



NEW HOLLAND

E 265

E 305

NEW HOLLAND KOBELCO

Operation and
Maintenance
Instruction
Manual

 **NEW HOLLAND**

PROVEN PERFORMANCE

**WARNING*****Read this manual before operating the machine***

Most accidents occurring during work are due to non-observance of simple safety norms and elementary precautions.

*Many accidents can be avoided if the causes are known and opportune cautions taken beforehand.
There is no device or protection, no matter how advanced, that may prove so effective at avoiding accidents as a careful and attentive behaviour.*

**WARNING**

Ensure that the attachment is safely resting onto the ground before repairing, adjusting or servicing machines fitted with hydraulically, mechanically or cable controlled attachments (such as, excavators, loaders, dozers, scrapers, etc.). Should it be necessary to partially or fully raise the hydraulically, mechanically or cable controlled attachment to gain access to certain items, make sure the attachment is adequately retained in the raised position by means other than the hydraulic lift cylinders, cables and/or mechanical devices used for controlling it.

| | |
|---------------------------|-------------------------------|
| MACHINE SERIAL NO. | |
| ENGINE TYPE - E265 | CNH U.K. 667TA/EEG |
| ENGINE TYPE - E305 | CNH U.K. 667TA/EEC |
| ENGINE SERIAL NO. | |
| NOTES | |

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E265

E305

(Tier 3)

Operation and Maintenance Instruction Manual

Print No. 604.35.484.00



WARNING

READ THIS MANUAL CAREFULLY BEFORE STARTING, OPERATING, SERVICING. REFUELLING
OR CARRYING OUT ANY OTHER WORK ON THE MACHINE



*This symbol is your alert sign and is specifically intended for safety purposes.
It means: **ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED.***



*Read and comply with all precautionary statements following the key-words **DANGER, WARNING** and **CAUTION.***



*Machine-mounted safety signs are colour coded yellow with black borders and lettering when they refer to points where special **ATTENTION** must be paid as an **ACCIDENT** may occur. They are white with red borders and black lettering when they refer to a **FORBIDDEN** practice.*

IMPORTANT: *Data contained in this manual was current at the time of publication. It is the Manufacturer's policy to constantly improve its products and such changes may affect information herein. If variances are observed, contact your Dealer and After-Sales Service.*

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S - SAFETY PRECAUTIONS





SAFETY PRECAUTIONS

GENERALITIES

Read the Operation and Maintenance Instruction Manual carefully before starting, operating, maintaining, fuelling or servicing the machine.

Carefully read the explanation to each and all safety signs in the special section of this Manual before starting, operating, maintaining, fuelling or servicing the machine.

Machine-mounted safety plates are colour coded yellow with black borders when they refer to points where special **ATTENTION** must be paid and failure to observe them may cause a serious **DANGER** to the integrity of machine operators. They are white with red borders and black lettering when they refer to a **FORBIDDEN** practice.

It is fundamental that all machine operators know very well the meaning of each safety plate as this considerably decreases operating hazards and accidents.

Do not allow unauthorised personnel to operate or service this machine.

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, non-slip footwear, heavy gloves, ear protection, safety glasses, reflector vests, respirators every time the job requires it. Ask your employer about safety regulations in force and protective equipment.

Always keep the operator's compartment, step plates, grab-rails and handles clean and 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.

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.

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.

Never operate the machine or its attachments from any position other than sitting in the driver's seat. Keep head, body, limbs, hands and feet inside the operator's compartment at all times to reduce exposure to external hazards.

Be careful of possible slippery conditions of the steps and hand rails as well as of the ground around the machine. Wear protective boots or shoes with the soles made of highly non-slip rubber

Do not leave the machine until it has come to a complete stop.

Always check height, width and weight limitations which may be encountered in the working site and ensure the machine does not exceed them.

Assess exact paths of gas ducts, water mains, telephone lines, sewers, overhead and underground electric lines and all other possible obstacles.

Such paths should be opportunely defined by competent Authorities. If necessary, require that the service is interrupted or said installations are moved prior to starting the work.

You must know the working capacity of the machine.

Define the rear upperstructure swing area and provide for opportune barriers to prevent access into it.

Never exceed machine lifting capacity.

Remain within the limits shown in the loading capacity chart which is located on the machine.

STARTING

Never start or operate a failed machine. Walk all around the machine before mounting.

Before operating the machine, make sure that any possible dangerous condition has been properly removed. Before starting machine, check that steering and attachment controls are in the neutral position and the safety lever is in the LOCK position. Immediately report any malfunction of parts or systems to the maintenance managers for proper action.

Prior to starting the engine, check, adjust and lock the driver's seat for maximum riding comfort and control accessibility. Prior to operating the machine and/or its attachments, check that bystanders are outside the machine operating range. Sound the horn.

Obey all hand signals, safety indications and signs.

Due to the presence of flammable fluids, never check fuel level, refuel, charge the batteries in the presence of smoking materials, open flames or sparks.

Ensure that nobody is within the excavator operating area before starting the machine, swinging the upper structure or moving in any direction.

Adjust all rear-view mirrors for maximum visibility of the area behind the machine.

Ensure that engine speed is appropriate to the job to be carried out.

If any hydraulic control or system exhibits erratic performance or responds abnormally, have the machine checked for air in the system.

Air in these circuits may cause incorrect movements with consequent accident hazard. Refer to the Operation and Maintenance Instruction Manual about corrective action to be taken.



SAFETY PRECAUTIONS

OPERATING

Do not run the engine of this machine in closed buildings without proper ventilation capable to remove harmful exhaust gases which concentrate in the air.

Keep the operator's compartment free of foreign objects, especially if not firmly secured. Never use the machine to transport objects, unless proper securing points are provided.

Do not carry riders on the machine.

Study and familiarise with escape routes alternative to normal exit routes.

For your personal safety, do not climb on or off the machine while it is in motion.

Make sure that bystanders are clear of the machine operating range before starting the engine and operating the attachment. Sound the horn.

Obey all hand signals, safety indications and signs.

When backing, always look to where the machine is to be moved. Be alert of the position of bystanders. Should someone enter the work area, stop the machine.

Maintain a safe distance from other machines or obstacles to ensure required visibility conditions.

Always give way to loaded machines.

Maintain a clear vision of the surroundings of the travel or work area at all times.

Keep cab windows clean and repaired.

When pulling loads or towing through a cable or chain, do not start suddenly at full throttle. Take-up slack carefully.

Avoid kinking or twisting chains or cables.

Carefully inspect the towing items for flaws or problems before proceeding.

Do not pull through a kinked chain or cable as the high anomalous stresses existing in this condition may induce failures in the kinked portion.

Always wear heavy gloves when handling chains or cables.

Chains and cables should be securely anchored using suitable hooks. Anchor points should be strong enough to withstand the expected load.

Keep anyone clear of anchor points and cables or chains.

Do not pull or tow unless the operator's compartments of the machines involved are properly protected against possible backlash in case of cable or chain failure or detachment.

Be alert of soft ground conditions close to newly constructed walls. The fill material and machine weight may cause the wall to collapse under the machine.

In darkness, check area of operation carefully before moving in with the machine. Use all lights provided. Do not move into low visibility areas.

If the engine tends to slow down and stall for whatever reason under load or at idle, immediately report this problem to the maintenance managers for proper action. Do not operate the machine until this condition is corrected. Regularly check all exhaust system components, as exhaust fumes are toxic for the operator.

Operators must know the performance of the machine they are driving.

When working on slopes or near sudden level drops in the terrain, pay attention not to lose adherence and avoid loose soft ground since overturn or loss of machine control could result.

If noise level is high and exceeds 90 dB (A) over 8 hours at the operator's ear, wear approved ear protection in compliance with local regulations.

Do not operate the machine if you are extremely tired or feel ill.

Be especially careful towards the end of the working shift. Where removable counterweights are provided, do not operate the machine if they have been removed.

When operating the machine, keep in mind height limits of overhead doors, arches, overhead cables and lines as well as width limits of corridors, roads and narrow passages. Also, get to know load limits of the ground and paving type of the ramps you are to work on.

Beware of fog, smoke or dust that obscure visibility.

Always inspect the working area to identify potential risks such as: inclines, overhangs, trees, demolition rubble, fires, ravines, steep slopes, rough terrain, ditches, crowns, ridge trenches, diggings in traffic areas, crowded parking lots, crowded service areas, fenced zones. In such conditions, proceed with extreme care.

Whenever possible, avoid crossing over obstacles such as very rough terrain, rocks, logs, steps, ditches, railroad tracks. When obstructions must be crossed, do so with extreme care and at a square angle, if possible. Slow down. Ease up to the break-over point, pass the balance point slowly and ease down the other side also using the attachment, if necessary.

To overcome deep trenches or sinking ground, place the machine perpendicular to the obstacle, drastically reduce ground speed and start crossing using also the attachment if necessary, only after assessing that ground conditions allow the traverse safely and without risks.

The gradient you may attempt to overcome is limited by factors such as ground conditions, load being handled, machine type and speed, and visibility.

There is no substitute for good judgement and experience when working on slopes.

Avoid operating the attachment too close to an overhang or high wall, either above or below the machine. Beware of caving edges, falling objects and landslides. Remember that such hazards are likely to be concealed by bushes, undergrowth and such.

Avoid faggots, bushes, logs and rocks. Never drive over them, nor over any other surface irregularities that discontinue adherence or traction with the ground, especially near slopes or drop-offs.

Be alert to avoid changes in adherence conditions that could cause loss of control. **Work with extreme care** on ice or frozen ground and on stepped slopes or near drop-offs.



SAFETY PRECAUTIONS

The word “bulldozing” generally refers to work in virgin rough terrain, characterised by the presence of all the perils and risks listed above. We emphasise the danger represented in these conditions by large tree limbs (possibly falling on the machine) and large roots (which may act as a leverage under the machine when up-rooted and cause the unit to overturn).

Position the machine dependent upon the loading and unloading areas in order to swing leftwards to load to obtain best visibility.

Never use the bucket or attachment as a man lift or carry riders. Never use the machine as a work platform or scaffolding. The machine must not be improperly used for works not consistent with its features (such as pushing railway cars, trucks or other machines).

Always pay attention to people within the machine operating range.

Never move or stop the bucket, other loads or the attachment above ground personnel or truck cabs.

Ensure the truck driver is in a safe place before loading the truck.

Load trucks from side or rear.

Use only the type of bucket recommended considering machine type, materials to be handled, material piling up and loading characteristics, ground type and other typical conditions of the work to be performed.

When transporting a loaded bucket, keep it as rolled-back as possible. Keep boom and arm as low as possible.

Ground speed should be adequate to the load and ground conditions.

The load must always be properly arranged in the bucket; move with extreme care when transporting oversize loads. Do not lift and move the bucket overhead where persons are standing or working, nor downhill when working on a slope as this would decrease machine stability. Load the bucket from the uphill side.

Loads to be raised using the machine should be exclusively hooked to the hitch specially provided.

The excavator is no lifting and transportation means, therefore it should not be used to position loads accurately. Should it be exceptionally used to lift and lay building components, special caution must be taken as follows:

- The machine must be equipped without failure with the appropriate variant supplied, upon request. Also, totally comply with the safety precautions for the operation of the excavator as a lifting equipment.
- Secure the loads to be raised using cables or chains fastened with appropriate hooking mechanisms.
- Nobody should be allowed to remain under the raised load or within the excavator operating range for any reason whatever.

Never exceed specified loading capacity. Incorrect fastening of slings or chains may cause boom/arm failure or failure of the lifting means with consequent bodily injuries and even death.

Always ensure that slings and chains used for lifting are adequate to the load and in good condition.

All loading capacities are referred to the machine on a level surface and should be disregarded when working on a slope.

Avoid travelling across slopes. Proceed from uphill downhill and vice-versa. If machine starts slipping sideways when on a slope, lower the bucket and thrust bucket teeth into the ground.

Working on slopes is dangerous. Grade the working area if possible. Reduce work cycle time if it is not possible to grade the working area.

Do not move full bucket or a load from uphill downhill as this would reduce machine stability. Do not work with the bucket turned to the uphill side.

Do not work with the bucket turned uphill as counterweights protruding downhill would reduce machine stability on the slope and increase risk of overturning.

We recommend to work on slopes with the bucket downhill, after checking machine stability with the bucket empty and attachment retracted, by slowly swinging the upper structure by 360°.

Position the carriage at a right angle relative to slopes, hanging walls, etc. to exit the working area easily.

Standard use, provides for the travel controls at the front and travel motors at the back. Should travel motors be positioned at the front with regard to the actual travel direction. Remind relative to travel direction that controls are reversed.

Always check travel motor position before moving off.

Properly judge ground conditions with particular attention to consistency of the area you are going to work on. Keep the machine sufficiently far from the ditch edge.

Never dig under the machine.

Should it be necessary to dig under the machine, always ensure that digging walls are opportunely propped up against landslide to prevent the machine from falling into the trench.

Do not swing the upperstructure, raise the load or brake abruptly if not required. This may cause accidents.

Prior to beginning the work near gas distribution mains or other public utilities:

- Contact the company owner of the gas mains or its nearest branch before starting the work. Look up the number in the telephone directory.
- Define together which precautions should be taken to guarantee work safety.
- Decrease work speed. Reaction time could be too slow and distance evaluation wrong.



SAFETY PRECAUTIONS

- When working near gas mains or other public utilities installations, appoint a person in charge of signalling duties. This person will have the responsibility of observing the machine, any part of it and/or the load approaching the gas mains from a standpoint more favourable than the Operator's. This signal man (flag-man) must be in direct communication with the Operator and the Operator must pay undivided attention to the signals supplied.
- The gas distributing Company, if previously advised and involved in the work, as well as machine Operator, Owner and/or any natural person or legal entity having rent or leased the machine or being responsible at the time by contract or by law, are liable for the adoption of the necessary precautions.

Working near electric lines can be very dangerous, therefore some special precautions must be observed. Within this Manual, "work near electric lines" means when the attachment or load raised by the excavator (in any position) may reach the minimum safety distance established by local or international Safety Regulations. To work without risks, keep maximum possible distance from electric lines and never trespass minimum safety distance.

- Contact the Company owner of the electric lines or its nearest branch before starting the work. Look up the in the telephone directory.
- Define together with the Company representative which precautions should be taken to guarantee work safety.
- All electric lines should be considered as operative live lines even though it might be well known that the line in question is out of work and visibly connected to the ground.
- The Electric Power Company, if previously advised and involved in the work, as well as machine Operator, Owner and/or any natural person or legal entity having rent or leased the machine or being responsible at the time by contract or by law, are liable for the adoption of the necessary precautions.
- Decrease work speed. Reaction time could be too slow and distance evaluation wrong.
- Warn all ground personnel to keep clear of the machine and/or load at all times. If the load has to be guided down for laying, consult the Electric Power Company to know which precautions should be taken.
- Appoint a person in charge of signalling duties. This person will have the responsibility of observing

the machine, any part of it and/or the load approaching the electric lines from a standpoint more favourable than the Operator's. This signal man (flag-man) must be in direct communication with the Operator and the Operator must pay undivided attention to the signals supplied.

When working in or near pits, in ditches or very high walls, check that the walls are sufficiently propped up to avoid cave-in hazards.

Pay the utmost attention when working near overhang walls or where landslides may take place. Make sure that the support surface is strong enough to prevent landslides.

When digging, there is the risk of cave-ins and landslides. Always check ground conditions and conditions of the material to be removed. Support everywhere it is required to prevent possible cave-ins or landslides when:

- digging near previous trenches filled with material
- digging in bad ground conditions
- digging trenches subject to vibration from railroads, working machines or highway traffic.

STOPPING

When the machine is to be stopped for whatever reason, always check that all controls are in the neutral position and that the safety lever is on the lock position to guarantee risk-free start-up.

Never leave the machine unattended with the engine running.

Prior to leaving the driver's seat, and after making sure that all people are clear of the machine, slowly lower the attachment until resting it safely to the ground. Retract possible auxiliary tools to the closed safety position.

Check that all controls are in the neutral position. Move engine controls to the shut-down position. Switch off the key-start switch. Consult the Operation and Maintenance Instruction Manual.

Park the machine in a non-operating and no-traffic area. Park on firm level ground. If this is not possible, position the machine at a right angle to the slope, making sure there is no danger of uncontrolled sliding.

If parking in traffic lanes cannot be avoided, provide appropriate flags, barriers, flares and other signals as required to adequately warn the oncoming drivers.

Always switch off the key-start switch before cleaning, repairing, or parking the machine to prevent accidental unauthorised start-up.

Never lower the attachment or auxiliary tools other than from sitting in the operator's seat. Sound the horn. Make sure that nobody is within the machine operating range. Lower the attachment slowly.



SAFETY PRECAUTIONS

Securely block and lock the machine every time you leave it unattended. Return keys to the safe place previously agreed upon. Perform all necessary operations for stopping as detailed in the Operation and Maintenance Instruction Manual.

Drive the machine far from pits, trenches, rocky hanging walls, areas with overhead electric lines, and slopes before stopping it at the end of the working day.

Align the upperstructure to the tracks in order to allow to easily get on and off the driver's compartment.

Move all controls to the position specified for machine stopping. Refer the Operation and Maintenance Instruction Manual.

Never park on an incline without accurately blocking the machine to prevent unexpected movement.

Follow stopping instructions contained in the Operation and Maintenance Instruction Manual.

MAINTENANCE

GENERALITIES

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 repair or service the machine.

Follow all recommended maintenance and service 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, non-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. Clean mud or grease from your shoes before climbing on the machine or driving it.

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



SAFETY PRECAUTIONS

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.

Never align holes or slots using your fingers; always use appropriate aligning tools.

Remove all sharp edges and burrs from re-worked parts. Use only approved and effectively 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.

Use lifting eyes provided to this aim.

Pay attention to bystanders near the lifting area.

Never pour gasoline or diesel fuel into open containers. Never use gasoline, solvents or other flammable fluids to clean parts. Use proprietary certified non-flammable, non-toxic solvents only.

When using compressed air to clean parts, wear safety glasses with side shields. Limit pressure to max. 2 bars, in accordance with local and national safety regulations in force.

Do not run the engine of this machine in closed buildings without proper forced ventilation capable to remove toxic exhaust gases concentrating in the air.

Do not smoke, nor allow open flames or sparks nearby while refuelling the unit or handling highly flammable materials.

Do not use open flames as light sources to look for leaks or inspect anywhere on the machine.

Make sure that all mechanical tools provided are in good condition at all times. Never use tools with mushroomed or damaged heads. Always wear eye protections with side shields.

Move with extreme care when working under, on or near the machine or its attachments.

In case of attachment tests during which the engine should be kept running, a qualified operator must sit in the driver's seat at all times while the mechanic is at work.

Keep hands and clothes far OFF moving parts.

Stop the engine and move the safety lever to the lock position before starting adjusting or repairing an assembly.

Do not carry out any work on the attachment without prior authorisation. Observe maintenance and repair procedures.

In case of field service, move the machine to level ground and block it. If work on an incline cannot be avoided, securely block the machine and its attachments. Move the machine to level ground as soon as possible. Do not twist chains and cables. Never use a twisted chain or cable for lifting or pulling. Always wear safety gloves to handle chains or cables.

Be sure chains and cables are firmly fastened and that the anchor point is strong enough to withstand the expected load. Keep all bystanders clear of the anchor point, cables or chains. **Do not pull or tow unless the operator's compartments of the machines involved are fitted with proper guards against cable or chain backlash.**

Keep the maintenance area clean and dry at all times.

Clean immediately all water and oil spillage.

Do not pile up oily or greasy rags as they represent a major fire hazard. Always store them in closed metal containers.

Before starting the machine or its attachment, check, adjust and lock the operator's seat. Also ensure that nobody is within the machine or attachment operating range before starting or operating the machine and/or its attachments.

Sound the horn.

Rust inhibitors are volatile and flammable.

Prepare parts in well ventilated areas. Keep open flames away.

Do not smoke.

Store containers in a cool well ventilated place where they could not be reached by unauthorised people.

Do not carry loose objects in your pockets that might fall unnoticed into open compartments.

Wear appropriate safety clothing such as hard hat, safety shoes and gloves, safety glasses when splinters or other particles may be ejected.

Wear the appropriate welder's equipment such as dark safety glasses or mask, hard hat, protective clothing, safety gloves and footwear always while welding or arc-cutting.

Wear dark safety glasses when you are near a welding in progress.

Do not look the welding arc without proper eye protection.

Become acquainted with all your jacking equipment and their capacity.

Ensure that the jacking point on the machine is appropriate for the load applied. Also, be sure the supports under the jack and between the jack and the machine are appropriate and stable.

Any equipment supported by a jack represents a possible hazard. Always support the load onto appropriate blocking means as a safety measure before proceeding with service or maintenance work, in compliance with local or national safety regulations.

Metal cables produce steel splinters. Always wear certified protection clothes such as safety gloves and glasses while handling them.

Do not use makeshift jacks to adjust track sag. Follow instructions given in the Repair Manual.

Handle all parts carefully. Keep hands and fingers away from gaps, gears, and similar. Always use and wear certified safety clothes such as safety glasses, gloves and footwear.



SAFETY PRECAUTIONS

The attachment is kept constantly in position by an oil column trapped into the high pressure circuit. Lower the attachment to the ground and relieve pressure from all circuits prior to carrying out any type of maintenance or repair work.

Do not service or repair the machine if it is parked downhill. If this is unavoidable, in case of emergency, block the carriages to prevent unexpected movement, particularly if the work is to be carried out on the final reduction units or travel motors.

Consult the Operation and Maintenance Instruction Manual for correct maintenance procedure.

Areas near articulated cutting edges where mechanical parts are in motion are where personal injuries are most likely to occur. Pay attention to prevent possible part movements by means of blocks or by keeping clear of such zones when motion may take place during maintenance or repair.

Move the hydraulic system lock safety lever to the lock position when stopping the machine for whatever reason. Always install the safety stays for the hood and other hinged covers before performing any maintenance or repair work in the engine compartment.

TRANSFERS AND TRANSPORTATION

Before moving or transporting the machine, block upperstructure swing to prevent accidental movement.

Pay particular attention during transfer on inclines, both uphill and downhill. Keep the bucket in a position to provide a possible anchor point into the ground in case of slipping.

During transfers on inclines, both uphill and downhill, keep the upperstructure aligned with the carriages. Do not travel across the slope.

Never transfer the machine in the working site, in a crowded area, or near people without having at least one person charged with hand-signals who could guide the Operator.

Sound the horn to inform that you are about to move off. It is necessary to know load limits of bridges and dimensional limits of tunnels. Such limits must never be exceeded. You should also know machine height, width, and weight. Have a signal-man help you when clearances are limited.

Check distance between boom/arm and dimensional limits during transfer or transportation.

Rough terrain may cause the machine to sway and roll to such an extent that boom/arm could get to contact electric lines or other obstacles. Cross obstacles at a right angle at low speed. Pay attention to machine shaking when the centre of gravity overcomes the obstacle.

Keep the bucket down at all times during transfers.

Drive with the lights on and use appropriate signals and flags.

Get to know and respect local and national regulations. Consider boom/arm and upperstructure dimensions while turning.

Use a ramp to load the machine on a trailer. If a ramp is not available, fabricate one using blocks. The ramp should be sufficiently strong to support machine weight. Always load and unload on level surface.

Tow the machine following the instructions contained in the Operation and Maintenance Instruction Manual.

ENGINE

Do not run the engine in closed buildings without proper ventilation capable to remove harmful exhaust fumes.

Do not place head, body, limbs, feet, hands or fingers near rotating fans or belts. Be especially careful near blower fans.

Loosen the radiator cap very slowly to relieve system pressure before removing it. Always top-up coolant level with the engine off or idling if hot. See the Operation and Maintenance Instruction Manual.

Keep the exhaust manifold and tube free from combustible matters. Fit the machine with shields and guards when working in the presence of combustible matter free in the air.

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

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

Do not adjust the fuel injection pump when the machine is operating.

Do not lubricate the machine with the engine running.

Do not run the engine with the air intakes open and not protected. If this cannot be avoided for service reasons, place protection meshes on all intakes before servicing the engine.

ELECTRICAL SYSTEM

Pay attention to connect connecting cables to correct poles (+ to +) and (- to -) at both ends. Do not short-circuit terminals. Thoroughly follow instructions given in Operation and Maintenance Instruction Manual.

Always move the key-start switch in the lock position before servicing or repairing the machine.



SAFETY PRECAUTIONS

Batteries contain SULPHURIC ACID. Protect the eyes when working near the batteries against possible sprays of the acid solution. Should acid contact skin, eyes, or clothes, RINSE IMMEDIATELY IN WATER FOR AT LEAST 15 MINUTES. Immediately seek medical attention.

Battery released gas is highly flammable. Leave the battery compartment cover open during recharging to improve ventilation. Never check battery charge by placing metal objects across the posts. Keep sparks or open flames away from batteries. Do not smoke near the battery to prevent explosion hazard.

Before any maintenance or repair, make sure that there are no fuel or electrolyte leaks from the batteries. If any, correct prior to proceeding with further work. Do not recharge batteries in confined spaces. Ensure proper ventilation is provided to avoid accidental explosions due to build-up of explosive gas released during charging.

Disconnect batteries before working on the electrical system or carrying out any other type of work.

HYDRAULIC SYSTEM

Pressure fluid escaping from a very small hole can be almost invisible and still have sufficient force to penetrate the skin. Always check any suspected pressure leaks using a piece of cardboard or wood.

Do not use hands. If injured by escaping fluid, obtain medical attention immediately or serious infection or reaction may develop. Stop the engine and ensure pressure is relieved from all systems before removing side panels, housings, guards and covers. See the Operation and Maintenance Instruction Manual.

Always use gauges of adequate capacity for pressure testing. Refer to the Operation and Maintenance Instruction Manual or Repair Manual.

TOOLS

Always keep head, body, limbs, feet, hands, and fingers away from the bucket and attachments, when in the raised position.

Prior to any maintenance or repair work, install all supports necessary to this aim according to local and national safety regulations.

In case the attachment is to be operated for maintenance or repair purposes, do so exclusively while sitting in the driver's seat. Sound the horn before starting the machine or moving the attachment. Require that nobody remain near the machine. Raise the attachment slowly.

Do not use the machine to transport loose objects, unless proper securing devices are provided.

Never use gases other than nitrogen to charge the accumulators.



SAFETY PRECAUTIONS

RECOGNISE SAFETY INFORMATION

- This is your **SAFETY ALERT SYMBOL**.
 - When you see this symbol on your machine or in this Manual, be alert of the potential for personal injury.
 - Follow recommended precautions and safe operating practices.



S0021

UNDERSTAND SIGNAL WORDS

- In this Manual you will find the following words:
 - **DANGER;**
 - **WARNING;**
 - **CAUTION.**

referring to different hazard risks.

These words are always accompanied by the safety alert symbol.

DANGER: indicates an imminent hazardous situation which, if not avoided, will result in death or serious injury.

WARNING: indicated a potential hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION: indicates a potential hazardous situation which, if not avoided, may result in minor or moderate injury.

IMPORTANT: indicates a situation which, if not avoided, may cause damage to the machine.

NOTE: indicates an additional explanation for information purposes.



DANGER



WARNING



CAUTION

IMPORTANT

NOTE

ENVIRONMENTAL PROTECTION

- This Manual also contains this symbol accompanying instructions for correct behaviour as regards environmental protection.



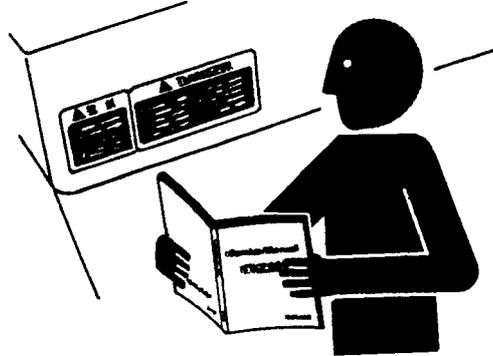
S0024



SAFETY PRECAUTIONS

FOLLOW SAFETY PRECAUTIONS

- Carefully read and observe all safety signs on the machine and read all safety precautions in this Manual.
- Safety signs should be installed, maintained, and replaced when necessary.
 - If a safety sign or this Manual are damaged or missing, obtain a replacement from your Dealer in the same way you order a spare part (be sure to detail machine model and serial number upon ordering).
- Learn how to operate the machine and its controls correctly and safely.
- Allow only trained, qualified, authorised personnel to operate the machine.
- Keep the machine in proper working conditions.
 - Unauthorised changes to the machine may impair function and/or safety and affect machine life.
- Safety messages in this Chapter “**SAFETY PRECAUTIONS**”, are intended to illustrate basic safety procedures of the machine. However, it is impossible for these safety messages to cover every hazardous situation you may encounter. If you have any doubts, consult your direct supervisor prior to operating or servicing the machine.



S0022

PREPARE FOR EMERGENCIES

- Be prepared if a fire starts or an accident occurs.
 - Keep the first-aid kit and fire extinguisher on hand.
 - Thoroughly read and understand the label attached to the fire extinguisher to use it properly.
 - Establish emergency priority procedures to cope with fires and accidents.
 - Keep emergency numbers for doctors, ambulance service, hospitals and fire department posted near the telephone.



S0023



SAFETY PRECAUTIONS

WEAR PROTECTIVE CLOTHING

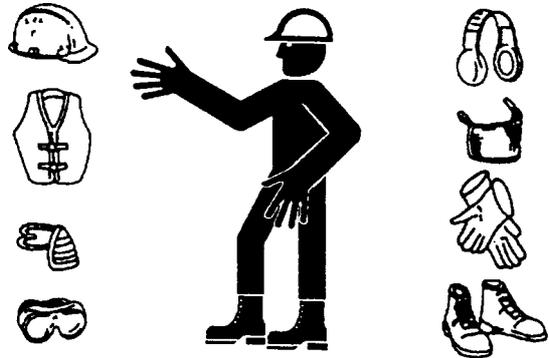
- Wear close-fitting clothing and safety equipment appropriate to the job.

You need:

- A hard hat;
- Safety shoes;
- Safety glasses or face shield;
- Heavy gloves;
- Ear protection;
- Reflective clothing;
- Waterproof clothing;
- Respirator or filter mask;

Be sure to correctly wear equipment and clothing for the job.

- Do not take any chances.
 - Avoid wearing loose clothing, jewellery, or other items that can catch on control levers or other parts of the machine.
- Operating equipment safely requires the full attention of the operator. Do not wear radio or music headphones while operating the machine.



S0025

PROTECT AGAINST NOISE

- Prolonged exposure to loud noise can cause impairment or loss of hearing.
- Wear a suitable hearing protection such as earmuffs or earplugs to protect objectionable or uncomfortably loud noise.



S0026

INSPECT THE MACHINE

- Inspect the machine carefully every day or work-shift by an attentive visual inspection of machine outside prior to starting it to prevent damages and personal injuries.
- In the walk-around inspection, be sure to cover all points detailed in the Chapter “**MAINTENANCE**”, paragraph “**EXTERNAL VISUAL INSPECTION**”.



S0027



SAFETY PRECAUTIONS

USE HAND HOLDS AND STEPS

- Falling is one of the major causes of personal injury.
 - When you get on and off the machine, always face the machine and maintain a three-point contact with the steps and handrails.
 - Do not use any control as a handhold.
 - Never jump off the machine. Never get on and off a moving machine.
 - Be careful of slippery conditions of platforms, steps, and handrails when leaving the machine.



S0028

ADJUST THE OPERATOR'S SEAT

- A seat poorly adjusted for operator or work requirements may quickly fatigue the operator leading to improper operations.
 - The seat should be adjusted whenever machine operator changes.
 - The operator should be able to fully press the pedals and correctly move the control levers with his back resting against the seat back.
 - If not, move the seat fore and aft, and check again.



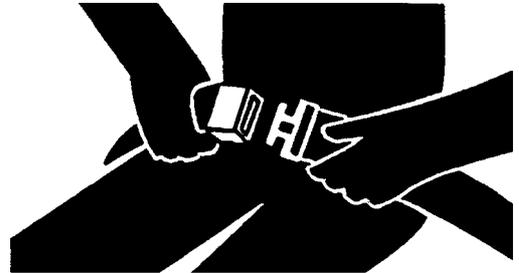
S0029



SAFETY PRECAUTIONS

FASTEN SEAT BELT

- Should the machine overturn, the operator may become injured and/or thrown from the cab. Not only, the operator may be crushed by the overturning machine resulting in serious injury or even death.
- Prior to operating the machine, thoroughly examine belt webbing, buckle, and attaching hardware. If any item is damaged or worn, replace the seat belt or component before operating the machine.
- Be sure to remain seated with the seat belt securely fastened at all times when the machine is in operation to minimise injury hazard in case of accident.
- After a significant accident, replace the seat belts even though they do not look damaged.



S0030

MOVE AND OPERATE MACHINE SAFELY

- Bystanders can be run over.
- Pay the utmost attention not to run over bystanders.
- Be sure and aware of the location of bystanders before moving, swinging or operating the machine.
- If fitted, keep the travel alarm and horn sounding to warn people that the machine is about to move.
- When operating, swinging, or moving the machine in a congested area use a signal man.
- Co-ordinate hand signals before starting the machine.



S0031



SAFETY PRECAUTIONS

OPERATE ONLY FROM THE DRIVER'S SEAT

- Inappropriate engine starting procedures may cause the machine unexpected movement, possibly resulting in serious injury and even death.
 - Start the engine only from the operator's seat.
 - **NEVER** start the engine while standing on the track or on the ground.
 - Do not start the engine by shorting across starter motor terminals.
 - Before starting the engine, ensure that all control levers are in the neutral position.



S0032

DONT CARRY RIDERS ON THE MACHINE

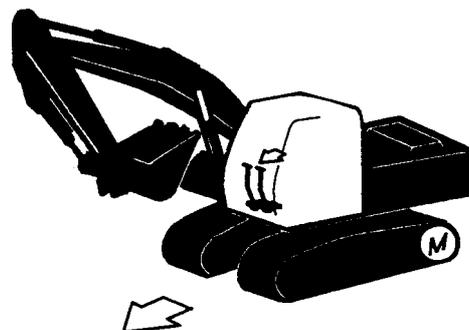
- Riders on the machine are subject to injuries such as being struck by foreign objects and being thrown off the machine.
 - Only machine operator is allowed on the machine. Keep riders off.
 - Riders also obstruct the operator's visibility, resulting in the machine being operated **unsafely**.



S0033

CONFIRM DIRECTION WHERE THE MACHINE IS TO BE DRIVEN

- Incorrect travel controls operation may result in serious injury and even death.
 - Before driving the machine, be aware of the undercarriage position relative to the operator's position. If travel motors are located at the front of the cab, the machine will move reverse when travel controls are moved towards cab front.



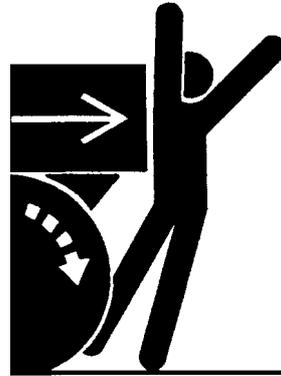
S0037



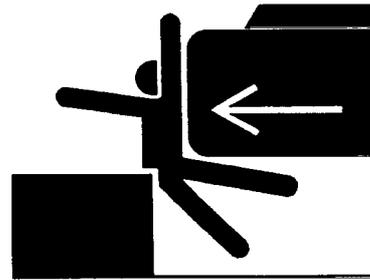
SAFETY PRECAUTIONS

AVOID INJURY FROM BACK-OVER AND SWING ACCIDENTS

- If any person is present near the machine when backing or swinging the upperstructure, the machine may hit or run over that person, resulting in serious injury or death.
- To avoid back-over and swing accidents:
 - Always look around **BEFORE YOU BACK UP AND SWING THE MACHINE. BE SURE THAT ALL BYSTANDERS ARE CLEAR.**
 - Keep the travel alarm in working condition (if equipped).
 - **ALWAYS BE ALERT FOR BYSTANDERS MOVING INTO THE WORK AREA. USE THE HORN OR OTHER SIGNAL TO WARN BYSTANDERS BEFORE MOVING MACHINE.**
 - **USE A SIGNAL PERSON WHEN BACKING UP IF YOUR VIEW IS OBSTRUCTED. ALWAYS KEEP THE SIGNAL PERSON IN VIEW.**
 - Use hand signals, which conform to your local regulations, when work conditions require a signal person.
 - No machine motions shall be made unless signals are clearly understood by both signalman and operator.
 - Learn the meanings of all flags, signs, and markings used on the job and confirm with the person in charge of signalling.
 - Keep windows, mirrors, and lights clean and in good condition.
 - Dust, heavy rain, fog, etc., can reduce visibility. As visibility decreases, reduce speed and use proper lighting.
 - Read and understand all operating instructions in this operator's manual.



S0042



S0043



SAFETY PRECAUTIONS

DRIVE MACHINE SAFELY

- Before moving the machine, confirm which way to move travel pedals/levers for the corresponding direction you wish to go.

- Pushing down on the front of the travel pedals or pushing the levers forward moves the machine towards the idlers. (Refer to the **OPERATING INSTRUCTIONS** in this Manual).

- Traveling on a grade may cause the machine to slip or to overturn, possibly resulting in serious injury or death.

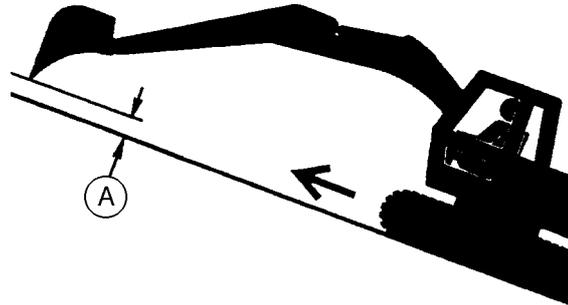
- When traveling up or down a grade, keep the bucket in the direction of travel, approximately 20 to 30 cm (A) above the ground.

- If machine starts to skid or becomes unstable, lower the bucket immediately.

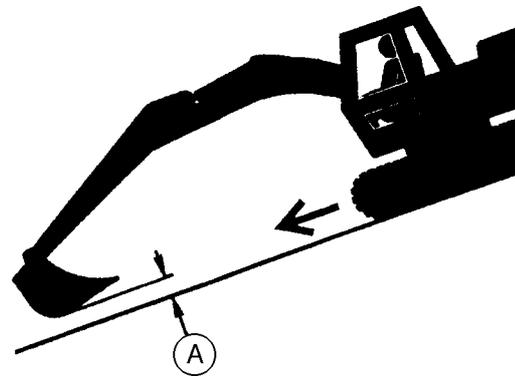
- Traveling across the face of a slope may cause the machine to skid or to overturn. When travelling (ascending/descending) on a slope, be sure to point the tracks uphill/downhill.

- Turning on an incline may cause the machine to tip over.

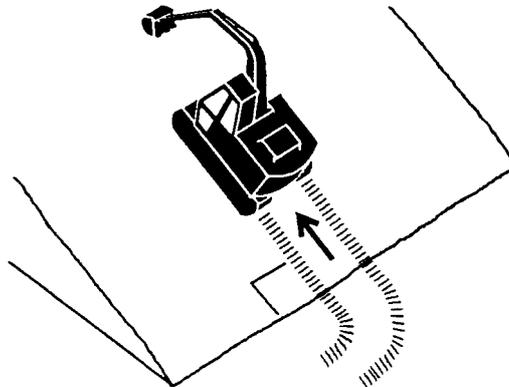
If turning on an incline is absolutely unavoidable, do so at a place where the slope is gentle and the surface is firm.



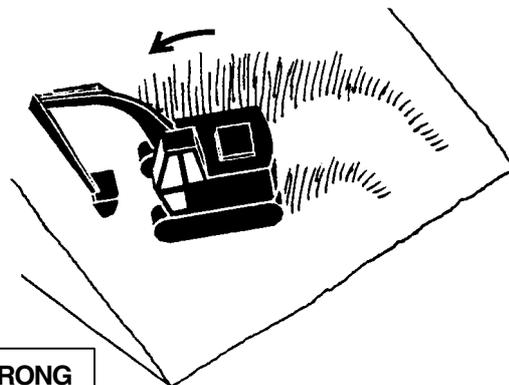
S0038



S0039



S0004



WRONG

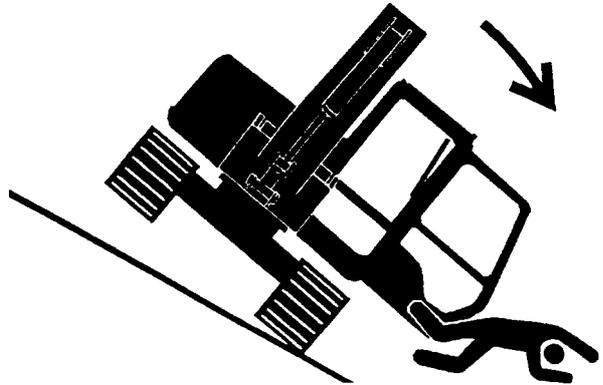
S0005



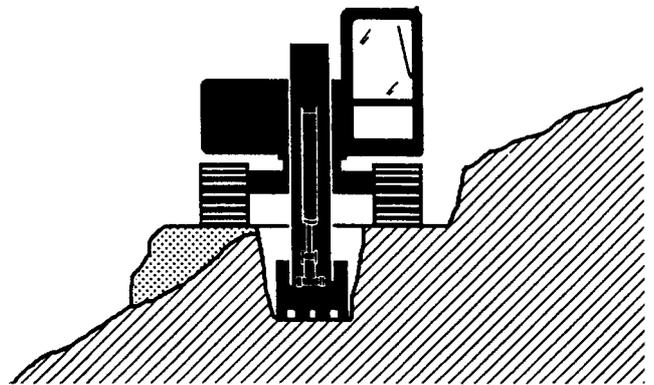
SAFETY PRECAUTIONS

AVOID OVERTURNING

- The danger of tipping is always present when operating on a grade, possibly resulting in serious injury or death.
- To avoid tipping:
 - Be extra careful before operating on a grade.
 - Prepare machine operating area flat by grading.
 - Keep the bucket low to the ground and close to the machine.
 - Reduce machine operating speed to avoid tipping or slipping.
 - Avoid changing direction when travelling on grades.
 - **NEVER** attempt to travel across a grade steeper than 15 degrees.
 - Reduce swing speed as necessary when swinging loads.
- Be careful when working on frozen ground.
 - Temperature increases will cause the ground to become soft and make ground travel unstable.



S0002



S0047

PARK MACHINE SAFELY

- To avoid accidents:
 - Park machine on a level surface.
 - Lower bucket to the ground.
 - Turn auto-idle switch off.
 - Run engine at slow idle speed without load for 5 minutes.
 - Turn key-start switch to **OFF** to stop engine.
 - Remove the ignition key from the key switch.
 - Pull the safety lever (pilot-control shut-off lever) to the **LOCK** position.
 - Close windows, roof window, and cab door.
 - Lock all access doors and compartments.



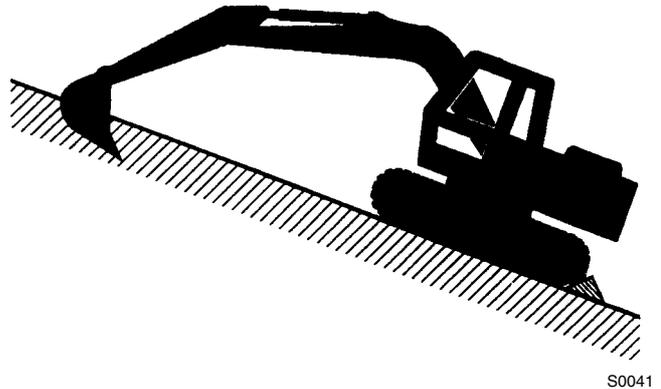
S0049



SAFETY PRECAUTIONS

AVOID INJURY FROM UNEXPECTED MACHINE MOVEMENT

- Death or serious injury may result if you attempt to get on or off a moving machine.
- To avoid roll-aways:
 - Select level ground when possible to park machine.
 - Do not park the machine on a grade.
 - Lower the bucket and/or other work tools to the ground. Thrust the bucket teeth into the ground if you must park on a grade.
 - Turn the auto-idle switch off.
 - Run the engine at slow idle speed without load for 5 minutes to cool down the engine.
 - Stop the engine and remove the key from the key switch.
 - Pull the safety lever (pilot control shut-off lever) to **LOCK** position.
 - Block both tracks.
 - Position the machine to prevent overturning.
 - Park a reasonable distance from other machines.



PROVIDE SIGNALS FOR JOBS INVOLVING A NUMBER OF MACHINES

- For jobs involving several machines, provide signals commonly known by all personnel involved. Also, appoint a signal person to co-ordinate the job site. Make sure that all personnel obey the signal person's directions.



S0036



SAFETY PRECAUTIONS

INVESTIGATE JOB SITE BEFORE HAND

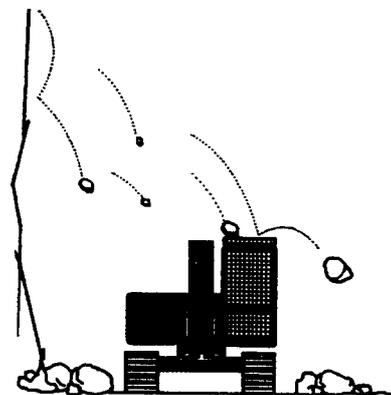
- When working at the edge of an excavation or on a road shoulder, the machine could overturn, possibly resulting in serious injury or death.
 - Investigate the configuration and ground conditions of the job site beforehand to prevent the machine from overturning and prevent the ground, stockpiles, or banks from collapsing.
 - Make a work plan. Use machines appropriate to the work and job site.
 - Reinforce ground, edges, and road shoulders as necessary. Keep the machine well back from the edges of excavations and road shoulders.
 - When working on an incline or road shoulder, employ a signal person as required.
 - Confirm that your machine is equipped with a **F.O.P.S.** (Falling Object Protective Structure) cab before working in areas where there is the possibility of falling stones or landslides.
 - When footing is weak, reinforce the ground before starting the work.
 - When working on frozen ground, be extremely alert. As ambient temperature rises, footing becomes loose and slipped.



S0034

PROTECT AGAINST FALLING STONES AND LANDSLIDES

- Confirm that your machine is equipped with a **F.O.P.S.** (Falling Object Protective Structure) cab before working in areas where there is the possibility of falling stones.



S0035



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, and water lines. If a fiber optic cable should be accidentally severed, do not look into the end. Doing so may result in serious eye injury.
 - Contact local authorities and/or the utility companies directly (electric power, gas, telephone, water, sewers, telecommunications, etc.) to obtain information about underground utility lines.



S0009

OPERATE WITH CAUTION

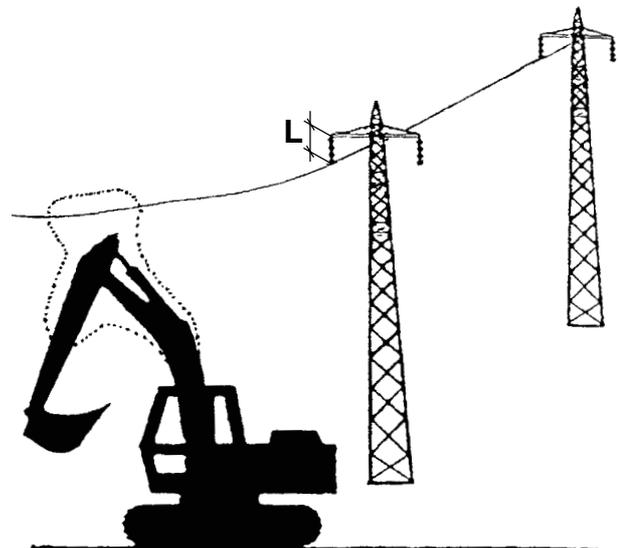
- If the front attachment or any other part of the machine hits against an overhead obstacle, such as a bridge, both the machine and the overhead obstacle will be damaged, and personal injury may result as well.
 - Take care to avoid hitting overhead obstacles with the boom or arm.



S0008

AVOID ELECTRIC LINES

- Serious injury or death can result if the machine or front attachments are not kept a safe distance from electric lines.
 - When operating near an electric line, **NEVER** move any part of the machine or load closer than 5 m plus twice the line insulator length (**L**).
 - Check and comply with any local regulations that may apply.
 - Wet ground will expand the area that could cause any person on it to be affected by electric shock.
 - Keep all bystanders or co-workers away from the site.



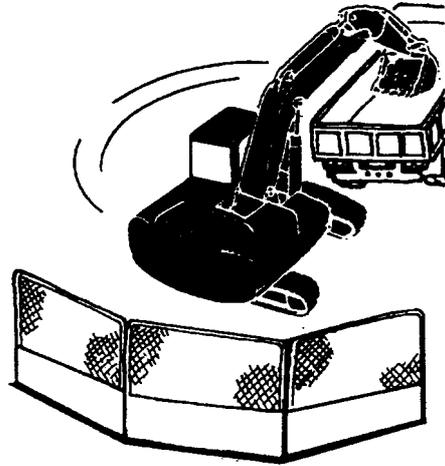
S0205



SAFETY PRECAUTIONS

KEEP PERSONNEL CLEAR FROM WORKING AREA

- A person may be hit severely by the swinging front attachment or counterweight and/or may be crushed against an other object, resulting in serious injury or death.
 - Keep all persons clear from the area of operation and machine movement.
 - Before operating the machine, set up barriers to the sides and rear area of the bucket swing radius to prevent anyone from entering the work area.



S0044

NEVER MOVE THE BUCKET OVER ANY ONE

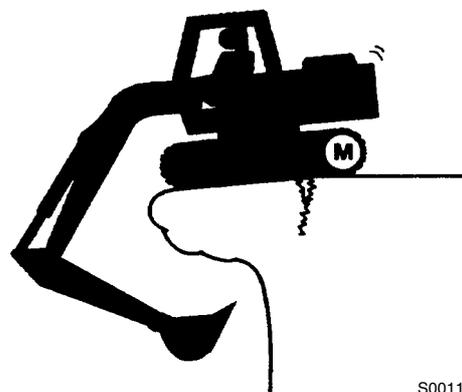
- Never lift, move, or swing bucket above anyone or a truck cab.
Serious injury or machine damage may result due to bucket load spill or due to collision with the bucket.



S0045

AVOID UNDERCUTTING

- In order to retreat from the edge of an excavation if the footing should collapse, always position the undercarriage perpendicular to the edge of the excavation with the travel motors at the rear.
 - If the footing starts to collapse and if sufficient retreat is not possible, do not panic. Often, the machine can be secured by lowering the front attachment, in such cases.



S0011



SAFETY PRECAUTIONS

NEVER UNDERCUT A HIGH BANK

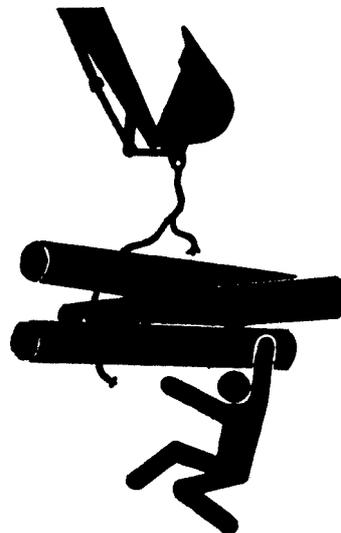
- The edges could collapse or a land slide could occur causing serious injury or death.



S0048

SAFETY LOADS MOVING

- The excavator is no lifting and transportation means, therefore it should not be used to position loads accurately. Should it be exceptionally used to lift and lay building components, special caution must be taken as follows:
 - The machine must be equipped without failure with the appropriate variant supplied, upon request. Also, totally comply with the safety precautions for the operation of the excavator as a lifting equipment.
 - Secure the loads to be raised using cables or chains fastened with appropriate hooking mechanisms.
 - Never hook cables or chains to the bucket teeth.
 - Nobody should be allowed to remain under the raised load or within the excavator operating range for any reason whatever.
 - Never exceed specified loading capacity. Incorrect fastening of slings or chains may cause boom/arm failure or failure of the lifting means with consequent bodily injuries and even death.
 - Always ensure that slings and chains used for lifting are adequate to the load and in good condition.
 - All loading capacities are referred to the machine on a level surface and should be disregarded when working on a slope.



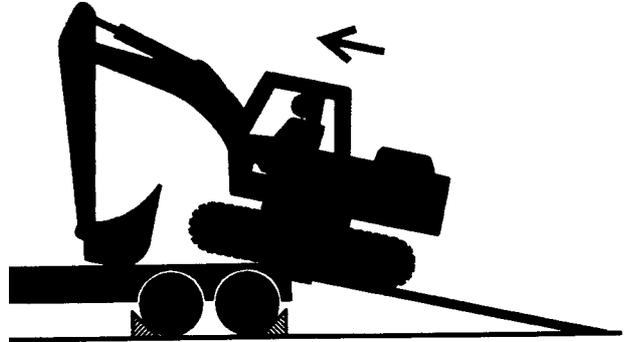
S0165



SAFETY PRECAUTIONS

SAFETY TRANSPORTING

- The danger of tipping is present when loading/unloading the machine onto/from a truck or trailer bed.
 - Be sure to observe local regulations when transporting the machine on public roads.
 - Provide an appropriate truck or trailer for transporting the machine.
- Take the following precautions when loading/unloading the machine:
 1. Select firm level ground.
 2. Be sure to use a loading dock or ramp.
 3. Be sure to have a signal person when loading/unloading the machine.
 4. Always turn the auto-idle switch **OFF** when loading or unloading the machine, to avoid unexpected speed increase due to unintentional operation of a control lever.
 5. Always select the slow speed mode with the travel speed selector. In the high speed mode, travel speed may automatically increase.
 6. Avoid steering while driving up or down the ramp as it is extremely dangerous. If steering is unavoidable, first move back to the ground or flatbed, modify travelling direction, and begin to drive again.
 7. Do not operate any levers besides the travel levers when driving up or down the ramp.
 8. The top end of the ramp where it meets the flatbed is a sudden bump. Take care when traveling over it.
 9. Prevent possible injury from machine tipping while the upperstructure is rotating.
 10. Keep the arm tucked under and rotate the upperstructure slowly for best stability.
 11. Securely fasten machine frame using chains or cables. Refer to “**Road and sea transport**” chapter in this manual for details.



S0052



SAFETY PRECAUTIONS

SAFE MAINTENANCE

- To avoid accidents:
 - Understand maintenance procedure before starting the work.
 - Keep the working area clean and dry.
 - Do not spray water or steam inside the cab.
 - Do not lubricate or service the machine when it is in motion.
 - Keep hands, feet and clothes far from moving parts.

Prior to service in the machine:

1. Park the machine on the level ground.
 2. Lower the bucket to the ground.
 3. Switch off the Auto-Idle.
 4. Let the engine idle with no load for at least five minutes until it has cooled down.
 5. Move the key-start switch to the **OFF** position to stop the engine.
 6. Remove the ignition key from the start switch.
 7. Apply the "Maintenance in progress" tag (see **SAFETY PLATE** in this Chapter). This tag can be applied to the left-hand control lever, safety lever or cab door.
 8. Move the safety lever (pilot-control shut-off lever) to the **LOCK** position.
 9. Let the engine cool down.
- Do not leave the machine unattended if servicing requires the engine running.
 - If the machine is to be raised, place boom and arm at an angle 90 to 110°. Lock machine components which should be raised for maintenance or repair using suitable supporting means.
 - Never work under a machine kept raised by the boom.
 - Inspect certain component regularly, repair or replace as necessary. Refer to the Chapter **MAINTENANCE** in this Manual.
 - Keep all components in good condition and properly install. Immediately repair any fault.
 - Immediately repair any damage. Replace worn or failed components. Remove grease, oil, debris build-ups.
 - Disconnect the negative cable (-) from the battery before carry out any work on the electrical system or arc-welding on the machine.



S0053



S0054



SAFETY PRECAUTIONS

WARN OTHERS OF SERVICE WORK

- Unexpected machine movement can cause serious injury.
- Before performing any work on the machine, attach a maintenance in progress tag (see also **SAFETY PLATES** in this Chapter) . This tag can be applied o the left-hand control lever, safety lever or cab door.



S0055

SUPPORT MACHINE PROPERLY

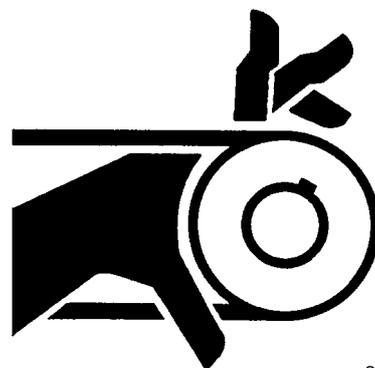
- Never attempt to work on the machine without securing the machine first.
- Always lower the attachment or tool to the ground before working on the machine.
- If you must work on a lifted machine or attachment, securely support the machine or attachment.
- Do not support the machine on cinder blocks, bollow tires, or props that may crumble under continuous load.
- Do not work under a machine that is supported solely by a jack.



S0054

STAY CLEAR OF MOVING PARTS

- Entanglements in moving parts can cause serious injury.
- To prevent accidents, care should be taken to ensure that hands, feet, clothing, jewelry and hair do not become entangled when working near rotating parts.



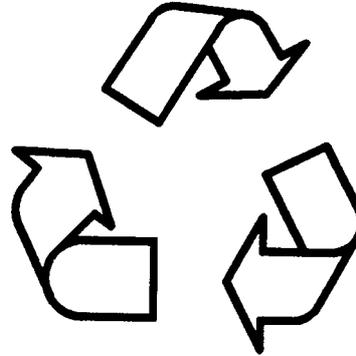
S0056



SAFETY PRECAUTIONS

DISPOSE OF WASTE IN THE APPROPRIATE MANNER

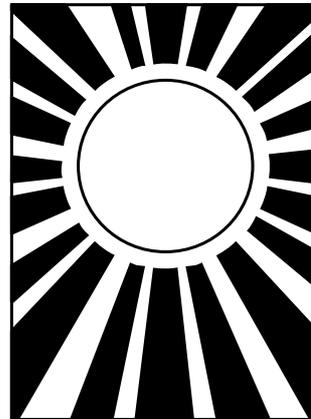
- Waste improperly disposed of represents a danger for the environment. Potentially dangerous waste used on the excavators includes lubricants, fuel, coolant, brake fluid, filters and batteries.
 - Used sealed containers when discharging fluids. Do not use containers for food or beverages which may induce drinking.
 - Do not spill waste over the ground, into drains, or water beds.
 - Obtain information about the correct methods to recycle or dispose of waste from local Authorities, collection centres or your Dealer.



S0064

WORK IN A CLEAN AREA

- Before starting an operation, clean the working area. Clear the area from all the objects that can be dangerous for mechanics or people in the working area.



S0166

PROPERLY LIGHT THE WORKING AREA

- Properly and safely light the working area.
 - Use safe portable lamps in order to work inside and under the machine.
 - Make sure that the lamp is shielded by a cage; the incandescent filament of a lamp, accidentally broken, can cause fuel or oil fire.



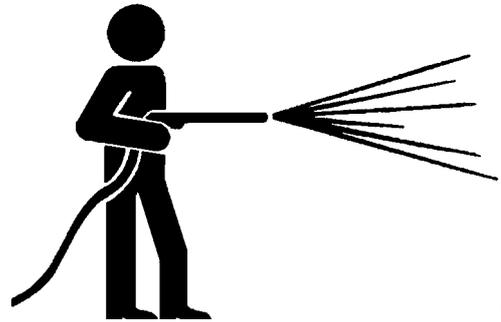
S0167



SAFETY PRECAUTIONS

REGULARLY WASH THE MACHINE

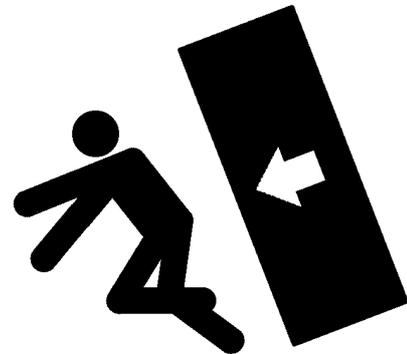
- Remove all the traces of grease, oil and deposits, in order to avoid people accidents or damages to things.
- Do not spray water or steam in the cab.



S0153

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 falling.
- Keep bystanders away from storage areas.



S0058

PREVENT ACID SCALDS

- The sulphuric acid, contained in the battery, is poisonous. It is strong enough to scald the skin, corrode clothes and cause blindness, if it is sprayed into the eyes.

To avoid dangers:

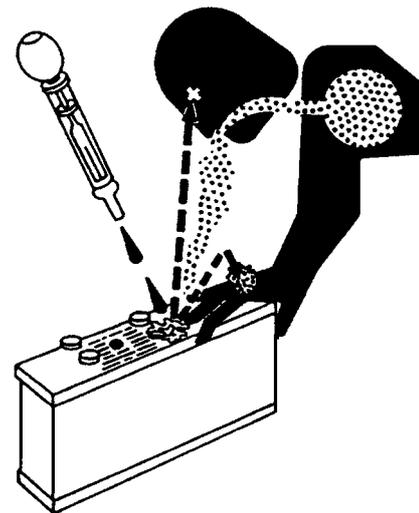
- Fill the batteries in airy areas.
- Wear eye protections and rubber gloves.
- Avoid breathing the electrolyte vapours when topping up.
- Avoid spilling or dripping the electrolyte.
- Use proper emergency starting techniques.

If you are touched with acid sprays:

- Rinse your skin well with water.
- Put on your skin sodium bicarbonate or clay to help the acid neutralization.
- Rinse your eyes with water for 10-15 minutes.
- Immediately see a doctor.

If you have swallowed the acid:

- Drink a big quantity of water or milk, swallow milk of magnesia, scrambled eggs or vegetal oil.
- Immediately see a doctor.



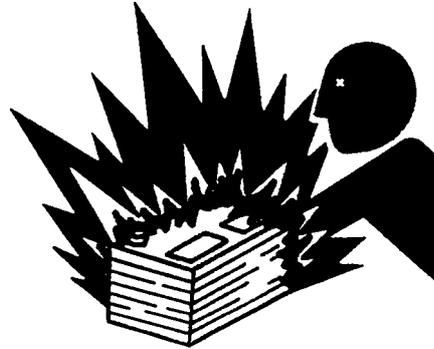
S0168



SAFETY PRECAUTIONS

STARTING THE ENGINE WITH BOOSTER BATTERIES

- Battery gas may explode causing serious damages and injuries.
 - If the engine is to be started using booster batteries, ensure to comply with all procedures detailed in the chapter “**OPERATING INSTRUCTIONS**”.
 - The operator should be sitting in the driver’s seat to keep the machine under control when the engine starts. Starting the engine with booster batteries is a two man operation.
 - Do not use batteries that have been stored in the cold for a long time.
 - Mistakes in following procedures detailed for starting the engine with slave batteries may cause the batteries to explode or machine to move unexpectedly.



S0001

PREVENT BATTERY EXPLOSIONS

- Battery gas can explode.
 - Keep sparks, lighted matches, and flames away from the top of battery.
 - Never check battery charge by placing a metal object across the posts. Use a voltmeter or hydrometer.
 - Do not charge a frozen battery; it may explode. Warm battery to 16 °C.
- Battery electrolyte is poisonous. If the battery should explode, battery electrolyte may be splashed into eyes, possibly resulting in blindness.
 - Be sure to wear eye protection when checking electrolyte specific gravity.



S0001



SAFETY PRECAUTIONS

PREVENT BURNS

Hot spraying fluids:

- After operation, engine coolant is hot and under pressure. Hot water or steam is contained in the engine, radiator and heater lines. Skin contact with escaping hot water or steam can cause severe burns.
 - To prevent possible injury from hot spraying water. Do not remove the radiator cap until the engine is cool. When opening, turn the cap slowly to the stop. Allow all pressure to be released before removing the cap.
 - The hydraulic oil tank is pressurized. Again, be sure to release all pressure before removing the cap.



S0019

Hot fluids and surfaces:

- Engine oil, reduction gear oil and hydraulic oil also become hot during operation. The engine, hoses, lines and other parts become hot as well.
 - Wait for the oil and components to cool down before starting any maintenance or inspection work.



S0059

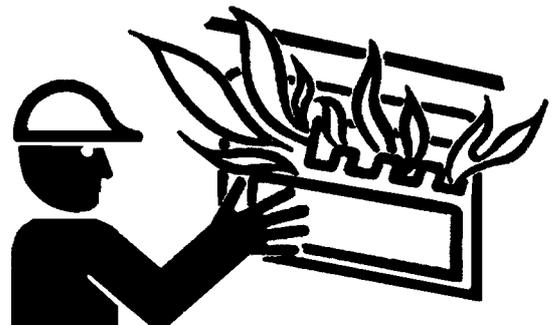
KEEP CLEAN THE MACHINE

Keep clean the engine compartment, radiator, batteries, hydraulic pipes, fuel tank and operator's position.

The engine compartment temperature can quickly rise, after stopping the engine.

IN THESE CASES, BE CAREFUL TO POSSIBLE FIRES.

Open the access doors in order to quicken the engine cooling process and clean the compartment.



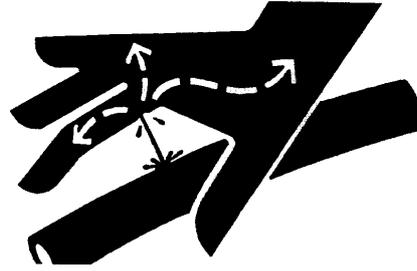
S0177



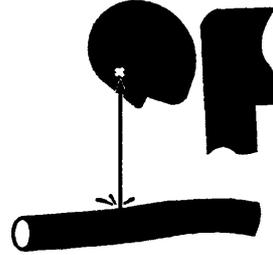
SAFETY PRECAUTIONS

AVOID HIGH-PRESSURE FLUIDS

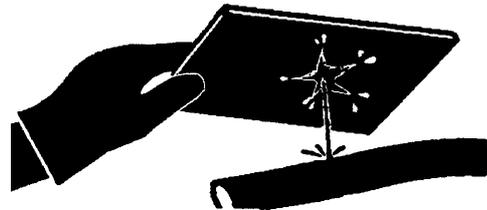
- Fluids such as diesel fuel or hydraulic oil under pressure can penetrate the skin or eyes causing serious injury, blindness or death.
 - Avoid this hazard by relieving pressure before disconnecting hydraulic or other lines.
 - Tighten all connections before applying pressure.
 - Search for leaks with a piece of cardboard; take care to protect hands and body from high-pressure fluids. Wear a face shield or goggles for eye protection.
 - In an accident occurs, see a doctor familiar with this type of injury immediately. Any fluid injected into the skin must be surgically removed within a few hours or gangrene may result.



SA0016



SA0017



SA0018

PREVENT PARTS FROM FLYING OFF

- Grease in the track adjuster is under high pressure. Failure to follow the precautions below may result in serious injury, blindness, or death.
 - **NEVER** attempt to remove **GREASE FITTING** or **VALVE ASSEMBLY**.
 - As pieces may fly off, be sure to keep body and face away from valve.
- Travel reduction gears are under pressure.
 - As pieces may fly off, be sure to keep body and face away from air release plug to avoid injury. Reduction gear oil is hot. Wait for gear oil to cool down, then gradually loosen the air release plug to release pressure.



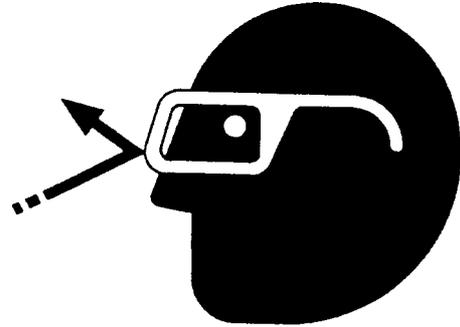
S0178



SAFETY PRECAUTIONS

PROTECT AGAINST FLYING DEBRIS

- If flying debris hit eyes or any other part of the body, serious injury may result.
- Guard against injury from flying pieces of metal or debris; wear goggles or safety glasses.
- Keep bystanders away from the working area before striking any object.



S0046

HANDLE FLUIDS SAFELY - AVOID FIRES

- Handle fuel with care: it is highly flammable. If fuel ignites, an explosion and/or a fire may occur, possibly resulting in serious injury or death.
- Do not refuel the machine while smoking or when near open flame or sparks.
- Always stop the engine before refuelling the machine.
- Fill the tank outdoors.



S0050

- All fuels, most lubricants, and some antifreeze fluids are flammable.
- Store flammable fluids well away from fire hazards.
- Do not burn or puncture pressurized containers.
- Do not store oily rags; they can ignite and burn spontaneously.



S0051



SAFETY PRECAUTIONS

PREVENT FIRES

- Check for Oil Leaks:
 - Fuel, hydraulic oil and lubricant leaks can lead to fires.
 - Check for missing or loose clamps, kinked hoses, lines or hoses that rub against each other, damage to the oil-cooler, and loose oil-cooler flange bolts which may cause oil leaks.
 - Tighten, repair or replace any missing, loose or damaged clamps, lines, hoses, oil-cooler and oil-cooler flange bolts.
 - Do not bend or strike high-pressure lines.
 - Never install bent or damaged lines, pipes, or hoses.
- Check for Shorts:
 - Short circuits can cause fires.
 - Clean and tighten all electrical connections.
 - Check before each shift or after about ten (10) hour operation for loose, kinked, hardened or frayed electrical cables and wires.
 - Check before each shift or after about ten (10) hour operation for missing or damaged terminal caps.
 - **DO NOT OPERATE MACHINE** if cable or wires are loose, kinked, etc..
- Clean up Flammables:
 - Spilled fuel and lubricants, and trash, grease, debris, accumulated coal dust, and other flammables may cause fires.
 - Prevent fires by inspecting and cleaning the machine daily and by removing spilled or accumulated flammables immediately.
- Check Key-start Switch:
 - If a fire breaks out, failure to stop the engine will escalate the fire, hampering fire fighting.
 - Always check key-start switch function before operating the machine every day:
 1. Start the engine and run it at slow idle.
 2. Turn the key-start switch to the **OFF** position to confirm that the engine stops.
 - If any abnormalities are found, be sure to repair them before operating the machine.
- Check Heat Shields:
 - Damaged or missing heat shields may lead to fires.
 - Damaged or missing heat shields must be repaired or replaced before operating the machine.



S0051



SAFETY PRECAUTIONS

EVACUATING IN CASE OF FIRE

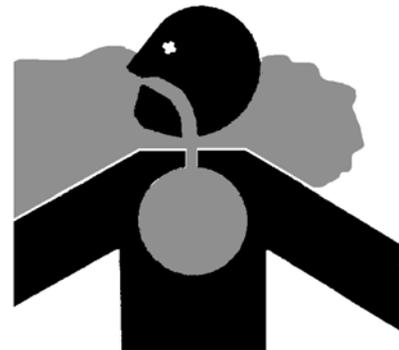
- If a fire breaks out, evacuate the machine in the following way:
 - Stop the engine by turning the key-start switch to the **OFF** position if there is time.
 - Use a fire extinguisher if there is time.
 - Exit the machine.



S0060

BEWARE OF EXHAUST FUMES

- Prevent asphyxiation. Engine exhaust fumes can cause sickness or death.
 - If you must operate in a building, be sure there is adequate ventilation. Either use an exhaust pipe extension to remove the exhaust fumes or open doors and windows to bring enough outside air into the area.



S0061

USE APPROPRIATE TOOLS

- Use tools appropriate for the job to be performed.
 - Inappropriate tools, parts and procedures might generate dangerous conditions.
 - Use tools of correct size to tighten or loosening securing elements, in order to avoid injuries caused by a wrench getting out of control.
 - Do not use U.S. Standard or British Standard tools on metric fasteners and vice versa.
- Use only genuine spare parts (please refer to the Spare Parts Catalogue).



S0120



SAFETY PRECAUTIONS

AVOID HEATING NEAR PRESSURIZED FLUID LINES

Flammable spray can be generated by heating near pressurized fluid lines, resulting in severe burns to yourself and bystanders.

Do not heat by welding, soldering, or using a torch near pressurized fluid lines or other flammable materials.

Pressurized lines can be accidentally cut when heat goes beyond the immediate flame area. Install temporary fire resistant guards to protect hoses or other materials when welding, soldering, etc.



S0062

AVOID APPLYING HEAT TO LINES CONTAINING FLAMMABLE FLUIDS

- Do not weld or flame cut pipes or tubes that contain flammable fluids.
- Clean them thoroughly with non-flammable solvent before welding or flame cutting them.

REMOVE PAINT BEFORE WELDING OR HEATING

- Hazardous fumes can be generated when paints are heated by welding, soldering, or using a torch. If inhaled, these fumes may cause sickness.

- Avoid breathing potentially toxic fumes and dust.
- Do all such work outside or in a well-ventilated area.
- Dispose of paint and solvents properly.
- Remove paint before welding or heating:
 1. If you sand or grind paint, avoid breathing the dust.
Wear an approved respirator.
 2. If you use solvent or paint stripper, remove stripper with soap and water before welding. Remove solvent or paint stripper containers and other flammable material from area. Allow fumes to disperse at least 15 minutes before welding or heating.



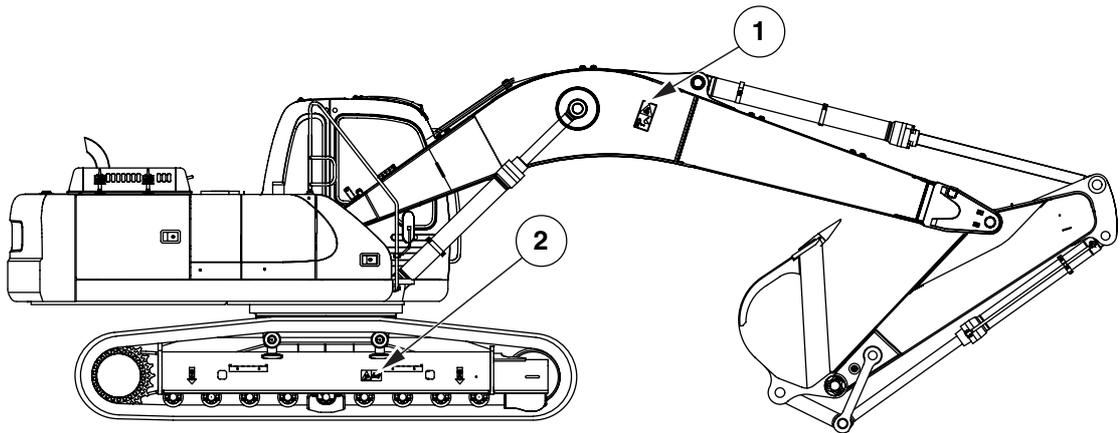
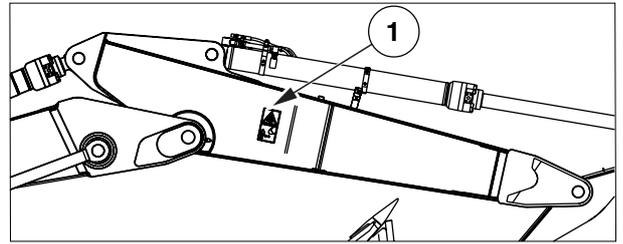
S0063



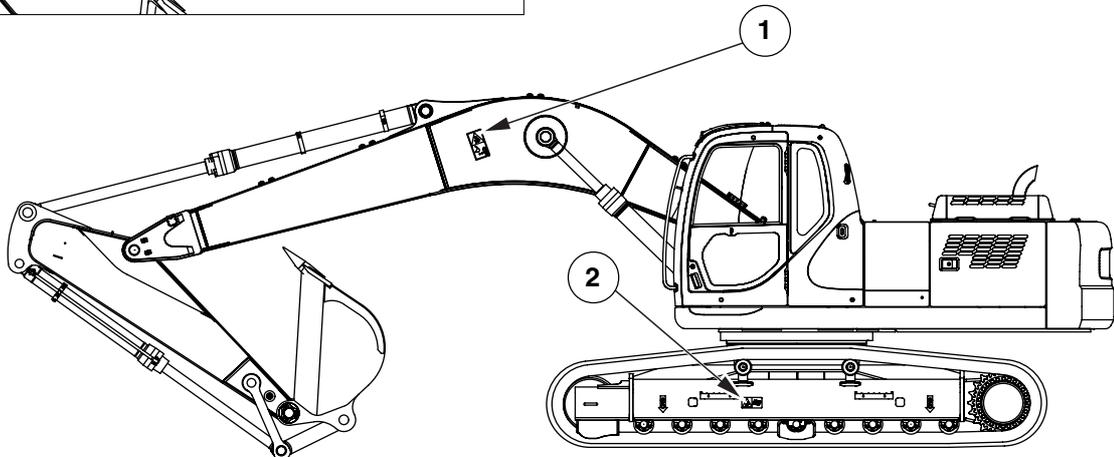
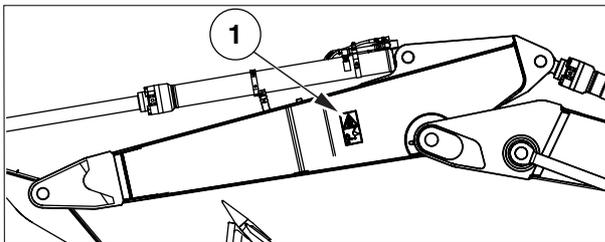
SAFETY PRECAUTIONS

SAFETY PLATES

Triple articulation version



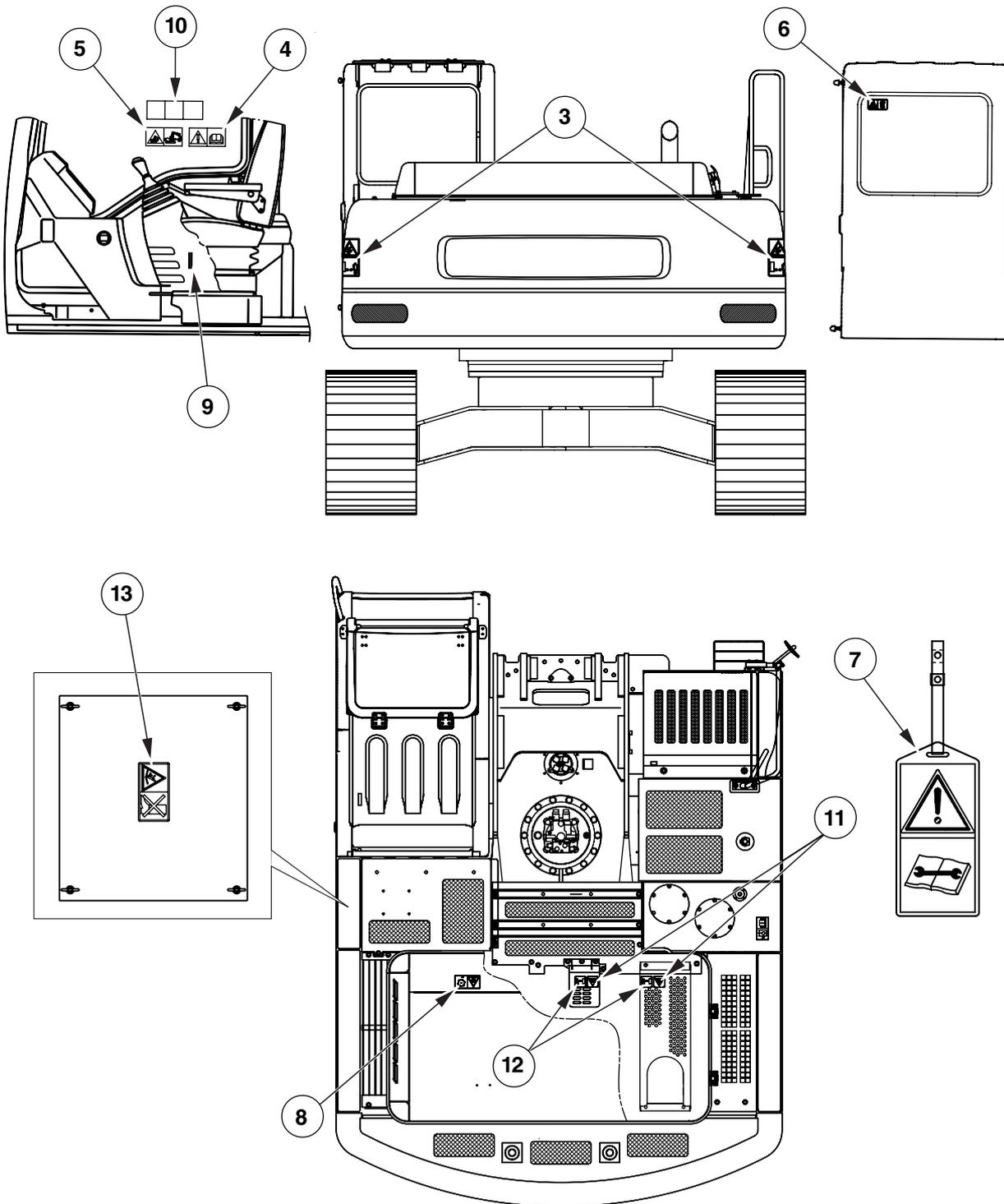
Triple articulation version



1. Attachment operating range safety plate.
2. Track adjuster plate.



SAFETY PRECAUTIONS



- 3. Counterweight operating range safety plate.
- 4. Read-your-manual plate.
- 5. Boom and arm movement warning plate (Triple articulation version).
- 6. Open windscreen warning plate (inside the cab).
- 7. Tag indicating maintenance in progress.
- 8. Engine hood warning plate.
- 9. Controls lock/unlock plate (safety lever).
- 10. Biodegradable hydraulic oil level check plate (opt.).
- 11. Burns warning plate.
- 12. Safety distance plate.
- 13. No-stepping warning plate.



SAFETY PRECAUTIONS

1 - Attachment operating range safety plate

Ensure that any person near the working site is outside the machine operating range before starting the machine or operating the attachments. Sound the horn.

Yellow background

Black border and icons



S0074

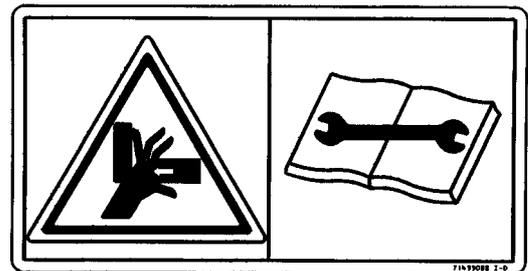
2 - Track adjuster plate

It shows that obligation is made to consult the Operation and Maintenance Instruction Manual prior to acting on the track adjust valve.

Danger of severe injuries.

Yellow background

Black border and icons



S0076

3 - Counterweight operating range safety plate

Ensure that any person near the working site is outside the machine operating range before starting the machine or operating the attachments. Sound the horn.

Yellow background

Black border and icons



S0075

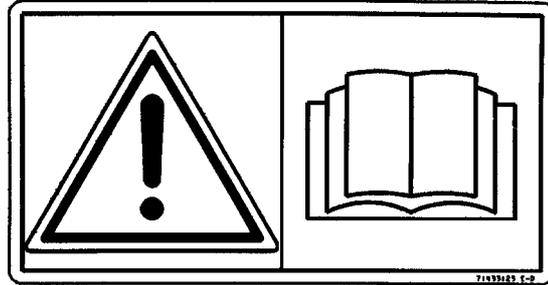


SAFETY PRECAUTIONS

4 - Read-your-manual plate

It is positioned in the cab to recommend to carefully read the Operation and Maintenance Instruction Manual prior to starting, operating, servicing, refuelling or carrying out any other work on the machine.

Yellow background
Black border and icons



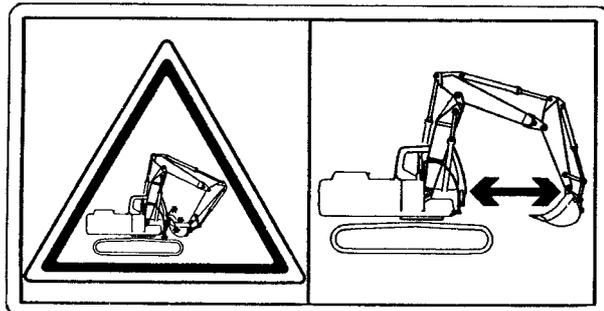
S0077

5 - Boom and arm movement warning plate (triple articulation version)

It shows the danger represented by the bucket hitting the cab.

Pay special attention as no stops are provided to prevent this problem.

Yellow background
Black border and icons

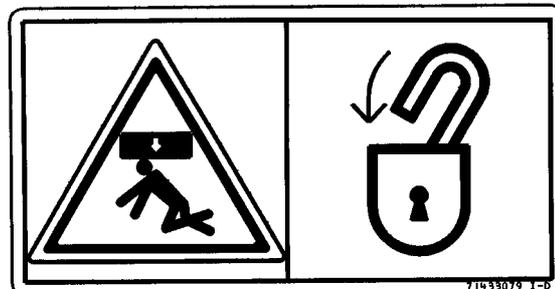


S0139

6 - Open windscreen warning plate (inside the cab)

It indicates the risk of injuries deriving from the windscreen not being locked or being improperly locked in the open position.

Yellow background
Black border and icons



S0079



SAFETY PRECAUTIONS

7 - Tag indicating maintenance in progress

Maintenance staff is obliged to apply the tag that indicates that the machine is not fully efficient and warns about maintenance staff being located in not visible positions. This tag should be applied to the left-hand control lever, safety lever or cab door.

Yellow background

Black border and icons



S0080

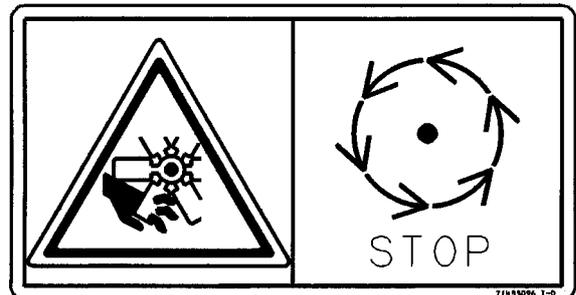
8 - Engine hood warning plate

It highlights the obligation to stop the engine before opening engine hood.

Danger of severe injuries following the presence of rotating parts such as fan, pulleys, and belts.

Yellow background

Black border and icons



71495096 1-0

S0081

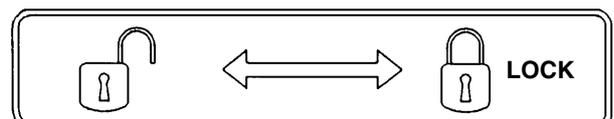
9 - Controls lock/unlock plate (safety lever)

It shows the position that the safety lever can assume when the engine is running.

When the operator is about to leave the cab with the engine running, even if for a short time, he must move the safety lever to the **LOCK** position. Controls are disabled and therefore no accidental machine or attachment movement is possible.

White background

Black border and icons



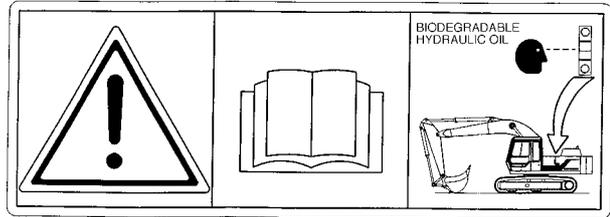
S0083



SAFETY PRECAUTIONS

10 - Biodegradable hydraulic oil level check plate (optional)

It shows that the machine is filled with biodegradable hydraulic oil and that it is necessary to consult this manual for correct practices (oil level check, sampling, and change).
Yellow background
Black border and icons



S0088

11 - Burns danger plate

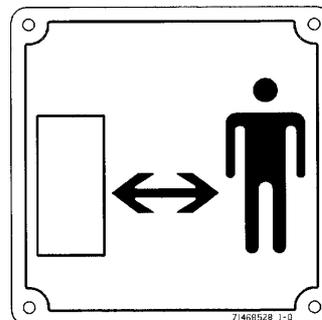
It indicates that a burns danger exists, since the zone is characterised by high temperature.
Background: yellow
Black border and icons



S0095

12 - Safety distance plate

It instructs to keep at a safe distance from a zone dangerous for personal safety.
Background: yellow
Black border and icons



S0096



SAFETY PRECAUTIONS

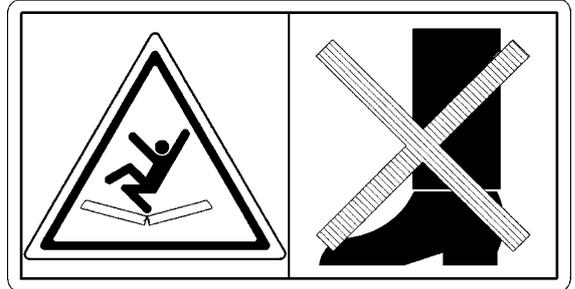
13 - No-stepping warning plate

It instructs not to step on the zone where this decal is attached.

Background: yellow

Cross: red

Black border and icons



S0097

1 - SPECIFICATIONS



M0103

TO THE OWNER

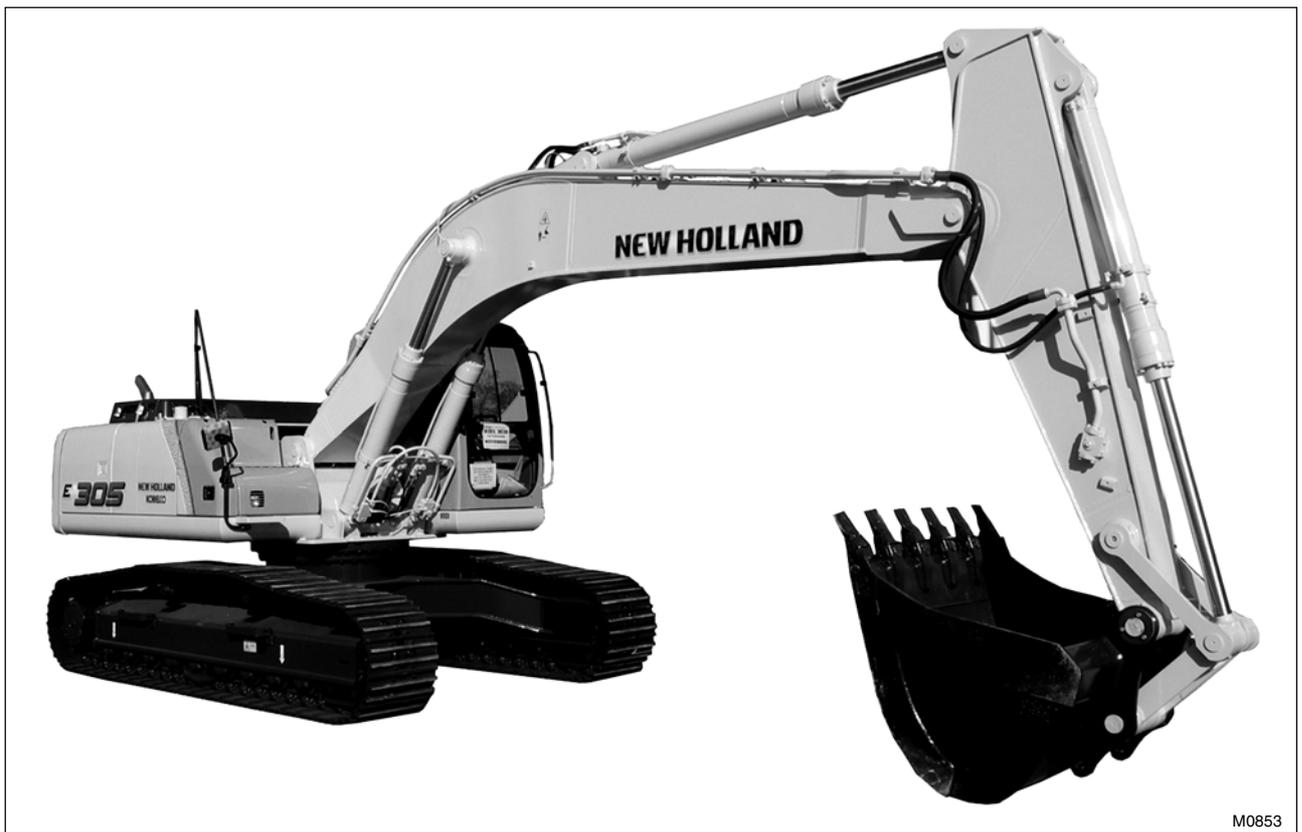
This manual has been prepared to assist you in the correct safe procedures for driving, operating and servicing the machine.

Only continuous compliance with the norms herein detailed guarantees best performance, economic operation, and durability of your machine and prevents the commonest causes for accidents which might occur during operation or maintenance.

Particularly, as regards safety, we recommend to carefully read the general safety precautions detailed from page S1 to page S41.

Repair procedures for this machine are contained in specific Service Manuals, which you may obtain from your Dealer.

Each machine is supplied complete with a copy of this Manual. Descriptions and illustrations herein are not binding. The Manufacturer, provided that the basic characteristics of machine types described and shown in this Manual remain the same, reserves the right to change components, parts and accessories supplied without any commitment to timely update this publication; and this any time it deems it convenient for improvement purposes or due to commercial or manufacturing requirements. For exact information, please consult your Dealer or contact the Manufacturer's Branch Offices.



DANGER

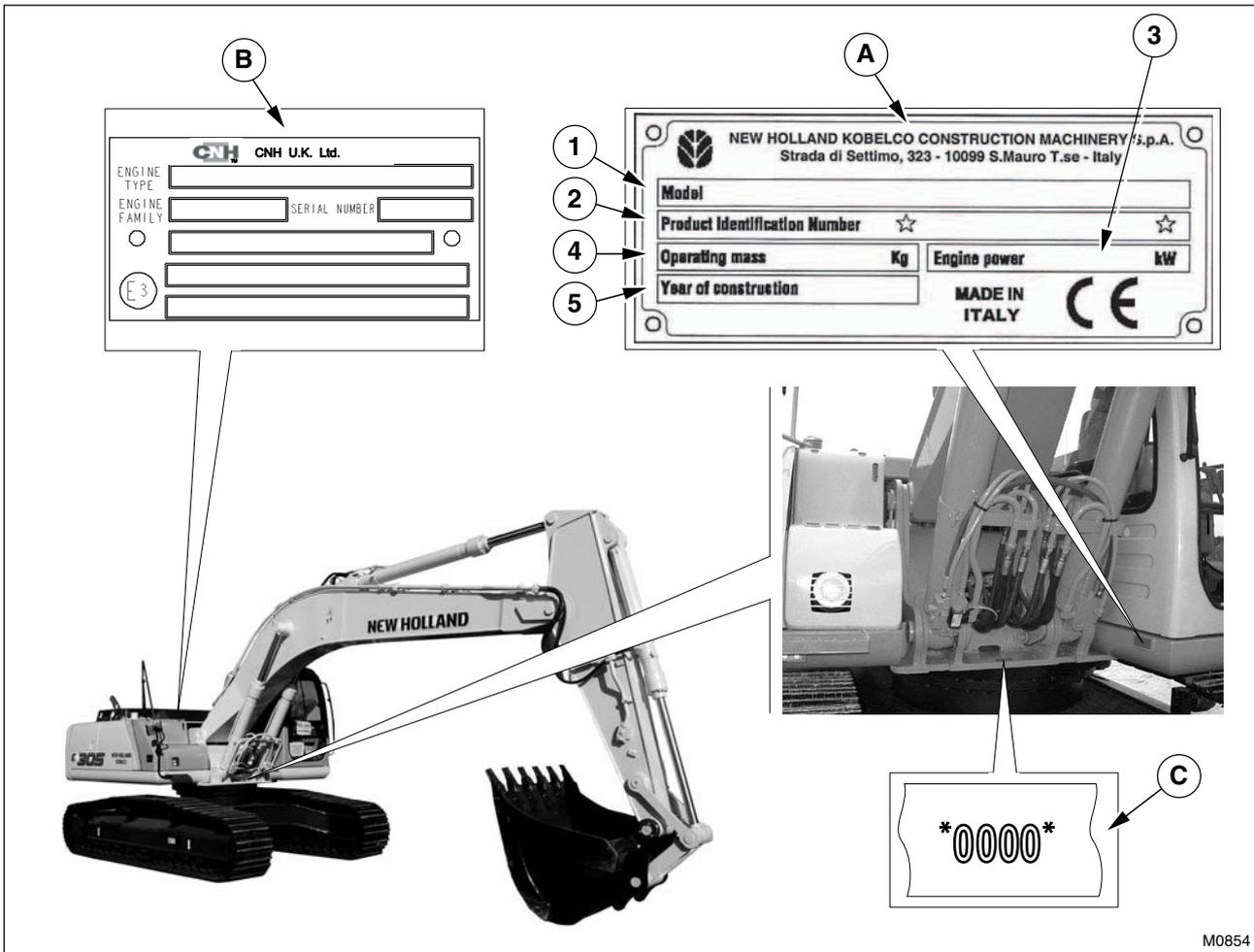
For clarity purposes, some figures in this Manual show the machine with protection panels or covers removed. Never operate the machine with any protection panels or covers removed.



DANGER

It is absolutely forbidden to tamper and/or change the setting of any of the hydraulic system valves to avoid damaging machine components with consequent risks to personal safety.

IDENTIFICATION DATA E265 - E305



M0854

A - Identification Plate

1. Model
2. Machine serial number
3. Engine power in kW, as per ISO 9249 Standards
4. Total machine weight (standard version)
5. Machine construction year

B - Engine type and serial number

C - Frame number

AFTER SALES SERVICE

For maintenance work which cannot be easily carried out by the Owner, please contact your Dealer where you will find trained personnel, suitable tools and equipment, and genuine spare parts. Service personnel and technicians will be glad to provide you with all explanations and suggestions you may need and to carry out all required specialised repair work in case of machine unsatisfactory operation.

SPARE PARTS

To ensure a perfect performance of the machine, use exclusively genuine spare parts.

To order them, it is necessary to specify:

- machine type and serial number;
- engine type and serial number;
- part number of the component being ordered.

NOISE LEVEL E265 - E305 (2000/14/EC)

Sound power level (1)

L_{WA} = 104 dB (A)

Guaranteed sound level power, determined in accordance with EC Directive 2000/14/EC.

Level of sound pressure at operator's compartment

L_{pA} = 75 dB (A)

Constant measured equivalent weighted sound pressure level A on identical machine in accordance with ISO 6396:1992.

VIBRATION TO THE OPERATOR

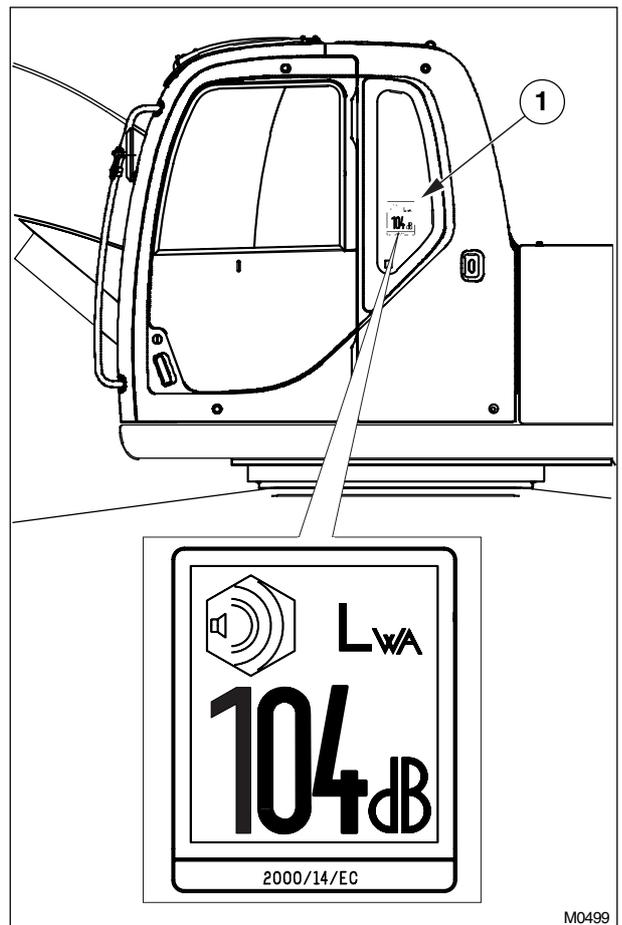
The level of vibrations transmitted to the operator depends mainly upon the conditions of the ground on which operations take place, the mode of operation of the machine and its equipment.

Thus, the exposure to vibrations can be considerably reduced when the following recommendations are complied with:

- use equipment compatible with the machine and the type of work to be done;
- adjust and lock the seat in the correct position; also inspect regularly the suspensions of the seat, performing the adjustments and repairs as required;
- perform regularly the current maintenance operations of the machine at the prescribed intervals;
- operate the equipment in a uniform manner, preventing, as far as possible, sharp movements or excessive loads;
- when travelling, avoid, as far as possible, particularly rough terrain or the impact against possible obstacles.

This machine is equipped with an operator's seat complying with the requisites of standard ISO 7096:2000. This ensures that the exposure of the operator's body to vibrations comply with the protection requisites for the protection against vibrations when the machine operates as required by the operational scopes, in accordance with the prescriptions of this Manual

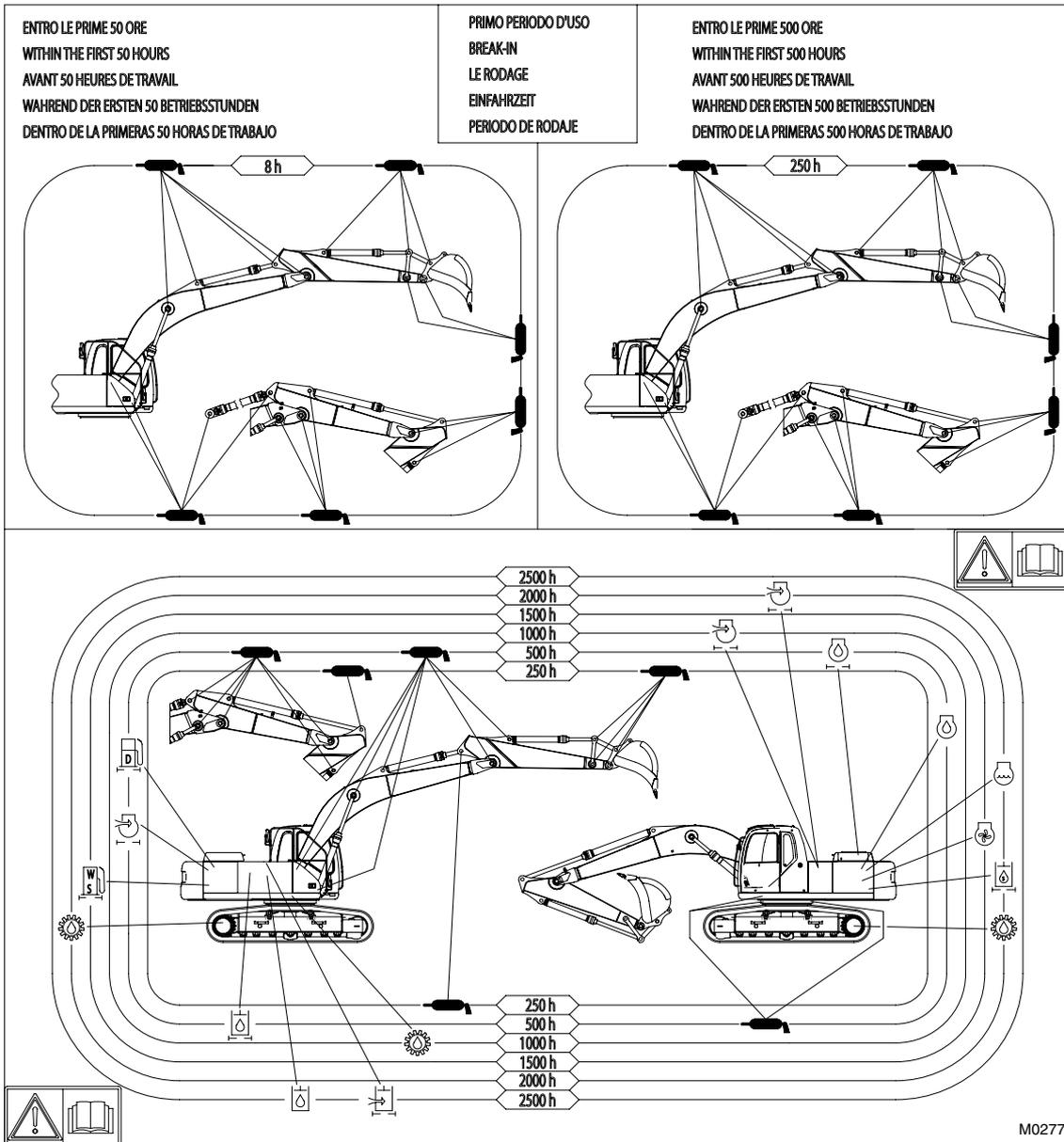
- The weighted average quadratic acceleration value to which the operator's arms are subjected does not exceed 2.5 m/s².
- The weighted average quadratic acceleration value to which the operator's body is subjected does not exceed 0.5 m/s².
These results were obtained using an acceleration gauge while digging ditches.



M0499

SERVICE REMINDER PLATE E265 - E305

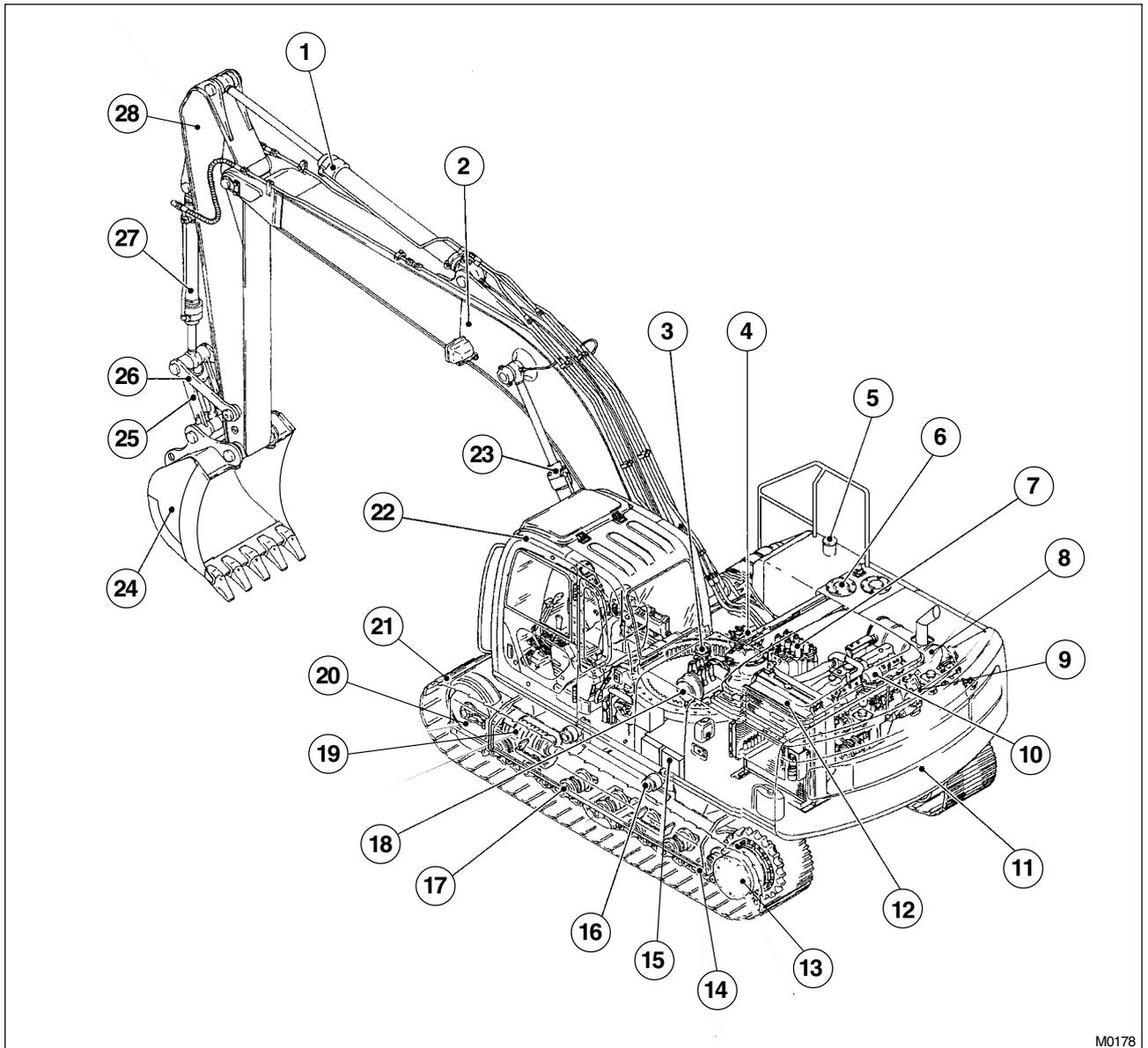
A summary decal indicating the main lubrication and replacement operations to be performed periodically, is located inside the tool compartment.



- | | | | |
|--|--|--|--|
| | Lubricate | | Replace engine oil filter |
| | Replace reduction unit oil | | Replace engine coolant |
| | Replace hydraulic oil (*) | | Replace alternator/fan belt |
| | Replace hydraulic system return oil filter | | Replace engine oil |
| | Replace fuel filter | | Replace air filter |
| | Replace fuel pre-filter | | Replace hydraulic oil tank breather filter |

(*) **IMPORTANT:** if the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46 (opt)**, this oil must not be mixed with mineral hydraulic oil.

MAIN MACHINE COMPONENTS E265 - E305



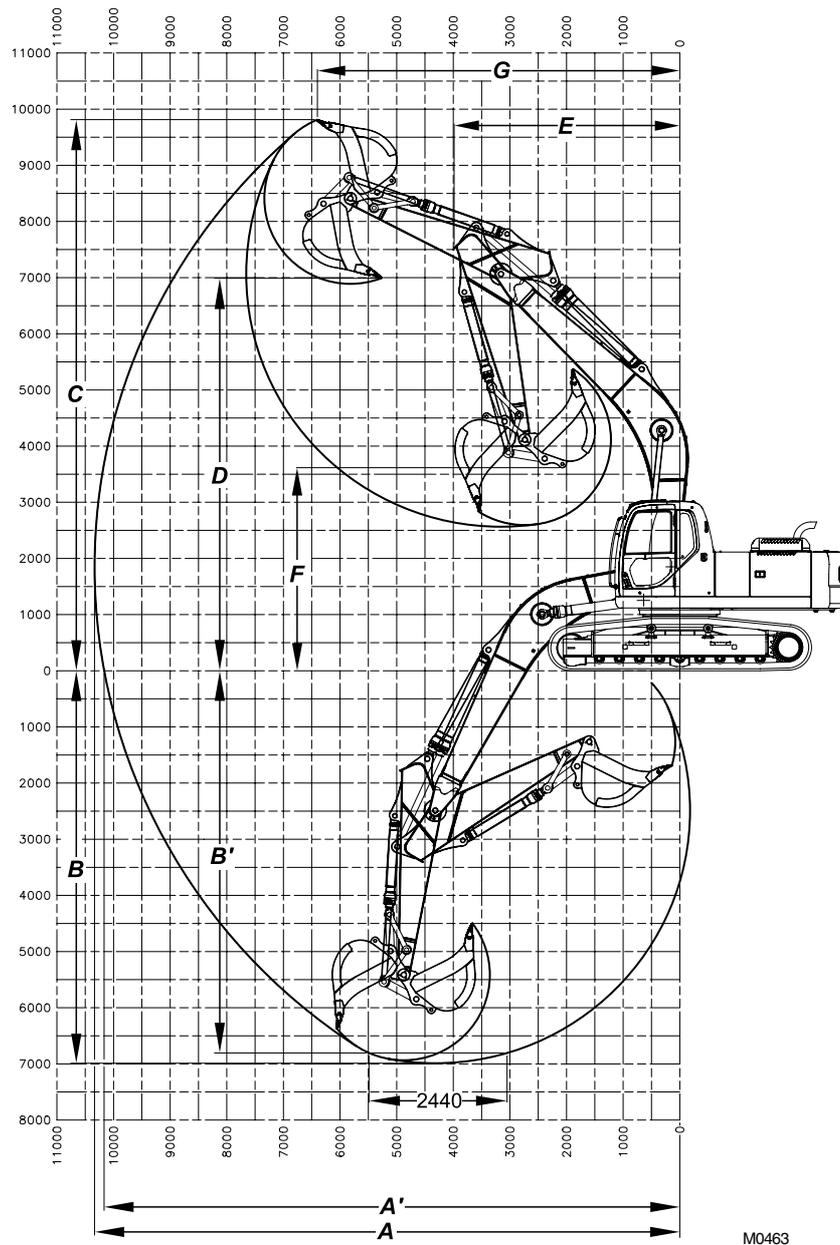
M0178

- | | |
|-----------------------|------------------------|
| 1. Arm cylinder | 15. Batteries |
| 2. Boom | 16. Upper roller |
| 3. Center joint | 17. Lower roller |
| 4. Swing device | 18. Air filter |
| 5. Fuel tank | 19. Track adjuster |
| 6. Hydraulic oil tank | 20. Track adjust wheel |
| 7. Control valve | 21. Track shoe |
| 8. Muffler | 22. Cab |
| 9. Hydraulic pumps | 23. Boom cylinder |
| 10. Diesel engine | 24. Bucket |
| 11. Counterweight | 25. Bucket A linkage |
| 12. Radiators | 26. Bucket B linkage |
| 13. Travel device | 27. Bucket cylinder |
| 14. Tracks | 28. Arm |

TECHNICAL SPECIFICATIONS

| ENGINE | E265 | E305 |
|---|---|--|
| Make Model Type Net power at flywheel at 2100 rpm (ISO 14396) Net power at flywheel at 2100 rpm (ISO 9249) Number of cylinders Total displacement Bore x Stroke | CNH U.K. 667TA/EEG 667TA/EEC Diesel, 4-stroke, direct injection, turbocharged 137 kW 148 kW 127 kW 138 kW 6 in line 5.9 L 102 x 120 mm | |
| ELECTRICAL SYSTEM | E265 | E305 |
| Voltage of operation Batteries (Capacity/Voltage) Alternator (Current/Voltage) Starter motor (Power) | 24 V 2 x 160 Ah / 12 V 70 A / 24 V 4 kW | |
| HYDRAULIC SYSTEM | E265 | E305 |
| Pump Total displacement (theoretical value) Maximum delivery (theoretical value) Pilot system pump Maximum delivery Maximum operating pressure Equipment and travel Turret swing Power Boost Hydraulic cylinders (bore x stroke) Boom Arm Bucket Positioner (triple articulation version only) | 2 x 112 cm ³ 2 x 235 L/min 21 L/min 34.3 MPa 28.5 MPa 37.7 MPa 135 x 1235 mm 140 x 1635 mm 125 x 1200 mm 150 x 1200 mm | 2 x 115 cm ³ 2 x 241 L/min 21 L/min 34.3 MPa 27.5 MPa 37.8 MPa 140 x 1235 mm 145 x 1670 mm 130 x 1208 mm 150 x 1230 mm |
| TRANSMISSION | E265 | E305 |
| Type Motors Brakes Final reduction Maximum climbable gradient Travel speeds Slow Fast | hydrostatic, two-speed axial pistons and dual speed automatic, discs planetary, oil-bath 70% 4 km/h 3.5 km/h 6 km/h 5.5 km/h | |
| TURRET SWING | E265 | E305 |
| Swing motor Swing brake Final reduction Bullgear Swing speed | axial pistons automatic, discs planetary, oil-bath grease-bath 11 min ⁻¹ 10.7 min ⁻¹ | |

**DIGGING DATA E265
(Monoblock Version)**

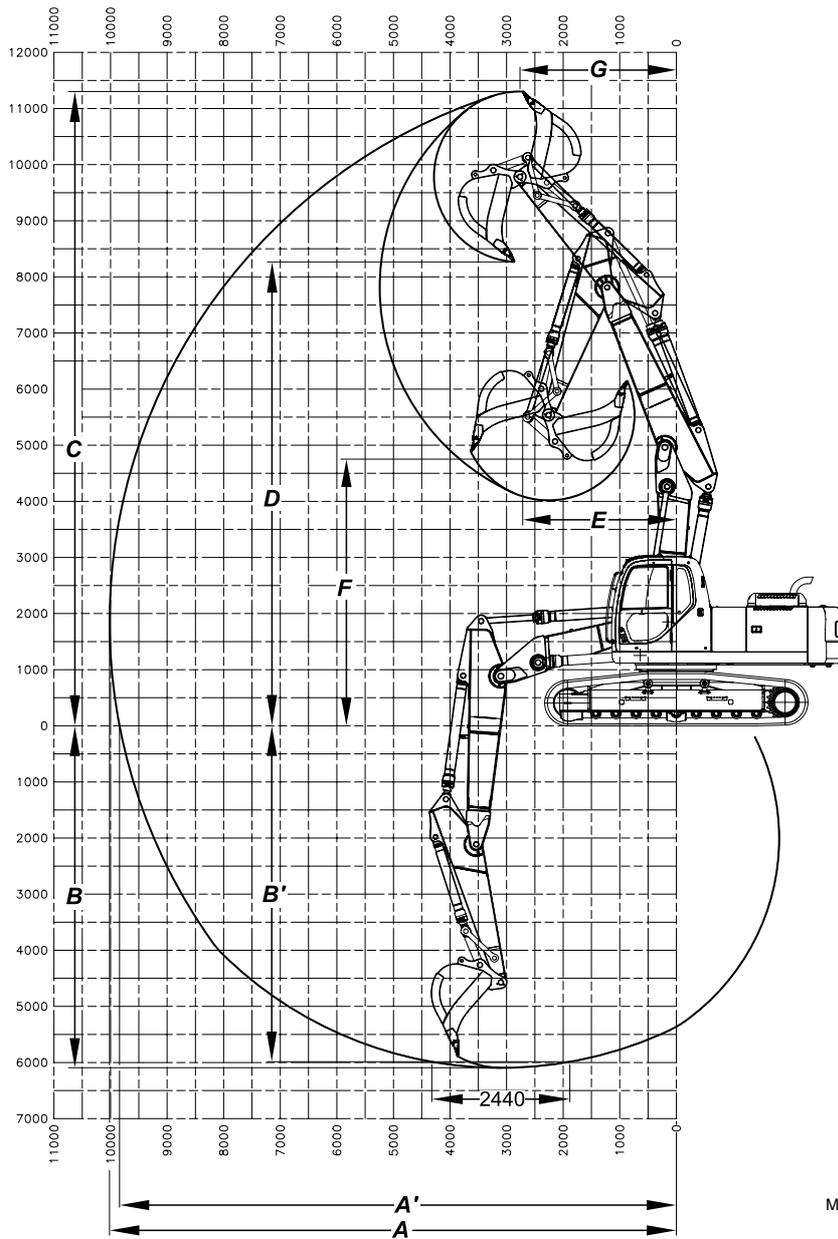


M0463

(Dimensions in mm)

| Arm | 2 160 | 2 500 | 2 980 | 3 660 |
|-----|-------|-------|--------|--------|
| A | 9 647 | 9 919 | 10 335 | 11 001 |
| A' | 9 465 | 9 742 | 10 166 | 10 842 |
| B | 6 168 | 6 508 | 6 988 | 7 668 |
| B' | 5 953 | 6 305 | 6 805 | 7 520 |
| C | 9 579 | 9 668 | 9 813 | 10 218 |
| D | 6 828 | 6 818 | 6 990 | 7 369 |
| E | 3 964 | 3 934 | 3 985 | 3 916 |
| F | 4 351 | 3 971 | 3 616 | 3 016 |
| G | 5 606 | 5 908 | 6 400 | 6 929 |

**DIGGING DATA E265
(Triple Articulation Version)**

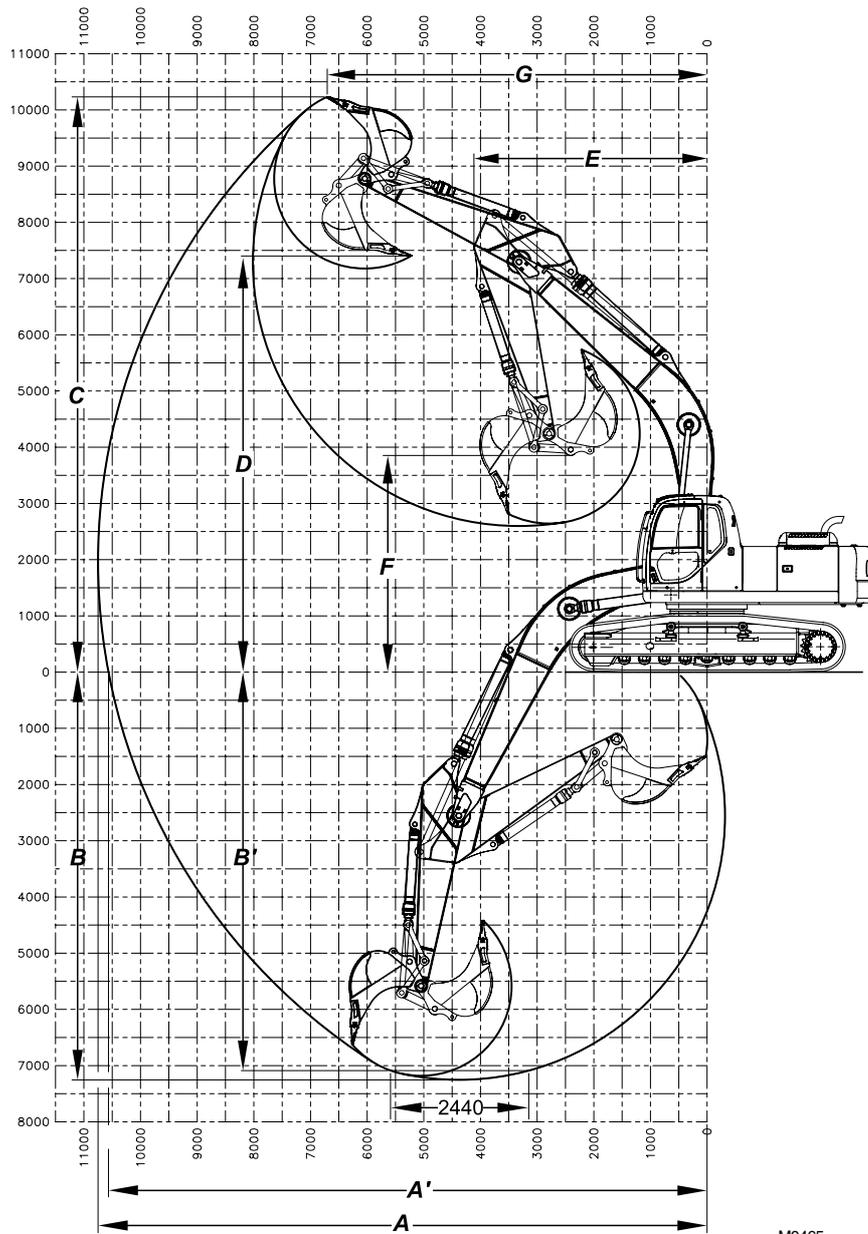


M0464

(Dimensions in mm)

| Arm | 2 160 | 2 500 | 2 980 | 3 660 |
|-----|--------|--------|--------|--------|
| A | 9 733 | 10 017 | 10 445 | 11 118 |
| A' | 9 553 | 9 842 | 10 277 | 10 960 |
| B | 5 777 | 6 093 | 6 554 | 7 239 |
| B' | 5 685 | 5 986 | 6 453 | 7 147 |
| C | 11 098 | 11 302 | 11 633 | 12 218 |
| D | 8 058 | 8 266 | 8 595 | 9 182 |
| E | 2 882 | 2 715 | 2 477 | 2 463 |
| F | 5 251 | 4 752 | 4 216 | 3 539 |
| G | 2 468 | 2 763 | 3 118 | 3 475 |

**DIGGING DATA E305
(Monoblock Version)**

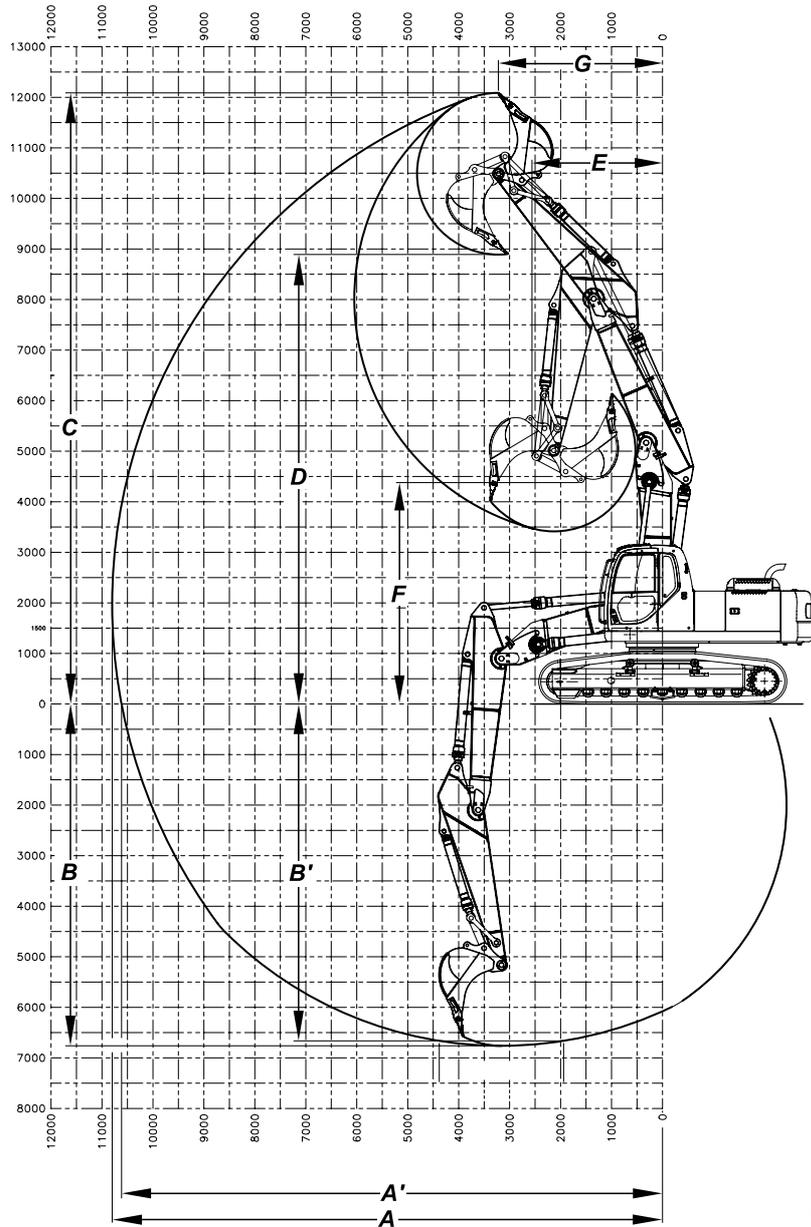


M0465

(Dimensions in mm)

| Arm | 2 100 | 2 400 | 3 100 | 3 750 |
|-----|-------|--------|--------|--------|
| A | 9 830 | 10 120 | 10 750 | 11 389 |
| A' | 9 628 | 9 924 | 10 565 | 11 215 |
| B | 6 254 | 6 554 | 7 254 | 7 904 |
| B' | 6 034 | 6 357 | 7 088 | 7 763 |
| C | 9 747 | 9 942 | 10 232 | 10 632 |
| D | 6 978 | 7 128 | 7 402 | 7 770 |
| E | 4 226 | 4 216 | 4 116 | 4 113 |
| F | 4 657 | 4 402 | 3 854 | 3 237 |
| G | 5 873 | 6 077 | 6 705 | 7 202 |

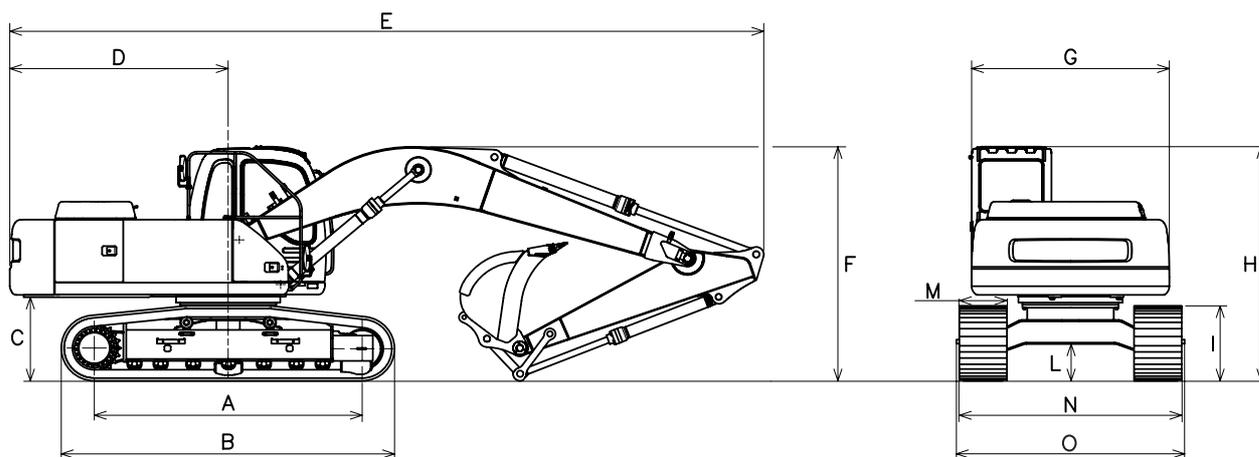
**DIGGING DATA E305
(Triple Articulation Version)**



(Dimensions in mm)

| Arm | 2 100 | 2 400 | 3 100 | 3 750 |
|-----|--------|--------|--------|--------|
| A | 9 857 | 10 152 | 10 800 | 11 447 |
| A' | 9 655 | 9 956 | 10 616 | 11 273 |
| B | 5 778 | 6 079 | 6 761 | 7 416 |
| B' | 5 666 | 5 972 | 6 663 | 7 326 |
| C | 11 301 | 11 564 | 12 088 | 12 659 |
| D | 8 105 | 8 366 | 8 891 | 9 462 |
| E | 3 084 | 2 911 | 2 562 | 2 645 |
| F | 5 515 | 5 162 | 4 378 | 3 742 |
| G | 2 667 | 2 771 | 3 221 | 3 538 |

**TRANSPORTING DIMENSIONS E265
(Monoblock Version)**



M0614

| VERSIONS | A | B | C | D | E | F | G | H | I | L |
|---------------|-------|-------|-------|-------|------------|-----------|-------|-------|-----|-----|
| E265EL | 3 846 | 4 660 | 1 118 | 2 950 | (1) 10 200 | (1) 3 390 | 2 950 | 3 050 | 970 | 488 |
| | | | | | (2) 10 170 | (2) 3 320 | | | | |
| | | | | | (3) 10 120 | (3) 3 140 | | | | |
| | | | | | (4) 10 100 | (4) 3 140 | | | | |
| E265LC | 3 846 | 4 660 | 1 118 | 2 950 | (1) 10 200 | (1) 3 390 | 2 950 | 3 050 | 970 | 488 |
| | | | | | (2) 10 170 | (2) 3 320 | | | | |
| | | | | | (3) 10 120 | (3) 3 140 | | | | |
| | | | | | (4) 10 100 | (4) 3 140 | | | | |

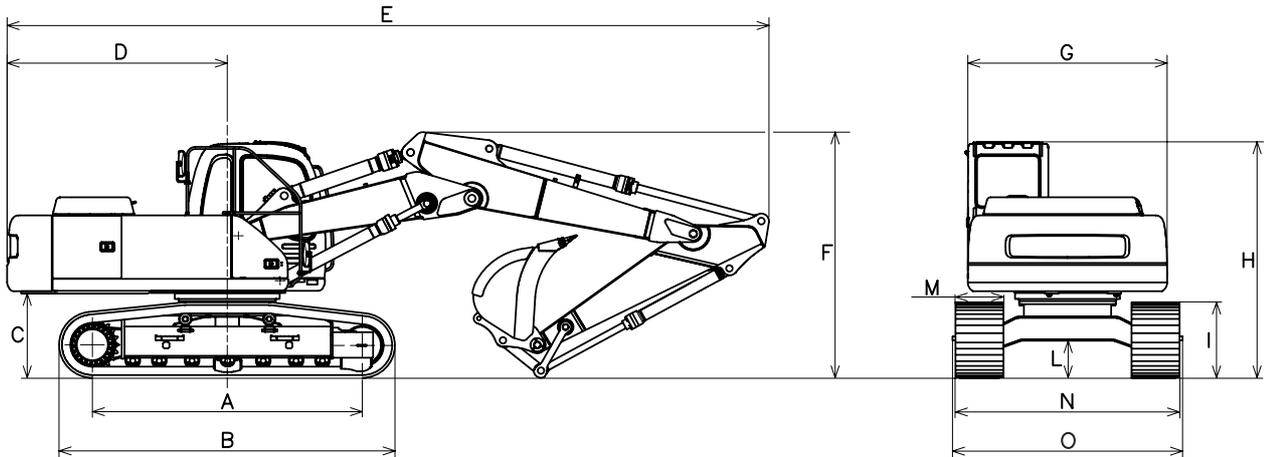
Arm:

- (1) 2 160 mm
- (2) 2 500 mm
- (3) 2 980 mm
- (4) 3 660 mm

(Dimensions in mm)

| | | E265EL | | | | E265LC | | | |
|------------------------------------|------------------------------|---------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|
| M | Track shoe width (mm) | 600 | 700 | 800 | 900 | 600 | 700 | 800 | 900 |
| N | Gauge (mm) | 2 990 | 3 090 | 3 190 | 3 290 | 3 190 | 3 290 | 3 390 | 3 490 |
| O | Frame width (mm) | 3 064 | 3 064 | 3 064 | 3 064 | 3 264 | 3 264 | 3 264 | 3 264 |
| Working weight (kg) | | 26 320 | 26 650 | 26 980 | 27 310 | 26 380 | 26 710 | 27 040 | 27 370 |
| Spec. ground pressure (bar) | | 0.56 | 0.49 | 0.43 | 0.39 | 0.56 | 0.49 | 0.43 | 0.39 |

**TRANSPORTING DIMENSIONS E265
(Triple Articulation Version)**



M0615

| VERSIONS | A | B | C | D | E | F | G | H | I | L |
|---------------|-------|-------|-------|-------|--|--|-------|-------|-----|-----|
| E265EL | 3 846 | 4 660 | 1 118 | 2 950 | (1) 10 220 (2) 10 180 (3) 10 680 (4) 10 150 | (1) 3 220 (2) 3 170 (3) 3 050 (4) 3 190 | 2 950 | 3 050 | 970 | 488 |
| E265LC | 3 846 | 4 660 | 1 118 | 2 950 | (1) 10 220 (2) 10 180 (3) 10 680 (4) 10 150 | (1) 3 220 (2) 3 170 (3) 3 050 (4) 3 190 | 2 950 | 3 050 | 970 | 488 |

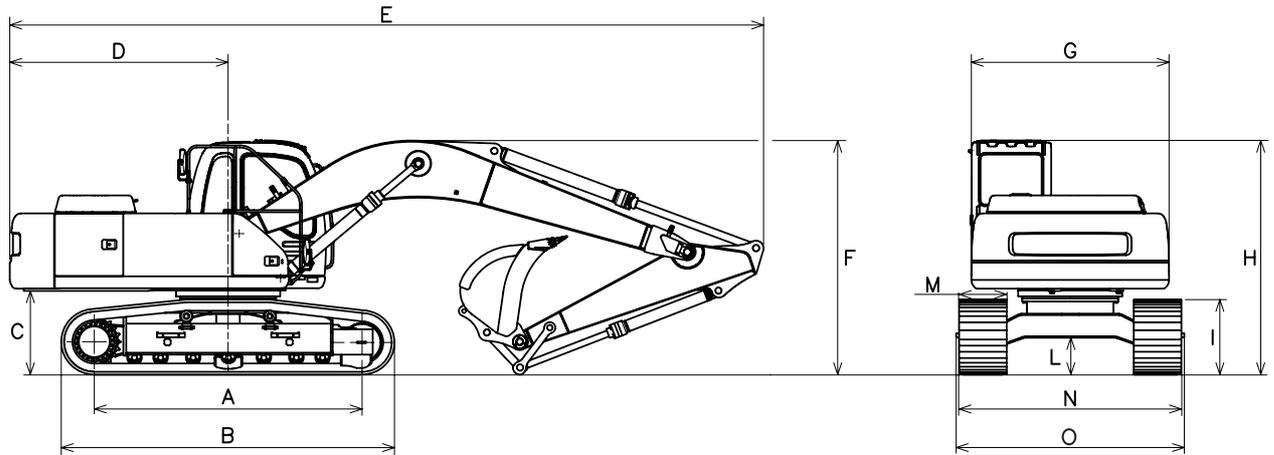
Arm:

- (1) 2 160 mm
- (2) 2 500 mm
- (3) 2 980 mm
- (4) 3 660 mm

(Dimensions in mm)

| | | | E265EL | | | | E265LC | | | | |
|------------------------------|-------------------------|-------------|---------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|--------|
| M | Track shoe width | (mm) | 600 | 700 | 800 | 900 | 600 | 700 | 800 | 900 | |
| N | Gauge | (mm) | 2 990 | 3 090 | 3 190 | 3 290 | 3 190 | 3 290 | 3 390 | 3 490 | |
| O | Frame width | (mm) | 3 064 | 3 064 | 3 064 | 3 064 | 3 264 | 3 264 | 3 264 | 3 264 | |
| Working weight | | | (kg) | 27 220 | 27 550 | 27 880 | 28 210 | 27 280 | 27 610 | 27 940 | 28 270 |
| Spec. ground pressure | | | (bar) | 0.58 | 0.50 | 0.44 | 0.40 | 0.58 | 0.50 | 0.45 | 0.40 |

**TRANSPORTING DIMENSIONS E305
(Monoblock Version)**



M0614

| VERSIONS | A | B | C | D | E | F | G | H | I | L |
|---------------|-------|-------|-------|-------|--|--|-------|-------|-------|-----|
| E305EL | 4 010 | 4 870 | 1 245 | 2 950 | (1) 10 470 (2) 10 370 (3) 10 270 (4) 10 280 | (1) 3 490 (2) 3 410 (3) 3 160 (4) 3 200 | 2 950 | 3 170 | 1 040 | 539 |
| E305LC | 4 010 | 4 870 | 1 245 | 2 950 | (1) 10 470 (2) 10 370 (3) 10 270 (4) 10 280 | (1) 3 490 (2) 3 410 (3) 3 160 (4) 3 200 | 2 950 | 3 170 | 1 040 | 539 |

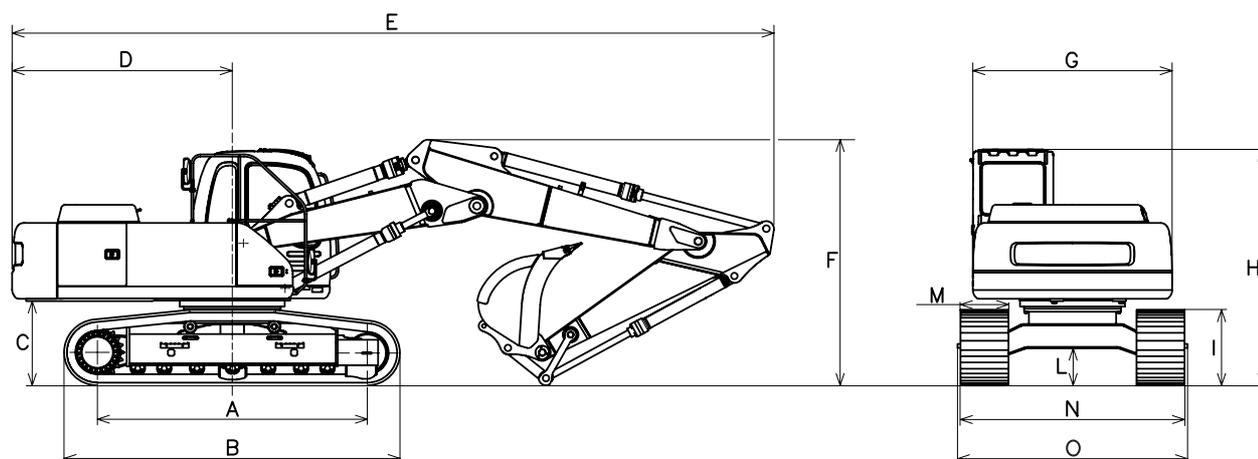
Arm:

- (1) 2 100 mm
- (2) 2 400 mm
- (3) 3 100 mm
- (4) 3 750 mm

(Dimensions in mm)

| | | E305EL | | | | E305LC | | | |
|------------------------------------|------------------------------|---------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|
| M | Track shoe width (mm) | 600 | 700 | 800 | 900 | 600 | 700 | 800 | 900 |
| N | Gauge (mm) | 2 990 | 3 090 | 3 190 | 3 290 | 3 190 | 3 290 | 3 390 | 3 490 |
| O | Frame width (mm) | 2 998 | 2 998 | 2 998 | 2 998 | 3 198 | 3 198 | 3 198 | 3 198 |
| Working weight (kg) | | 29 400 | 29 800 | 30 200 | 30 600 | 29 460 | 29 860 | 30 260 | 30 660 |
| Spec. ground pressure (bar) | | 0.60 | 0.52 | 0.46 | 0.42 | 0.60 | 0.52 | 0.46 | 0.42 |

**TRANSPORTING DIMENSIONS E305
(Triple Articulation Version)**



M0615

| VERSIONS | A | B | C | D | E | F | G | H | I | L |
|---------------|-------|-------|-------|-------|--|--|-------|-------|-------|-----|
| E305EL | 4 010 | 4 870 | 1 245 | 2 950 | (1) 10 420 (2) 10 320 (3) 10 260 (4) 10 250 | (1) 3 270 (2) 3 220 (3) 3 060 (4) 3 290 | 2 950 | 3 170 | 1 040 | 539 |
| E305LC | 4 010 | 4 870 | 1 245 | 2 950 | (1) 10 420 (2) 10 320 (3) 10 260 (4) 10 250 | (1) 3 270 (2) 3 220 (3) 3 060 (4) 3 290 | 2 950 | 3 170 | 1 040 | 539 |

Arm:

- (1) 2 100 mm
- (2) 2 400 mm
- (3) 3 100 mm
- (4) 3 750 mm

(Dimensions in mm)

| | | E305EL | | | | E305LC | | | |
|------------------------------------|------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| M | Track shoe width (mm) | 600 | 700 | 800 | 900 | 600 | 700 | 800 | 900 |
| N | Gauge (mm) | 2 990 | 3 090 | 3 190 | 3 290 | 3 190 | 3 290 | 3 390 | 3 490 |
| O | Frame width (mm) | 2 998 | 2 998 | 2 998 | 2 998 | 3 198 | 3 198 | 3 198 | 3 198 |
| Working weight (kg) | | 30 300 | 30 700 | 31 100 | 31 500 | 30 360 | 30 760 | 31 160 | 31 560 |
| Spec. ground pressure (bar) | | 0.62 | 0.54 | 0.48 | 0.43 | 0.62 | 0.54 | 0.48 | 0.43 |

**BUCKET APPLICATIONS AS A
FUNCTION OF THE ARMS E265**

Monoblock and triple articulation version

| BUCKETS | | | E265EL | | | | E265LC | | | |
|---------------|--|--------------|----------|-------|-------|-------|----------|-------|-------|-------|
| Width (mm) | Capacity (dm ³) SAE J296 (ISO 7451) | Mass (kg) | Arm (mm) | | | | Arm (mm) | | | |
| | | | 2 160 | 2 500 | 2 980 | 3 660 | 2 160 | 2 500 | 2 980 | 3 660 |
| 750 | 580 | 587 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 850 | 680 | 650 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 000 | 845 | 708 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 200 | 1 060 | 810 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 300 | 1 175 | 830 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 500 | 1 395 | 920 | ■ | ■ | ■ | ▤ | ■ | ■ | ■ | ▤ |

■ General digging work (specific weight of material < 1.8 t/m³)

▤ Slightly heavy digging work (specific weight of material < 1.5 t/m³)

**BUCKET APPLICATIONS AS A
FUNCTION OF THE ARMS E305**

Monoblock and triple articulation version

| BUCKETS | | | E305EL | | | | E305LC | | | |
|---------------|--|--------------|----------|-------|-------|-------|----------|-------|-------|-------|
| Width (mm) | Capacity (dm ³) SAE J296 (ISO 7451) | Mass (kg) | Arm (mm) | | | | Arm (mm) | | | |
| | | | 2 100 | 2 400 | 3 100 | 3 750 | 2 100 | 2 400 | 3 100 | 3 750 |
| 800 | 600 | 620 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 000 | 800 | 720 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| 1 200 | 1 100 | 820 | ■ | ■ | ■ | ▤ | ■ | ■ | ■ | ▤ |
| 1 400 | 1 400 | 930 | ■ | ■ | ■ | □ | ■ | ■ | ■ | □ |
| 1 600 | 1 650 | 1 050 | ■ | ■ | □ | ✕ | ■ | ■ | □ | ✕ |

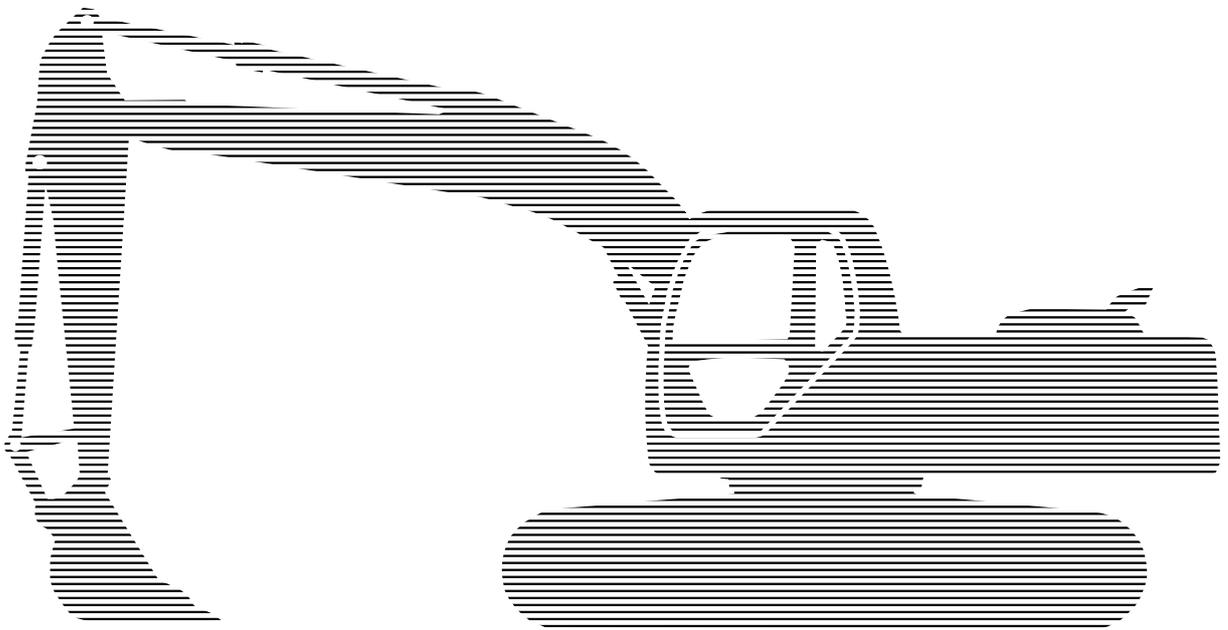
■ General digging work (specific weight of material < 1.8 t/m³)

▤ Slightly heavy digging work (specific weight of material < 1.5 t/m³)

□ Loading work (specific weight of material < 1.2 t/m³)

✕ Bucket not applicable

2 - OPERATING INSTRUCTIONS





SAFETY PRECAUTIONS FOR USING THE MACHINE

Read this Chapter carefully before starting, operating, servicing, refuelling or carrying out any other work on the machine.



This symbol is your safety alert sign. It means: **ATTENTION! BE ALERT! YOUR SAFETY IS INVOLVED!**

Read and observe all safety precautions headed by the key words **DANGER, WARNING AND CAUTION**.

Do not rush on the machine. Use the grab rails and steps which should be kept clean at all times. Keep the operator's platform clean and clear from foreign objects. Any tools or personal belongings not necessary on the machine should be removed or firmly secured.

This machine and its attachments should be operated exclusively by qualified operators sitting in the driver's seat.

Your safety and safety of those working with you depends on your care and wisdom in operating the machine. It is necessary to be thoroughly acquainted with the location and function of all controls and with stability features of the unit before operating it.

Before starting the machine, adjust and lock the seat to obtain maximum riding comfort and control accessibility.

At low external temperatures, it is necessary to carry out the correct hydraulic oil warm up. When the hydraulic oil is cold, the hydraulic functions are slow. Do not operate the machine until the hydraulic functions present standard cycles.

Before moving off or operating the attachments, ensure that nobody is within the machine operating range. Before getting on, walk all around the machine to inspect it. Sound the horn.

Keep people clear of the attachments when in the raised position to prevent any possible personal injury.

Never operate the machine and its attachments from any position other than from the driver's seat. Under all circumstances keep your head, body, limbs, hands, and feet inside the operator's compartment to minimise the risk of exposure to external dangers.

Check the engine exhaust system for leaks.

During night work, use all lights available. During the day, check if any lamp is burned and replace it immediately.

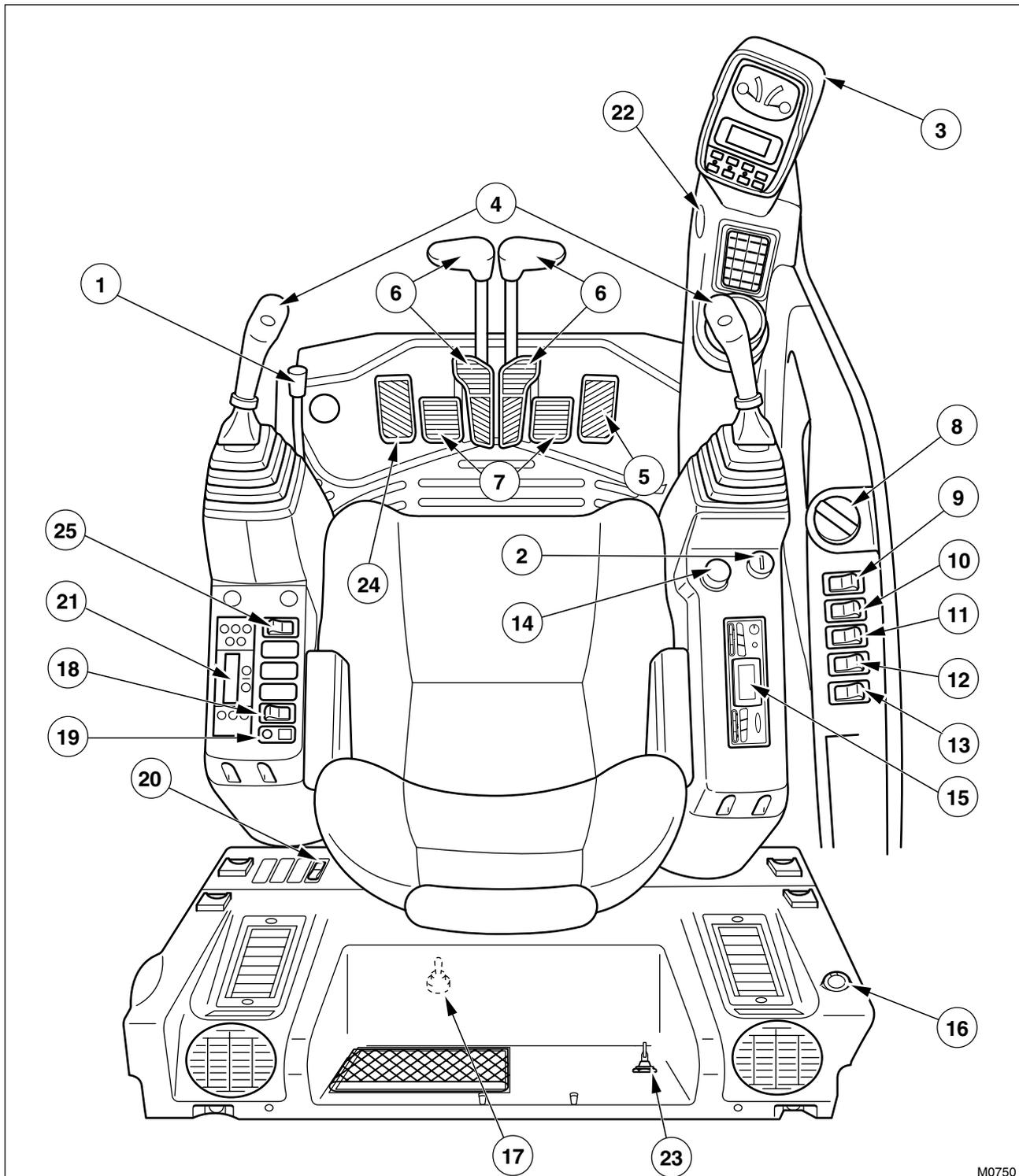
Never leave the machine unattended with the engine running.

Before leaving the driver's seat and after ensuring that nobody is near the machine, slowly lower the attachment and rest it safely onto the ground.

Bring auxiliary attachments, if any, to the closed safety position. Move all controls to the neutral position. Move engine controls in the shutdown position. Move the safety lever to **LOCK** and switch off the key-start switch.

Never park the machine downhill without carefully blocking it to prevent unexpected movement.

INSTRUMENT AND CONTROLS



M0750

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Safety lever 2. Starter switch 3. Monitor 4. Control levers 5. Triple articulation version: positioner cyl. pedal Monobloc version: hammer/crusher pedal. 6. Travel pedals and levers 7. Footrest 8. Engine speed hand control knob 9. Work light switch 10. Cab work light switch (optional) 11. Load momentum alarm switch (optional) 12. "Quick coupling" switch (optional) | <ul style="list-style-type: none"> 13. "Heavy Lift" switch (optional) 14. Cigarette lighter 15. Radio 16. Socket 12 Volt 17. Parking brake release switch 18. "Engine Diagnostics" switch 19. "Engine Diagnostics" indicator 20. Hydraulic system pressure release switch 21. Climate system panel 22. Hourmeter 23. Hydraulic theft prevention (optional) 24. Triple articulation version: hammer/crusher pedal 25. "Travel Independence" Switch |
|--|--|

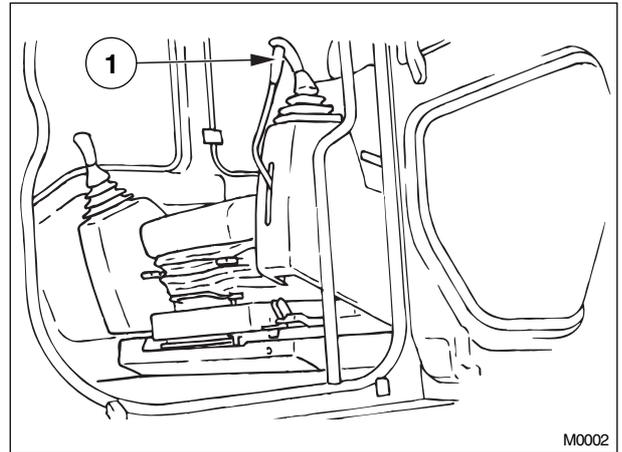
Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual

SAFETY LEVER

The safety lever (1) is used to disable travel and swing controls and the attachment movements.

It has two positions:

- When in the **LOCK** position with the machine stationary and the engine running or stopped, it prevents the possibility of machine unexpected movements if the control levers/pedals are accidentally moved;
- When in the **UNLOCK** position, the safety lever enables the operation of all controls. Therefore, to control and operate the machine, the lever should be moved to this position.



Lock position



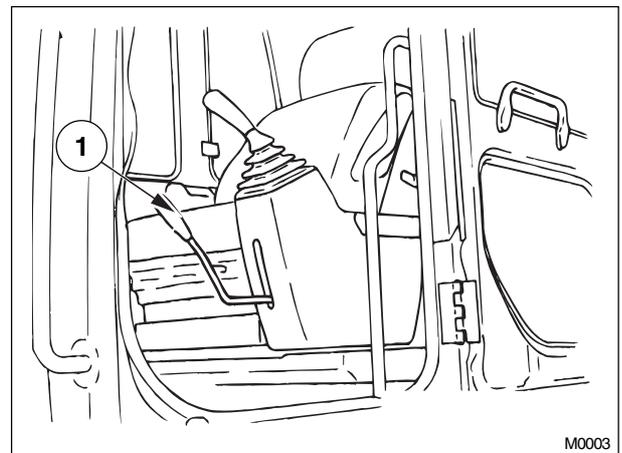
WARNING

*Before starting the engine, ensure that the safety lever in the **LOCK** position (vertical).*



WARNING

*When the machine is parked or upon leaving it for whatever reason, always ensure that the safety lever in the **LOCK** position (vertical).*



Unlock position

STARTER SWITCH

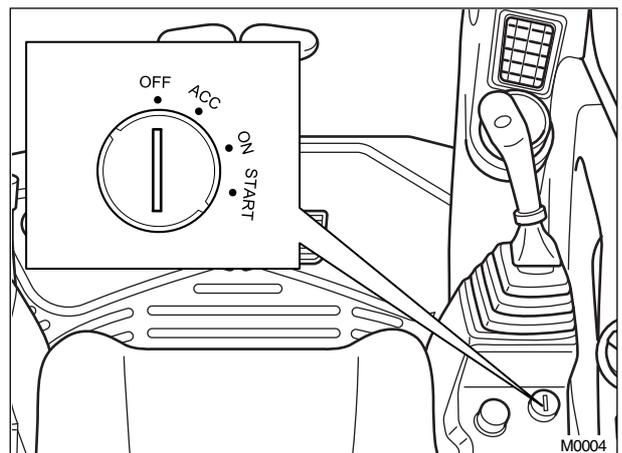
The starter key is located on the right control panel and has 4 positions:

"OFF": When the key is moved onto this position, the engine is cut-off and the electric system is deactivated after about 4 seconds.

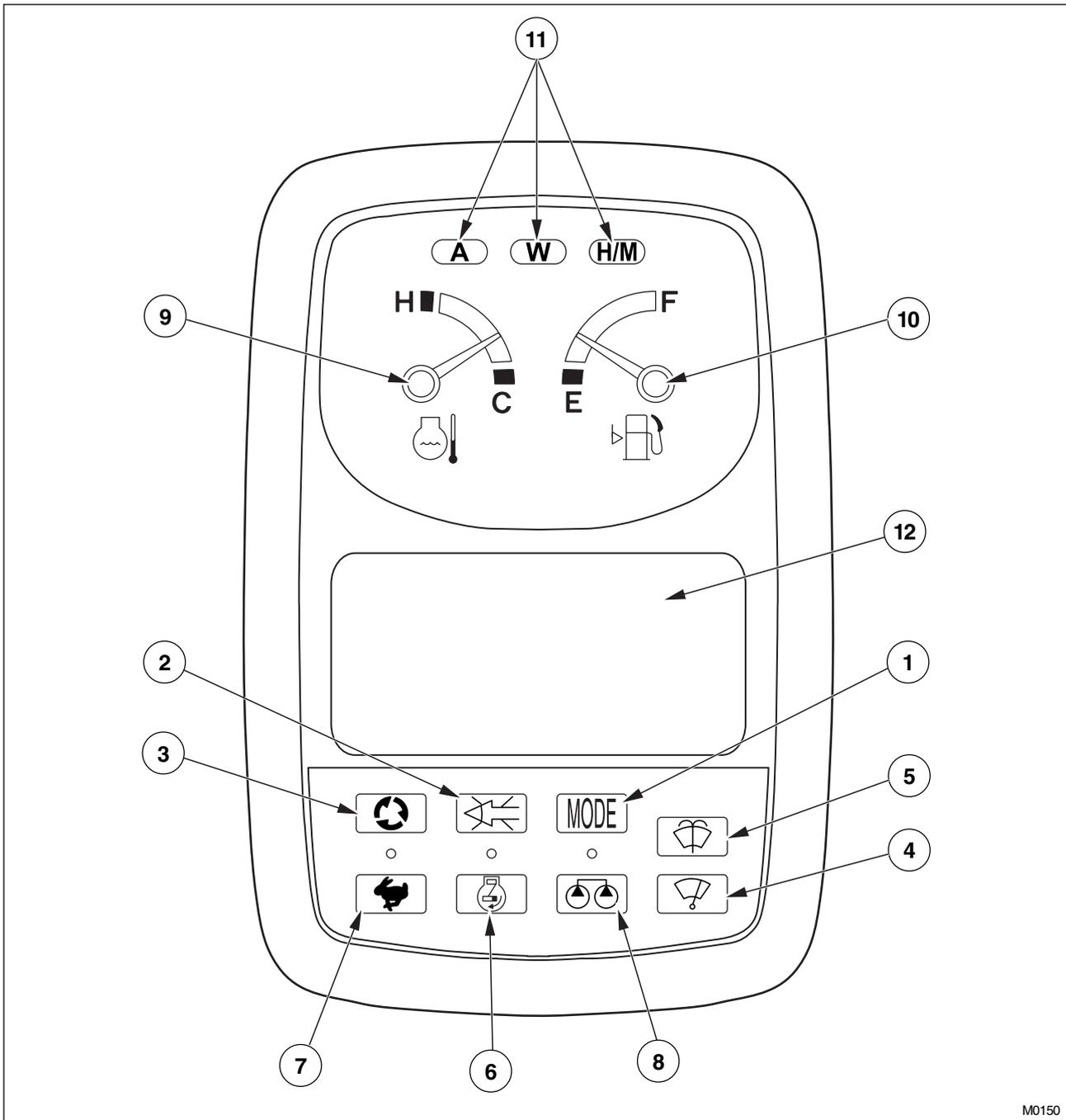
"ACC": When the key is in position **"ACC"** the cigarette lighter, the radio and the horn are energised.

"ON": With the key in position **"ON"** the entire system is energised.

"START": With the key in this position the starter solenoid is energised to start the engine. Once the engine is started, the key is released to return into position **"ON"**.



MONITOR



M0150

- | | |
|--------------------------|----------------------------------|
| 1. Work mode button | 7. Travel speed button |
| 2. Buzzer cut-off button | 8. Dual flow selection button |
| 3. Display change button | 9. Coolant temperature indicator |
| 4. Wiper button | 10. Fuel level indicator |
| 5. Washer button | 11. Work mode indicators |
| 6. Auto-Idle button | 12. Display |

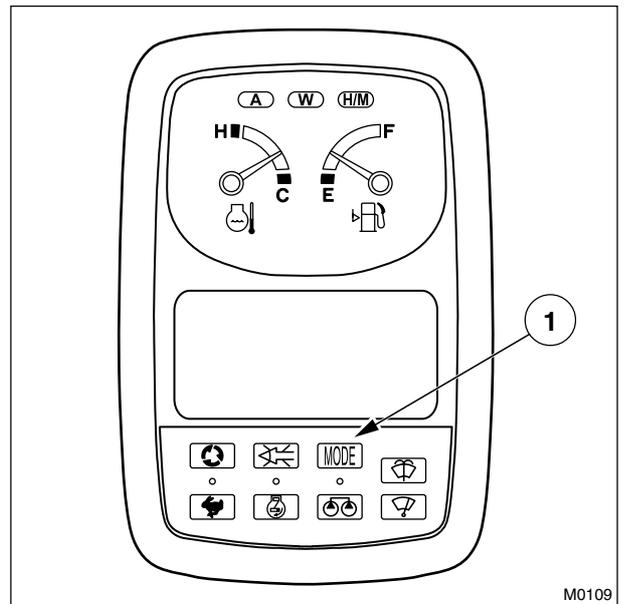
Work mode button



Work mode button (1) provides the selection of one of the 3 work operating mode as a function of the work to be performed.

When pressing repeatedly button (1) the indicators identify the work mode selected come **W**, **H/M** e **A**.

NOTE: when the engine is started, work mode **W** is automatically selected.



M0109

Mode W (Work)

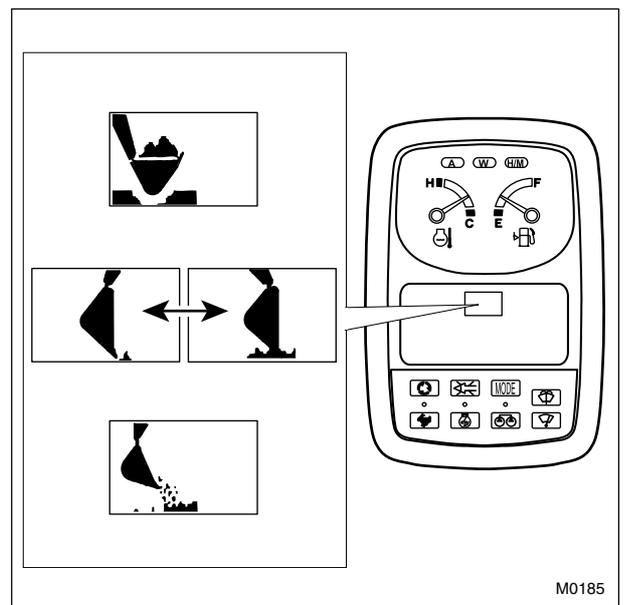


Optimised conditions in terms of performance/fuel consumption ratio.

Mode H/M (Heavy work)

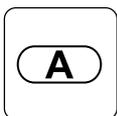


Select work mode **H/M** when a higher power is required. Also, in work mode **H/M**, the controller automatically distinguishes the type of operation being performed (digging, grading, spreading) automatically regulating the power (engine rpm) and speed (flow). The result of this distinction is visualised by the display of the monitor.



M0185

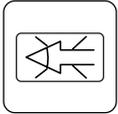
Mode A (Equipment)



In work mode **A** it is automatically activated once the optional attachment pedal is actuated. Once the optional attachment pedal is released into neutral position, the work mode previously selected is automatically reset. However, it is possible to select manually work mode **A** using the Work Mode button. The monitor displays the value of the pre-set maximum flow.

NOTE: depending upon the type of attachment installed, it is possible to modify the value of the pre-set maximum flow. For such operation, please contact a Dealer.

Buzzer cut-off button

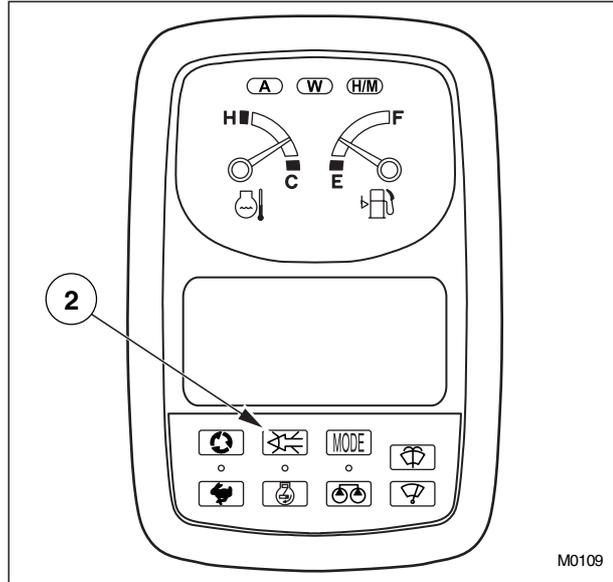


The alarm buzzer sounds in the event of:

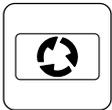
- insufficient engine oil pressure. The display on the monitor shows the relevant engine oil insufficient pressure indicator. After about 5 minutes the engine is automatically cut-off.
- Excessive engine coolant temperature. The display on the monitor shows the coolant excessive temperature indicator.

NOTE: the buzzer cannot be cut-off when the engine oil pressure is insufficient.

IMPORTANT: when the engine coolant temperature is high, press button (2) to cut-off the buzzer, immediately reduce the load and reduce the rpm of the engine to low idle. If the overheating persists, cut-off the engine, wait for a few minutes, then check the coolant level.



Display change button



With starter key in position "ON" or with engine running, each time display change button (3) is pressed, the display of the monitor shows the following data in sequence:

| |
|----------|
| 1515 RPM |
|----------|

Engine rpm.

| | |
|-------|--------|
| 256Hr | AFT |
| E/G | OIL CH |

Time elapsed since the last engine oil change.

| | |
|-------|--------|
| 256Hr | AFT |
| FUEL | FIL CH |

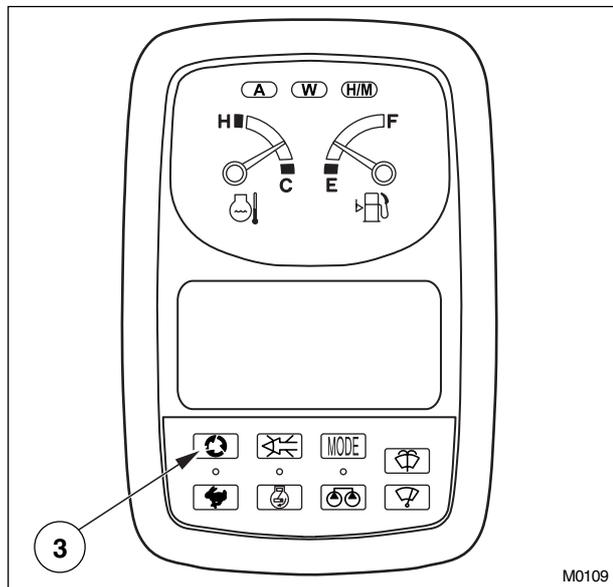
Time elapsed since the last fuel filter change.

| | |
|-------|--------|
| 256Hr | AFT |
| HYD | FIL CH |

Time elapsed since the last hydraulic oil filter change.

| | |
|--------|--------|
| 1920Hr | AFT |
| HYD | OIL CH |

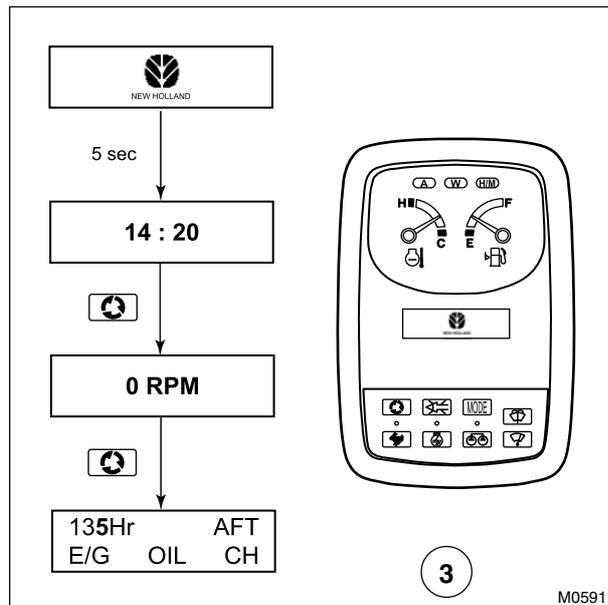
Time elapsed since the last hydraulic oil change.



Change/Zeroing of the engine oil cumulative time

IMPORTANT: *the visualisation or the change of cumulative times can be performed with engine in operation as well.*

- Turn the starter key into position "ON". The monitor shows the self-check indicator and after 5 seconds, the clock.
- Press display change button (3) until the display of the monitor shows the time of the engine oil cumulative time.
- Keep display change button (3) pressed and release it after 5 - 10 seconds to enter the change mode.
- Press button "MODE" (1) to increment the cumulative time at 1 hour intervals. Press buzzer cut-off button (2) to decrement the cumulative time at 1 hour intervals.
- To memorise the cumulative time selected, press display change button (3). The monitor shows the subsequent display.

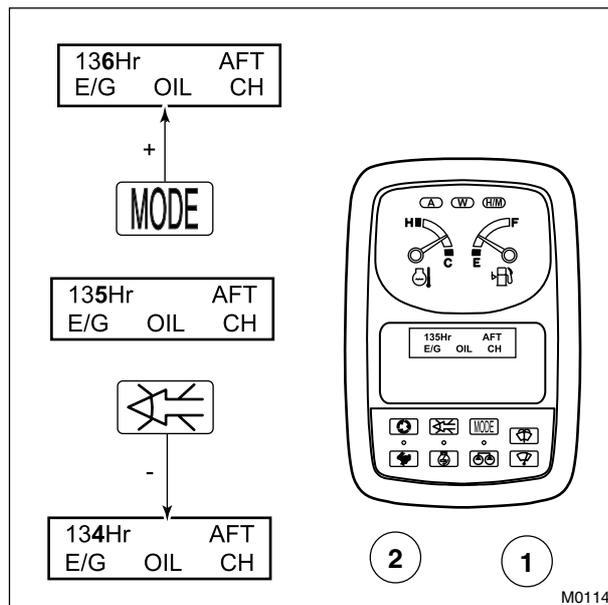


NOTE: *once 500 hours work are reached, the display shows the engine oil change indication. Then, proceed with the change of the oil. (See chapter "500 HOURS WORK MAINTENANCE" paragraph "ENGINE OIL AND FILTER").*

By pressing buzzer cut-off button (2) the engine oil cumulative time is zeroed and the indicator goes OFF.

NOTE: *to change the work time of the fuel filter, the hydraulic filter or the hydraulic oil, follow the same procedure described for the engine oil, selecting the relevant display.*

IMPORTANT: *no warning indicators are available for the fuel filter, hydraulic oil filter and hydraulic oil. Check periodically the displays so that the maintenance procedures to be performed can be established.*



Wiper button



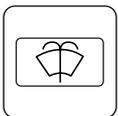
When wiper button (4) is pressed, the front wiper is activated.

It is possible to select two operating modes:

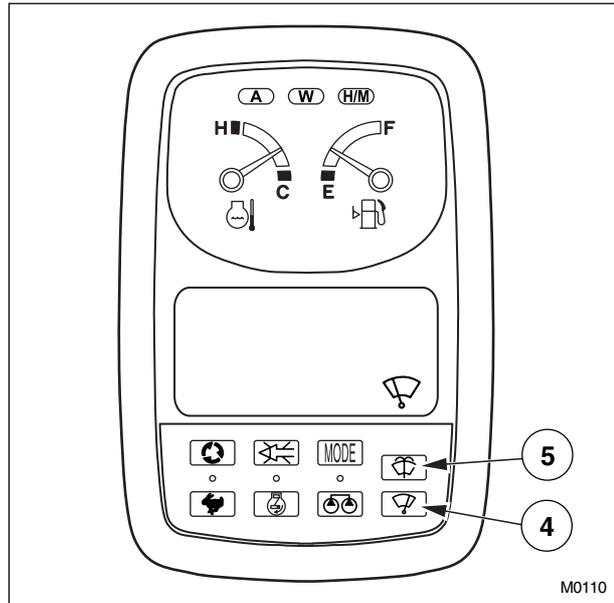
1. Intermittent: press button (4) once.
2. Continuous: press button (4) twice.

To cut-off the wiper, press button (4) until the relevant indicator on the monitor display disappears.

Washer button



Press washer button (5) to activate the washer for the time it is kept pressed. The wiper is automatically activated.



M0110

IMPORTANT: Make sure the windscreen washer tank is filled before actuating the washer.

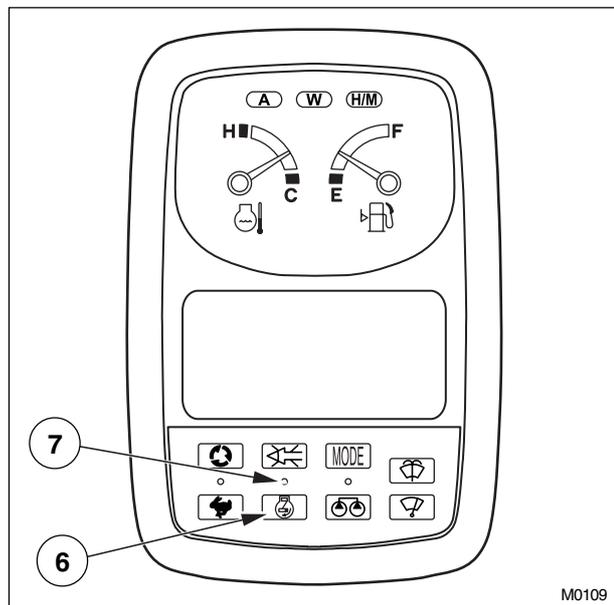
Auto-Idle button



With the engine running, press Auto-Idle button (6) to bring the engine to the pre-set automatic idle speed, reducing the noise and the fuel consumption. This speed is reached after about 5 seconds, providing none of the control levers is actuated.

The activation of the Auto-idle function is indicated on the monitor by the lighting of the relevant indicator (7).

NOTE: when one of the control levers is actuated or the Auto-idle function is cut-off, the engine speed progressively returns to the value established by the position of the manual throttle.



M0109

To deactivate the Auto-idle function, press button (6) again. The relevant indicator (7) goes **OFF**.

Travel speed button



WARNING

Avoid shifting to fast travel speed when descending a slope or during the loading/unloading phase on a trailer: it could create a dangerous situation.

Two travel speeds can be selected pressing travel speed button (8):



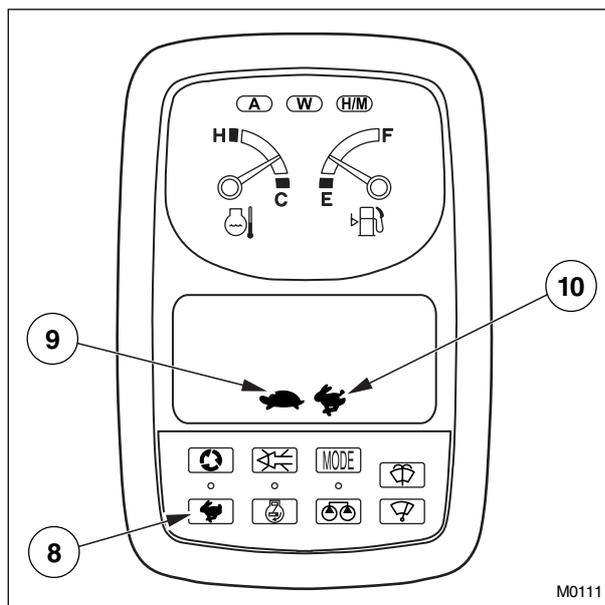
SLOW: select the slow travel speed when the machine is on uneven or soft ground or when a high pulling capacity is required.



FAST: select the fast travel speed when the machine is on hard ground or flat.

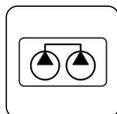
The travel speed selected is indicated on the display of the monitor by the relevant indicators (9) and (10).

NOTE: when starting the engine, the travel speed is automatically selected on "SLOW".



M0111

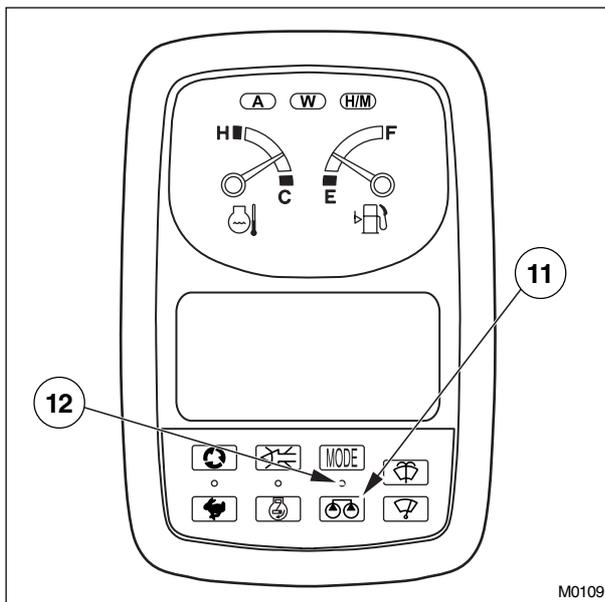
Dual flow selection button



Press dual flow selection button (11) when an attachment requiring a flow larger than the one provided by a single pump (ex, demolition crusher). This function, in fact, provides the combination of the flow of both equipment pumps.

To activate the dual flow function, keep button (11) pressed for at least 8-10 seconds.

The activation of the dual flow function is indicated on the monitor by the lighting of the relevant indicator (12).



M0109

Coolant temperature indicator

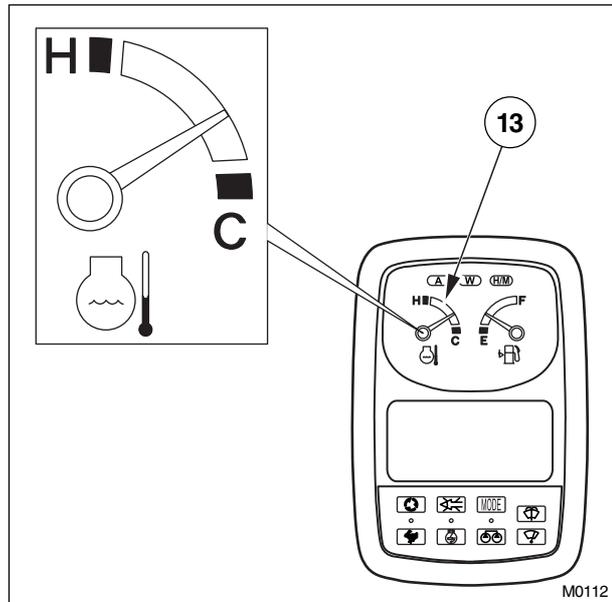
Indicator (13) shows the temperature reached by the engine coolant.

The dial of the instrument located in the white zone indicates a normal operating temperature.

The location of the dial on the red zone indicates an excessive temperature of the engine coolant.

IMPORTANT: *if the indicator dial is located in the red zone, the display of the monitor shows the relevant warning indicator and the buzzer sounds at the same time. In this case, press the buzzer cut-off button, stop temporarily the operations and bring the engine at low idle.*

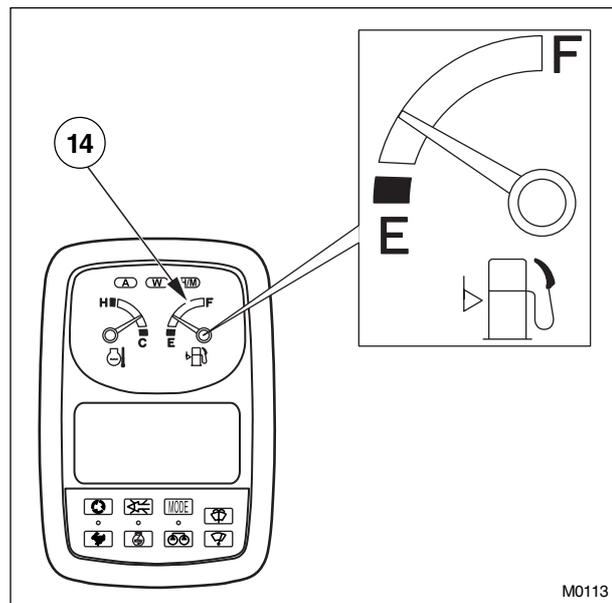
In the event the overheating continues, cut-off the engine, wait for a few minutes, then check the coolant level.



Fuel level indicator

Indicator (14) shows the quantity of fuel present in the tank.

In the event the quantity of fuel is insufficient, the display on the monitor shows the relevant warning indicator. In this case refuel the machine.



Warning indicators

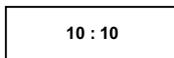
IMPORTANT: *monitor carefully the warning indicators and the relevant descriptions so that it is possible to identify quickly possible abnormal conditions and provide at once to their elimination.*

Self-check



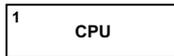
When the starter key is positioned onto "ON" all the systems and components of the machine are checked by the CPU and, when found in good operating condition, this icon is shown. It stays on the display for 5 seconds.

Clock



This icon appears, with the current time, once the self-check icon is switched off.

CPU icon



This icon appears on the display when a problem occurs in the **I.T.C.S.** (Intelligent Total Control System). Turn the starter key into "OFF" and then to "ON" again to attempt the programming reset of the CPU. In the event the icon remains on the display, cut-off the engine and call the Dealer.

Swing brake disengaged icon



Turn the switch to disengage the swing brake, located behind the operator's seat, moving into the position "RELEASE", thereafter this icon appears. As long as this icon appears, the swing brake is cut-off. Consequently, this switch must be used exclusively in case of emergency. Call the Dealer.

Engine pre-heating icon



This icon appears when the starter key is moved into position "ON" and the controller recognises that the outer temperature is such that the pre-heating of the engine is required. When this icon appears, await that it goes off before starting the engine.

Pre-heating failure icon



This icon appears on the display when a trouble in the pre-heating appears. Stop the engine at once and call the Dealer.

Engine oil pressure icon



In the event the engine oil pressure is insufficient, this icon appears and the buzzer sounds. After 5 seconds, the engine is automatically cut-off. Check the engine oil level and top-up with oil complying with the prescribed specifications. This icon appears only when the alternator recharges.

Engine coolant temperature icon



In case of an excessive temperature of the engine coolant, this icon appears and the buzzer sounds. Under this condition, reduce the engine speed to idle and stop operating until the engine coolant temperature drops to normal operating values.

Engine air cleaner icon



This icon appears when the elements of the air cleaner are too dirty to ensure an adequate intake of air into the engine. When this icon appears, cut-off the engine and provide the cleaning or the replacement of the air cleaner.

Overload alarm icon



In the event the oil pressure in the boom circuit exceeds the pre-set value, this icon appears and the buzzer sounds. Under this circumstance, the operator is warned that he is operating under conditions of insufficient stability of the machine. The operator must reduce the flow of the equipment to return the machine within the conditions of stability.

Insufficient battery recharge icon



This icon appears when the battery recharge system does not operate adequately. In this case, it is necessary to repair at once the recharging system. The icon appears only when a problem to the recharging system occurs, with a normal engine oil pressure.

Fuel level icon



This icon appears when the fuel level in the fuel tank reaches 54 litres or less. When this icon appears, refuel at once with good quality fuel.

Hydraulic oil level icon



This icon appears when the level of the hydraulic oil in the tank drops below the normal operational value. In the event this icon appears before starting the engine, move the machine in the right position and check the level. Top-up to the correct level with oil complying with the prescribed specifications. This icon does not appear in the event an oil leakage occurs while the engine is in operation.

Engine coolant level icon



This icon appears when the coolant level is insufficient. In the event the icon appears before the engine is started, check and top-up the level in the expansion tank of the radiator and in the coolant tank. The icon does not appear when a sudden spill of coolant occurs while the alternator is recharging.

Engine oil level icon



This icon appears when the engine coolant level is insufficient. Check and top-up the level at once.

Equipment pressure increment icon



This icon appears when the "power boost" button is pressed. It appears on the display only when this device is activated during the operation of the machine.

Heavy Lift function icon



This icon is shown when the Heavy Lift button is pressed to activate the relevant function.

Engine oil change icon



This icon appears every 500 hours of operation of the machine to remind the operator that the periodic change of the oil is due.

Hydraulic system pressure discharge icon



This icon is shown when the hydraulic system pressure release switch is actuated.

Fuel filters pre-heater icon



This icon is shown when the fuel filters pre-heater function (automatic) is activated.

Presence of water in the fuel pre-filter icon

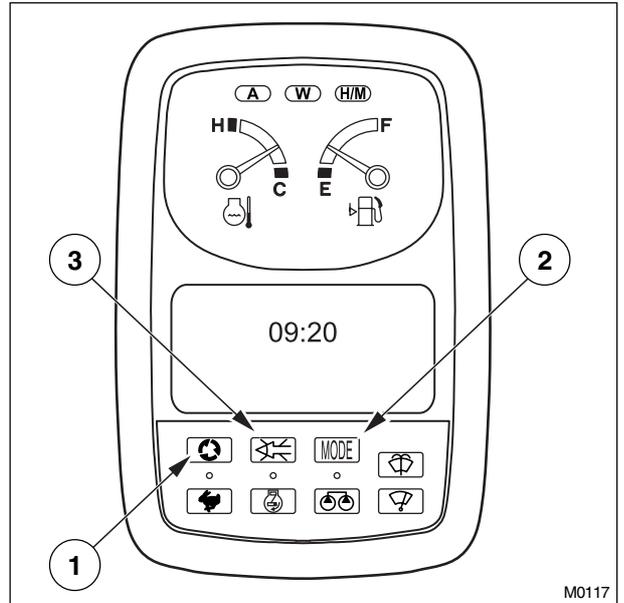


This icon is shown when there is a significant presence of water in the fuel pre-filter. In this case it is necessary to drain the water from the fuel pre-filter.

Setting the date and hour

To set the clock, proceed as follows:

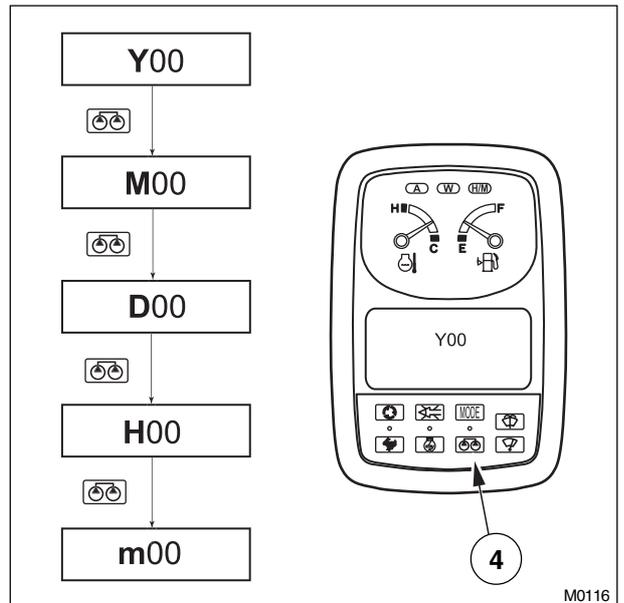
- Turn the starter key into position "ON". The display of the monitor shows the self-check icon and after 5 seconds the clock appears.
- Keep display change button (1) pressed and release it after 5 - 10 seconds to enter the change mode.
- The display on the monitor shows the digit "Y" followed by a number indicating the year.
- Press "MODE" button (2) to increment the digit by one unit. Press buzzer cut-off button (3) to decrease the digit one unit.
- Press dual flow selection button (4) to show the sequence of digits:
 "M" followed by a number indicating the month
 "D" followed by a number indicating the day
 "H" followed by a number indicating the hour
 "m" followed by a number indicating the minutes



M0117

Set the digits shown as indicated here above.

- To memorise and to exit the change mode, press display change button (1).

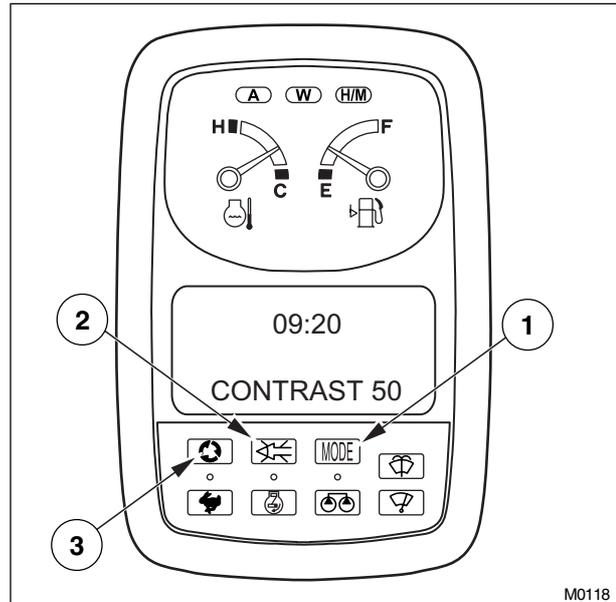


M0116

Adjusting the display contrast

To adjust the contrast of the display, proceed as follows:

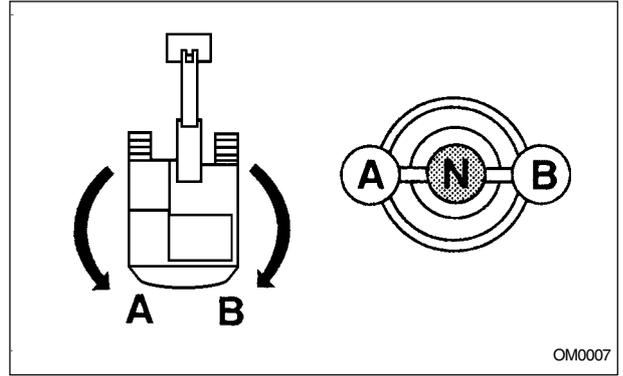
- Turn the starter key into position "**ON**". The display of the monitor shows the self-check icon and after 5 seconds the clock appears.
- Keep button "**MODE**" (1) and buzzer cut-off button (2) pressed at the same time and release them after 5 - 10 seconds to enter the change mode.
- The display shows "CONTRAST" followed by the display contrast value memorised.
- Press button "**MODE**" (1) to increment the contrast. Press buzzer cut-off button (2) to decrease the contrast.
- To memorise and to exit the change mode, press display change button (3).



LEFT-HAND CONTROL LEVER

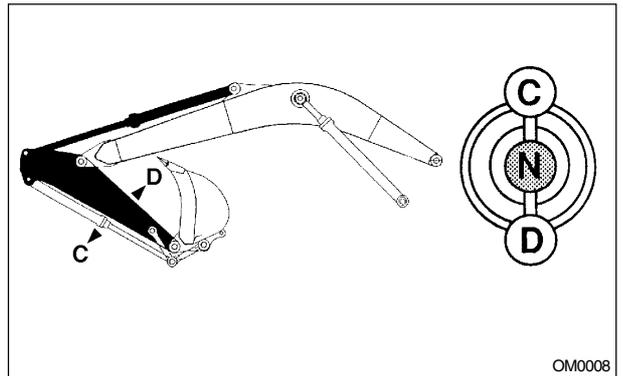
Upperstructure swing control

- N** - Neutral
- A** - Anticlockwise rotation
- B** - Clockwise rotation



Arm cylinder control

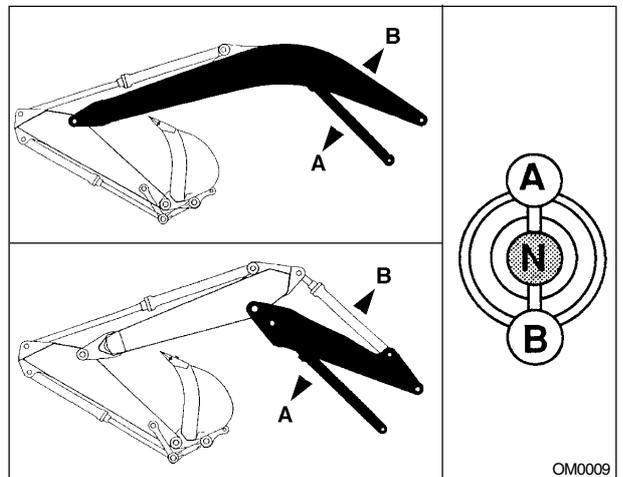
- N** - Neutral
- C** - Arm roll-out
- D** - Arm roll-in



RIGHT-HAND CONTROL LEVER

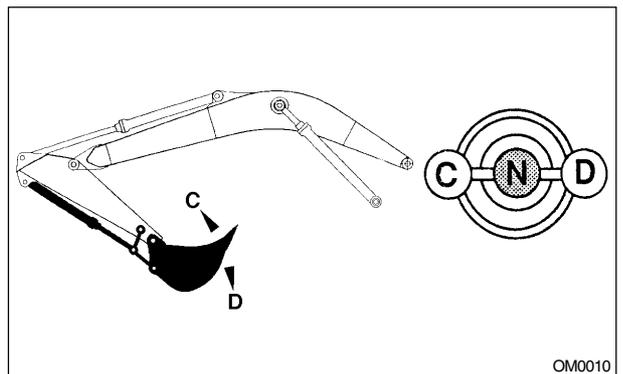
Boom cylinder control

- N** - Neutral
- A** - Boom lower
- B** - Boom raise



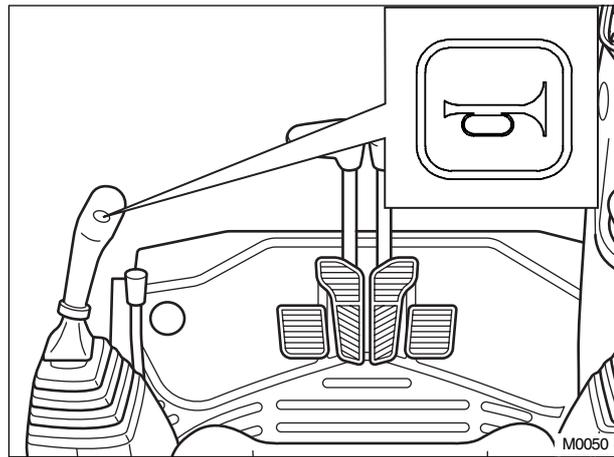
Bucket cylinder control

- N** - Neutral
- C** - Bucket roll-in
- D** - Bucket roll-out



HORN

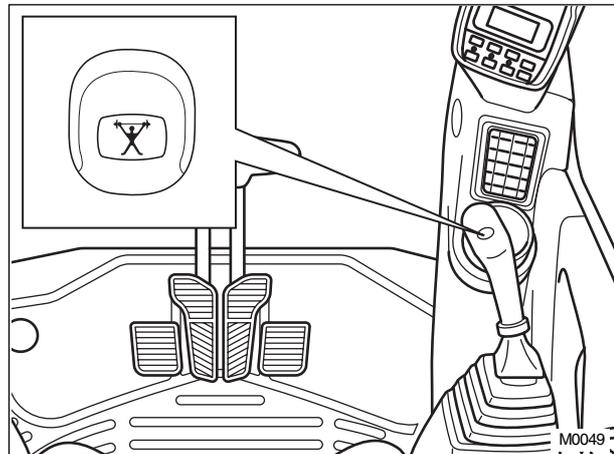
The horn control button is located on top of the left-hand lever handle. Press to sound.



POWER BOOST

The power boost button, located on the top of the right-hand lever handle, is used to provide a boosting of the power, thus to reach maximum force in digging operations.

NOTE: *the power boost control is effective during the arm retraction, bucket filling and boom raising operations.*



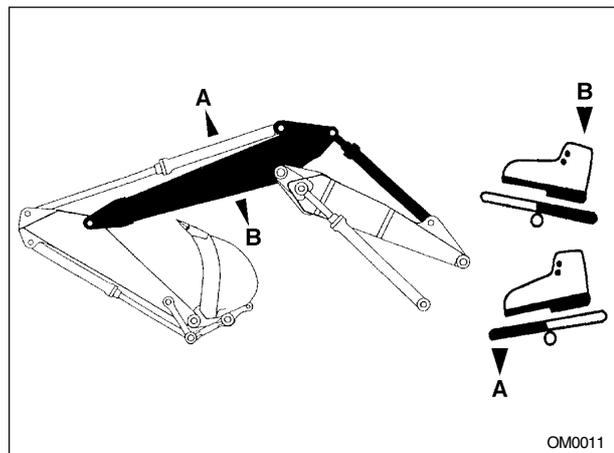
**POSITIONER ROCKER FOOT CONTROL
(triple articulation version)**

- A - Lift
- B - Lower



WARNING

On machines with the triple articulation option, the bucket might come in contact with the cab.



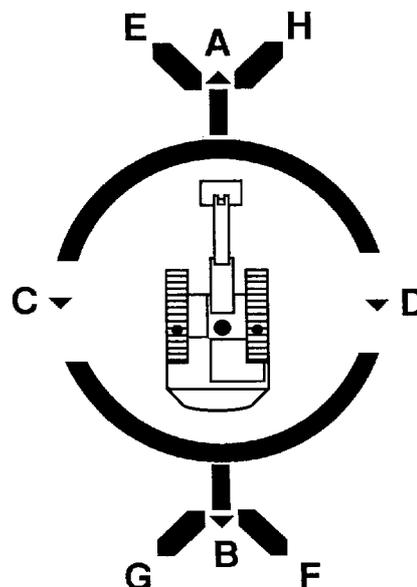
TRAVEL CONTROL PEDALS



WARNING

Standard use, provides for the travel controls at the front and travel motors at the back. Should travel motors be positioned at the front with regard to the actual travel direction, remind that controls are reversed. Always check travel motor position before moving off.

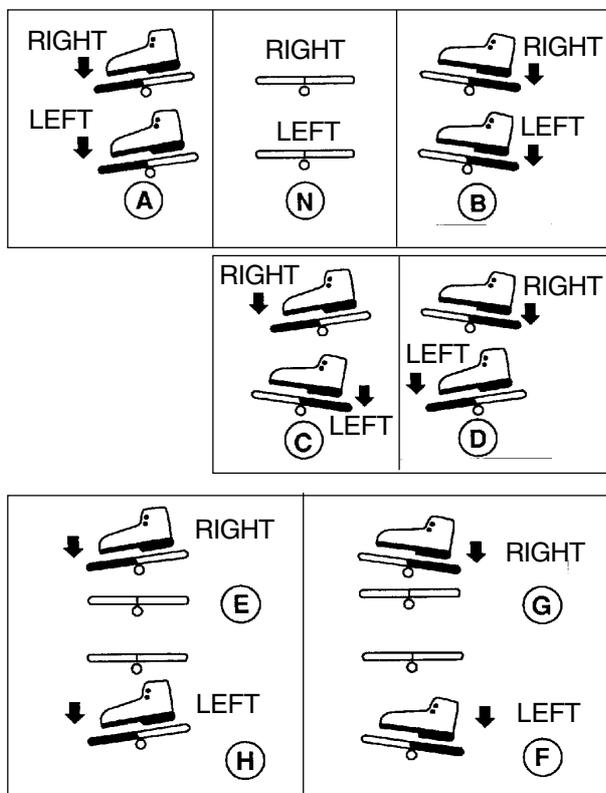
NOTE: the words **right, left, front, back, clockwise, and anticlockwise** are to be referred of the operator position properly sitting in the driver's seat.



Machine movements

- N - Neutral
- A - Tracks move forward
- B - Tracks move backward
- C - Opposite simultaneous rotation of the tracks with consequent anticlockwise (leftwise) rotation of the machine around its centre axis
- D - Opposite simultaneous rotation of the tracks with consequent clockwise (rightwise) rotation of the machine around its centre axis
- E - F - G - H - Positions to move one track only; consequently the machine steers pivoting on the stationary track.

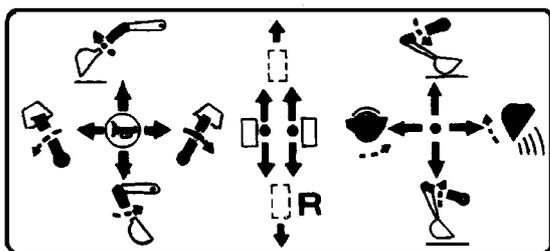
NOTE: It is possible to move the pedals shown, and consequently move the machine as desired, by moving the corresponding levers.



OM0006

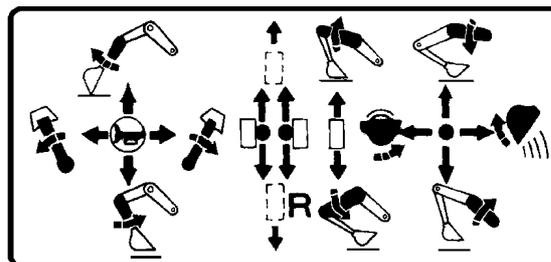
MACHINE CONTROLS PLATE (located in the cab)

Monobloc version



S0092

Triple articulation version



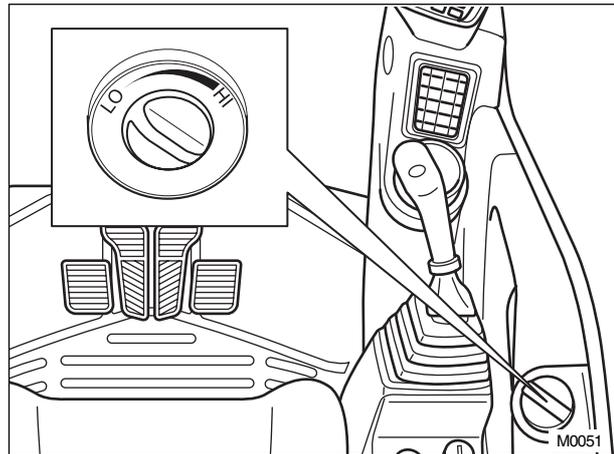
S0093

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual

ENGINE SPEED HAND CONTROL

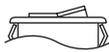
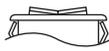
The engine speed hand control knob is used to increase or decrease engine rpm.
 Turn the knob clockwise to increase engine rpm.
 Turn the knob anticlockwise to decrease engine rpm.

NOTE: turn the engine speed control knob fully anticlockwise (engine slow idle) before stopping the engine.

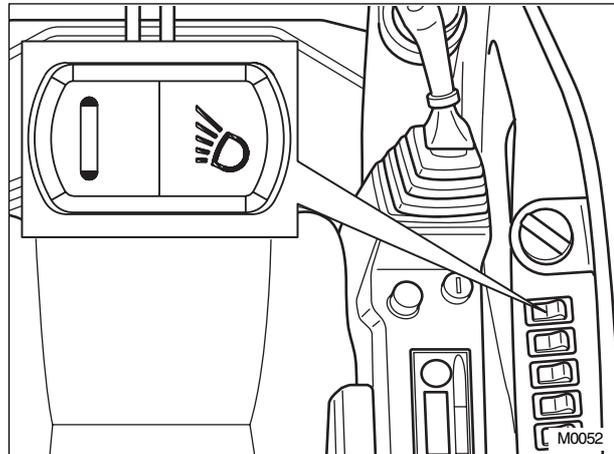


WORK LIGHTS SWITCH

The work lights switch activates the lights located on the boom and the turret.
 The switch has the following positions:

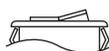
-  Position **OFF**. Both lights are inactive.
-  Position for the activation of the light located on the boom only.
-  Position for the activation of both lights.

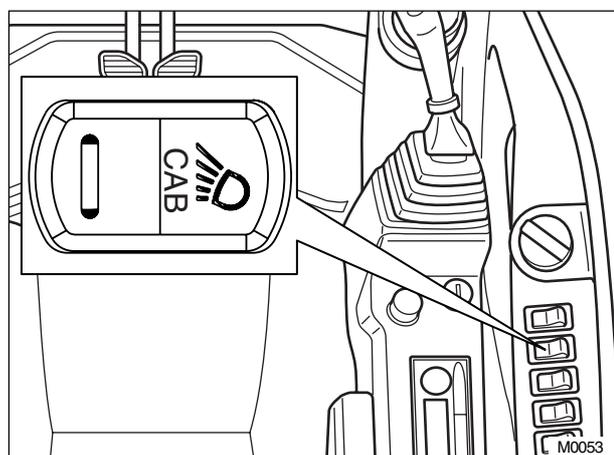
NOTE: when the lights are switched **ON**, all the indicator lights of the switches located on the right panel are activate as well.



CAB WORK LIGHTS SWITCH (Optional)

The cab work light switch activates the lights located on the top of the cab.
 The switch has the following positions:

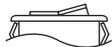
-  Position **OFF**. The three lights are inactive.
-  Position for the activation of the two front lights.
-  Position for the activation of the three lights.



**LOAD MOMENTUM ALARM SWITCH
(Optional)**

The load momentum switch activates a sound warning device in the event the load reaches the safety limit.

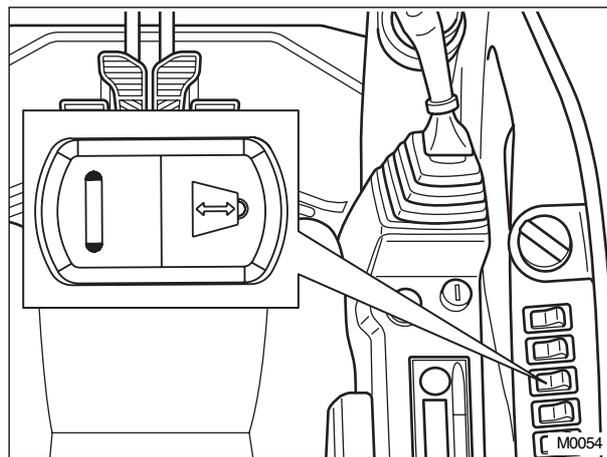
The switch can be positioned as follows:



Position **OFF**: the function is deactivated.



Position for the activation of the sound warning device.



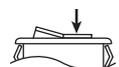
**HYDRAULIC "QUICK COUPLING" SWITCH
(Optional)**

The "quick coupling" switch actuates the hydraulic quick coupling device.

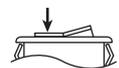
NOTE: please refer to the relevant manual for the operation of the quick coupling device.



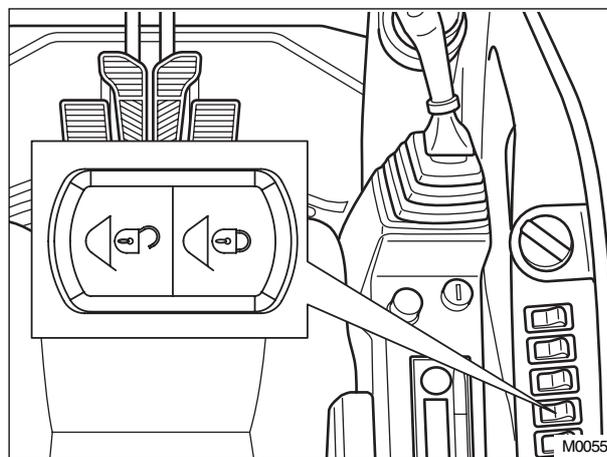
Neutral: work position.



Keep the button pressed on the right side until the coupling device is fully closed.



Keep the button pressed on the left side until the coupling device is fully open.



**"HEAVY LIFT" SWITCH
(Optional)**

The installation of the "Heavy Lift" switch is subordinated to the "object handling" variant (see page 2-64).

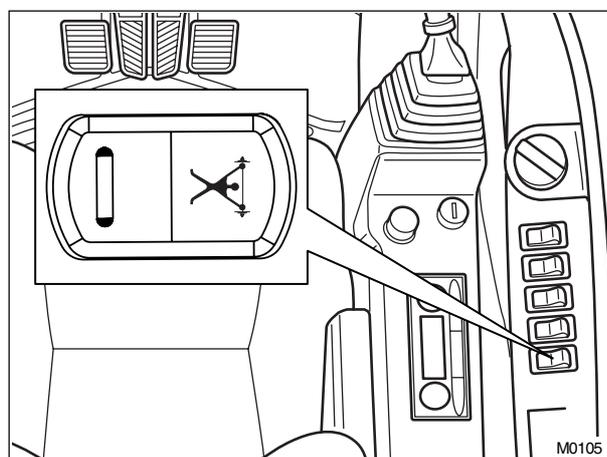
The "Heavy Load" switch actuates a device optimising the performance of the excavator during lifting operations.



Position **OFF**: function deactivated.



Position for the activation of the "Heavy Lift" device.



CIGAR LIGHTER

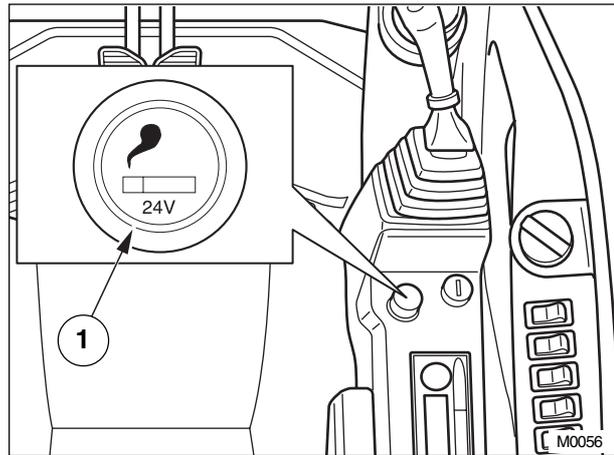


CAUTION

The cigar lighter attains very high temperatures. Always handle it with care: fire and burn hazards.

Press the control button (1). After approximately 20 seconds the button returns automatically to the previous position and the lighter is ready to be pulled out and used.

NOTE: *the cigar lighter seat can be used as a power socket for 24 V operated equipment.*

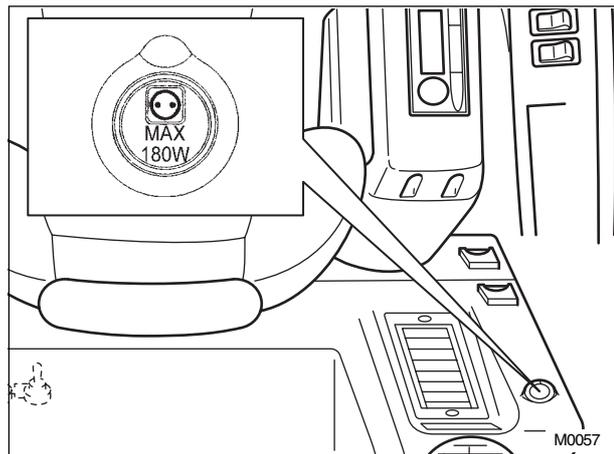


SOCKET 12 V

A socket power at 12 V is located on the right side of the rear panel.

The socket can be used to power small appliances (food heating, portable refrigerator, mobile phones, etc.).

IMPORTANT: *do not plug-in utilities requiring more than 180 W.*

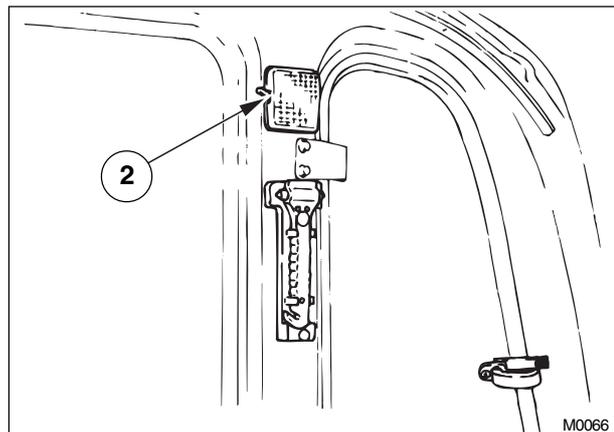


CAB INNER LIGHT

It is controlled through the switch (2) located at the side of the transparent cover.

The switch (2) has the following position:

- Downward: light OFF;
- Middle: light ON when opening the door and OFF when closing;
- Upward: light always ON.



"TRAVEL INDEPENDENCE" SWITCH

The "Travel Independence" switch (1), located on the left panel, activates a device optimising the movements of the machine during finishing operations combined with travel.

Press switch (1) to facilitate finishing operations combined with travel of the machine and the loading and unloading of the machine on trailers.

NOTE: the "Travel Independence" device is specific for finishing operations combined with travel and loading and unloading operations of the machine from the trailer. For other work operations, the machine is more efficient with the "Travel Independence" device deactivated.



SWING PARKING BRAKE RELEASE SWITCH



WARNING

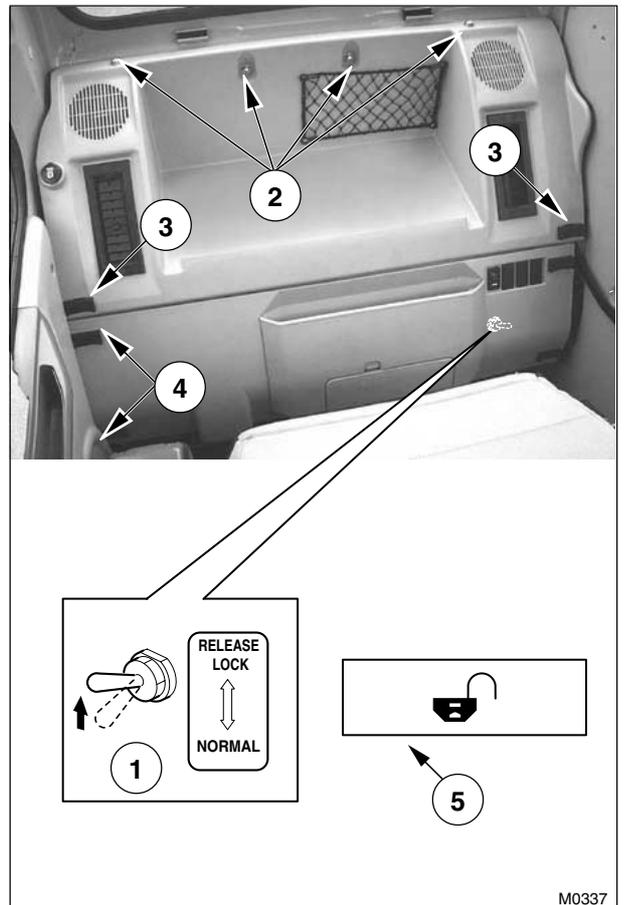
The swing parking brake release operation must be performed exclusively as a consequence of a failure of the brake release system.

Switch (1) provides the release of the swing parking brake in the event it does not occur normally during the swing operations and during the roll-in of the arm.

To reach switch (1), proceed as follows:

- Loosen securing screws (2) and remove the upper panel lifting hooks (3) making sure that the loudspeaker and 12 V socket cables are disconnected.
- Remove the lower panel lifting hooks (4) making sure that the pressure release switch cable is disconnected.

Release the swing parking brake moving switch (1) into position "RELEASE LOCK". The relevant indicator light (5) on the monitor comes ON and the buzzer sounds. Thus, it becomes possible to swing the turret, actuating the relevant control lever. Then contact a Dealer.



WARNING

Never operate with the swing parking brake deactivated. This mode must be used only to move the machine under safe conditions.

HYDRAULIC SYSTEM PRESSURE RELEASE SWITCH

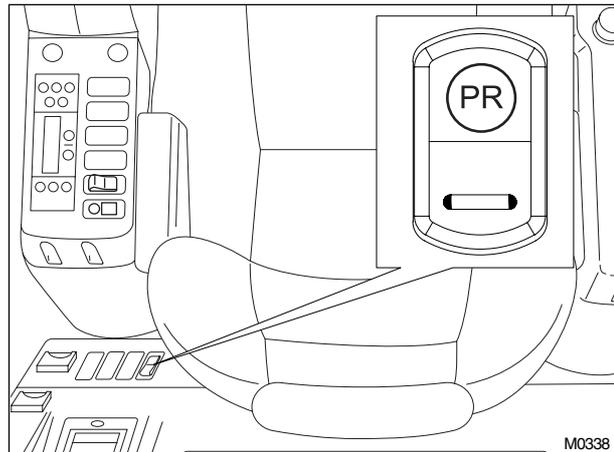
The switch, located behind the operator's seat, provides the release of the pressure inside the hydraulic system of the machine.

NOTE: *the pressure release operation must be performed with the engine running.*

To release the pressure of the hydraulic system, press switch (**PR**) to discharge the pressure upstream the control valve and actuate, afterward, the control levers to discharge the pressures downstream the control valve.

To re-instate normal operating conditions for the hydraulic system, with engine inoperative, press switch (**PR**) again to return it into inactive position.

NOTE: *the function is subject to the self-diagnosis automatic procedure. In the event the pressure discharge operation does not occur in an optimised manner, the monitor displays "PR"; in this case repeat the operation from the beginning. Should the trouble persist, call a Dealer.*

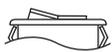


ENGINE DIAGNOSTICS SWITCH AND RELEVANT INDICATOR

The engine diagnostic switch and the relevant indicator provide the indication of possible malfunctions of the engine.

When turning the key into position **ON**, indicator light (1) comes **ON**; once the engine is started, indicator light (1) goes **OFF**.

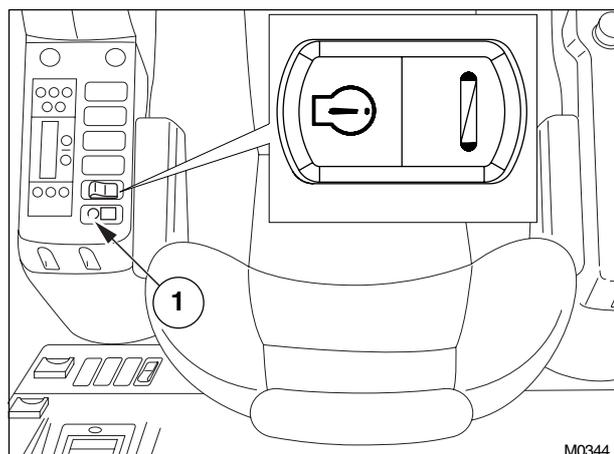
The switch can stay in the following positions:



Position **OFF**: function deactivated; indicator light (1) is **OFF**.

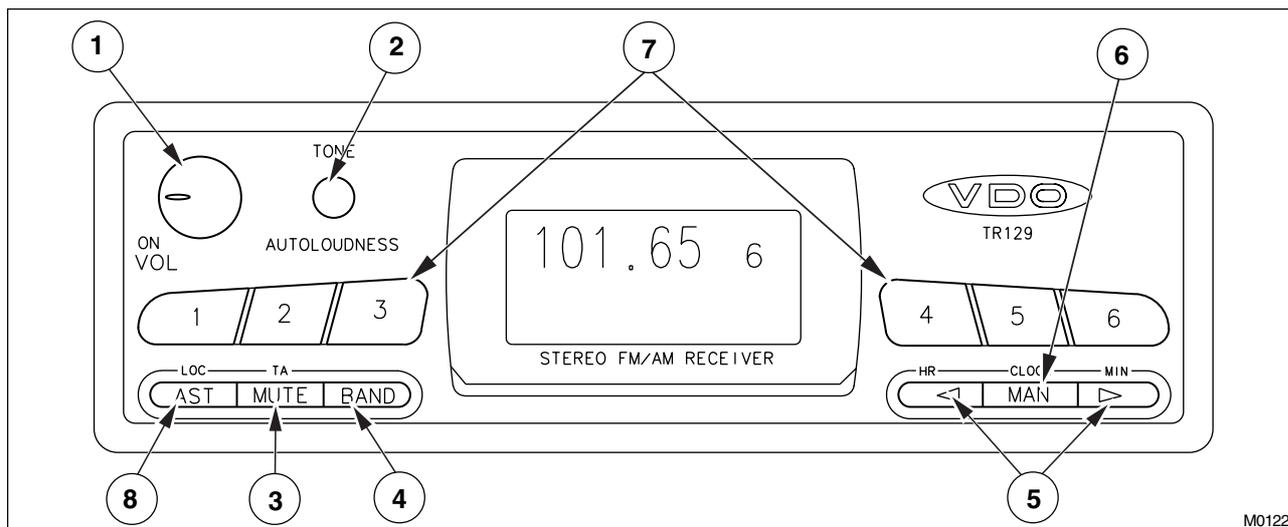


Position in which the engine diagnostics indicated by the flashing of indicator light (1) starts.



IMPORTANT: *the "engine diagnostics" switch must be used only by personnel providing maintenance/diagnostics.*

RADIO



Radio controls

1. Knob **ON/VOL**; switching on and off of the radio and volume.
2. Knob **TONE**; tone adjustment.
3. Button **MUTE**; volume cut-off and **TA** button, road traffic information messages.
4. Button **BAND**; selection of frequency bands FM (FM1-FM2-FM3), MW (MW1-MW2) and LW.
5. Buttons for the selection of stations and clock setting.
6. Button **MAN**; manual selection of frequency.
7. Buttons (1-6) station selection/memorisation.
8. Button Autostore; automatic frequency selection.

IMPORTANT: *pay special attention to prevent the spillage of liquids in the zone marked by decal (A). Also, avoid using detergent liquids or steam to clean the same zones. Never use alcohol or alcohol based products.*

Switching on and off the radio and adjusting the volume

To switch on the radio, turn knob **ON/VOL (1)** clockwise.

Adjust the volume turning knob **ON/VOL** as follows:

- Clockwise rotation: Increasing the volume
- Anticlockwise rotation: Decreasing the volume

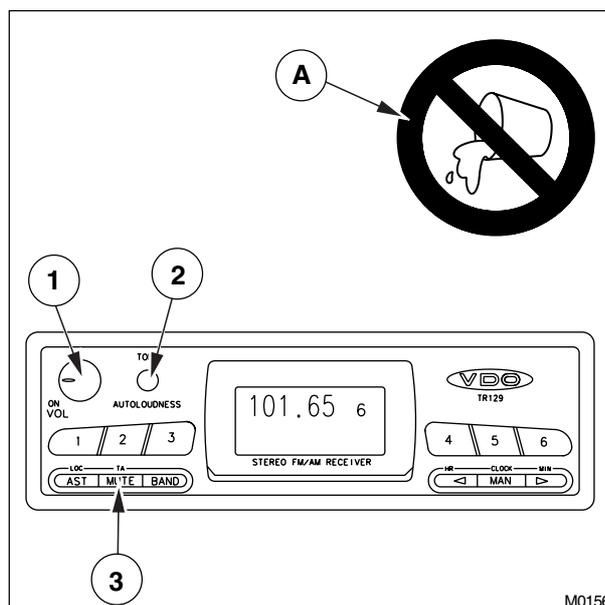
NOTE: *it is possible to cut-off the volume by pressing button **MUTE (3)**. The display shows "MUTE". To re-instate the volume set by the **ON/VOL (1)** knob, press button **MUTE (3)** again.*

To cut-off the radio, turn knob **ON/VOL (1)** anticlockwise.

Tone adjustment (treble/bass)

The tone adjustment is obtained by turning knob **TONE (2)** as follows:

- Clockwise rotation: Increasing the treble tones.
- Anticlockwise rotation: Increasing the bass tones.



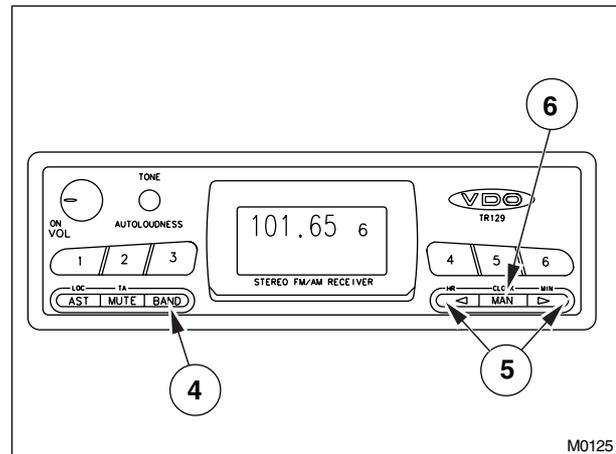
Selection of frequency bands

It is possible to select the FM frequency bands (3 levels: FM1-FM2-FM3), MW (2 levels: MW1-MW2) and LW.

To select the frequency band desired, press button **BAND** (4). The display shows the frequency band selected.

Automatic station search

To search automatically the stations, press one of the buttons (5). The radio is automatically tuned on the next station that can be received.



Manual station search

To search manually the stations, proceed as follows:

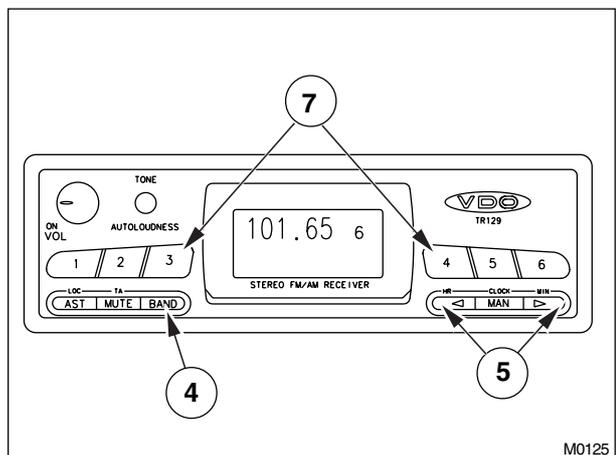
- Press button **MAN** (6). The sound signal indicates that you are in manual search mode.
- Select the station desired pressing one of the buttons (5).

NOTE: *the radio returns automatically into automatic search after about 1 minute, with a sound signal.*

Station memorisation

To memorise stations, proceed as follows:

- Select the frequency band using button **BAND** (4).
- Select the station desired pressing one of the buttons (5).
- Keep one of the six buttons (7) on which the radio station is going to be memorised for at least 2 seconds. The sound signal indicates that the station has been memorised.



Recalling a memorised station

To recall one of the stations memorised, proceed as follows:

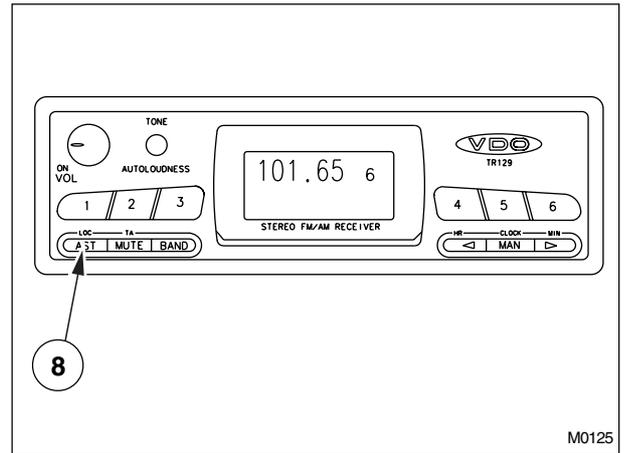
- Select the frequency band using button **BAND** (4).
- Press one of the six buttons (7) corresponding to the station desired.

Automatic station memorisation (Autostore)

Using the "Autostore" function it is possible to memorise automatically six stations in the FM3 frequency band and six stations in the MW2 frequency band.

To memorise automatically the stations, press button **AST** (8). The display shows "AST". The sound signal indicates that the memorisation is completed.

NOTE: by performing the automatic memorisation, all the stations previously memorised are cancelled on levels FM3 and MW2.



M0125

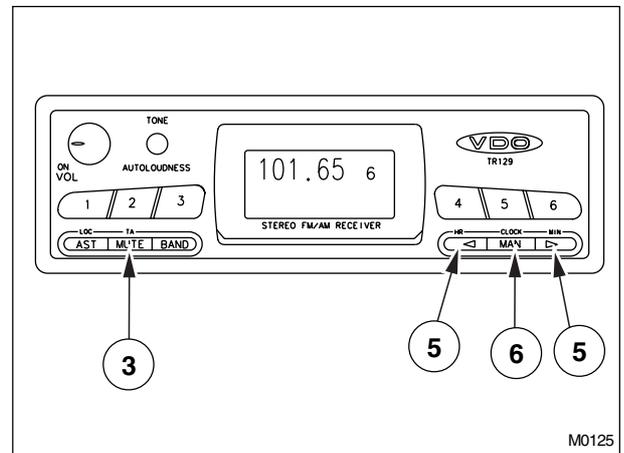
Clock

The radio is equipped with a digital clock. To visualise the digital clock, keep button **MAN** (6) pressed for about two seconds.

To set the hour, proceed as follows:

- Keep pressed at the same time, button **MAN** (6) and button **MIN** (5) to set the minutes.
- Keep pressed at the same time, button **MAN** (6) and button **HR** (5) to set the hours.

NOTE: to return to the frequency visualisation, keep button **MAN** (6) pressed.



M0125

Reception of road traffic messages

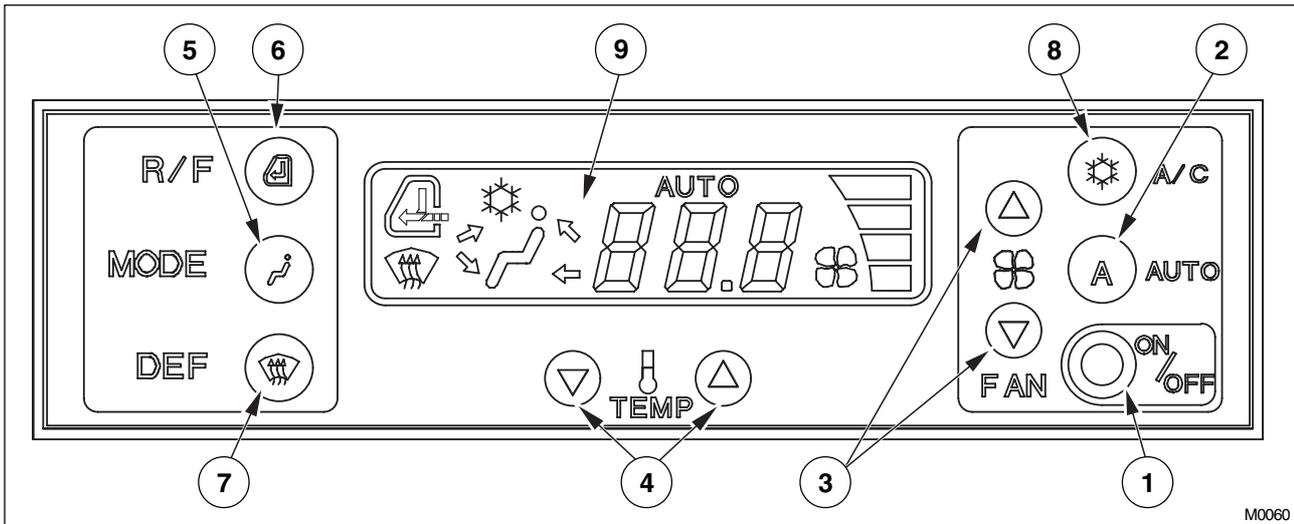
For the reception messages related to road traffic, keep button **MUTE** (3) pressed for 2 seconds.

The priority function for road traffic messages is activated when the display shows "TA".

NOTE: in the event the station tuned does not provide the reception of road traffic messages, the display shows "NO TA" and the radio tunes automatically on the next station providing such function.

To deactivate the function for the reception of road traffic messages, keep button **MUTE** (3) pressed again for at least 2 seconds.

CLIMATE CONDITIONER SYSTEM



- | | |
|--------------------------------------|-----------------------------------|
| 1. On/Off button | 6. Air recirculation button |
| 2. Automatic control button | 7. Defrost button |
| 3. Fan speed regulation button | 8. Air conditioner control button |
| 4. Temperature setting button | 9. Display |
| 5. Air distribution selection button | |

Operation instructions

IMPORTANT: pay special attention to prevent spilling liquids in the zones marked by plate (A). Also, do not use detergent liquids nor steam to clean the same zones. Never use alcohol or alcohol based products.

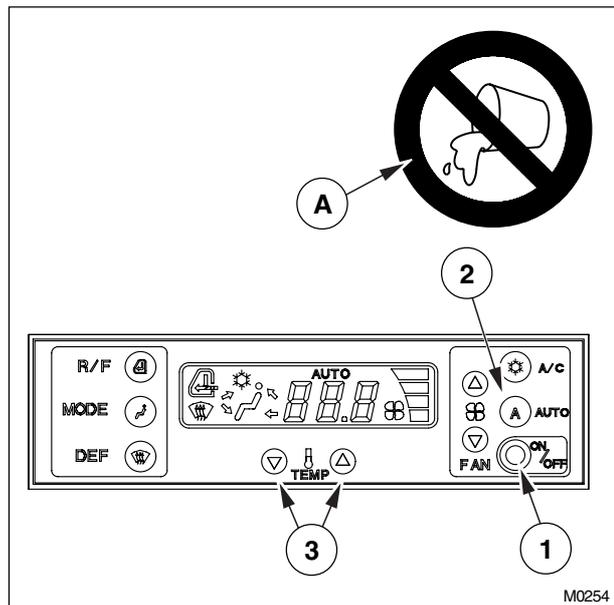
NOTE: prior to activating the air conditioner, close the cab door and the windows to obtain a better performance.

To start the climate conditioner system, press the **ON/OFF** button (1).

The functions of the climate conditioner can be manually set, by actuating the function buttons, or automatically using button "**AUTO**" (2).

To operate the climate conditioner system in automatic mode, proceed as follows:

- Press button "**AUTO**" (2). The display shows the wording "**AUTO**". In this mode, the ventilation and the air distribution are automatically regulated.
- Set the desired temperature (the temperature range is a 18 °C through 32 °C - 64 F° through 90 °F) using buttons (3). Thus the system gradually changes the temperature until the set value is reached.

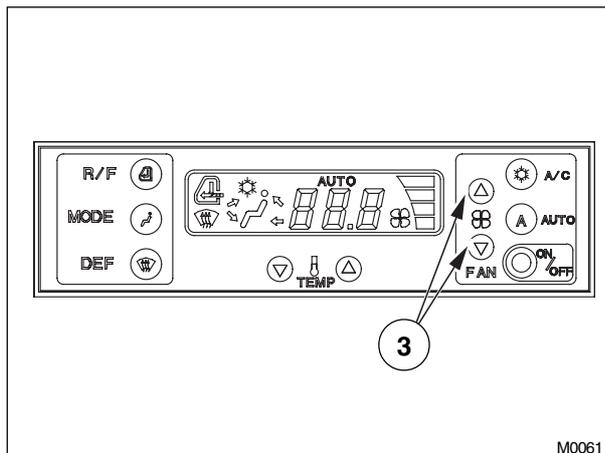
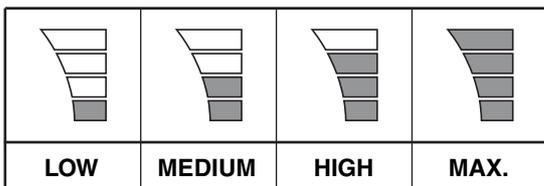


NOTE: during the operation in automatic mode, it is possible to change the ventilation speed and the distribution of the air. In this manner the "**AUTO**" function is deactivated until the relevant button is pressed again.

Fan speed regulation buttons

NOTE: if the fan speed setting buttons (3) are actuated while the climate conditioner is in "AUTO" mode, this is switched OFF.

Buttons (3) provide the regulation of the quantity of air flowing from the ducts.
The quantity of air flowing out the ducts is indicated by the display as follows:

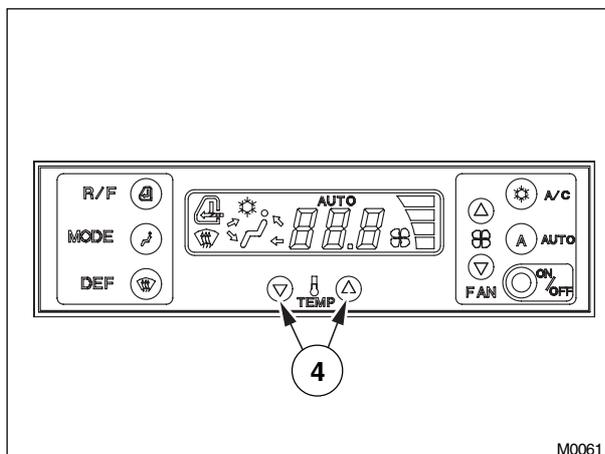


M0061

Temperature setting buttons

Buttons (4) provide the setting of the desired temperature in the cab.
The range of the temperatures that can be selected is 18 °C (64 °F) through 32 °C (90 °F).
When buttons (4) are pressed, it is possible to increase/decrease the temperatures by 0,5 °C (0,9 °F) steps.

NOTE: when temperature setting buttons (4) are pressed simultaneously it is possible to switch the reading of the temperature on the display from °C to °F and viceversa.



M0061

Air distribution selection buttons

Button (5) provides the manual choice of one of the 4 air distribution positions in the cab.
The air distribution is indicated on the display as follows:



Air output from the ducts located behind the operator's seat.



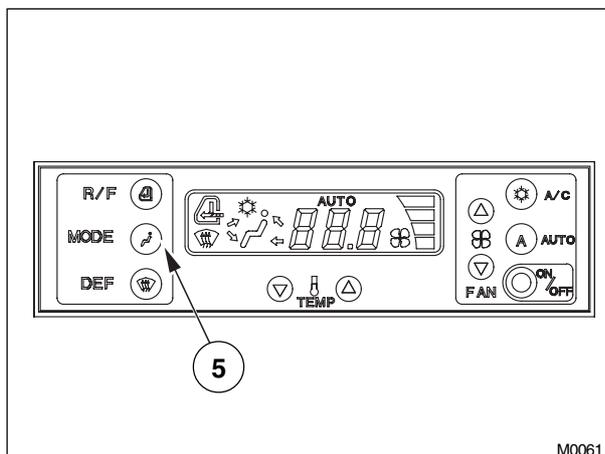
Air output from the ducts located behind the operator's seat and the lower zone of the seat.



Air output from the duct located in the lower zone of the seat.



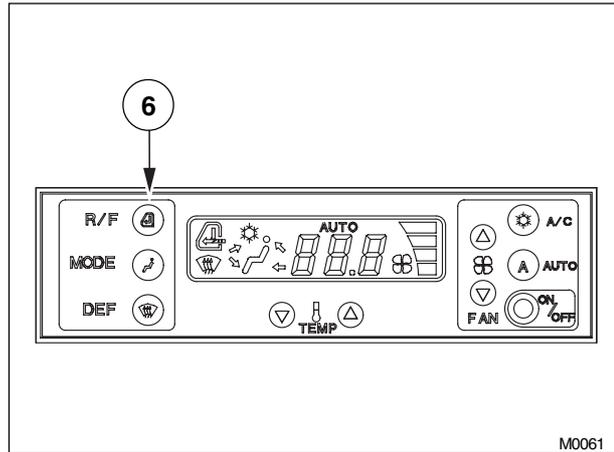
Air output from the duct located under the control monitor.



M0061

Air re-circulation button

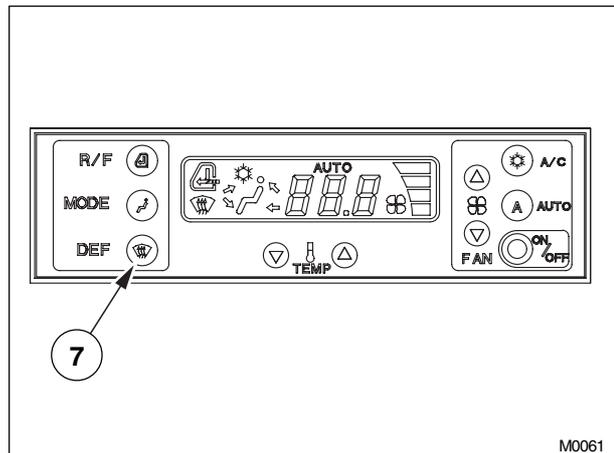
Button (6) provides the setting of the re-circulation of the air inside the cab or the inlet of air from the outside.



Defrosting button

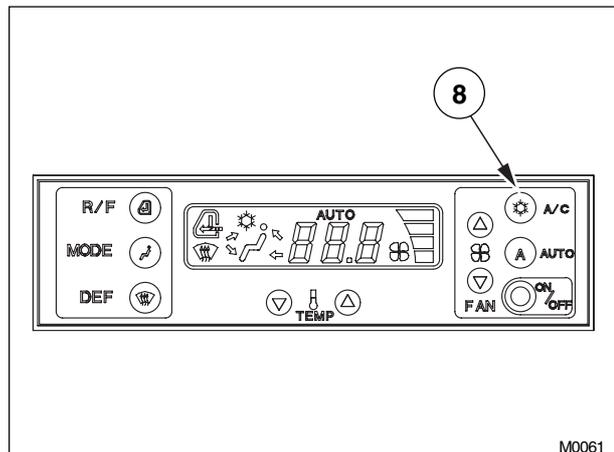
NOTE: if defrosting button (7) is actuated while the climate system is in "AUTO" mode, this is deactivated.

When pressing button (7) air flows out the vent located under the seat and form the two vents located under the monitor, thus defrosting the windshield.



Air conditioner activation button

To activate the air conditioner, press button (8)



HOURMETER

The hourmeter located on the right side panel records the hours of work performed by the machine.

NOTE: *the first digit of the hourmeter indicates the tenths of hour (6 minutes) .*

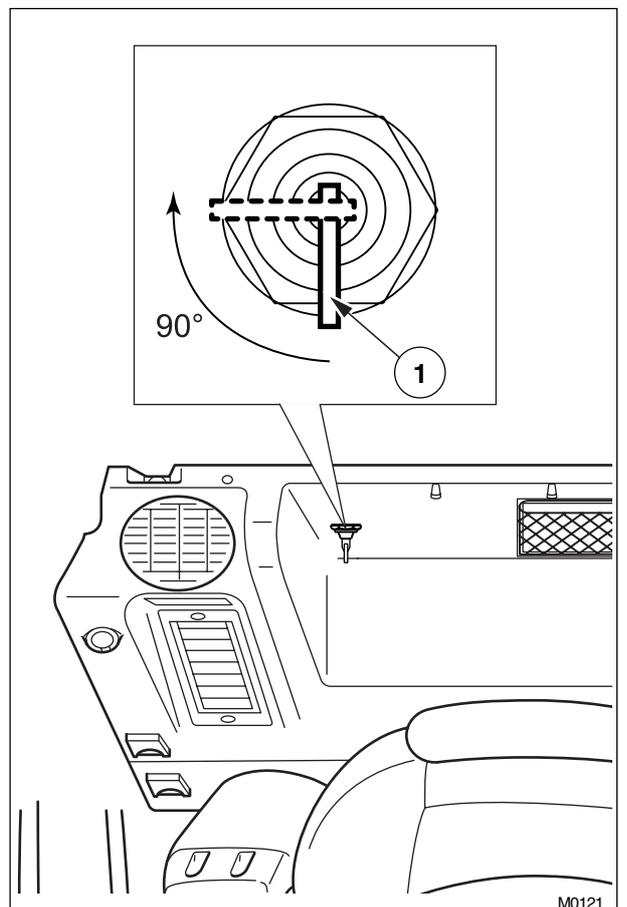


**HYDRAULIC THEFT PREVENTION
(Optional)**

The hydraulic theft prevention provides the neutralisation of all hydraulic controls, thus it precludes any movement of the machine.

To deactivate the theft prevention, insert key (1) and turn it clockwise 90°.

NOTE: *with the theft prevention deactivated it is not possible to extract key (1).*



CAB

DOOR

NOTE: the key supplied is used for starting and for the following:

- Opening/closing cabdoor
- Opening/closing of radiator compartment panel
- Opening/closing the hydraulic pump compartment cover
- Opening/closing the tool compartment
- Opening/closing the fuel tank plug
- Opening/closing engine hood.

Opening the door from the outside

If unlocked, pull the opening lever (1) outwards.

Closing the door from the outside

Close the door and turn the key in the lock.



Opening the door from the inside

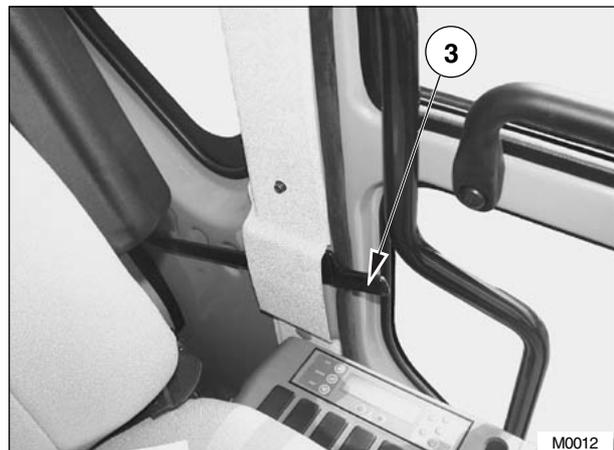
Pull the opening lever (2).



Releasing the door from the inside

NOTE: to keep the door wide open during machine operation, open it until it securely locks into the latch on the cab side.

Release the door using the lever (3).

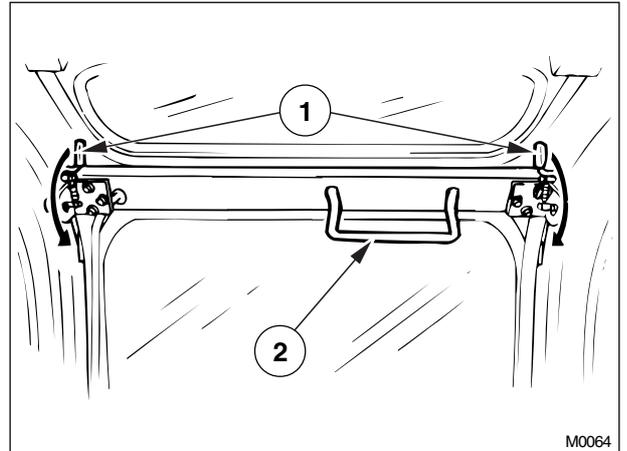


FRONT WINDSCREENS AND WINDOWS

Sliding the front windscreen open/closed

To open the front windshield, proceed as follows:

- Move levers (1) of the locking device downward.
- Using handles (2), slide the windshield in the relevant guides made on the cab frame to stroke-end.
- Lock the windshield, moving levers (1) downward again.

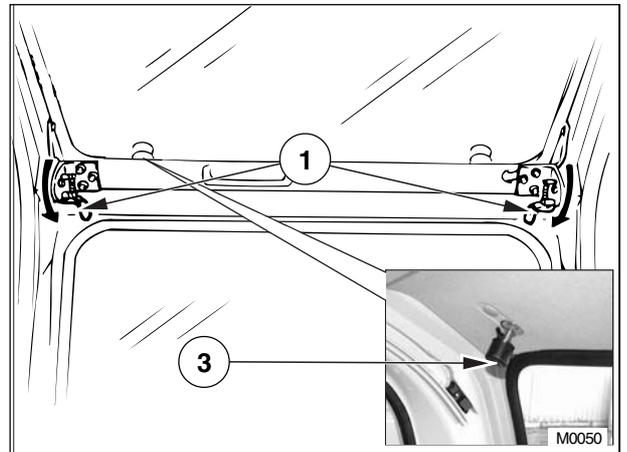


CAUTION

Always make sure that the windshield is locked. Also, once the windshield is locked, device (3) is actuated, deactivating the wiper control.

To close the front windshield, proceed as follows:

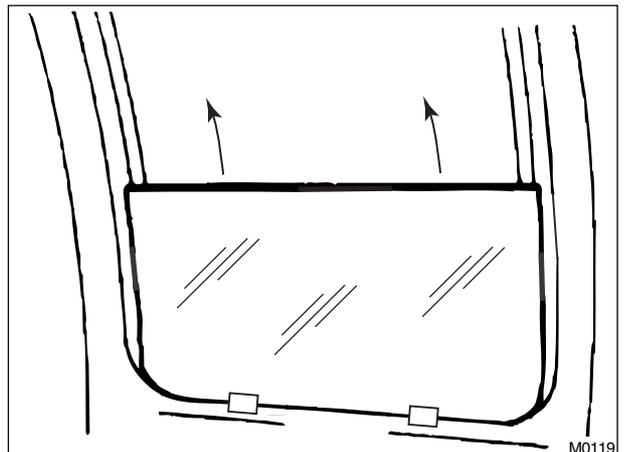
- Unlock the windshield moving levers (1) upward.
- Lift slightly the windshield and slide it using handles (2) along the guides made on the cab frame to stroke-end.
- Lock the windshield moving upward levers (1).



Removing/repositioning the front and rear windshields

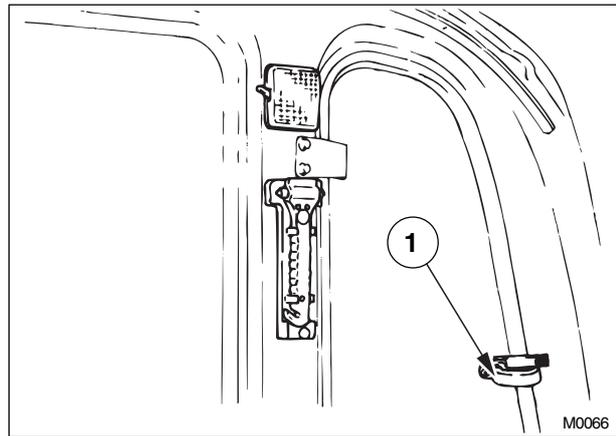
NOTE: *to remove the lower windshield it is necessary to open the front windshield.*

Slide the lower windshield upward and remove it, ensuring that it is stored in the appropriate compartment over the rear panels.



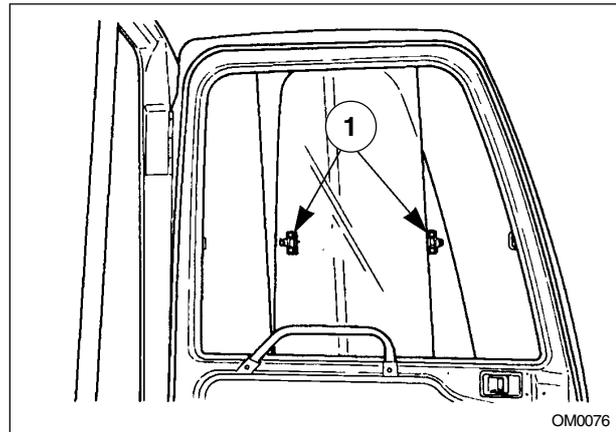
Opening/closing the side windows

Use lever (1) to pivot the side window open or closed.



Opening/closing the door window

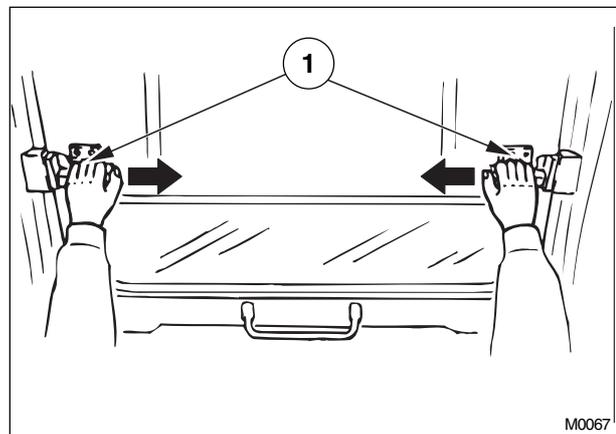
Release the locks (1) and slide the window pane open. Close the window pane by moving it back to its previous position until the locks (1) automatically engage in their seats.



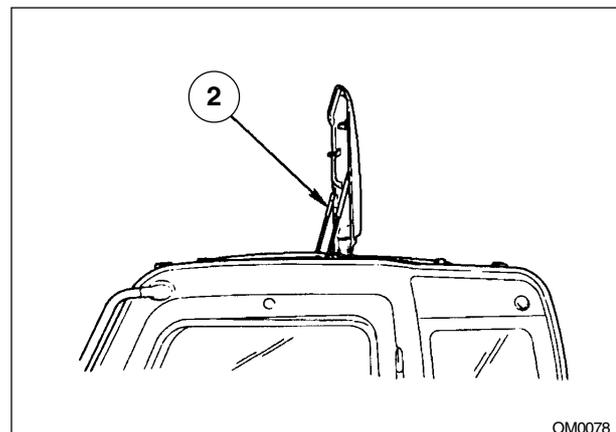
Opening/closing roof window

Release the side lock pins (1) and push the roof window upwards using the handle (2) until the dampers are completely extended.

NOTE: *in case of need, the roof window can be used as an emergency exit.*



To close, hold the handle (2) and pull it down. Ensure of proper automatic engagement of the lock pins (1).



EMERGENCY EXIT

If the cab door cannot be opened (due to an accident occurred while working), recommended escape routes are the following:

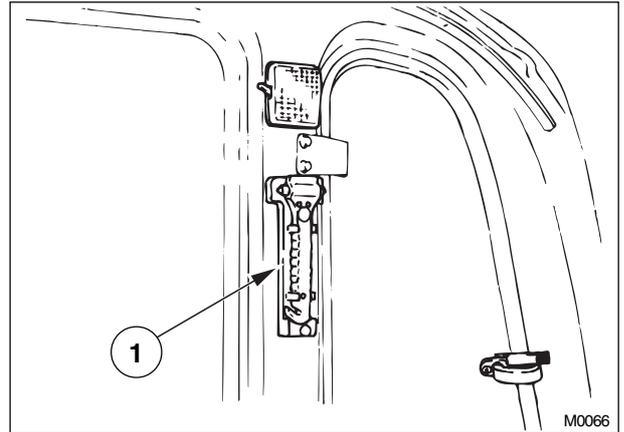
- by opening the front sliding windscreen
- by opening the roof window.

Should opening of the front sliding windscreen or roof window be impossible, a hammer (1) is provided to shatter the front or rear window.



CAUTION

Always wear safety gloves and glasses prior to shattering the window pane, if necessary. Danger of bodily injuries.



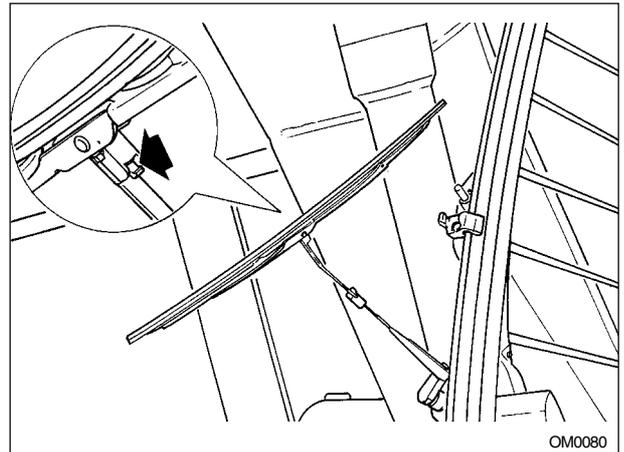
M0066

WINDSCREEN WIPER

Blade replacement

Replace the windscreen wiper blade as follows:

- Pull the wiping arm outwards,
- Rotate the blade until it is square to the wiping arm (90° angle).
- Press the support tang and remove the blade to be replaced.



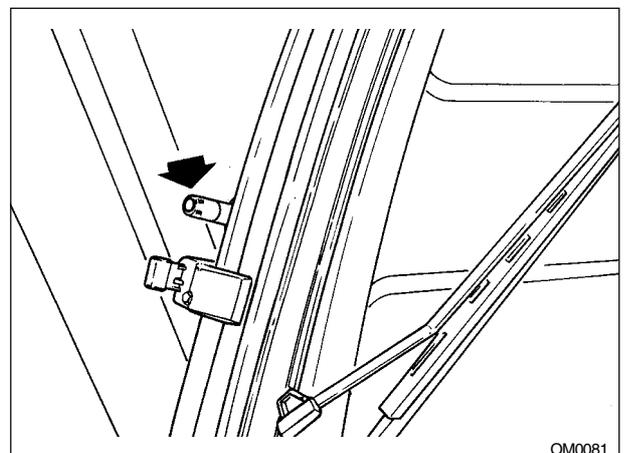
OM0080

WINDSCREEN WASHER

Cleaning the spraying holes

If the spraying pattern is not satisfactory, clean the spraying holes using a needle.

IMPORTANT: *do not hold down the windscreen washer control button longer than 20 seconds. Do not press the button if there no detergent in the tank. Damage to the windscreen washer motor may ensue. Check detergent level in the tank and top up as necessary.*



OM0081

OPERATOR'S COMPARTMENT

ADJUSTING THE SEAT

Prior to setting the machine in motion, adjust and lock the seat in the correct position to guarantee maximum driving comfort and maximum control accessibility.

Seat adjustment to operator's weight

Seat suspension is adjusted by turning the knurled knob (1). Set the scale according to the Operator's weight for optimum ride comfort.

Longitudinal adjustment

It is possible to obtain a double longitudinal adjustment (for and back):

- by actuating lever (2) the distance of the seat from the control levers is adjusted;
- by actuating lever (3) the distance of the seat + the control levers is adjusted with respect to the pedals.

Seat tilt and height adjustment

Move the lever (4) and adjust seat angle and height for maximum comfort by moving your body back and forth. Release the lever to lock the seat.

Backrest adjustment

The backrest inclination relative to seat cushion is adjusted by moving the lever (5).

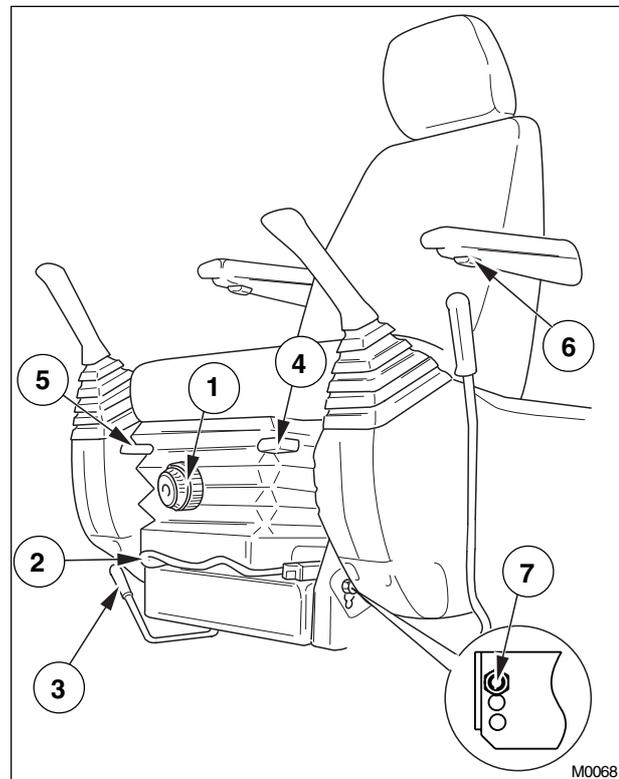
Armrest adjustment

The armrest angle relative to the backrest is adjusted by turning the armrest controls (6) (one per armrest).

NOTE: if above adjustments are not enough to provide ride comfort and control accessibility, a further three-point adjustment (7) is available to change the angle of the levers relative to the seat.

Headrest

The headrest can be adjusted in height and can be moved at an angle. Lift the headrest upwards to remove.

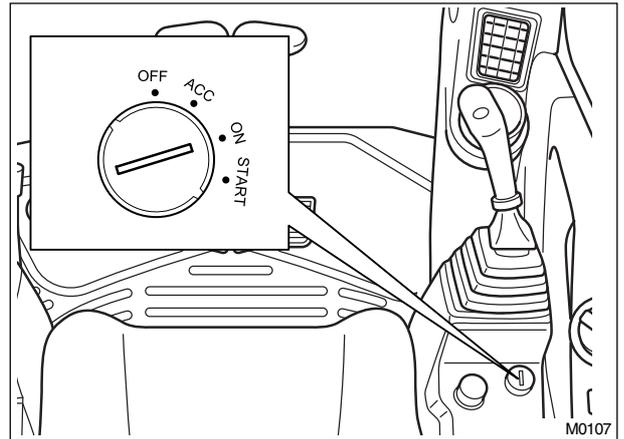


HEATED SEAT (MECHANIC TYPE)

To obtain the seat heating activation perform the following procedure:

- move starter switch to **ON** position;
- press switch **(1)** located in the rear side of the backrest of the seat, moving it from position **(0)** to position **(I)**.

IMPORTANT: *in order to preserve the charging of the batteries, it is recommended that the seat heater is activated, if possible, with the engine in operation.*



The heating electrical circuit is controlled by a thermostat, keeping the temperature of the seat constant.

HEATED SEAT (PNEUMATIC TYPE)

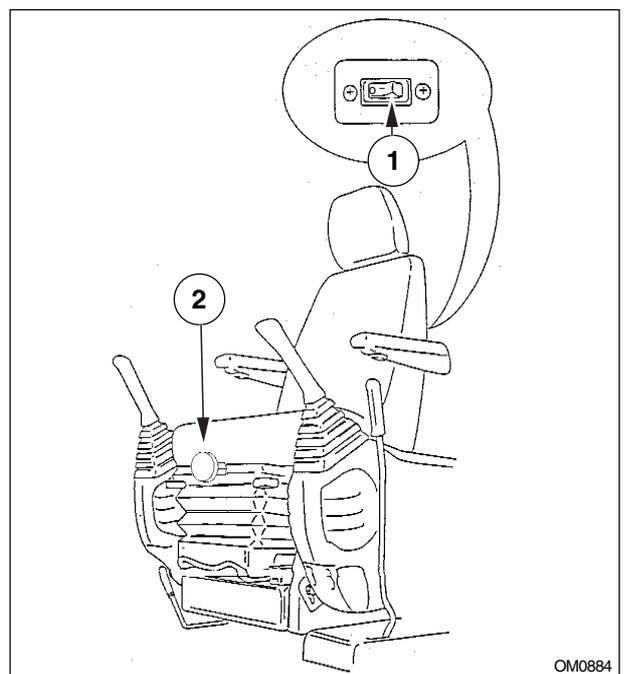
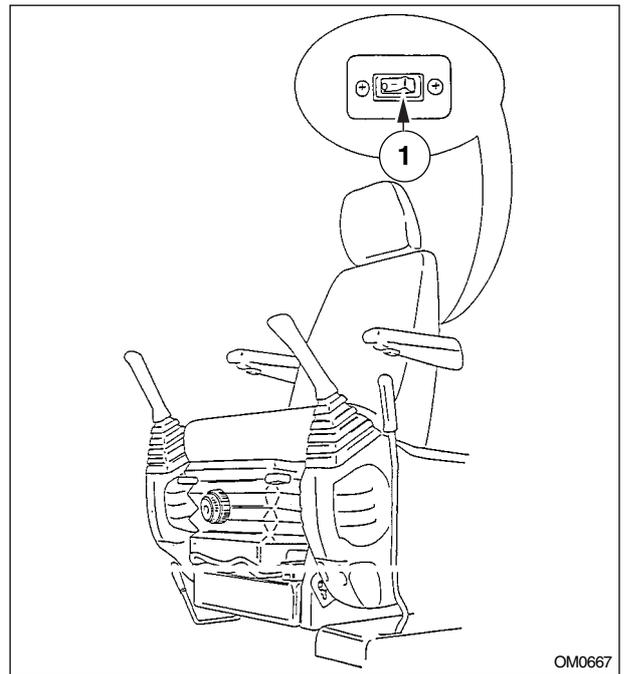
For the pneumatic heated seat adjustment refer to the adjusting seat procedure, except for the seat adjustment to operator's weight.

In this pneumatic heated seat, the seat suspension is adjusted by pressing the central knob **(2)**.

The adjustment is obtained operating as follows:

- move starter switch to **ON** position
- push the knob **(2)** to increase the seat pneumatic damper.
- pull the knob **(2)** to decrease the seat pneumatic damper.

The seat heating operation is obtained following the same mechanic heated seat procedure listed before.



SEAT BELT

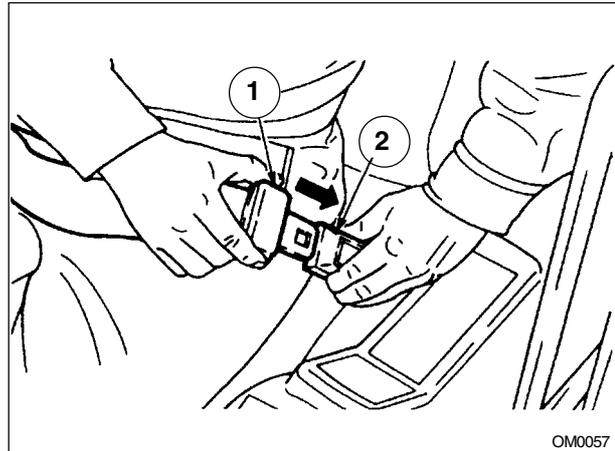


CAUTION

- Prior to operating the machine, it is necessary:*
- to check the belt, the hooking buckle and the relevant securing points;
 - to check that the band is not twisted;
 - always fasten the seat safety belt;
 - in the event the belt is damaged or frayed, please contact your Dealer for a replacement.

Fasten the safety belt as follows:

- Insert the retaining tang (1) into the buckle (2)
- Check the belt is positively buckled and adjust belt length around your body.

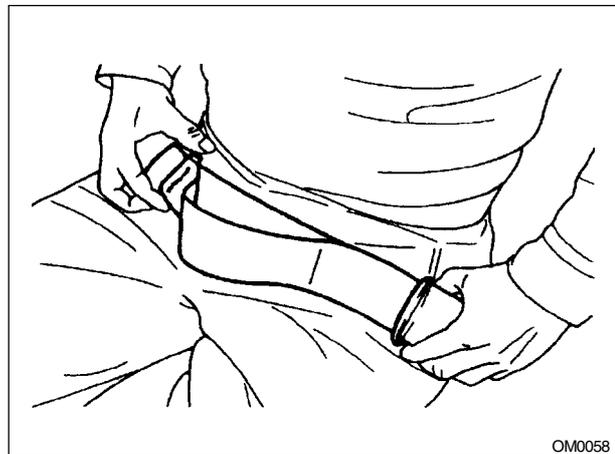


CAUTION

The seat belt is correctly adjusted when it perfectly adheres to the pelvis.

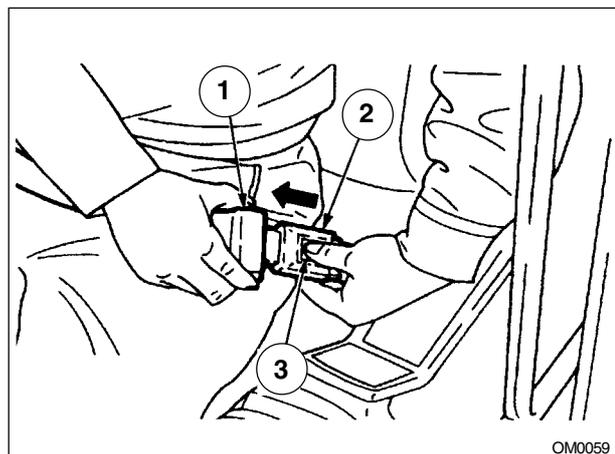
Unfasten the seat belt as follows:

- Press the button (3) on the buckle (2)
- Slide out the tang (1)



WARNING

Always fasten the seat safety belt. Operating the machine without fastening the seat belt increases the risk of serious injuries or death in case of accidental collisions. After an accident of some importance, replace the safety belt, even if it does not appear damaged. To perform this operation, please contact your Dealer.



FIRE EXTINGUISHER LOCATION (IF FITTED)

To prevent accidental fire to spread on the machine, we recommend to keep a fire extinguisher of known efficiency within easy reach at all times, possibly in the cab.

We suggest to install the fire extinguisher bracket on the right-hand rear cab post.

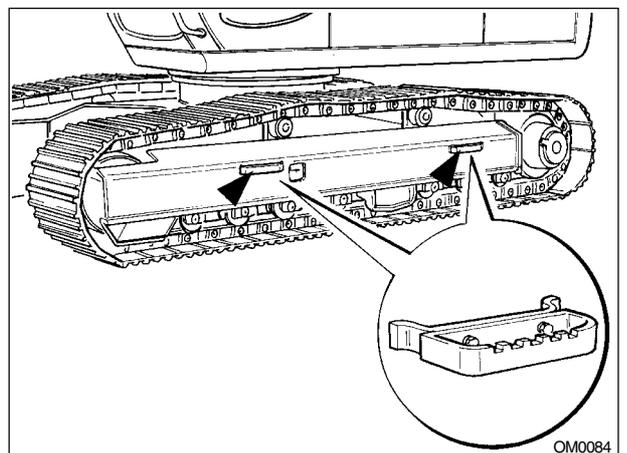
GRAB RAILS AND STEPS

To get in or off the cab or to move outside the machine during routine inspections and checks, always use the specially provided grab rails and steps, shown in the figure.



WARNING

Always use the grab rails and steps provided on the machine. Danger of accidental fall.



FUEL TRANSFER PUMP



WARNING

Diesel fuel is flammable. Do not puncture or burn the containers. Follow the instructions provided on the containers for stocking and handling.

Always extinguish smoking materials and free flames prior to checking or refuelling the fuel reservoir, replacing filters or opening the condensation draining plug, due to the presence of highly flammable fumes.

Do not refuel with the engine running. Do not use matches, cigarette lighters or free flame torches as a source of light on the machine.



WARNING

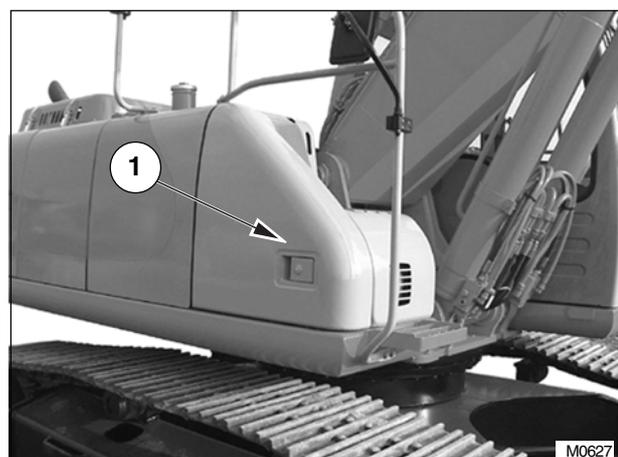
Never use gasoline, solvent or other flammable fluid to clean parts. Use exclusively qualified, non-flammable, non-toxic commercial solvents.

NOTE: *use decanted fuel for refuelling.*

It is recommended that the refuelling is made at the end of the working day, thus avoiding condensations during overnight parking.

Do not run-out of fuel in the reservoir. This would cause the entry of air in the fuel system, making its bleeding necessary.

To reach the fuel transfer pump, open tool compartment door (1).



- The filling of the fuel reservoir using the electric fuel transfer pump is made in the following manner:
 - remove cap (2) from the fuel reservoir;
 - unwind hose (3) until its end with filter can be dipped into fuel drum;
 - move switch (4) located on pump (5) from position (OFF) to position (ON);
 - check on level sight indicator (1) ;
 - once the desired fuel level is reached in reservoir, move switch (4) from position (ON) to position (OFF);
 - install cap (2) on the fuel filler neck;
 - drain completely the residual fuel from hose (3), then wind it up and store it in its place, inside the tool storing compartment.



WARNING

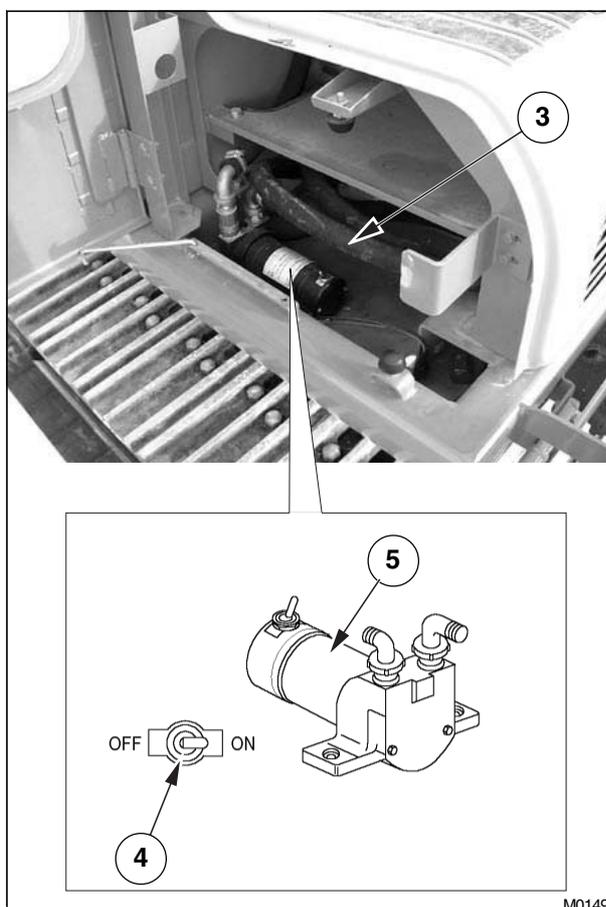
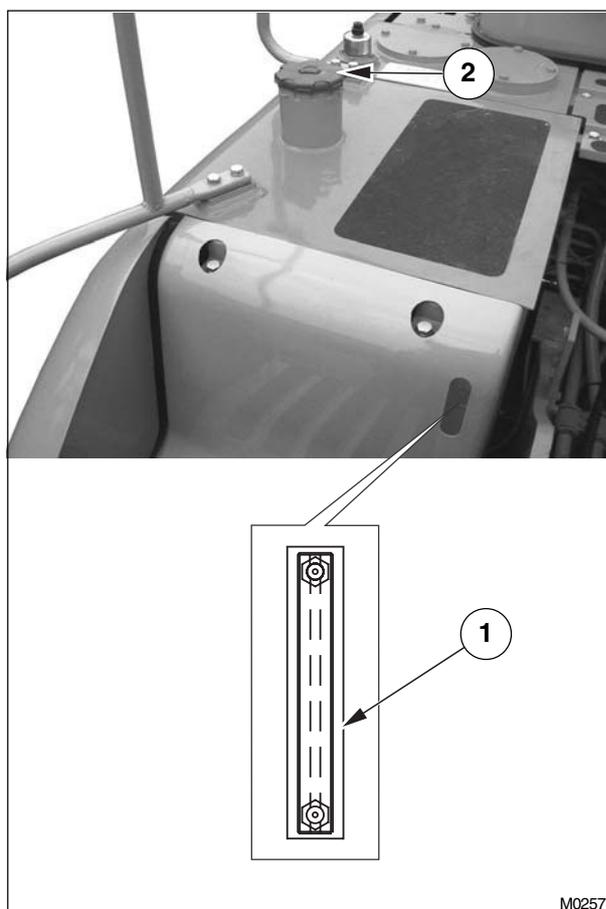
Check that there are no traces of fuel inside the tool storing compartment. If positive, mop it up with a rag and let it evaporate. This is to prevent the danger of fires.

IMPORTANT: *when rewinding the hose, pay attention to avoid kinking it, to prevent damages and leakages.*

Maintenance

- The fuel transfer pump has its own electrical circuit, protected by a 7.5 Amp fuse. In the event the fuse blows, thus preventing the pump from operating, only replace it with one of the same rating. If the problem keeps occurring investigate the cause.
- The end of hose (3) is fitted with mesh filter which, in case of clogging, preventing the flow of fuel, must be cleaned. In case the cleaning is ineffective, replace the filter.

IMPORTANT: *the use of non genuine components can involve the risk of malfunctions of the machine and a reduction of the safety limits during its operation.*



USING THE MACHINE

Prior to starting the machine carefully read all procedures and precautions contained in this Operation and Maintenance Instruction Manual.



DANGER

Do not run the engine in closed spaces without proper ventilation and/or an adequate system capable to removal lethal exhaust gases.



WARNING

Before starting the machine or operating its attachments, ensure that all bystanders are clear of the machine operating range. Walk all around the machine before mounting. Sound the horn.

Before starting the machine, adjust and lock the driver's seat for maximum riding comfort and control accessibility.

Never park downhill without securely blocking the machine before hand to prevent any possible movement.

Before leaving the driver's seat and after ensuring no-one is near the machine; slowly lower the attachment until it rests safely onto the ground. Move possible supplementary tools in the safe retracted position.

Always stop the engine before leaving the driver's seat.

*Each time you stop working with the machine for whatever reason, ensure that all controls are in the neutral position and that the safety lever is pulled fully vertical to the **LOCK** position.*

REFUELLING

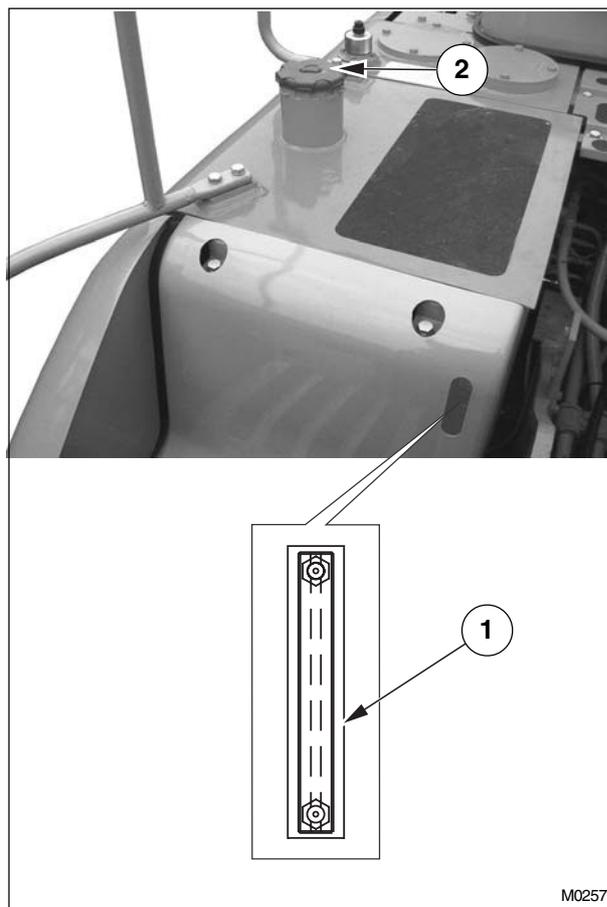


WARNING

Fuel is flammable. Do not puncture or burn containers. Strictly observe the Manufacturer's instructions as regards storage and distribution. Following the presence of highly flammable vapours, extinguish all smoking materials and open flames or sparks before checking fuel level or refuelling, replacing the filters or opening the condensation drain plug. Do not refuel with the engine running. Do not use matches, cigar lighters or torches as light sources on the machine.

NOTE: *refuel using decanted fuel. Transfer fuel from the storage container to the machine tank using the electrical pump. We advise to fill the tank at the end of the working day to prevent condensation formation overnight. Do not run out of fuel in the tank as this would cause air to enter the fuel system. The fuel system should then be bled from air.*

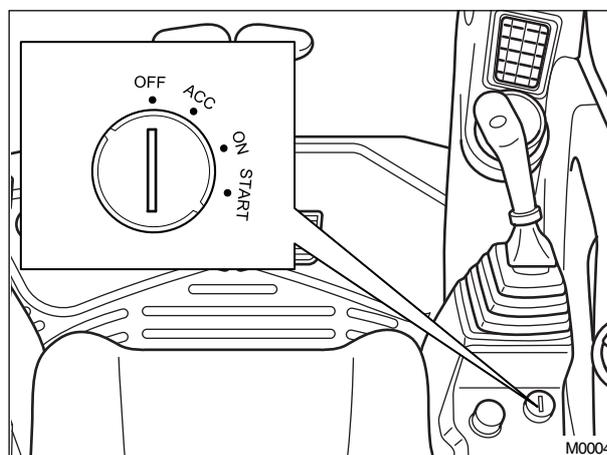
- Check the fuel level using level indicator (1).
- Open filler cap (2) using the key and refuel as required.
- Then check indicator (1) to determine the level of fuel reached.



STARTER SWITCH

The starter key is located on the right control panel and has 4 positions:

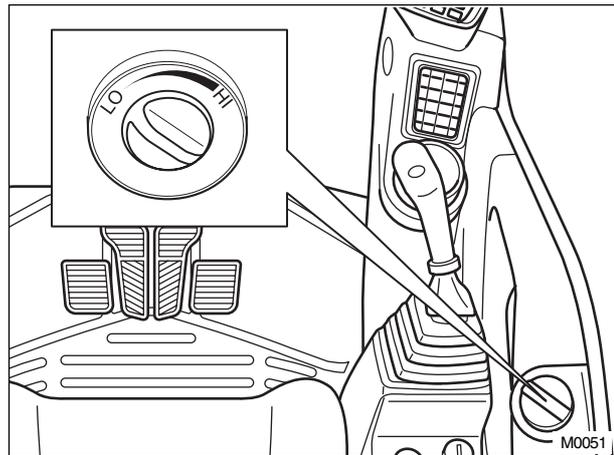
- "OFF"** When the key is moved onto this position, the engine is cut-off and the electric system is deactivated after about 4 seconds.
- "ACC"** When the key is in position **"ACC"** the cigarette lighter, the radio and the horn are energised.
- "ON"** With the key in position **"ON"** the entire system is energised.
- "START"** With the key in this position the starter solenoid is energised to start the engine. Once the engine is started, the key is released to return into position **"ON"**.



CHECKS BEFORE ENGINE START-UP

Checks of controls

- Ensure that safety lever is in block position (**LOCK**) (see paragraph "**INSTRUMENTS AND CONTROLS**" of this Chapter).
- Ensure that all controls (control levers and pedals) are in neutral condition.
- Ensure that manual throttle control knob is totally rotated anticlockwise (engine minimum idle).
- The operator must adjust the seat prior to starting the machine. This adjustment must be made while keeping the back against the back rest of the seat. A poor adjustment of the seat could cause the operator failing to operate pedals and control levers full stroke.
- Always fasten the seat belts.



STARTING THE ENGINE

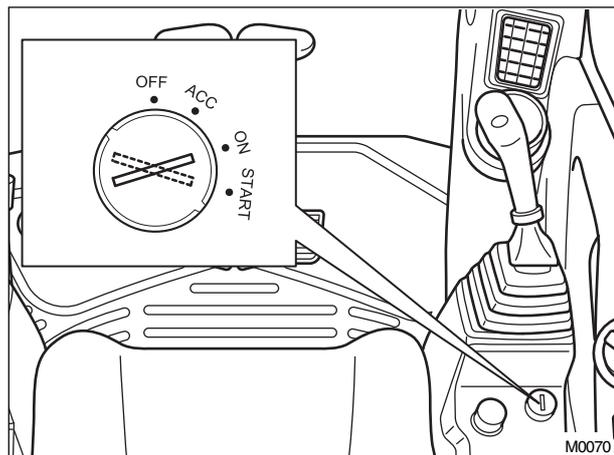


WARNING

*The engine must be started exclusively from the operator's seat.
Prior to starting the engine, make sure that the safety lever is resting vertically in **LOCK** position.*

After having performed the checks prior to starting the engine, as described in the preceding chapter, operate as follows:

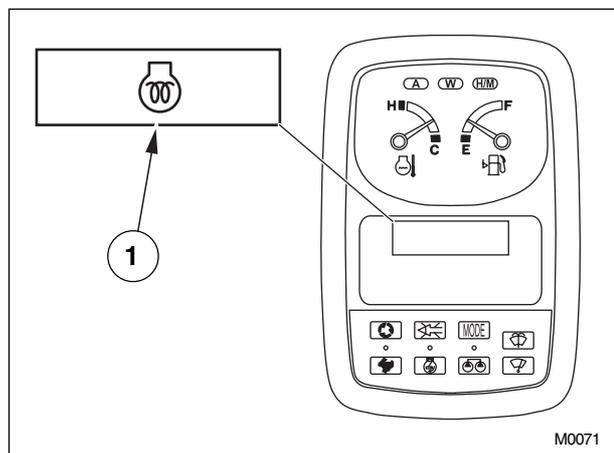
- Turn the starting key into position **ON**.



NOTE: with the machine equipped with the "Cold starting" variant, in case of very low ambient temperatures, turn the key into position **ON** to activate the automatic pre-heating indicated by indicator (1) on the display. Under this condition, wait for the indicator to go OFF before starting the engine.

- Sound the horn.
- Move and keep the starter key into position **START** until the engine starts. When the key is released, it returns automatically to position **ON**.

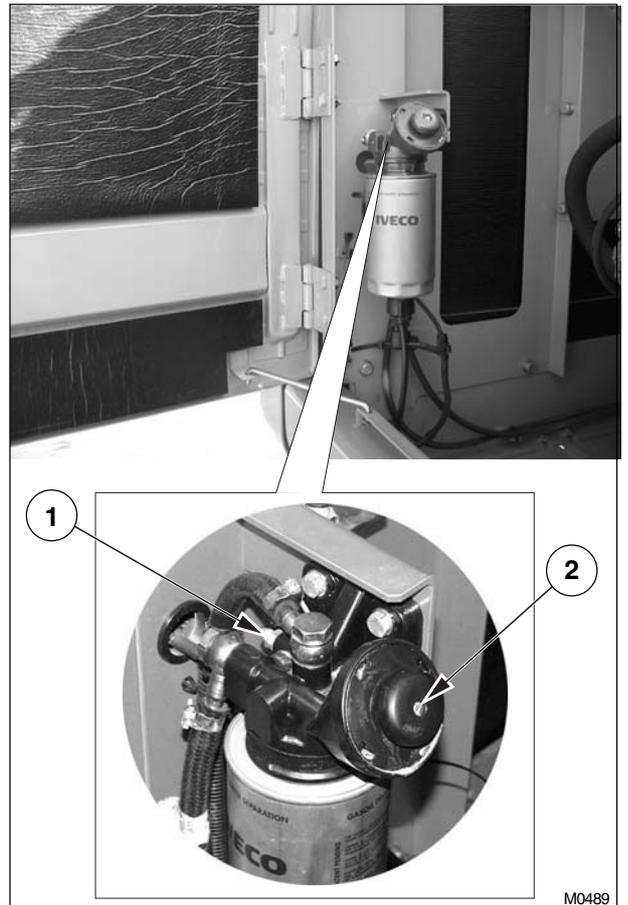
IMPORTANT: do not persist in attempting the starting for prolonged time. After failing the starting, return the key into position **OFF** and wait for at least 1 minute before repeating the starting procedure.



STARTING THE ENGINE AFTER PROLONGED STORAGE

If the machine has been inoperative for a long time, it is necessary to bleed air from the fuel system, as follows:

- Loosen the bleed screw (1) to allow air to escape;
- Press button (2) located on the priming pump to circulate fuel in the relevant circuit;
- Continue this operation until a minimum quantity of fuel free from air bubbles flows out from the bleeding screw (1);
- Tighten bleeding screw (1);
- Keep pumping button (2) until some resistance is experienced.
- Start the engine.

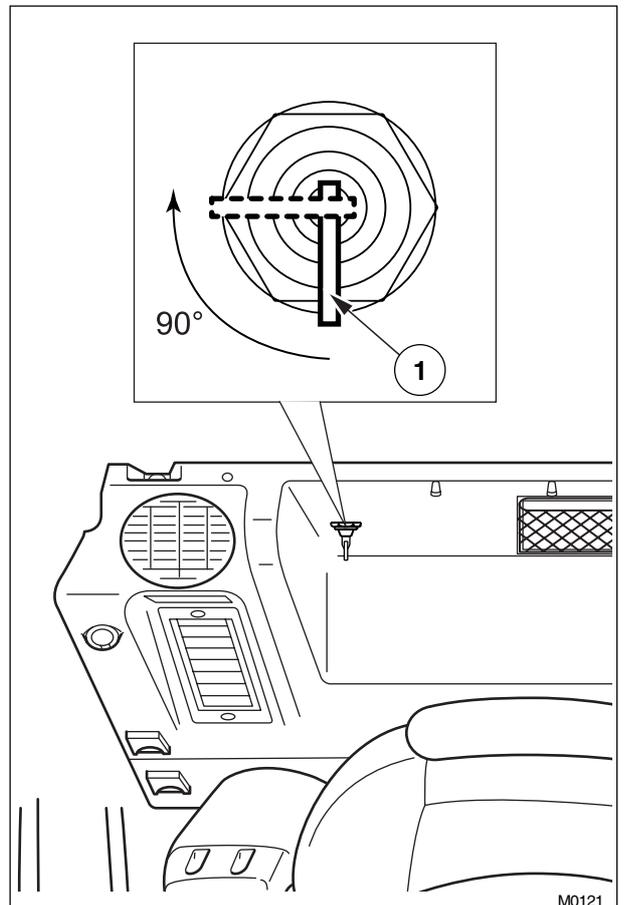


HYDRAULIC THEFT PREVENTION (Optional)

The hydraulic theft prevention provides the neutralisation of all hydraulic controls, thus it precludes any movement of the machine.

To deactivate the theft prevention, insert key (1) and turn it clockwise 90°.

NOTE: with the theft prevention deactivated it is not possible to extract key (1).



STARTING THE ENGINE USING BOOSTER BATTERIES



WARNING

Explosive gas is produced while batteries are in use or being charged. Keep open flames and/or sparks away from the battery charging area. Charge the batteries in a well ventilated place. Park the machine on a dry firm, surface. Do not park on metal surfaces. Take care to make correct connections: never connect a positive terminal (+) to a negative terminal (-).



S0001

IMPORTANT: the machine electrical system is 24 V with negative (-) ground. Use only booster batteries with same voltage.

Connecting booster batteries

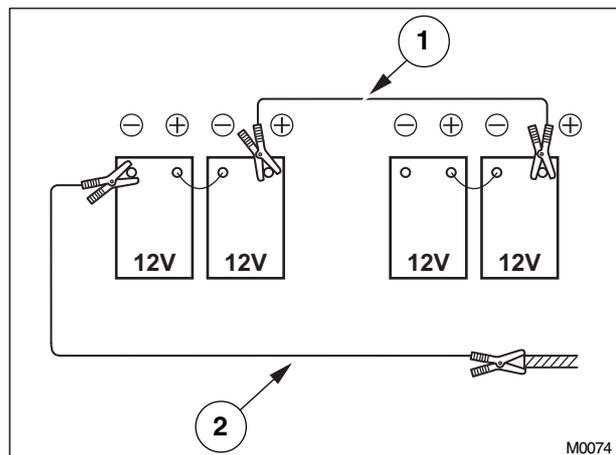
Proceed in the following order:

- Connect one terminal of the red cable (1) to the positive (+) pole of machine batteries and the other terminal of same cable to the positive (+) pole of booster batteries.
- Connect one terminal of the black cable (2) to the negative (-) pole of booster batteries and the other terminal of same cable to ground (machine frame).
- Start the engine.

Disconnecting booster batteries

Proceed in the following order:

- Disconnect the black cable (2) terminal from ground (machine frame), then disconnect the other terminal of same cable from the negative (-) pole of booster batteries.
- Disconnect the red cable (1) terminal from the positive (+) pole of booster batteries, then disconnect the other terminal of same cable from the positive (+) pole of machine batteries.



M0074

STOPPING THE ENGINE



WARNING

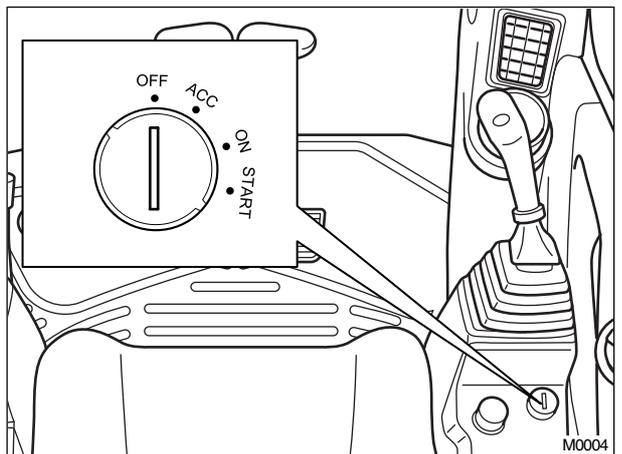
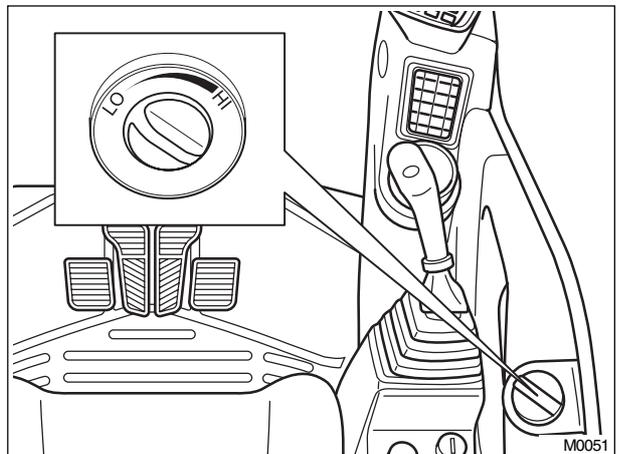
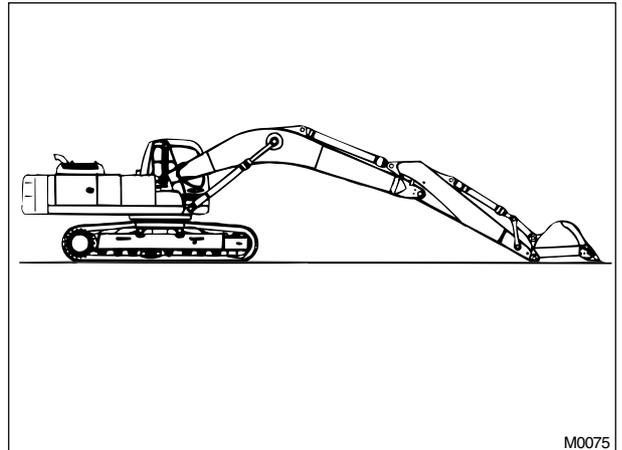
Park the machine on firm and possibly level ground. Always rest the bucket safely onto the ground before stopping the engine.

NOTE: Refer to the paragraph **“EMERGENCY BOOM LOWERING PROCEDURE”** in this Chapter to lower the boom and rest the bucket onto the ground in case of emergency when the engine stalls and cannot be re-started.

- Park the machine on a firm and possibly level ground.
- Position the equipment as illustrated in the figure.
- Disengage the auto-idle and turn the engine speed hand control fully anticlockwise (minimum engine rpm).
- Let the engine run at low idle for some minutes to guarantee turbocharger progressive slow-down and cooling.

IMPORTANT: Do not accelerate during engine shut-down as it may cause the turbocharger turbine shaft to rotate without proper lubrication, due to inertia, with consequent severe damage to the turbocharger.

- Move the key-start switch to the **OFF** position.
- Remove the ignition key from the starter switch.
- Move the safety lever in the vertical **LOCK** position.



EMERGENCY BOOM LOWERING PROCEDURE

The machine is equipped with a hydraulic accumulator providing the lowering of the boom even with engine inoperative.



WARNING

Make sure that nobody is standing under or near the front equipment prior to starting the procedure for the lowering of the boom.

In the event the engine stops and it cannot be re-started, lower the boom and rest it on the ground, referring to the procedure listed here below:

- Make sure starter key (1) is in **ON** position.
- Make sure safety lever (2) is in unlock position.
- Move forward the right lever (3) slowly and lower the boom.



WARNING

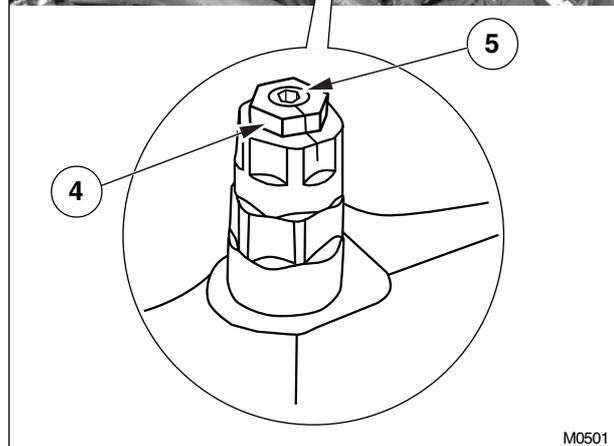
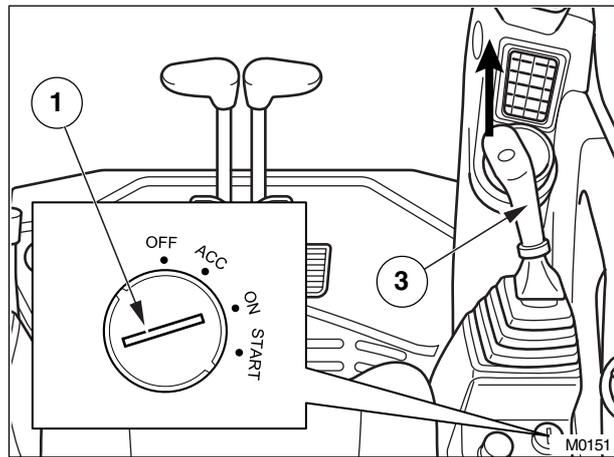
Do not perform any maintenance operation of the hydraulic system without first releasing any residual pressure in the accumulator. With engine inoperative, actuate the control levers several times.

In case of failure of the accumulator or the electrical system, proceed with the lowering of the equipment, operating as follows:

Machine without anti-drop valves

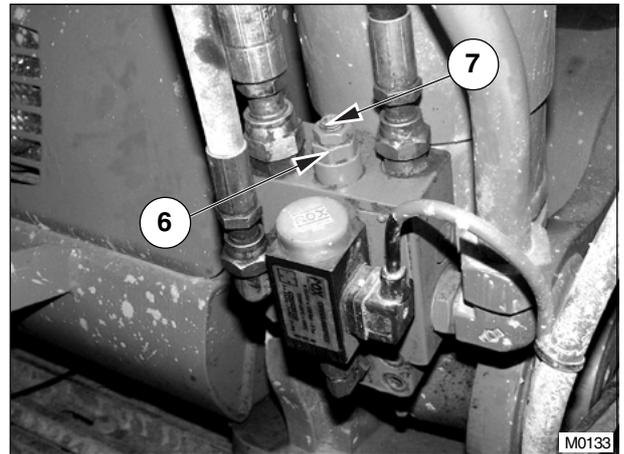
1. Get over the turret and remove the cover in correspondence with the control valve.
2. Make a reference mark between the valve body, lock-nut (4) and setting screw (5).
3. Loosen lock-nut (4) using a 22 mm hex wrench.
4. Loosen slowly setting screw (5) using a 6 mm Allen wrench and lower the equipment to the ground.

Return setting screw (5) and lock-nut (4) to their original position, making reference to the mark previously made.



Machine with anti-drop valves

1. Make a reference mark between the valve body, lock-nut (6) and setting screw (7).
2. Loosen lock-nut (6) using a 19 mm hex wrench.
3. Loosen slowly setting screw (7) using a 6 mm Allen wrench and lower the equipment to the ground.
4. Return setting screw (7) and lock-nut (6) to their original position, making reference to the mark previously made.

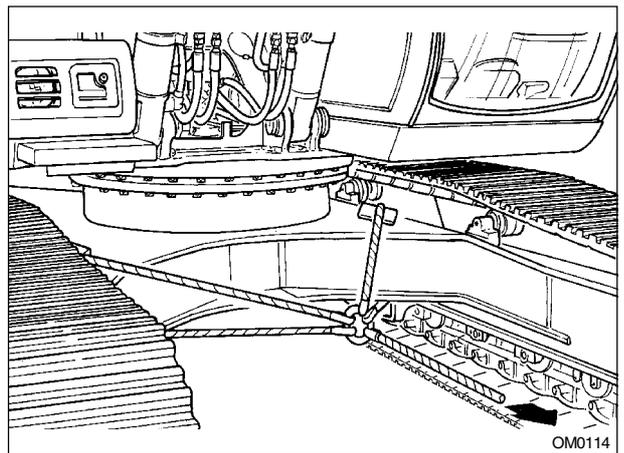


NOTE: *it is sufficient to perform the procedure indicated here above on one anti-drop valve only.*

Once the boom lowering procedure is completed, contact a Dealer.

TOWING THE MACHINE

- In the event the machine is prevented from moving forward, but the engine is still operational (i.e. soft ground) it is possible to tow the machine slowly, with another machine.
Move near the limit of solid ground and sling the two machines.
- Secure and connect steel cables (or chains) around the respective frames, as illustrated in the figure. To avoid damaging the steel cables or chains, it is necessary to place some appropriate protecting materials between them and the frames.



WARNING

Steel wire rope or chains may break causing severe injuries. Carefully inspect metal cables and/or chains prior to use and check for damages or wear. Always wear suitable protection gloves when handling metal cables or chains. Use metal cables or chains of appropriate size according to the load to be towed.

- Pull slowly, keeping the towing cable horizontal and in line with the tracks.
- When the machine is pulled, release the parking brakes, actuating the travel control levers.

MACHINE WARM-UP



WARNING

With low ambient temperatures it is necessary to warm-up the hydraulic oil correctly. When the hydraulic oil is cold, hydraulic functions are slow. Do not operate a machine until the hydraulic functions are showing normal cycles.

IMPORTANT: *do not operate a machine immediately after the first starting of the day or after long pauses. Warm-up the hydraulic oil, the engine and the cylinders.*

Warm-up the engine correctly, by proceeding as follows:

- Start the engine by turning the engine speed hand control (1) fully anti-clockwise to slow idle, as shown.
- Let the engine run at idle speed for at least 5 minutes and wait for the coolant temperature indicator (2) to get into the white zone.

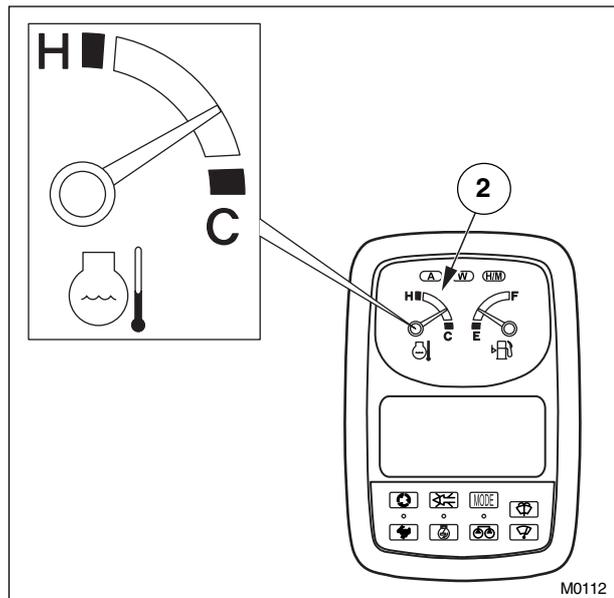
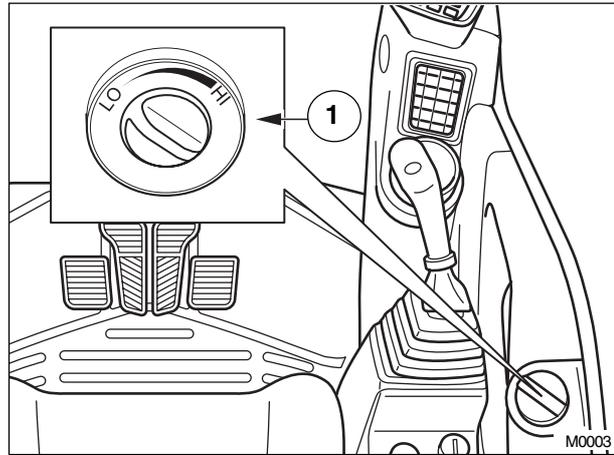
Warm-up correctly the hydraulic system components as follows:

- After warming-up correctly the engine as detailed above, move the engine speed hand control (1) to the "HI" position.

IMPORTANT: *hydraulic system components can be seriously damaged if the machine is operated with hydraulic oil temperature below 30 °C.*

Do not keep drive cylinders fully extended longer than 15 seconds (by holding the control lever). This is to avoid excess heating of hydraulic oil in the operating section only. After each operating cycle, wait 5 to 10 seconds at least.

- Actuate slowly the control levers to activate, respectively, boom, arm and bucket cylinders full stroke; repeat this cycle several times for at least 5 – 10 minutes.
- Actuate slowly the turret swing control, in one direction, then in the opposite one; repeat this cycle several times for at least 5 – 10 minutes.
- Actuate the travel control pedals, moving, at first, over short distances.

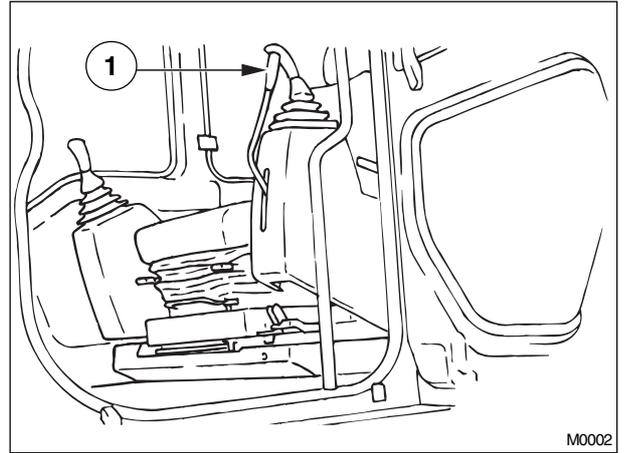


SAFETY LEVER

The safety lever (1) is used to disable travel and swing controls and the attachment movements.

It has two positions:

- When in the **LOCK** position with the machine stationary and the engine running or stopped, it prevents the possibility of machine unexpected movements if the control levers/pedals are accidentally moved.
- When in the **UNLOCK** position, the safety lever enables operation of all controls. Therefore, to control and operate the machine, the lever should be moved to this position.



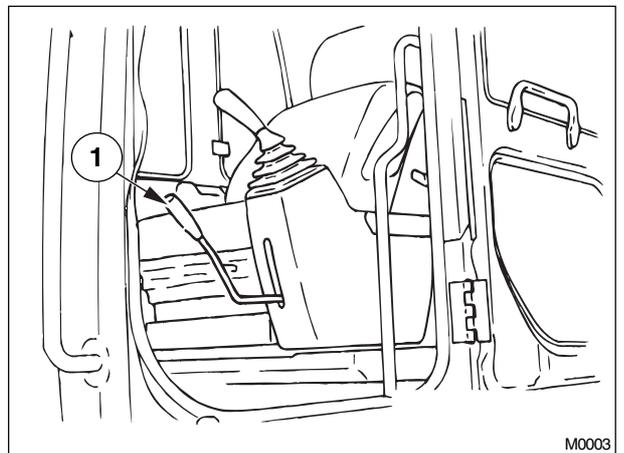
WARNING

*Before starting the engine, ensure that the safety lever is in the **LOCK** position (vertical).*



WARNING

*When the machine is parked or upon leaving it for whatever reason, always ensure that the safety lever is in the **LOCK** position (vertical).*



Before start-up

Before starting the engine, ensure that the safety lever (1) is in the **LOCK** position.

After starting

After starting the engine, it is necessary to ensure that the control levers and pedals are in neutral conditions. Then, lower safety lever (1) into position **UNLOCK** to make the cab controls operational.



WARNING

If attachment movement is detected when the safety lever is released with the control levers still in the neutral position, proceed as follows:

- *Pull the safety lever to stroke end in the lock position (vertical)*
- *Stop the engine*
- *Contact the nearest Dealer.*

CONTROL LEVERS

NOTE: the following descriptions concerning use of the controls are to be intended with the travel motors at the rear relative to the travel direction. The words right, left, front, back, clockwise, and anticlockwise are to be referred to the Operator's position properly sitting in the driver's seat.



CAUTION

Prior to any digging operation, get acquainted with location and function of each control lever as detailed below.



DANGER

It is forbidden to expose limbs or any part of the body outside the cab windows during work: Danger of severe injuries and even death.

NOTE: the machine is fitted with a plate showing all functions of control levers and pedals.

Main controls

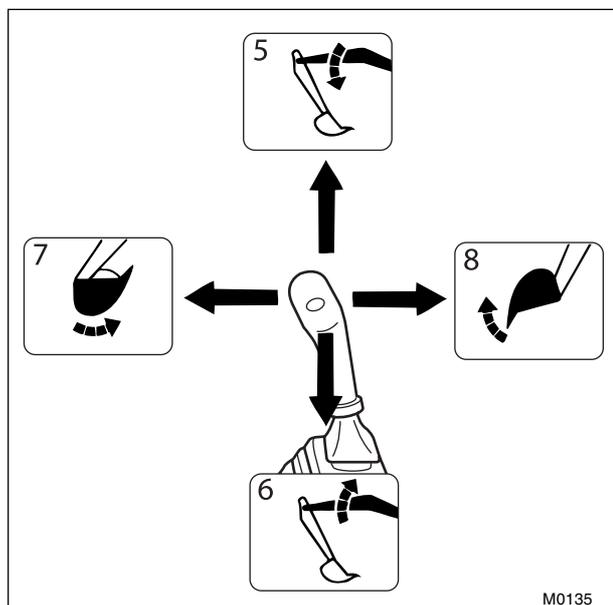
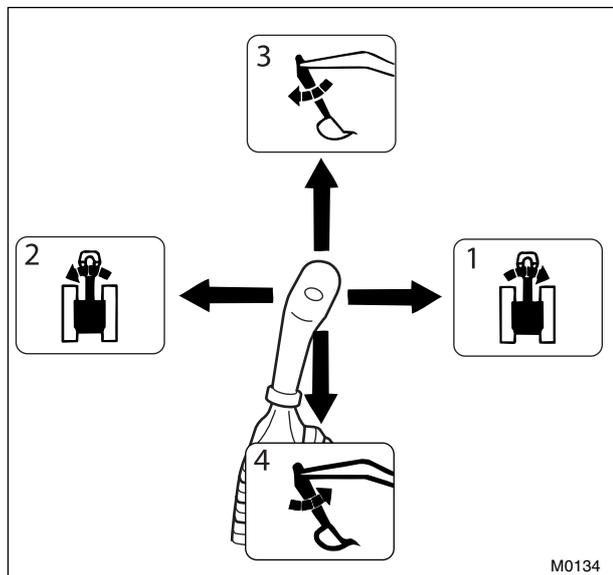
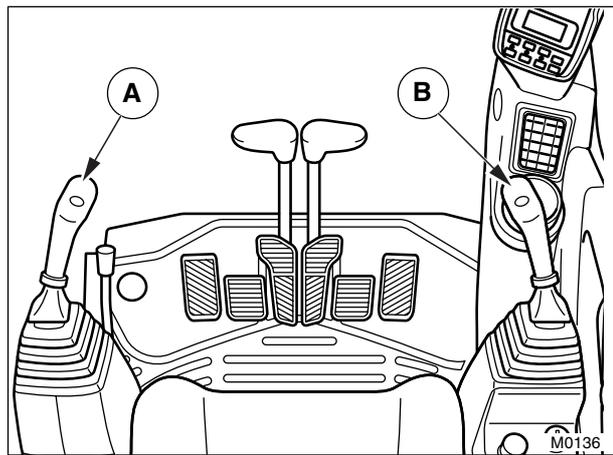
A - Left control lever

- 1. Swing Right
- 2. Swing Left
- 3. Arm Roll-Out
- 4. Arm Roll-In

B - Right control lever

- 5. Boom Lower
- 6. Boom Raise
- 7. Bucket Roll-In
- 8. Bucket Roll-Out

When a control lever is released, it returns automatically to the neutral position and the associated work function stops.



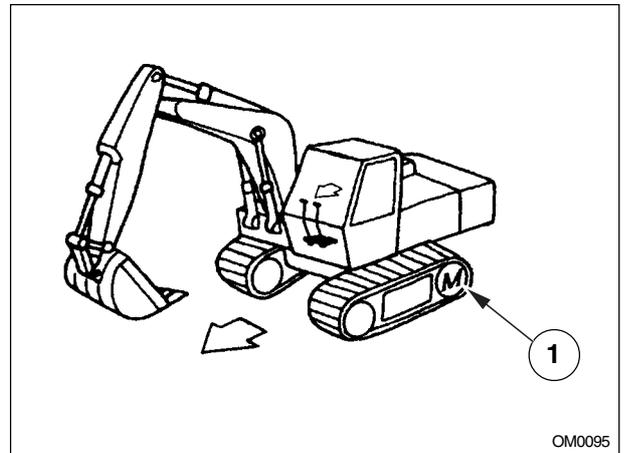
TRAVEL CONTROLS

Driving the machine using the pedals



WARNING

In the standard travel position, travel controls are at the front and travel motors (1) at the rear of the machine. Remember that travel controls are reversed when travel motors (1) are positioned at the front relative to the travel direction. Be always aware of travel motor (1) location prior to moving off.



OM0095

NOTE: the words **right, left, front, back, clockwise, and anticlockwise** are referred to the operator's position properly sitting in the driver's seat.

Forward travel

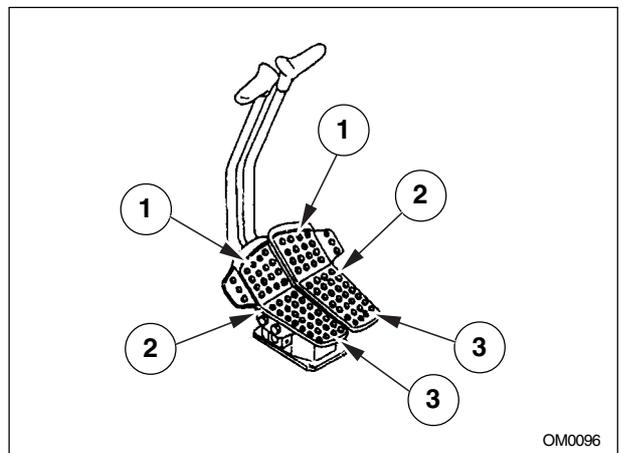
Push down on front (1) of both pedals simultaneously.

Reverse travel

Push down on rear (3) of both pedals simultaneously.

Neutral position

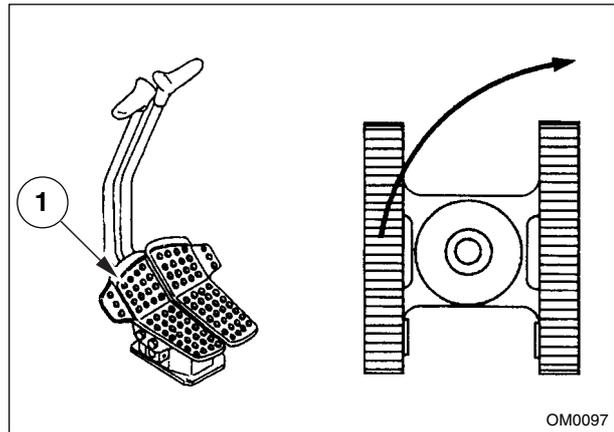
When both pedals are in the neutral position, automatic brake operation will stop machine travel.



OM0096

Right turn

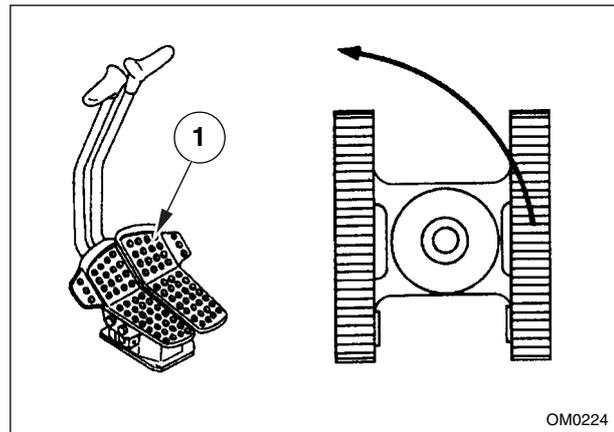
Push down on front (1) of the left-hand pedal.
This action will cause only one track to turn and the machine will steer by pivoting on the stationary track.



OM0097

Left turn

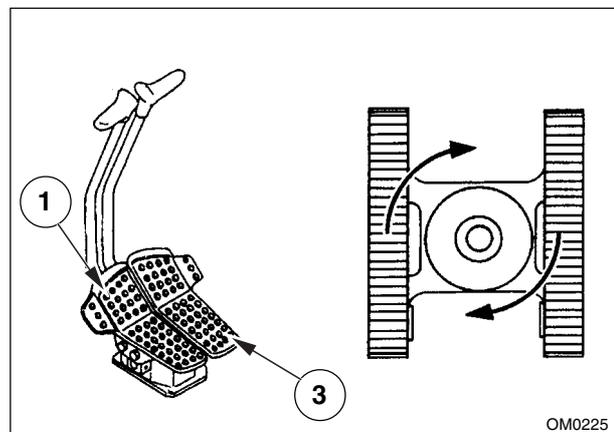
Push down on front (1) of right-hand pedal.
This action will cause only one track to turn and the machine will steer by pivoting on the stationary track.



OM0224

Clockwise spin

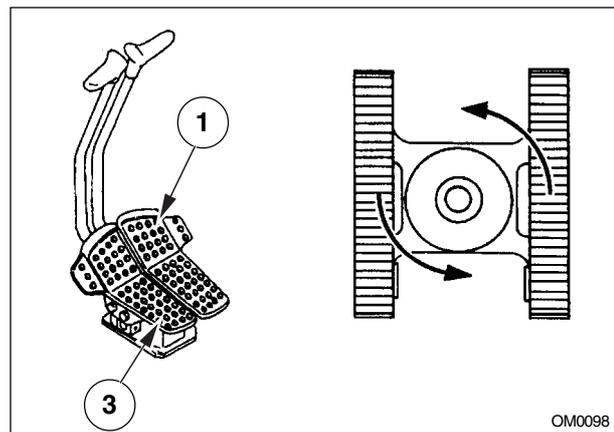
Push down simultaneously on front (1) of the left-hand pedal and rear (3) of the right-hand pedal.
This action will cause the tracks to turn opposite to one another at the same time. As a consequence, the machine will rotate by pivoting on its centreline.



OM0225

Anti-clockwise spin

Push down simultaneously on front (1) of the right-hand pedal and rear (3) of the left-hand pedal.
This action will cause the tracks to turn opposite to one another at the same time. As a consequence, the machine will rotate by pivoting on its centreline.



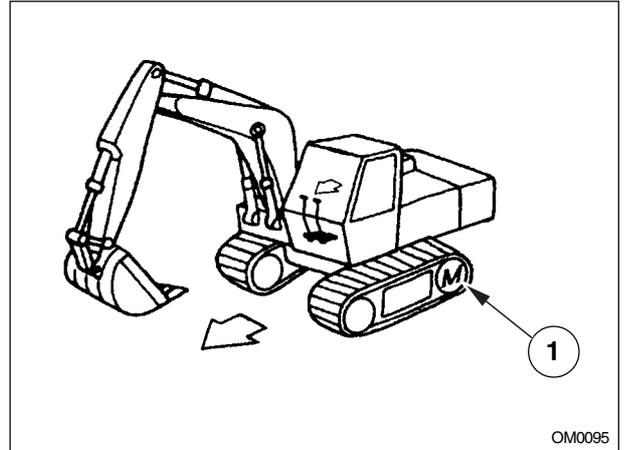
OM0098

Driving the machine using the levers



WARNING

In the standard travel position, travel controls are at the front and travel motors (1) at the rear of the machine. Remember that travel controls are reversed when, travel motors (1) are positioned at the front relative to the travel direction. Be always aware of travel motor (1) location prior to moving off.



OM0095

NOTE: the words **right, left, front, back, clockwise, and anticlockwise** are referred to the operator's position properly sitting in the driver's seat.

Forward travel

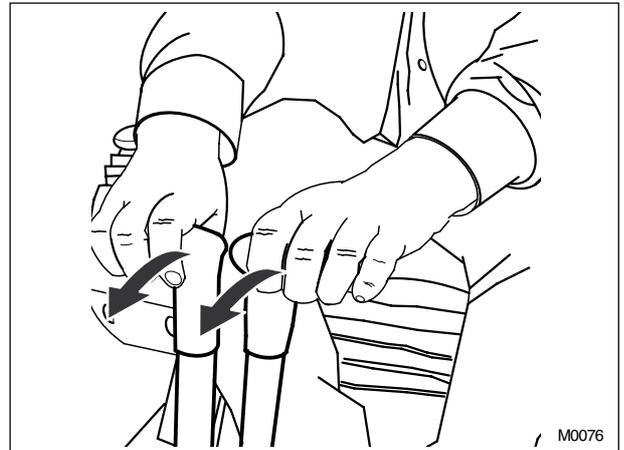
Push both levers forward simultaneously.

Reverse travel

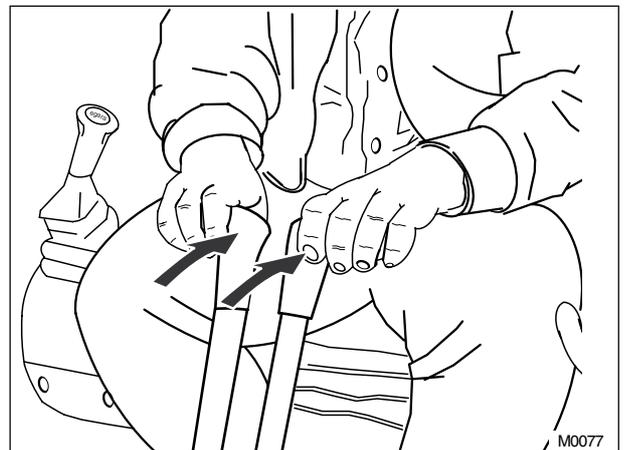
Pull both levers backward simultaneously.

Neutral position

When both levers are in the neutral position, automatic brake operation will stop machine travel.



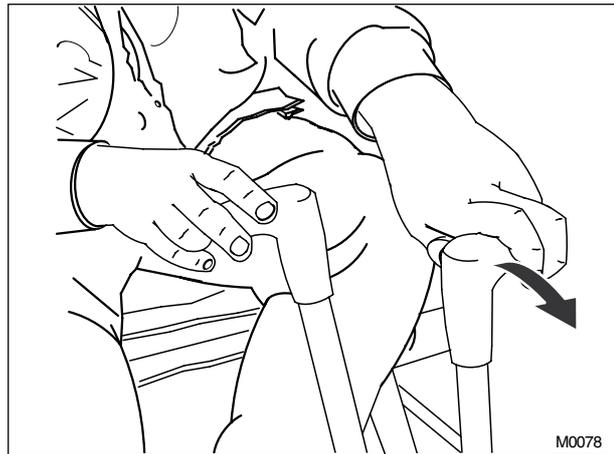
M0076



M0077

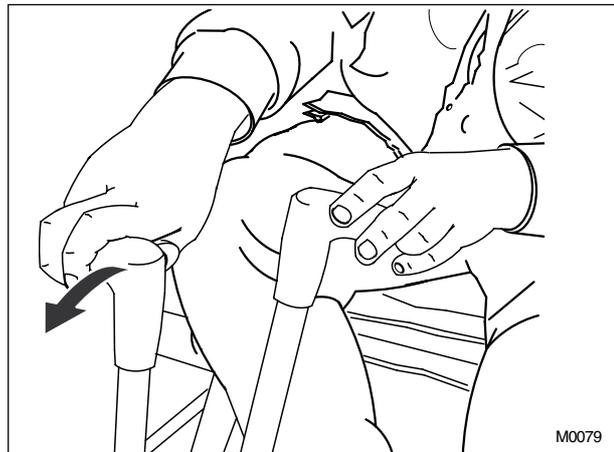
Right turn

Push the left-hand lever forward.
This action will cause only one track to turn and the machine will steer by pivoting on the stationary track.



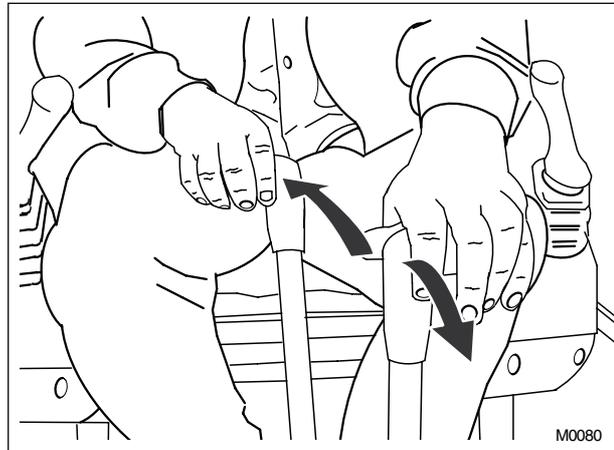
Left turn

Push the right-hand lever forward.
This action will cause only one track to turn and the machine will steer by pivoting on the stationary track.



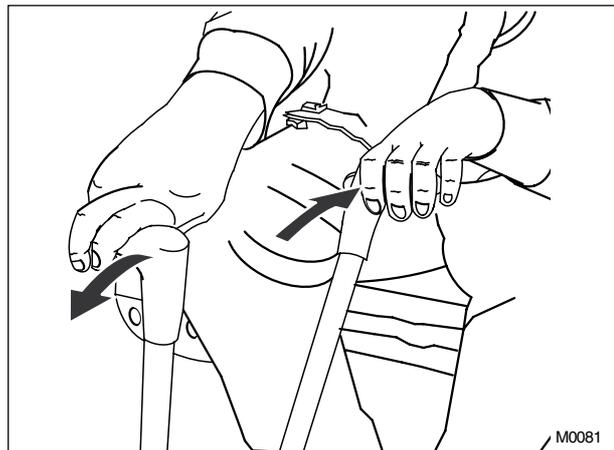
Clockwise spin

Push the left-hand lever forward and at the same time pull the right-hand lever backward.
This action will cause the tracks to turn opposite to one another at the same time. As a consequence, the machine will rotate by pivoting on its centreline.



Anti-clockwise spin

Push the right-hand lever forward and at the same time pull the left-hand lever backward.
This action will cause the tracks to turn opposite to one another at the same time. As a consequence, the machine will rotate by pivoting on its centreline.



OPERATING THE MACHINE



WARNING

Keep the attachment down or in any case in a suitable position to guarantee maximum visibility and control of the machine.

Do not swing the upperstructure, raise the load or brake abruptly if not justified. This may cause accidents.

Should the machine be accidentally placed under voltage (for ex., after pulling out an electric line), absolutely do not touch machine metal structure while getting off. Spot an adjacent area not very rough and jump directly over it from the cab.

Working near electric lines can be very dangerous, therefore some special precautions must be observed. By "work near electric lines" we mean when the attachment or load raised by the machine (in any position) may reach the minimum safety distance according to local or international Safety Regulations.

To work without risks, keep maximum possible distance from electric lines and never trespass minimum safety distance.

The Electric Power Company, if previously advised and involved in the work, as well as machine Operator, Owner and/or any natural person or legal entity being responsible at the time by contract or law, are liable for the adoption of all necessary precautions.

Contact the Electric Power Company owner of the line or its nearest branch before starting the work by looking up their address and number in the telephone directory.

Define which precautions should be taken to guarantee work safety together with the Electric Power Company representative.

Decrease work speed. Reaction time could be too slow and distance evaluation wrong.

Warn all ground personnel to keep clear of the machine and its load at all times.

If the load has to be guided down for laying, ask the Power Company which precautions should be taken.

Appoint a person in charge of signalling duties.

This person will have the responsibility of observing the machine, any part of it and/or the load approaching the electric line from a standpoint more favourable than the Operator's. This signalman must be in direct communication with the Operator and the Operator must pay undivided attention to the signals supplied.

Ensure that local and/or national Safety Regulations concerning work near electric lines are duly observed.

Working near overhead or underground electric lines involves the danger of severe injuries and even death.

All electric lines should be considered as operating live lines even though it might be well known that the line is question is out of work and visibly connected to the ground.

Working on slopes is dangerous.

Do not travel with a full bucket or a load from uphill downhill. Do not work with the bucket turned to the uphill side.

We recommend to work on slopes with the bucket downhill, after checking machine stability with the bucket empty and attachment retracted, by slowly swinging the upperstructure by 360°.

Keep the machine sufficiently far from the digging border.

Never dig under the machine.

Never use the bucket or attachment to lift persons or carry riders on the machine.

Prior to beginning the work near gas distribution mains or other public utilities (water ducts, sewers, telephone and/or telematic lines, etc.), always contact the nearest branch of the Distributing Company.

When working in or near pits, in ditches or near gullies, very high rocky or supporting walls check that the walls are sufficiently propped up according to safety regulations in force, in order to avoid cave-in hazards.

Pay the utmost attention when working near overhang walls.

When digging, there is the risk of cave-ins and landslides.

Always check ground conditions and conditions of the material to be removed. Support everywhere it is required to prevent possible cave-ins or landslides when:

- digging near previous trenches filled with materials
- digging in bad ground conditions
- digging trenches subject to vibration from railroads, working machines, city or highway traffic.

Always appoint a person in charge of signalling when Operator visibility in the working area is limited.

Keep all people clear of the attachment (auxiliary equipment) when raised to prevent possible injuries.

Only highly experienced personnel should be allowed to work on difficult virgin soil.

MAJOR OPERATING NORMS

IMPORTANT: Under climate conditions, when freezing could occur, park the machine on solid ground to avoid that the track chains could be frozen into the ground. Free the track chains and track frames from debris.

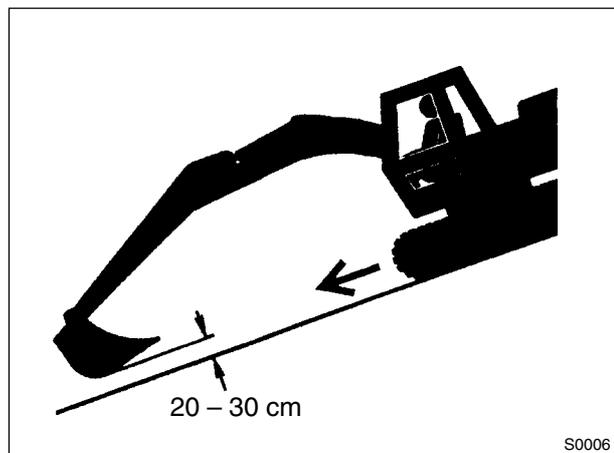
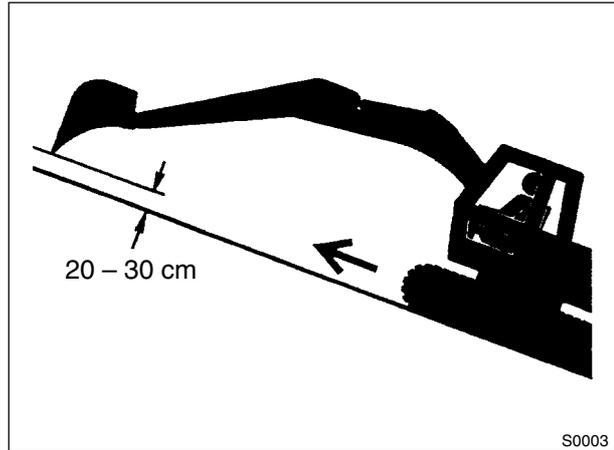
In the event the track chains are frozen into the ground, lift one track chain using the boom, moving carefully the machine, to avoid damaging the transmission and the undercarriage.

Choose a travel path as flat as possible. Drive carefully the machine in a straight direction, as much as possible, making small and gradual changes of direction.

When travelling on rough terrain, reduce the engine speed to reduce the possibility of damaging the undercarriage.

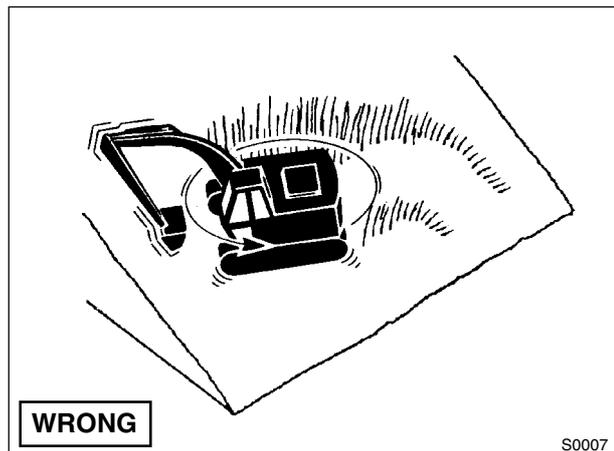
Keep the bucket down

Always move with the bucket down, namely on slopes or during transfers. The bucket, however, should be sufficiently raised from the ground to overcome possible obstacles. Do not use the bucket as a man lift or to carry riders.



Avoid tipping over

When working on slopes, do not swing the upperstructure and boom towards the downhill side. When moving heavy loads at the sides of the tracks pay attention not to cause the machine to overturn. With a full bucket, pay the utmost attention and care while swinging or lifting the attachment.



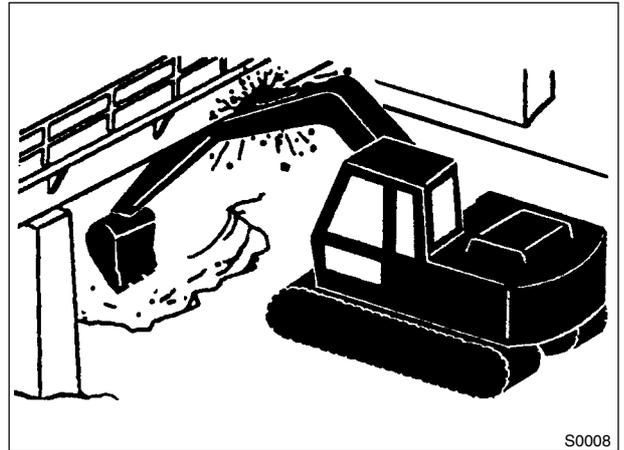
Work with caution

While working, when the machine is moving or being transported, avoid any contact of the boom and/or arm with possible overhanging obstacles. Prior to digging, check existence and location of electrical lines, gas ducts, water pipes or other public utilities installations. If in doubt, contact local authorities and/or the distributing companies (Electric Power, Gas, Telephone, Water, Telecommunications, etc.)



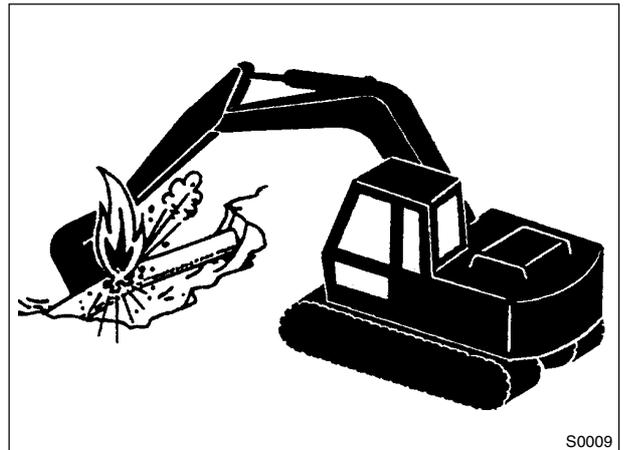
WARNING

Should optical fibre cables be damaged, do not look into the cable ends to avoid eye injuries.



S0008

Never dig under the machine. In case of emergency, should the engine stall and not be possibly restarted, it is possible to lower the boom and rest the bucket safely onto the ground following the “**EMERGENCY BOOM LOWERING PROCEDURE**” detailed in this chapter.



S0009

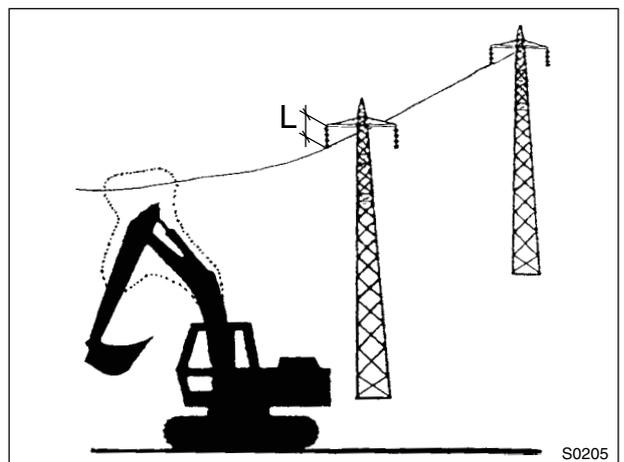
Avoid electric lines



WARNING

Contact with electric lines may cause severe injuries and even death.

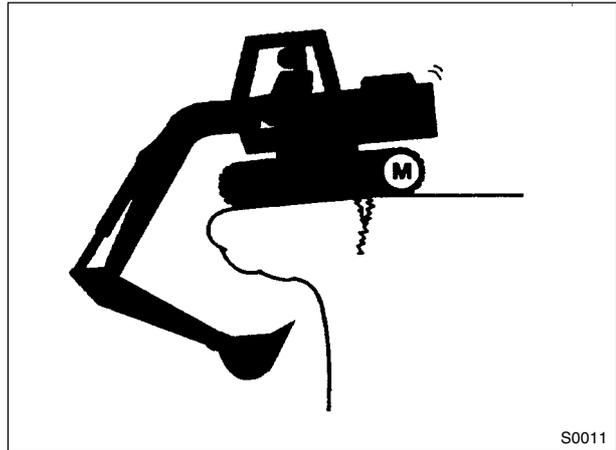
When working near electric lines, **NEVER MOVE** any part of the machine or loads at a distance less than 5 meters plus twice the length (L) of line insulators. Check and behave in compliance with any applicable local regulation. Ground dampness increases the area on which people might be affected by electric shocks. Keep all people and/or assistants away from the working area.



S0205

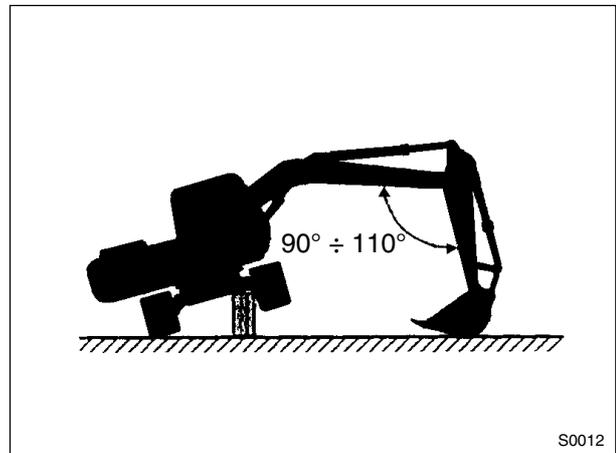
Check the working area

Always make sure that the work site has sufficient strength to firmly support machine weight.



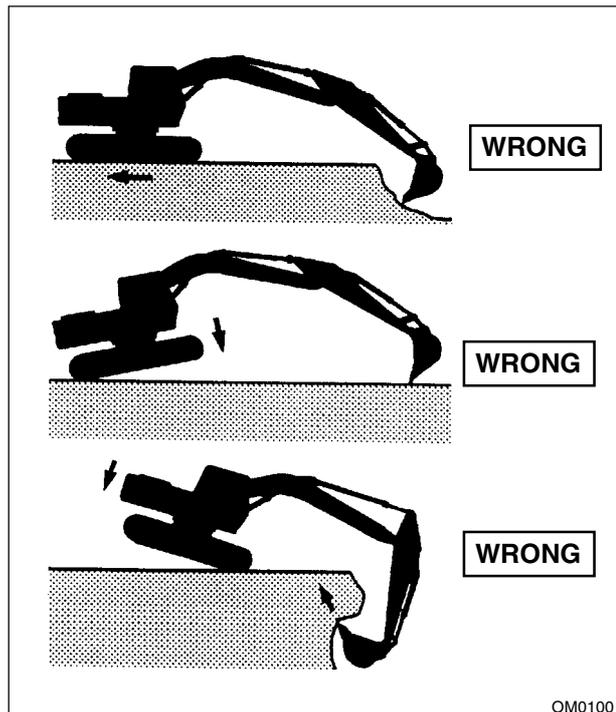
Raising one track with boom and arm

Keep the angle between boom and arm 90° to 100° when lifting the machine using the thrust from the front attachment. Rest the outer (round) side of the bucket onto the ground and use it as the origin of force, as shown.



Avoid excess digging effort

Never travel with the bucket teeth deep into the ground, nor try to dig using the excavator weight as additional digging force. Both operations cause excessive stress on the machine.



Operating in mud or water

The machine can wade or work into a river, providing that:

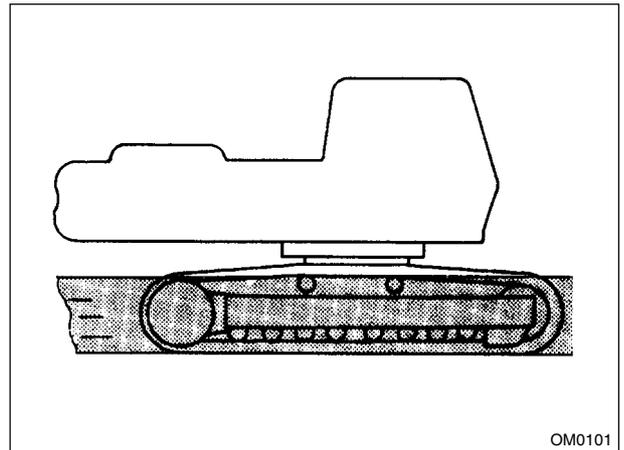
- The terrain is firm enough to prevent the machine from sinking excessively.
- The water level does not exceed the track support rollers.
- The stream is not excessive.

When operating under these conditions, check frequently the positioning of the machine. Re-position it, as required.

Avoid dipping the bullgear, the swing motor reduction unit and the centre joint below the water level.

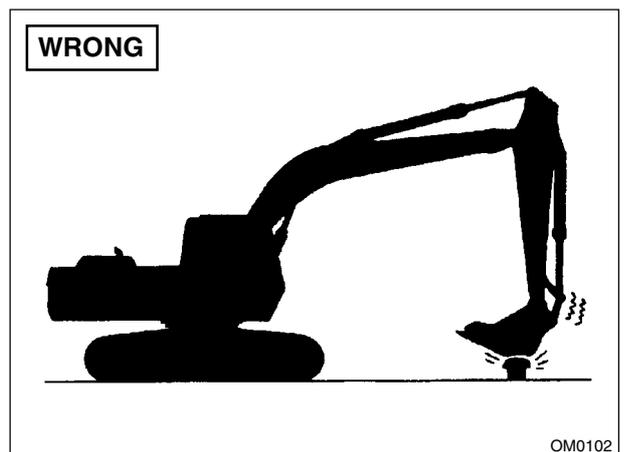
In the event they are accidentally submerged, please contact a Dealer.

The non compliance with these due precautions could cause a premature wear of some components of the machine.



Hammering or piling

Never use the bucket as a hammer. Improper use would damage the bucket and other parts of the front attachment.



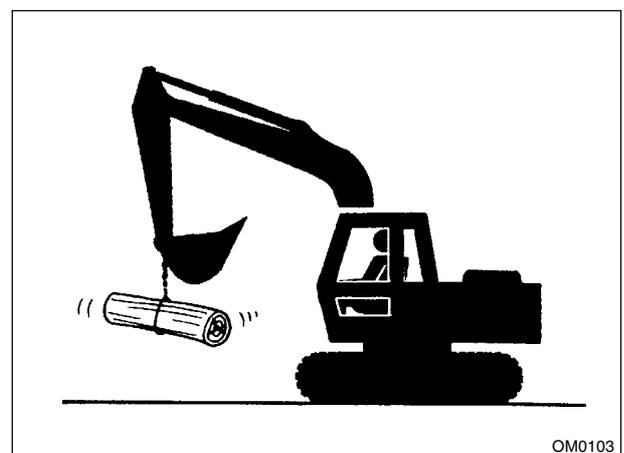
Avoid using as a crane

Avoid, in particular, this use, since the machine has been designed specifically for digging works.



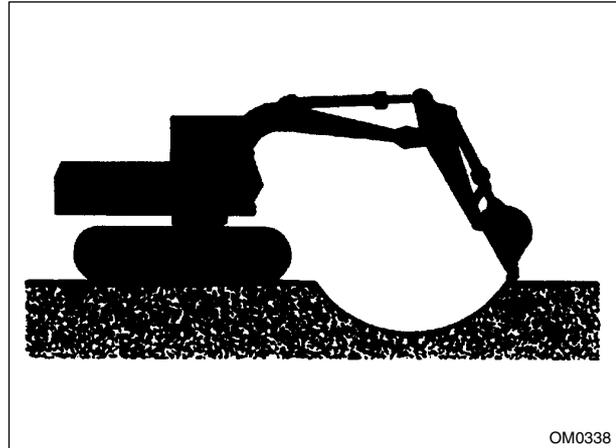
WARNING

*The machine has been specifically designed to perform digging/loading works. The handling of suspended loads completing the digging cycle is allowed, providing that the machine is equipped with the appropriate variant supplied upon request. Handle suspended loads, following strictly all current regulations regarding this matter, as well as the rules indicated at page 2-64 and those described in the **SAFETY RULES** chapter.*



Digging

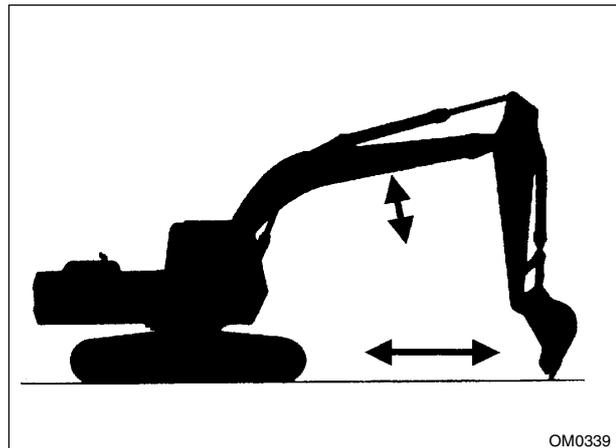
Place bucket teeth on the ground with the bottom of the bucket at 45° angle to the ground. Pull the bucket towards the machine using the arm as main digging force. When the soil sticks to the bucket, disengage the bucket by moving the arm and/or bucket rapidly back and forth. When trenching a straight line, position the tracks parallel to the trench.



NOTE: do not stop the boom abruptly during lowering as this may cause harmful kick-backs to the machine. When using the arm, do not fully extend the arm cylinder. Should it be necessary to dig with the upperstructure not aligned with the tracks, prevent bucket teeth from hitting the tracks. If the trench is deep, also avoid that the drive cylinder tubes hit the ground.

Grading

Position the arm slightly forward of its vertical position with the bucket fully rolled back, as shown. Retract the arm and at the same time slightly lift the boom. Once the arm moves past its vertical position, slightly lower the boom to allow the bucket to obtain a smooth surface.



Track shoe selection

Do not use marsh shoes or wide shoes when working on very rough terrain (stones, sand, gravel, crushed stone, etc. ...) as they are designed for use over soft ground. Using these special shoes on rough difficult terrain causes distortions and loosening, with possible damages to the track components.

Swing force

Do not use the swing force (rotation) to move huge stones, pull down walls, etc. This use may damage the front attachment and swing motor.

Avoid improper use

Performance which can be obtained from the machine is clearly defined by the Manufacturer's specifications. Never exceed allowed operation.

Improper travel

Never travel with the machine bucket firmly thrust into ground.

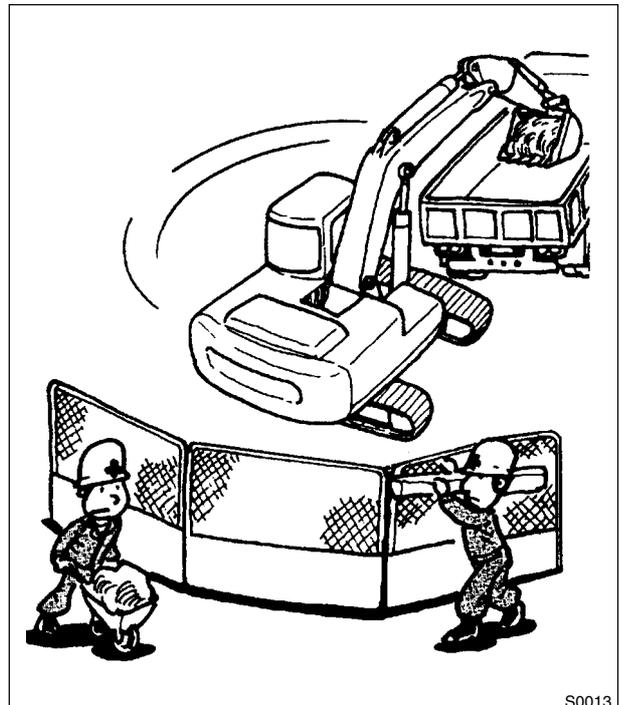
PRECAUTIONS DURING OPERATION



WARNING

Carefully inspect the work site before digging. If there is the possibility of falling objects, install overhead cab guards for safety purposes. If the ground where you are going to work is not compact or firm, adequately reinforce (prop up) the work area to operate safely.

- Wear clothing and safety equipment suitable for the job, such as hard hat, etc., when operating the machine.
- Clear all persons and obstacles, if any, from the area of machine operation and movement.
- Always beware of the surroundings while operating the machine.
- When working in a small area congested or surrounded by obstacles, take care not to hit the upperstructure or counter weight against such obstacles while swinging.



S0013

PARKING THE MACHINE

Drive the machine to a firm and possibly level ground. Lower the bucket to the ground.

Turn off the auto/idle mode, if engaged, by pressing the associated control button.

Stop the engine following the procedure detailed in the paragraph "**USING THE MACHINE**" in this Chapter.

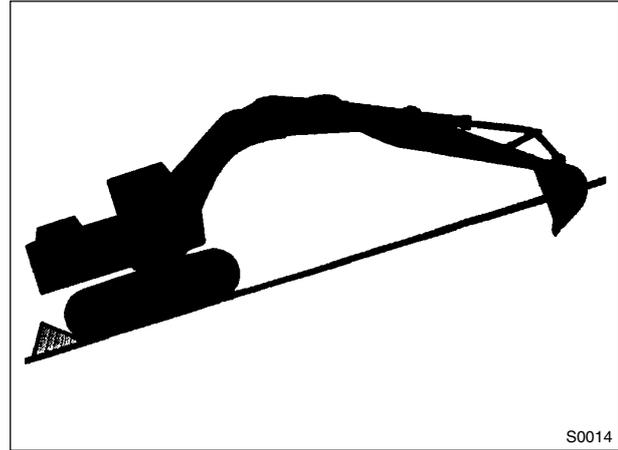
Move the key-start switch to the **OFF** position and remove the ignition key.

Pull the safety lever upwards and ensure it has reached end of travel to the vertical **LOCK** position.

Close all windows and roof window.

Lock the cab door and the following panels:

- battery bay and air filter access panel,
- hydraulic pump compartment panel,
- tool compartment panel
- engine hood.



WARNING

Do not park the machine on slopes whenever possible.

Should parking the machine on a slope be unavoidable, perform that detailed before and observe the following:

- Thrust the bucket teeth into the ground.
- Adequately block both tracks using wedges, as shown in the figure.

IMPORTANT: *always protect cab electrical components from bad weather taking care to close all windows, roof window, and access door.*

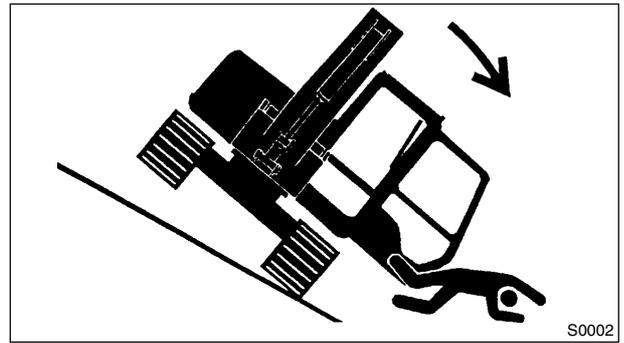
PRECAUTIONS FOR TRAVELING ON SLOPES



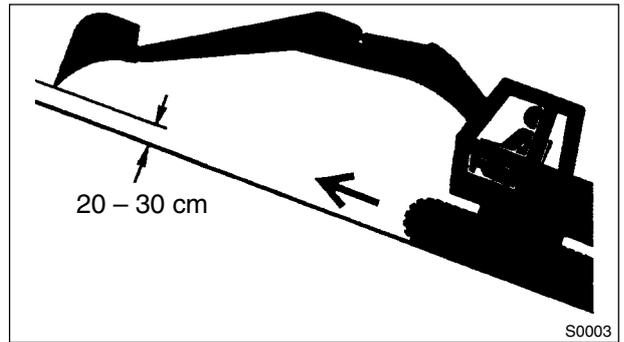
WARNING

Should it be necessary to operate the machine on slopes, carefully observe the following precautions. This is to prevent bodily injuries due to accidental machine overturn.

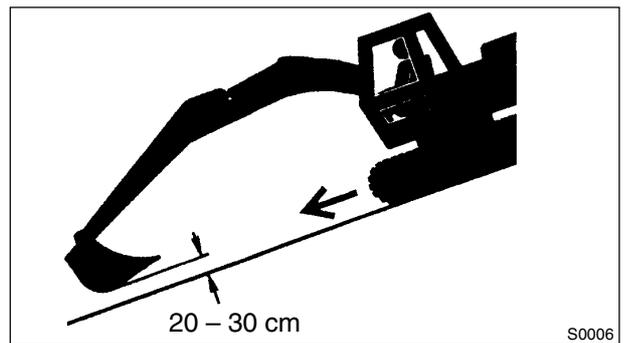
- Never attempt to enter or exit the machine when on 30° (abt 58%) slopes or steeper.
- Ensure the seat belt is properly fastened.
- Avoid travelling across the slope as much as possible.
- Never attempt to travel across 15° (abt 27%) slopes or steeper.
- Keep the bucket in the travel direction at approximately 20 to 30 cm from the ground.
- If the machine starts slipping or becomes unstable, immediately lower the bucket to the ground.
- Always travel at slow speed.
- Never attempt to steer the machine while travelling on slopes. Steering is allowed only on very gentle slopes where the ground is firm.
- Do not swing the upperstructure on slopes.
- Never attempt to swing the upperstructure downhill as the machine may overturn. If swinging uphill is unavoidable, operate very carefully by moving very slowly the upperstructure swing and lift control.
- Never turn loads downhill. Keep the bucket to the uphill side and reduce rotation speed at minimum.
- If the engine stalls on a slope, immediately lower the bucket to the ground and move control levers back to the neutral position. Then restart the engine.
- Be sure the machine has completely warmed up before ascending a steep slope. If hydraulic oil has not warmed up correctly, sufficient performance may not be obtained.



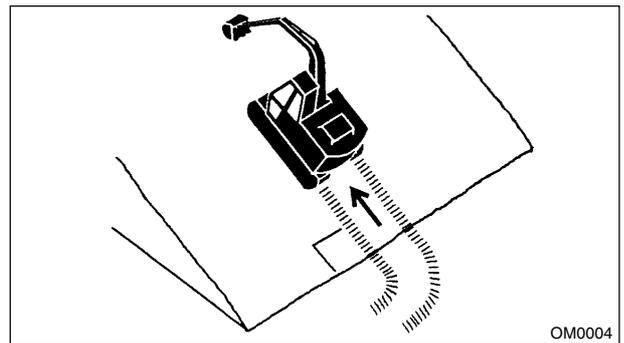
S0002



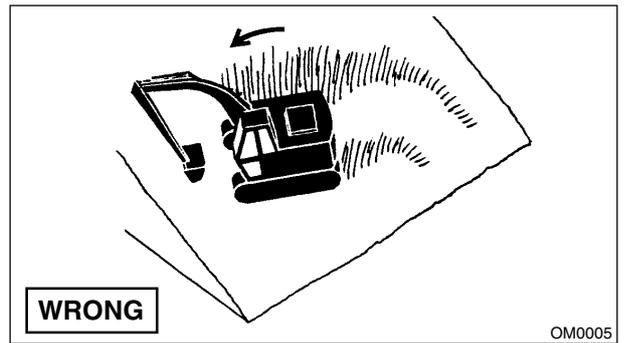
S0003



S0006



OM0004



OM0005

OBJECTS HANDLING OPERATION



WARNING

*The machine has been specifically designed to perform digging/loading works. The handling of suspended loads completing the digging cycle is allowed, providing that the machine is equipped with the appropriate variant supplied upon request. Handle suspended loads, following strictly all current regulations regarding this matter, as well as the rules described in the **SAFETY RULES** chapter.*



WARNING

*The anti-drop valves located on the cylinders, the warning buzzer device, the table of the loads that can be lifted located in the cab and the hook on the link of the bucket linkage are **SAFETY DEVICES**, making part of the suspended load handling variant.*

To handle suspended loads, act as described here below:



WARNING

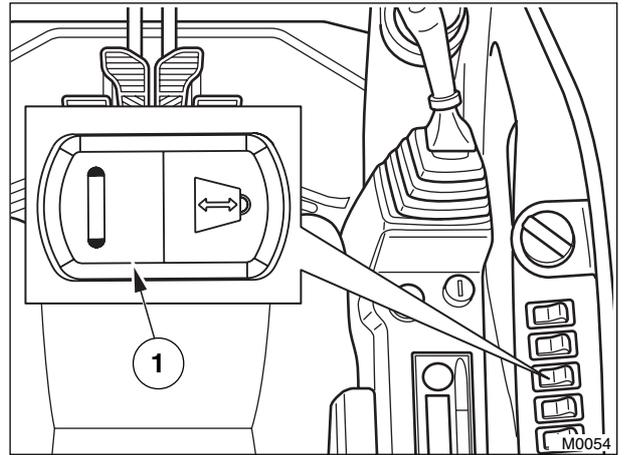
Prior to starting any handling of suspended loads check that the valves do not show clear evidence of damages or abnormal noises. In the event abnormal conditions are found, it is necessary to contact a Dealer; in the meantime, do not use the machine for the handling of suspended loads. Check that the lifting devices (hooks, chains etc.) are in perfect conditions without any sign of excessive wear. In any case, comply with current regulations in effect for these devices (non supplied with the machine)



WARNING

In order to prevent injuries, do not exceed the nominal load capacity of the machine. If the machine is not on a flat surface, the load capacity is reduced. In any event, proceed always with extreme care.

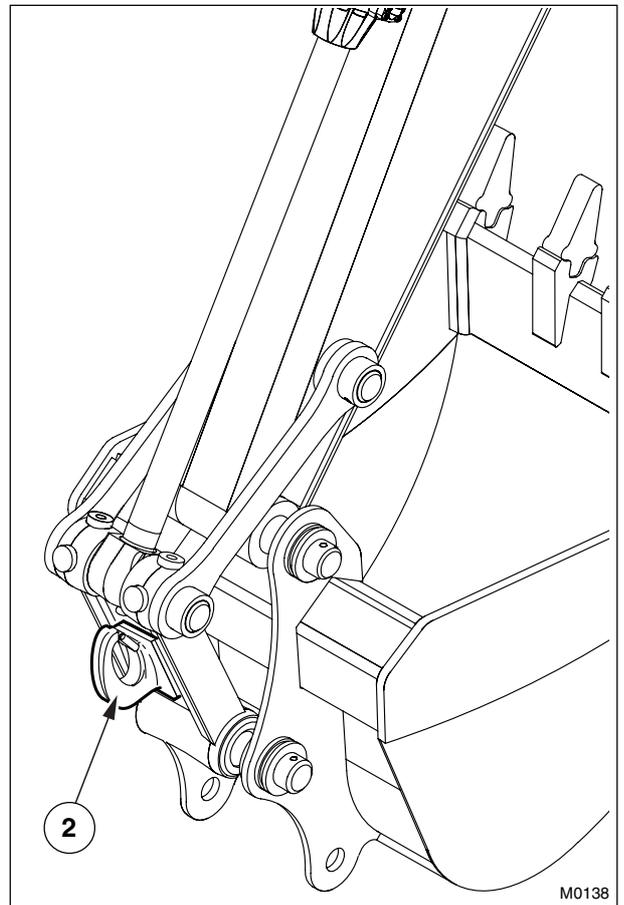
- Set an engine speed appropriate for the hydraulic load required.
- Evaluate (if known) the mass of the object to be handled and compare it with the data listed in the table located in the cab. Do not lift loads exceeding the maximum values prescribed by the table.
- Prior to performing lifting operations, press switch (1) to activate the load-momentum sensor. This sensor, once the safety limit is reached, activates the sound warning device.
- Secure the load with the appropriate hook (2) located on the bucket linkage rod, using slinging devices and chains adequate for the load to be lifted.



WARNING

Check that the lifting devices (hooks, chains etc.) are safe and free from signs of excessive wear. In any case, comply with current regulations relative to the inspection of such devices (not provided with the machine). The device can be used exclusively for the lifting of parts not anchored to the ground. Never use it for towing operations, uprooting or tearing apart.

- In order to limit the swinging of the load, avoid slinging it with cables and/or chains too long.
- Check the surrounding working area and make sure that the path to be travelled with the load is free from obstacles.
- Lift slowly the load, avoiding sharp movements which could cause swinging of the load. Keep the load near the machine, to improve the stability and operate, preferably, along its longitudinal axis, rather than crossways. Lift the load from the ground the minimum height required.



WARNING

Suspended load can swing and rotate in all directions, thus there is the dangerous possibility that they can hit persons or the cab of the machine. In order to limit this danger, it is absolutely required that all bystanders are moved away from the field of action of the machine and that the load is handled slowly. In the event the load rotates or swings during the handling, slow-down until stopped and lower it slowly to the ground; then correct the way it is slung.

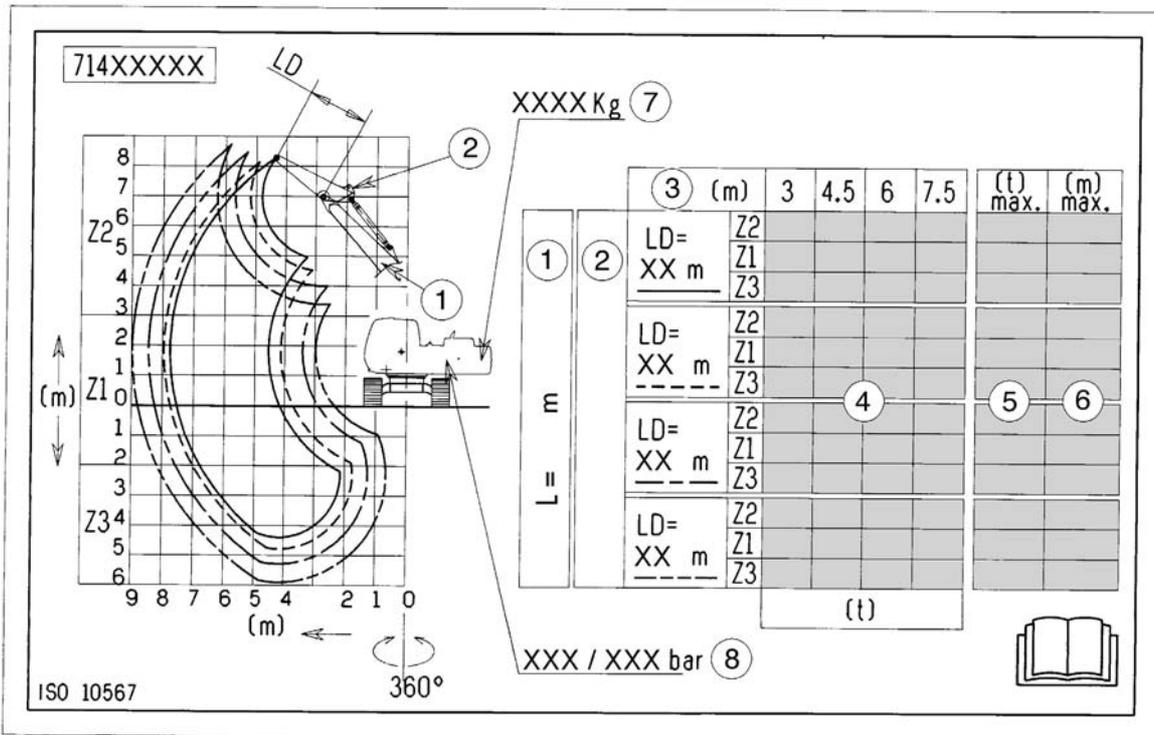


WARNING

In the event the sound alarm is activated during the handling of the load, place the load onto the ground and check the load conditions making reference to the appropriate table in the cab.

- Position and place the load where desired, making sure that it is resting on a solid base appropriate for its mass.
- Remove the chains.

Diagram for the readings of the liftable loads, located inside the cab



1. Boom length.
2. "LD" length of second alternative arm.
3. Distance of the load from the swing centre line.
4. Maximum liftable load in tons, at the tilting limit, in accordance with standard ISO 10567 (75% stability, 87% hydraulic system).
5. Maximum liftable loads in tons, at the maximum distance from the swing centre line.
6. Maximum working distance from the swing centre line.
7. Ballast weight.
8. Setting pressure of main pressure relief valve/ safety valves of the hydraulic system.

BUCKET INSTALLATION

Install the bucket as follows:

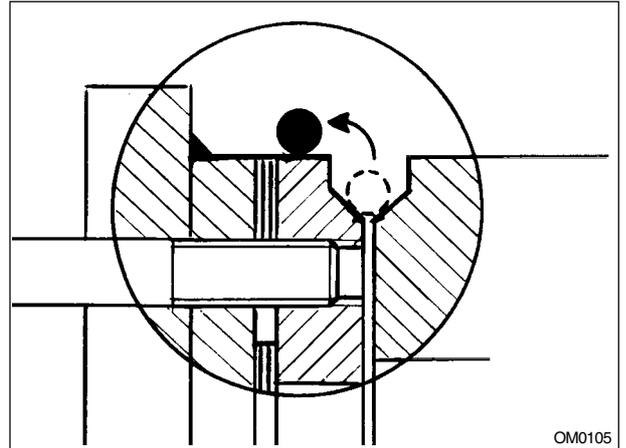
- using a suitable hoist, place the bucket on the same level as the tracks;
- position the O rings outside their seats;
- using the arm cylinder control and boom cylinder control make small vertical and horizontal movements to insert pivot pin (B) connecting the bucket to the arm into hole (A);
- use the bucket cylinder control to align the connecting rod (C) to hole (D) and insert pivot pin (E).
- secure pivot pins using lock pins and retaining rings and reposition the O rings into their seats.



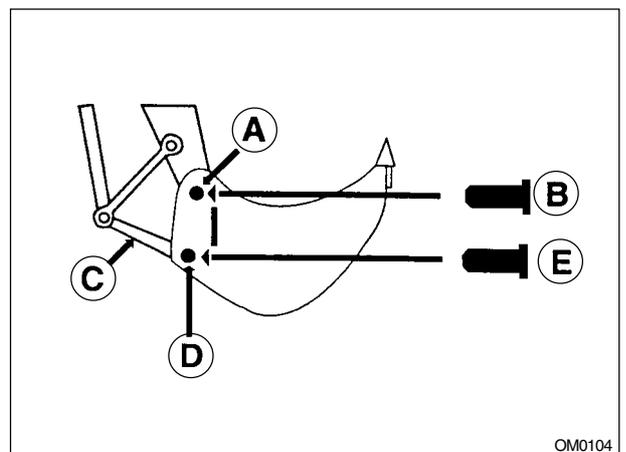
WARNING

Always use suitable tools to align holes. **DO NOT USE HANDS OR FINGERS.**

IMPORTANT: during installation, take care to position the O-rings correctly into their seats, between bucket and arm and between bucket and connecting rods.



OM0105



OM0104

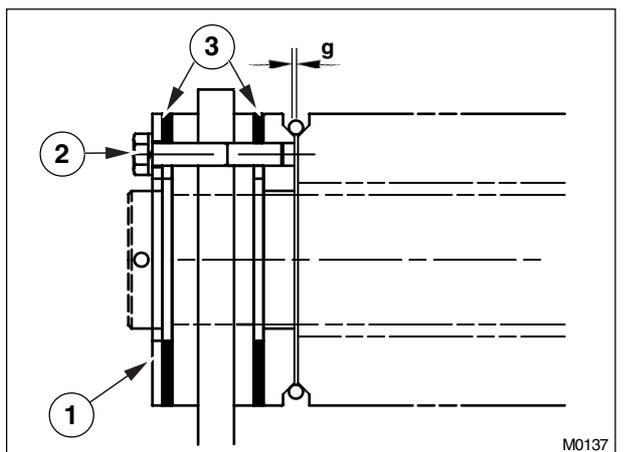
Bucket play adjustment

Bucket play (g) is adjusted by opportunistically changing total shims installed.

NOTE: bucket play (g) should be 0.5 to 1.5 mm.

If bucket play (g) exceeds the specified value, increase adjust shims as follows:

- Loosen the three bolts (2) taking care to retrieve the washers. Slide out the ring (1).
- Add adjust shims (3) until compensating the play (g).
- Install the ring (1) and tighten securing bolts.



M0137

Bucket teeth replacement



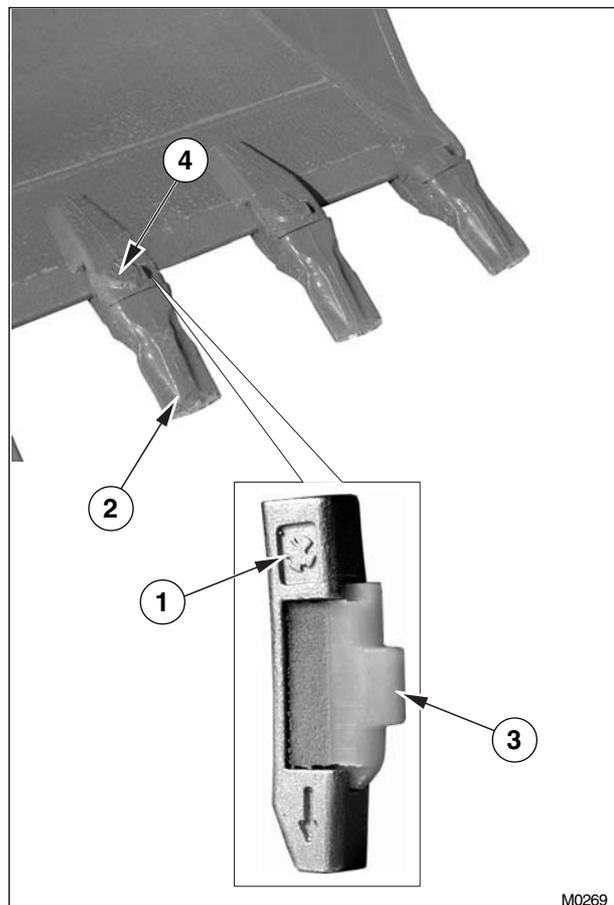
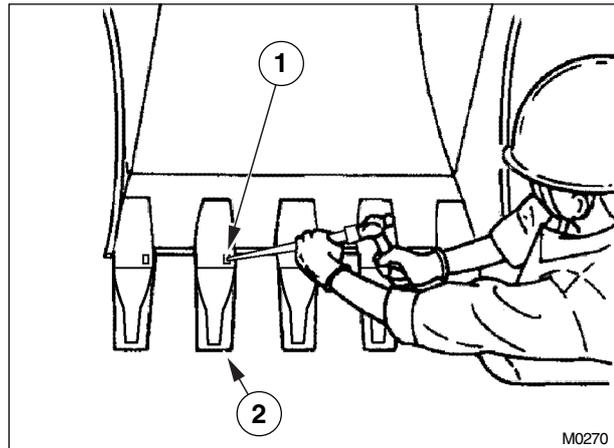
CAUTION

*Keep people not involved in the maintenance work outside the working area.
Wear adequate personal clothes and glasses with side shields as a protection against flying debris.*

- Ensure the machine is parked on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Use a hammer and punch to push lock pin (1) out of its seat and remove the tip of bucket tooth (2).

NOTE: *to push lock pin (1) out of its seat, strike it with a punch on its upper side*

- Install a new rubber insert (3) inside lock pin (1).
- Clean the surface of bucket tooth (4) and insert a new tip.
- Insert lock pin (1) into its seat using a punch and hammer, until it is fully mounted.



ROAD TRANSPORT

NORMS FOR TRANSPORT

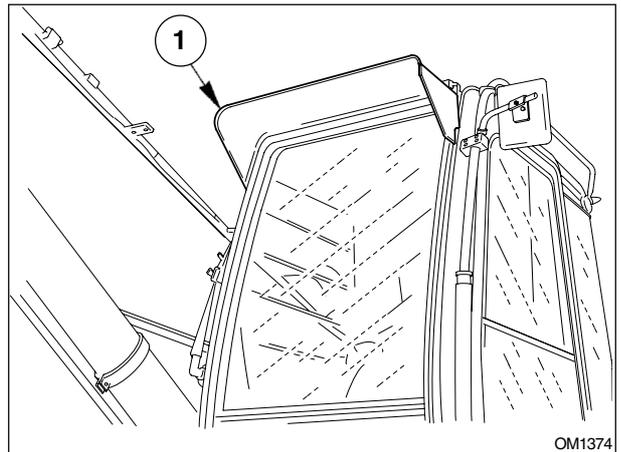
NOTE: *in some cases, it may be necessary to disassemble the machine to bring it within dimensional and/or weight limits provided for by local regulations.*

- When transporting the machine on a trailer on public roads, you must know and observe all the Norms of the Highway Law as well as all provisions released by the different Agencies owning the roads (Municipality, Province, Region, State).
- Prior to transporting the machine on a flatbed, check width, height, length and weight of the trailer with the machine loaded.

NOTE: *dimensions and weight may vary dependent upon the type of shoes and/or front attachment installed.*

- Investigate beforehand the conditions of the road you are going to travel, weight and size limits, and special local traffic regulations.

NOTE: *in some instances it is possible to remove the climbing steps in order to reduce the maximum dimensions of the machine. Please refer to chapter "SPECIFICATIONS" on paragraph "TRANSPORTING DIMENSIONS" .*



WARNING

In the event the machine is equipped with the variant "Rain protection" (1) installed on the cab, it is necessary, when loading, to position the machine with the cab directed toward the opposite side with respect to the motion direction of the vehicle, otherwise remove the rain protection and store it in an appropriate manner in the cab. This precaution prevents the risk of a sudden separation caused by the "sail effect" of the air during the on-the-road haulage.

NORMS FOR LOADING/UNLOADING THE MACHINE ON A TRAILER

Always load/unload the machine on a firm level surface.

Thoroughly clean the flatbed and ramp before loading.

Block the truck and trailer by adequately wedging the wheels.

The loading/unloading ramp should be of sufficient width, length, and strength. Also ensure that ramp angle is lower than 15°.



WARNING

Ensure that the auto-idle mode is turned off to prevent unexpected rpm increase due to unintentional operation of any control lever.

Always select the slow travel speed mode  and proceed with extreme care and attention.

Avoid steering while driving the machine onto the ramp: danger of machine overturn. Should corrective steering be necessary, move back to ground or flatbed, change travel direction, and resume driving.

The ramp end, where it meets the flatbed, is a sudden bump. Travel over the bump with extreme care and increase machine stability using the front attachment.

LOADING THE MACHINE ON A TRAILER

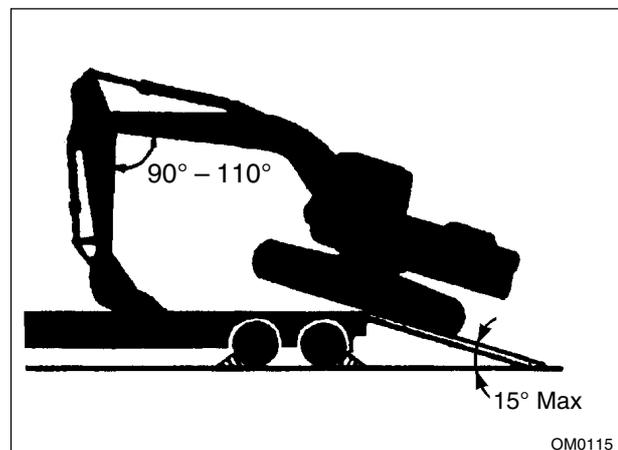
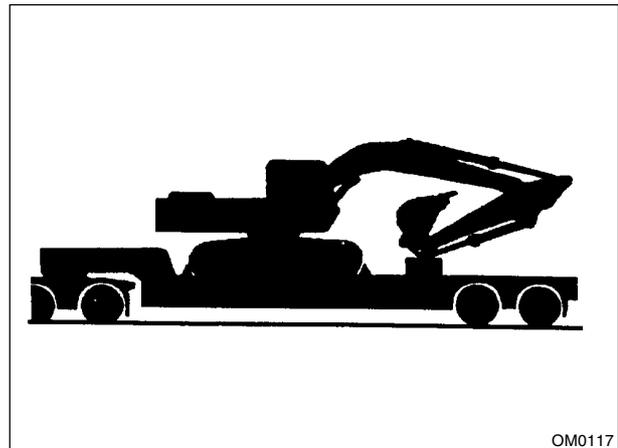
Observe the following when loading the machine on a trailer.

NOTE: in cold weather, the machine should be properly warmed up before loading.

- Loading procedure may vary dependent upon whether the front attachment is installed or not.

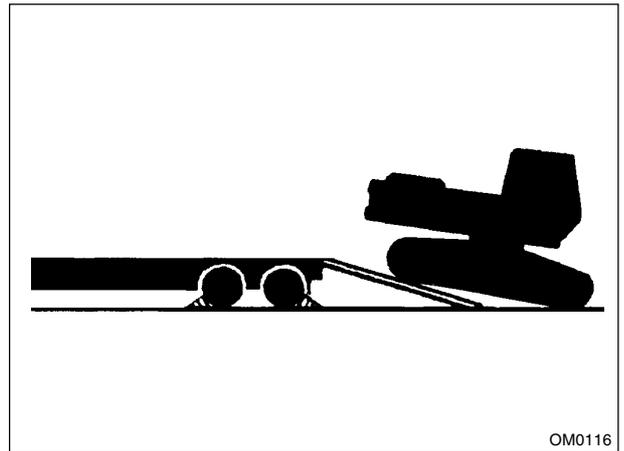
With the front attachment installed

- Activate the "Travel Independence" device by actuating the appropriate switch located on the left side panel.
- Travel forward along the ramp with the front attachment at the front.
- Once at the ramp end and before the machine starts falling forward onto the flatbed (shifting the position of its centre of gravity), rest the bucket flat side onto the flatbed (boom to arm angle to be 90° to 110°).
- Drive slowly forward until the tracks are correctly positioned on the flatbed.
- Slightly raise the bucket from the flatbed, retract the arm and keeping it tucked under, slowly swing the upperstructure by 180°;
- Roll in the bucket and rest it on blocks of suitable matter and strength (for ex., wooden blocks).



With the front attachment removed:

- Activate the "Travel Indipendence" device by actuating the appropriate switch located on the left side panel.
 - Travel in reverse along the ramp as shown.
- Machine centre of gravity should correspond to the trailer centre of gravity.
 - Stop the engine and remove ignition key from the start switch.
 - Cycle the control levers to relieve any residual hydraulic pressure from the boom and arm drive cylinders.
 - Move the safety lever to end of travel to the vertical **LOCK** position.
 - Close all windows, front windcreens, roof window, and cab door. Cover the exhaust pipe to prevent ingress of water or dirt.
 - Adequately secure the machine to the trailer to prevent dangerous movements. Proceed as follows:
 - Lock machine frame to the trailer flatbed by means of chains or metal cables of suitable size. Do not place metal cables or chains over or against hydraulic tubing and hoods.
 - Block track ends using wedges.



UNLOADING THE MACHINE FROM A TRAILER

The following precautions should be observed while unloading the machine from a trailer.

- Unloading procedure may vary dependent upon whether the front attachment is installed or not.

With the front attachment installed

- Activate the "Travel Indipendence" device by actuating the appropriate switch located on the left side panel.
- Travel slowly in reverse along the flatbed.
- Once at the flatbed end and before the machine starts falling forward onto the ramp (shifting the position of its centre of gravity), rest the bucket flat side onto the ground (boom to arm angle to be 90° to 110°);
- Drive slowly forward while retracting the boom, extending the arm and repositioning the bucket resting onto the ground until the entire machine is unloaded.

With the front attachment removed:

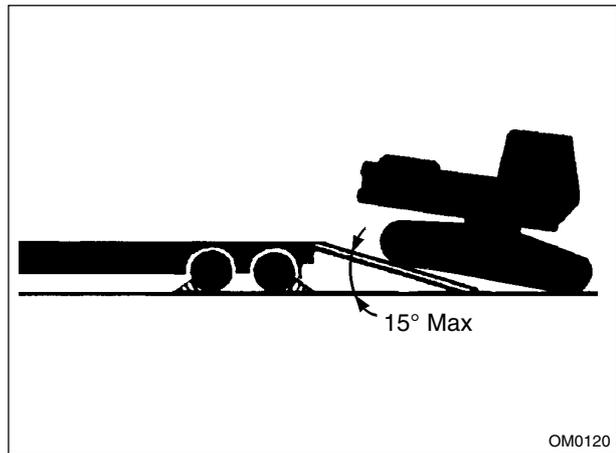
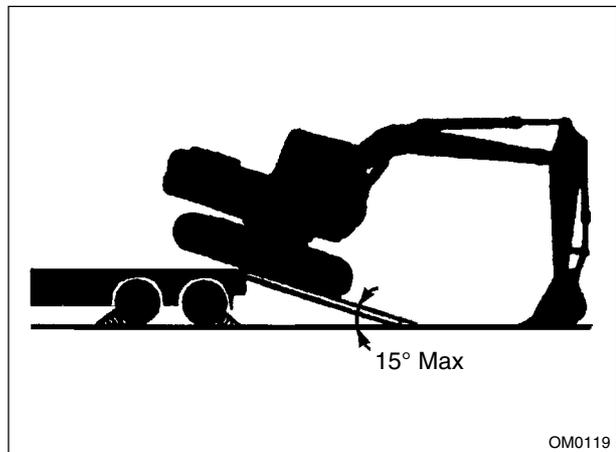
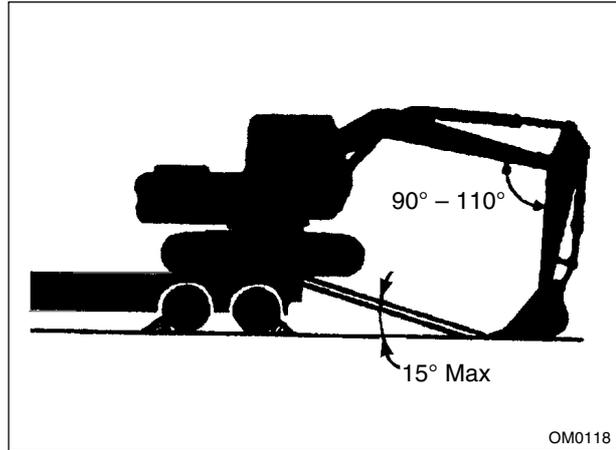
- Activate the "Travel Indipendence" device by actuating the appropriate switch located on the left side panel.
- Travel forward down the ramp.



WARNING

Never change the travel speed mode while travelling downhill as it will create a very dangerous situation.

IMPORTANT: *to avoid damaging the front attachment, observe the following while unloading the machine: minimum angle between boom and arm should never be lower than 90° and the bucket should not violently hit the ground.*



SEA TRANSPORT

CRANING THE MACHINE FOR SEA TRANSPORT

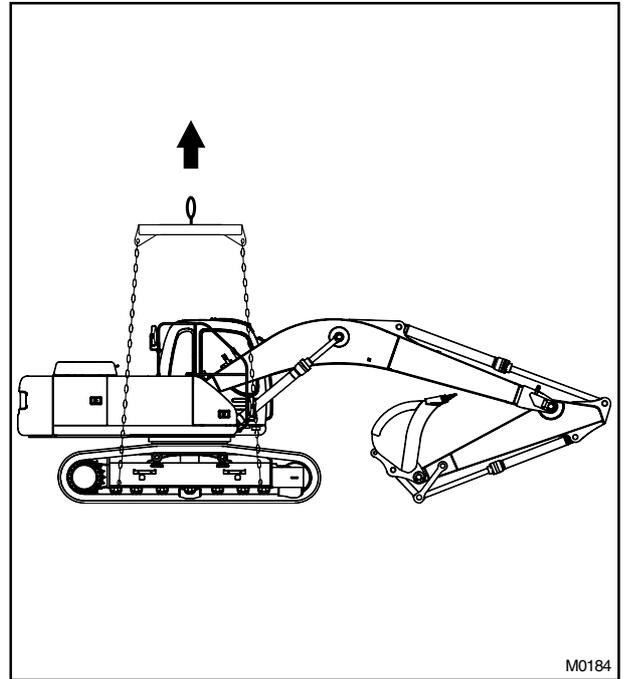


DANGER

Metal cables or chains may break causing severe injuries. Carefully inspect metal cables and/or chains prior to use and check for damages or wear. Always wear suitable protection gloves when handling metal cables or chains. Use metal cables or chains of appropriate size according to the load to be raised.

Arrange the lifting sling with the utmost care to avoid any possible movement of the machine while it is being raised. Crane the machine very slowly.

Ensure no one is under or near the machine while this is being raised: danger of death.



Observe the following to raise the machine:

- Fully extend the arm and bucket cylinders and tuck in the front attachment.
- Lower the boom and gently rest the bucket onto the ground.
- Move the safety lever to the **LOCK** position.
- Stop the engine and remove the ignition key from the starter switch.
- Arrange the sling around the machine. Take care to place protections (such as, rubber, tyre pieces, wooden blocks) to prevent any damage during craning, as shown in the figure.
- Check that the sling is correctly attached to the crane hook prior to start lifting.
- Ensure that no one is near. Slowly raise the machine and check that it is correctly balanced when it is taken off the ground.

PRECAUTIONS IN COLD WEATHER

The antifreeze fluid is recommended for all climates: it widens the operating temperature range, lowers the freezing point and raises the boiling point. When temperature is next to 0 °C, to avoid freezing hazard, it is necessary to check that the cooling system is filled with an antifreeze mixture. If not, replace the radiator coolant with this mixture.

Flush the cooling system prior to filling with the antifreeze mixture (refer to the chapter “**MAINTENANCE**”).



CAUTION

Fluid under pressure. Turn cap or cover slowly before removing to relieve pressure.

We recommend to use **AGRIFLU** antifreeze fluid. Refer to the below for mixing percentage according to outer temperature.

| Outer temperature (up to...) | AGRIFLU | Water |
|---------------------------------|---------|-------|
| - 8 °C | 20% | 80% |
| -15 °C | 30% | 70% |
| - 25 °C | 40% | 60% |
| - 35 °C | 50% | 50% |

We recommend to use lubricants of adequate viscosity.

NOTE: *do not use the machine immediately after first start-up of the day or after prolonged inoperative time. Always warm up hydraulic, engine and cylinder oil as detailed in the previous paragraphs.*

PROLONGED MACHINE INACTIVITY**DANGER**

Do not run the engine in confined spaces without proper ventilation and/or a suitable system capable of removing.

**WARNING**

Explosive gas is produced while batteries are being charged. Keep open flames and/or sparks away from the battery charging area. Charge the batteries in a well ventilated area. Remove cell plugs during recharging. Take care to make correct connections: Never connect a positive terminal (+) to a negative terminal (-).

- Inspect the machine. Repair damaged or worn parts. Install new parts, if necessary.
- Clean the air filter.
- Fully retract all cylinders, if possible. If not, coat the exposed cylinder rods with grease.
- Lubricate all grease points.
- Park on a base.
- Wash the machine.
- Remove the batteries and store in a dry protected place after charging fully. If not removed, disconnect battery negative cable from the terminal (-).
- Drain coolant. If the system is filled with antifreeze mixture, draining is not necessary.
- Release alternator and fan belt.
- Remove injectors and inject a small amount of engine oil into the cylinders through injector holes. This operation should be carried out using a syringe after bringing each piston to the bottom dead centre. After injecting, crank the engine several turns (using the starter motor) to spread a protective coat of oil over cylinder walls. Reinstall injectors.
- Paint parts needing it to prevent rust formation.
- Store the machine in a dry protected place. If the machine is parked outside, cover it with a tarpaulin arranged as to consent ventilation. If not, humidity harmful to the machine may result.
- If the machine is to be stored for a prolonged period of time, operate travel, swing and digging hydraulic systems at least once per month to guarantee proper lubrication.
- Before operating the machine, check coolant level (or refill the system if drained) and lubrication conditions.
- Check battery charge each month and recharge, if necessary.

USING THE MACHINE AFTER PROLONGED INACTIVITY



DANGER

Do not run the engine in confined spaces without proper ventilation and/or a suitable system capable to remove harmful exhaust gases.

- Remove grease from cylinder rods.
- Adjust alternator and fan belt tensions.
- Fill the tank with fuel. Bleed air from the fuel system. Check levels of all fluid.
- Start the engine.
Run the engine at medium speed for several minutes prior to operating it at full load.
- Cycle all hydraulic functions several times.
- Thoroughly check all systems prior to operating the machine at full load.

NOTE: *After prolonged machine storage, perform all the operations detailed above and the following checks:*

- a) Check condition of all hoses and connections*
- b) Warm up the engine*
- c) Stop the engine*
- d) Install new fuel filters. Replace engine oil filter and top up engine oil.*

IMPORTANT: *If the machine has not been used for a long time, oil layers on the sliding surfaces may have deteriorated. Operate travel, swing and digging hydraulic systems 2 or 3 times to lubricate sliding surfaces.*

DESMANTLING OF THE MACHINE



WARNING

- *The machine decommissioning must be exclusively carried out by personnel trained, qualified and authorized to carry out such operation.*
- *Start disassembling the hydraulic components only after that the hydraulic components, the hydraulic oil and the lubricants are completely cooled down and after that the residual pressure has been relieved as described on the Repairing Instruction Manuals.*
- *Prior to disassembling, follow the **GENERAL SAFETY RULES** and release fluids contained in every machine component, both in the tanks and in the relevant systems.*

In order to disassemble the machine, it is necessary to have special tools (hoists, hydraulic presses, fluid containers, etc.) and specific attachments listed on the **Repairing Instruction Manuals**, available at the Dealers, in order to avoid dangerous situations, either for the personnel or for the environment, while disassembling.

In the machine, there are:

- Fluids under pressure (hydraulic system, cooling system, etc.)
- Gases (conditioning system and accumulator where provided).
- Acid (Batteries)
- High weigh parts constituting the machine (arm, boom, buckets, etc.)



Handle and dispose of the fluids according to current regulations. Use only authorized disposal procedure. If in doubt contact authorities concerned.

3 - OPTIONS AND VARIANTS



HYDRAULIC BREAKER

HYDRAULIC BREAKER SELECTION AND INSTALLATION

If it is required to install a hydraulic breaker to the excavator, select a breaker model that meets the requirements of stability, pressure and oil quantity of the excavator hydraulic system. Contact your authorised Dealer to select a type of hydraulic breaker suitable for this machine.

NOTE: depending upon the type of attachment installed, it is possible to modify the value of the preset maximum flow. For such operation, please contact a Dealer.

PRECAUTIONS TO BE OBSERVED WHEN USING THE HYDRAULIC BREAKER

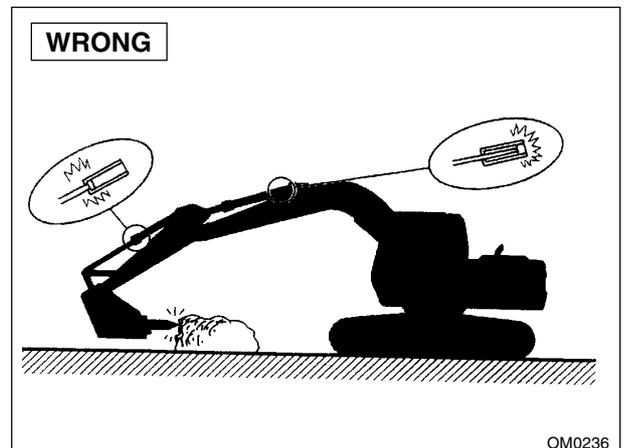
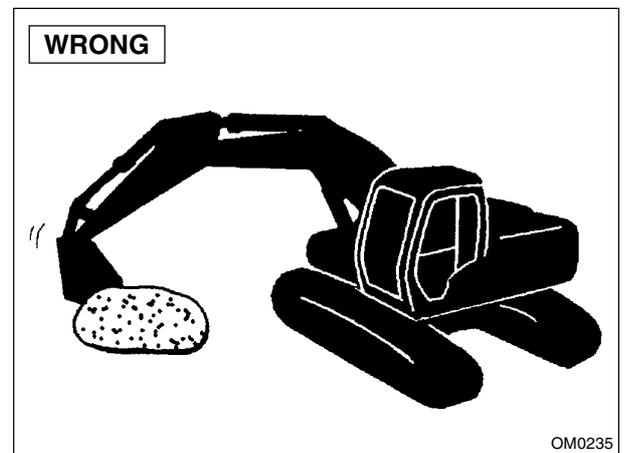
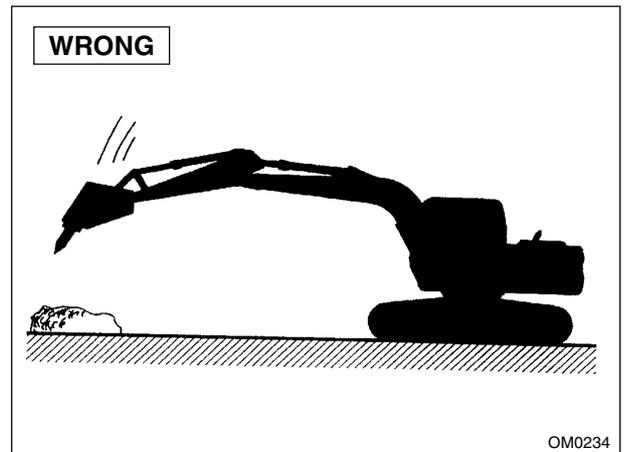


WARNING

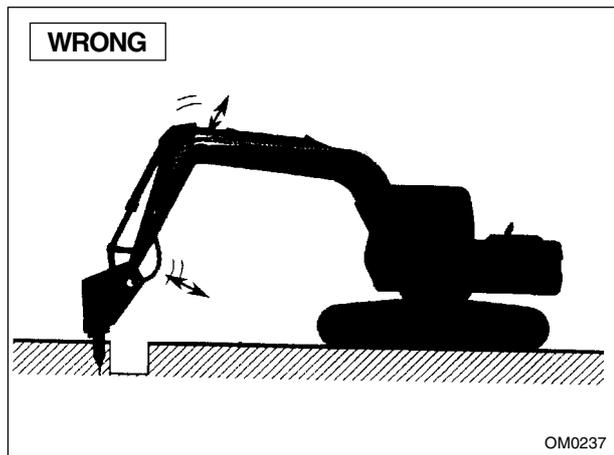
The hydraulic breaker is much heavier than the bucket, therefore it reduces excavator stability and increases overturn hazard. During operation, splinters or flying debris may hit the cab or other parts of the excavator.

Observe all following precautions and take all necessary measures to prevent accidents that may damage the excavator and cause personal injuries to the Operator.

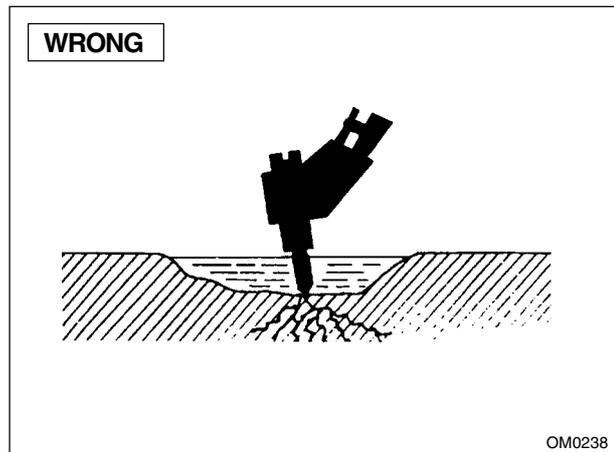
1. Avoid hitting objects with breaker. The breaker is heavier than the bucket and lowers faster. This may cause damages to the breaker, attachment, and upperstructure. Always lower the breaker slowly until the chisel point touches the object to be broken before starting breaker operation.
2. Do not use the hydraulic breaker and/or swing function to push objects as damages to the attachment may result.
3. Do not operate the breaker with the excavator cylinders fully extended or retracted to avoid attachment and/or cylinder damage.



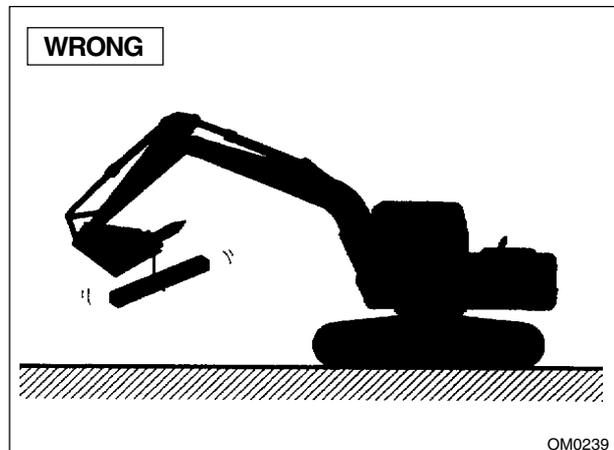
4. Stop working if hydraulic hoses look abnormally bent. Contact your authorised Dealer.



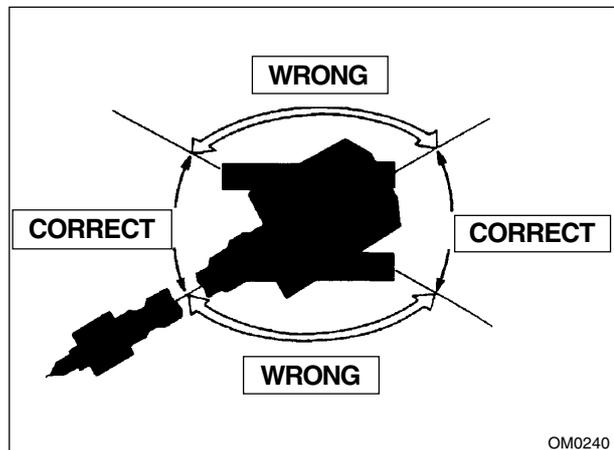
5. Do not operate the hydraulic breaker in water. Doing so will cause rust and seal damage, resulting in damage to the hydraulic system components.



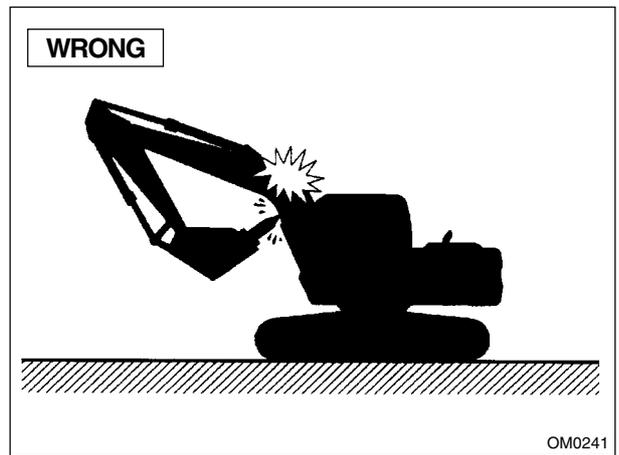
6. Do not use the hydraulic breaker to move objects. The excavator might overturn and/or the hydraulic breaker may be damaged.



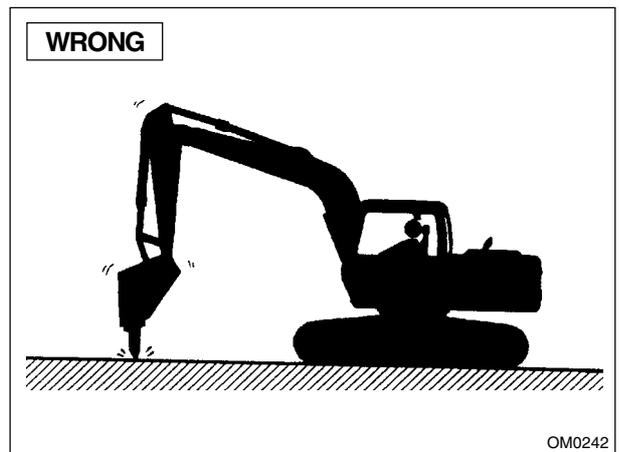
7. Do not operate the breaker to the side of the machine. The machine may become unstable and undercarriage component life may be reduced.



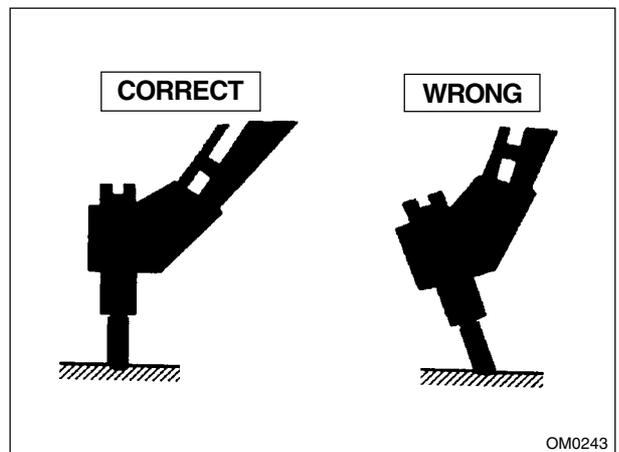
8. Operate the excavator carefully to avoid hitting the boom with the hydraulic breaker.



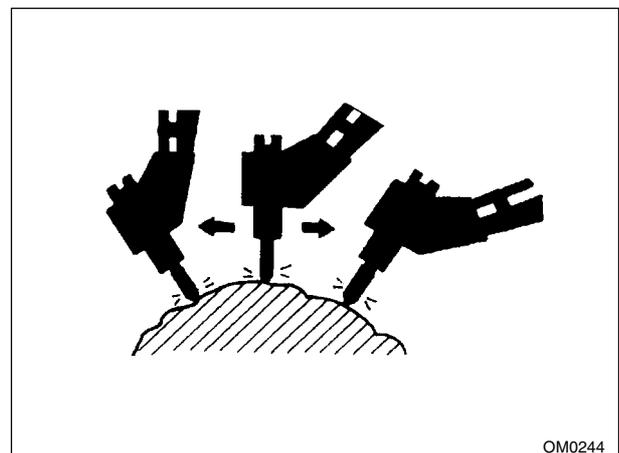
9. Do not operate the breaker with the arm positioned vertically. Excessive vibration to the arm cylinder may cause oil leakage.



10. Press the breaker so that the chisel point thrust is square (perpendicular) to the object to be broken.



11. Do not operate the hydraulic breaker continuously longer than one minute. Excessive chisel wear will result. If an object could not be broken within one minute, apply chisel to other locations, less than one minute for each location.



OPERATION

Machine in monobloc version

To operate the hydraulic hammer, proceed as follows:

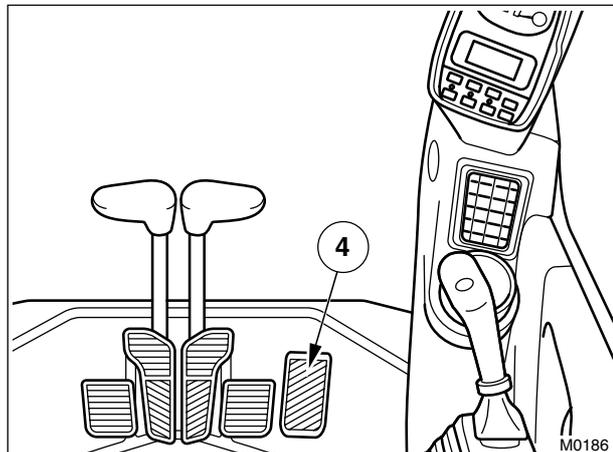
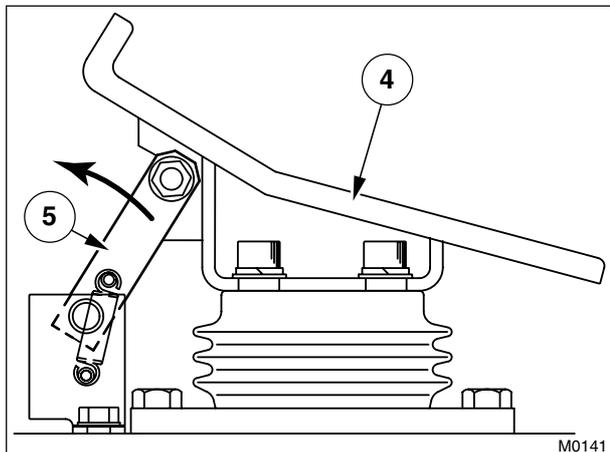
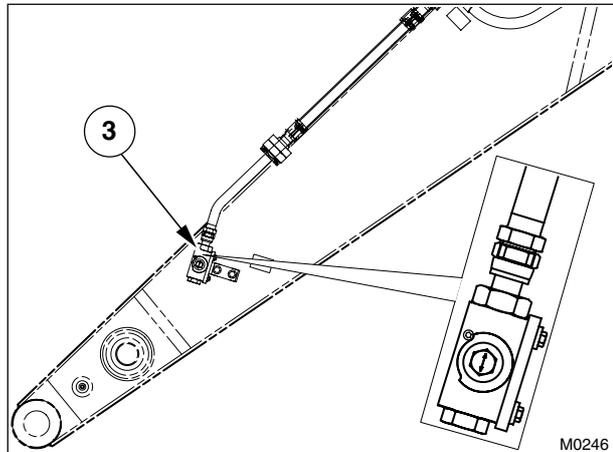
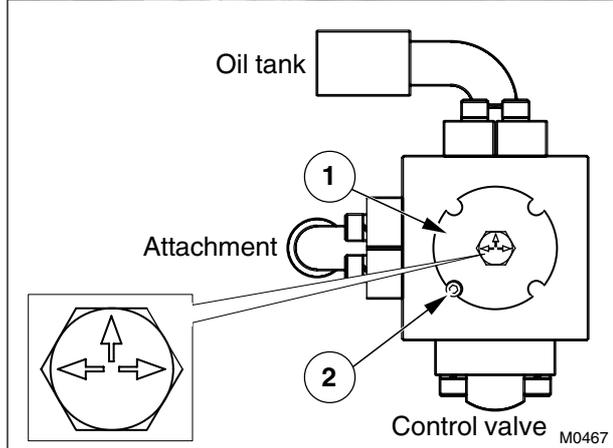
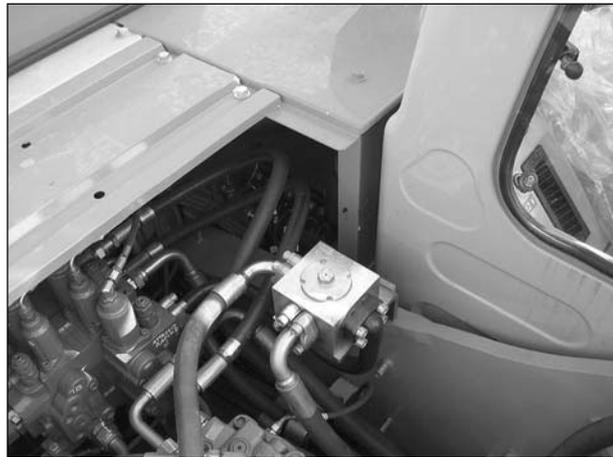
- Get on the turret.
- Verify that selector (1) is in a position connecting the return from the hammer to the hydraulic tank (see the position of the arrows indicated on the selector).
In the event the selector is not in such position, proceed as follows:
 - Loosen Allen screw (2) using a 5 mm wrench.
 - Turn selector (1) into the position return of the hammer to the hydraulic tank, using a 24 mm wrench.
 - Tighten screw (2).
- Check that valves (3) located on the arm are open (arrow stamped on the valve parallel with the pipe). In the event the valves are not open, turn them using a 24 mm wrench.

IMPORTANT: a hydraulic hammer of dimensions and performance compatible with the machine does not require the doubling of the flow. On the contrary, this could cause serious troubles to the equipment.

- Free hydraulic hammer pedal (4) moving pedal lock device (5) outward.
- To operate the hydraulic hammer, actuate pedal (4).

NOTE: by actuating hydraulic breaker pedal (4), work mode **A** is automatically engaged. Once hydraulic breaker pedal (4) is released into neutral position, the work mode previously selected is automatically reset.

- To cut-off the operation of the hydraulic hammer, release pedal (4).



Machine in triple articulation version

To operate the hydraulic hammer, proceed as follows:

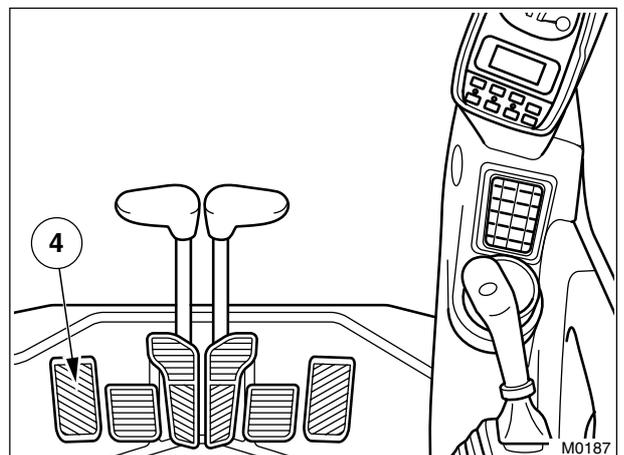
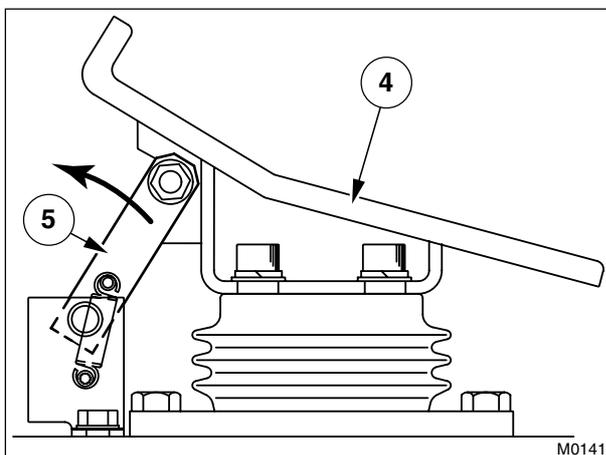
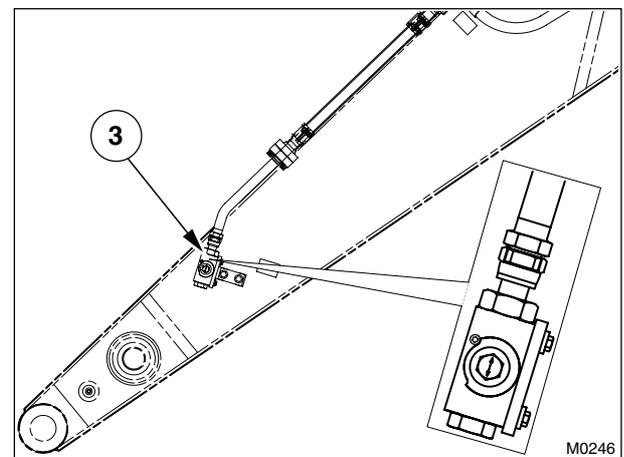
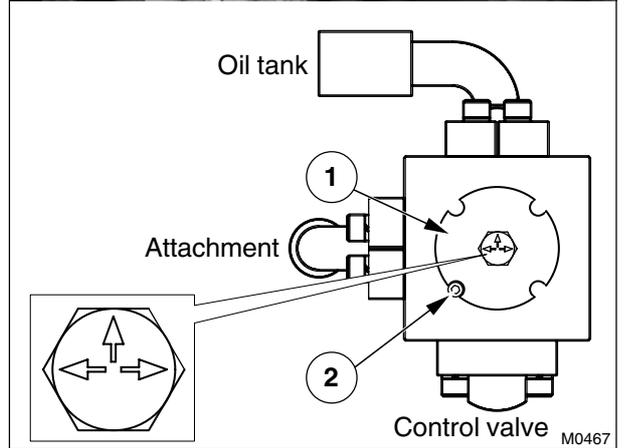
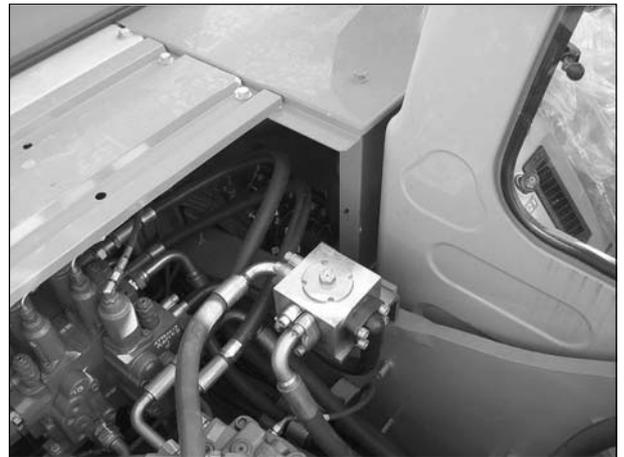
- Get on the turret.
- Verify that selector (1) is in a position connecting the return from the hammer to the hydraulic tank (see the position of the arrows indicated on the selector).
In the event the selector is not in such position, proceed as follows:
 - Loosen Allen screw (2) using a 5 mm wrench.
 - Turn selector (1) into the position return of the hammer to the hydraulic tank, using a 24 mm wrench.
 - Tighten screw (2).
- Check that valves (3) located on the arm are open (arrow stamped on the valve parallel with the pipe).
In the event the valves are not open, turn them using a 24 mm wrench.

IMPORTANT: a hydraulic hammer of dimensions and performance compatible with the machine does not require the doubling of the flow. On the contrary, this could cause serious troubles to the equipment.

- Free hydraulic hammer pedal (4) moving pedal lock device (5) outward.
- To operate the hydraulic hammer, actuate pedal (4).

NOTE: by actuating hydraulic breaker pedal (4), work mode **A** is automatically engaged. Once hydraulic breaker pedal (4) is released into neutral position, the work mode previously selected is automatically reset.

- To cut-off the operation of the hydraulic hammer, release pedal (4).



CRUSHER

CRUSHER SELECTION AND INSTALLATION

Considering that the crusher is heavier than the bucket, select a crusher model whose characteristics meet the excavator requirements to prevent problems, namely as regards stability.

Contact your authorised Dealer to select a type of crusher suitable for this machine.

NOTE: depending upon the type of attachment installed, it is possible to modify the value of the preset maximum flow. For such operation, please contact a Dealer.

NOTE: for operations with demolition crusher, refer to the relevant Instruction Manual provided by the Manufacturer.

PRECAUTIONS TO BE OBSERVED WHEN USING THE CRUSHER



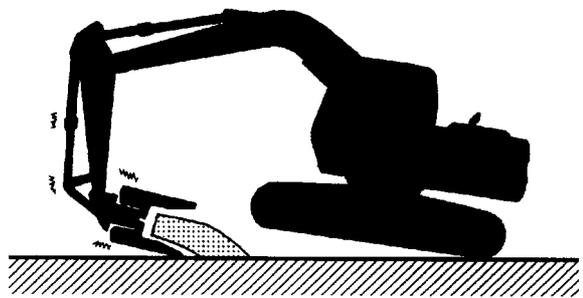
WARNING

The crusher is much heavier than the bucket, therefore it reduces excavator stability and increases overturn hazard. During operation, splinters or flying debris may hit the cab or other parts of the excavator.

Observe all following precautions and take all necessary measures to prevent accidents that may damage the excavator and cause personal injuries to the Operator.

1. Do not allow the machine weight to be supported by prying with the crusher and cylinders fully extended or retracted. Doing so may damage the front attachment. In particular, avoid doing so with the crusher cylinder fully extended as the front attachment will be more easily damaged.
2. Do not perform crushing on either side of the machine, always do so at front or rear, parallel with tracks. Otherwise, the machine may overturn.

WRONG



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WRONG

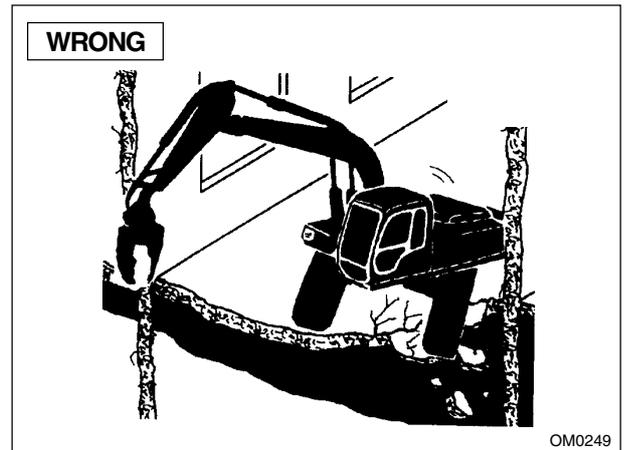


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3. When operating the crusher up high with the boom fully raised, be careful of falling objects.



4. When operating the crusher on a floor in a building, first confirm that the floor has sufficient strength to support the load caused by crushing in addition to machine weight.



5. Always operate the crusher on a firm level surface, not on a slope or crushed scraps.

6. Do not use the crusher to haul or move crushed scraps.

7. Always remove the crusher from the excavator before transporting the machine. Do not travel the excavator with the bucket cylinder fully extended. This made damage the attachment due to high travel vibrations.

OPERATION

Machine in monobloc version

To operate the crusher, proceed as follows:

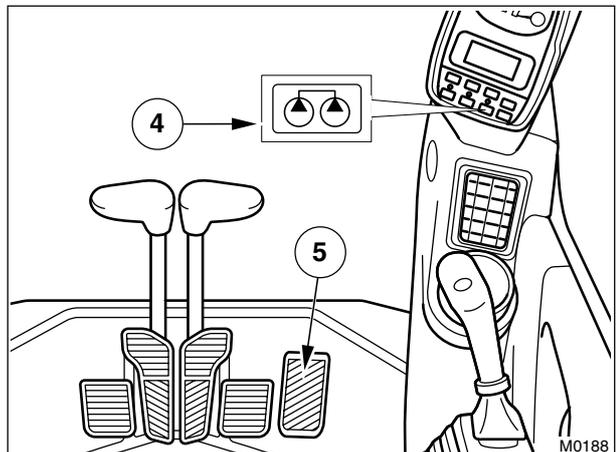
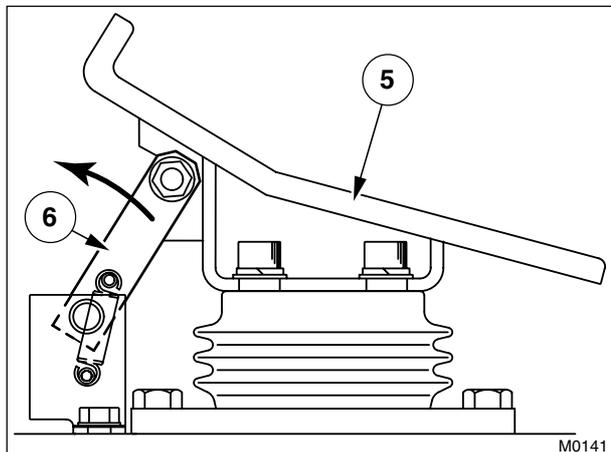
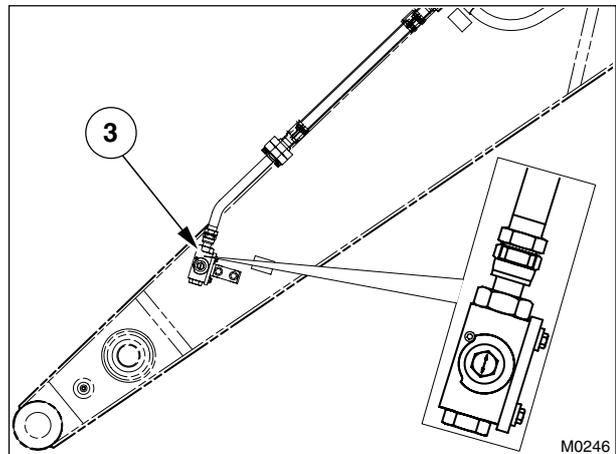
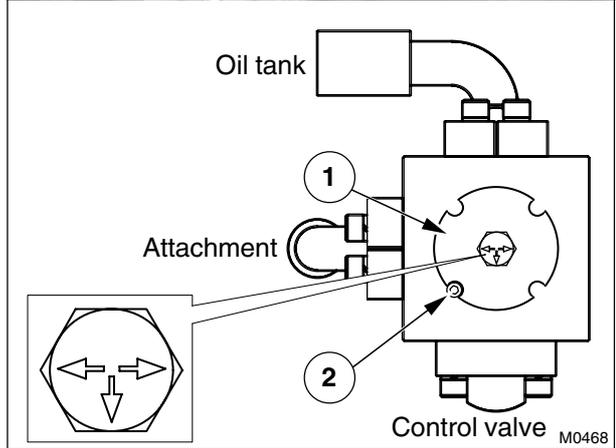
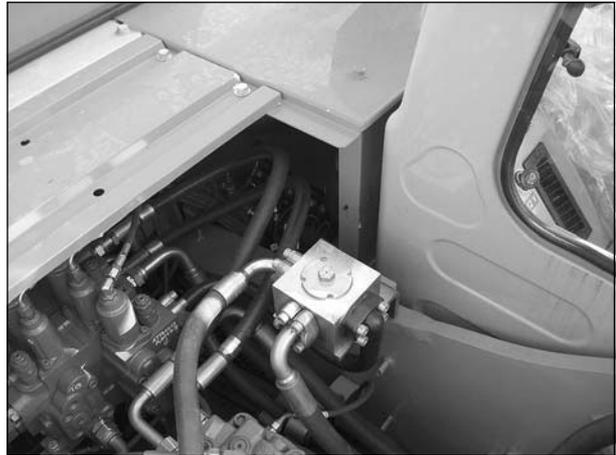
- Get on the turret.
- Verify that selector (1) is in a position connecting the return from the crusher to the hydraulic tank (see the position of the arrows indicated on the selector). In the event the selector is not in such position, proceed as follows:
 - Loosen Allen screw (2) using a 5 mm wrench.
 - Turn selector (1) into the position return of the scissors to the hydraulic tank, using a 24 mm wrench.
 - Tighten screw (2).
- Check that valves (3) located on the arm are open (arrow stamped on the valve parallel with the pipe). In the event the valves are not open, turn them using a 24 mm wrench.

NOTE: if the demolition crusher installed requires a larger flow, select the dual flow function keeping button (4) pressed for at least 8-10 seconds.

- Free demolition crusher pedal (5) moving pedal lock device (6) outward.
- Then, actuate pedal (5) to open and close the demolition crusher.

NOTE: by actuating crusher pedal (5), work mode **A** is automatically engaged. Once crusher pedal (5) is released into neutral position, the work mode previously selected is automatically reset.

- To cut-off the operation of the crusher, release pedal (5).



Machine in triple articulation version

To operate the crusher, proceed as follows:

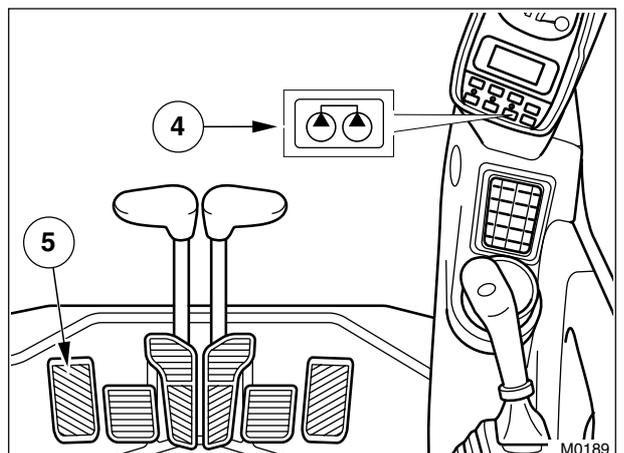
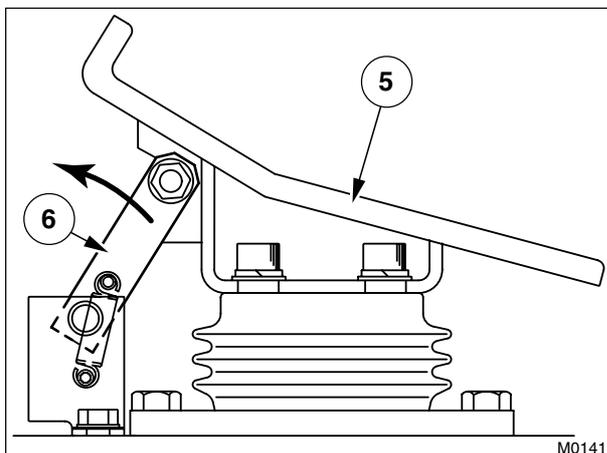
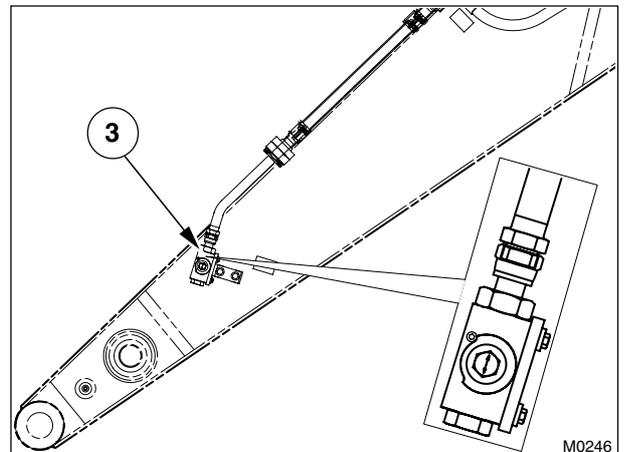
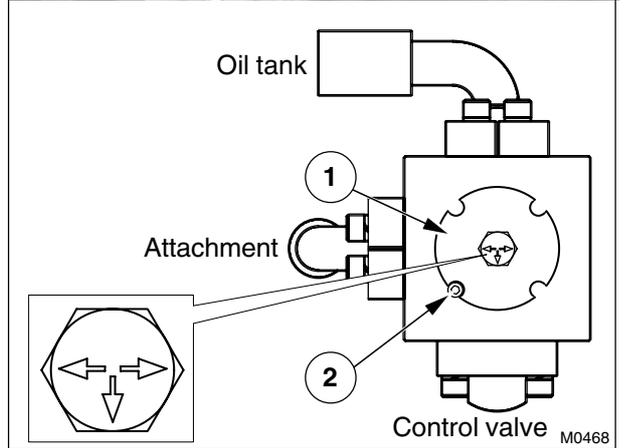
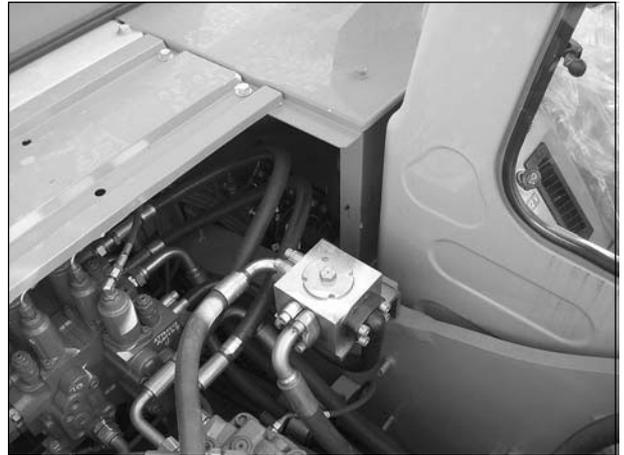
- Get on the turret.
- Verify that selector (1) is in a position connecting the return from the crusher to the hydraulic tank (see the position of the arrows indicated on the selector). In the event the selector is not in such position, proceed as follows:
 - Loosen Allen screw (2) using a 5 mm wrench.
 - Turn selector (1) into the position return of the scissors to the hydraulic tank, using a 24 mm wrench.
 - Tighten screw (2).
- Check that valves (3) located on the arm are open (arrow stamped on the valve parallel with the pipe). In the event the valves are not open, turn them using a 24 mm wrench.

NOTE: if the demolition crusher installed requires a larger flow, select the dual flow function keeping button (4) pressed for at least 8-10 seconds.

- Free crusher pedal (5) moving pedal lock device (6) outward.
- Then, actuate pedal (5) to open and close the crusher.

NOTE: by actuating crusher pedal (5), work mode **A** is automatically engaged. Once crusher pedal (5) is released into neutral position, the work mode previously selected is automatically reset.

- To cut-off the operation of the crusher, release pedal (5).



HYDRAULIC OIL AND FILTER ELEMENT SERVICE INTERVAL

When the hydraulic breaker or crusher are used, the the excavator is subjected to working conditions more critical than usual, that speed up hydraulic oil deterioration and contamination.

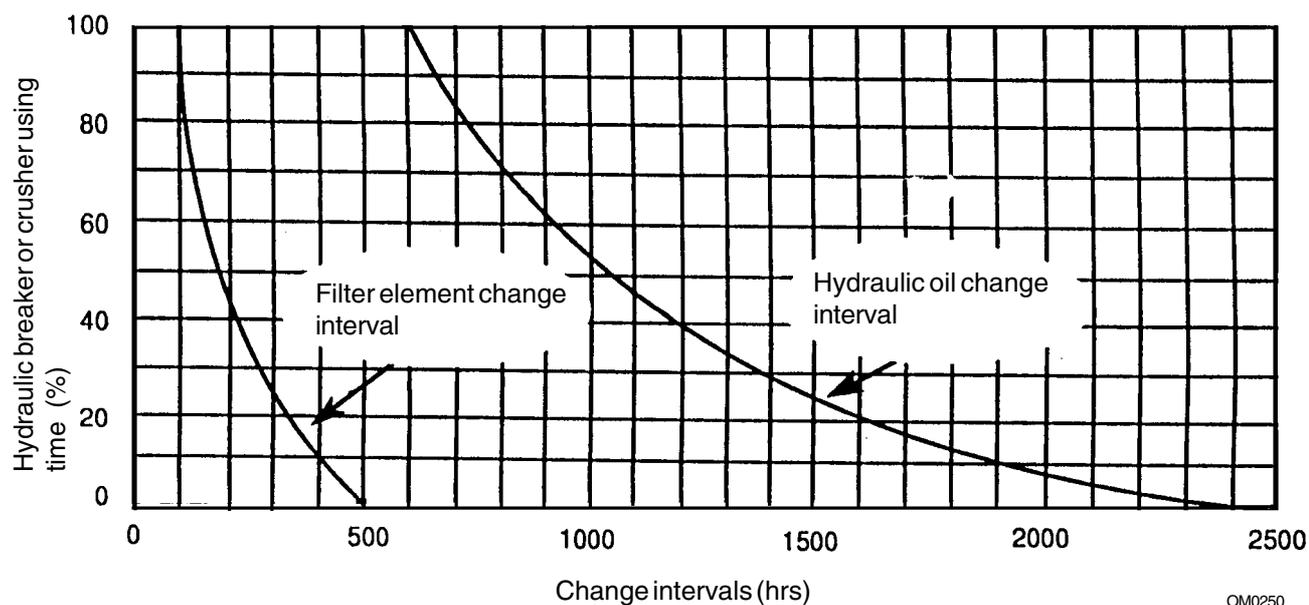
To prevent damages to the excavator hydraulic system, breaker, or crusher carefully respect service intervals detailed in this Manual. In particular, replace hydraulic oil and filter element according to the instructions below:

Change interval (hrs)

| Component to be replaced | Machine equipped with breaker or crusher | Machine equipped with bucket |
|--------------------------|--|------------------------------|
| Hydraulic oil (**) | 600 (*) | 2 500 |
| Filter element | 100 (*) | 500 |

(*) **IMPORTANT:** Change intervals shown should be applied if the machine is used 100% of the time equipped with the hydraulic breaker or crusher. In case of lower time percentage of breaker or crusher use, hydraulic oil and filter element change intervals may vary accordingly to the following diagram.

(**) **IMPORTANT:** if the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46** (opt.), this oil must not be mixed h mineral hydraulic oil. Refer to the service intervals shown in the table above for filter element replacement. If in doubt, do not hesitate to contac your Dealer.



OM0250

EQUIPMENT ROTATION SYSTEM



WARNING

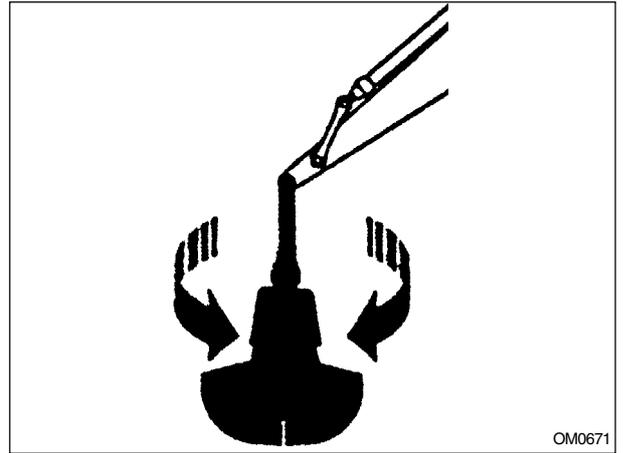
When a rotating attachment is installed, operate and swing the excavator slowly.

Rotate the attachment when the equipment is inoperative. This is in order to avoid dangerous swings which could endanger the stability.

When lowering the boom, make sure that the rotating attachment is in vertical position.

Never use a rotating attachment for piling jobs or removing poles.

Before leaving the operator's compartment, lower the boom until the rotating attachment rests on the ground. This is to avoid that the attachment loads the excavator, representing a danger of personal injuries, being suspended in the air.



This system is a must when equipment requiring a rotation, such as crusher, grabbing bucket etc. is going to be used.

The choice of a rotating equipment, must be made in agreement with the Dealer. This is because the equipment one intends to use must ensure, in any case, the stability of the excavator and the compatibility with its hydraulic and electrical systems.

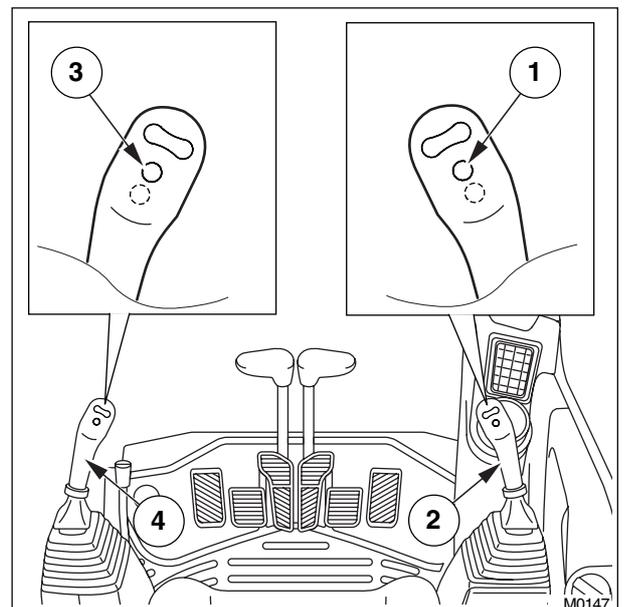
The evaluation of the factors mentioned above can make the **NEW HOLLAND KOBELCO** engineers to decide to equip the excavator with further devices to prevent the tipping over of the machine.

Also, the system requires adjustments, which must be performed exclusively by **NEW HOLLAND KOBELCO** engineers.

OPERATING THE ROTATING ATTACHMENT

The operation of this system occurs as follows:

- to rotate the attachment **clockwise** press button (1) located on the right lever (2);
- to rotate the attachment **anti-clockwise** press button (3) located on the left lever (4);
- moving control lever (2) rightward or leftward, the attachment is actuated.



NORDIC COUNTRIES ARRANGEMENT

This variant has been studied for Nordic Countries, where the climate is particularly frigid and daylight, not always, provides the operator with sufficient visibility conditions.

The variant is made of the following components:

- double lights (1) mounted on the cab roof and controlled by switch (7);
- double lights (2) mounted on the boom controlled by switch (8);
- portable light (3) equipped with built-in switch. The light is powered by inserting the plug into the cigarette lighter receptacle or in the 24 Volt receptacle located under the storing compartment behind the operator's seat.

IMPORTANT: do not use lamp (3) for extended time, when the engine is inoperative. This could cause a premature discharge of the batteries.

- guard (5) complete with frame (4) mounted under the undercarriage frame, covering the compartment under the bullgear.

Guard (5) is secured to frame (4), inserted in the bullgear compartment, with four screws (6) tightened to a torque of 9 daNm. To check the correct torque tightening using a torque wrench with a 24 mm socket.

In case changing the grease inside the bullgear is required, operate as indicated here below:

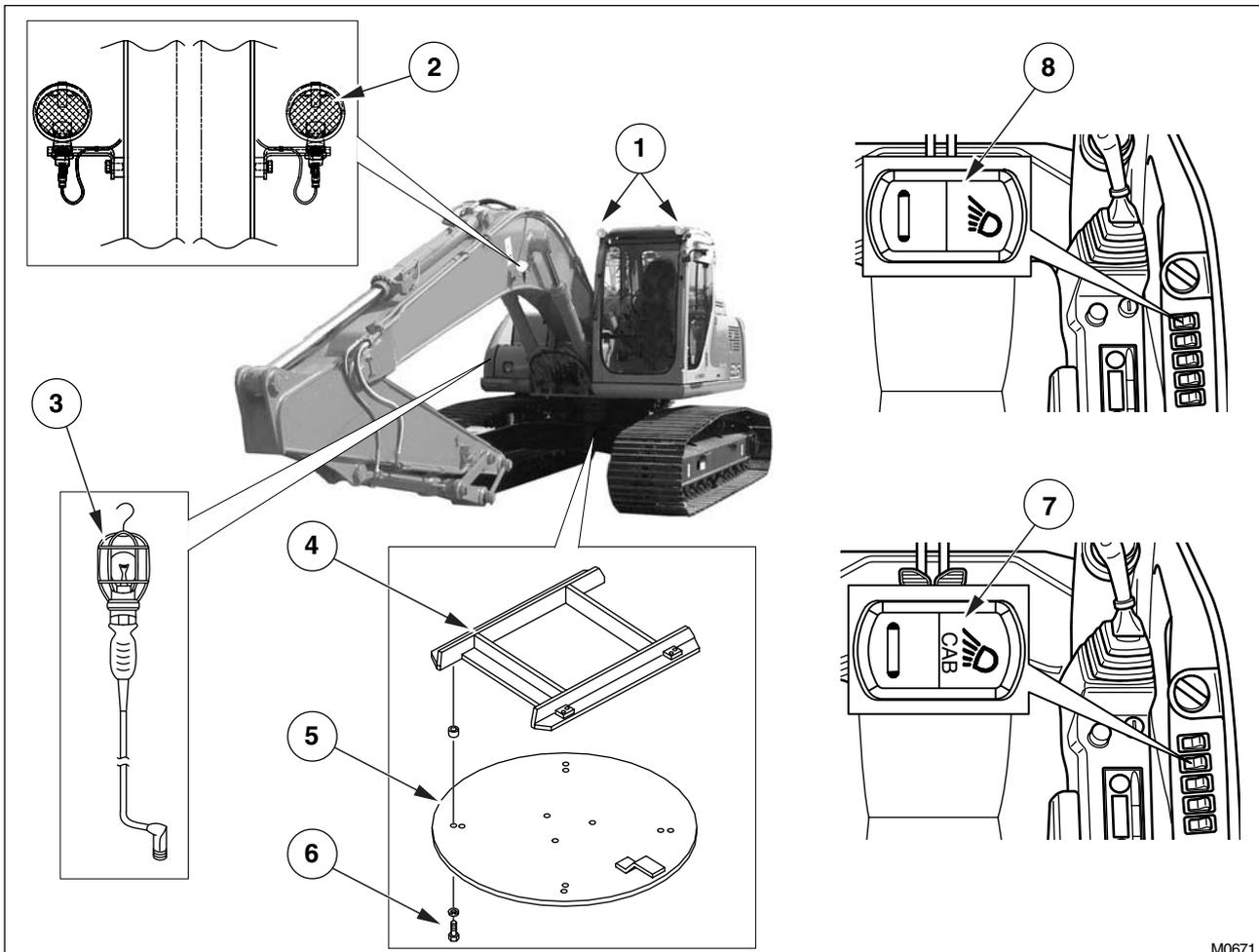
- Loosen slowly screws (6), so as to avoid the sudden dropping of guard (5);
- Remove guard (5);
- Remove manually frame (4).

At this point, it is possible to reach the grease draining hole cover located under the bullgear.



CAUTION

During the removal phase of guard (5) stay in an offset position, to avoid that a sudden dropping could cause personal injuries. It is recommended that this operation is performed with a helper, who could hold the guard in the event it drops.



M0671

CAB GUARD (F.O.P.S.)

The use of guard (1) is imperative when operating in zones where the possibility of falling stones or debris exists.

In the event the machine is not originally equipped with this guard, it is possible to have it installed, contacting a Dealer.



NOTES:

4 - MAINTENANCE





SAFETY PRECAUTIONS DURING MAINTENANCE

Do not allow unauthorised persons to maintain or repair this machine. Read carefully this Manual before starting, operating, maintaining, fuelling or servicing the machine.

Do not lubricate, repair or adjust a machine with the engine running, unless this is expressly required by the Operation and Maintenance Manual, to avoid being caught by moving parts or crushed by the machine.

Stop the machine in accordance with the procedure prescribed by the Operation and Maintenance Manual, prior to lubricating or performing any intervention.

Every time groups of the machine must be removed or installed, being lifted by jacks, ensure that the supports under the jack and between jack and machine are appropriate for the load to be supported. Transfer immediately the load on appropriate supports and stands.

Do not loosen the connections of the hydraulic system located on the front equipment, unless the equipment has not first being lowered to the ground, totally flat and after discharging residual pressures.

In the event of a sudden cutting-off of the engine, lower the equipment to the ground as possible then, prior to operating on the hydraulic system, consult an Dealer.

Do not work on or under the machine or on its components if they are supported only by jacks or lifting devices, in accordance with local and national safety rules.

Do not work under or near the equipment of a machine or components which are not adequately supported or blocked.

*Always move the safety lever into the **LOCK** position prior to cleaning, repairing or intervening on the machine and after parking it, so that personal injuries are prevented.*

Never use petrol, solvents or any other flammable solvent for cleaning operations. Use approved, non toxic non flammable commercial solvents.

Never use your hands to identify pressure leakages. Leakages of fluids under pressure could have enough force to penetrate the skin. Press the pressure relief button, located on the hydraulic oil reservoir, before performing servicing on hydraulic system.

When servicing or maintenance require access to areas that cannot be reached from the ground, use a ladder or step platform that meet local and national regulations, to reach the service point. If such ladder or platform are not available, use the machine hand holds and steps as provided. Perform all service or maintenance carefully.

To reduce the risk of electrocution, use only grounded auxiliary devices, such as heaters, battery charges, pumps or similar equipment.

Prior to starting the engine, warn all persons performing operations or working around the machine.

When performing maintenance operations involving the handling of lubricant fluids, grease or coolant liquids, make sure that proper protective clothing and rubber gloves are worn to prevent contacts with eyes and skin. A prolonged contact with such fluids with the skin can cause irritation and dermatitis. In the event an accidental contact occurs, wash with plenty of water and seek medical attention, if required.

Keep hands and face away form loosen pipe connections, when efficiency and tightness tests for injectors and systems are performed. Also, wear protective glasses with side shields.

Do not work under or near a linkage of the equipment or other components of the machine which are not adequately supported and blocked.

Always move the safety lever to lock position.



WARNING

Always lock engine hood before servicing any component inside the engine compartment.

Keep all people clear of equipment and/or attachments when in the raised position to prevent injury hazards.

Following the presence of flammable fluids, do not use matches, cigar lighters or torches as lighting means when servicing the machine.

Always use suitable tools to align holes. Do not use hands or fingers.

Do not park, service, repair the machine nor carry out any work without prior moving the hydraulic system lock safety lever in the locked position.

Always lower the attachment to the ground and relieve pressure from all circuits before carrying out any type of maintenance work.

GENERALITIES

To operate the machine correctly means to prolong its working life. Adhere to instructions to inspect and correctly service the machine supplied in this Manual. Check the machine every day before commencing the work:

- Check controls and instruments.
- Check oil, fuel, and coolant levels (with the machine parked on level ground).
- Check pipes and hoses for possible leaks, kinking, fraying or damages.
- Visually inspect the machine outside considering its condition, noises if any or excess heat release.
- Check for loose or detached parts.

If the machine exhibits any fault, repair before starting the machine or contact your Dealer.



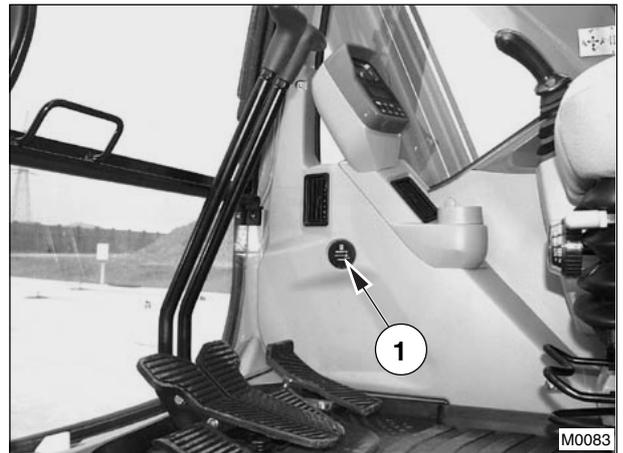
S0015

IMPORTANT:

- Use only recommended fluids and lubricants (See the **FILLING CHART** at the end of this Chapter).
- Use only genuine spare parts.
- Using fuel, lubricants, fluids or spare parts other than the recommended ones will immediately invalidate the warranty.
- Never change the fuel injection pump governor setting or the hydraulic system safety valve setting. Lead seals can be removed solely by authorised personnel, otherwise the Manufacturer rejects any responsibility as regards the guarantee.
- Always keep protected electrical parts from water and dampness.
- Never remove electrical components such as the main electronic central unit, sensors, etc. as they may be irreversibly damaged.

CHECKING THE HOUR-COUNTER REGULARLY

- Read machine worked hours on the hour-counter (1) and determine, on the basis of the **MACHINE LUBRICATION AND MAINTENANCE CHART** on page 4-14, when and which type of servicing is required. Service intervals indicated in the table refer to a machine working under normal operating conditions. During the first period of use of the machine and under particularly heavy operating conditions shorter service intervals may be required than shown in the table.



SERVICE REMINDER PLATE

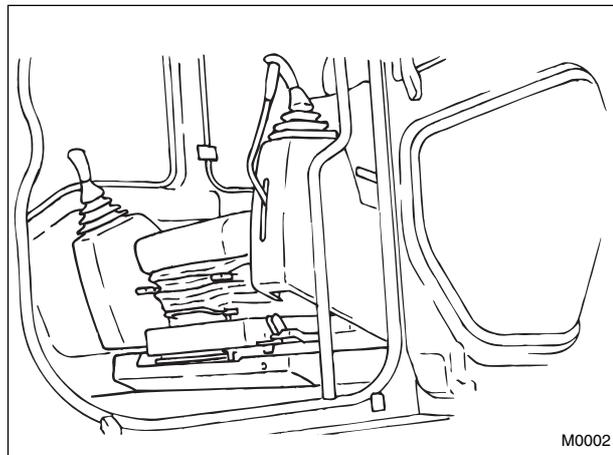
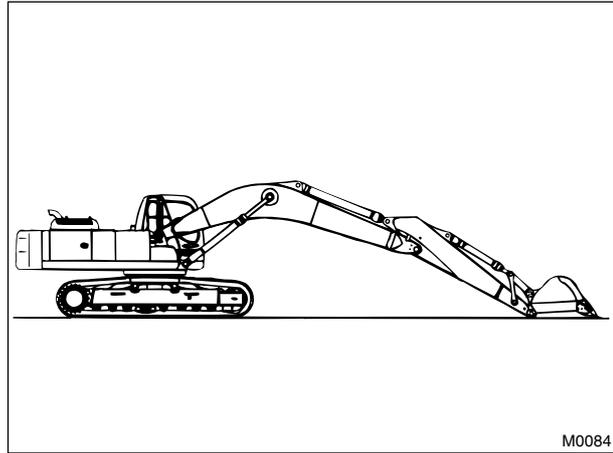
A summary decal (2) indicating the main lubrication and replacement operations to be performed periodically, is located inside the tool compartment.



PREPARING THE MACHINE FOR MAINTENANCE

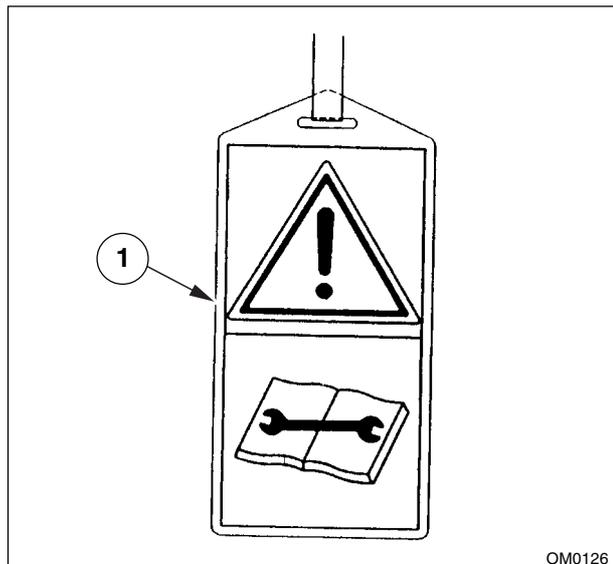
Before performing the maintenance procedures detailed in the following chapters, park the machine as described below if not otherwise specified:

- 1) Position the equipment as illustrated in the figure.
- 2) Disengage the auto-idle, turn the manual throttle knob fully anticlockwise, cut-off the engine, extract the starter key and place the safety lever in **(LOCK)** position.
- 3) Before performing any maintenance work on the machine, maintenance men must apply the sign "maintenance in progress" (1) signalling that the machine is not completely efficient and that such maintenance staff is located in not visible positions.
- 4) Prior to and after any lubrication work, thoroughly clean grease fittings, covers and plugs to avoid penetration of foreign matter inside the mechanisms.
- 5) We recommend to replace oil in the different components immediately after stopping the machine. In this way, oil being hot is drained more easily together with possible loose particles.



CAUTION

If it is advised to carry out maintenance work with the components still hot, that is immediately after stopping the machine, the body must be protected with suitable clothing and protections to avoid burns and personal injuries.

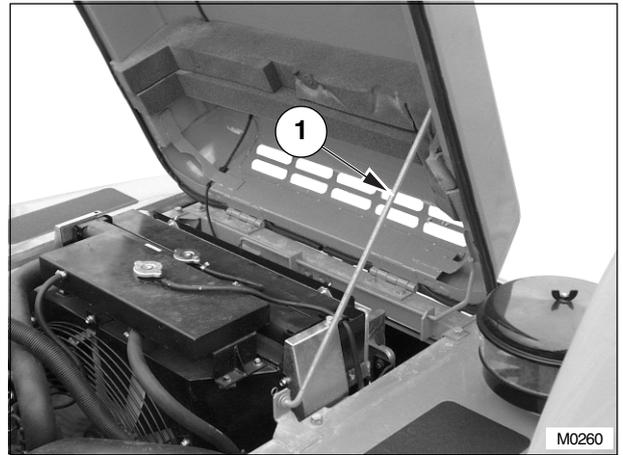


HOOD AND ACCESS COVERS



WARNING

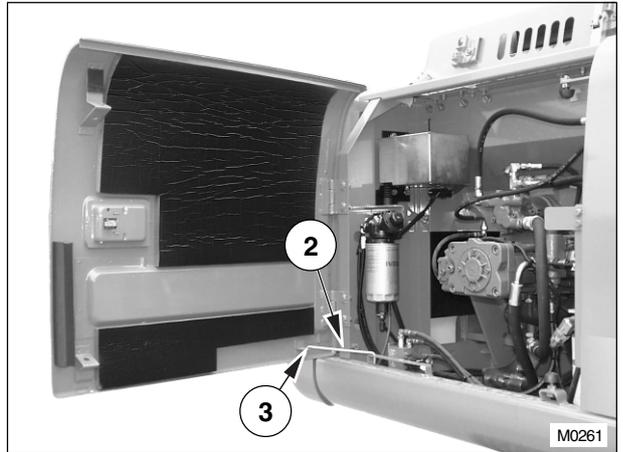
Do not keep the hood and access doors open when the machine is placed on a gradient or when a wind is blowing. The hook and the door could close accidentally, causing injuries.
When the hood or access doors are open, take extreme care not to be caught with the fingers between the base of the machine and the hood or the doors.



M0260

Secure the engine hood in open position

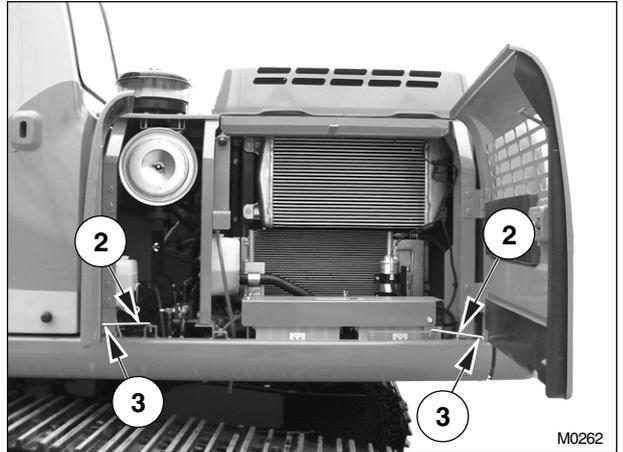
Loosen the two hood locking devices. Lift the hood using the appropriate handle located on the hood itself, until the locking device (1) engages, with a click, into its locking seat. In this manner, the hood is locked in open position.



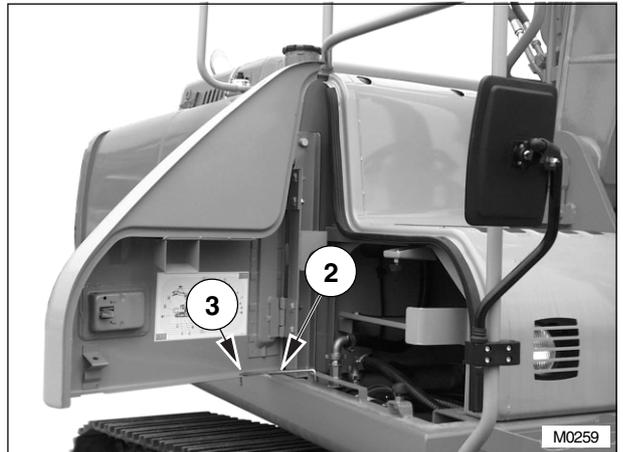
M0261

Secure the access doors in open position

Open each access door and engage the end of road (2) into hole (3) to lock the door in open position.



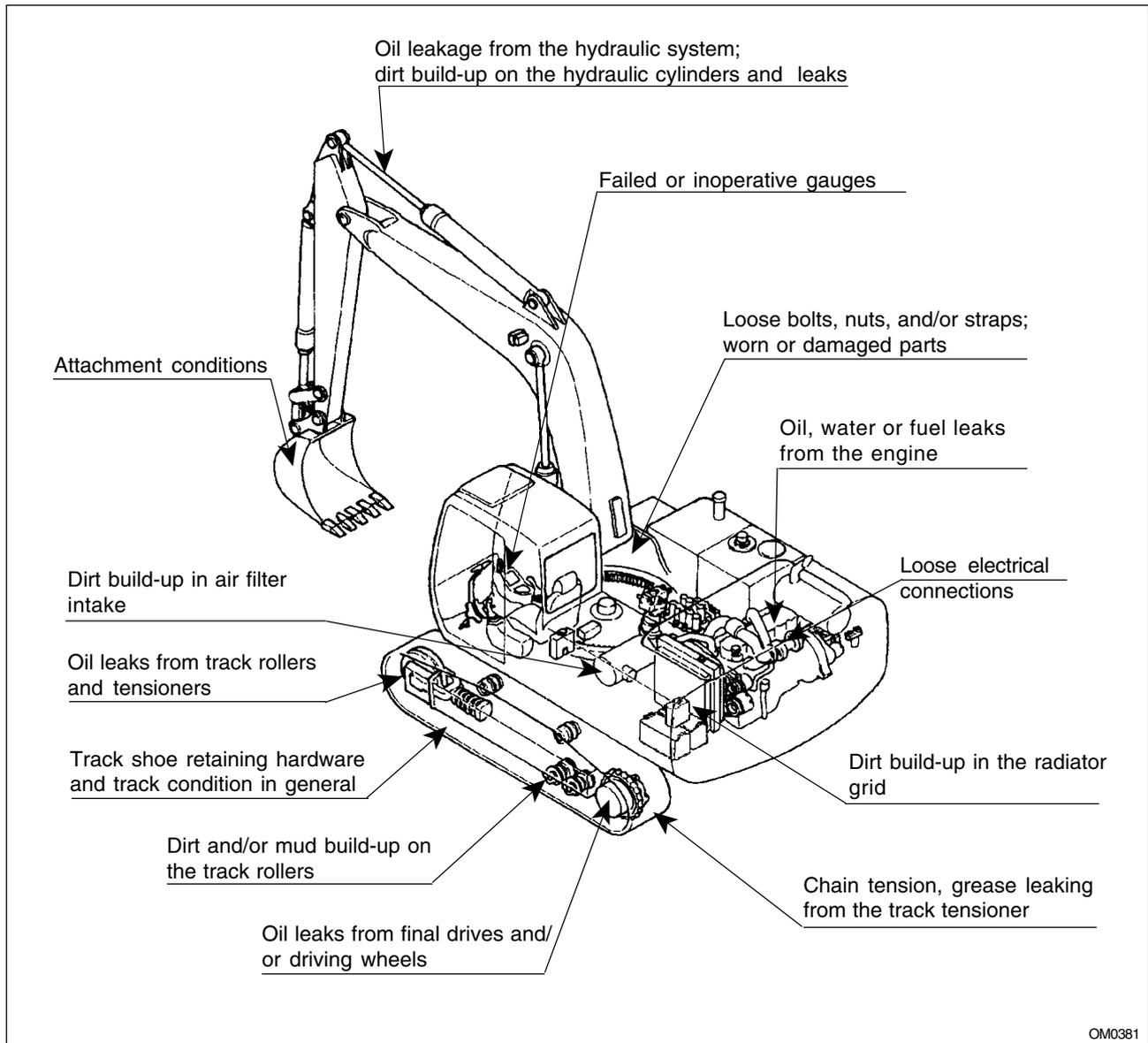
M0262



M0259

EXTERNAL VISUAL INSPECTION

If proper corrective action is taken as soon as the problem is first suspected, machine maintenance costs and down-times may be consistently reduced. Therefore, we recommend to visually inspect from the outside the components indicated in the figure each day, before starting the work or at the end of the working day, to assess their condition.



| CHECKS BEFORE STARTING DAILY WORK | | | | |
|--|----------------|------------------|--------------|--------------|
| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
| Engine oil | | | | |
| Engine cooling system | | | | |
| Hydraulic system oil | | | | |
| Fuel tank; level | | | | |
| Windscreen washer tank | | | | |
| Cyclonic pre-cleaner | | | | |
| Fuel pre-filter | | | | |

ENGINE OIL

Visual inspection and topping-up



DANGER

Do not run machine engine in confined spaces without proper ventilation and/or suitable system capable to remove harmful exhaust gases.



ATTENTION

Always ensure that the engine hood, once in the open position, is securely locked by means of the locking rod: danger of personal injury.



CAUTION

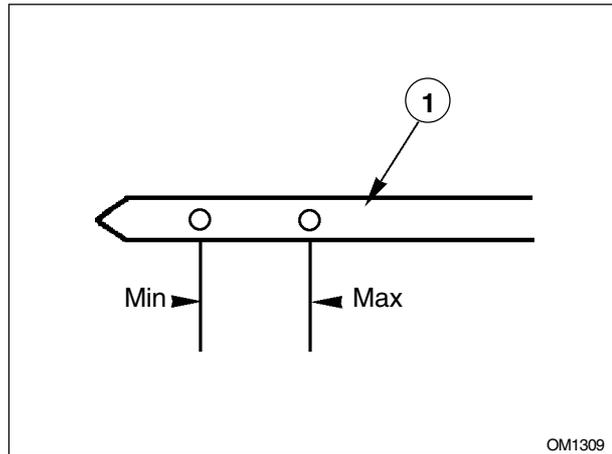
You are reminded that the engine and the oil can reach high operating temperatures, thus it is essential, while performing this operation with engine still hot, to wear safety clothing and devices to prevent burns.

IMPORTANT: *check oil level with the engine cold and stopped.*

In the event the check is made at the end of the work shift, comply with the following:

- Ensure that the machine is positioned on a flat surface;
- Rest the bucket on the ground;

- Exclude the auto-idle, turn completely anticlockwise the engine speed manual control, cut-off the engine, extract the starter key and place the safety lever in **LOCK** position;
- Wait for 15-20 minutes to let the oil drain to the sump.
- Open the engine hood and lock it in open position, as described in paragraph "**HOOD AND ACCESS COVERS**".
- Pull-out dipstick (1), clean it with a dry rag and reinsert it into its seat; pull it out again and check the level. This level shall be included between the marks **MIN** and **MAX** located at the end of the dipstick.

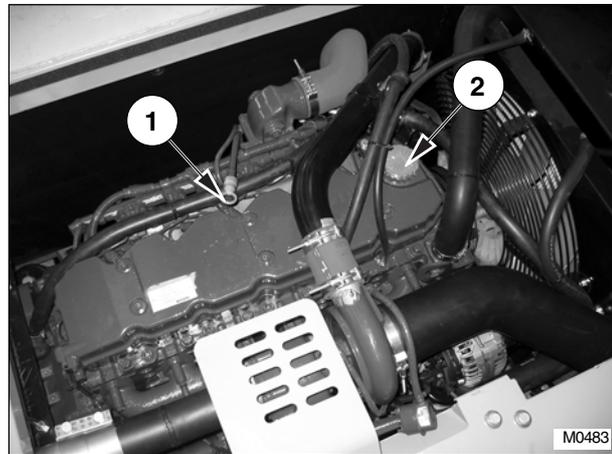


OM1309

NOTE : *insert the dipstick slowly into its seat, so as to avoid that the pressure alters the level check.*

- In the event a low engine oil level is measured, remove plug (2) and top-up the oil level, through the filler neck.
- Close the engine hood and lock it using the two catches.

IMPORTANT: *do not add oil with different characteristics from the oil already in the engine (See the **FILLING CHART** at the end of this Chapter).*



M0483

ENGINE COOLING SYSTEM

Visual inspection of engine coolant level and topping-up

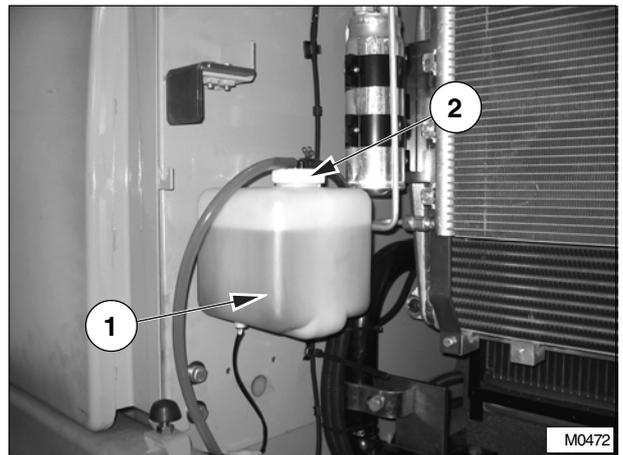


CAUTION

When the engine is hot, do not remove the plug from the expansion tank or from the radiator: danger of burns.

In the event the check is made at the end of the work shift, comply with the following:

- Ensure that the machine is positioned on a flat surface;
 - Rest the bucket on the ground;
 - Exclude the auto-idle, turn completely the engine speed manual control knob anticlockwise, cut-off the engine, extract the starter key and place the safety lever in **LOCK** position;
 - Wait for the machine to cool-off.
- Open the radiator compartment and lock-it in open position.
 - The coolant level must be checked with cold engine and it must be between the **FULL** and **MIN** reference marks visible on expansion reservoir (1).
 - In case the level is insufficient, remove cap (2) and top-up the level, through the filler neck, until it reaches the **FULL** mark.
 - Re-install cap (2) and close the doors.



IMPORTANT: *when topping up, keep the water and antifreeze percentage existing in the system. Use clean water and free from chlorinated compounds whenever possible (See the **FILLING CHART** at the end of this Chapter).*

HYDRAULIC SYSTEM OIL

Visual inspection and topping up.

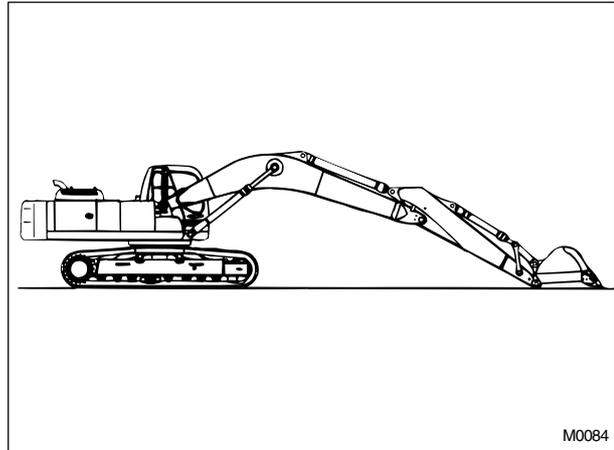


CAUTION

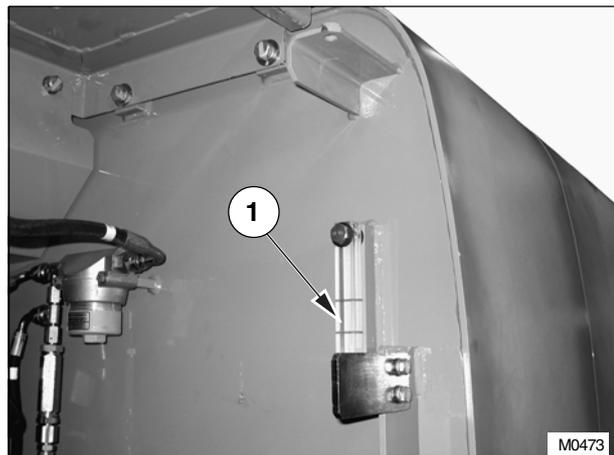
During work components and lines composing the hydraulic system can reach high temperatures. Shut off the machine and let it cool down before starting any inspection or maintenance: danger of burns.

In the event the check is made at the end of the work shift, comply with the following:

- Position the equipment as illustrated in the figure.
- Exclude the auto-idle, turn completely the engine speed manual control knob anticlockwise, cut-off the engine, extract the starter key and place the safety lever in **LOCK** position.



- Open the hydraulic pump compartment door, then check the oil level on visual indicator (1) located on the hydraulic oil reservoir, which should be between the **MIN** and **MAX** reference marks, as indicated.
- In the event a low level of the hydraulic oil is found, proceed with its topping-up, operating as indicated in the **2500 WORK HOURS MAINTENANCE** paragraph "HYDRAULIC SYSTEM OIL".
- Close the door.



IMPORTANT: *do not top up using oil with different specifications from the oil already in the hydraulic oil reservoir (See the **FILLING CHART** at the end of this Chapter).*

IMPORTANT: *if the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46** (option), take note that this oil cannot be mixed with mineral hydraulic oil.*

FUEL TANK

Visual inspection of fuel level and refuelling



WARNING

The fuel is flammable. Do not puncture or burn fuel containers. Follow instructions given on the containers as regards storage and distribution. Following the presence of highly flammable vapours, extinguish all smoking materials and open flames before checking the fuel level, refuelling, replacing the filters or opening the drain plug. Do not refuel the machine with the engine running. Do not use matches, cigar lighters or torches as light source on the machine.

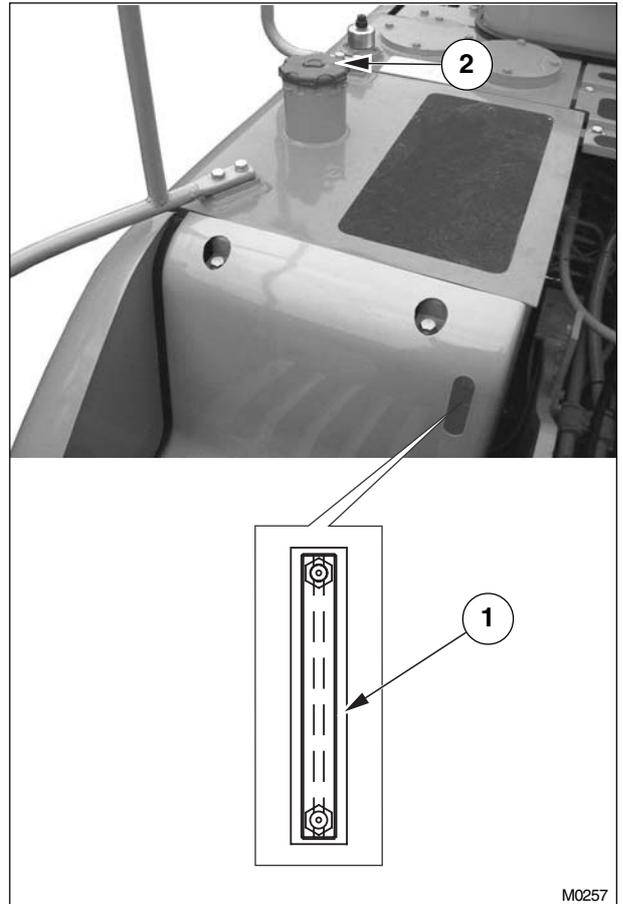
If check is performed at the end of the working period:

- Make sure that the machine is parked on a level surface;
- Rest the bucket to the ground;
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).

NOTE: *refuel using decanted fuel. Transfer fuel from the storage container to the machine tank using the electrical pump.*

We advise to fill the tank at the end of the working day to prevent condensation formation overnight.

Do not run out of fuel in the tank as this would cause air to enter the fuel system. The fuel system should then be bled from air.



- Check the fuel level using level indicator (1).
- Open filler cap (2) using the key and refuel as required.
- Then check indicator (1) to determine the level of fuel reached.

WINDSCREEN WASHER TANK

Checking the level and topping up

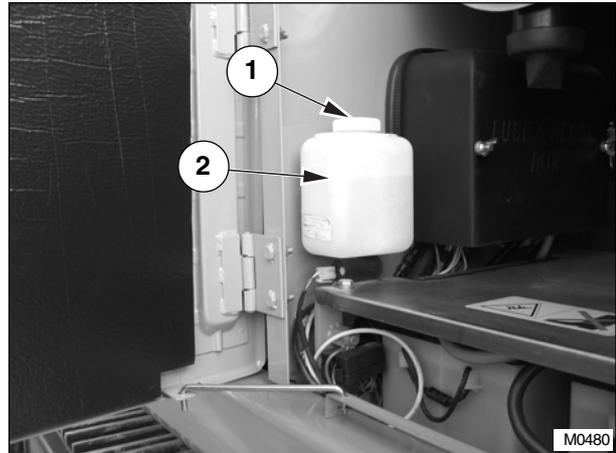


WARNING

The pure detergent liquid catches fire easily when in touch with comburent substances or in presence of incendive sources (sparks, open flames,). Avoid smoking during windscreen washer liquid refuelling.

This operation should be carried out consistently with how frequently the windscreen washer is used.

- Open the radiator compartment cover and lock it in the open position using the latch.
- Remove the plug (1) located on the tank (2) and add water and glass detergent in the tank. During the cold weather, use a glass detergent for all seasons.
- Close the cover.



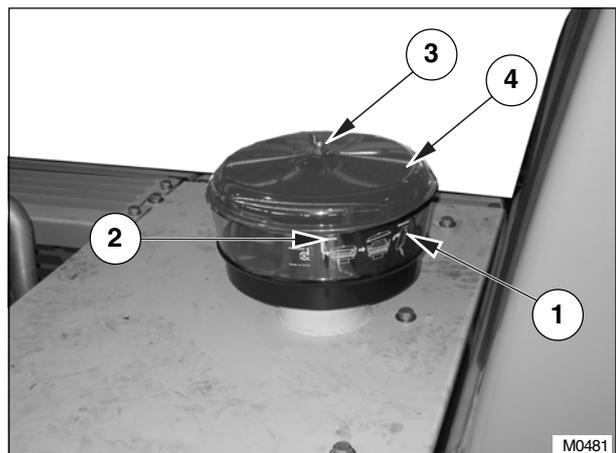
CYCLONIC PRE-CLEANER

Dust discharge

Proceed with the discharge of the cyclonic pre-cleaner when the dust deposited in canister (1) almost reaches mark (2).

Discharge the cyclonic pre-cleaner operating as follows:

- Get over the turret.
- Loosen wing nut (3) and remove cover (4).
- Empty canister (1).
- Reposition canister (1), cover (4) and tighten wing nut (3).

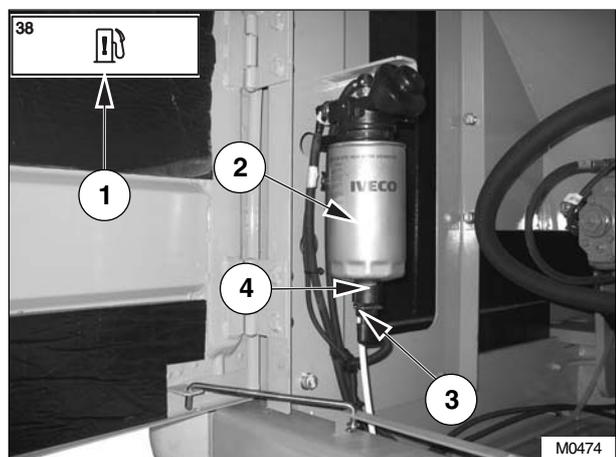


FUEL PRE-FILTER

Draining the water

When indicator light (1) comes **ON** on the monitor, proceed with the draining of the water trapped inside the pre-filter (2) operating as follows:

- Open the hydraulic pump compartment panel and secure it in open position.
- Remove clogging sensor (3) pressing the relevant securing band.
- Turn slowly ring-nut (4) and drain the water into an appropriate container. Once fuel only starts flowing, shut the ring-nut.
- Install clogging sensor (3) and close the hydraulic pump compartment panel.



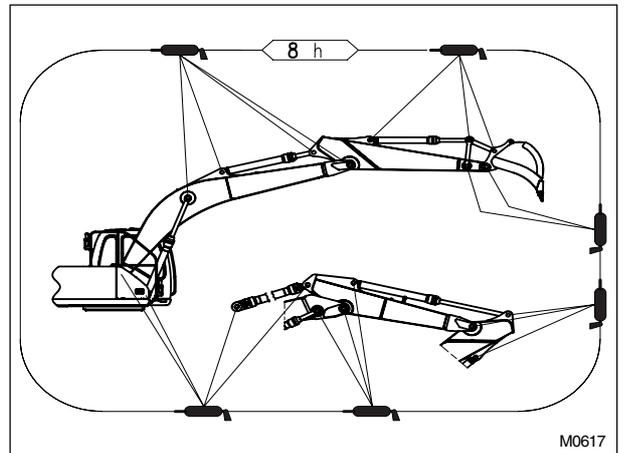
BREAK-IN

WITHIN THE FIRST 50 OPERATING HOURS

Lubricate the linkages and arms every 8 hours.

- Ensure the machine is parked on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).

Using a grease gun, inject grease of the specified type (see the **FILLING CHART** at the end of this Chapter) in the grease point of the links shown.

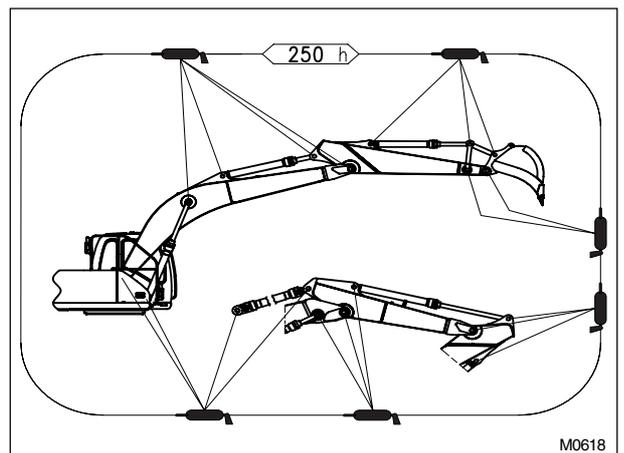


WITHIN THE FIRST 500 OPERATING HOURS

Lubricate the linkages and arms every 250 hours.

- Ensure the machine is parked on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).

Using a grease gun, inject grease of the specified type (see the **FILLING CHART** at the end of this Chapter) in the grease point of the links shown.



MACHINE LUBRICATION AND MAINTENANCE CHART

| SERVICE INTERVALS (HRS) | | | | | | | DESCRIPTION OF SERVICE | PAGES |
|-------------------------|-----|------|------|------|------|------|---|-------|
| 250 | 500 | 1000 | 1500 | 2000 | 2500 | 3000 | | |
| | | | | | | | Bucket links | 4-15 |
| | | | | | | | Tracks | 4-16 |
| | | | | | | | Hydraulic reservoir | 4-18 |
| | | | | | | | Fuel tank | 4-19 |
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| | | | | | | | Swing reduction unit | 4-21 |
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| | | | | | | | Air cleaner: outer element (*) | 4-23 |
| | | | | | | | Hardware tightening torques | 4-24 |
| | | | | | | | Hoses, lines and connections | 4-30 |
| | | | | | | | Fuel hoses | 4-33 |
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| | | | | | | | Boom and arm | 4-36 |
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| | | | | | | | Fuel filter | 4-39 |
| | | | | | | | Engine cooling system | 4-40 |
| | | | | | | | Hydraulic system return oil filter | 4-42 |
| | | | | | | | Air conditioner | 4-43 |
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| | | | | | | | Air cleaner: outer element | 4-47 |
| | | | | | | | Swing reduction unit | 4-48 |
| | | | | | | | Fuel pre-filter | 4-49 |
| | | | | | | | Alternator-fan belt | 4-51 |
| | | | | | | | Travel side reduction units | 4-52 |
| | | | | | | | Engine cooling system | 4-54 |
| | | | | | | | Pilot system hydraulic oil filter | 4-57 |
| | | | | | | | Air cleaner: inner element | 4-58 |
| | | | | | | | Hydraulic system oil (**) | 4-59 |
| | | | | | | | Hydraulic oil tank breather filter | 4-63 |
| | | | | | | | Engine valves | 4-64 |

(▲) IMPORTANT: *within the first 500 OPERATING HOURS it is necessary to perform the lubrication operations listed in chapter **BREAK-IN**.*

() IMPORTANT:** *If the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46** (option), take note that this oil cannot be mixed with mineral hydraulic oil.*

| | | | | | |
|--|-----------|-----|--|--|-------|
| | Replace | (*) | Operation to be performed also in the case of activation of the relevant indicator light on the display of the monitor | | Clean |
| | Lubricate | | | | Check |

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual

| AFTER 250 HOURS OF OPERATION | | | | |
|---|----------------|------------------|--------------|--------------|
| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
| Bucket links | | | | |
| Tracks | | | | |
| Hydraulic oil reservoir | | | | |
| Fuel tank | | | | |
| Travel side reduction units | | | | |
| Swing reduction unit | | | | |
| Outside air filter and recirculation air filter | | | | |
| Air filter: outer element | | | | |
| Hardware tightening torques | | | | |
| Hoses, lines and connections | | | | |

BUCKET LINKS

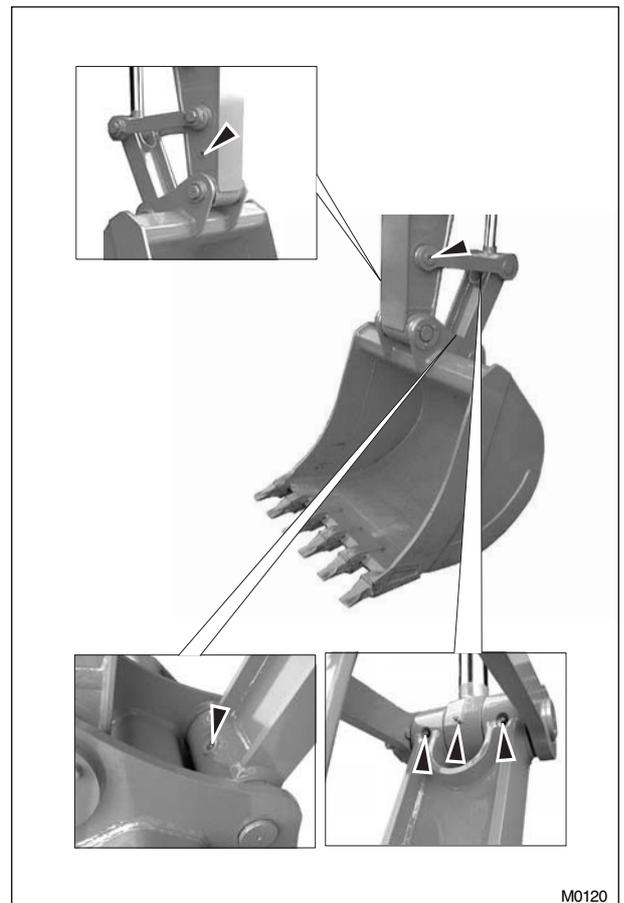
Lubrication

IMPORTANT: *within the first 500 OPERATING HOURS it is necessary to perform the lubrication operations listed in chapter **BREAK-IN**.*

- Ensure the machine is parked on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).

Using a grease gun, inject grease of the specified type (See the **FILLING CHART** at the end of this Chapter) in the grease point of the links shown.

IMPORTANT: *we recommend to lubricate every 10 working hours if the machine has been operated in water or mud.*



M0120

TRACKS

Adjusting tension



WARNING

Fluid under pressure. Proceed as detailed in this paragraph to reduce or increase track tension.

*The track adjust wheel return spring is installed on the machine with a high compression load. Follow the procedure detailed in the “**WORKSHOP MANUAL**” for assembling/disassembling it.*

Carry out this maintenance work paying the utmost attention to the safety precautions for personal safety.

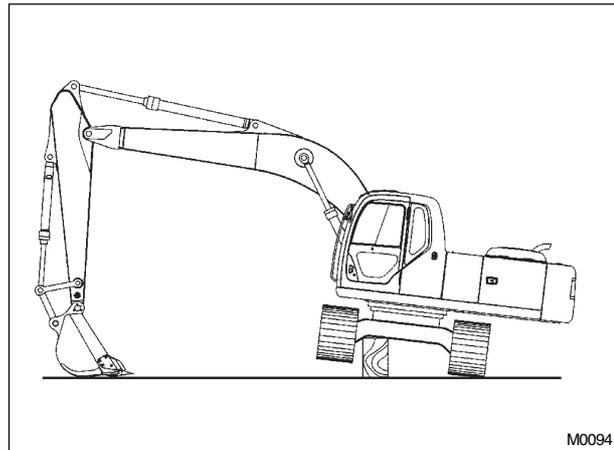
In case of doubt, even minimum, contact your Dealer: do not act on your own initiative as this may prove dangerous.

This work should be carried out by two persons. The operator should move the machine in accordance with the signals by the ground assistant.

If the tracks are to be inspected visually while in motion, always keep at a safe distance and outside the machine operating range.

All services to the tracks should be carried out with the machine controls in the following positions:

- auto-idle off
- manual engine speed control fully turned anti-clockwise
- engine off
- ignition key removed
- safety lever in the locked position (**LOCK**).



M0094

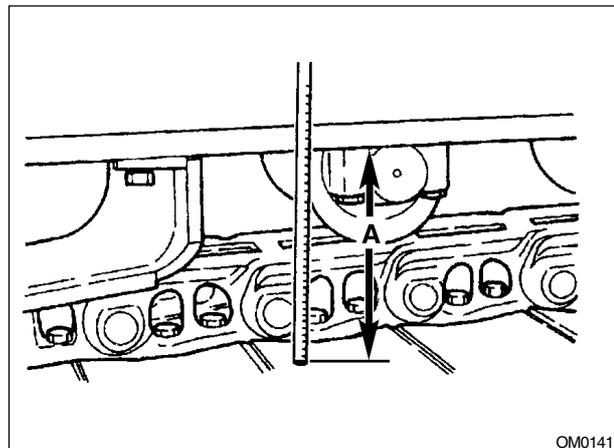
Checking track sag

NOTE: *check track sag after thoroughly removing dirt stuck on the track by pressure-washing.*

- Turn the upperstructure 90° and lower the bucket to raise one track off the ground as shown.
- Keep the angle between boom and arm 90° to 110° and rest the bucket round side (outer) onto the ground.
- Place blocks under the frame to support the machine.
- Rotate the raised track in reverse two full rotations, then forward two full rotations.
- Measure distance **(A)** at the middle of the frame and from the bottom of the track frame to the back face of the track shoe. Distance **(A)** should be 340 to 380 mm.

IMPORTANT: *we recommend to check track sag more frequently than every 250 hours if the machine is used mainly on terrains with gravel, mud or sharp stones.*

- If track sag is not within specification, loosen or tighten the track following the procedures detailed below.



OM0141

Loosening the track



WARNING

Do not loosen the valve (1) quickly or too much as grease pressure inside the cylinder might dangerously eject it off its seat.

Loosen the valve with care, keeping the body parts and face away from the valve (1).

Never loosen the grease fitting (2).

IMPORTANT: *remove any matter such as mud or gravel possibly stuck between sprockets and track links before loosening.*

- To loosen the track chain, turn slowly valve (1) anticlockwise.

Wrench used: 19 mm

Then, the grease shall start getting out the base of the valve.

- 1 to 1.5 turns of the valve (1) are sufficient to loosen the track.
- If grease does not come out evenly, slowly rotate the raised track.
- When proper track sag is obtained, turn valve (1) clockwise and tighten to 14 daNm.

Tightening the track

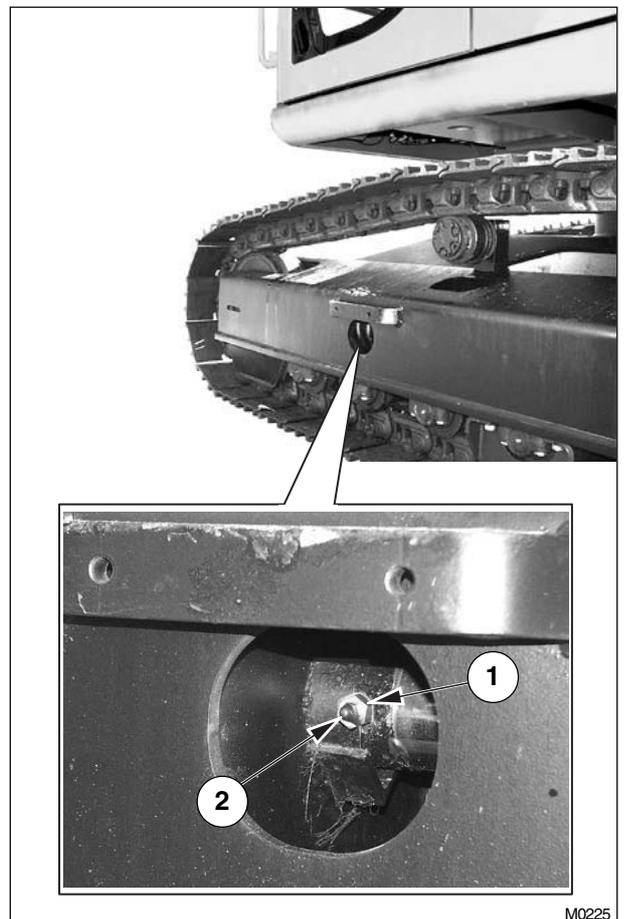


WARNING

It is abnormal if the track remains tight after turning valve (1) anticlockwise or if the track is still loose after charging grease through the grease fitting (2).

*In such cases **NEVER ATTEMPT TO DISASSEMBLE** the track or the track adjuster due to dangerous high-pressure grease inside the track adjuster. Contact your Dealer immediately.*

- To tighten the track, inject grease from a grease gun into fitting (2) until sag is within specification.



M0225

HYDRAULIC OIL RESERVOIR

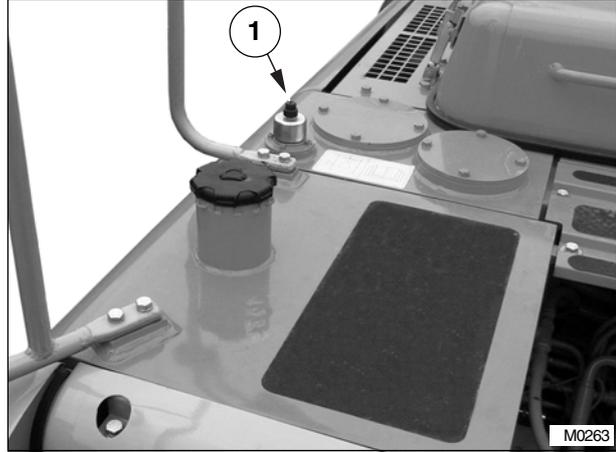
Condensation discharge



WARNING

The hydraulic oil reservoir is under pressure. Press the pressure relieve button on the reservoir to relieve pressure before maintenance. Danger of personal injuries.

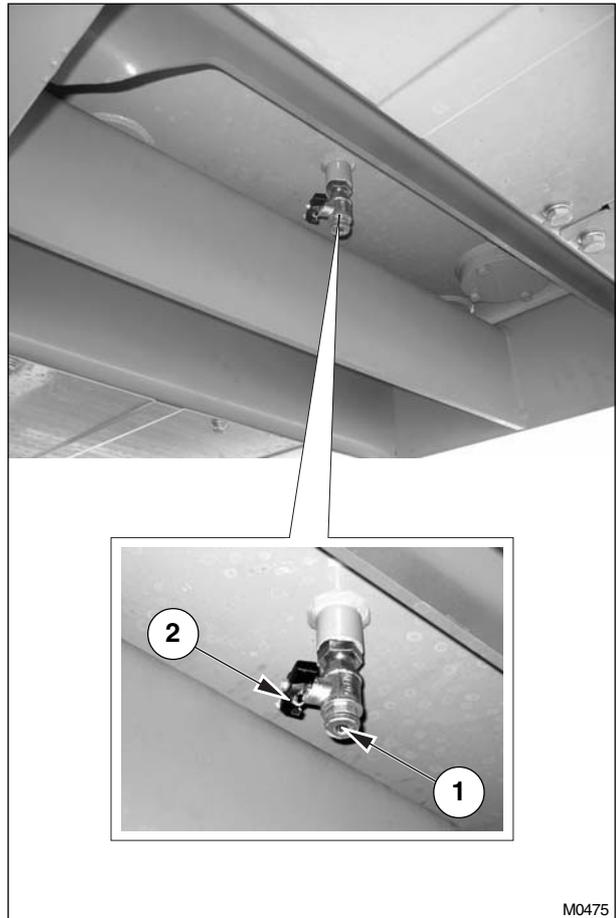
- Park the machine on a level surface and turn the upperstructure 90° to obtain easy access.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**). Wait until the machine is cold.
- Press button (1) located on the tank to bleed the pressure trapped inside.



CAUTION

Do not release the drain plug until oil has properly cooled down. Contact with hydraulic oil at working temperature may cause burns and personal injuries.

- With cold oil, remove draining plug (1) open valve (2) and drain into an appropriate container, water condensation and possible sediments. Keep valve (2) open as required to let condensation and sediment be drained; otherwise also hydraulic oil would be drained at.
- Once the draining operation is completed, close valve (2) and tighten plug (1) fully.



Handle and dispose of water mixed to hydraulic oil according to current regulations. Use only authorised disposal procedure. If in doubt, contact authorities concerned.

FUEL TANK

Discharging condensation



WARNING

Following the presence of flammable vapours, extinguish all smoking materials and open flames before checking fuel level, refuelling the machine, replacing the filters, or removing the condensation discharge plug.

If check is performed at the end of the working period:

- Park the machine on a level surface, with the upperstructure turned to 90° to make access easier;
- Rest the bucket to the ground;
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).

NOTE: a plug is installed on the drain cock to prevent ingress of dirt and as a protection against vandalism.

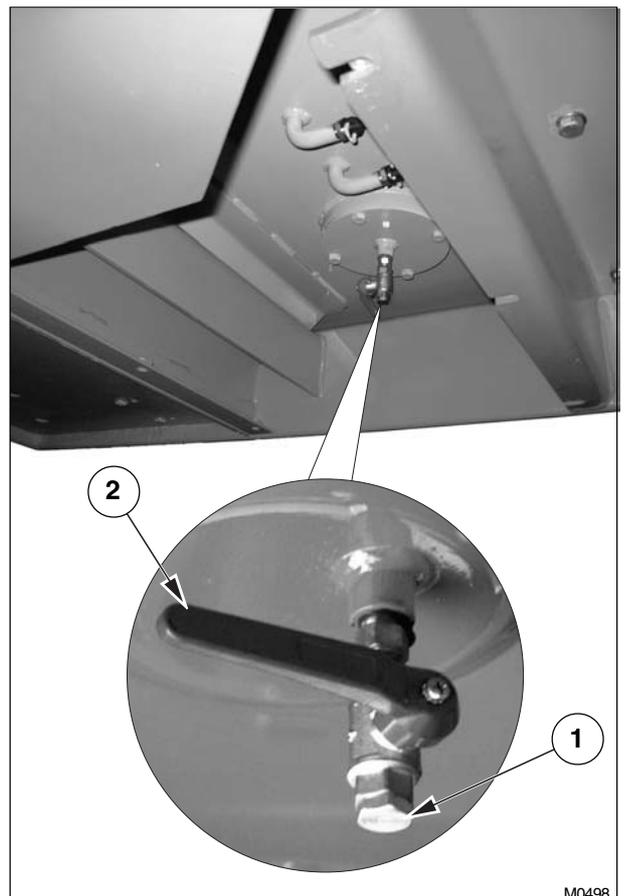
- Get under the turret in correspondence with the fuel tank and remove the guard.
- Remove plug (1) from draining valve (2). Slowly open the cock and let condensation and deposits drain into a suitable container until only clean fuel comes out.

NOTE: when the temperature is above 0 °C draining can be done before engine start-up. When working with temperatures below 0 °C, the tank should be drained at the end of work, after engine shut-down, as water might freeze and not drain properly.

- Once the draining operation is over, close valve (2) reinstall plug (1) and the guard.



Handle and dispose of the water mixed with fuel oil according to current legislation. Use only authorised disposal procedures. If in doubt, contact authorities concerned.



M0498

TRAVEL SIDE REDUCTION UNITS

Oil level check



WARNING

Travel reduction units and oil therein can reach high operating temperatures. Therefore, the body must be protected with suitable clothing, glasses and protections to avoid burns and personal injuries. Slowly loosen the filler/drain/level threaded plug from the reduction units. This is slowly relieve the pressure which builds up inside the reduction units. When checking oil level, stay at the side of the reduction units for protection and wear safety glasses.

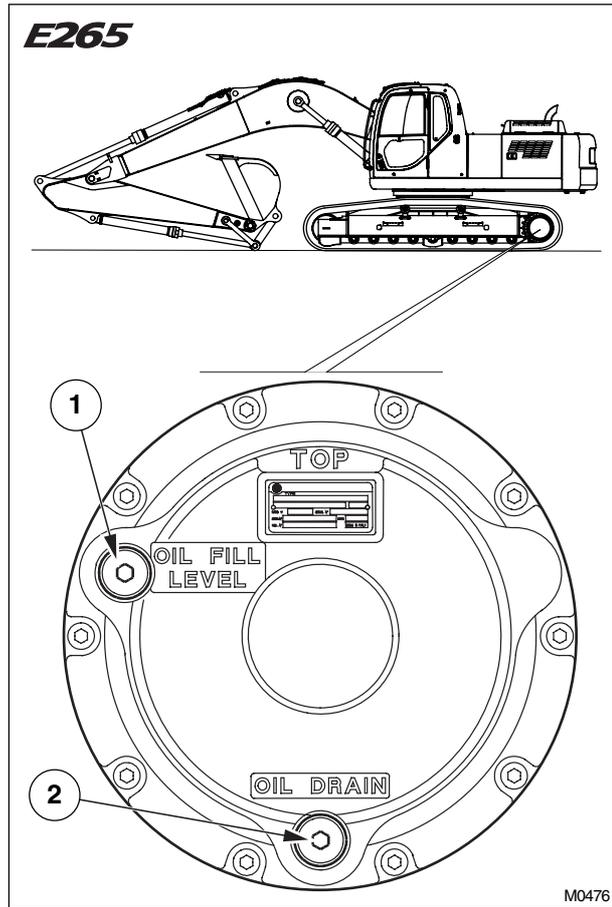
Filler/drain/level plug alignment procedure, which is described below, is to be carried out with the help of a ground assistant. The assistant must stay clear of the machine operating range.

Never service or inspect travel motor circuits when on slope. They are under high pressure due to machine weight.

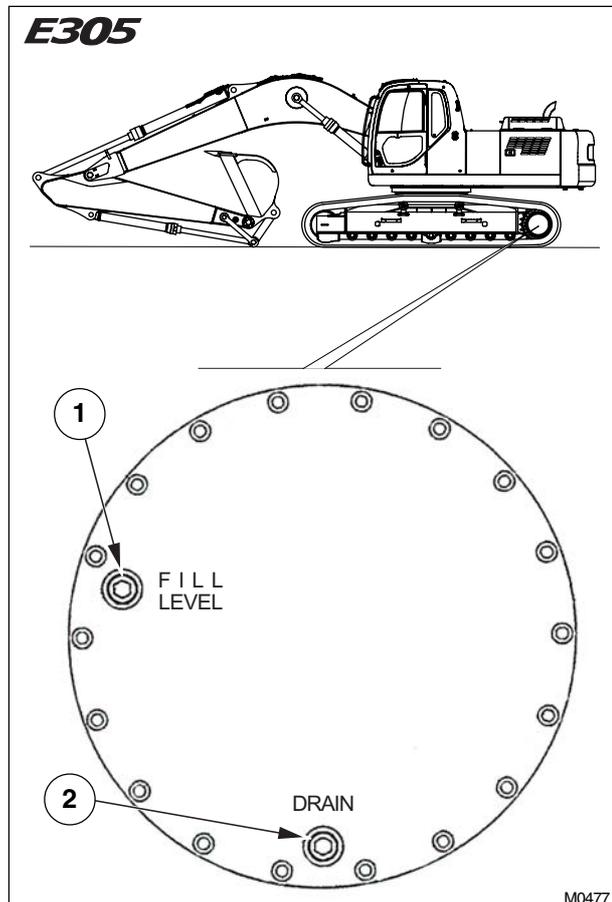
- Park the machine on a level surface. The side reduction unit should be positioned as to have the plugs (1) and (2) as shown. Observance of this position is essential to proper servicing.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Wait until the machine is cold.
- Slowly release the threaded plug (1) gradually relieving pressure from inside the reduction unit. After relieving pressure, fully remove the plug (1) from its seat.
- Check oil level inside the travel reduction unit through the plug (1) seat. Oil level should be flush with the hole. If oil is low, top up through the hole of plug (1) until oil comes out of the hole of plug (1).
- Reinstall the threaded plugs (1).

The above operation should be carried out on both travel side reduction units.

IMPORTANT: Do not top using oil with different specifications than the one already contained in the travel side reduction units (See the **FILLING CHART** at the end of this Chapter).



M0476



M0477

SWING REDUCTION UNIT

Oil level check



WARNING

Never service or inspect swing motor circuits with the machine parked on a slope. This circuit is under high pressure due to machine weight.

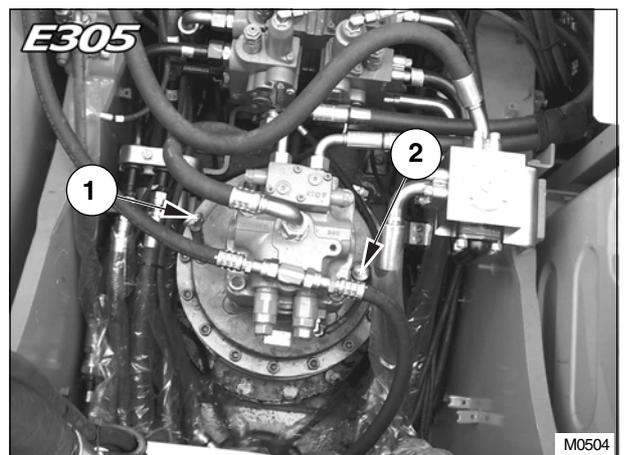
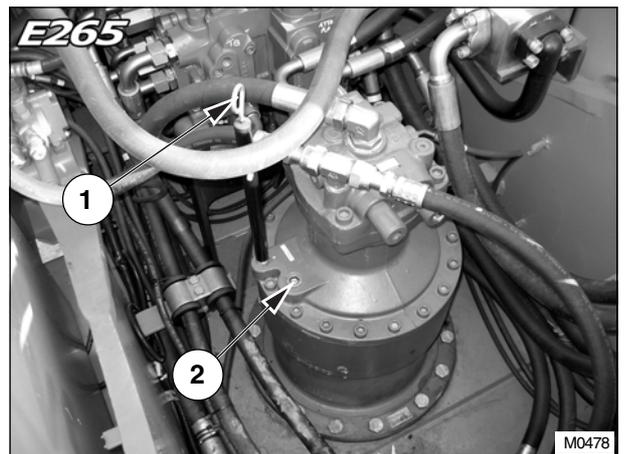


CAUTION

The swing reduction unit and oil therein can reach high operating temperatures. Therefore, while carrying out this operation, the body must be protected with suitable clothing and protections to avoid burns and personal injuries.

- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Wait until the machine is cold.
- Check oil level in the reduction unit using the dipstick (1).
- Level should be between the **MIN** and **MAX** marks shown on the dipstick.
- If oil level is low, remove the plug (2) and top up through the filler neck.
- Reinstall the plug (2).

IMPORTANT: *do not top up using oil with different specifications than the one already contained in the reduction unit (See the **FILLING CHART** at the end of this Chapter).*



OUTSIDE AIR FILTER AND RECIRCULATION AIR FILTER

Check

IMPORTANT: *the normal maintenance interval requires the inspection of both air filters every 250 hours. Under particular ambient conditions (very dusty areas) it is recommended to reduce such an interval at least 50%.*

Proceed with the inspection if the outside air filter, operating as follows:

- Place the machine on a flat surface.
- Rest the bucket on the ground.
- Disengage the auto-idle, turn the manual throttle knob fully anticlockwise, cut-off the engine, extract the starter key and place the safety lever in (**LOCK**) position.
- Move the operator's seat fully forward and lower the backrest.
- Loosen securing screws (1) and remove the upper panel lifting hooks (2).
- Lift vertically outside air filter (4) and check its conditions. In case it is found dirty, proceed with its cleaning.

IMPORTANT: *clean the outside air filter exclusively with compressed air. Replace it every 10 cleaning operations or, in any case every 2 years.*

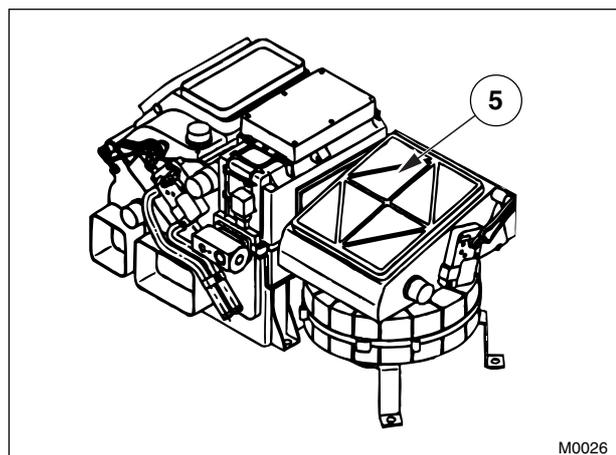
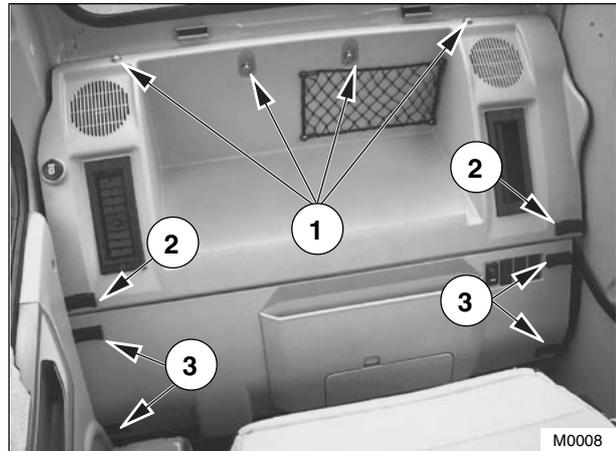
- Reposition outside air filter (4) in its seat.

Proceed with the inspection of air re-circulation filter (5) operating as follows:

- Remove the lower panel lifting hooks (3).
- Lift air re-circulation air filter (5), remove it from its seat and inspect its conditions. In the event it is found dirty, proceed with its cleaning.

IMPORTANT: *never use gasoline or solvents to clean the re-circulation air filter. Use compressed air or water.*

- Re-position re-circulation air filter (5) in its seat.
- Install the lower panel, the upper panel and tighten screws (1).



AIR CLEANER: OUTER ELEMENT

Cleaning

IMPORTANT: operation to be performed also in the case of activation of the relevant indicator light on the display of the monitor.

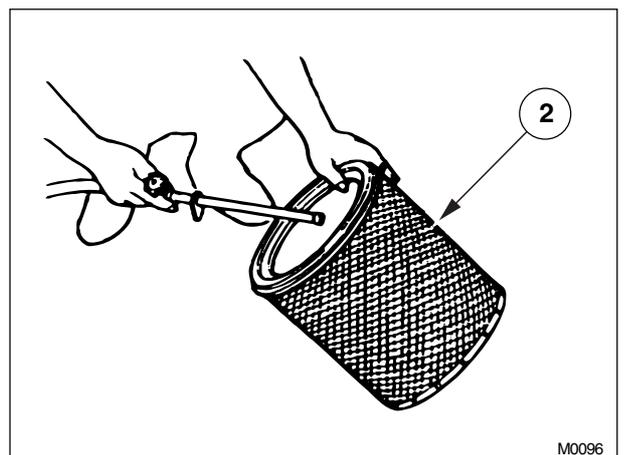
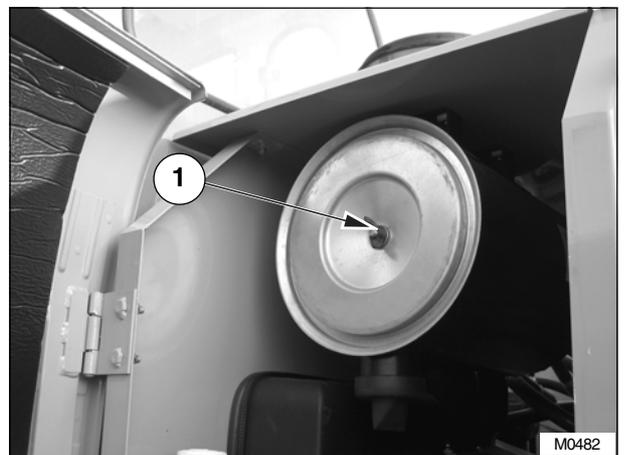


CAUTION

Always wear safety glasses with side shields when using compressed air to clean parts to reduce the risk of personal injuries due to projected particles. Limit pressure to 0.2 MPa (2 kg/cm²).

Proceed with the cleaning of the outer element of the cleaner operating as follows:

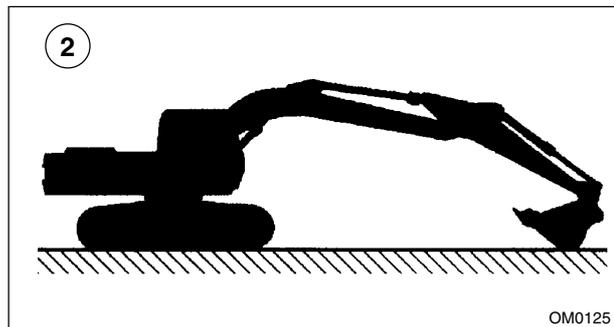
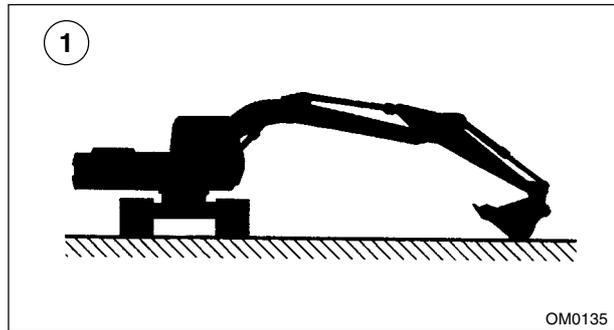
- Position the machine on a flat surface.
- Rest the bucket on the ground.
- Cut-off the auto-idle, turn the manual throttle knob anticlockwise, cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Open the air cleaner/batteries compartment and lock it in open position.
- Loosen wing nut **(1)** and extract the cover with the outer element.
- Clean outer element **(2)** using compressed air. Direct the air jet from the inside to the outside of the filter.
- Check that there are no holes or cuts in the filter placing a light inside the filter. The light shows holes or cuts in the filter. In this case replace it.
- Insert outer element **(2)**, making sure that it is well fitted and secure it with wing nut **(1)**.
- Close the air cleaner/batteries compartment panel.



HARDWARE TIGHTENING TORQUES

Torque check

- Park the machine on a level surface. To assist checking the fuel tank and hydraulic oil reservoir mounting bolt tightening, swing the upperstructure by 90° (see figure 1). Remaining checks can be performed with the upperstructure parallel to the carriage (see figure 2).
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Tightening torques should be checked using a suitably pre-set torque wrench.



Engine mounting bolts



WARNING

Always ensure that engine hood is correctly locked in the open position. Danger of personal injuries.

- Open engine hood and lock it in the open position as detailed in the paragraph "**HOOD AND ACCESS COVERS**".
- Check tightening torques of the following bolts:

A) Engine silent blocks retaining bolts (radiators side):

- Bolt: M18 x 130
- Torque: 22.5 daNm
- Bush: 27 mm

(pumps side):

- Bolt: M18 x 130
- Torque: 22.5 daNm
- Bush: 27 mm

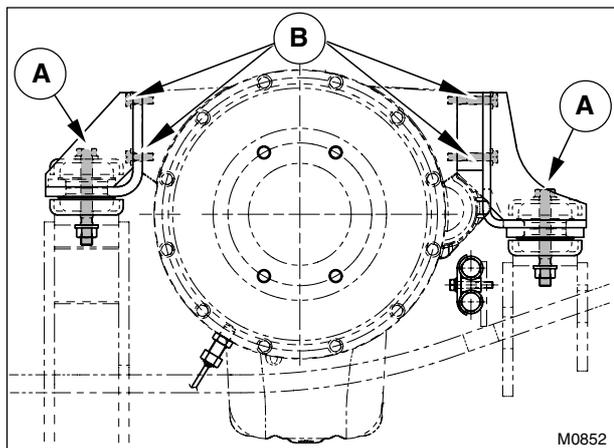
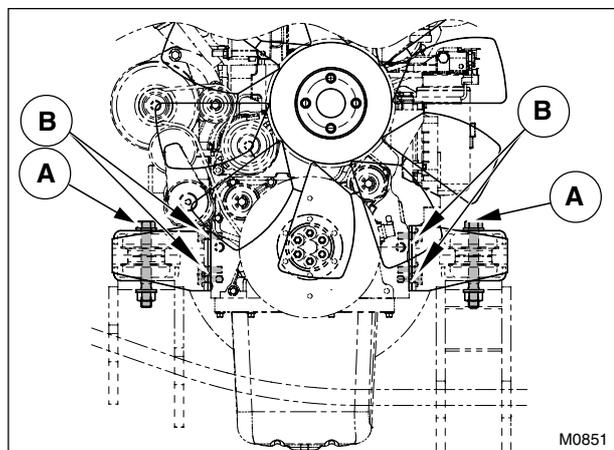
B) Engine bracket retaining bolts (radiators side):

- Bolt: M12
- Torque: 11.5 daNm
- Bush: 19 mm

(pumps side)

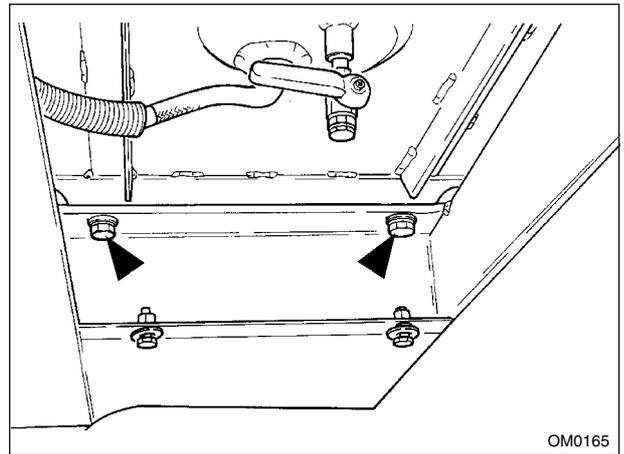
- Bolt: M12
- Torque: 11.5 daNm
- Bush: 19 mm

- Close engine hood and lock it using the two catches.



Fuel tank retaining bolts

- From under the machine, loosen the protection panel retaining bolts at the fuel tank and remove panel.
- Check bolt tightening torque as follows:
 - Bolt: M16
 - Torque: 21 ± 2 daNm
 - Bush: 24 mm
- Reinstall protection panel and associated retaining bolts.



OM0165

Hydraulic oil reservoir retaining bolts

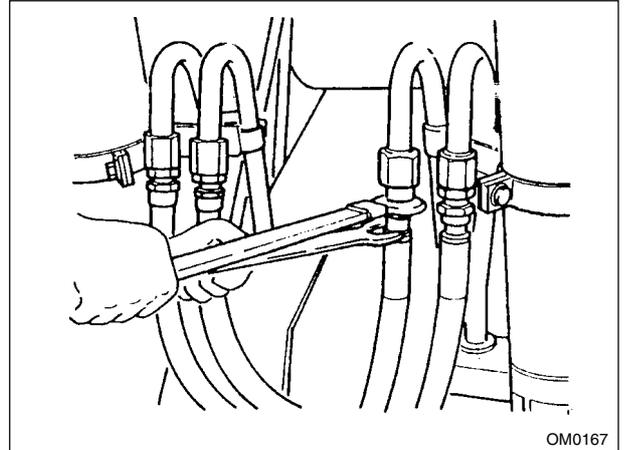
- Check bolt tightening torque as follows:
 - Bolt: M20
 - Torque: 21 ± 2 daNm
 - Bush: 30 mm



M0503

Hydraulic hose connections

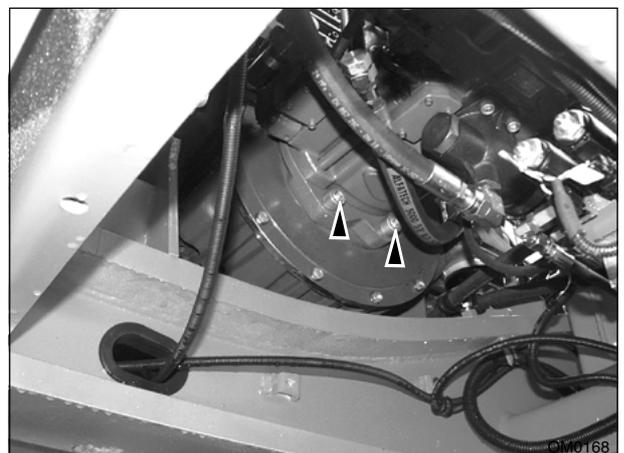
- Check hydraulic hose connection tightening torque as follows:
 - Wrench: 36 mm
 - Torque: 18 ± 2 daNm



OM0167

Hydraulic pump to engine retaining bolts

- Open the hydraulic pump compartment cover and latch it in the wide open position using the safety catch.
- Check hydraulic pump retaining bolt torque as follows:
 - Bolt: M20
 - Torque: 43 ± 4 daNm
 - Wrench: 17 mm
- After checking, close the cover.



OM0168

Control valve securing screws

A1) Screws securing the control valve to the bracket

- Check control valve to bracket retaining bolt torque as follows:

- Bolt: M12 x 30
- Torque: 11 ± 1 daNm
- Bush: 19 mm

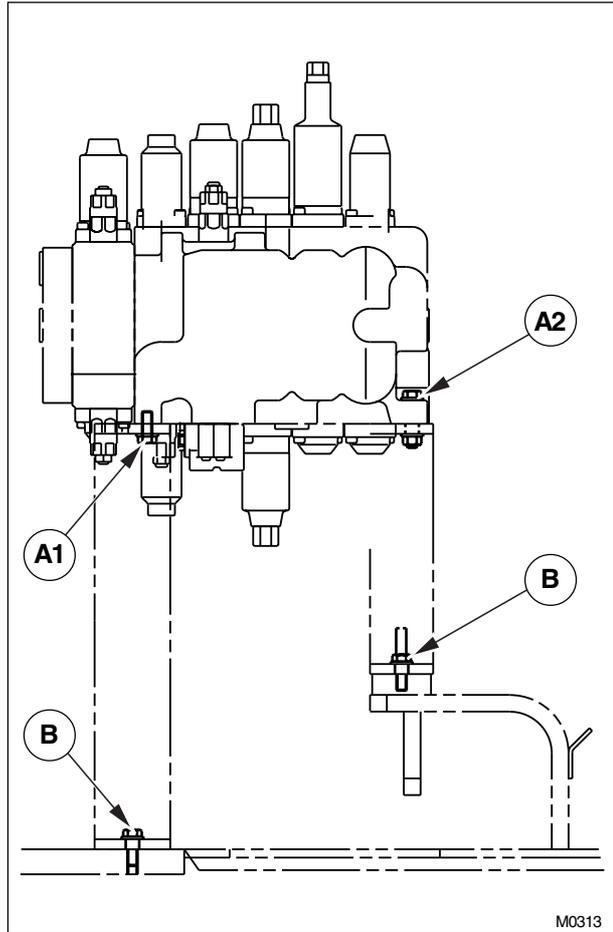
A2) Screws securing the control valve to the bracket

- Bolt: M12 x 1.75 x 60
- Torque: 11 ± 1 daNm
- Bush: 19 mm

B) Screws securing the control valve bracket to the frame

- Check control valve bracket to frame retaining bolt torque as follows:

- Bolt: M16 x 35
- Torque: 27 ± 3 daNm
- Bush: 24 mm



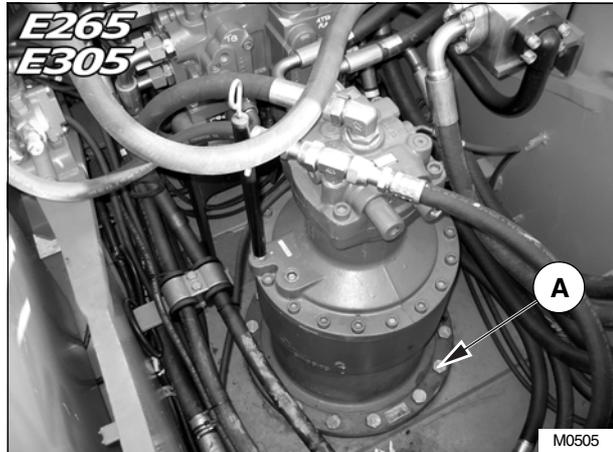
M0313

Swing reduction unit retaining bolts

- Check torque of the swing reduction unit retaining bolts (A) as follows:

Hex head screws (A):

- | | E265 | E305 |
|-----------|-------------|-------------|
| - Bolt: | M20 x 55 | M24 |
| - Torque: | 57 ± 3 daNm | 95 ± 5 daNm |
| - Bush: | 30 mm | 36 mm |



M0505

Battery bracket retaining bolts

- Open the radiator bay cover and air filter/battery bay cover and latch them in the wide open position using the catches.
- Remove battery protection.
- Check bracket retaining bolt torque as follows:

Side bracket

- Bolt: M10 x 30
- Torque: 1 daNm
- Bush: 17 mm



M0233

Cab mounting bolts

- Check cab mounting bolts torque as follows:

- Bolt: M12 x 65
- Torque: 11 daNm
- Bush: 19 mm



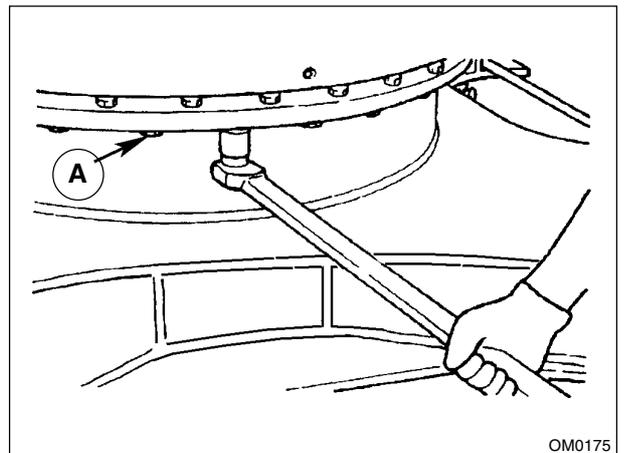
M0030

Swing bearing retaining bolts

- Check torque of the swing bearing to carriage bolts (A) and swing bearing to upperstructure bolts (B) as follows:

Swing bearing to carriage bolts (A):

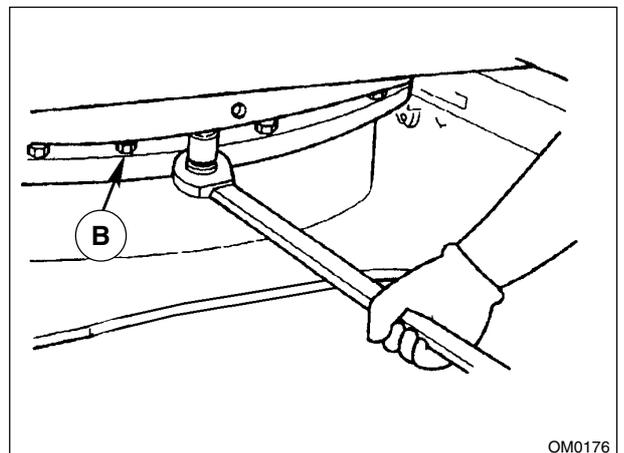
- Bolt: M22
- Torque: 70 ± 5 daNm
- Bush: 32 mm



OM0175

Swing bearing to upperstructure bolts (B):

- Bolt: M22
- Torque: 70 ± 5 daNm
- Bush: 32 mm



OM0176

Travel reduction unit retaining bolts

- Check torque of the travel reduction unit to carriage bolts (A) and ring gear to reduction unit bolts (B) as follows:
- Loosen the bolts retaining the reduction unit inner protection and remove protection.

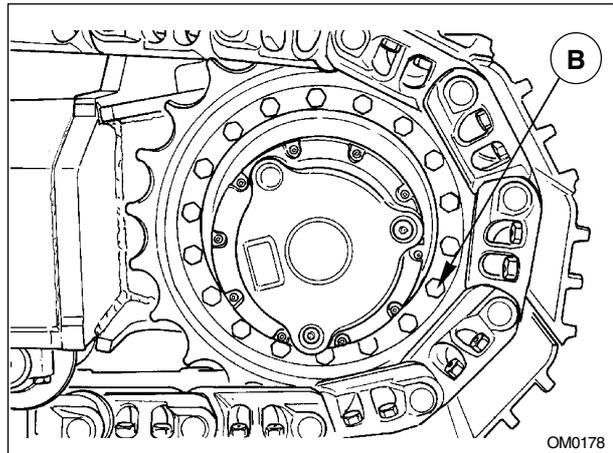
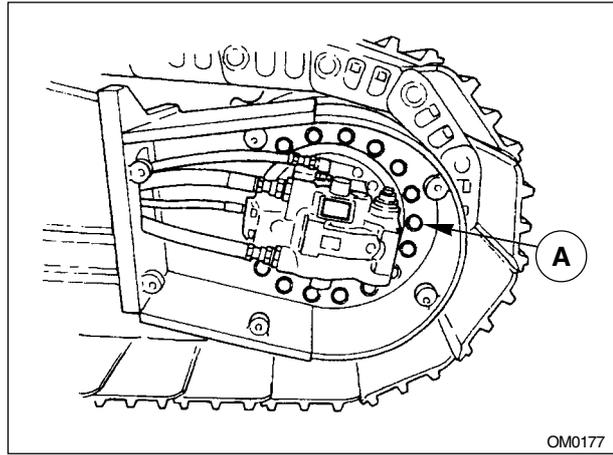
Travel reduction unit to carriage bolts (A):

| | E265 | E305 |
|-----------|-------------|-------------|
| - Bolt: | M20 | M24 x 60 |
| - Torque: | 57 ± 3 daNm | 95 ± 5 daNm |
| - Bush: | 30 mm | 36 mm |

- After checking, reinstall the reduction unit inner protection and associated retaining bolts.

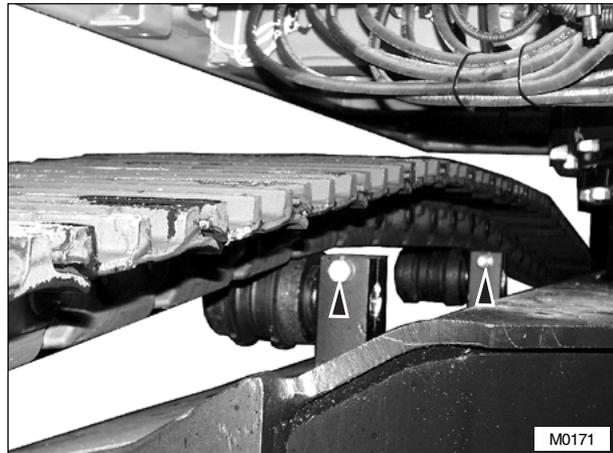
Ring gear to reduction unit bolts (B)

| | E265 | E305 |
|-----------|-------------|-------------|
| - Bolt: | M18 | M20 |
| - Torque: | 40 ± 4 daNm | 57 ± 3 daNm |
| - Bush: | 27 mm | 30 mm |



Upper roller retaining bolts

- Check upper roller retaining bolt torque as follows:
- | | |
|-----------|-------------|
| - Bolt: | M20 |
| - Torque: | 57 ± 3 daNm |
| - Bush: | 30 mm |



Lower roller retaining bolts

- Check lower roller retaining bolt torque as follows:
- | | E265 | E305 |
|-----------|-------------|-------------|
| - Bolt: | M18 | M22 |
| - Torque: | 40 ± 4 daNm | 70 ± 5 daNm |
| - Bush: | 27 mm | 32 mm |



Shoe and track retaining bolts and nuts

- Check torque of the shoe and track retaining bolts as follows:

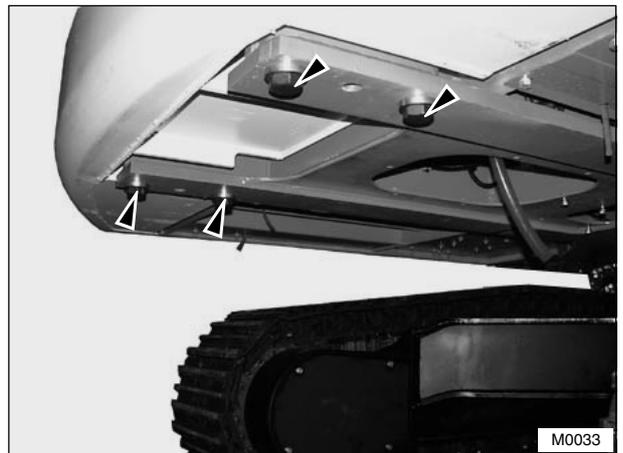
| | E265 | E305 |
|-----------|-------------|-------------|
| - Bolt: | M20 | M20 |
| - Torque: | 85 daNm | 70 ± 5 daNm |
| - Bush: | 30 mm | 30 mm |



Counter weight retaining bolts

- Check counterweight retaining bolt torque as follows:

| | |
|-----------|----------|
| - Bolt: | M36 |
| - Torque: | 294 daNm |
| - Bush: | 55 mm |



Screws securing the track chain guard

- Proceed with the torque tightening check, as indicated below, of the screws securing the track chain guard:

| | E265 | E305 |
|-----------|-------------|-------------|
| - Screw: | M18 | M24 x 60 |
| - Torque: | 40 ± 4 daNm | 95 ± 5 daNm |
| - Socket: | 27 mm | 36 mm |



HOSES, LINES AND CONNECTIONS

Check and assembly instructions



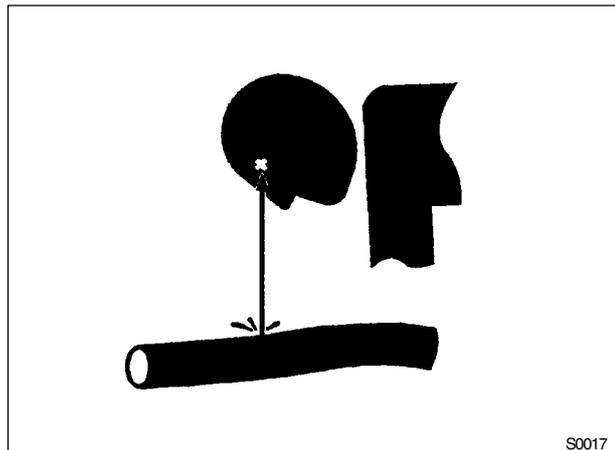
CAUTION

Always make sure that the engine hood, once open, has the locking device securely applied; there is a danger for personal injuries. Move the safety lever in the locked position (**LOCK**)

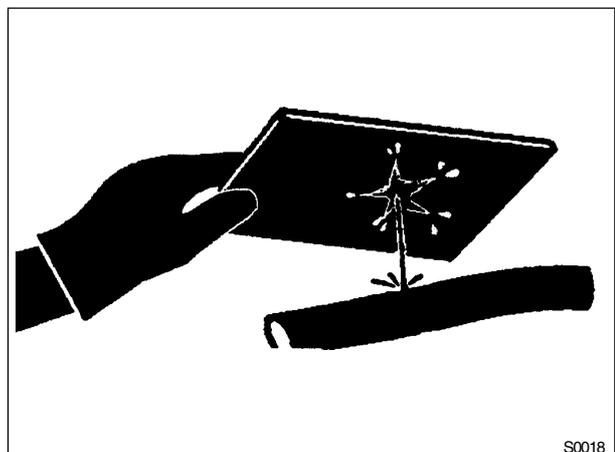
- Leakages of fluids under pressure could penetrate the skin, causing serious injuries. To avoid such a risk, search for leakages using a piece of cardboard.
- Make sure that hands and body are protected against fluids under high pressures. In the event an accident occurs, seek immediate specialised medical care. All liquids penetrating the skin must be surgically removed within a few hours, since a gangrene could develop.
- Leakages of hydraulic fluid and lubricants could cause fires, resulting in serious injuries.
- Start maintenance operation of hydraulic components only after they are totally cooled-off, as well as hydraulic fluids and lubricants and after discharging all residual pressures.
- Keep in mind that maintaining overheated and pressurised hydraulic components could result in sudden leakages of pressurised oil, resulting in possible personal injuries.
- Keep all parts of body and limbs and face away from plugs and screws in the event they are removed.
- Hydraulic components could be pressurised even after cooling-off.
- Never perform maintenance nor inspection operations on travel and swing motor circuits with the machine on gradients. They are highly pressurised by the weight of the machine.
- Besides protective clothing, always wear glasses with side shields and oil proof gloves.
- Fluid under pressure. Always rest the hydraulic equipment on the ground. Stop the engine, then press the pressure discharge button located on the hydraulic reservoir prior to perform any maintenance operation.
- Components of the hydraulic system can reach considerably high temperature when in operation. Wait for the machine to cool-off, prior to beginning maintenance or inspection operations.



S0016



S0017



S0018

- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**). Wait until the machine has cooled down.
- Open the engine hood, the hydraulic pump compartment door and the air cleaner, battery and radiators doors, locking them in maximum open position, as described in paragraph "**HOOD AND ACCESS DOORS**".

Hoses and lines check

- Check for missing or loose clamps, kinked hoses, line-to-hose rubbing. Check oil cooler for damages. Check proper tightening of the oil cooler flange bolts. This check will also exhibit possible leaks.
- Check the hoses, lines and oil cooler at the check points listed below to assess possible damages which may be the cause for future leaks. If any fault is found, replace or tighten the connections.
- Tighten, repair or replace all damaged, loose or missing clamps. Check the hydraulic oil cooler, cooler sleeves and companion flanges which should be free from leaks. Replace damaged or worn hoses and lines.
- Never bend or hit high pressure lines.
- Never install hoses or lines if damaged or bent.
- When connecting hoses and/or lines, pay attention to keep sealing surfaces clean from dirt and not to damage them. Observe the following precautions:
 - Wash pipes and hoses both, inside and outside, with washing fluid and thoroughly dry them before reconnecting.
 - Use exclusively O-Ring seals without damages or faults. Pay attention not to damage seals during assembly.
 - Do not kink high pressure hoses when connecting them. Duration of kinked hoses is drastically reduced.
 - Carefully tighten the low pressure hose clamps to the torque specified: 0.6 to 0.7 daNm. Do not overtighten.

Sealed connections

Two types of sealed connections are used for hoses and pipes.

• **Connections with O-Ring seals**

An O-Ring seal (4) is fitted into its seat (1) specially provided at connection end (3).

- Upon assembly, always replace the O-Ring seals with new parts.
- Before tightening the nut (5), always ensure that the O-Ring seal (4) is located into its seat (1). If not, the O-Ring seal may be damaged when the nut is tightened.
- Carefully avoid scratching or damaging in any manner the O-Ring seal seat (1) surface towards the connection (3) and contact surface (2) inside the nut (5). A scratch on these surfaces can damage the seal and cause oil leakage.
- If a connection leaks, check that the O-Ring seal (4) is correctly installed into its seat (1) before tightening the nut (install new O-rings also in this case).

Connection tightening torques:

| | | | | | |
|--------------------------------|------------|-------------|-----------|-----------|-----------|
| Wrench (mm) | 27 | 32 | 36 | 41 | 50 |
| Tightening torque da Nm | 9.5 | 13.5 | 18 | 21 | 33 |

Permissible tolerance ± 10%

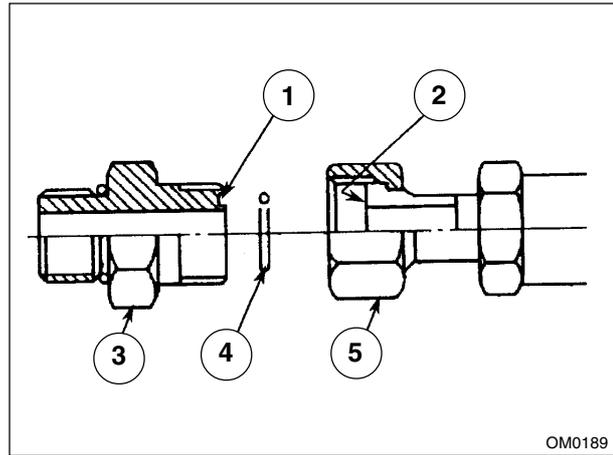
• **Connection with metal sealing**

In this case, metal sealing is obtained by contact of the tapered surface (7) of connection (6) and tapered seat (9) in the pipe (10). This is used for small diameter fittings. Be very careful during disassembly and assembly to avoid damaging the contact surfaces.

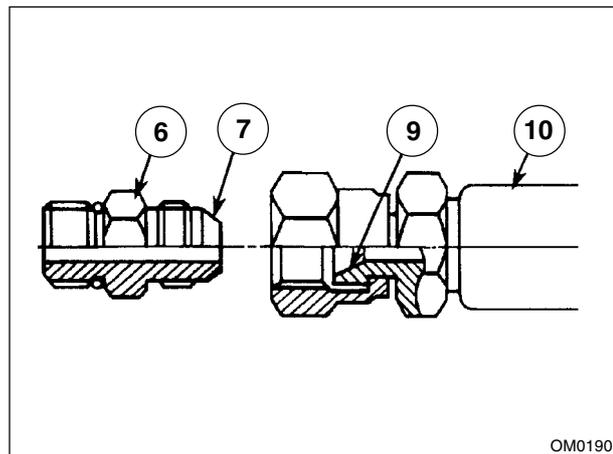
| | | | | |
|-------------------------------|-----------|-----------|-----------|-----------|
| Wrench (mm) | 19 | 22 | 27 | 36 |
| Tightening torque daNm | 3 | 4 | 8 | 16 |

IMPORTANT: *Metal sealing surfaces cannot be repaired if damaged. Overtightening connections with damaged metal sealing surfaces does not solve the leakage.*

- Close the hood and the covers of the hydraulic pump compartment, battery/radiator bay, and air filter bay.



OM0189



OM0190

FUEL HOSES

Inspection



WARNING

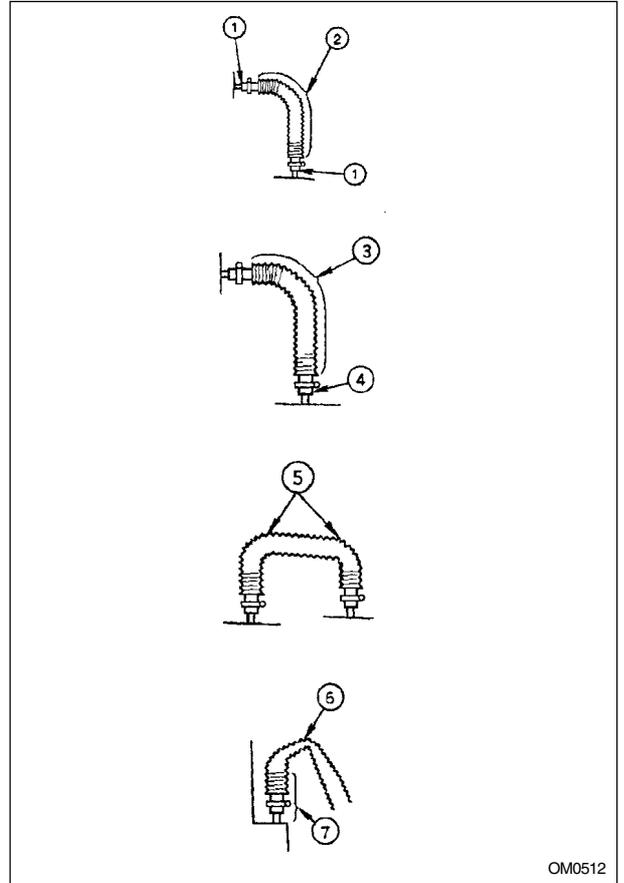
Never use gasoline, solvents or other flammable fluids to wash components. Use approved, non flammable, non toxic commercial solvents only. Always make sure that the engine hood, once open, has the locking device securely engaged; there is a danger for personal injuries.



CAUTION

You are reminded that the engine can reach a high temperature during operation. Protect body and limbs with appropriate clothing and protections, since there is a danger for burns and personal injuries.

- Place the machine on a flat surface.
- Rest the bucket on the ground.
- Exclude the auto-idle, turn completely the engine speed manual control knob anticlockwise, cut-off the engine, extract the starter key and place the safety lever in **LOCK** position.
- Wait for the machine to cool-off.
- Open the engine hood and lock it in open position as described by paragraph "**HOOD AND ACCESS COVERS**".
- Check the hoses to identify and eliminate wrinkling and that they are free from signs of rubbing which could cause leakages.
- Check the hoses in the points indicated in the table to identify and eliminate eventual leakages or any other damage which could result in a future leakage. In the event troubles are found on hoses, they must be replaced or tightened, as indicated by the table.
- Repair or change all hoses which result to be loosen or damaged. Never install bent or damaged hoses.



OM0512

| Check point | Trouble | Remedy |
|---------------------|------------------------------|---|
| Hose end | Leakage (1) | Tighten or replace |
| | Cracking (4) | Replace |
| Metal sleeve | Rubbing (2) | Replace |
| | Tearing (3) | Replace |
| Hose | Bending (5) | Replace |
| | Folding (6) | Replace (use an appropriate bending radius) |
| Hose end and joints | Deformation or corrosion (7) | Replace |

NOTE: please refer to the illustrations on the side for each check point or for the description of the trouble. Use genuine spare parts only.

- Close the engine hood.

AFTER 500 HOURS OF OPERATION

| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
|------------------------------------|---------|-----------|-------|-------|
| Swing bearing and gear | | | | |
| Boom and arm | | | | |
| Engine oil and filter | | | | |
| Fuel filter | | | | |
| Engine cooling system | | | | |
| Hydraulic system return oil filter | | | | |
| Air conditioner | | | | |
| Engine oil coalescent filters | | | | |

SWING BEARING AND GEAR

Swing bearing lubrication

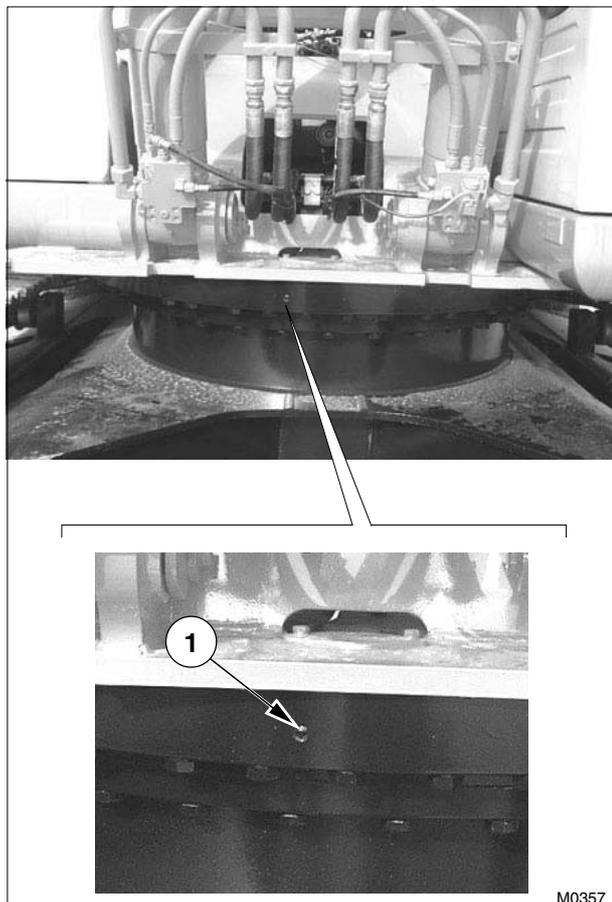


WARNING

The lubrication operations of the bullgear must be performed by a single person only. Prior to starting the operations, have all bystanders move away from the zone of operation of the machine.

Before leaving the cab, arrange machine and controls as follows:

- Park the machine on a level surface.
 - Rest the bucket to the ground.
 - Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
 - With the upperstructure stationary, inject grease of the specified type (See the **FILLING CHART** at the end of this Chapter) through the two grease fittings (1).
 - Start the engine, raise the bucket approximately 20 cm from the ground and swing the upperstructure by 45° (1/8 of a turn).
 - Lower the bucket to the ground.
 - Repeat the procedure above three times.
- Always observe safety precautions supplied at the beginning of the paragraph.
- Grease should be injected until it is seen coming out of the seals. Do not inject excess grease.



Swing gear lubrication

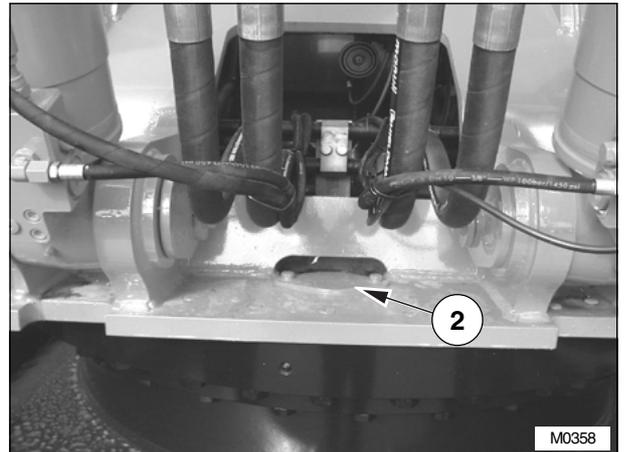


WARNING

The lubrication operations of the bullgear must be performed by a single person only. Prior to starting the operations, have all bystanders move away from the zone of operation of the machine.

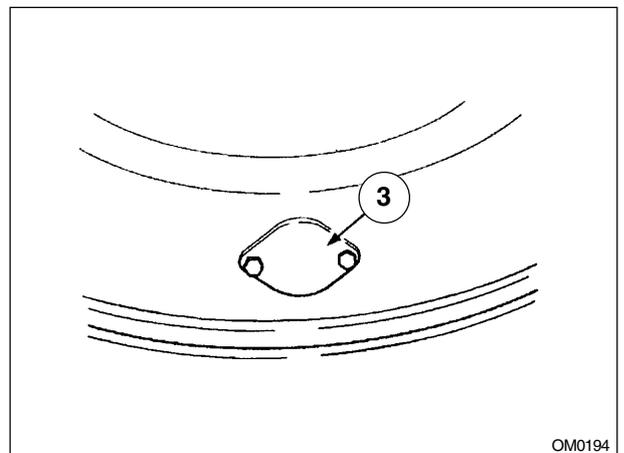
Before leaving the cab, arrange machine and controls as follows:

- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Remove the upper cover (2).
- Surfaces of the swing gear should appear lubricated and visible grease should be free from impurities.
- If needed, add 0.5 L of grease. If grease looks contaminated, replace it.
- Reinstall the cover (2).



IMPORTANT: refer to the chapter “**MAJOR OPERATING NORMS**” if water or mud are found in the swing gear.

- If grease contains water or mud, replace it as follows:
 - Remove cover (3) located in the swing gear bottom near the rotating joint.
 - Remove grease from the inner tothing and replace it.
 - Reinstall cover (3).
 - Swing the upperstructure to distribute grease all along swing ring gear. Observe safety precautions detailed at the beginning of this paragraph.



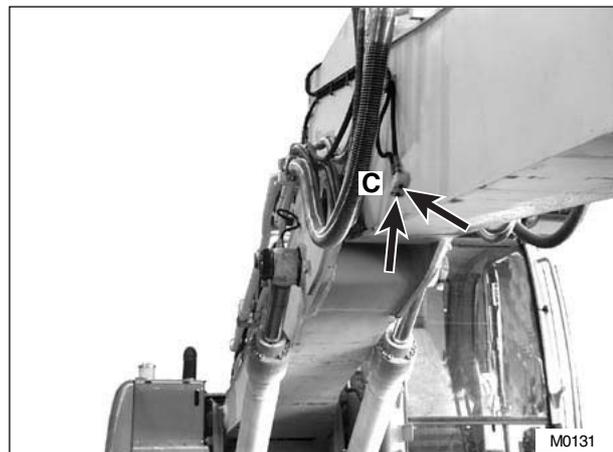
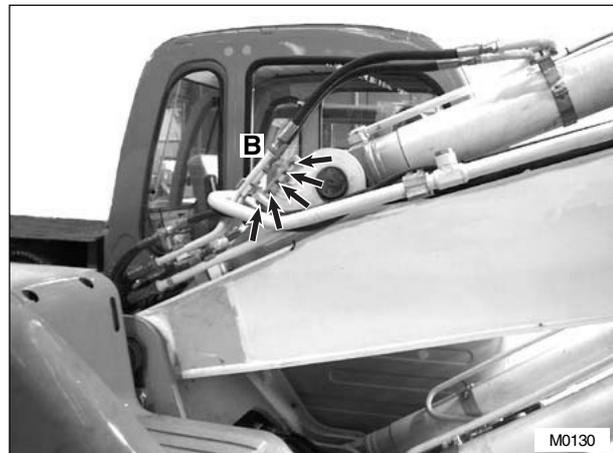
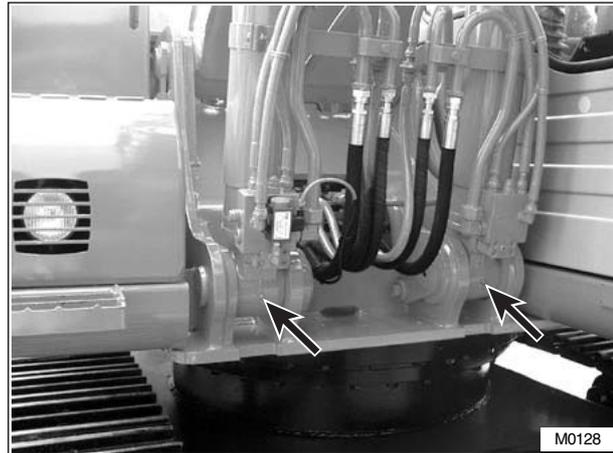
BOOM AND ARM

Lubrication

IMPORTANT: *within the first 500 OPERATING HOURS it is necessary to perform the lubrication operations listed in chapter **BREAK-IN**.*

- Ensure the machine is parked on a level surface.
- Rest the bucket to the ground and position the boom to obtain easy access to all greasing points shown. If necessary, use only safety ladders during lubrication.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).

Using a grease gun, inject grease of the type specified (See the **FILLING CHART** at the end of this Chapter) in the lubrication (**A**: monobloc version or **B-C**: triple articulation version) and in the articulation grease fittings shown by the arrows.



ENGINE OIL AND FILTER

Replacement



DANGER

Never operate the engine of this machine in enclosed areas and without systems for the evacuation of fumes, since exhaust fumes are toxic.



WARNING

Make sure that the engine hood, when open, always has the locking mechanism well secured. There is a danger of personal injuries.

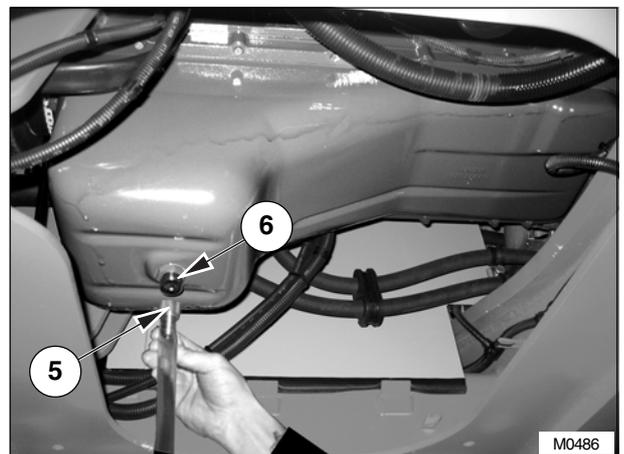
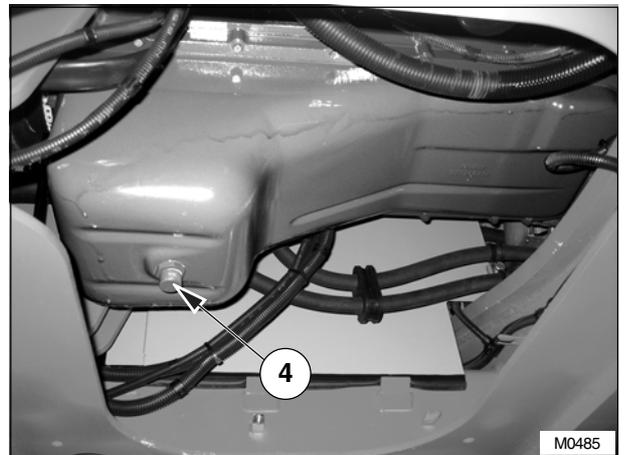
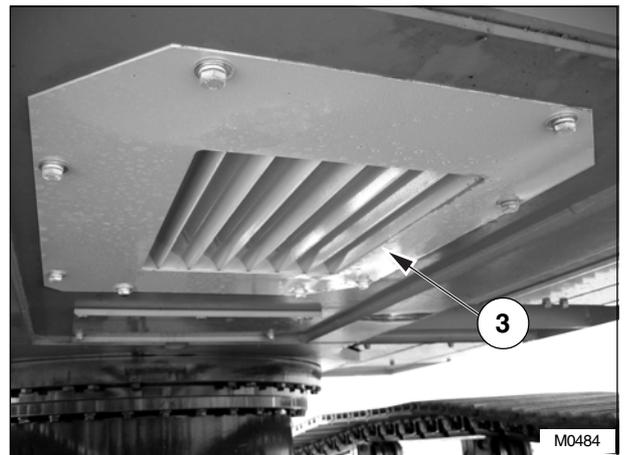
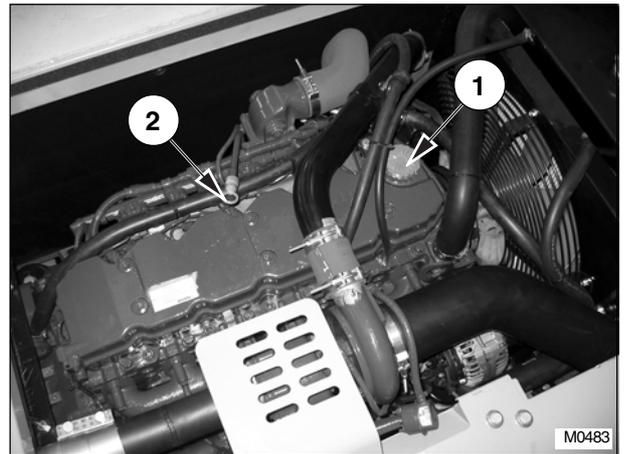
You are reminded that the engine and its oil can reach high temperature when in operation, thus it is essential that when this operation is performed while the engine is still hot, the body is protected by appropriate clothing and safety devices, since there is a danger for personal injuries and burns.



CAUTION

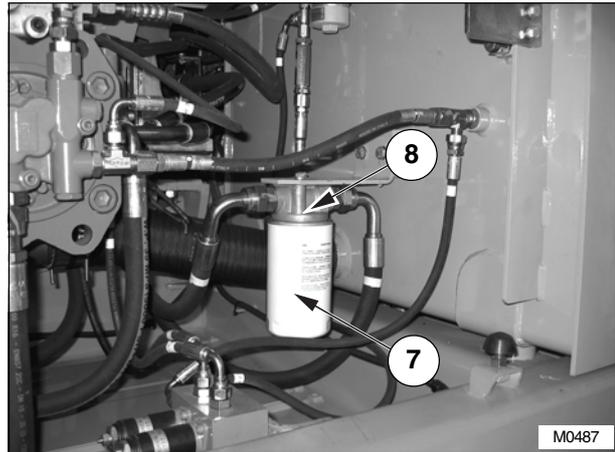
Avoid prolonged and repeated skin contacts with spent engine oil, since it this could cause skin injuries or other syndromes. In the event of a contact, wash accurately the part involved.

- Position the machine on a flat surface.
- Rest the bucket on the ground.
- Cut-off the auto-idle, turn the manual throttle knob anticlockwise, cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Open the engine hood compartment and lock it in open position, as described in chapter "**HOOD AND ACCESS PANELS**".
- Remove plug (1) and extract dipstick (2). These two operations provide a faster draining of the oil contained by the sump.
- Get under the turret, loosen the screws securing guard (3) and remove it from its seat.
- Loosen manually plug (4).
- Tighten manually the connection complete with pipe (5) (provided with the machine) on valve body (6). Once this operation is over, open the valve located inside valve body (6) letting the spent oil to drain into an appropriate container.
- Once the draining operation is over, remove the connection complete with pipe (5), install plug (4) on valve body (6) and guard (3).



Replace filter (7) proceeding in the following manner:

- Open the hydraulic pump compartment panel and lock it in open position with the locking device.
- Clean the contact area and around the filter.
- Loosen filter (7) using a general tool.
- Lubricate the gasket of the new filter with engine oil.
- Hand tighten the filter until the gasket touches support (8).
- Tighten the filter further $\frac{3}{4}$ turn using a general tool.
- Close the hydraulic pump compartment panel.

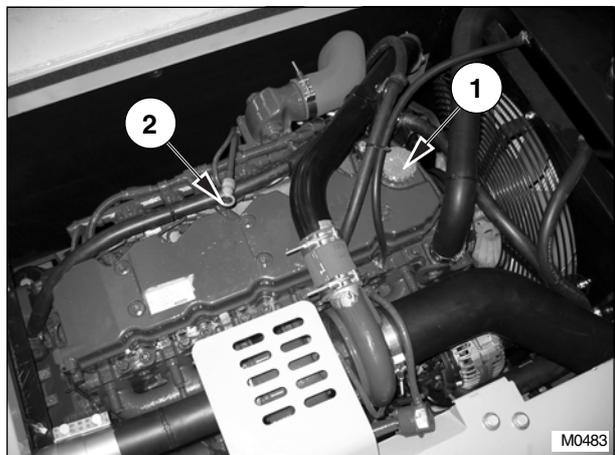


Handle and dispose of exhausted engine oil and filters, in accordance with current regulations. Use only authorised disposal procedures and, in case of doubts, contact the appropriate authorities.

Then proceed with the refilling with oil of the type, grade and quantity prescribed (See the **FILLING CHART** at the end of this Chapter) operating as described here below:

- Pour oil into the engine through filler neck (1) until the maximum level indicated on dipstick (2) is reached.
- Then, tighten plug (1) and insert dipstick (2).
- Start the engine, let it run a few minutes then cut it off.
- Use dipstick (2) to check again the level and top-up in the event it has changed with respect to the previous check.

NOTE: *insert the dipstick slowly into its seat so as to prevent that pressure alters the reading of the level.*



- Close the engine hood and secure it hooking the two securing devices.

FUEL FILTER

Replacement



WARNING

Never use gasoline, solvents or other flammable fluids to clean parts. Use only proprietary certified solvents which are non-flammable and non-toxic.



CAUTION

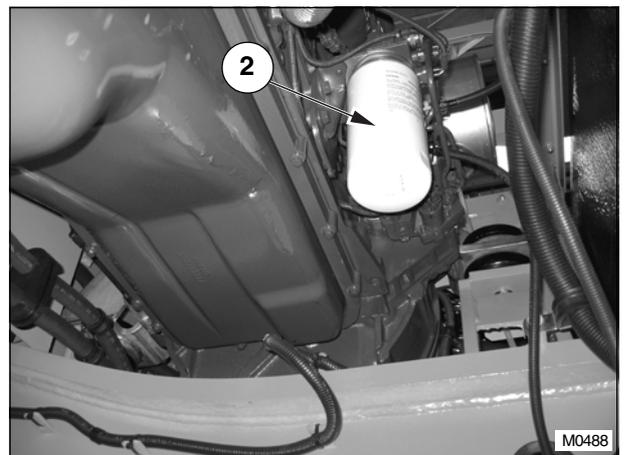
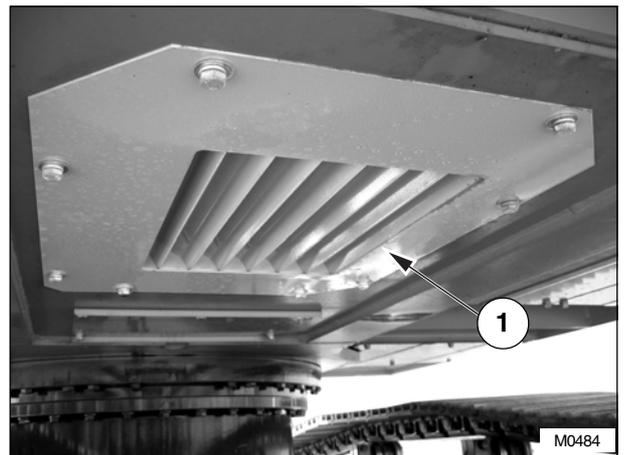
The engine can reach high working temperatures. Therefore, the body must be protected with suitable clothing and protections to avoid burns and personal injuries.



WARNING

During disassembly, pay attention not to disperse the fuel contained in the filters. Fire hazard.

- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Wait until the machine has cooled down.
- Get under the turret, loosen the screws securing guard (1) and remove it from its seat.
- Replace filter as follows:
 - Clean the filter (2) surrounding areas.
 - Unscrew the filter using the special wrench or a general-purpose tool.
 - Fill new filter with clean fuel and screw them on manually until the seal touches the support body. Then, tighten a further 1/2 of a turn.

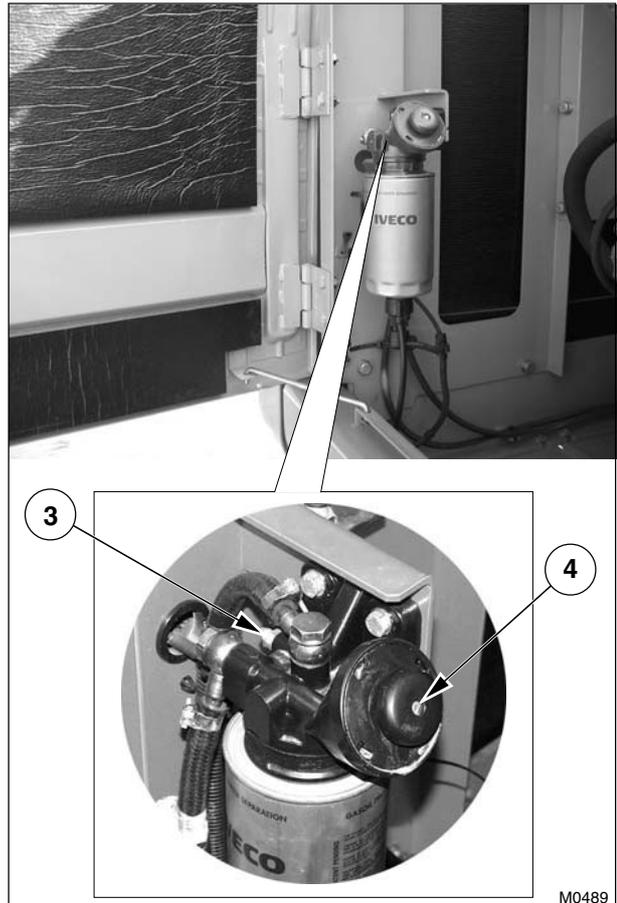


Bleeding air

- Bleed air which entered the fuel system during filter replacement as follows:
 - Loosen the bleed screw (3) to allow air to bleed.
 - Press button (4) located on the priming pump to circulate fuel in the relevant circuit.
 - Continue this operation until a minimum quantity of fuel free from air bubbles flows out bleeding screw (3).
 - Tighten bleeding screw (3).
 - Keep pumping button (4) until some resistance is experienced.
 - Start the engine.
- Close engine hood and lock it using the two catches.



Handle and dispose of used fuel filters according to current regulations. Use only authorised disposal procedures. If in doubt, contact authorities concerned.



M0489

ENGINE COOLING SYSTEM

(Radiators)

Cleaning



WARNING

Always ensure that engine hood is correctly locked in the open position. Danger of personal injuries.

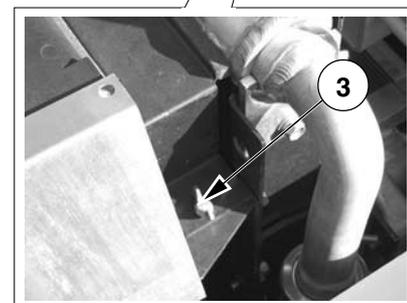
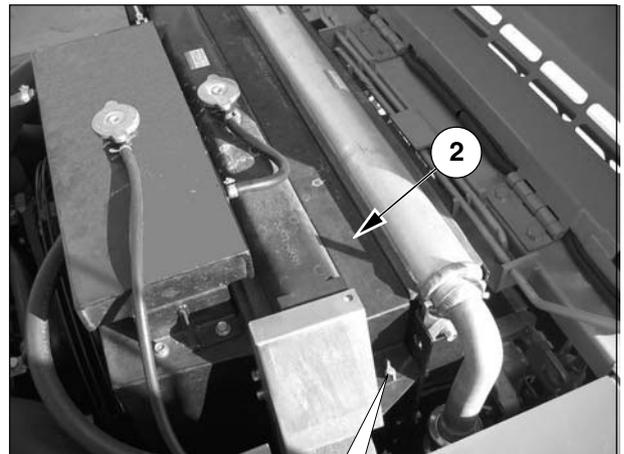
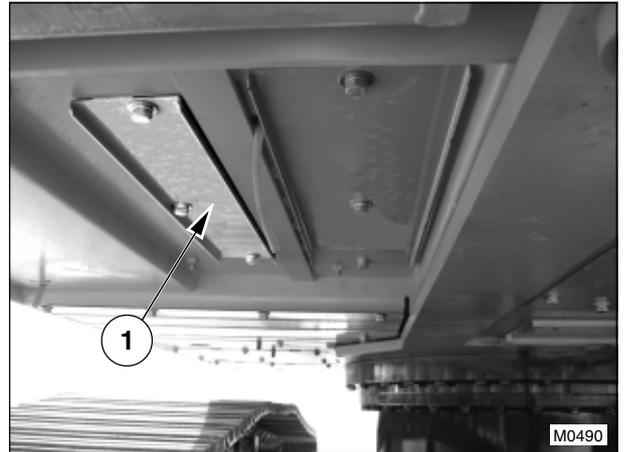


CAUTION

Compressed air or pressure water jets will be used to perform this operation. Therefore, suitable clothing must be used to protect the body. In particular, wear glasses with side shields. Keep people not involved in the maintenance work outside the working area.

- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Get under the machine and remove the screws securing lower panel (1) located in correspondence with the radiators and remove it from its seat.
- Open the radiator compartment panel and the engine hood and secure them in open position as described in paragraph "**HOODS AND ACCESS PANELS**".
- Loosen wing nuts (3) and remove guard (2). In this manner it is possible to reach the radiator cores.
- Using compressed air or a jet of water, clean accurately, directing the jet from the upper part of the radiators toward the bottom.
- Once the cleaning operation is over, reinstall guard (2) using wing nuts (3) and close the engine hood.
- Then get under the machine, reinstall guard (1) securing it with the relevant screws and close the radiator compartment panel.

IMPORTANT: use compressed air or pressure water not exceeding 0.2 MPa (2 kg/cm²) to avoid damaging radiator fins and coils.



M0491

HYDRAULIC SYSTEM RETURN OIL FILTER

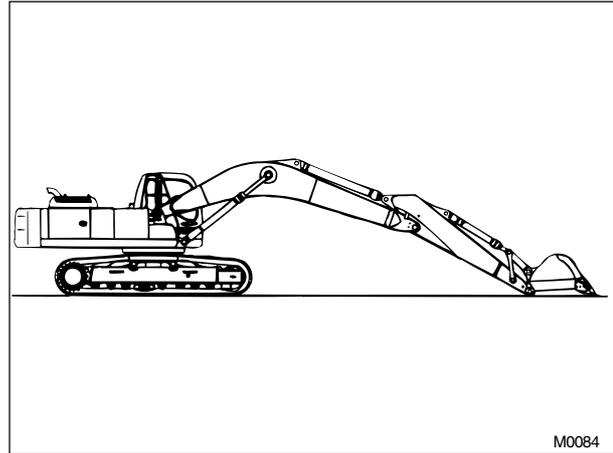
Replacement



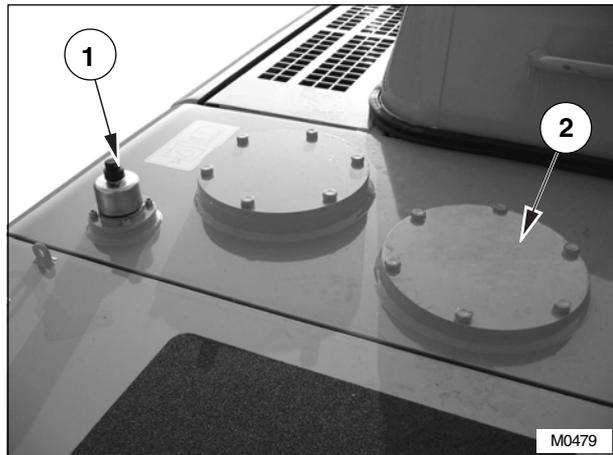
WARNING

The components and pipes of the hydraulic system can reach high temperatures. Thus it is recommended to cut-off the machine and let it cool-off prior to performing any inspection or maintenance operation. Danger of burns. The hydraulic oil tank is pressurised. Press the button on the tank to bleed the pressure prior to performing maintenance operations. Danger of personal injuries.

- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Wait until the machine has cooled down.
- Press button (1) located on the tank to bleed the pressure trapped inside.



M0084



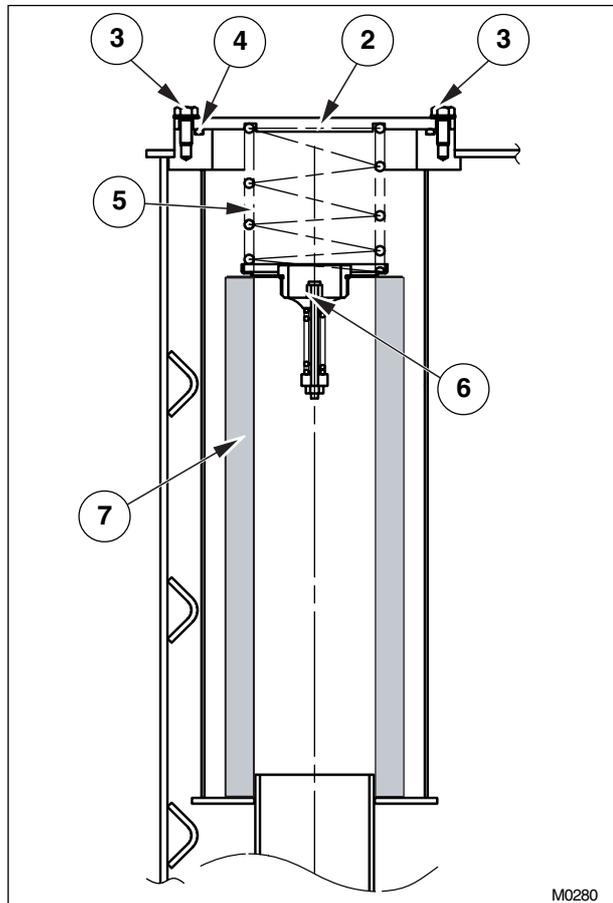
M0479



WARNING

Under the cover (2) there is a loaded spring (5). Loosen the bolts (3) slowly to avoid sudden spring release.

- Loosen the bolts (3) which retain the cover (2) as follows:
 - Loosen two out of the four bolts (3).
 - Hold the cover (2) down and loosen the last two bolts (3). This is to avoid sudden release of the spring (5).
 - Remove cover (2).
- Remove spring (5), valve (6) and filter element (7).
- Replace the filter element (7) and the O-Ring seal (4).
- Install the new filter element (7), valve (6), and spring (5) into the reservoir seat.
- Install cover (2) with a new O-Ring seal (4).
- Install the four cover (3) retaining bolts (2) and tighten to 5 daNm.



M0280



Handle and dispose of hydraulic system return oil filter according to current regulations. Use only authorised disposal procedure. If in doubt, contact authorities concerned.

AIR CONDITIONER

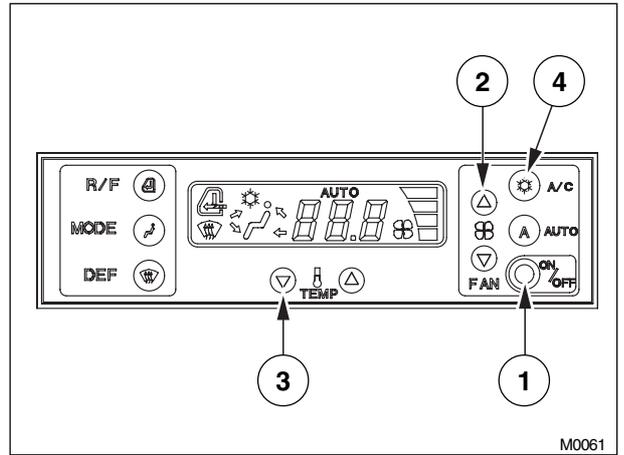
Check

Check the quantity of refrigerant in the air conditioner system operating as follows:

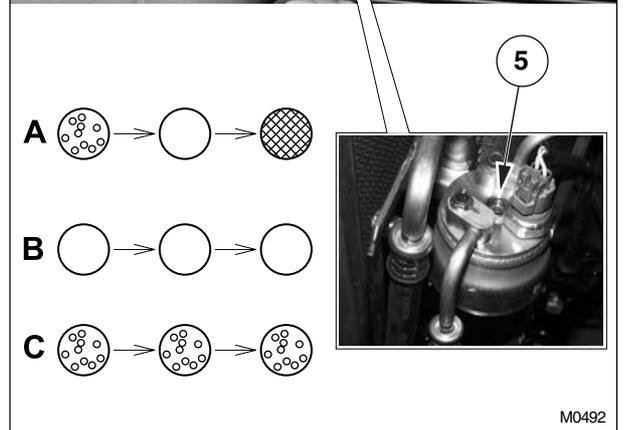
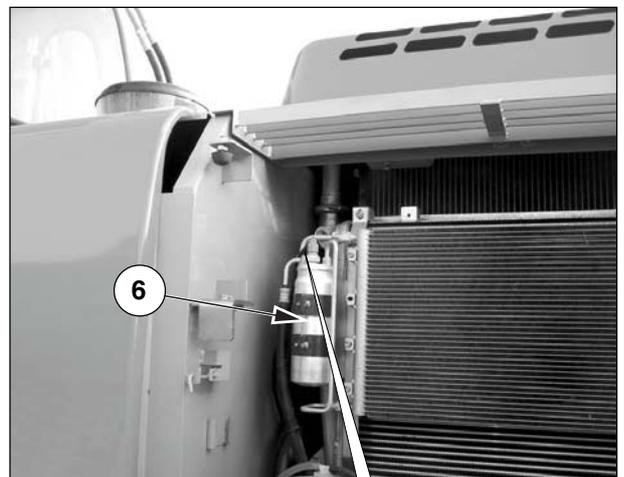
- Start the engine, position the machine on a flat surface and rest the bucket on the ground.
- Move the engine speed hand control knob to intermediate speed.
- Activate the climate system by pressing button (1).
- Adjust the air flow from the air jets to maximum by pressing button (2).
- Adjust the minimum temperature by pressing button (3).
- Start the conditioner by pressing button (4).
- Open the radiator compartment panel and check the quantity of refrigerant through visual gauge (5) located on drier (6) that provides the following visual indications:

- A) Appropriate quantity of refrigerant:** bubbles appear on the gauge . Thereafter, the indicator is transparent and then becomes foggy.
- B) The system is overloaded:** no bubbles are ever seen on the visual gauge.
- C) Insufficient quantity of refrigerant:** Bubbles appear constantly on the visual gauge.

IMPORTANT: when the system is overloaded (B) or the quantity of refrigerant is insufficient (C), please contact the Dealer.



M0061



M0492

ENGINE OIL COALESCENT FILTERS

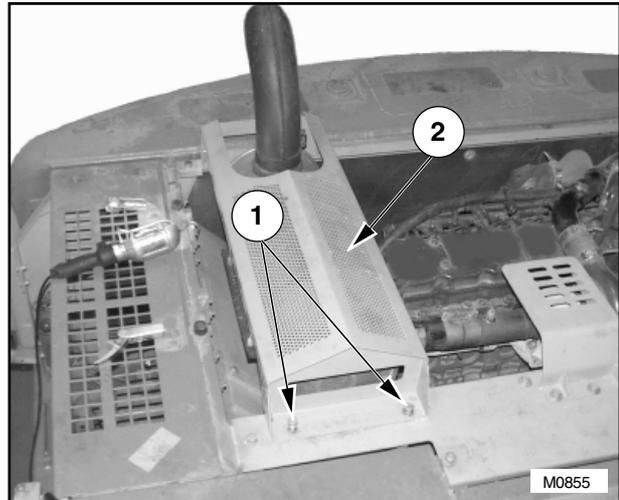
Replacement



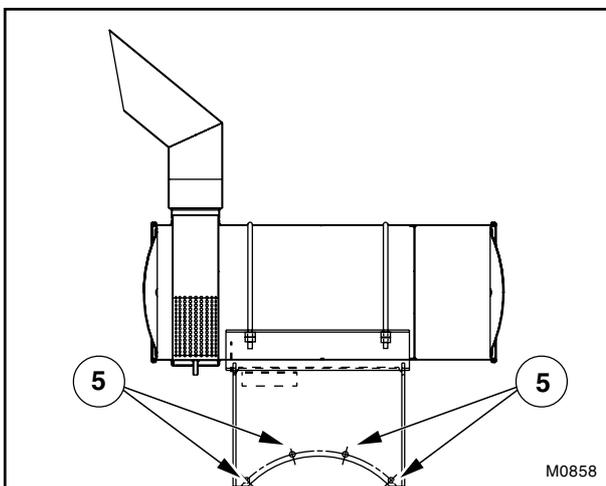
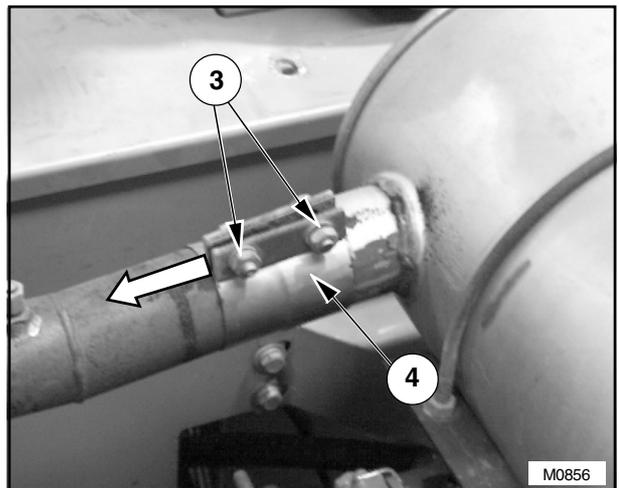
WARNING

You are reminded that the engine can reach high operational temperatures; protect the body with appropriate clothing and guards, since there is a risk of burns and personal injuries.

1. Get on the turret, unhook the two engine hood locking devices. Open the engine hood and secure it is locked in open position.
2. Loosen the four screws M12 (1) securing the muffler guard.
Wrench: 19 mm
3. Remove securing the muffler guard (2).

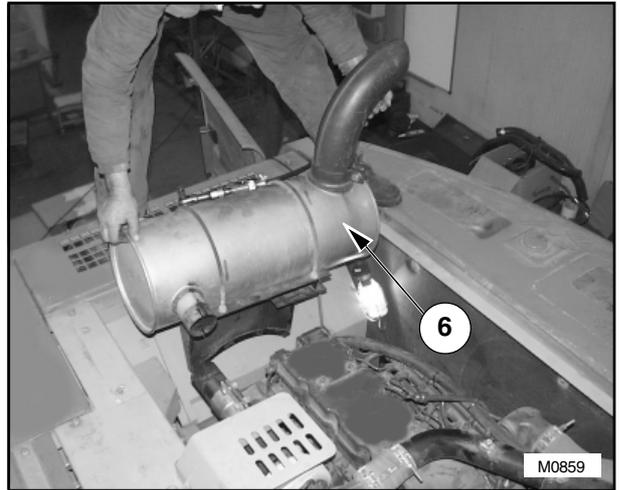


4. Loosen the two screws M10 (3) of sleeve (4).
Wrench: 17 mm
5. Move sleeve (4) toward the turbo charger so that it is possible to disconnect the muffler from the piping.
6. Loosen the four screws M10 (5) securing the muffler bracket to the engine flywheel housing
Wrench: 17 mm

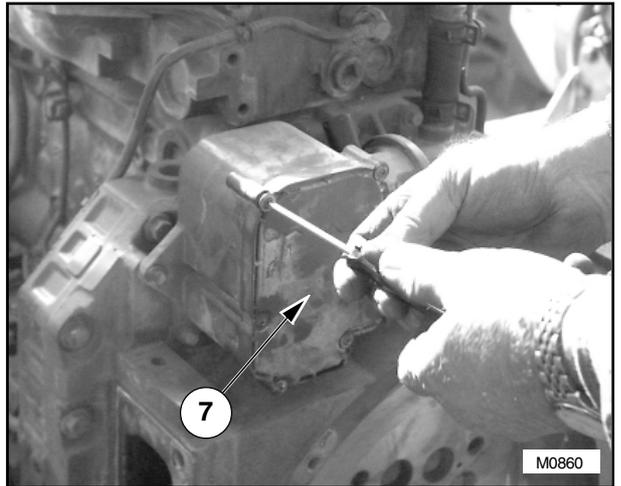


Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual

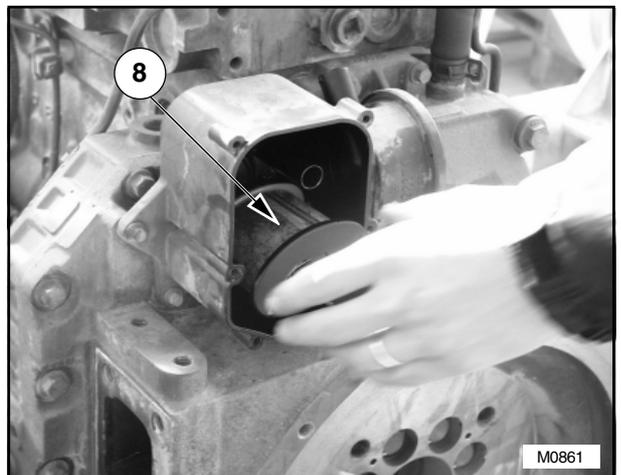
7. Remove the muffler complete with bracket (6).



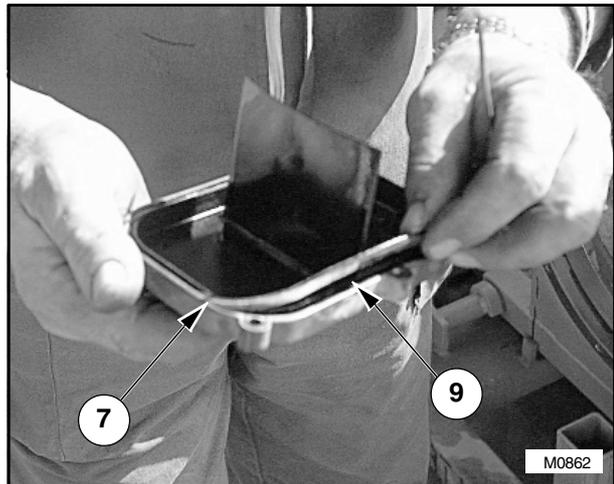
8. Remove the six screws of the coalescent filter canister cover (7). Then, remove (7)



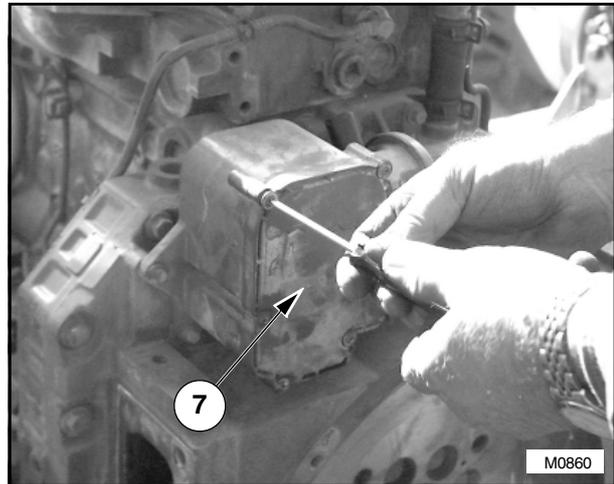
9. Extract two filters (8) and replace them with new ones.



10. Remove seal (9) from cover (7) and replace it with a new one.



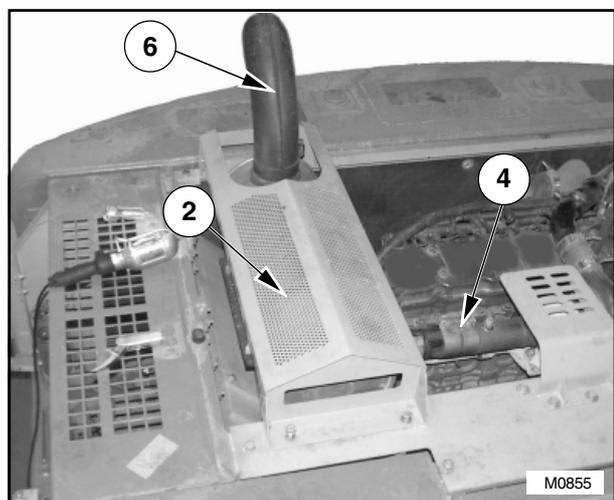
11. Reinstall cover (7) on the filter canister and tighten the screws.



12. Reinstall the muffler (6).
Muffler bracket screws M10 (q.ty 4)
Tightening torque: 6,5 daNm
Wrench: 17 mm

13. Reconnect sleeve (4).
Sleeve screws M10 (q.ty 2)
Tightening torque: 6,5 daNm
Wrench: 17 mm

14. Reinstall muffler guard (2).
Muffler guard screws M12 (q.ty 4)
Tightening torque: 11 daNm
Wrench: 19 mm



| AFTER 1000 HOURS OF OPERATION | | | | |
|--------------------------------------|----------------|------------------|--------------|--------------|
| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
| Air cleaner: outer element | | | | |
| Swing reduction unit | | | | |

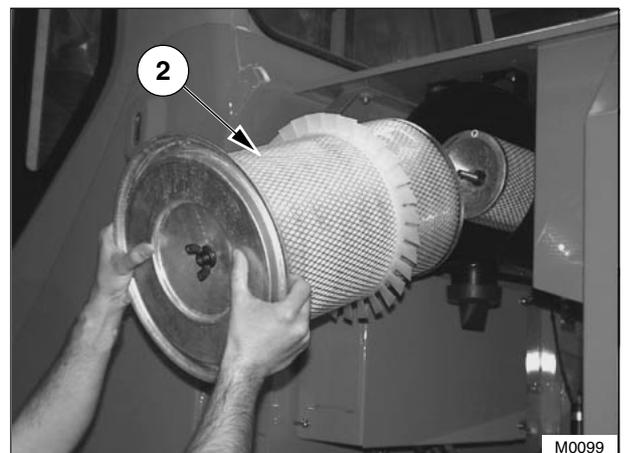
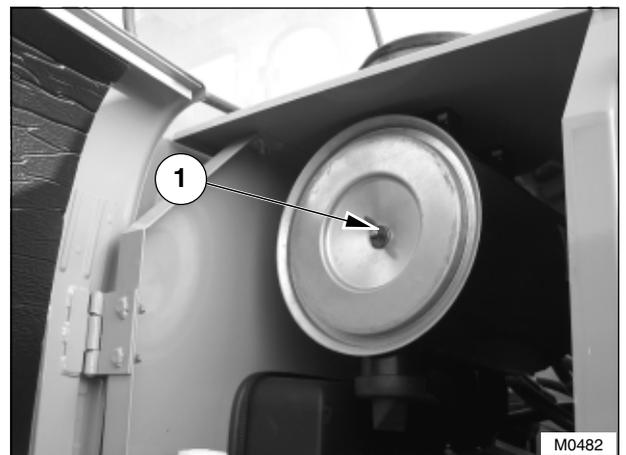
AIR CLEANER: OUTER ELEMENT

Replacement

IMPORTANT: *The normal maintenance interval prescribes the replacement of the outer element of the air cleaner any 1000 hours. Under particular ambient conditions (very dusty areas) it is recommended to reduce the replacement interval at least 50 %.*

Proceed with the replacement of the outer element of the air cleaner operating as follows:

- Position the machine on a flat surface.
- Rest the bucket on the ground.
- Cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Open the air cleaner/batteries compartment panel and lock it in open position.
- Loosen wing nut (1) and extract the cover with outer element (2).
- Check that dust ejection valve (3) is clean.
- Insert inside the filter canister the new outer element, making sure that it is correctly seated.
- Tighten wing nut (1).
- Close the air cleaner/batteries compartment panel.



SWING REDUCTION UNIT

Oil replacement



WARNING

Never service or inspect swing reduction unit circuits with the machine parked on a slope. This circuit is under high pressure due to machine weight.



CAUTION

Swing reduction units and oil therein can reach high operating temperatures. Therefore, while carrying out this operation with the machine still hot, the body must be protected with suitable clothing and protections to avoid burns and personal injuries.

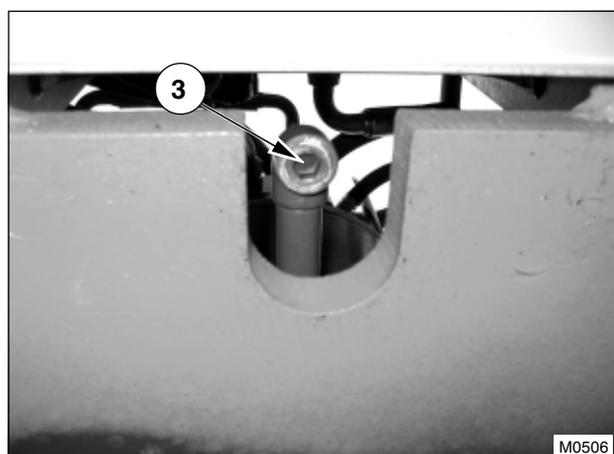
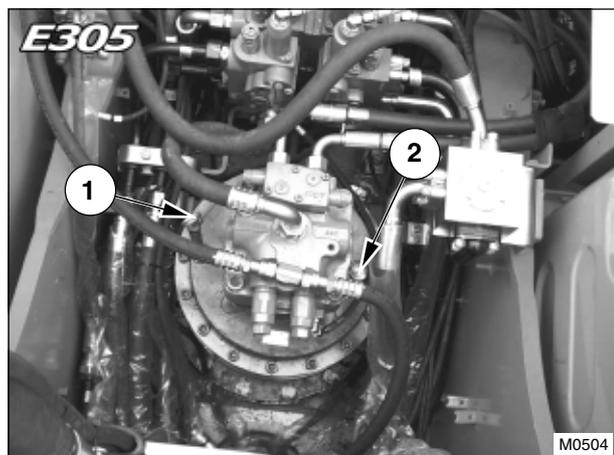
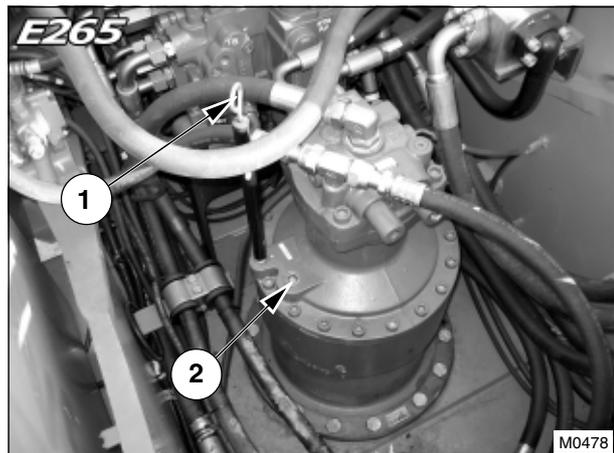
- Park the machine on a level surface.
- Rest the bucket to the ground.
- Switch off the auto-idle, fully turn the engine speed manual control anticlockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**).
- Remove the oil level dipstick (1) and filler plug (2).
- From under the machine, loosen the plug (3) installed in the drain hose end and allow oil to drain in a suitable container.
- Reinstall plug (3).

Refill using oil of type, grade and quantity specified (See the **FILLING CHART** at the end of this Chapter). Proceed as follows:

- Pour new oil through the filler neck (2) until reaching the correct level which should be between the **MIN** and **MAX** marks on the dipstick.
- Reinstall the filler plug (2).



Handle and dispose of swing reduction unit oil according to current regulations. Use only authorised disposal procedure. In case of doubt, contact authorities concerned.



| AFTER 1500 HOURS OF OPERATION | | | | |
|--------------------------------------|----------------|------------------|--------------|--------------|
| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
| Fuel pre-filter | | | | |
| Alternator - fan belt | | | | |

FUEL PRE-FILTER

Replacement

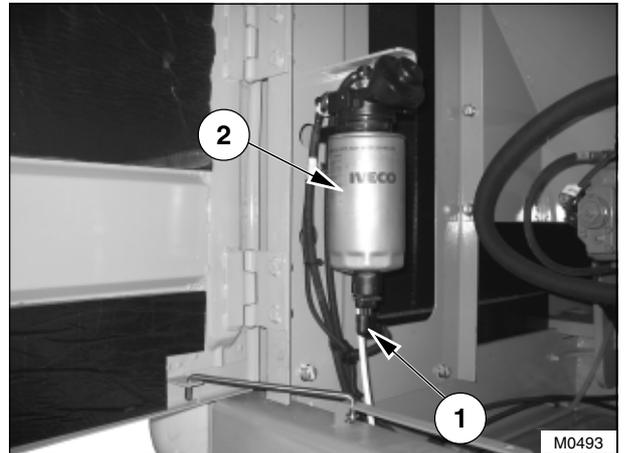


WARNING

Pay attention, during the disassembly phase, not to spill the fuel in the filter; there is a danger of fires.

Proceed with the replacement of the fuel pre-filter, operating as follows:

- Position the machine on a flat surface.
- Rest the bucket on the ground.
- Cut-off the engine, extract the starter key and place the safety lever in lock position (**LOCK**).
- Wait for the machine to cool-off.
- Open the pump compartment and lock it in open position.
- Remove clogging sensor (1) pressing the relevant locking band.
- Remove fuel pre-filter (2) using a filter wrench.
- Apply a light film of clean fuel on the new pre-filter.
- Fill the new pre-filter with clean fuel and tighten it manually until the gasket touches the sealing face.
- Using a filter wrench, tighten pre-filter (2) ¾ turn further.



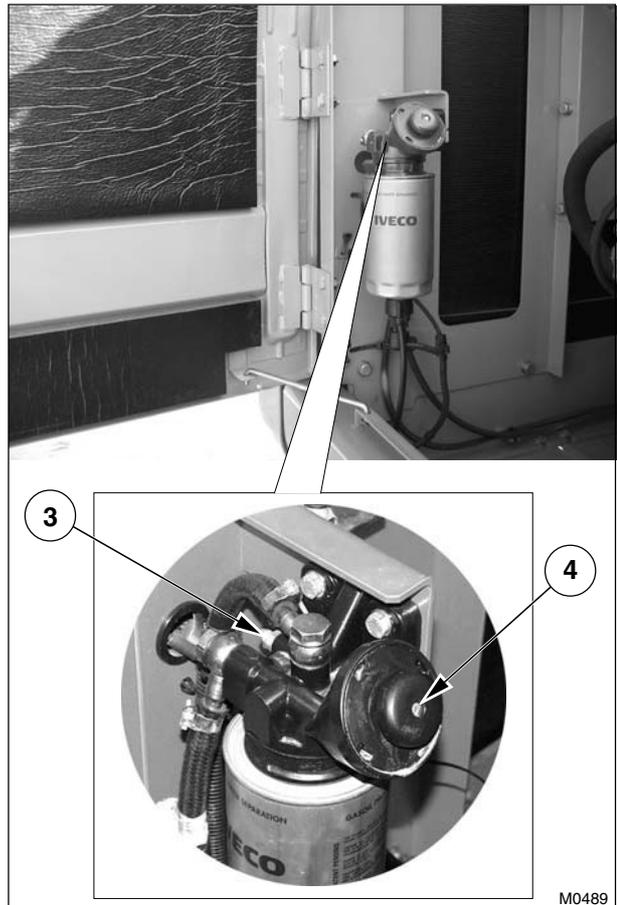
Handle and dispose of exhausted engine oil and filters, in accordance with current regulations. Use only authorised disposal procedures and, in case of doubts, contact the appropriate authorities.

Bleeding air

- Bleed air which entered the fuel system during filter replacement as follows:
 - Loosen the bleed screw (3) to allow air to bleed.
 - Press button (4) located on the priming pump to circulate fuel in the relevant circuit.
 - Continue this operation until a minimum quantity of fuel free from air bubbles flows out bleeding screw (3).
 - Tighten bleeding screw (3).
 - Keep pumping button (4) until some resistance is experienced.
 - Start the engine.
- Close engine hood and lock it using the two catches.



Handle and dispose of used fuel filters according to current regulations. Use only authorised disposal procedures. If in doubt, contact authorities concerned.



M0489

ALTERNATOR - FAN BELT

Replacement



WARNING

Always make sure that the engine hood, once open, has the locking device securely applied; there is a danger for personal injuries. Never place any part of the body near belts or rotating blades. Be particularly aware near fans (alternator and radiator fan).

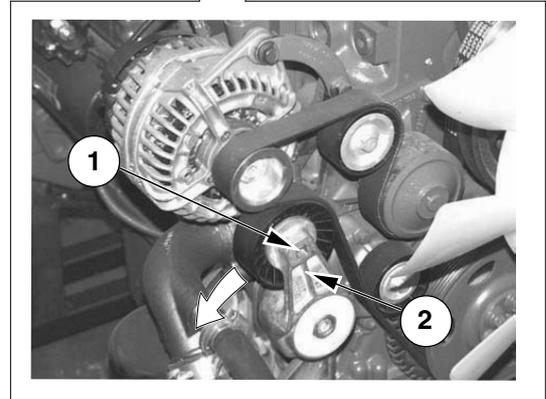


CAUTION

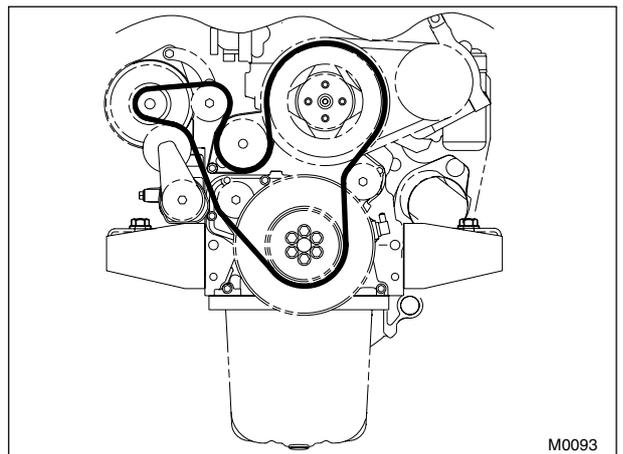
The engine, when in operation, can reach high temperatures. Thus, prior to performing these operations, cut-off the machine and let it cool-off. In the event it is imperative to operate just the same on a hot engine, protect body and limbs with appropriate clothing and protections, since there is a danger of burns and personal injuries.

Proceed with the replacement of the fan-alternator belt operating as follows:

- Position the machine on a flat surface.
- Rest the bucket on the ground.
- Cut-off the auto-idle, turn the manual throttle knob anticlockwise, cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Wait for the machine to cool-off.
- Open the engine hood compartment and lock it in open position.
- Insert a square wrench into seat (1) and pull in the direction indicated by the arrow to move tensioner (2) and free the belt.
- Proceed with the installation of the new belt, making sure that it is arranged as indicated in the figure.



M0092



M0093

AFTER 2000 HOURS OF OPERATION

| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
|-----------------------------------|---------|-----------|-------|-------|
| Travel side reduction units | | | | |
| Engine cooling system | | | | |
| Pilot system hydraulic oil filter | | | | |
| Air cleaner: inner element | | | | |

TRAVEL SIDE REDUCTION UNITS

Oil replacement



WARNING

You are reminded that the travel reduction units and their oil can reach, during operation, high temperatures, thus it is indispensable to protect body and limbs with appropriate clothing, glasses and protections, since there is a danger of burns and personal injuries.

Loosen slowly the threaded plugs for the inspection of the oil level in the reduction units. This is to allow a slow bleeding of the pressure created inside the final drives.

When changing the oil, stand in a out-of-line position with respect to the side of the reduction units and always wear protective glasses.

The operation for the alignment of the reduction units filling and level check plugs, described here below, must be made with an assistant on the ground. However, this assistant must always stand away from the field of action of the machine.

Never perform maintenance or inspection operations on the circuits of the travel motors on gradients. They are strongly pressurised due to the effect of the weight of the machine.

- Park the machine on a level surface. The reduction units should be positioned as to have the plugs (1), (2), as shown. Observance of this position is essential to proper servicing.
- After positioning the reduction unit for either discharge or filling, set the machine controls as follows:
 - Rest the bucket to the ground.
 - Switch off the auto-idle, fully turn the engine speed manual control anti-clockwise, stop the engine, remove the ignition key and move the safety lever in the locked position (**LOCK**). The machine should be positioned as shown.

Oil discharge

- Position the reduction unit as shown and slowly release the threaded plug (1) gradually relieving pressure from inside the reduction unit. After relieving pressure, fully remove the plug (1) from its seat. Loosen plug (2) and take it out of its seat. Allow oil to drain in a suitable container

Oil refilling

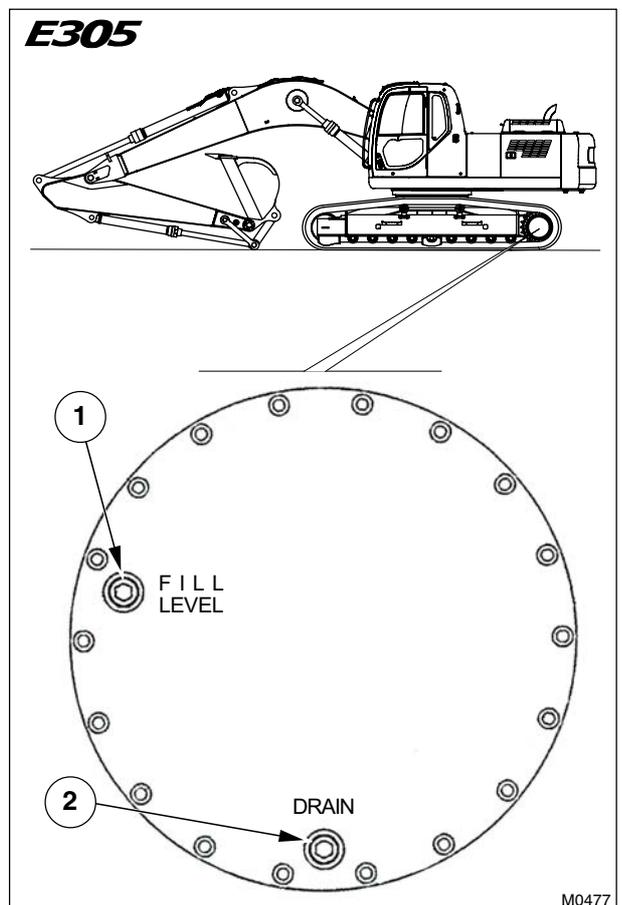
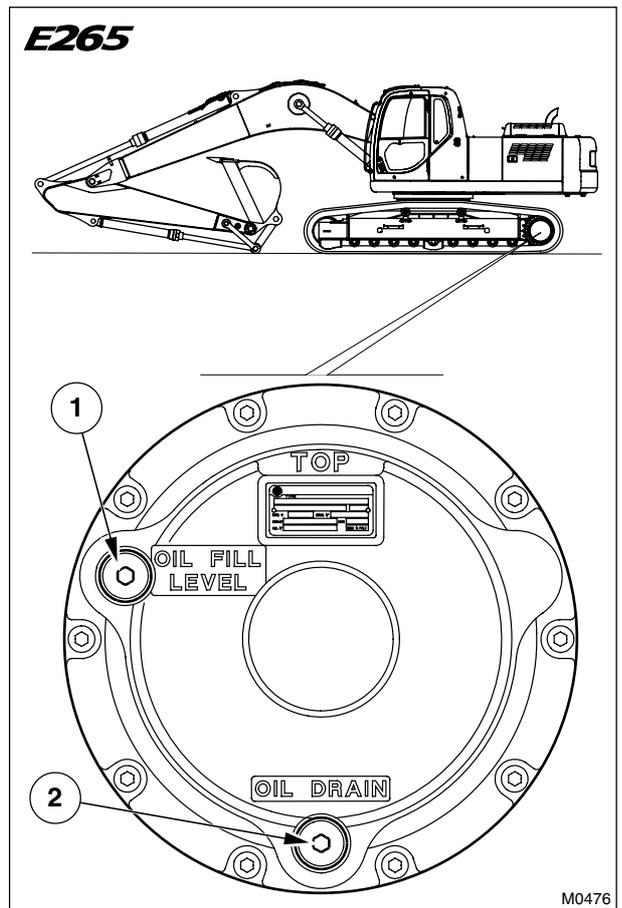
- Tighten plug (2) and refill through the hole of plug (1) with the prescribed oil (See the **FILLING CHART** at the end of this Chapter) until it flows out the plug itself. Oil flowing out indicates that the correct level is reached.

- Reinstall plug (1) .

The above operation should be carried out on both travel side reduction units



Handle and dispose of travel side reduction unit oil according to current regulations. Use only authorised disposal procedure. If in doubt, contact authorities concerned.



ENGINE COOLING SYSTEM

Engine coolant replacement and system flushing.



DANGER

Do not run the engine in closed spaces without proper ventilation and/or an adequate system capable to remove noxious exhaust gases.



WARNING

Always ensure that engine hood is correctly locked in the open position. Danger of personal injuries.



CAUTION

Pressure fluid. Turn the cap slowly before removing it completely to relieve pressure. Do not loosen the radiator cap when the engine is hot to avoid burn hazard.

Do not perform this operation when the machine is still hot. Contact with engine coolant at working temperature may cause burns and personal injuries.

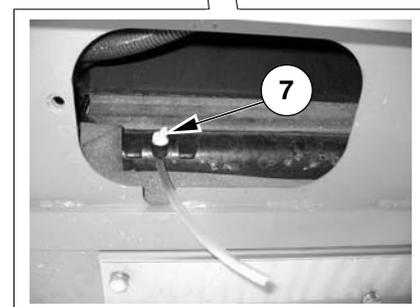
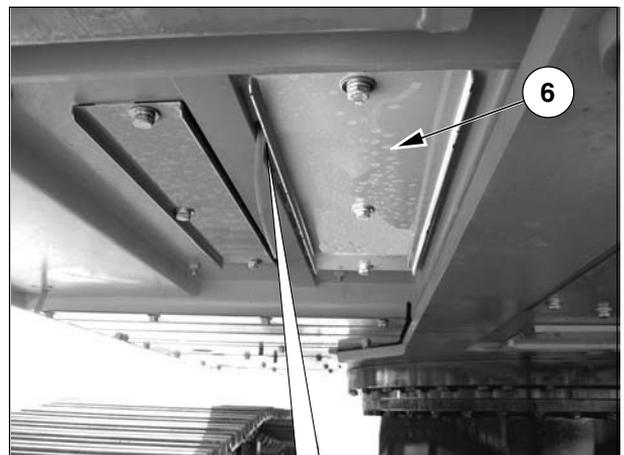
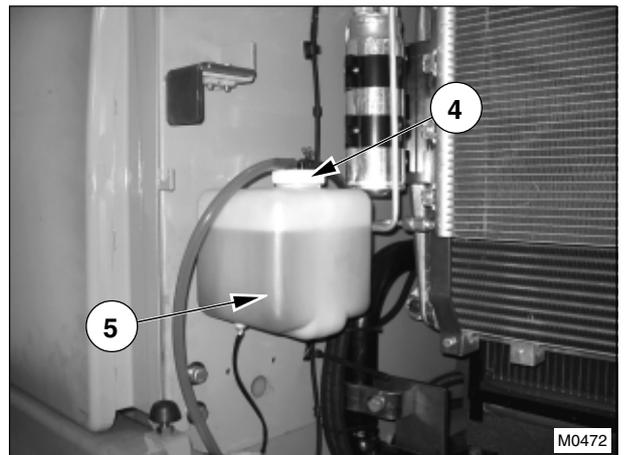
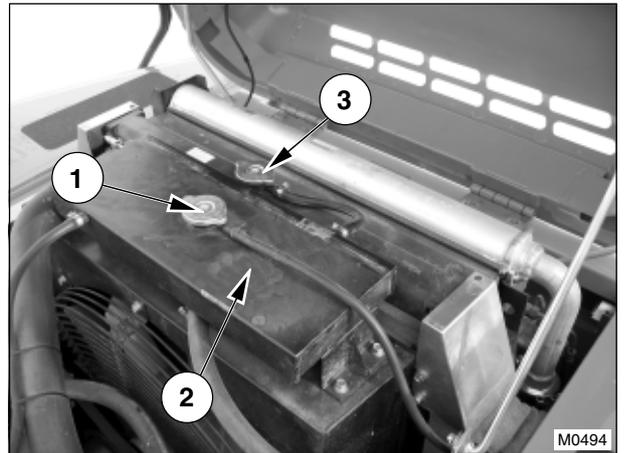
IMPORTANT: *never use sealant additives to stop leaks from the cooling system. Failure to observe this rule might cause system obstruction with consequent insufficient flow of coolant, temperature increase and engine overheating.*

- Park the machine on a flat surface.
- Rest the bucket on the ground.
- Exclude the auto-idle, turn completely the engine speed manual control knob anticlockwise, cut-off the engine, extract the starter key and place the safety lever in **LOCK** position.
- Wait for the machine to cool-off.
- Open the engine hood and the air cleaner, batteries and radiator compartment door, locking them in open position as described by paragraph "**HOOD AND ACCESS COVERS**".

Draining of coolant

Drain the coolant operating as follows:

- With engine cold, remove cap (1) of expansion tank (2), radiator cap (3) and cap (4) of level tank (5).
- Get under the turret, loosen the securing screws of guard (6) and remove it from its seat.
- Open draining valve (7) and let the coolant drain into a container of appropriate capacity. Once the operation is over, retighten the valve.
- Inspect carefully the sleeves checking that they are trouble free and tight (replace them if required) and tighten the securing band if slacken. Check there are no leakages from the radiator, damages or accumulation of dirt.



Flushing the cooling system

Proceed with the flushing of the cooling system operating as follows:

- Fill the system through expansion tank (2) with water and an appropriate detergent product until the radiator is completely filled.
- Install radiator cap (3) and complete the filling of expansion tank (2).
- Install cap (1) of expansion tank (2) and cap (4) of level tank (5).
- Start the engine at let it run at a speed slightly over idle, until the temperature gauge, located on the monitoring panel, reaches the white zone. Then, let the engine operate for about 10 minutes.
- Cut-off the engine and let it cool-off.
- Drain the water and detergent following the procedure described here above.
- Then refill the cooling system with fresh water only and flush the system again. Repeat this operation until the water drained is clean.

Filling the cooling system

Proceed with the filling of the cooling system operating as follows:

- Make sure that draining valve (7) is closed.
- Refill the system through expansion tank (2) with coolant (See the **FILLING CHART** at the end of this Chapter) until the radiator is fully filled.

NOTE: When the coolant is topped-up, proceed slowly to prevent the formation of air bubbles in the system.

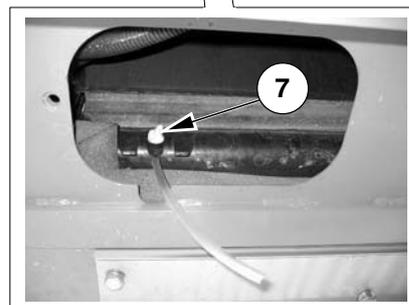
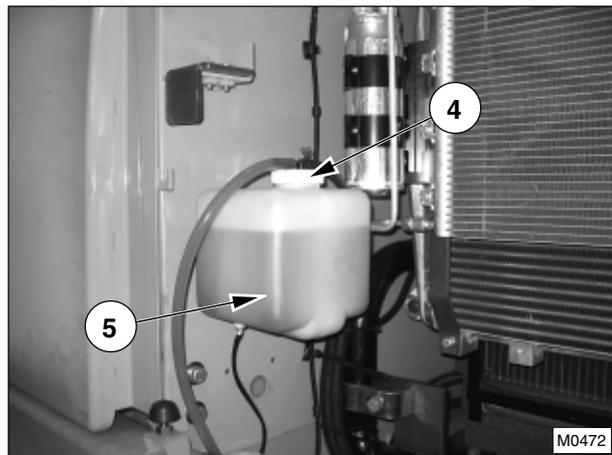
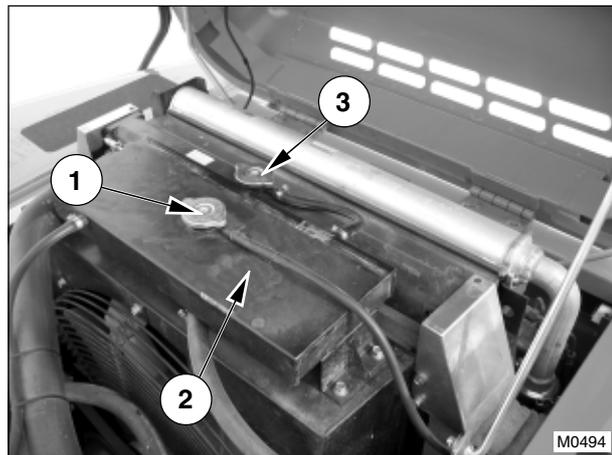
- Install radiator cap (3) and complete the filling of expansion tank (2) Then install cap (1).

NOTE: Pay attention to prevent exchanging cap (1) of the expansion tank with radiator cap (3). The pressurised cap marked 0.9 bar on its top must be installed on expansion tank (2).

- Close the engine hood. get under the turret and reinstall guard (6) securing it with the relevant screws.
- Start the engine and let it operate several minutes.
- Cut-off the engine, let it cool-off and check the coolant level in level tank (5). The coolant level must be between the marks **FULL** and **MIN**. In the event the coolant is insufficient, remove cap (4) and top-up.
- Close the radiator compartment panel.



Handle and dispose of coolant in accordance with current regulations. Use only approved procedures for the disposal and, in case of doubts, consult with the appropriate Authorities.



M0495

PILOT SYSTEM HYDRAULIC OIL FILTER

Cleaning



CAUTION

Never perform this operation while the machine is still very hot. Hydraulic oil at operating temperature can cause burns and personal injuries, in the event is contacts the skin.

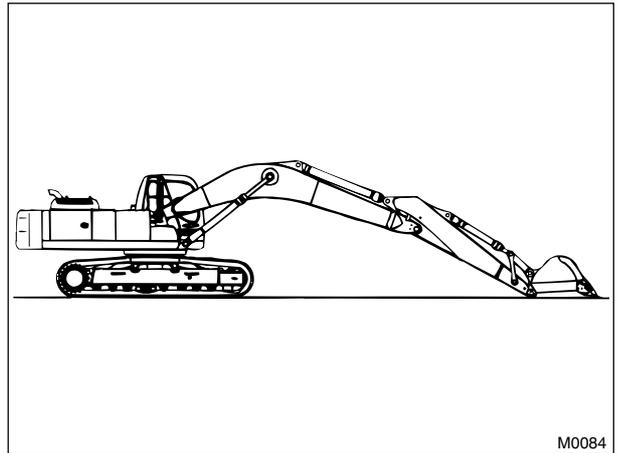
- Position the machine on a flat surface.
- Rest the front attachment as in the figure.
- Cut-off the auto-idle, turn the manual throttle knob anticlockwise, cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Wait for the machine to cool-off.



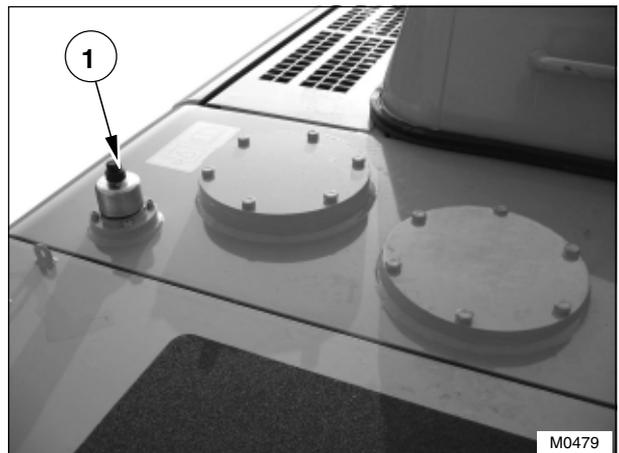
CAUTION

The hydraulic oil is pressurised. Press button (1) located on the tank to bleed the pressure.

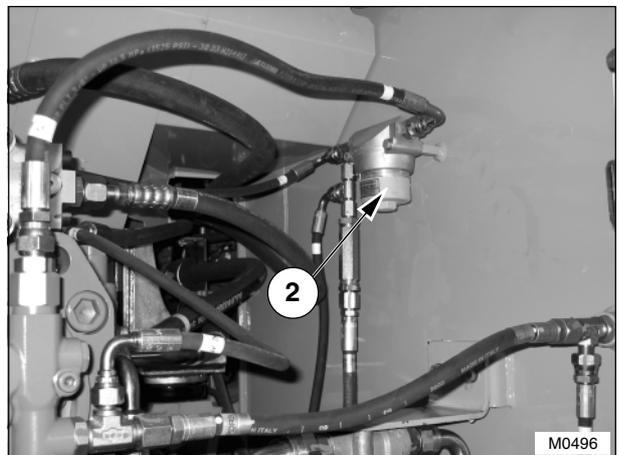
- Open the hydraulic pump compartment and secure it in open position using the locking device.
- Remove filter canister (2) using a 24 mm wrench.
- Remove filter element (3) and clean it.
- Remove sealing ring (4) located on filter canister (2) from its seat.
- Clean filter canister (2).
- Apply a thin film of hydraulic oil on the new sealing ring and install it in its seat located on filter canister (2). Make sure that the sealing ring is correctly seated.
- Install filter element (3).
- Install canister (2) using a 24 mm wrench. Tightening torque: 30 Nm
- Close the hydraulic pump compartment panel.



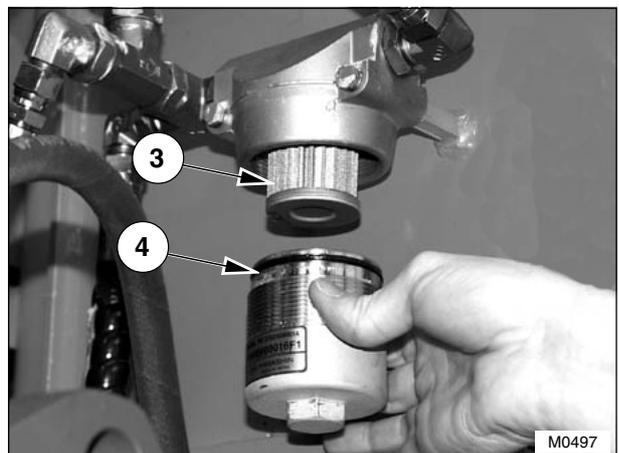
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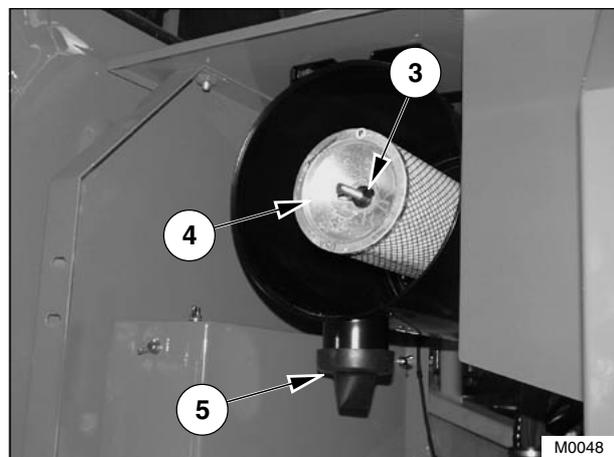
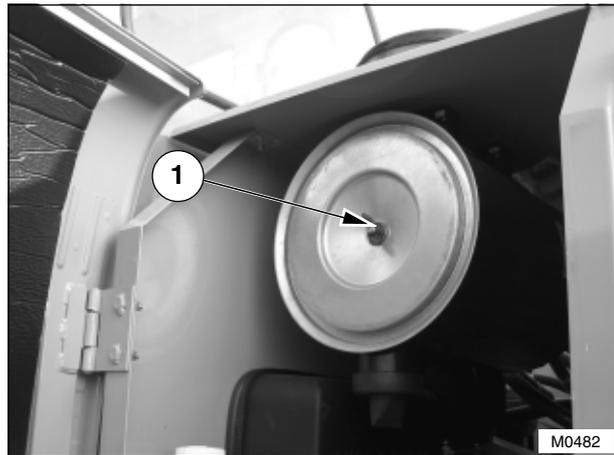
AIR CLEANER: INNER ELEMENT

Replacement

IMPORTANT: *the normal maintenance interval prescribes the replacement of the inner element of the air cleaner every 2000 hours. Under particular ambient conditions, (very dusty areas) it is recommended to reduce the replacement interval 50 %.*

Proceed with the replacement of the inner element of the cleaner operating as follows:

- Position the machine on a flat surface.
- Rest the bucket on the ground.
- Cut-off the auto-idle, turn the manual throttle knob anticlockwise, cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Open the air cleaner/batteries compartment and lock it in open position.
- Loosen wing nut (1) and extract outer element.
- Loosen wing nut (3) and extract inner element (4).
- Clean the inside of the filter canister and check that dust ejection valve (5) is clean.
- Insert the new inner element and secure it with the relevant wing nut (3).
- Insert the outer element and secure it with the relevant wing nut (1).
- Close the air cleaner/batteries compartment panel.



AFTER 2500 HOURS OF OPERATION

| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
|------------------------------------|---------|-----------|-------|-------|
| Hydraulic system oil (*) | | | | |
| Hydraulic oil tank breather filter | | | | |

(*) **IMPORTANT:** If the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46** (option), take note that this oil cannot be mixed with mineral hydraulic oil.

HYDRAULIC SYSTEM OIL

Change



DANGER

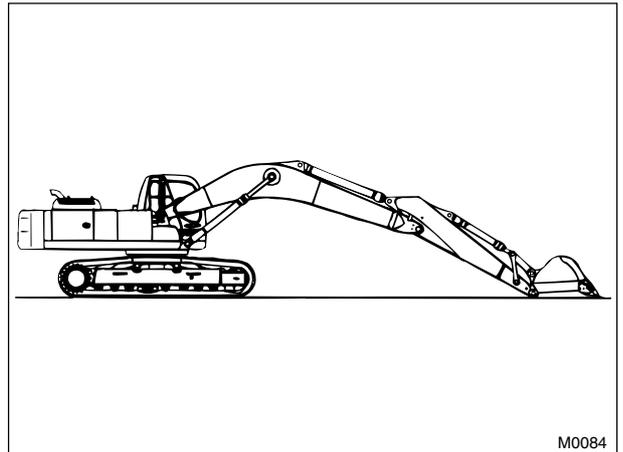
Never operate the engine of this machine in enclosed areas and without systems for the evacuation of fumes, since exhaust fumes are toxic.



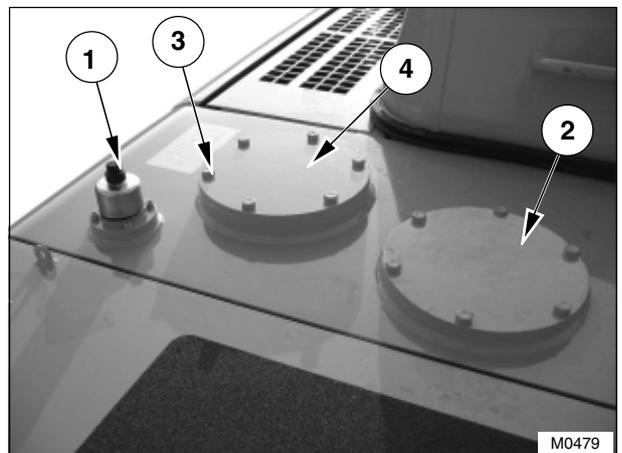
WARNING

The components and pipes of the hydraulic system can reach high temperatures. Thus it is recommended to cut-off the machine and let it cool-off prior to performing any inspection or maintenance operation. danger of burns. The hydraulic oil tank is pressurised. Press the button on the tank to bleed the pressure prior to performing maintenance operations. danger of personal injuries.

- Position the machine on a flat surface with the turret swung 90 ° to facilitate the access.
- Position the front attachment as indicated in the figure.
- Cut-off the auto-idle, turn the manual throttle knob anticlockwise, cut-off the engine, extract the starter key and move the safety lever into **(LOCK)** position.
- Wait for the machine to cool-off.
- Clean the upper side of the hydraulic oil tank to prevent dirt to contaminate the hydraulic system.
- Press release button **(1)** located on the tank to bleed the inside pressure.
- Loosen the six securing screws **(3)** using a 17 mm wrench and remove cover **(4)**.

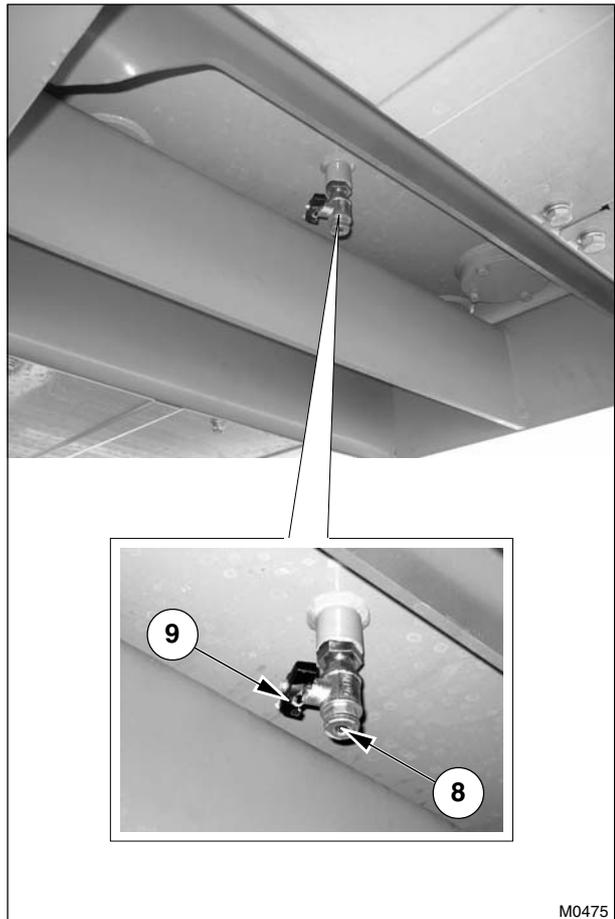
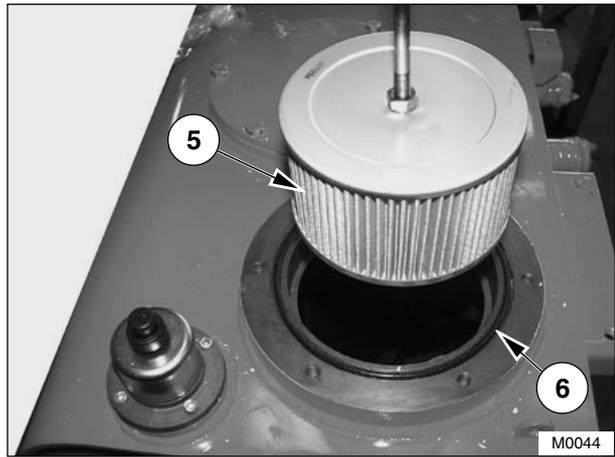


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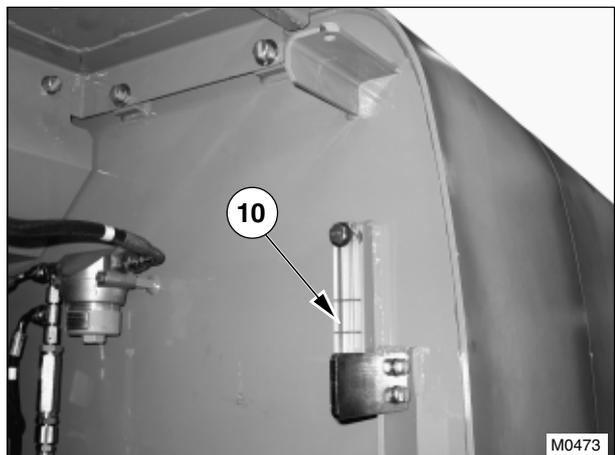


M0479

- Remove suction filter assembly (5) and O-Ring (6).
- Remove the hydraulic system return oil filter inside cover (2) as described in the **500 HOUR WORK MAINTENANCE** paragraph "**HYDRAULIC SYSTEM RETURN OIL FILTER**".
- Suck the oil from the tank using an appropriate pump.
- Get under the turret, remove draining plug (8) and open valve (9) to let residual oil to drain into an appropriate container.
- Close valve (9), clean and reinstall draining plug (8) making sure that the O-Ring is replaced.
- Replace the hydraulic system return oil filter as described in **500 HOUR WORK MAINTENANCE** paragraph "**HYDRAULIC SYSTEM RETURN OIL FILTER**".
- Clean suction filter (5). In the event the filter must be replaced, install a new filter on the rod.
- Install a new O-Ring (6) and suction filter assembly (5).
- Pour through the suction filter oil of a prescribed type, grade and quantity (See the **FILLING CHART** at the end of this Chapter) until the level is included between the marks MIN and MAX on level sight gauge (10) located inside the hydraulic pumps compartment.
- Install cover (4) ensuring that the suction filter assembly is correctly seated.



 **Handle and dispose of hydraulic oil and filters according to current regulations. Use only authorised disposal procedure. If in doubt, contact authorities concerned.**



BIODEGRADABLE HYDRAULIC OIL

Specifications

- Recommended oil **PANOLIN AG. - HLP SYNTH 46.**

Operating range

- Ambient temperature: -20 °C a 40 °C.
- Oil temperature in the reservoir -20 °C to 95 °C.

Instructions for use

IMPORTANT: *Biodegradable hydraulic oil must not be mixed with mineral hydraulic oil.*

| Oil change | Oil sampling for analysis |
|-------------------|---------------------------|
| Every 2 500 hours | Every 500 hours |

- Oil samples to be analysed should be taken every 500 hours of operation using the sampling kit and related instructions supplied by the Dealer.
- The samples should be sent by the Customer to **PANOLIN AG.**, that will carry out necessary analyses. The Dealer will then inform the Customer when oil characteristics are no longer suitable for use.

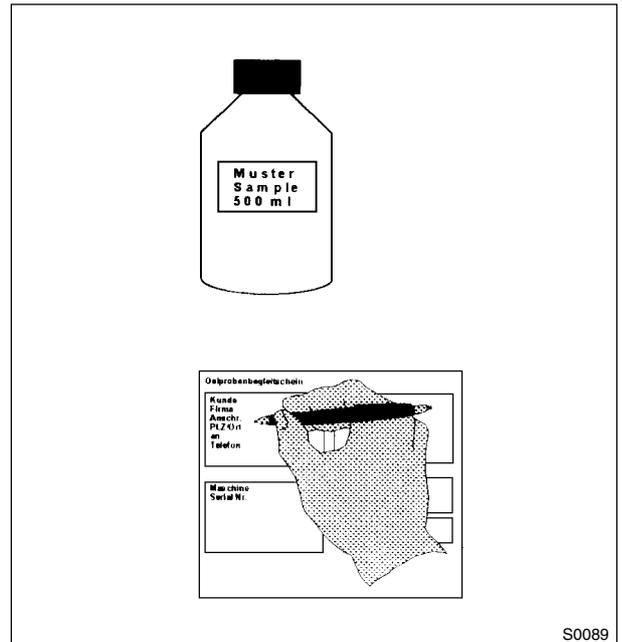
IMPORTANT: *If special equipments (hydraulic breaker, etc.) are used, oil sampling for analysis should be done every 250 hours.*

IMPORTANT: *Oil should be changed if the Dealer informs the Customer that oil is outside operating limits. Failure to observe this measure will invalidate the warranty and may cause damages to the machine.*

- To change the bio-degradable hydraulic oil, please proceed as indicated in the preceding pages.

Replacing mineral hydraulic oil with biodegradable hydraulic oil.

IMPORTANT: *if the machine was bought filled with mineral hydraulic oil and you want to change to biodegradable hydraulic oil (option), this operation must be carried out by the Dealers personnel. In fact, it is necessary to thoroughly drain mineral oil and flush the entire hydraulic system. Remember that mineral hydraulic oil must not be mixed with biodegradable hydraulic oil.*

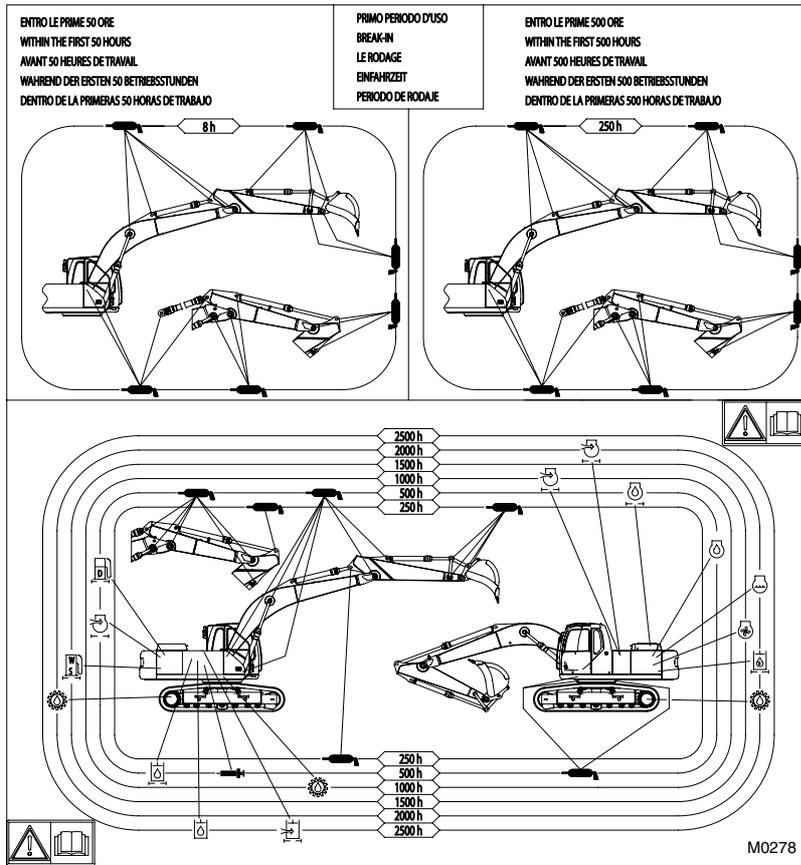


S0089

SERVICE REMINDER PLATE

A summary decal (1) indicating the main lubrication, cleaning and replacement operations to be performed periodically, is located inside the tool compartment.

This decal differs from the one normally applied to the machine. since it lists the maintenance sequences related to biodegradable hydraulic oil.



-  Lubricate
-  Replace reduction units oil
-  Replace hydraulic oil
-  Replace hydraulic system return oil filter
-  Replace fuel filters
-  Replace fuel pre-filter
-  Replace engine oil filter
-  Replace engine coolant
-  Replace alternator/fan belt
-  Replace engine oil
-  Replace air cleaner
-  Replace hydraulic oil tank breather filter
-  Oil sampling for analysis

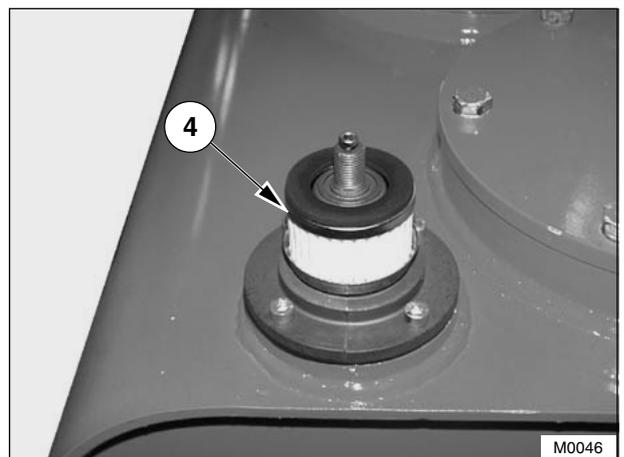
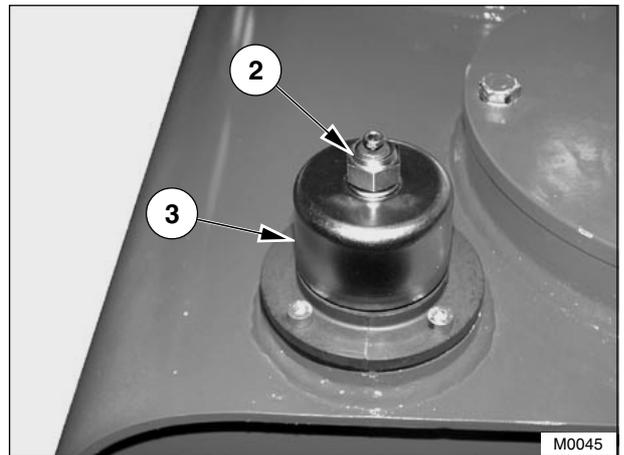
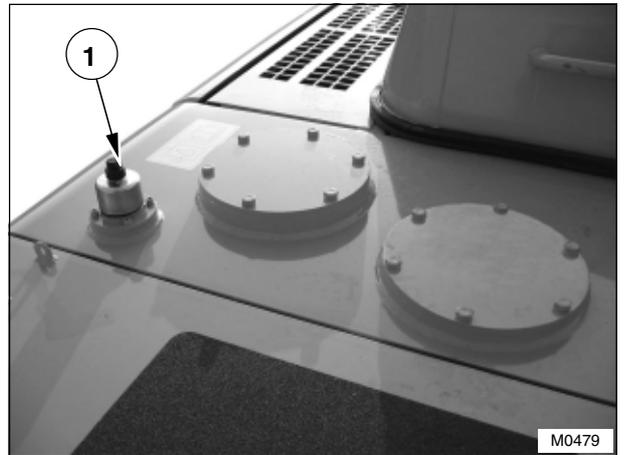
HYDRAULIC OIL TANK BREATHER FILTER

Replacement

Proceed with the replacement of the filter located inside the breather cap operating as follows:

- Press release button (1) to bleed the pressure.
- Remove the rubber plug.
- Loosen nut (2).
- Loosen filter cover (3).
- Remove filter (4) and replace it.

To reinstall it, reverse the disassembly operation.



AFTER 3000 HOURS OF OPERATION

| ITEM TO BE CHECKED | Replace | Lubricate | Clean | Check |
|--------------------|---------|-----------|-------|-------|
| Engine valves | | | | |

ENGINE VALVES

Valve check and adjustment



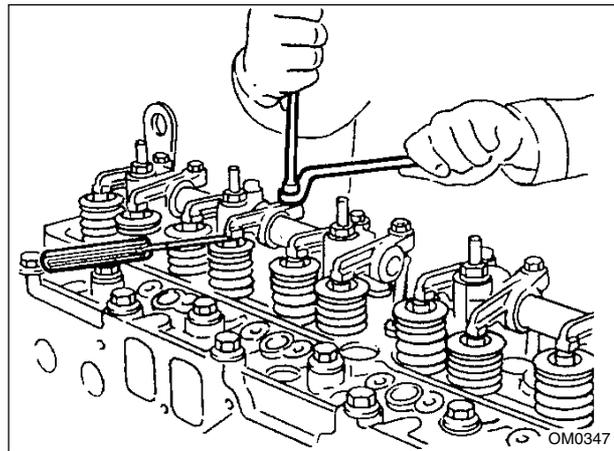
WARNING

Always ensure that engine hood is correctly locked in the open position. Danger of personal injuries.



CAUTION

The engine reaches high working temperatures. Therefore, it is necessary to let the machine cool down prior to carrying out this operation.



IMPORTANT: *contact your authorised Dealer to perform this service.*

- Valve clearance is as follows:
 - Intake:0.152 ± 0.381 mm
 - Discharge:0.381 ± 0.762 mm

FILLING CHART E265

| COMPONENT TO BE FILLED | QUANTITY | RECOMMENDED FLUIDS AND LUBRICANTS | | | |
|-------------------------------|----------|-----------------------------------|-------------------------------|---------------------------------|--|
| | Litres | AMBRA™ | MANUFACTURER'S SPECIFICATIONS | INTERNATIONAL SPECIFICATIONS | NOTES |
| Engine cooling system | 23 | AGRIFLU | NH 900 A | – | Protective fluid to be mixed with water at 50%. This mix has anticorrosive, anti-scaling, and anti-foaming properties; does not freeze down to -35 °C. |
| Fuel tank | 447 | – | – | Diesel fuel ASTM N. 2-D type TT | – |
| Engine | 17 | Mastergold HSP | QFK 586 EN | API CH-4 ACEA E5 | Multigrade oil for aspirated or turbocharged diesel engine of every types and powers. |
| Swing reduction unit | 15.3 | HYPOIDE 90 | NH 520 A | API GL 5 MIL-L-2105 D | Gear oil with Extreme Pressure (E.P.) performance |
| Travel reduction units (each) | 3.5 | | | | |
| Hydraulic system (**) | 180 | HI-TECH 46 | QFK 583/HD | – | High viscosity lubricant for excavators and earthmoving machine hydraulic controls. |
| Pressure grease fittings | – | GR EXP | QFK 587/GR | – | Lithium-based grease containing molybdenum disulphide, resists to water, low temperature and high loads; NLGI 2 consistency. |
| Swing gear (*) | 14 | MG2 | QFK 585/GR | – | |
| Windscreen washer | 1.5 | TUTELA PROFESSIONAL SC35 | – | – | Detergent diluted in water from 10% to 50%. The mix has anti-freezing properties until -22 °C. |

Oil quantities shown are necessary for periodical changes following discharging and filling procedures detailed for each assembly.

(*) First filling only.

(**) **IMPORTANT:** if the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46** (option), take note that this oil cannot be mixed with mineral hydraulic oil.

| TYPE OF LUBRICANTS | | | OPERATING RANGE (AMBIENT TEMPERATURE °C) | | | | | | | | |
|----------------------------------|-----------------------|------------------------------|--|-----|-----|---|----|----|----|----|----|
| FILL | AMBRA™ | VISCOSITY | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 |
| Engine | Mastergold HSP | SAE 15W - 40 SAE 10W - 30 | | | | | | | | | |
| Swing and travel reduction units | HYPOIDE 90 | SAE 80W - 90 | | | | | | | | | |
| Hydraulic system | HI-TECH 46 | ISO VG 46 | | | | | | | | | |

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual

FILLING CHART E305

| COMPONENT TO BE FILLED | QUANTITY | RECOMMENDED FLUIDS AND LUBRICANTS | | | |
|-------------------------------|----------|-----------------------------------|-------------------------------|---------------------------------|--|
| | Litres | AMBRA™ | MANUFACTURER'S SPECIFICATIONS | INTERNATIONAL SPECIFICATIONS | NOTES |
| Engine cooling system | 23 | AGRIFLU | NH 900 A | – | Protective fluid to be mixed with water at 50%. This mix has anticorrosive, anti-scaling, and anti-foaming properties; does not freeze down to -35 °C. |
| Fuel tank | 447 | – | – | Diesel fuel ASTM N. 2-D type TT | – |
| Engine | 17 | Mastergold HSP | QFK 586 EN | API CH-4 ACEA E5 | Multigrade oil for aspirated or turbocharged diesel engine of every types and powers. |
| Swing reduction unit | 10.5 | HYPOIDE 90 | NH 520 A | API GL 5 MIL-L-2105 D | Gear oil with Extreme Pressure (E.P.) performance |
| Travel reduction units (each) | 7.5 | | | | |
| Hydraulic system (**) | 180 | HI-TECH 46 | QFK 583/HD | – | High viscosity lubricant for excavators and earthmoving machine hydraulic controls. |
| Pressure grease fittings | – | GR EXP | QFK 587/GR | – | Lithium-based grease containing molybdenum disulphide, resists to water, low temperature and high loads; NLGI 2 consistency. |
| Swing gear (*) | 14 | MG2 | QFK 585/GR | – | |
| Windscreen washer | 1.5 | TUTELA PROFESSIONAL SC35 | – | – | Detergent diluted in water from 10% to 50%. The mix has anti-freezing properties until -22 °C. |

Oil quantities shown are necessary for periodical changes following discharging and filling procedures detailed for each assembly.
 (*) First filling only.

(**) **IMPORTANT:** if the machine was filled with biodegradable hydraulic oil **PANOLIN AG.-HLP SYNTH 46** (option), take note that this oil cannot be mixed with mineral hydraulic oil.

| TYPE OF LUBRICANTS | | | OPERATING RANGE (AMBIENT TEMPERATURE °C) | | | | | | | | |
|----------------------------------|-----------------------|------------------------------|--|-----|-----|---|----|----|----|----|----|
| FILL | AMBRA™ | VISCOSITY | -30 | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 |
| Engine | Mastergold HSP | SAE 15W - 40 SAE 10W - 30 | | | | | | | | | |
| Swing and travel reduction units | HYPOIDE 90 | SAE 80W - 90 | | | | | | | | | |
| Hydraulic system | HI-TECH 46 | ISO VG 46 | | | | | | | | | |

Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual

5 - TROUBLESHOOTING



ENGINE

| Problem | Possible causes | Remedy |
|---|--|---|
| 1. The engine turns, but it fails or is difficult to start | Lack of fuel | Add fuel. Bleed air |
| | Wrong type of fuel | Drain fuel tank and refill with fuel of correct type |
| | Contaminated fuel | Drain fuel tank and refill with fuel of correct type |
| | Low battery power | Charge or install new batteries |
| | Fuel injection pump | Contact the Dealer |
| | Cold-starter inefficient | Contact the Dealer |
| | Defective wiring connections | Clean and tighten battery and starter motor terminals |
| | Faulty starter motor | Contact the Dealer |
| | Wrong type of engine oil | Drain oil and replace with oil of correct type |
| | Air filter restricted | Replace filter elements |
| | Fuel filters restricted | Replace filters and check fuel tank for impurities |
| | Poor engine compression | Contact the Dealer |
| | Dirty injectors or poor injector operation | Contact the Dealer |
| | Fuel system leakage | Check fuel system hoses and fittings |
| | Air in the fuel system | Bleed air |
| 2. Engine stops | Lack of fuel | Refuel. Bleed the air |
| | Low idle speed irregular | Contact the Dealer |
| | Low engine oil pressure | Contact the Dealer |
| | Air intake clogged | Clean air cleaner and system |
| | Injection pump out of timing | Contact the Dealer |
| | Fuel filters clogged | Install new filters |
| | Water, dirt or air in the fuel system | Bleed air from fuel system: Drain water from reservoir and sedimentation filter |
| | Dirty or faulty injectors | Contact the Dealer |

ENGINE

| Problem | Possible causes | Remedy |
|--|---|--|
| 3. The engine does not develop full power | Air filter restricted | Replace filter elements |
| | Fuel lines kinked | Repair or replace fuel lines |
| | Contaminated fuel | Drain fuel tank. Refill with clean fuel |
| | Clogged fuel filters | Install new filters |
| | Dirty or faulty injectors | Contact the Dealer |
| | Engine to fuel injection pump timing | Contact the Dealer |
| | Wrong type of fuel | Use correct type of fuel |
| | Wrong type of engine oil | Use correct type of oil |
| | Faulty turbocharger | Contact the Dealer |
| | Valve clearance | Contact the Dealer |
| | Air intake or exhaust system leakage | Contact the Dealer |
| 4. The engine overheats | Low coolant level | Top-up coolant |
| | Thermostat | Contact the Dealer |
| | Inside of engine radiator or oil radiator clogged | Clean cooling radiator and hydraulics radiator |
| | Radiators grill clogged | Clean grill |
| | Injection pump out of phase | Contact the Dealer |
| | Air filter clogged | Clean the air filter |
| | Fan belt damaged | Install a new belt |
| | Thermostat defective | Contact the Dealer |

ENGINE

| Problem | Possible causes | Remedy |
|---|---|---|
| 5. Low engine oil pressure | Engine oil pump or pump drive Low engine oil level Engine oil pressure regulating valve Restricted oil filter High engine temperature Oil with incorrect viscosity | Contact the Dealer Add oil Contact the Dealer Install new filter Contact the Dealer Drain the oil and use the prescribed one |
| 6. Excessive engine oil consumption | Change interval incorrect Wrong type of oil Oil leakage High engine temperature | Change the oil at the prescribed intervals Drain oil and fill with specified oil Check leaks Check the cooling system |
| 7. Excessive fuel consumption | Air intake system dirty or clogged Wrong type of fuel Fuel injectors Wrong fuel injection pump timing | Clean air intake system Use specified fuel Contact the Dealer Contact the Dealer |
| 8. Excessively black or grey exhaust smoke | Wrong type of fuel Air intake or exhaust systems dirty or clogged Wrong fuel injection pump timing Dirty or faulty injectors Faulty engine | Use specified fuel Clean air intake and exhaust systems Contact the Dealer Contact the Dealer Contact the Dealer |
| 9. White exhaust smoke | Wrong type of fuel Engine cold Wrong injection pump timing Coolant leakage into engine cylinders | Drain fuel tank and fill with correct type or fuel Let the engine turn until it warms up Contact the Dealer Contact the Dealer |

TROUBLESHOOTING

ENGINE

| Problem | Possible causes | Remedy |
|---|---|--|
| 10. Batteries Undercharged | Loose or corroded connections Alternator not charging Fuse Batteries defective | Clean and tighten or replace batteries Contact the Dealer Replace fuse Replace the batteries |
| 11. The starter motor is inoperative | Exhausted or faulty batteries Battery cables have a faulty contact Fuse Starter switch Starter relay Starter solenoid Starter motor | Recharge or replace batteries Clean connections Change LINK fuse Contact the Dealer Contact the Dealer Contact the Dealer Contact the Dealer |

MONITOR

| Problem | Possible causes | Remedy |
|---|---|---|
| 1. Low engine oil pressure (the buzzer sounds, the icon appears on the display and the engine stops) | <p>Low engine oil level</p> <p>Oil leakage</p> <p>Oil with wrong viscosity</p> | <p>Top-up level</p> <p>Repair leakage and top-up level</p> <p>Drain oil and change it with the prescribed type</p> |
| 2. Excessive temperature of engine coolant (the buzzer sounds and the icon appears on the display) | <p>Level of coolant low</p> <p>Leakage of coolant</p> <p>Radiator cap loosen</p> <p>Radiator clogged</p> <p>Fan belt damaged</p> <p>Presence of rust or scaling</p> <p>Thermostat defective</p> | <p>Top-up level</p> <p>Repair the leakage and top-up level</p> <p>Tighten the cap</p> <p>Clean cooling system</p> <p>Install a new belt</p> <p>Flush the cooling system</p> <p>Contact a Dealer</p> |
| 3. Air cleaner clogged (the icon appears on display) | <p>Air cleaner clogged</p> <p>Ducts from air cleaner to turbocharger clogged</p> | <p>Replace filtering elements</p> <p>Clean, repair or change the parts</p> |

HYDRAULIC SYSTEM

| Problem | Possible causes | Remedy |
|---|--|---|
| 1. Difficult or irregular movements of manual pilot valves | Connections corroded or worn | Contact the Dealer |
| 2. No reaction when actuating the manual pilot valves | Safety lever Power system | Check that it is in correct position Contact the Dealer |
| 3. Slow hydraulic circuit operation | Low oil level Cold oil Wrong type of oil Low engine speed Pilot-control circuit Worn pump Air leaks into the pump suction hose Twisted or damaged oil hoses | Fill the reservoir to the full mark Check if the warm-up light is on. If not, contact the Dealer Drain reservoir. Use oil of correct type Increase engine speed or contact the Dealer Contact the Dealer Contact the Dealer Contact the Dealer Check hoses |
| 4. Hydraulic oil overheats | Wrong type of oil Low oil level Worn pump Clogged coolant radiator or oil cooler Oil cooler by-pass | Use oil of correct type Fill the reservoir to the full mark Contact the Dealer Clean fins and straighten if bent Contact the Dealer |
| 5. Low or no oil pressure | Wrong type of oil Misadjusted hydraulic components No oil in the system Worn cylinder seals Relief valve | Use oil of correct type Contact the Dealer Fill the system with correct type of oil Contact the Dealer Contact the Dealer |

HYDRAULIC SYSTEM

| Problem | Possible causes | Remedy |
|--|---|---|
| 6. The hydraulic cylinders are operational, but do not lift loads | <p>Worn hydraulic pump</p> <p>Misadjusted main relief valve</p> <p>Low hydraulic oil level</p> <p>Restricted suction filter</p> <p>Pump suction hose leaks</p> | <p>Contact the Dealer</p> <p>Contact the Dealer</p> <p>Add oil</p> <p>Clean filter and system</p> <p>Contact the Dealer</p> |
| 7. One of the cylinder is inoperative or provides low power | <p>Control valve spool damaged or contaminated with dirt</p> <p>Damaged hydraulic hoses</p> <p>Pilot-control valve</p> <p>Piston ring leakage</p> <p>Damaged cylinder rod</p> | <p>Contact the Dealer</p> |
| 8. The turret swing is slow | <p>Brake valve defective</p> <p>Control valve defective</p> <p>Swing hydraulic motor Defective</p> <p>Hydraulic pump defective</p> | <p>Contact the Dealer</p> <p>Contact the Dealer</p> <p>Contact the Dealer</p> <p>Contact the Dealer</p> |
| 9. Abnormal noises while swinging the turret | <p>Insufficient lubrication of bullgear</p> <p>Level of swing reduction insufficient</p> | <p>Grease the bullgear</p> <p>Top-up level</p> |
| 10. The turret moves while parking brake is engaged | <p>Pressure setting of brake valve incorrect</p> <p>Brake valve defective</p> | <p>Contact the Dealer</p> <p>Contact the Dealer</p> |

HYDRAULIC SYSTEM

| Problem | Possible causes | Remedy |
|---------------------------------------|---|--|
| 11. The travel is not even | Track chain tension incorrect Stones or mud stuck in the track chain structure Brake valve defective Swing motor-reduction defective | Adjust tension of track chains Remove the obstructing materials Contact a Dealer Contact a Dealer |
| 12. The travel lacks power | Hydraulic pumps defective Low performance of engine Setting of main pressure relief valve incorrect Hydraulic oil level insufficient Travel motor-reduction defective Brake valve defective Oil leakage in centre joint | Contact a Dealer Contact a Dealer Contact a Dealer Top-up level Contact a Dealer Contact a Dealer Contact a Dealer |
| 13. The travel is not straight | Track chain tension not even Pressure setting of pressure relief valves unbalanced Travel motor-reduction defective | Adjust track chain tension Contact a Dealer Contact a Dealer |

6 - ELECTRICAL SYSTEM



ELECTRICAL SYSTEM

Generalities

**WARNING**

Use only properly grounded power outlets for heaters, battery chargers, pumps or similar devices, to minimise the danger of electrocution.

Make sure that connections cables are properly connected to the exact terminals, (+ with + and - with -) at both ends.

Avoid short circuiting the terminals.

In case the batteries are to be recharged, remove battery cell plugs.

FLAMMABLE FUMES. Extinguish all smoking materials or free flames prior to checking, topping-up or recharging batteries. do not check batteries by sparking them.

IMPORTANT: *improper radio-communications equipment and associated parts and/or improper assembly of radio-communications equipment affects machine electronic components with consequent unexpected machine movement. Consult your Dealer when installing radio-communications equipment or any additional electronic component, and when replacing an electric part.*

Do not disassemble or change electric or electronic components. Consult your Dealer to replace or change such components, if necessary.

IMPORTANT: *the electrical system of this machine is 24 V and is powered by two batteries connected in series. The machine is equipped with complex electric and electronic components which can be handled exclusively by qualified personnel.*

Do not run the engine with the alternator threaded terminal disconnected.

If the batteries have been recharged using an external equipment, they should then be reinstalled onto the machine paying attention to match terminals of same sign (+ to + and - to -). This norm should be observed also when the engine is to be started using slave batteries.

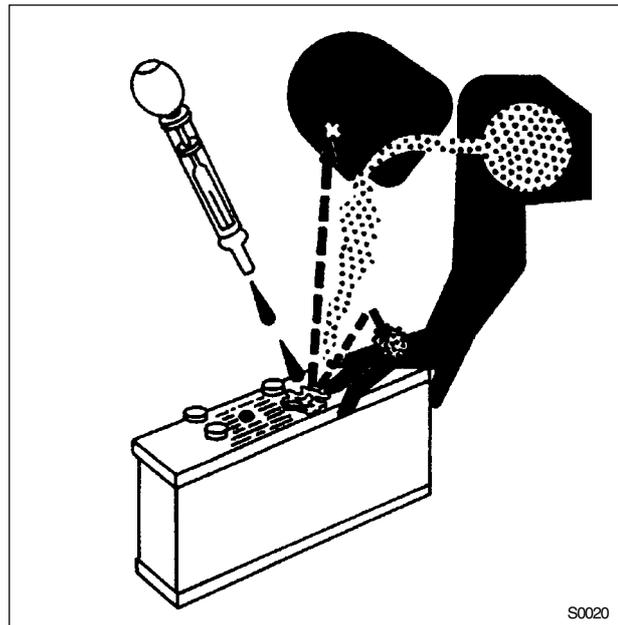
If repair using electrical welders is required on the machine, it is good practice to disconnect the batteries and alternator, and ground the welder as near as possible to the welding point.

BATTERIES

**WARNING**

- Battery gas may explode. Keep away sparks and flames. Use a pocket torch to check electrolyte level.
- Sulphuric acid contained in the electrolyte is poisonous. It can burn the skin, corrode clothes and cause loss of sight if sprayed into the eyes.
- To avoid dangers:
 1. Top up the batteries in a well ventilated area.
 2. Wear protective glasses and rubber gloves.
 3. Avoid breathing vapours when adding distilled water.
 4. Do not spill or drip the electrolyte.
 5. When starting the machine with booster batteries, observe the procedures detailed in the chapter **OPERATING NORMS**, in the paragraph **“STARTING THE ENGINE WITH BOOSTER BATTERIES”**. Always ensure to connect cables to correct poles (+ to +) and (- to -) at both ends. Do not short-circuit the terminals.
- If acid comes to touch the skin:
 1. Wash skin with water.
 2. If acid has reached the eyes, wash with water for at least 15 minutes. Immediately seek medical attention.
 3. If acid has been ingested, immediately seek medical attention.

- Batteries installed to this type of machine are maintenance-free, therefore they do not require top-ups with distilled water. In exceptional cases, however, it is possible to restore the electrolyte level by removing cell plugs and adding distilled water. Electrolyte level should be between the maximum and minimum marks on the battery. Charge the battery after topping up.



S0020



S0001

IMPORTANT: *if it is necessary to add distilled water in freezing weather conditions, top up at the beginning of the working day. Otherwise the battery should be recharged.*

**CAUTION**

Always disconnect the negative (-) ground terminal first and reconnect it last.

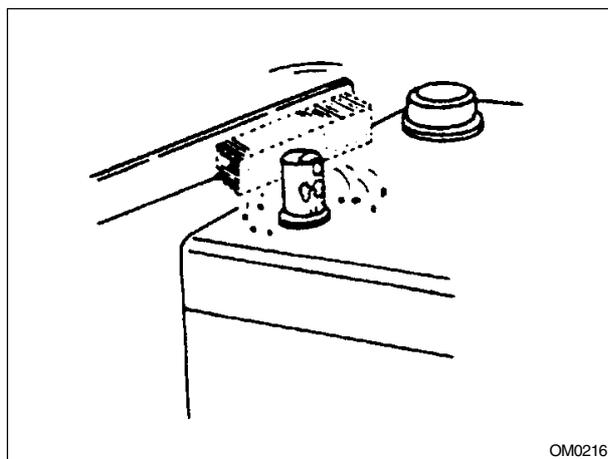
- Open the air cleaner and battery compartment doors.
- Check inside the batteries compartment to identify eventual leakages of electrolyte. In the event of leakages, clean it accurately to avoid the corrosion of metal components.
- Always keep terminals and caps, located on the upper side of the battery, clean, to avoid the discharge of the battery. Check the terminals of the battery. The clamps must not be loose and be free from rust or oxidation. Apply vaseline to the terminals, to avoid corrosions.
- For short inoperative periods, it is preferable not to stop the engine, but let it run at low idle, since each starting requires a considerable output of energy by the batteries.
- To keep the batteries efficient, comply with the following standards:
 - when the engine is inoperative, extract the starter key to avoid a progressive discharge of the batteries;
 - do not keep lights on for a long time, with engine inoperative or at idle.
- In the event a battery on a 24 V fails, but the other one is still efficient, replace the failed battery with another one of the same type. As an example, replace a failed maintenance free type battery with another one of the same maintenance free type. Different types of batteries could have different recharging rates. This difference could overload one of the batteries and damage it.
- Close the doors.



Handle and dispose of batteries according to current regulations. Use only authorised disposal procedure. If in doubt, contact authorities concerned.



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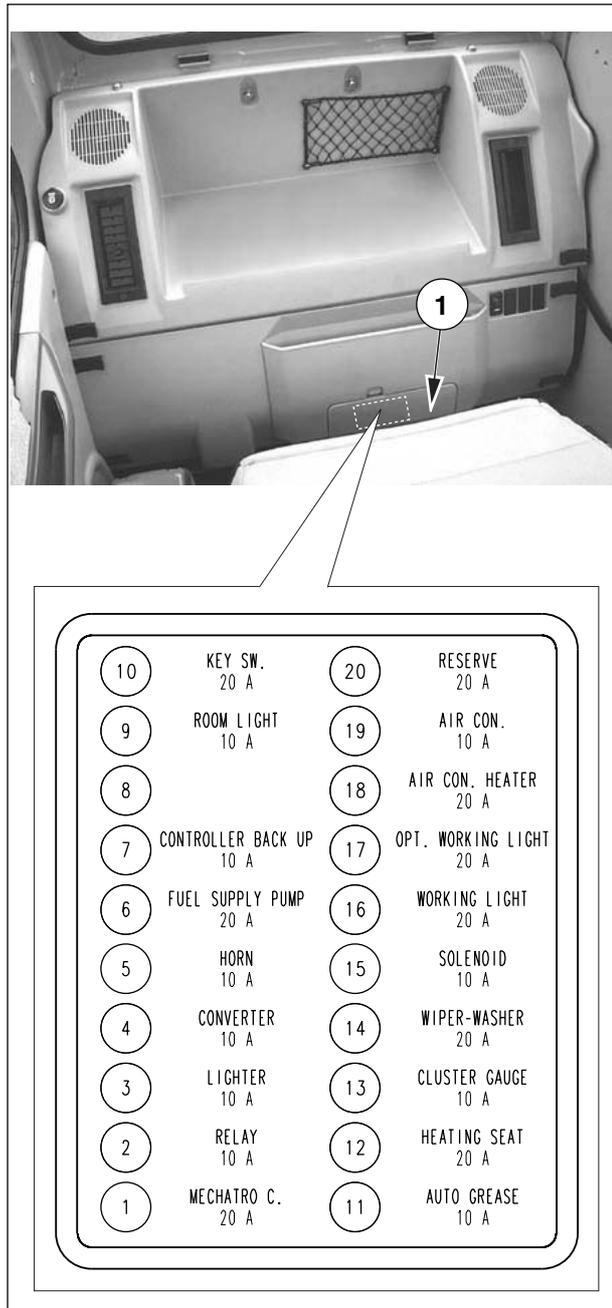
FUSES

To reach the fuse box, move the operator's seat fully forward, lower the backrest and remove protection (1).

A decal is applied to the cover of the fuse box describing the location and the Amp capacity of the fuses.

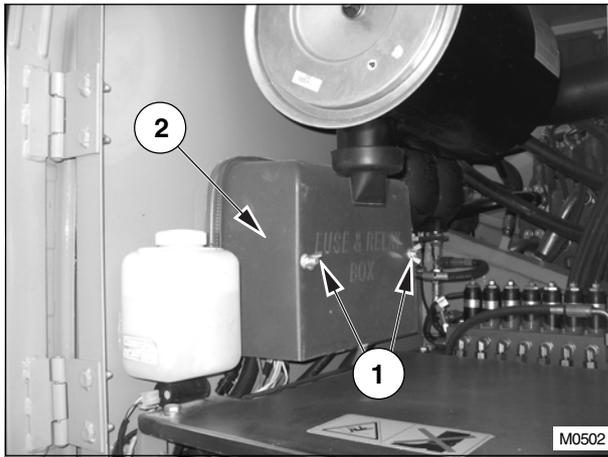
Also, there are high Amperage fuses located in the air cleaner compartment inside the protection box.

IMPORTANT: *always make sure that the fuses installed have the correct capacity to prevent damages from an overload of the electrical system.*

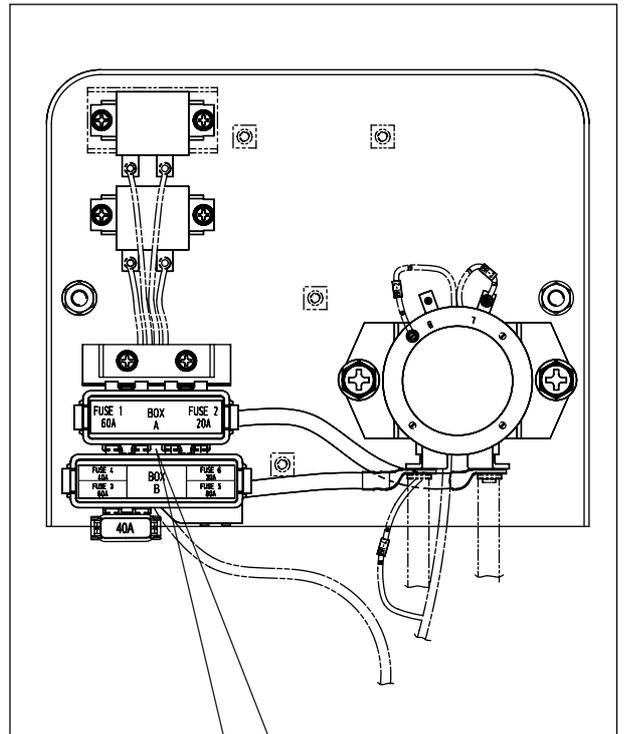


| FUSES BOX | | | |
|-----------|------------------------|---|------------|
| Fuse no. | Decal | PROTECTED CORCUIT | Rating (A) |
| 1 | MECHATRO CONTROLLER | Mechatro Controller | 20 |
| 2 | RELAY | Relay | 10 |
| 3 | LIGHTER | Cigarette lighter | 10 |
| 4 | CONVERTER | Voltage converter (Radio-Socket 12 Volt) | 10 |
| 5 | HORN | Horn | 10 |
| 6 | FUEL SUPPLY PUMP | Fuel transfer pump | 20 |
| 7 | CONTROLLER BACK UP | Mechatro Controller | 10 |
| 8 | / | / | / |
| 9 | ROOM LIGHT | Cab ceiling light | 10 |
| 10 | KEY SWITCH | Starter switch | 20 |
| 11 | AUTO GREASE | Centralised lubrication | 10 |
| 12 | HEATING SEAT | Heated seat | 20 |
| 13 | CLUSTER GAUGE | Monitor | 10 |
| 14 | WIPER WASHER | Wiper-Washer tank | 20 |
| 15 | SOLENOID | Safety lever and hydraulic pump solenoids | 10 |
| 16 | WORKING LIGHT | Work lights | 20 |
| 17 | OPTIONAL WORKING LIGHT | Cab work lights | 20 |
| 18 | AIR CONDITIONER HEATER | Air conditioning | 20 |
| 19 | AIR CONDITIONER | Air conditioning | 10 |
| 20 | RESERVE | Optional 24 V | 20 |

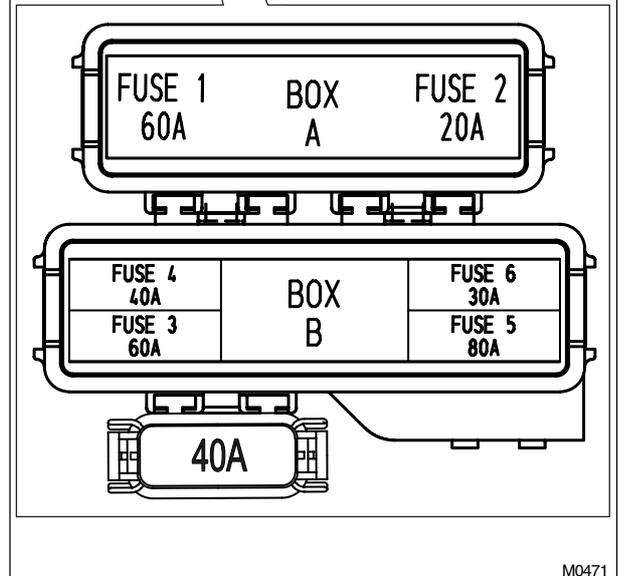
Carefully read personal and machine SAFETY PRECAUTIONS at the beginning of this Manual



To reach the high capacity fuses, open the air cleaner/ battery compartment panel, loosen wing nuts (1) and remove protection box (2).



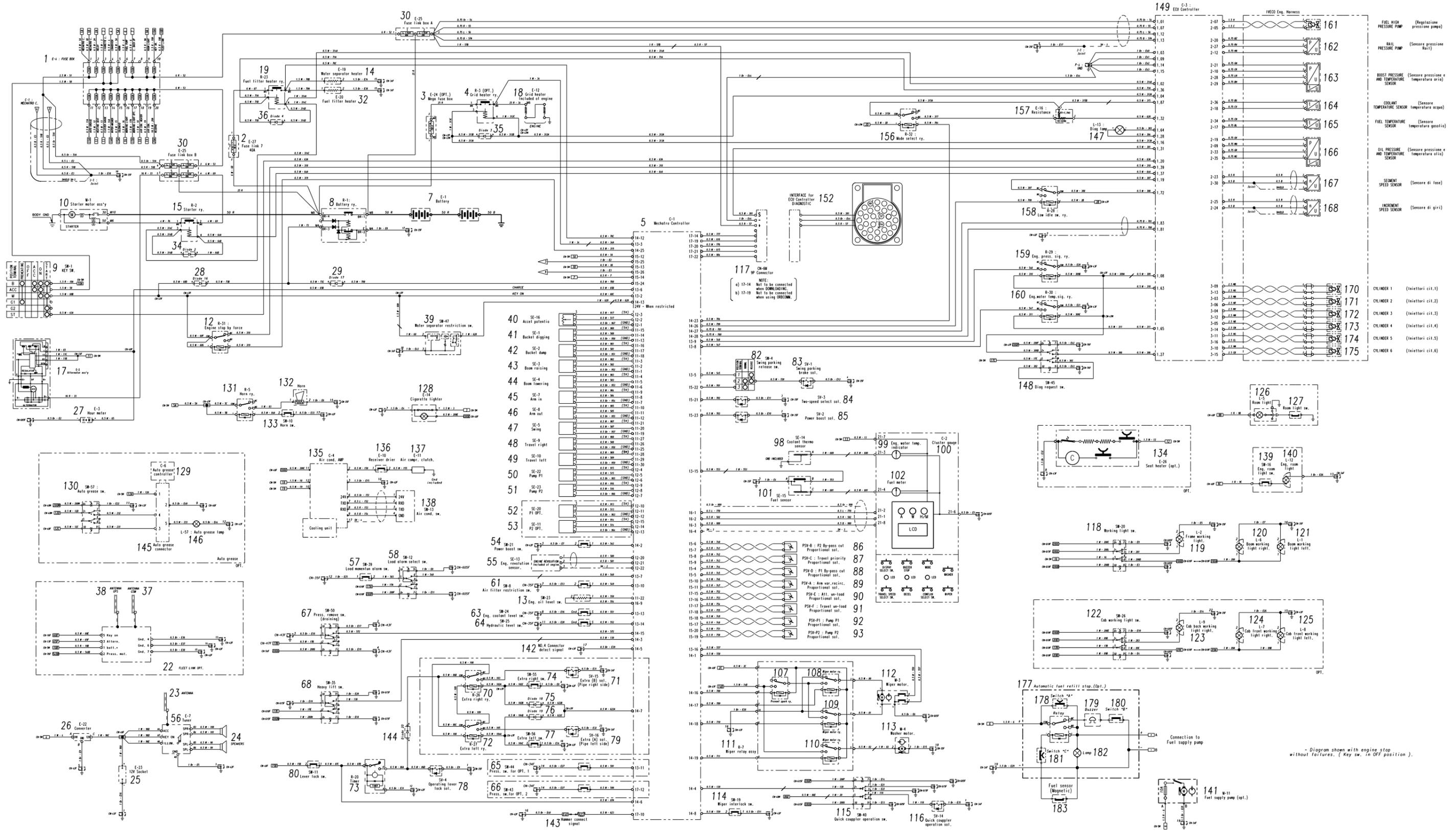
| FUSES IN THE AIR FILTER COMP. | | | |
|-------------------------------|---------|--------------------------|------------|
| Decal | Fuse N° | Protected circuit | Rating (A) |
| BOX A | FUSE 1 | Fuse powering (6-7-9-10) | 60 |
| | FUSE 2 | Engine controller supply | 20 |
| BOX B | FUSE 3 | Fuse powering (11-20) | 60 |
| | FUSE 4 | Starter relay | 40 |
| | FUSE 5 | Alternator | 80 |
| | FUSE 6 | Mechatro controller | 30 |
| | FUSE 7 | Fuel heated filters | 40 |



ELECTRICAL SYSTEM DIAGRAM READING KEY

- | | |
|---|---|
| <p>1 - Fuse box (E-4) 2 - Fuse link 7 (60 A) (E-27) 3 - Mega Fuse (E-24) (Opt) 4 - Preheating (Grid heater) relay (R-3) (Opt) 5 - Mechatro Controller (C-1) 7 - Battery (E-1) 8 - Battery relay (R-1) 9 - Key switch (SW-1) 10 - Starter motor assembly (M-1) 12 - Engine stop relay (R-31) 13 - Engine oil level switch (SW-23) 14 - Water separator heater (E-19) 15 - Starter relay (R-2) 17 - Alternator assembly (E-2) 18 - Grid heater (engine) (E-12) 19 - Fuel filter heater relay (R-23) 22 - Fleet link (Opt) 23 - Antenna 24 - Speakers 25 - Socket 12 V D.C. 180 W (E-23) 26 - Converter 24 V/12 V (E-22) 27 - Hour meter (E-3) 28 - Diode 16 29 - Diode 17 30 - Fuse link box A, B (E-25) 32 - Fuel filter heater (E-20) 34 - Diode 2 35 - Diode 3 36 - Diode 4 37 - Antenna GSM 38 - Antenna GPS 39 - Water separator restriction switch (SW-47) 40 - Accelerator potentiometer (SE-16) 41 - Bucket digging sensor (SE-1) 42 - Bucket dump sensor (SE-2) 43 - Boom raising sensor (SE-3) 44 - Boom lowering sensor (SE-4) 45 - Arm in sensor (SE-7) 46 - Arm out sensor (SE-8) 47 - Swing sensor (SE-5) 48 - Travel right sensor (SE-9) 49 - Travel left sensor (SE-10) 50 - Pump P1 sensor (SE-22) 51 - Pump P2 sensor (SE-23) 52 - P1 Opt sensor valve (SE-20) 53 - P2 Opt sensor valve (SE-11) 54 - Power boost switch (SW-21) 55 - Engine revolution sensor (SE-13) 56 - Radio (E-7) 57 - Load momentum alarm switch (SW-39) 58 - Load alarm select switch (SW-12) 61 - Air filter restriction switch (SW-8) 63 - Engine coolant level switch (SW-24) 64 - Hydraulic level switch (SW-25) 65 - Pressure switch for OPT 1 (SW-44) 66 - Pressure switch for OPT 2 (SW-43) 67 - Hydraulic pressure remove switch (SW-50) 68 - Heavy lift switch (SW-35) 70 - Rotary Bucket (Extra) Right relay (R-26) 71 - Rotary Bucket (Extra) solenoid valve (B) (SV-15) 72 - Rotary Bucket (Extra) Left relay (R-27) 73 - Timer (R-20) 74 - Rotary Bucket (Extra) Right switch (SW-55) 75 - Diode 18 76 - Diode 19 77 - Rotary Bucket (Extra) Left switch (SW-56) 78 - Operating lever lock solenoid valve (SV-4) 79 - Rotary Bucket (Extra) solenoid valve (A) (SV-16) 80 - Lever lock switch (SW-11) 82 - Swing parking release switch (SW-4) 83 - Swing parking brake solenoid valve (SV-1) 84 - Two speed select solenoid valve (SV-3) 85 - Power boost solenoid valve (SV-2) 86 - P2 By-pass cut proportional solenoid valve (PSV-B) 87 - Travel straight proportional solenoid valve (PSV-C) 88 - P1 By-pass cut proportional solenoid valve (PSV-D) 89 - Arm variable recirculation proportional solenoid valve (PSV-A) 90 - Attachment unload proportional solenoid valve (PSV-E)</p> | <p>91 - Travel unload proportional solenoid valve (PSV-F) 92 - Pump P1 proportional solenoid valve (PSV-P1) 93 - Pump P2 proportional solenoid valve (PSV-P2) 98 - Coolant thermo sensor (SE-14) 99 - Engine coolant temperature indicator 100 - Cluster gauge (C-2) 101 - Fuel sensor (SE-15) 102 - Fuel meter 107 - Prevent spark relay 108 - Wiper motor relay 109 - Wiper motor relay 110 - Wiper motor relay 111 - Wiper relay assembly (R-7) 112 - Wiper motor (M-3) 113 - Washer motor (M-4) 114 - Wiper interlock switch (SW-19) 115 - Quick coupler operation switch (SW-40) (Opt) 116 - Quick coupler operation solenoid valve (SV-14) (Opt) 117 - 9P Connector (CN-6M) 118 - Working light switch (SW-20) 119 - Frame working light (L-2) 120 - Boom working light right (L-6) 121 - Boom working light left (L-1) 122 - Cab working light switch (SW-26) (Opt) 123 - Cab back working light right (L-9) (Opt) 124 - Cab front working light right (L-7) (Opt) 125 - Cab front working light left (L-8) (Opt) 126 - Room light (L-5) 127 - Room light switch 128 - Cigarette lighter (E-14) 129 - Auto grease controller (C-6) 130 - Auto grease switch (SW-57) (Opt) 131 - Horn relay (R-5) 132 - Horn 133 - Horn switch (SW-10) 134 - Seat heater (Opt) (E-26) 135 - Air conditioning AMP (C-4) 136 - Receiver drier (E-10) 137 - Air compressor clutch (E-11) 138 - Air conditioning switch (SW-13) 139 - Engine room light switch (SW-16) 140 - Engine room light (L-12) 141 - Fuel supply pump (M-11) 142 - No. 4 Connector detect signal 143 - Hammer connect signal 144 - Diode 20 145 - Automatic grease connector (Opt) 146 - Automatic grease diagnosis lamp (L-57) (Opt) 147 - Engine diagnosis lamp (L-13) 148 - Engine diagnosis request switch (SW-46) 149 - Engine controller (C-3) 152 - Interface for engine controller check connection 156 - Mode select relay (R-32) 157 - Resistance for mode selection (E-16) 158 - Low idle switching relay (R-28) 159 - Engine oil pressure signal relay (R-29) 160 - Engine coolant temperature signal relay (R-30) 161 - Fuel high pressure pump regulator 162 - Common Rail pressure pump sensor 163 - Boost pressure and temperature sensor 164 - Coolant temperature sensor 165 - Fuel temperature sensor 166 - Oil pressure and temperature sensor 167 - Segment speed sensor 168 - Increment speed sensor 170 - Cylinder 1 Electro-injector 171 - Cylinder 2 Electro-injector 172 - Cylinder 3 Electro-injector 173 - Cylinder 4 Electro-injector 174 - Cylinder 5 Electro-injector 175 - Cylinder 6 Electro-injector 177 - Automatic fuel refill (Opt) 178 - Switch A (start) 179 - Buzzer 180 - Switch B (buzzer ON/OFF) 181 - Switch C (refill stop) 182 - Refill lamp 183 - Magnetic fuel level sensor</p> |
|---|---|

NOTE: pressure switches, sensors and control switches in the electrical wiring diagram are shown in the position related to engine stop condition, without failure and with key switch (9) in OFF position.



- 161 FUEL HIGH PRESSURE PUMP (Sensore pressione pompa)
- 162 RAIL PRESSURE PUMP (Sensore pressione Rail)
- 163 BOOST PRESSURE AND TEMPERATURE SENSOR (Sensore pressione e temperatura aria)
- 164 COOLANT TEMPERATURE SENSOR (Sensore temperatura acqua)
- 165 FUEL TEMPERATURE SENSOR (Sensore temperatura gasolio)
- 166 OIL PRESSURE AND TEMPERATURE SENSOR (Sensore pressione e temperatura olio)
- 167 SECTOR SPEED SENSOR (Sensore di fase)
- 168 INCREMENT SPEED SENSOR (Sensore di giri)
- 170 CYLINDER 1 (Iniettori cil.1)
- 171 CYLINDER 2 (Iniettori cil.2)
- 172 CYLINDER 3 (Iniettori cil.3)
- 173 CYLINDER 4 (Iniettori cil.4)
- 174 CYLINDER 5 (Iniettori cil.5)
- 175 CYLINDER 6 (Iniettori cil.6)

- Diagram shown with engine stop without failures. (Key sw. in OFF position).

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PROVEN PERFORMANCE
