Solar 140LC-V

Operation and Maintenance Manual

022-00058E

Serial Number 1001 and Up

November 2003

Daewoo reserves the right to improve our products in a continuing process to provide the best possible product to the market place. These improvements can be implemented at any time with no obligation to change materials on previously sold products. It is recommended that consumers periodically contact their distributors for recent documentation on purchased equipment.

This documentation may include attachments and optional equipment that is not available in your machine's package. Please call your distributor for additional items that you may require.

Illustrations used throughout this manual are used only as a representation of the actual piece of equipment, and may vary from the actual item.

TABLE OF CONTENTS

TO THE OPERATOR OF A DAEWOO EXCAVATOR

⚠ DANGER!

Unsafe use of the excavator could lead to serious injury or death. Operating procedures, maintenance and equipment practices or traveling or shipping methods that do not follow the safety guidelines on the following pages could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property.

Please respect the importance of taking responsibility for your own safety, and that of other people who may be affected by your actions.

The safety information on the following pages is organized into the following sections:

⚠ WARNING!

Improper operation and maintenance of this machine can be hazardous and could result in serious injury or death.

Operator and maintenance personnel should read this manual thoroughly before beginning operation or maintenance.

Keep this manual in the storage compartment to the rear of the operator's seat, and have all personnel involved in working on the machine read the manual periodically.

Some actions involved in operation and maintenance of the machine can cause a serious accident, if they are not done in a manner described in this manual.

The procedures and precautions given in this manual apply only to intended uses of the machine.

If you use your machine for any unintended uses that are not specifically prohibited, you must be sure that it is safe for any others. In no event should you or others engage in prohibited uses or actions as described in this manual.

Daewoo delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Daewoo or your Daewoo distributor before operating the machine.

SAFETY ALERT SYMBOL

Be Prepared - Get To Know All Operating and Safety Instructions.

This is the Safety Alert Symbol. Wherever it appears in this manual or on safety signs on the machine you should be alert to the potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

LEARN THE SIGNAL WORDS USED WITH THE SAFETY ALERT SYMBOL

The words **"CAUTION," "WARNING,"** and **"DANGER"** used throughout this manual and on decals on the machine indicate degree of risk of hazards or unsafe practices. All three degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert "Triangle," no matter which signal word appears next to the "Exclamation Point" symbol.

CAUTION!

This word is used on safety messages and safety labels and indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

WARNING!

This word is used on safety messages and safety labels and indicates potential of a hazardous situation that, if not avoided, could result in serious injury or death. It may also be used to alert against a highly unsafe practice.

DANGER!

This word is used on safety messages and safety labels and indicates an imminent hazard of a situation that, if not avoided, is very likely to cause death or extremely serious injury. It may also be used to alert against equipment that may explode or detonate if handled or treated carelessly.

Safety precautions are described in SAFETY from page 1-4 on.

Daewoo cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore the safety messages in this manual and on the machine may not include all possible safety precautions. If any procedures or actions not specifically recommended or allowed in this manual are used, you must be sure that you and others can do such procedures and actions safely and without damaging the machine. If you are unsure about the safety of some procedures, contact a DAEWOO distributor.

LOCATION OF SAFETY LABELS

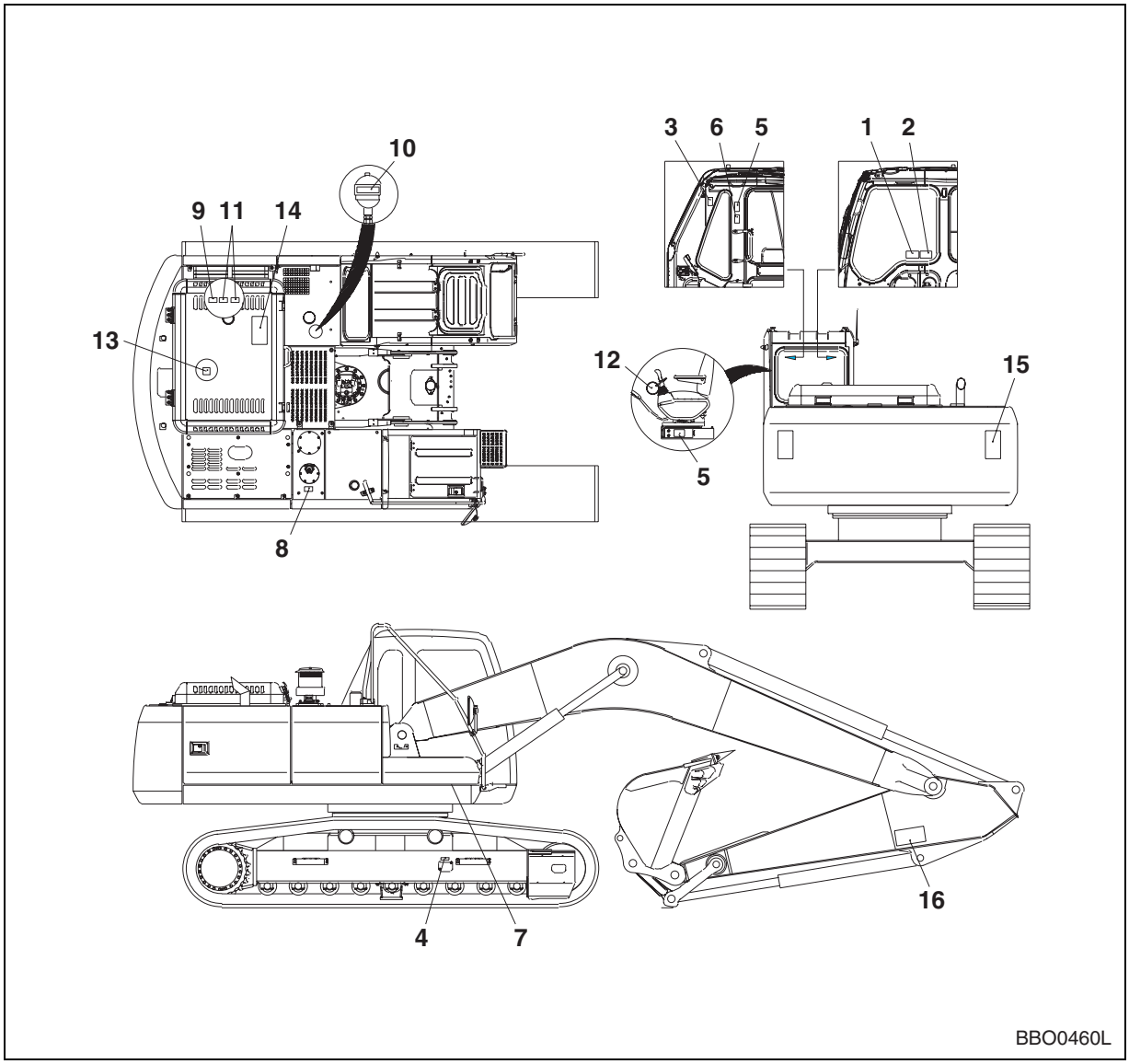


Figure 1

There are several specific warning signs on this machine. The exact location of hazards and the description of the hazards are reviewed in this section.

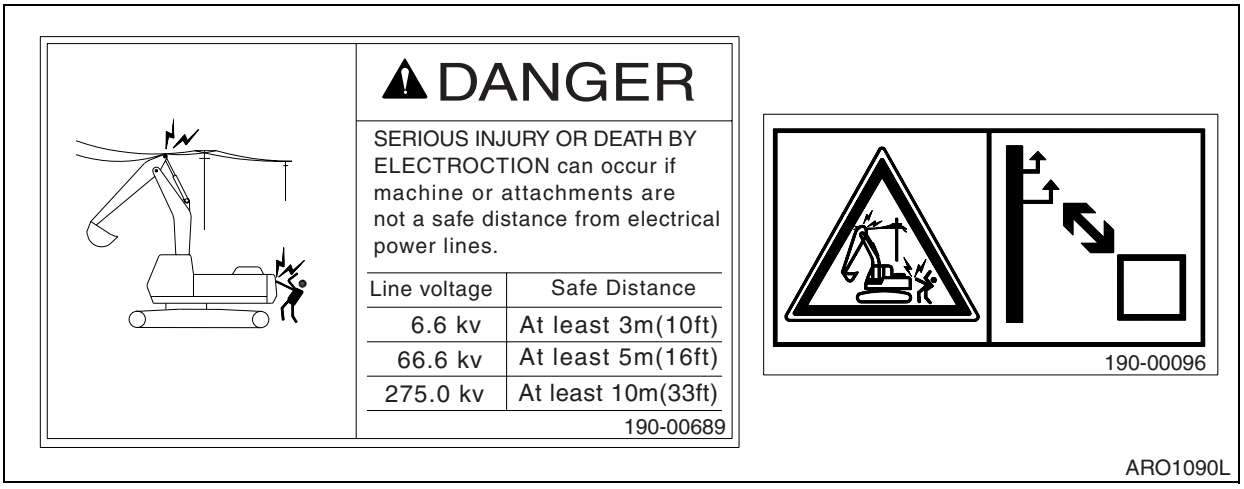
Please become familiarized with all warning signs.

Make sure that all of the warning signs are legible. Clean the warning signs or replace the warning signs if you cannot read the words. Replace the illustrations if the illustrations are not visible. When you clean the warning signs, use a cloth, water and soap. Do not use solvent, gasoline, or other harsh chemicals to clean the safety signs. Solvents, gasoline, or other harsh chemicals could loosen the adhesive that secures the warning sign. Loose adhesive will allow the warning sign to fall off.

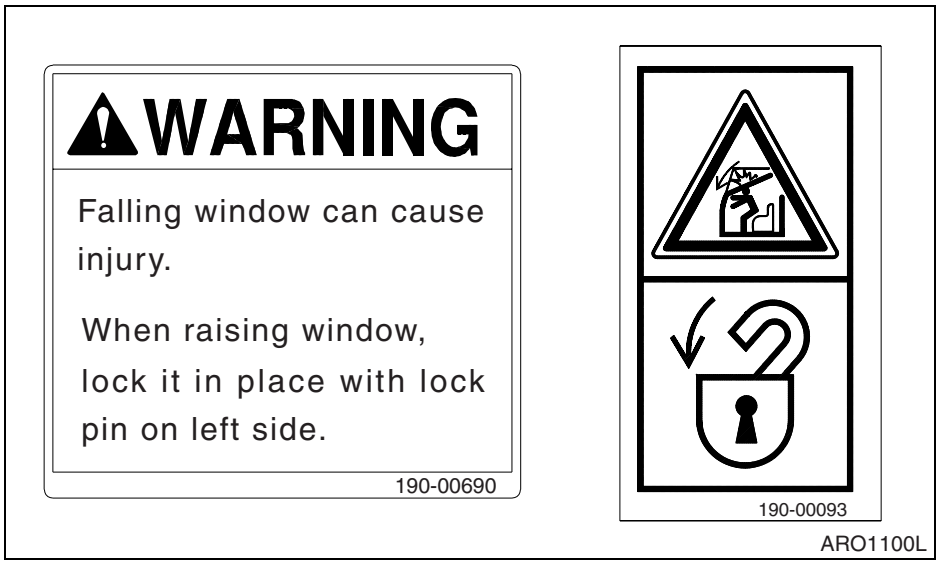
Replace any safety sign that is damaged, or missing. If a safety sign is attached to a part that is replaced, install a safety sign on the replacement part.

1. WARNINGS FOR OPERATION, INSPECTION AND MAINTENANCE (190-00688, 190-00092).

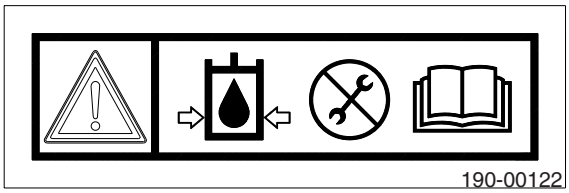
2. WARNINGS FOR HIGH VOLTAGE (190-00689, 190-00096)



3. WARNINGS WHEN OPENING A FRONT WINDOW (190-00690, 190-00093).



4. WARNINGS FOR A HIGH-PRESSURE CYLINDER (190-00122).



ARO1110L

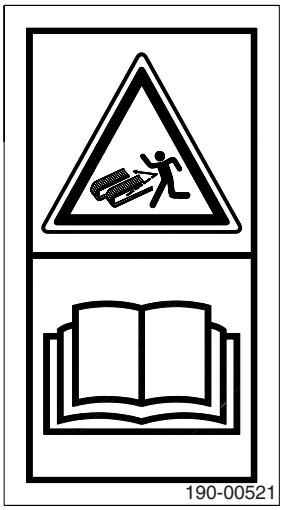
5. WARNINGS WHEN ADJUSTING TRACK TENSION (2190-3386A, 190-00521).

WARNING

The track adjuster adjustment and handling

- The spring in the track adjuster is loaded with great force and the pressure in the cylinder is very high. For this reason there is a possibility of an accident which may involve injury to personnel. It is very dangerous to make mistakes when performing such an adjustment or disassembly.
- Be sure to read the procedures described in the Operation and Maintenance Manual carefully before adjusting the track tension.

2190-3386A



ARO1120L

6. WARNINGS FOR LEAVING OPERATOR'S SEAT (190-00693, 190-00094).

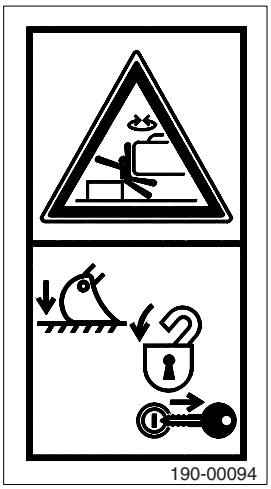
⚠ WARNING

Sudden and unwanted machine movement can cause serious injury or death.

Always make sure when leaving operator's seat to :

- Lower equipment to the ground.
- Move safety lever to LOCK position.
- Turn key switch OFF. Remove key from switch.

190-00693



190-00094

ARO1140L

7. WARNINGS FOR BATTERIES MAINTENANCE (2190-2533A, 190-00100).

⚠ DANGER

- Battery fumes can explode. Keep sparks and flames away from batteries.
- Always avoid storing metals like tools or flammable materials around or on the batteries. Explosion or fire can be caused by shortcircuiting batteries.
- Surfuric acid in battery is poisonous. It is strong enough burn skin, eat holes in clothing, and cause blindness if splashed eyes.

  If you spill acid on yourself;

  1. Flush your skin with water.
  2. Apply baking soda or lime to help neutralize the acid.
  3. Flush your eyes with water for 10-15 minutes. Get medical attention immediately.

2190-2533A

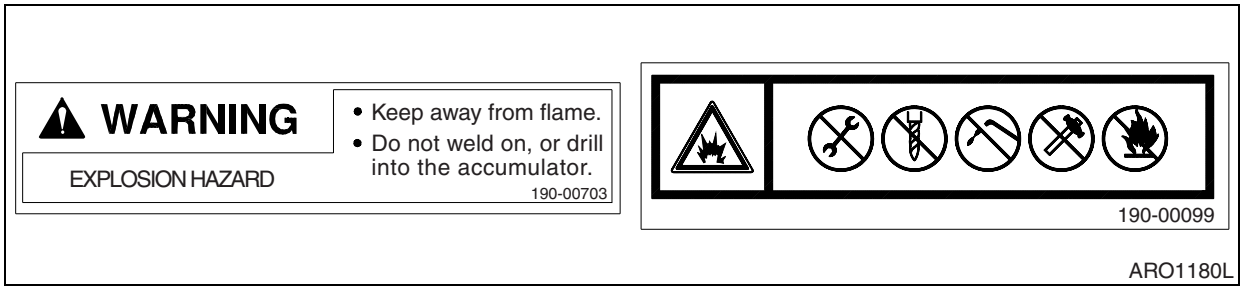
190-00100

ARO1150L

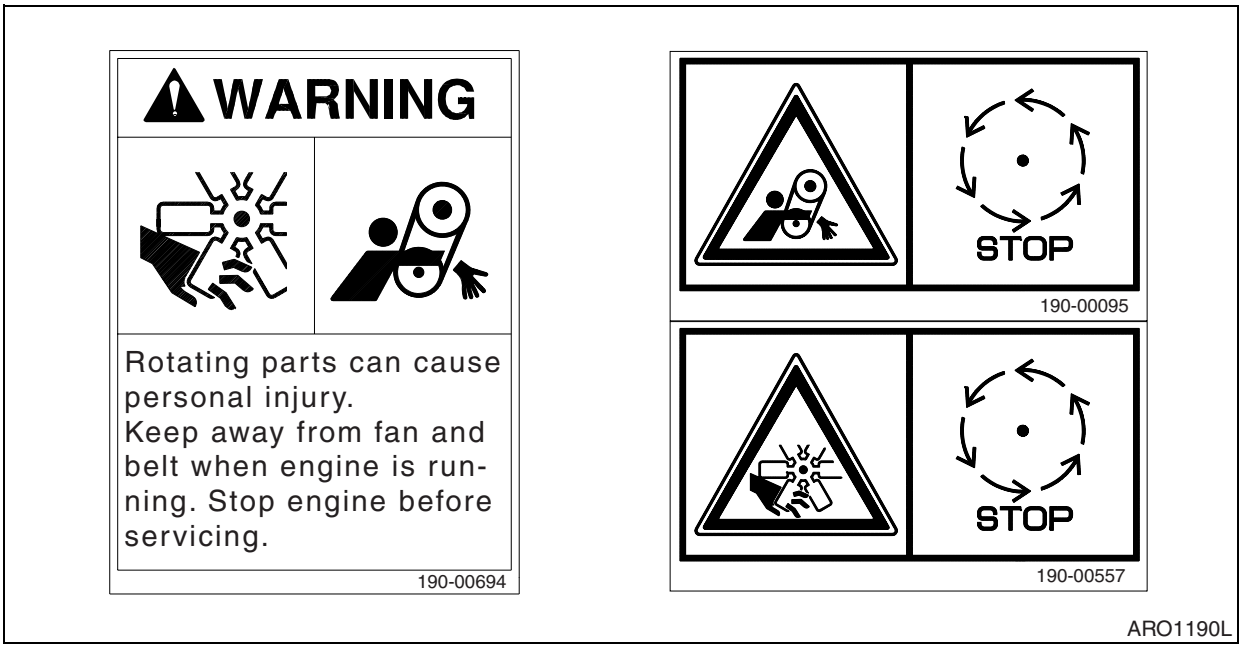
8. WARNINGS FOR HIGH TEMPERATURE HYDRAULIC OIL (190-00691, 190-00097)

9. WARNINGS FOR HOT COOLANT (190-00692, 190-00097)

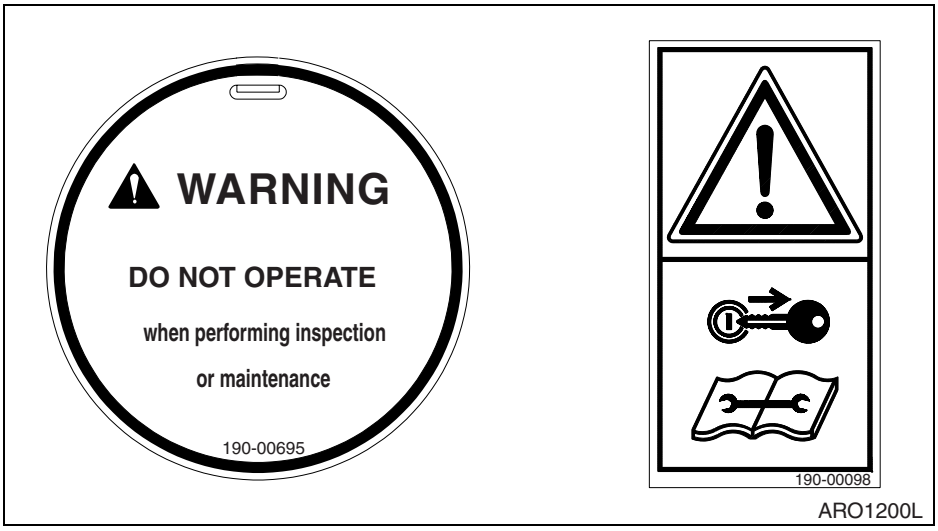
10. WARNINGS FOR HANDLING AN ACCUMULATOR (190-00703, 190-00099).



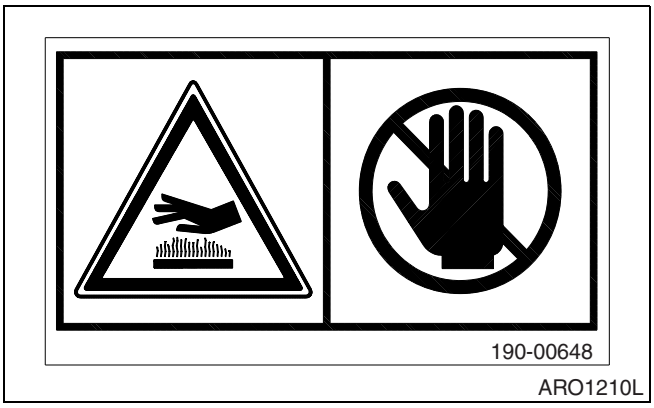
11. WARNINGS FOR ROTATING PARTS (190-00694, 190-00095, 190-00557).



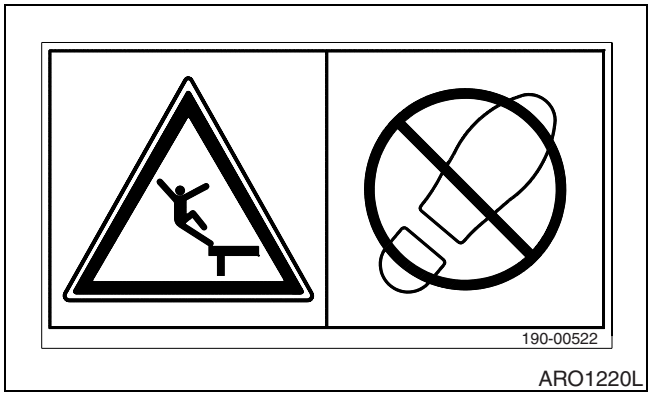
12. WARNING TAG - USED WHEN INSPECTION AND MAINTENANCE (190-00695, 190-00098).



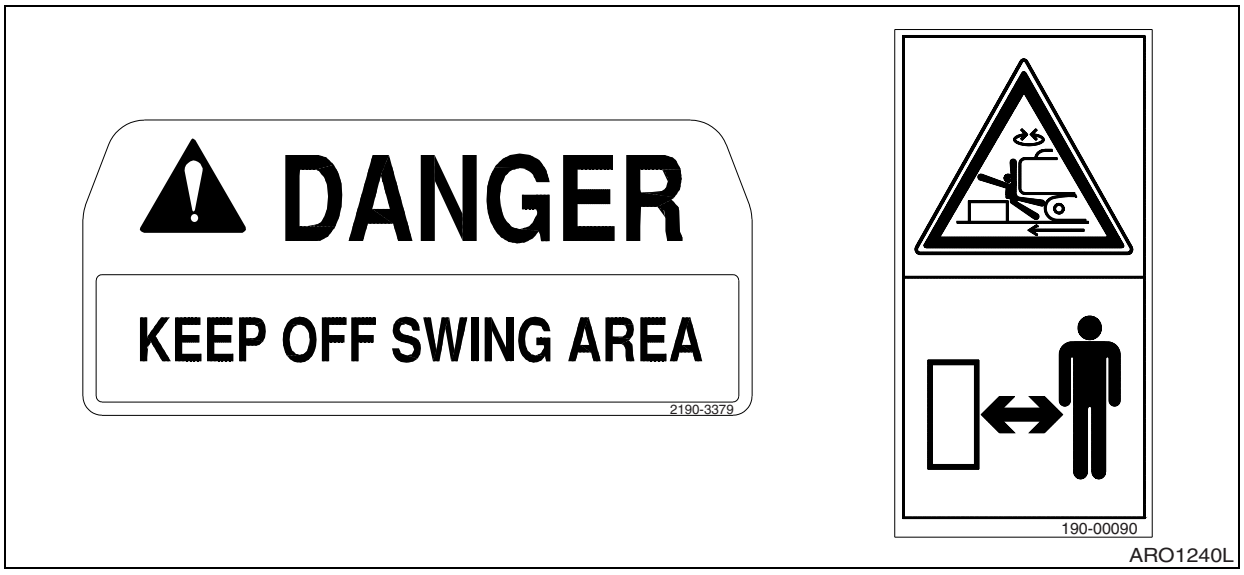
13. WARNING FOR A HOT SURFACE (190-00648).



14. CAUTION FOR HOOD (190-00522).



15. KEEP OUT OF THE SWING AREA (2190-3379, 190-00090).



16. WARNINGS FOR FRONT ATTACHMENTS (190-00652)

SUMMARY OF SAFETY PRECAUTIONS FOR LIFTING IN DIGGING MODE

DANGER!

Unsafe use of the excavator while making rated lifts could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property. Do not let anyone operate the machine unless they've been properly trained and understand the information in the Operation and Maintenance Manual.

To lift safely while in Digging Mode, the following items must be evaluated by the operator and the work site crew.

- Condition of ground support.
- Excavator configuration and attachments.
- Weight, lifting height and lifting radius.
- Safe rigging of the load.
- Proper handling of the suspended load.

Taglines on opposite sides of the load can be very helpful in keeping a suspended load secure, if they are anchored safely to control points on the ground.

WARNING!

NEVER wrap a tagline around your hands or body.

NEVER rely on taglines or make rated lifts when wind gusts are more than 48.3 km/h (30 MPH). Be prepared for any type of wind gust when working with loads that have a large surface area.

Always engage the **"Digging Mode"** control on the Instrument Panel before using the excavator for lifting work.

WARNING!

If you need more information or have any questions or concerns about safe operating procedures or working the excavator correctly in a particular application or in the specific conditions of your individual operating environment, please consult your local Daewoo representative.

UNAUTHORIZED MODIFICATIONS

Any modification made without authorization or written approval from Daewoo can create a safety hazard, for which the machine owner must be held responsible.

For safety's sake, replace all OEM parts with the correct authorized or genuine Daewoo part. For example, not taking the time to replace fasteners, bolts or nuts with the correct replacement parts could lead to a condition in which the safety of critical assemblies is dangerously compromised.

GENERAL HAZARD INFORMATION

SAFETY RULES

Only trained and authorized personnel can operate and maintain the machine.

Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.

Do not operate the machine if you are not feeling well, if you are taking medication that makes you feel sleepy, if you have been drinking, or if you are suffering from emotional problems. These problems will interfere with your sense of judgement in emergencies and may cause accidents.

When working with another operator or with a person on work site traffic duty, be sure that all personnel know the nature of the work and understand all hand signals that are to be used.

Always observe strictly any other rules related to safety.

SAFETY FEATURES

Be sure that all guards and covers are installed in their proper position. Have guards and covers repaired immediately if damaged.

Be sure that you understand the method of use of safety features such as safety lock lever and the seat belt, and use them properly.

Never remove any safety features. Always keep them in good operating condition.

Failure to use safety features according to the instructions in the Operation and Maintenance Manual could result in serious bodily injury.

INSIDE OPERATOR'S COMPARTMENT

When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the travel pedal with mud or oil stuck to your shoes, your foot may slip and this may cause a serious accident.

After using the ashtray, make sure that any matches or cigarettes are properly extinguished, and be sure to close the ashtray. If the ashtray is left open, there is danger of fire.

Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.

Do not leave lighters laying around the operator's compartment. If the temperature inside the operator's compartment becomes high, there is danger that the lighter may explode.

Do not use cellular telephones inside the operator's compartment when driving or operating the machine. There is danger that this may lead to an unexpected accident.

Never bring any dangerous objects such as flammable or explosive items into the operator's cab.

To ensure safety, do not use the radio or music headphones when operating the machine. There is danger that this may lead to a serious accident.

When operating the machine, do not put your hands or head out of the window.

When standing up from the operator's seat, always place safety lock lever securely in the "LOCK" position. If you accidentally touch the work equipment levers when they are not locked, the machine may suddenly move and cause serous injury or damage.

When leaving the machine, lower the work equipment completely to the ground, set safety lock lever to the "LOCK" position and shut down engine. Use the key to lock all the equipment. Always remove the key and take it with you.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

Contain long hair, and avoid loose clothing and jewelry. They can catch on controls or in protruding parts and cause serious injury or death.

Do not wear oily clothes. They are highly flammable.

Full eye protection, a hard hat, safety shoes and gloves may be required at the work site.

While working on the machine, never use inadequate tools. They could break or slip, causing injury, or they may not adequately perform intended functions.

Figure 2

BREATHING MASKS, EAR PROTECTION MAY BE REQUIRED

Do not forget that some risks to your health may not be immediately apparent. Exhaust gases and noise pollution may not be visible, but these hazards can cause disabling or permanent injuries.

NOTE: *The equivalent continuous A-weighted sound pressure level at the workstation for this machine is 74 dB(A).*

Measurement is obtained on a dynamic machine with the procedures and cab conditions as described in ISO 6396.

NOTE: *The guaranteed sound power level emitted by the machinery for this machine is 103 dB(A).*

Measurement is obtained on a dynamic machine with the procedures as described in 2000/14/EC.

MOUNTING AND DISMOUNTING

Before getting on or off the machine, if there is any oil. grease, or mud on the handrails, steps, or track shoes, wipe it off immediately. Always keep these parts clean. Repair any damage and tighten any loose bolts.

Never jump on or off the machine. In particular, never get on or off a moving machine. These actions may lead to serious injury.

When getting on or off the machine, always face the machine, and maintain three-point contact (both feet and one hand or one foot and both hands) with the handrails, steps, and track shoes to ensure that you support yourself securely.

Never hold any control levers when getting on or off the machine.

Apply the door lock securely. If you grip the handrail inside the door when moving on top of the track shoes, and the door lock is not applied securely, the door may move and cause you to fall.

Use the points marked by arrows in the diagram when getting on or off the machine.

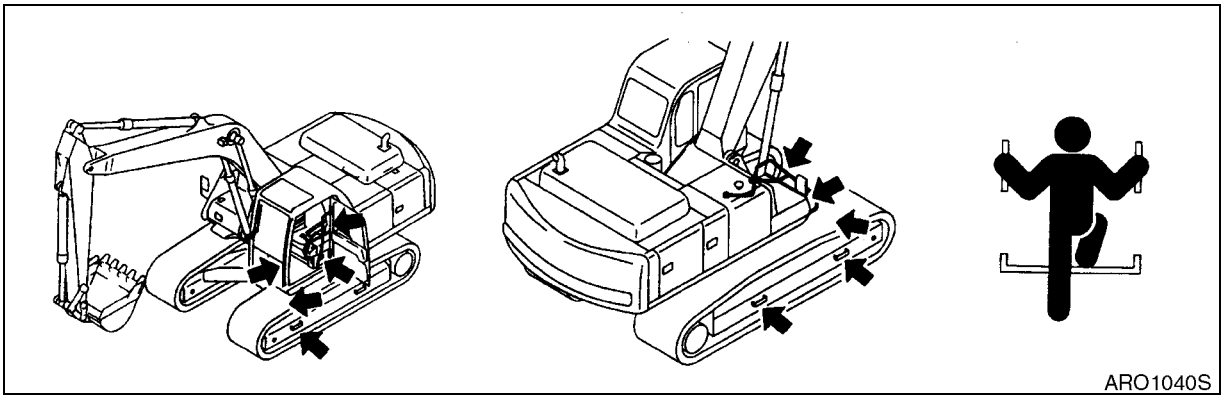


Figure 3

FUEL, OIL AND HYDRAULIC FLUID FIRE HAZARDS

Fuel, oil and antifreeze will catch fire if it is brought close to a flame. Fuel is particularly flammable and can be hazardous.

Always strictly observe the following.

Add fuel, oil, antifreeze and hydraulic fluid to the machine only in a well-ventilated area. The machine must be parked with controls, lights and switches turned "OFF." The engine must be "OFF" and any flames, glowing embers, auxiliary heating units or spark-causing equipment must be doused, turned off and/or kept well clear of the machine.

Static electricity can produce dangerous sparks at the fuel filling nozzle. In very cold, dry weather or other conditions that could produce a static discharge, keep the tip of the fuel nozzle in constant contact with the neck of the fuel filling nozzle, to provide a ground.

Keep fuel and other fluid reservoir caps tight and do not start the engine until caps have been secured.

Figure 4

PRECAUTIONS WHEN HANDLING FLUIDS AT HIGH TEMPERATURE

Immediately after operations are stopped, the coolant, engine oil, and hydraulic oil are at high temperature and the radiator and hydraulic tank are still under pressure. Attempting to remove the cap, drain the oil or coolant, or replace the filters may lead to serious burns. Always wait for the temperature to go down, and follow the specified procedures when carrying out these operations.

To prevent hot coolant from spurting out, shut down engine, wait for the coolant to cool, then loosen the cap slowly to relieve the pressure.

To prevent hot oil from spurting out, shut down engine, wait for the oil to cool, then loosen the cap slowly to relieve the pressure.

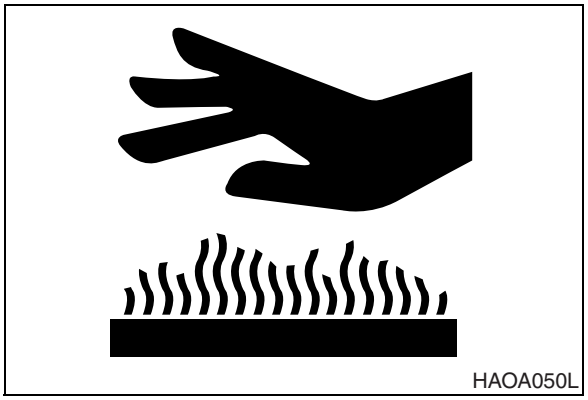


Figure 5

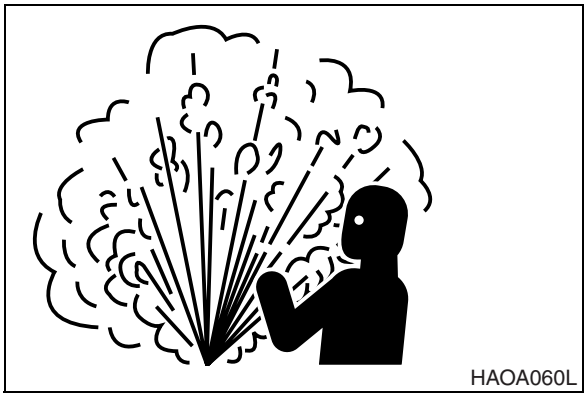


Figure 6

ASBESTOS DUST HAZARD PREVENTION

Asbestos dust can be HAZARDOUS to your health if it is inhaled. Materials containing asbestos fiber can be present on work site. Breathing air that contains asbestos fiber can ultimately cause serious or fatal lung damage. To prevent lung damage from asbestos fiber, observe following precautions;

- Use a respirator that is approved for use in an asbestos-laden atmosphere.
- Never use compressed air for cleaning.
- Use water for cleaning to keep down the dust.
- Work on the machine or component with the wind at your back whenever possible.
- Always observe any rules and regulations related to the work site and working environment.

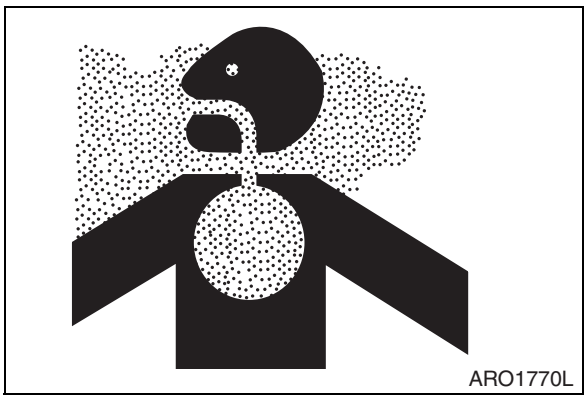


Figure 7

INJURY FROM WORK EQUIPMENT

Do not enter or put your hand, arm or any other part of your body between movable parts, such as between the work equipment and cylinders, or between the machine and work equipment.

If the control levers are operated, the clearance between the machine and the work equipment will change and this may lead to serious damage or personal injury.

If going between movable parts is necessary, always position and secure the work equipment so that it cannot move.

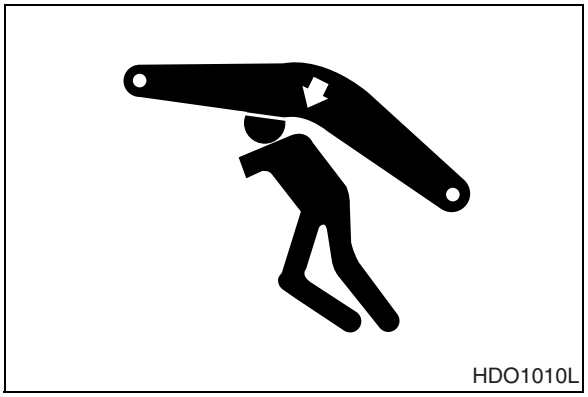


Figure 8

FIRE EXTINGUISHER AND FIRST AID KIT

As a precaution if any injury or fire should occur, always do the following.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know now to use them. It is recommended that an appropriately sized (2.27 kg [5 lb] or larger) multipurpose "A/B/C" fire extinguisher be mounted in the cab. Check and service the fire extinguisher at regular intervals and make sure that all work site crew members are adequately trained in its use.

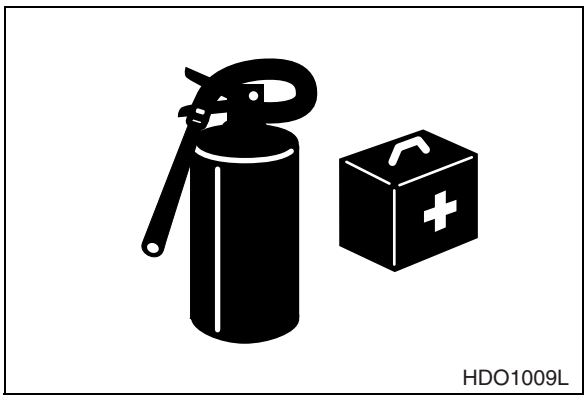


Figure 9

- Provide a first aid kit in the storage compartment and keep another at the work site. Check the kit periodically and make any additions if necessary.
- Know what to do in case of injury from fire.
- Keep emergency numbers for doctor, ambulance service, hospital and fire department near your telephone.

If the machine catches fire, it may lead to serious personal injury or death. If a fire occurs during operation, escape from the machine as follows;

- Turn the starter switch "OFF" and shut down engine.
- If there is time, use the fire extinguisher to extinguish as much of the fire as possible.
- Use the handrails and steps to escape from the machine.

The above is the basic method for escaping from the machine, but changing the method may be necessary according to the conditions, so carry out practice drills at the work site.

PROTECTION FROM FALLING OR FLYING OBJECTS

On work sites where there is danger that falling objects or flying objects may hit the operator's cab select a guard to match the operating conditions to protect the operator.

Working in mines, tunnels, deep pits or on loose or wet surfaces could produce danger of falling rock or hazardous flying objects. Additional protection for the operator's cab could be required in the form of a FOPS (Falling Object Protective Structure) or window guards.

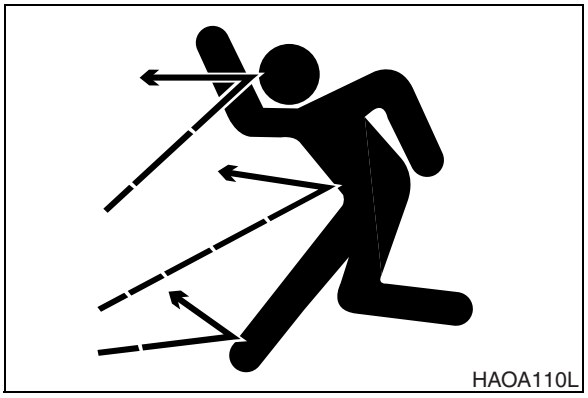


Figure 10

Never attempt to alter or modify any type of protective structure reinforcement system, by drilling holes, welding, remounting or relocating fasteners. Any serious impact or damage to the system requires a complete integrity reevaluation. Reinstallation, recertification and/or replacement of the system may be necessary.

Contact your Daewoo distributor for available safety guards and/or recommendations if there is any danger of getting hit by objects that could strike the operator's cab. Make sure that all other work site crew members are kept well away from the excavator and safe from possible hazards.

Figure 11

For breaker operation, install a front guard and apply a laminated coating sheet to the front glass. Contact your DAEWOO distributor for recommendations.

When carrying out demolition or cutting operation, install a front guard and top guard, and apply a laminated coating sheet to the front glass.

When working in mines or quarries where there is danger of falling rock, install FOPS (Falling Objects Protective Structure) and apply a laminated coating sheet to the front glass.

If any glass on the machine is broken, replace it with new glass immediately.

ATTACHMENT PRECAUTIONS

Option kits are available through your dealer. Contact Daewoo for information on available one-way (single-acting) and two-way (double-acting) piping / valving / auxiliary control kits. Because Daewoo cannot anticipate, identify or test all of the attachments that owners may wish to install on their machines, please contact Daewoo for authorization and approval of attachments, and their compatibility with options kits.

ACCUMULATOR

The pilot control system is equipped with an accumulator. For a brief period of time after the engine has been shut down, the accumulator will store a pressure charge that may enable hydraulic controls to be activated. Activation of any controls may enable the selected function to operate under force of gravity.

When performing maintenance on the pilot control system, the hydraulic pressure in the system must be released as describe in “Handling of Accumulator” on page 4-66.

The accumulator is charged with high-pressure nitrogen gas, so it is extremely dangerous if it is handled in the wrong way. Always observe the following precautions;

- Do not drill or make any holes in the accumulator or expose it any flame, fire or heat source.
- Do not weld on the accumulator, or try attaching anything to it.
- When carrying out disassembly or maintenance of the accumulator, or when disposing of the accumulator, the charged gas must be properly released. Contact your Daewoo distributor.
- Wear safety goggles and protective gloves when working on an accumulator. Hydraulic oil under pressure can penetrate the skin and cause serious injuries.

INDOOR VENTILATION

Engine exhaust gases can cause fatal accidents, and unconsciousness, loss of alertness, judgement and motor control and serious injury.

Make sure there is adequate ventilation before starting the engine in any enclosed area.

You should also be aware of open windows, doors or ductwork into which exhaust may be carried, or blown by the wind, exposing others to danger.

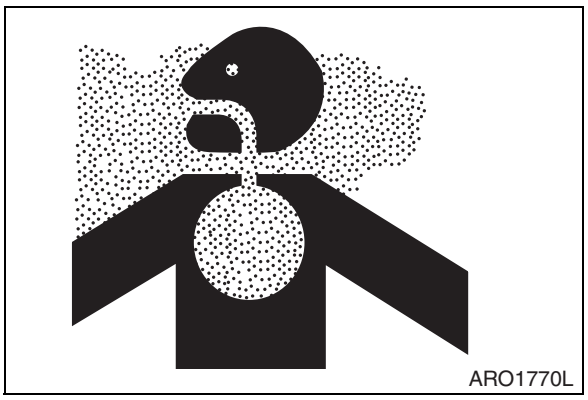


Figure 12

EMERGENCY EXIT

This machine is equipped with a glass breaking tool. It is behind the operator seat in the upper right corner of the cab. This tool can be used in case of an emergency situation that requires the breaking of glass to exit from the operator's cabin. Grip the handle firmly and use the sharp point to break the glass.

⚠ WARNING!

Protect your eyes when breaking the glass.

Figure 13

BEFORE STARTING ENGINE

WORK SITE PRECAUTIONS

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

Check the terrain and condition of the ground at the work site, and determine the best and safest method of operation.

Make the ground surface as hard and horizontal as possible before carrying out operations. If there is a lot of dust and sand on the work site, spray water before starting operations.

If you need to operate on a street, protect pedestrians and cars by designating a person for work site traffic duty or by erecting fences and posting "No Entry" signs around the work site.

Erect fences, post "No Entry" signs, and take other steps to prevent people from coming close to or entering the work site. If people come close to a moving machine, they may be hit or caught by the machine, and this may lead to serious personal injury or death.

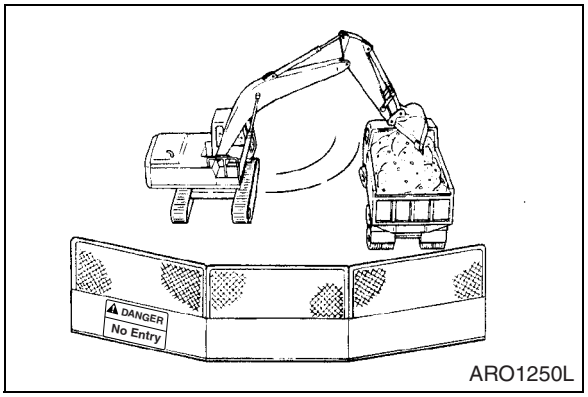


Figure 14

Water lines, gas lines, phone lines and high-voltage electrical lines may be buried under the work site. Contact each utility and identify their locations. Be careful not to damage or cut any of these lines.

Check the condition of the river bed, and the depth and flow of the water before operating in water or crossing a river. NEVER be in water that is in excess of the permissible water depth.

Any type of object in the vicinity of the boom could represent a potential hazard, or cause the operator to react suddenly and cause an accident. Use a spotter or signal person working near bridges, phone lines, work site scaffolds, or other obstructions.

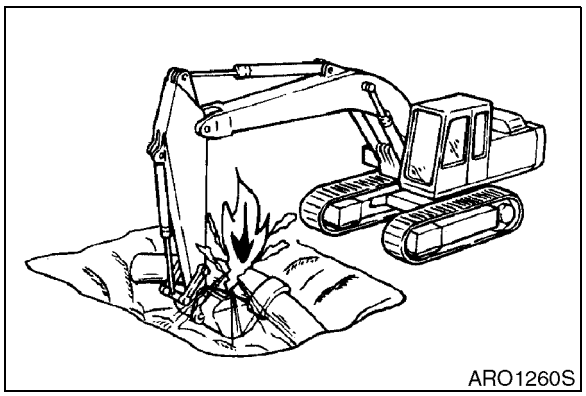


Figure 15

Minimum levels of insurance coverage, work permits or certification, physical barriers around the work site or restricted hours of operation may be mandated by governing authorities. There may also be regulations, guidelines, standards or restrictions on equipment that may have to be followed for local requirements. There may also be regulations related to performing certain kinds of work. If there is any question about whether your machine and work site complies with the applicable standards and regulations contact your local authorities and agencies.

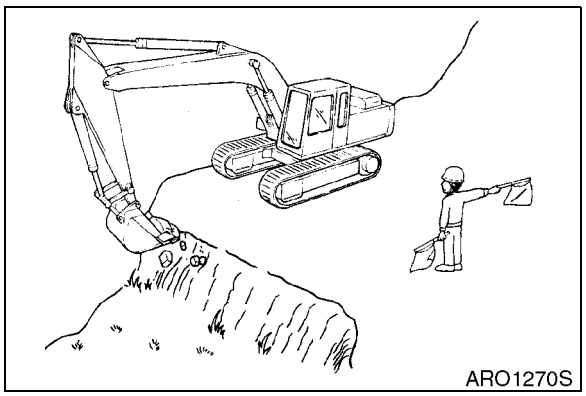


Figure 16

Avoid entering soft ground. It will be difficult for the machine to escape.

Avoid operating your machine to close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse, the machine could fall or tip over and this could result in serious injury or death.

Remember that the soil after heavy rain, blasting or after earthquakes, is weakened in these areas.

Earth laid on the ground and the soil near ditches is loose. It can collapse under the weight of vibration of your machine and cause your machine to tip over.

Install the head guard (FOPS) if working in areas where there is danger of falling rocks.

CHECKS BEFORE STARTING ENGINE

Every day before starting the engine for the first time, carry out the following checks. If these checks are not carried out properly, there is danger of serious injury.

Completely remove all wood chips, leaves, grass, paper and other flammable materials accumulated in the engine compartment and around the battery. They could cause a fire. Remove any dirt from the window glass, mirrors, handrails, and steps.

Do not leave tools or spare parts laying around in the operator's compartment. The vibration of the machine when traveling or during operations may cause them to fall and damage or break the control levers or switches. They may also get caught in the gap of the control levers and cause the work equipment to malfunction or move dangerously. This may lead to unexpected accidents.

Check the coolant level, fuel level, and hydraulic tank oil level, and check for clogged air cleaner and damage to the electrical wiring.

Adjust the operator's seat to a position where it is easy to operate the machine, and check the seat belt and mounts for damage and wear.

Check the operation of the gauges and the angle of the mirrors, and check that the safety lever is in "LOCKED" position.

If any abnormalities are found in the above checks, carry out repairs immediately.

ENGINE STARTING

Walk around your machine before getting in the operator's cab. Look for evidence of leaking fluid, loose fasteners, misaligned assemblies or any other indications of possible equipment hazard.

All equipment covers and machinery safety guards must be in place, to protect against injury while the machine is being operated.

Look around the work site area for potential hazards, people or properly that could be at risk while operation is in progress.

NEVER start the engine if there is any indication that maintenance or service work is in progress, or if a warning tag is attached to controls in the cab.

A machine that has not been used recently, or is being operated in extremely cold temperatures, could require a warm-up or maintenance service before start-up.

Check gauges and monitor displays for normal operation before starting the engine. Listen for unusual noises and remain alert for other potentially hazardous conditions at the start of the work cycle.

Do not short circuit the starting motor to start the engine. This is not only dangerous, but may also damage the machine.

When starting the engine, sound the horn as an alert.

Start and operate the machine only while seated.

BEFORE OPERATING MACHINE

If checks are not carried out properly after starting the engine, it may result in a delay in discovering abnormalities in the machine, and this may lead to personal injury or damage to the machine.

Carry out the checks in an open area where there are no obstructions. Do not let anyone near the machine when carrying out the checks.

- Check the operating condition of the equipment, and the actuation of the bucket, arm, boom, travel, and swing systems.
- Check the machine for any abnormal noise, vibration, heat, smell, or abnormality with the gauges. Check also for leakage of air, oil, and fuel.
- If any abnormality is found, repair the problem immediately. If the machine is used without repairing the problems, it may lead to unexpected injury or failure.
- Clear all personnel from directly around machine and from the area.
- Clear all obstacles from the machine's path. Beware of hazards.
- Be sure that all windows are clean. Secure the doors and the windows in the open position or in the shut position.
- Adjust the rear view mirrors for best visibility close to the machine. Make sure that the horn, the travel alarm (if equipped), and all other warning devices are working properly.
- Fasten the seat belt securely.
- Warm up the engine and hydraulic oil before operating machine.
- Before moving the machine, check the position of undercarriage. The normal travel position is with idler wheels to the front under the cab and the drive sprockets to the rear. When the undercarriage is in the reversed position, the travel controls must be operated in opposite directions.

WHEN SWINGING OR CHANGING DIRECTION OF TRAVEL

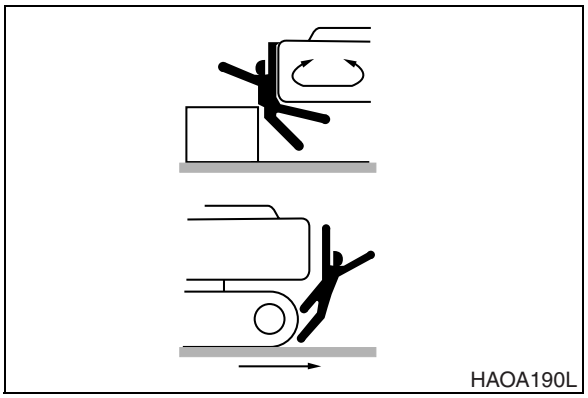


Figure 17

Before operating the machine or the work equipment, always observe the following precautions to prevent serious injury or death.

- When changing the direction of travel from forward to reverse or from reverse to forward, reduce speed early and stop the machine before changing the direction of travel.
- Sound the horn to warn people in the area.
- Check that there is no one in the area around the machine. There are blind spots behind the machine, so if necessary, swing the upper structure to check that there is no one behind the machine before traveling in reverse.
- When operating in areas that may be hazardous or have poor visibility, designate a person to direct work site traffic.
- Ensure that no unauthorized person can come within the turning radius or direction of travel.

Be sure to observe the above precautions even if a travel alarm or mirrors are installed.

TRAVEL PRECAUTIONS

Never turn the starting switch to the "O" (OFF) position when traveling. It is dangerous if the engine stops when the machine is traveling. It will be impossible to operate the steering.

Attachment control levers should not be operated while traveling.

Do not change selected travel mode (FAST/SLOW) while traveling.

Fold in work equipment so that the outer end of the boom is as close to the machine as possible, and is 40-50 cm (16 - 20 in) above ground.

Never travel over obstacles or slopes that will cause the machine to tilt severely. Travel around any slope or obstacle that causes the machine to tilt 10 degrees or more to the right or left, or 30 degrees or more from front to rear.

Do not operate the steering suddenly. The work equipment may hit the ground and cause the machine to lose its balance, and this may damage the machine or structures in the area.

When traveling on rough ground, travel at low speed, and avoid sudden changes in direction.

Always keep to the permissible water depth. Permissible water depth is to the centerline of the upper track rollers.

When traveling over bridges or structures on private land, check first that the bridge or structure can withstand the weight of the machine. When traveling on public roads, check with the local authorities and follow their instructions.

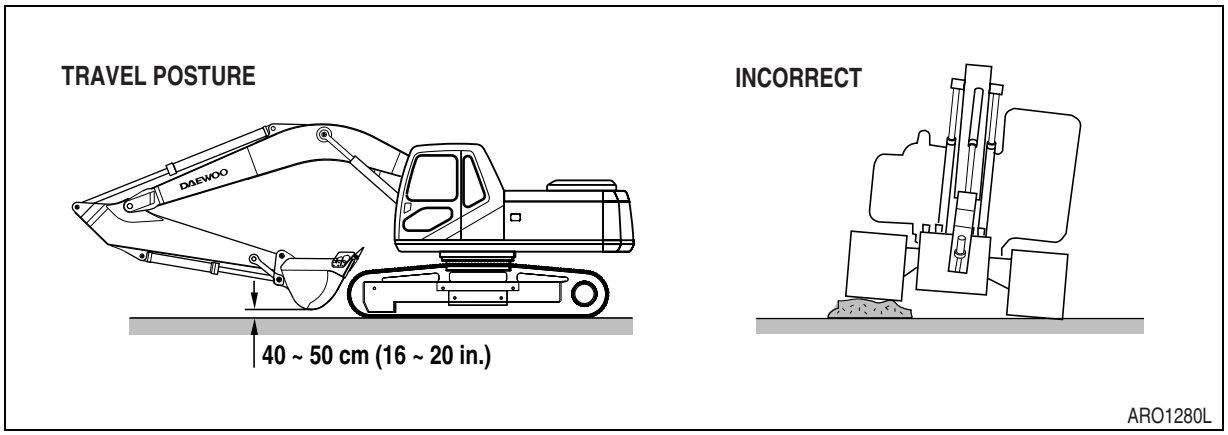


Figure 18

TRAVELING ON SLOPES

Never jump onto a machine that is running away to stop it. There is danger of serious injury.

Traveling on slopes could result in the machine tipping over or slipping.

On hills, banks or slopes, carry the bucket approximately 20 - 30 cm (8 - 12 in) above the ground. In case of an emergency, quickly lower the bucket to the ground to help stop the machine.

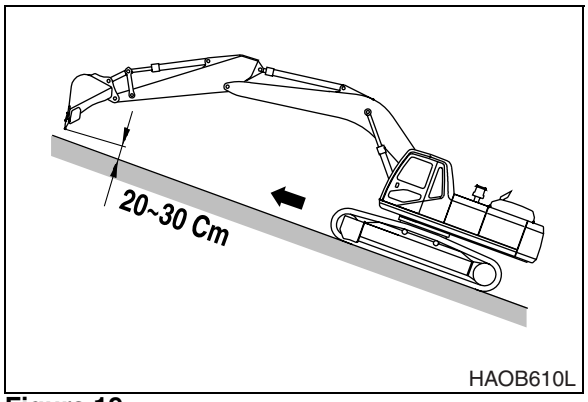


Figure 19

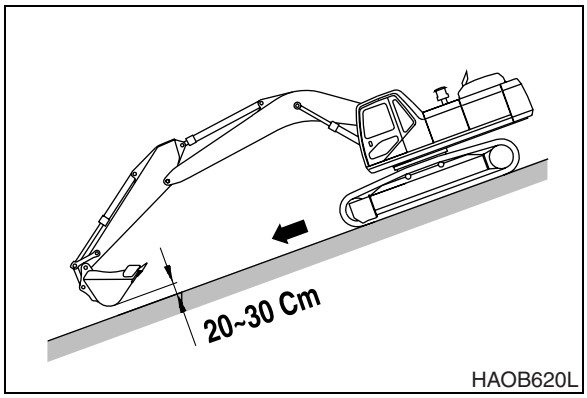


Figure 20

Do not travel on grass, fallen leaves, or wet steel plates. Even slight slopes may cause the machine to slip to the side, so travel at low speed and make sure that the machine is always traveling directly up or down the slope.

Avoid changing the direction of travel on a slope. This could result in tipping or side slipping of the machine.

When possible, operate the machine up slopes and down slopes. Avoid operating the machine across the slope, when possible.

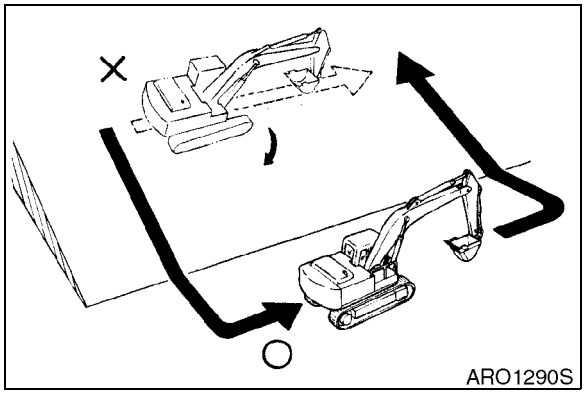


Figure 21

PROHIBITED OPERATIONS

Do not dig the work face under an overhang. This may cause the overhang to collapse and fall on top of the machine.

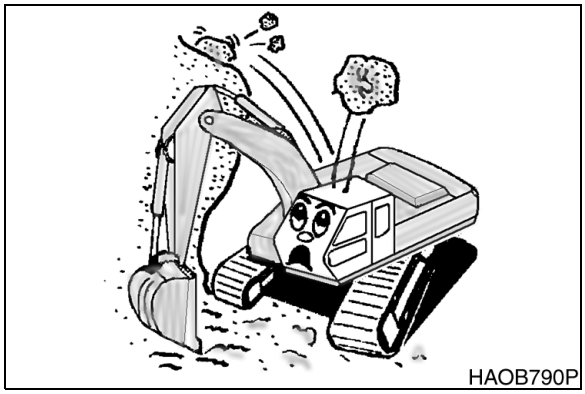


Figure 22

Do not carry out deep digging under the front of the machine. The ground under the machine may collapse and cause the machine to fall.

Working heavy loads over loose, soft ground or uneven, broken terrain can cause dangerous side load conditions and possible tipover and injury. Travel without a load or a balanced load may also be hazardous.

Never relay on lift jacks or other inadequate supports when work is being done. Block tracks fore and aft to prevent any movement.

When using the machine, to prevent accidents caused by damage to the work equipment and overturning because of an excessive load, do not use the machine in excess of its ability (in terms of the maximum load and stability determined by the structure of the machine).

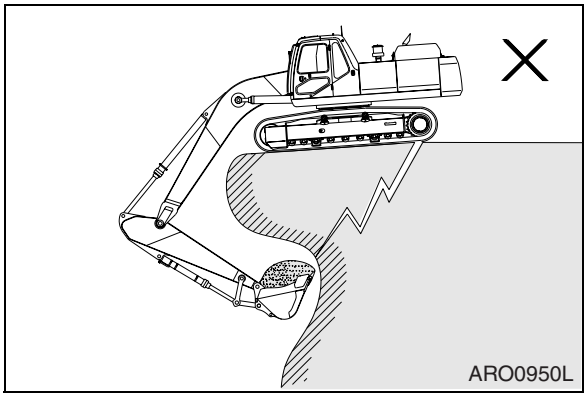


Figure 23

PRECAUTIONS FOR OPERATION

Be careful not to go close to the edge of a cliff by mistake.

Use the machine only for its main purpose. Using it for other purposes will cause failures.

To ensure an ample view, do as follows:

- When working in dark areas, attach working lights and front lights to the machine. If necessary, set up lighting at the work site.
- Stop operations when the visibility is poor, such as in fog, mist, snow, and rain. Wait for the visibility to improve to a level which causes no problems for the operation.

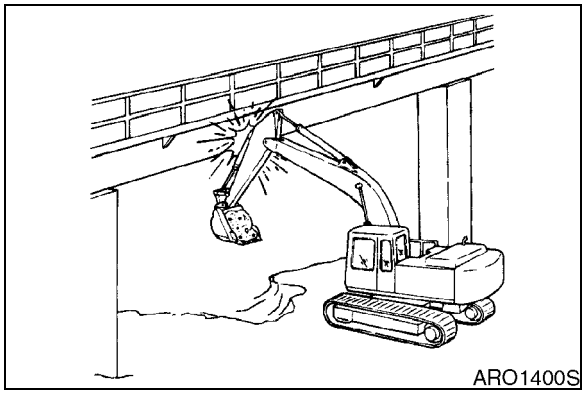


Figure 24

To avoid hitting the work equipment, always do the following;

- When working in tunnels, on bridges, under electric wires, or when parking the machine or carrying out other operations in places with limited height, be extremely careful not to hit the bucket or other parts.
- To prevent collisions, operate the machine at a safe speed when working in confined spaces, indoors, or in crowded areas.
- Do not pass the bucket over the heads of workers or over the operator's compartment of dump truck.

AVOID HIGH-VOLTAGE CABLES

Serious injury or death can result from contact or proximity to high-voltage electric lines. The bucket does not have to make physical contact with power lines for current to be transmitted.

Use a spotter and hand signals to stay away from power lines not clearly visible to the operator.

Voltage	Minimum Safe Distance
6.6 kV	3 m (9' 10")
33.0 kV	4 m (13' 1")
66.0 kV	5 m (16' 5")
154.0 kV	8 m (26' 3")
275.0 kV	10 m (32' 10")

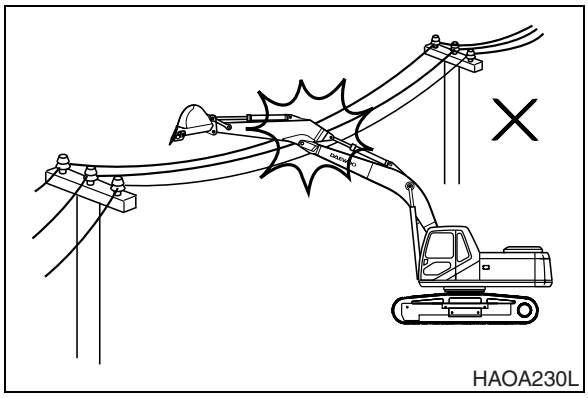


Figure 25

Use these minimum distances as a guideline only. Depending upon the voltage in the line and atmospheric conditions, strong current shocks can occur with the boom or bucket as far away as 4 - 6 m (13 - 20 ft) from the power line. Very high voltage and rainy weather could further decrease that safety margin.

NOTE: *Before starting any type of operation near power lines (either above ground or buried cable-type), you should always contact the power utility directly and work out a safety plan with them.*

OPERATE CAREFULLY ON SNOW, ICE AND IN VERY COLD TEMPERATURES

In icy cold weather avoid sudden travel movements and stay away from even slight slopes. The machine could skid off to one side very easily.

Snow accumulation could hide or obscure potential hazards. Use care while operating or while using the machine to clear snow.

Warming up the engine for a short period may be necessary, to avoid operating with sluggish or reduced working capacity. The jolting shocks and impact loads caused by bumping or bottoming the boom or attachment are more likely to cause severe stress in very cold temperatures. Reducing work cycle rate and work load may be necessary.

When the temperature rises, frozen road surfaces become soft, so the machine travel becomes unstable.

In cold weather, do not touch metal surfaces with your bare hands. If you touch a metal surface in extremely cold weather, your skin may freeze to the metal surface.

OPERATIONS ON SLOPES

When working on slopes. there is danger that the machine may lose its balance and turn over, when swinging, or when work equipment is operated. Always carry out these operations carefully.

Do not swing the work equipment from the uphill side to the downhill side when the bucket is loaded. This operation is dangerous.

If the machine has to be used on a slope, pile the soil to make a platform that will keep the machine as horizontal as possible.

In addition, lower the bucket as far as possible, keep it pulled into the front, and keep the swing speed as low as possible.

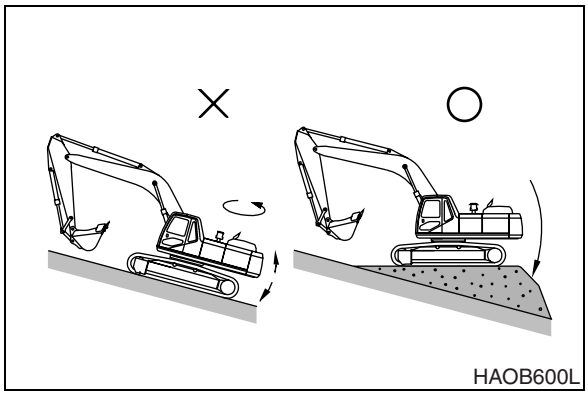


Figure 26

PARKING MACHINE

Avoid making sudden stops, or parking the machine wherever it happens to be at the end of the work day. Plan ahead so that the excavator will be on firm, level ground away from traffic and away from high walls, cliff edges and any area of potential water accumulation or runoff. If parking on inclines is unavoidable, block the crawler tracks to prevent movement. Lower the bucket or other working attachment completely to the ground, or to an overnight support saddle. There should be no possibility of unintended or accidental movement.

When parking on public roads, provide fences, signs, flags, or lights, and put up any other necessary signs to ensure that passing traffic can see the machine clearly, and park the machine so that the machine, flags, and fences do not obstruct traffic.

After the front attachment has been lowered to an overnight storage position and all switches and operating controls are in the "OFF" position, the safety lock lever must be set to the "LOCKED" position. This will disable all pilot circuit control functions.

Always close the door of the operator's compartment.

NEVER LET ANYONE RIDE ON ATTACHMENT

Never let anyone ride on any work attachment, such as the bucket, crusher, grapple, or clamshell (grab bucket). There is a danger of the person falling and suffering serious injury.

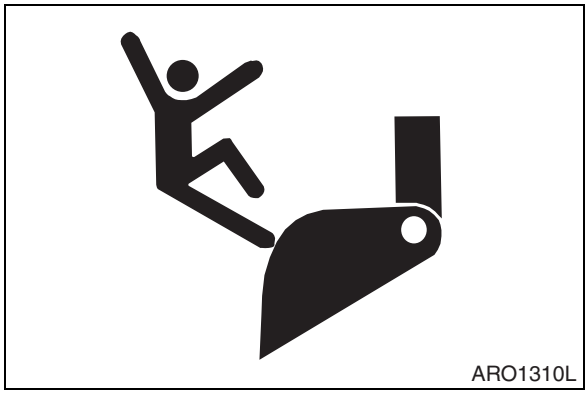


Figure 27

MAINTENANCE

WARNING TAG

Alert others that service or maintenance is being performed and tag operator's cab controls – and other machine areas if required – with a warning notice. OSHA mandated control lever lockout can be made with any OSHA certified lockout device and a length of chain or cable to keep the left-hand control console in the fully raised, nonactive position.

Warning tags, for controls are available from Daewoo distributors.

Figure 28

CLEAN BEFORE INSPECTION OR MAINTENANCE

Clean the machine before carrying out inspection and maintenance. This prevents dirt from getting into the machine and also ensures safety during maintenance.

If inspection and maintenance are carried out when the machine is dirty, it will become more difficult to locate the problems, and also there is danger that you may get dirt or mud in your eyes or that you may slip and injure yourself.

When washing the machine, do the following;

- Wear shoes with nonslip soles to prevent yourself from slipping and falling on wet places.
- Wear safety glasses and protective clothing when washing the machine with high-pressure steam.
- Take action to prevent touching high-pressure water and cutting your skin or having mud fly into your eyes.
- Do not spray water directly on electrical components (sensors, connector) (1, Figure 29). If water gets into the electrical system, there is danger that it will cause defective operation and malfunction.

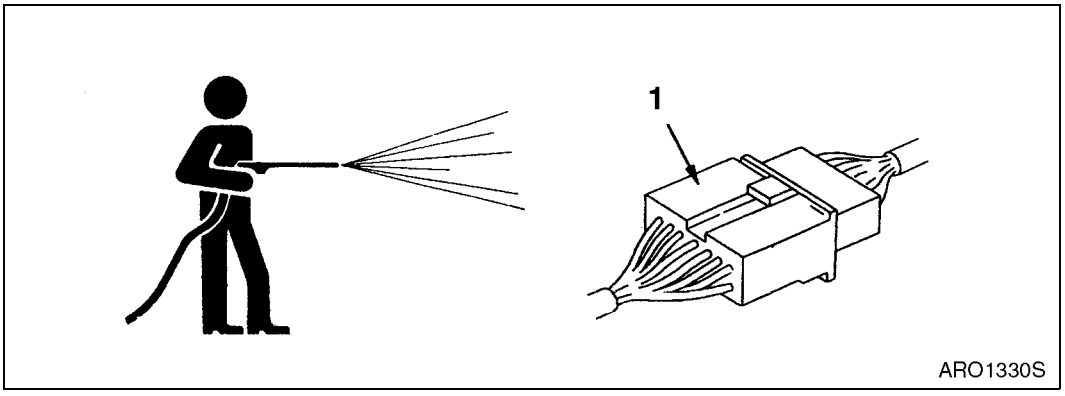


Figure 29

Pick up any tools or hammers that are laying in the work place, wipe up any grease or oil or any other slippery substances, and clean the area to make it possible to carry out the operation in safety. If the work place is left untidy, you may trip or slip and suffer injury.

PROPER TOOLS

Use only tools suited to the task. Using damaged, low qualify, faulty, or makeshift tools could cause personal injury. There is danger that pieces from, chisels with crushed heads, or hammers, may get into your eyes and cause blindness.

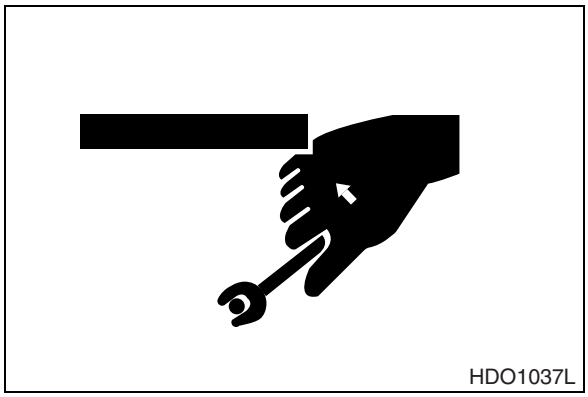


Figure 30

USE OF LIGHTING

When checking fuel, oil, battery electrolyte, or window washing fluid, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion.

If work is carried out in dark places without using lighting, it may lead to injury, so always use proper lighting.

Even if the place is dark, never use a lighter or flame instead of lighting. There is danger of fire. There is also danger that the battery gas may catch fire and cause and explosion.

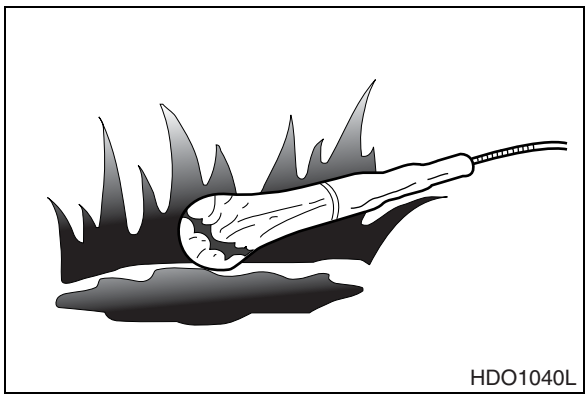


Figure 31

FIRE PREVENTION AND EXPLOSION PREVENTION

All fuels, most lubricants and some coolant mixtures are flammable. Leaking fuel or fuel that is spilled onto hot surfaces or onto electrical components can cause a fire.

Store all fuels and all lubricants in properly marked containers and away from all unauthorized persons.

Store oily rags and other flammable material in a protective container.

Do not smoke while you refuel the machine or while you are in a refueling area.

Do not smoke in battery charging areas or in areas the contain flammable material.

Clean all electrical connections and tighten all electrical connections. Check the electrical wires daily for wires that are loose of frayed. Tighten all lose electrical wires before you operate the machine. Repair all frayed electrical wires before you operate the machine.

Remove all flammable materials before they accumulate on the machine.

Do not weld on pipes or on tubes that contain flammable fluids. Do not flame cut on pipes or on tubes that contain flammable fluids. Before you weld on pipes or on tubes or before you flame cut on pipes or on tubes, clean the pipes or tubes thoroughly with a nonflammable solvent.

BURN PREVENTION

When checking the radiator coolant level, shut down engine, let the engine and radiator cool down, then check the coolant recovery tank. If the coolant level in the coolant recovery tank is near the upper limit, there is enough coolant in the radiator.

Loosen the radiator cap gradually to release the internal pressure before removing the radiator cap.

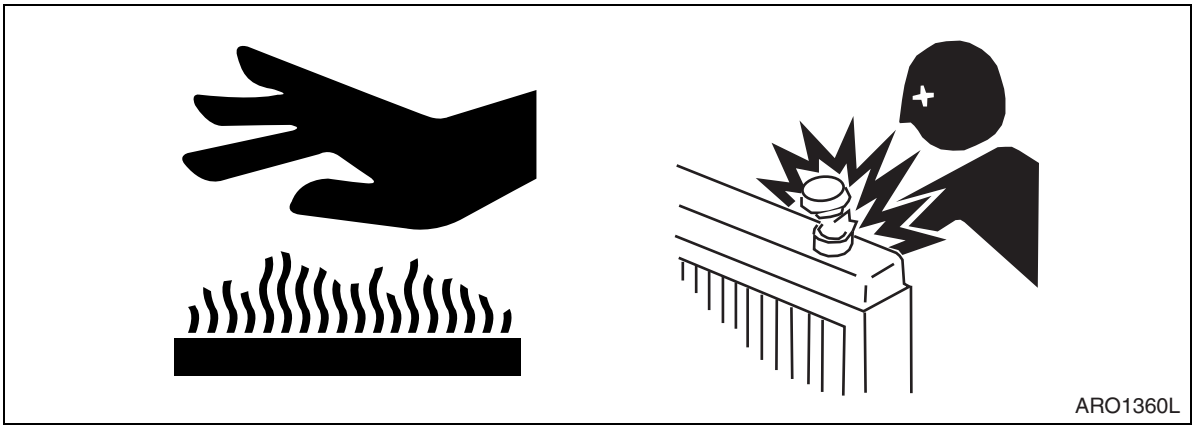


Figure 32

If the coolant level in the coolant recovery tank is below the lower limit, add coolant.

Cooling system conditioner contains alkali. Alkali can cause personal injury. Do not allow alkali to contact the skin, the eyes, or the mouth.

Allow cooling system components to cool before you drain the cooling system.

Hot oil and hot components can cause personal injury. Do not allow hot oil or hot components to contact the skin.

Remove the hydraulic tank filter plug only after the engine has been stopped. Make sure that the hydraulic tank filter plug is cool before you remove it with your bare hand. Remove the hydraulic tank filter plug slowly to relieve pressure.

Relieve all pressure in the hydraulic oil system, in the fuel system, or in the cooling system before you disconnect any lines, fittings, or related items.

Batteries give off flammable fumes that can explode.

Do not smoke while you are checking the battery electrolyte levels.

Electrolyte is an acid. Electrolyte can cause personal injury. Do not allow electrolyte to contact the skin or the eyes.

Always wear protective glasses when you work on batteries.

WELDING REPAIRS

When carrying out welding repairs, carry out the welding in a properly equipped place. The welding should be performed by a qualified worker. During welding operations, there is the danger of, generation of gas, fire, or electric shock, so never let an unqualified worker do welding.

The qualified welder must do the following;

- To prevent explosion of the battery, disconnect the battery terminals and remove batteries.
- To prevent generation of gas, remove the paint from the location of the weld.
- If hydraulic equipment, piping or places close to them are heated, a flammable gas or mist will be generated and there is danger of it catching fire. To avoid this, never subject these places to heat.
- Do not weld on pipes or on tubes that contain flammable fluids. Do not flame cut on pipes or on tubes that contain flammable fluids. Before you weld on pipes or on tubes or before you flame cut on pipes or on tubes, clean the pipes or tubes thoroughly with a nonflammable solvent.
- If heat is applied directly to rubber hoses or piping under pressure, they may suddenly break so cover them with a fireproof covering.
- Wear protective clothing.
- Make sure there is good ventilation.
- Remove all flammable objects and provide a fire extinguisher.

WARNING FOR COUNTERWEIGHT AND FRONT ATTACHMENT REMOVAL

⚠ DANGER!

Daewoo warns any user, that the removal of the counterweight from the machine, front attachment or any other part, may affect the stability of the machine. This could cause unexpected movement, resulting in death or serious injuries. Daewoo is not liable for any misuse.

Never remove the counterweight or front attachment unless the upper structure is in-line with the lower structure.

Never rotate the upper structure once the counterweight or front attachment has been removed.

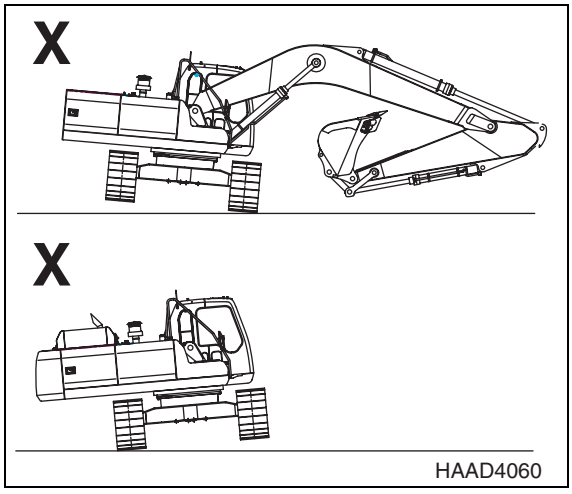


Figure 33

PRECAUTIONS FOR REMOVAL, INSTALLATION, AND STORAGE OF ATTACHMENTS

Before starting removal and installation of attachments, decide the team leader.

Do not allow anyone except the authorized workers close to the machine or attachment.

Place attachments that have been removed from the machine in a safe place so that they do not fall. Put up a fence around the attachments and take other measures to prevent unauthorized persons from entering.

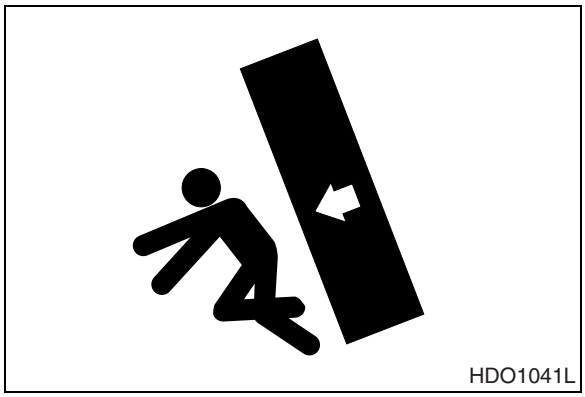


Figure 34

PRECAUTIONS WHEN WORKING ON MACHINE

When carrying out maintenance operations on the machine, keep the area around your feet clean and tidy to prevent you from falling. Always do the following;

- Do not spill oil or grease.
- Do not leave tools laying about.
- Watch your step when walking.

Never jump down from the machine. When getting on or off the machine, use the steps and handrails, and maintain a three-point contact (both feet and one hand or both hands and one foot) to support yourself securely.

If the job requires it, wear protective clothing.

To prevent injury from slipping or falling, when working on the hood or covers, never use any part except the inspection passage fitted with nonslip pads.

Figure 35

LOCK INSPECTION COVERS

When carrying out maintenance with the inspection cover open, lock the cover securely in position with the lock bar.

If maintenance work is carried out with the inspection cover open but not locked, there is danger that it may suddenly close and cause injury if there is a gust of wind.

CRUSHING PREVENTION AND CUTTING PREVENTION

You should always have at least two people working together if the engine must be run during service. One person needs to remain in the operator's seat, ready to work the controls or stop the machine and shut off the engine.

Unless you are instructed otherwise, never attempt adjustments while the machine is moving or while the engine is running.

Stay clear of all rotating parts and moving parts.

Keep objects away from moving fan blades. The fan blades will throw objects and the fan blades can cut objects.

Do not use a wire rope cable that is kinked or flayed. Wear gloves when you handle a wire rope cable.

When you strike a retainer pin, the retainer pin might fly out. The loose retainer pin can injure personnel. Make sure that the area is clear of people when you strike a retainer pin. To avoid injury to your eyes, wear protective glasses when you strike a retainer pin.

TRACK TENSION ADJUSTMENTS REQUIRE CAUTION

Never turn out the track tension grease fitting nut. To release pressure from the crawler frame track tension assembly, you should NEVER attempt to disassemble the track adjuster or attempt to remove the grease fitting or valve assembly.

Keep your face and body away from the valve. Refer to the track adjustment procedure in the Operator and Maintenance Manual or Shop Manual.

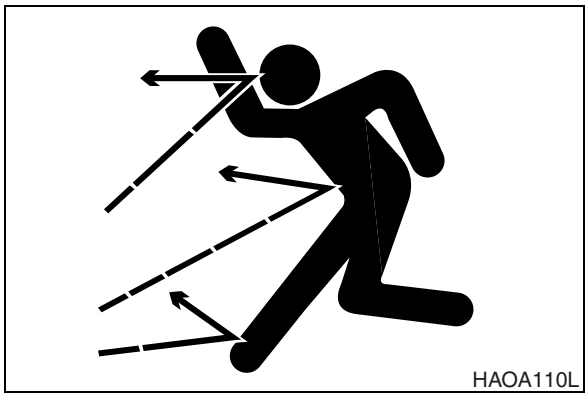


Figure 36

SUPPORTS AND BLOCKING FOR WORK EQUIPMENT

Do not allow weight or equipment loads to remain suspended. Lower everything to the ground before leaving the operator's seat. Do not use hollow, cracked or unsteady, wobbling weight supports. Do not work under any equipment supported solely by a lift jack.

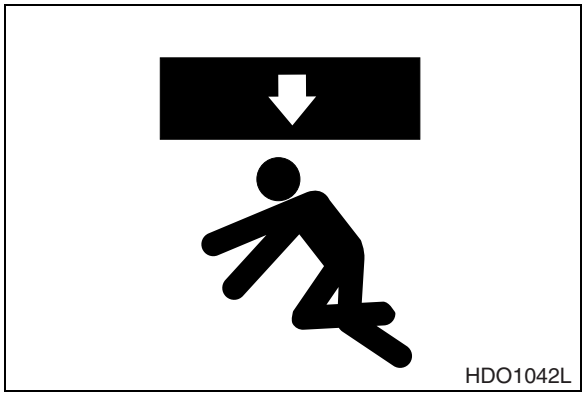


Figure 37

ACTION WHEN ABNORMALLY IS FOUND DURING INSPECTION

If any abnormality is found during inspection, always carry out repairs. In particular, if the machine is used when there are still problems with the brake or work equipment systems, it may lead to serious injury.

If necessary depending on the type of failure, please contact your Daewoo distributor for repairs.

PRECAUTIONS WITH HIGH-PRESSURE LINE, TUBES AND HOSES

When inspecting or replacing high-pressure piping or hoses, check that the pressure has been released from the circuit. Failure to release the pressure may lead to serious injury. Always do the following;

- Wear protective glasses and leather gloves.
- Fluid leaks from hydraulic hoses or pressurized components can be difficult to see but pressurized oil has enough force to pierce the skin and cause serious injury. Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands or expose your fingers.
- Do not bend high-pressure lines. Do not strike high-pressure lines. Do not install lines, tubes or hoses that are bent or damaged.
- Make sure that all clamps, guards and heat shields are installed correctly to prevent vibration, rubbing against other parts, and excessive heat during operation.
  - If any of the following conditions are found, replace the part.
  - Damage or leakage from hose end.
  - Wear, damage, cutting of covering, or exposure of strengthening wire layer.
  - Cover portion is swollen in places.
  - There is twisting or crushing at movable parts of hose.
  - Foreign material is embedded in the covering.
  - Hose end is deformed.

NOTE: *Refer to "Hose In-service Lifetime Limit (European Standard ISO 8331 and EN982 CEN)" on page 4-50, for additional European regulations.*

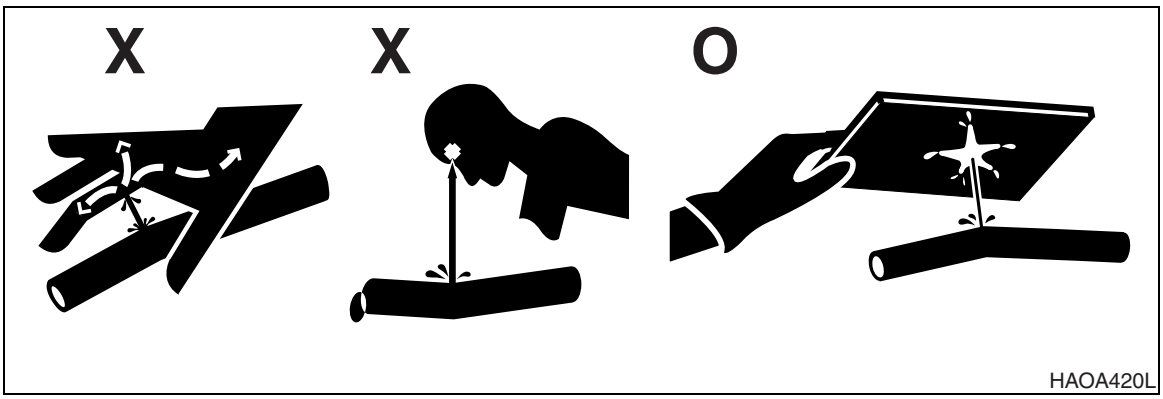


Figure 38

WASTE MATERIALS

Physical contact with used motor oil may pose a health risk. Wipe oil from your hands promptly and wash off any remaining residue.

Used motor oil is an environmental contaminant and may only be disposed of at approved collection facilities. To prevent pollution of the environment, always do the following;

- Never dump waste oil in a sewer system, rivers, etc.
- Always put oil drained from your machine in containers. Never drain oil directly onto the ground.
- Obey appropriate laws and regulations when disposing of harmful materials such as oil, fuel, solvent, filters, and batteries.

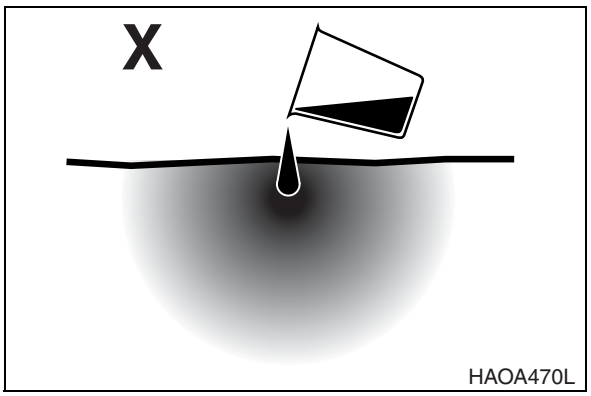


Figure 39

BATTERY

BATTERY HAZARD PREVENTION

Battery electrolyte contains diluted sulfuric acid and batteries generate hydrogen gas. Hydrogen gas is highly explosive, and mistakes in handling them can cause serious injury or fire. To prevent problems, always do the following;

- Do not smoke or bring any flame near the battery.
- When working with batteries, ALWAYS wear safety glasses and rubber gloves.
- If you spill battery electrolyte on yourself or your clothes, immediately flush the area with water.
- If battery electrolyte gets into your eyes, flush them immediately with large quantities of water and see a doctor at once.
- If you accidentally drink battery electrolyte, drink a large quantity of water or milk, raw egg or vegetable oil. Call a doctor or poison prevention center immediately.
- When cleaning the top surface of the battery, wipe it with a clean, damp cloth. Never use gasoline, thinner, or any other organic solvent or detergent.
- Tighten the battery caps securely.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with power from another source. There is danger that the battery may catch fire.
- When charging the battery or starting with power from another source, let the battery electrolyte melt and check that there is no leakage of battery electrolyte before starting the operation.
- Always remove the battery from the machine before charging.

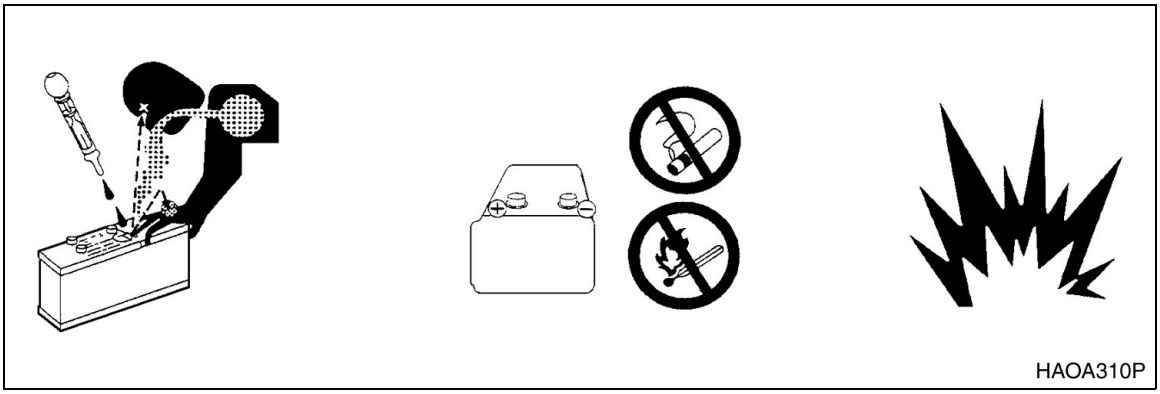


Figure 40

BOOST STARTING OR CHARGING ENGINE BATTERIES

If any mistake is made in the method of connecting the booster cables, it may cause an explosion or fire. Always do the following;

- Turn off all electrical equipment before connecting leads to the battery. This includes electrical switches on the battery charger or boost starting equipment.
- When boost-starting from another machine or vehicle do not allow the two machines to touch. Wear safety glasses or goggles while required battery connections are made.

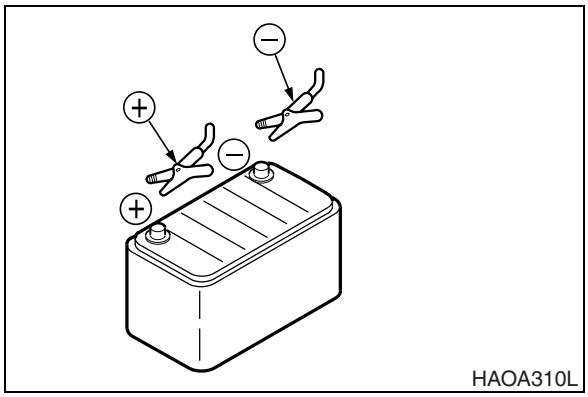


Figure 41

- 24 volt battery units consisting of two series-connected twelve volt batteries have a cable connecting one positive terminal on one of the 12 volt batteries to a negative terminal on the other battery. Booster or charger cable connections must be made between the nonseries-connected positive terminals and between the negative terminal of the booster battery and the metal frame of the machine being boosted or charged. Refer to the procedure and illustration in “Starting Engine With a Booster Cable” on page 3-8 of this manual.
- Connect positive cable first when installing cables and disconnect the negative cable first when removing them. The final cable connection, at the metal frame of the machine being charged or boost-started, should be as far away from the batteries as possible.

TOWING

PRECAUTIONS WHEN TOWING

If any mistake is made in the method of selecting or inspecting the towing wire or in the method of towing, it may lead to serious personal injury. Always do the following;

- Always use the method of towing given in this Operation and Maintenance Manual. Do not use any other method.
- Use leather gloves when handling the wire rope.
- When carrying out the preparation work for towing with two or more workers, determine the signals to use and follow these signals correctly.
- Always fit the towing rope to the left and right hooks and secure in position.
- If the engine on the problem machine will not start or there is a failure in the brake system. always contact your Daewoo distributor.
- Never go between the towing machine and the towed machine during the towing operation.
- It is dangerous to carry out towing on slopes, so select a place where the slope is gradual. If there is no place where the slope is gradual, carry out operations to reduce the angle of the slope before starting the towing operation.
- When towing a problem machine, always use a wire rope with a sufficient towing capacity.
- Do not use a frayed, kinked rope or a rope with any loss of diameter.
- Do not use the light-weight towing hook for towing another machine.

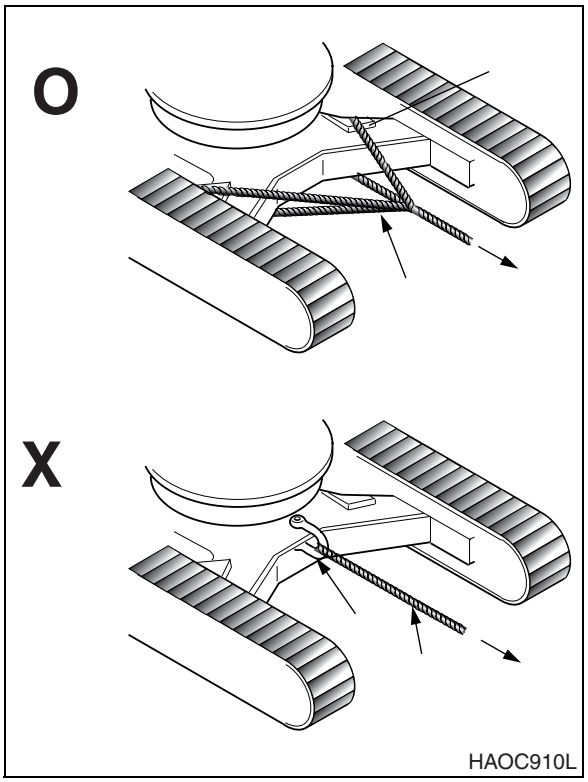


Figure 42

SHIPPING AND TRANSPORTATION

OBEY STATE AND LOCAL OVER-THE-ROAD REGULATIONS

Check state and local restrictions regarding weight, width and length of a load before making any other preparation for transport.

The hauling vehicle, trailer and load must all be in compliance with local regulations governing the intended shipping route.

Partial disassembly or tear-down of the excavator may be necessary to meet travel restrictions or particular conditions at the work site. See the Shop Manual for information on partial disassembly.

Refer to the Transportation and Shipping section of this Operation and Maintenance Manual for information on loading, unloading and towing.

EXCAVATOR RATED LIFT CAPACITY TABLES

⚠ WARNING!

All rated lift capacities are based on the machine and the load both remaining level at all times. DO NOT EXCEED THE RATED LIFT CAPACITY. Lifting loads greater than those shown in the rated capacity tables can cause catastrophic equipment failure and/or structural collapse of the machine.

To operate safely the excavator should be on a firm, level and uniformly supporting surface. The operator is expected to make due allowance for all specific work site and lift-related conditions, and respond to changes in those conditions that could pose a hazard. The following could all cause hazardous conditions and accidents or injuries:

- Soft or uneven ground.
- Off-level terrain.
- Side loads.
- Modifications or poor maintenance of the excavator.
- Failure to lift squarely over the end or over the side of the machine.

When a load is in the air, the operator must remain alert.

- Avoid side loads that may be caused by uneven slings, traveling with the load or swinging too quickly.
- The load can become unbalanced if the hookline is twisted and starts to rotate. If the surface area of the load is large enough, wind gusts can create side loads.
- Keep the bucket hook point directly over the load. Taglines on opposite sides of the load can help maintain greater stability against side loads and wind gusts.

Avoid traveling with a suspended load. Before swinging (or if required, traveling), bring the load into an arm position (radius and height) that has a safer weight capacity rating and adequate movement clearance. The operator and all work site personnel should be thoroughly familiar with safety instructions and procedures within this Operation and Maintenance Manual.

The following weight loads are in compliance with SAE (J1097) and ISO applicable, recommended standards for hydraulic excavators performing lifting operation on a firm supporting surface. An asterisk (*) next to the lift rating indicates rated load does not exceed 87% of hydraulic capacity. All other ratings have been determined not to exceed 75% of tipping capacity.

Do not attempt to lift or hold any load that exceeds rated load capacity at the specified distances (from the machine's rotation centerline and height - see "lift radius" and "lift height" in the reference drawing, Figure 43).

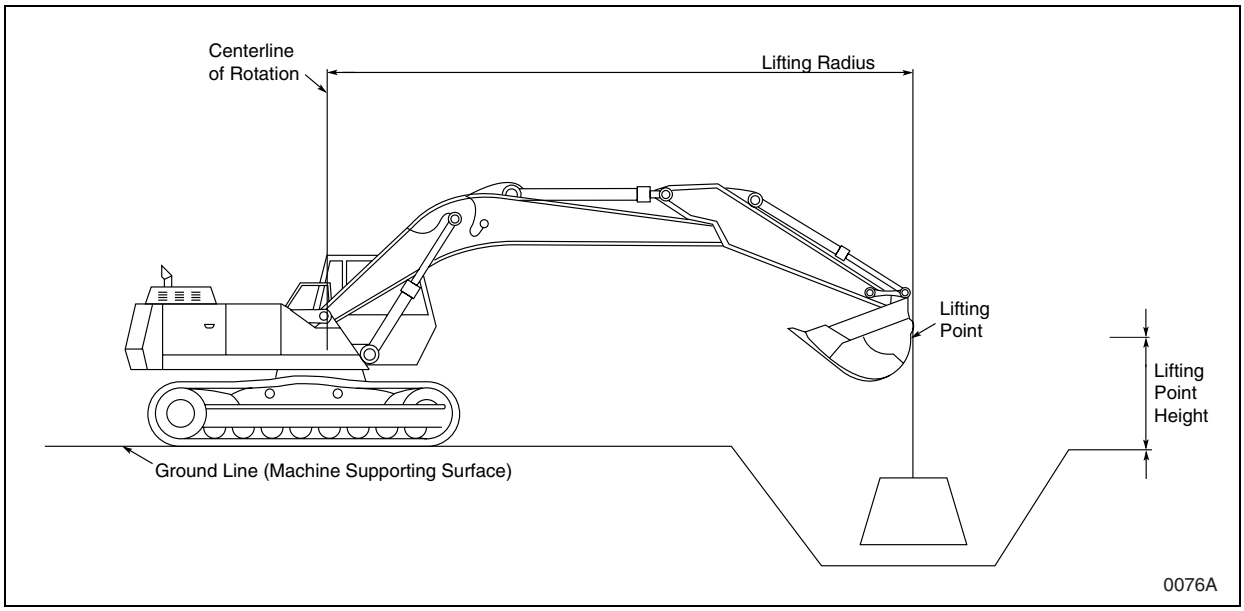
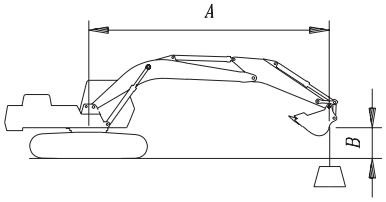


Figure 43

The weight of slings and any auxiliary lifting device (and/or the weight difference of any attachment heavier than standard configuration) must be deducted from the rated lift capacity to determine allowable net lifting load. The lift point should be on the back of the bucket, as shown in Figure 43.

IMPORTANT

Select the Digging Mode switch on the Instrument Panel before using the excavator for lifting work. Engine and hydraulic oil should both be fully warmed up to operating temperature before starting a lift.



TRACK WIDTH : 3.75 m (12' 3") LONG TRACK
BOOM : 4.0 m (13' 1")
ARM : 1.9 m (6' 3")
BUCKET : SAE 0.76 m^3 (CECE 0.65 m^3)
SHOE : 600 mm (24")
: RATING OVER FRONT
: RATING OVER SIDE OR 360 degree
UNIT : 1,000 kg (1,000 lb)

METRIC

A(m) / B(m)	2		3		4		5		MAX. REACH		
											A(m)
5					* 2.71	* 2.71			* 2.25	* 2.25	4.86
4					* 3.05	* 3.05	* 3.17	3.00	* 2.31	* 2.31	5.45
3			* 4.27	* 4.27	* 3.76	* 3.76	* 3.52	2.95	* 2.46	2.36	5.80
2			* 6.17	* 6.17	* 4.70	4.08	* 4.02	2.89	* 2.72	2.22	5.95
1			* 7.81	6.17	* 5.60	3.96	* 4.53	2.83	* 3.07	2.20	5.95
0 (GROUND)	* 5.86	* 5.86	* 8.76	6.05	* 6.24	3.87	4.48	2.78	3.63	2.27	5.77
-1	* 8.12	* 8.12	* 9.00	6.01	6.40	3.84	4.46	2.76	4.01	2.50	5.40
-2	* 10.90	* 10.90	* 8.66	6.04	* 6.37	3.86			4.84	2.98	4.80
-3	* 10.91	* 10.91	* 7.56	6.17					* 5.97	4.25	3.84

FEET

A (ft) / B (ft)	5'		10'		15'		MAX. REACH		
									A (ft)
15'					* 6.72	* 6.72	* 5.01	* 5.01	17' 1"
10'			* 9.80	* 9.80	* 8.11	7.25	* 5.47	5.16	19' 1"
5'			* 17.36	14.96	* 10.18	6.99	* 6.31	4.85	19' 7"
0 (GROUND)	* 10.45	* 10.45	* 20.71	14.46	11.08	6.81	8.00	5.01	18' 9"
-5'	* 18.36	* 18.36	* 20.47	14.40	11.01	6.76	9.41	5.84	16' 4"
-10'	* 27.74	* 27.74	* 16.17	14.00			* 13.16	9.37	11' 4"

1. LOAD POINT IS THE HOOK ON THE BACK OF THE BUCKET.
2. * RATED LOADS ARE BASED ON HYDRAULIC CAPACITY.
3. RATED LOADS DO NOT EXCEED 87 % OF HYD. CAPACITY OR 75 % OF TIPPING CAPACITY.

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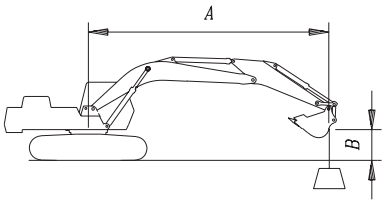

TRACK WIDTH	: 3.75 m (12' 3") LONG TRACK
BOOM	: 4.6 m (15' 1")
ARM	: 2.5 m (8' 2")
BUCKET	: SAE 0.52 m^3 (CECE 0.45 m^3)
SHOE	: 600 mm (24")
	: RATING OVER FRONT
	: RATING OVER SIDE OR 360 degree
UNIT	: 1,000 kg (1,000 lb)

METRIC

A(m) / B(m)	2		3		4		5		6		7		MAX. REACH		
															A(m)
6							* 2.35	* 2.35					* 2.04	* 2.04	5.76
5							* 2.41	* 2.41	* 2.46	2.29			* 2.01	* 2.01	6.42
4					* 2.73	* 2.73	* 2.71	* 2.71	* 2.73	2.26			* 2.05	1.83	6.86
3	* 6.15	* 6.15	* 4.07	* 4.07	* 3.47	* 3.47	* 3.15	2.96	* 2.98	2.22	* 2.22	1.71	* 2.13	1.69	7.13
2			* 5.96	* 5.96	* 4.42	4.03	* 3.70	2.86	* 3.28	2.17	2.69	1.69	* 2.27	1.62	7.26
1			* 7.53	5.97	* 5.31	3.88	* 4.22	2.79	3.38	2.12	2.66	1.66	* 2.44	1.60	7.25
0 (GROUND)	* 2.64	* 2.64	* 6.87	5.81	* 5.99	3.76	4.40	2.71	3.33	2.07	2.64	1.64	2.62	1.63	7.12
-1	* 4.17	* 4.17	* 7.74	5.78	6.23	3.71	4.36	2.67	3.31	2.05			2.77	1.73	6.83
-2	* 5.93	* 5.93	* 8.58	5.77	6.22	3.70	4.35	2.67	3.30	2.05			3.08	1.92	6.37
-3	* 8.16	* 8.16	* 8.00	5.83	* 5.99	3.73	4.37	2.69					3.67	2.28	5.70
-4	* 9.59	* 9.59	* 6.76	5.97	* 5.05	3.80							* 4.35	3.07	4.71

FEET

A (ft) / B (ft)	5'		10'		15'		20'		MAX. REACH		
											A (ft)
20'					* 5.18	* 5.18			* 4.48	* 4.48	19' 2"
15'					* 5.73	* 5.73	* 5.98	4.68	* 4.47	4.21	22' 0"
10'			* 9.59	* 9.59	* 7.48	7.13	* 6.66	4.56	* 4.74	3.69	23' 6"
5'			* 17.85	15.11	* 9.59	6.73	7.03	4.42	* 5.16	3.54	23' 10"
0 (GROUND)	* 4.90	* 4.90	* 14.05	* 14.05	10.65	6.52	6.94	4.32	5.77	3.59	23' 1"
-5'	* 10.37	* 10.37	* 19.43	14.58	12.28	7.38	6.87	4.27	6.30	3.92	21' 1"
-10'	* 16.98	* 16.98	* 18.43	14.78	10.70	6.55			8.08	5.02	17' 6"
-15'	* 21.67	* 21.67	* 10.43	* 10.43					* 9.89	8.12	10' 9"

1. LOAD POINT IS THE HOOK ON THE BACK OF THE BUCKET.
2. * RATED LOADS ARE BASED ON HYDRAULIC CAPACITY.
3. RATED LOADS DO NOT EXCEED 87 % OF HYD. CAPACITY OR 75 % OF TIPPING CAPACITY.

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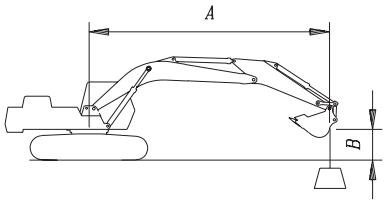

TRACK WIDTH	: 3.75 m (12' 3") LONG TRACK
BOOM	: 4.6 m (15' 1")
ARM	: 3.0 m (9' 8")
BUCKET	: SAE 0.4 m^3 (CECE 0.35 m^3)
SHOE	: 600 mm (24")
	: RATING OVER FRONT
	: RATING OVER SIDE OR 360 degree
UNIT	: 1,000 kg (1,000 lb)

METRIC

A(m) / B(m)	2		3		4		5		6		7		MAX. REACH		
															A(m)
7							* 2.11	* 2.11					* 1.85	* 1.85	5.55
6									* 2.06	* 2.06			* 1.76	* 1.76	6.40
5									* 2.25	* 2.25			* 1.74	* 1.74	6.99
4							* 2.31	* 2.31	* 2.42	2.32	* 2.20	1.79	* 1.76	1.64	7.40
3					* 2.91	* 2.91	* 2.78	* 2.78	* 2.70	2.27	* 2.26	1.76	* 1.82	1.53	7.65
2			* 4.97	* 4.97	* 3.90	* 3.90	* 3.35	2.93	* 3.04	2.21	2.72	1.72	* 1.91	1.47	7.77
1			* 6.79	6.08	* 4.88	3.93	* 3.94	2.82	* 3.41	2.15	2.69	1.69	* 2.03	1.45	7.76
0 (GROUND)	* 2.81	* 2.81	* 7.47	5.86	* 5.69	3.80	4.43	2.74	3.35	2.10	2.65	1.66	* 2.23	1.47	7.64
-1	* 3.81	* 3.81	* 7.56	5.77	* 6.19	3.72	4.37	2.69	3.31	2.06	2.64	1.64	2.48	1.55	7.37
-2	* 5.22	* 5.22	* 8.73	5.74	6.20	3.68	4.35	2.67	3.30	2.05			2.71	1.69	6.95
-3	* 6.98	* 6.98	* 8.36	5.77	6.21	3.69	4.36	2.67	3.31	2.06			3.11	1.94	6.34
-4	* 9.36	* 9.36	* 7.51	5.85	* 5.61	3.75	* 4.28	2.71					3.92	2.44	5.47
-5	* 8.25	* 8.25	* 5.76	* 5.76	* 4.33	3.89							* 4.29	3.69	4.20

FEET

A (ft) / B (ft)	5'		10'		15'		20'		25'		MAX. REACH		
													A (ft)
25'					* 4.40	* 4.40					* 4.24	* 4.24	16' 8"
20'							* 3.94	* 3.94			* 3.87	* 3.87	21' 2"
15'							* 5.31	4.83			* 3.84	3.77	23' 10"
10'					* 6.60	* 6.60	* 6.09	4.68			* 4.03	3.35	25' 2"
5'			* 15.72	15.47	* 8.91	6.91	7.10	4.49	* 4.41	3.21	* 4.33	3.22	26' 6"
0 (GROUND)	* 4.50	* 4.50	* 15.02	14.56	10.64	6.53	6.96	4.35			* 4.91	3.25	24' 10"
-5'	* 8.80	* 8.80	* 17.75	14.49	11.75	7.10	6.90	4.29			5.61	3.49	23' 0"
-10'	* 14.33	* 14.33	* 19.57	14.58	10.52	6.42	7.44	4.64			6.68	4.28	19' 9"
-15'	* 23.16	* 23.16	* 14.93	* 14.93	* 9.36	7.63					* 8.97	6.11	14' 2"

1. LOAD POINT IS THE HOOK ON THE BACK OF THE BUCKET.
2. * RATED LOADS ARE BASED ON HYDRAULIC CAPACITY.
3. RATED LOADS DO NOT EXCEED 87 % OF HYD. CAPACITY OR 75 % OF TIPPING CAPACITY.

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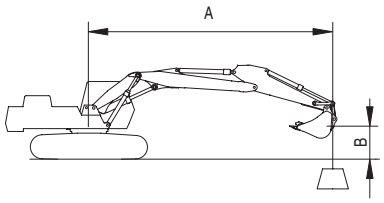

TRACK WIDTH	: 3.75 m (12' 3") LONG TRACK
BOOM	: 1.85 m (6' 11") Lower + 3.5 m (11' 6") Upper
ARM	: 2.5 m (8' 2")
BUCKET	: SAE 0.4 m^3 (CECE 0.35 m^3)
SHOE	: 600 mm (24")
	: RATING OVER FRONT
	: RATING OVER SIDE OR 360 degree
UNIT	: 1,000 kg (1,000 lb)

METRIC

A(m) / B(m)	3		4		5		6		7		8		MAX. REACH		
															A(m)
7							* 2.50	* 2.50					* 2.05	* 2.05	6.24
6							* 2.30	* 2.30	* 2.17	* 2.17			* 1.93	* 1.93	7.09
5							* 2.43	* 2.43	* 2.66	2.22			* 1.89	1.86	7.70
4					* 2.78	* 2.78	* 2.80	* 2.80	* 2.84	2.19	* 2.26	1.72	* 1.89	1.68	8.12
3			* 4.43	* 4.43	* 3.69	3.62	* 3.33	2.73	* 3.16	2.13	2.68	1.70	* 1.93	1.56	8.38
2			* 6.41	4.74	* 4.74	3.44	* 3.96	2.63	3.26	2.07	2.64	1.67	* 2.01	1.50	8.51
1			* 6.93	4.49	5.30	3.28	4.02	2.53	3.19	2.01	2.61	1.64	* 2.13	1.48	8.51
0 (GROUND)			* 6.13	4.36	5.18	3.18	3.94	2.46	3.14	1.97	2.58	1.61	* 2.32	1.50	8.37
-1	* 3.62	* 3.62	* 7.13	4.31	5.12	3.12	3.90	2.41	3.11	1.94	2.57	1.60	2.53	1.57	8.09
-2	* 5.39	* 5.39	7.33	4.32	5.10	3.11	3.88	2.40	3.10	1.93			2.74	1.71	7.65
-3	* 7.63	* 6.92	7.38	4.36	5.13	3.13	3.90	2.42	3.14	1.96			3.12	1.95	7.03
-4			7.48	4.45	5.20	3.20	3.97	2.49					3.90	2.45	6.08

FEET

A (ft) / B (ft)	10'		15'		20'		25'		MAX. REACH		
											A (ft)
25'									* 4.83	* 4.83	18' 1"
20'					* 5.15	* 5.15			* 4.27	* 4.27	23' 0"
15'					* 5.68	* 5.68	* 5.68	4.18	* 4.15	3.90	25' 11"
10'			* 8.54	* 8.54	* 7.23	5.88	6.40	4.09	* 4.25	3.45	27' 6"
5'			* 13.03	8.41	8.77	5.55	6.24	3.94	* 4.55	3.27	28' 0"
0 (GROUND)			13.11	7.95	8.49	5.30	6.11	3.82	* 5.11	3.31	27' 5"
-5'	* 10.16	* 10.16	12.95	7.81	8.36	5.18	6.06	3.78	5.79	3.60	25' 10"
-10'	* 17.40	14.87	13.03	7.88	8.41	5.22			6.93	4.34	22' 11"

1. LOAD POINT IS THE HOOK ON THE BACK OF THE BUCKET.
2. * RATED LOADS ARE BASED ON HYDRAULIC CAPACITY.
3. RATED LOADS DO NOT EXCEED 87 % OF HYD. CAPACITY OR 75 % OF TIPPING CAPACITY.

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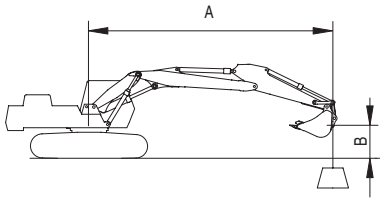

TRACK WIDTH	: 3.75 m (12' 3") LONG TRACK
BOOM	: 1.85 m (6' 11") Lower + 3.5 m (11' 6") Upper
ARM	: 2.1 m (6' 11")
BUCKET	: SAE 0.52 m^3 (CECE 0.45 m^3)
SHOE	: 600 mm (24")
	: RATING OVER FRONT
	: RATING OVER SIDE OR 360 degree
UNIT	: 1,000 kg (1,000 lb)

METRIC

A(m) / B(m)	3		4		5		6		7		8		MAX. REACH		
															A(m)
7													* 2.36	* 2.36	5.55
6							* 2.65	* 2.65					* 2.22	* 2.22	6.51
5							* 2.74	* 2.74	* 2.70	2.13			* 2.19	2.03	7.18
4					* 3.19	* 3.19	* 3.08	2.73	* 3.08	2.11			* 2.21	1.80	7.63
3			* 5.18	4.89	* 4.09	3.49	* 3.59	2.64	3.24	2.06			* 2.29	1.66	7.91
2			* 7.13	4.54	* 5.10	3.31	4.03	2.54	3.18	2.00	2.58	1.60	* 2.41	1.59	8.05
1			* 5.48	4.31	5.17	3.17	3.93	2.44	3.12	1.94	2.55	1.58	2.53	1.56	8.04
0(GROUND)			* 5.74	4.23	5.07	3.08	3.86	2.38	3.08	1.90			2.58	1.59	7.89
-1	* 3.83	* 3.83	7.21	4.21	5.03	3.04	3.83	2.35	3.06	1.88			2.72	1.68	7.60
-2	* 5.92	* 5.92	7.24	4.24	5.04	3.05	3.83	2.35	3.07	1.89			2.99	1.85	7.13
-3			7.32	4.31	5.09	3.09	3.87	2.39					3.50	2.17	6.45

FEET

A (ft) / B (ft)	10'		15'		20'		25'		MAX. REACH		
											A (ft)
20'					* 5.96	* 5.96			* 4.92	* 4.92	21' 1"
15'					* 6.32	5.96			* 4.83	4.23	24' 3"
10'			* 9.66	8.84	* 7.79	5.68	6.23	3.93	* 5.03	3.67	25' 11"
5'			13.29	8.09	8.57	5.36	6.10	3.80	* 5.50	3.46	26' 5"
0 (GROUND)			12.84	7.70	8.32	5.13	5.99	3.70	5.68	3.50	25' 11"
-5'	* 11.00	* 11.00	12.76	7.63	8.23	5.05			6.27	3.87	24' 2"
-10'			12.93	7.77	8.35	5.16			7.79	4.83	21' 0"

1. LOAD POINT IS THE HOOK ON THE BACK OF THE BUCKET.
2. * RATED LOADS ARE BASED ON HYDRAULIC CAPACITY.
3. RATED LOADS DO NOT EXCEED 87 % OF HYD. CAPACITY OR 75 % OF TIPPING CAPACITY.

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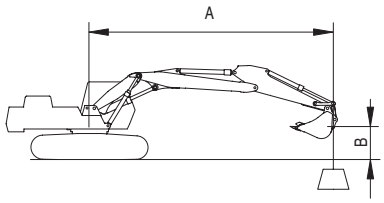


TRACK WIDTH	: 3.75 m (12' 3") LONG TRACK
BOOM	: 1.85 m (6' 11") Lower + 3.5 m (11' 6") Upper
ARM	: 3 m (9' 10")
BUCKET	: SAE 0.4 m^3 (CECE 0.35 m^3)
SHOE	: 600 mm (24")
	: RATING OVER FRONT
	: RATING OVER SIDE OR 360 degree
UNIT	: 1,000 kg (1,000 lb)

METRIC

A(m) / B(m)	2		3		4		5		6		7		8		9		MAX. REACH		
																			A(m)
8																	* 1.93	* 1.93	5.87
7																	* 1.74	* 1.74	6.95
6											* 2.21	* 2.21					* 1.64	* 1.64	7.72
5											* 2.25	2.25	* 2.13	1.76			* 1.60	* 1.60	8.27
4									* 2.35	* 2.35	* 2.47	2.21	* 2.61	1.74			* 1.60	1.49	8.66
3							* 3.06	* 3.06	* 2.89	2.76	* 2.81	2.15	2.69	1.71			* 1.63	1.40	8.91
2					* 5.35	4.86	* 4.13	3.49	* 3.54	2.65	* 3.22	2.08	2.65	1.67	* 1.77	1.35	* 1.68	1.35	9.03
1					* 7.21	4.56	* 5.20	3.31	4.04	2.54	3.19	2.01	2.60	1.63	* 1.85	1.33	* 1.77	1.33	9.02
0 (GROUND)					* 6.65	4.37	5.19	3.18	3.94	2.45	3.13	1.95	2.56	1.59			* 1.90	1.34	8.89
-1			* 3.32	* 3.32	* 6.85	4.28	5.10	3.10	3.87	2.39	3.09	1.91	2.54	1.57			* 2.09	1.40	8.63
-2	* 3.31	* 3.31	* 4.69	* 4.69	7.25	4.25	5.06	3.06	3.84	2.36	3.06	1.89	2.53	1.56			* 2.36	1.50	8.23
-3	* 4.78	* 4.78	* 6.46	* 6.46	7.28	4.28	5.06	3.07	3.84	2.36	3.07	1.90					2.72	1.68	7.66
-4			* 8.89	6.89	7.36	4.34	5.11	3.11	3.88	2.40							3.21	2.00	6.87

FEET

A (ft) / B (ft)	10'		15'		20'		25'		MAX. REACH		
											A (ft)
25'					* 4.83	* 4.83			* 4.06	* 4.06	20' 9"
20'							* 3.80	* 3.80	* 3.64	* 3.64	25' 1"
15'					* 4.70	* 4.70	* 5.42	4.24	* 3.52	3.46	27' 9"
10'			* 6.86	* 6.86	* 6.28	5.95	* 6.13	4.11	* 3.58	3.09	29' 2"
5'			* 11.45	8.55	* 8.40	5.59	6.24	3.94	* 3.79	2.94	29' 8"
0 (GROUND)			13.13	7.96	8.48	5.28	6.08	3.78	* 4.19	2.96	29' 2"
-5'	* 9.03	* 9.03	12.86	7.71	8.29	5.11	5.98	3.70	* 4.89	3.19	27' 8"
-10'	* 14.73	14.55	12.86	7.72	8.28	5.09	6.04	3.74	6.03	3.74	25' 0"
-15'			13.11	7.94					8.73	5.43	19' 7"

1. LOAD POINT IS THE HOOK ON THE BACK OF THE BUCKET.
2. * RATED LOADS ARE BASED ON HYDRAULIC CAPACITY.
3. RATED LOADS DO NOT EXCEED 87 % OF HYD. CAPACITY OR 75 % OF TIPPING CAPACITY.

BRO0290L

OPERATING CONTROLS

The "Operating Controls" section presented here consists of the following groups:

Each group is explained with a point location drawing or photo and a brief description of each control, switch, gauge or valve.

Indicator lights work in addition to the gauges on the instrument panel. The operator should monitor machine pressure on the instrument panel along with indicator lights. These lights will only give the operator an indication that there is a problem.

⚠ WARNING!

Warning lights. When any one or more of the warning lights on the control console, come "ON," immediately stop operation and shut down unit. Investigate and correct the problem before proceeding with operation.

COMPONENT LOCATIONS

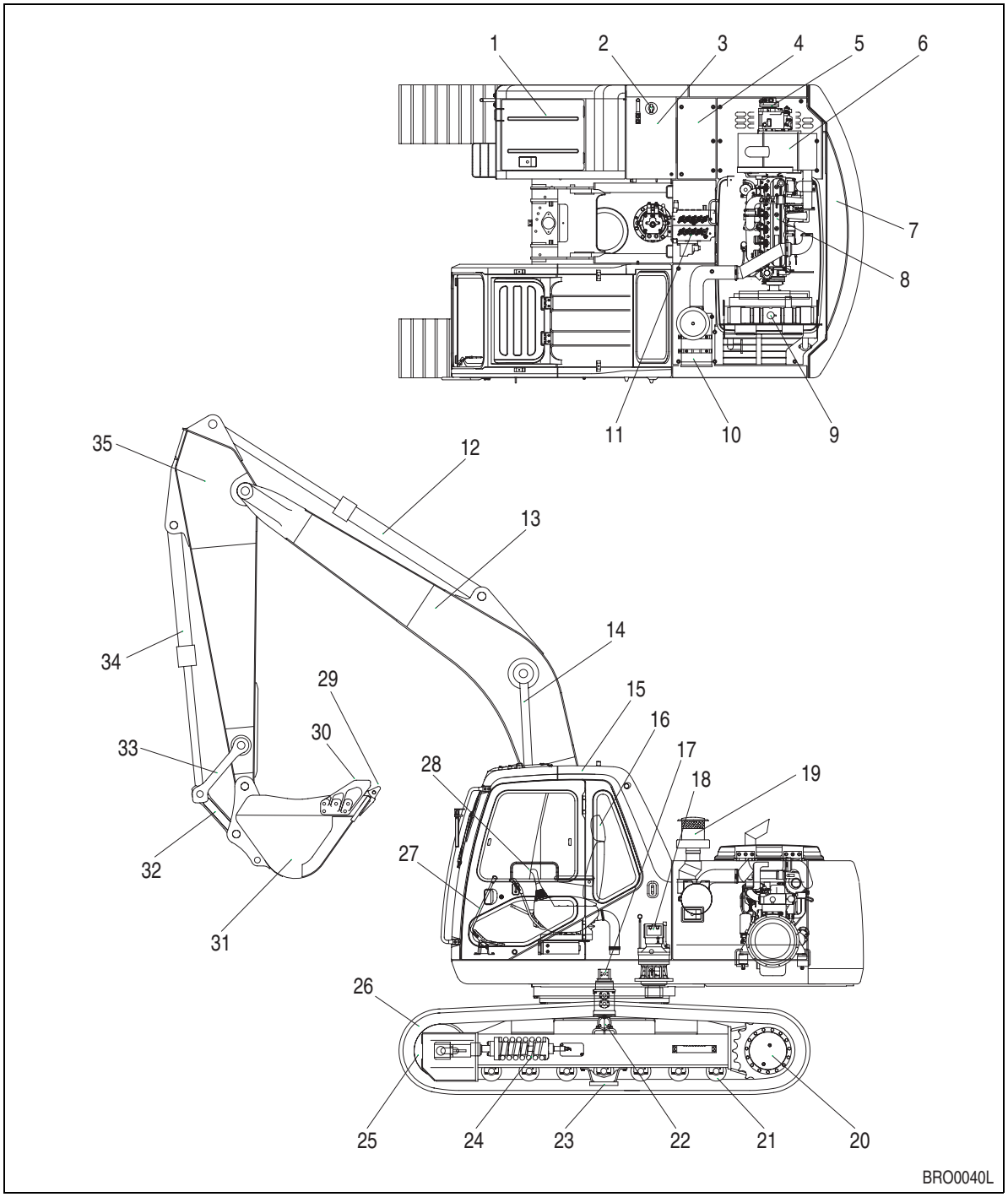


Figure 1

1. BATTERY
2. FUEL TANK FILL CAP
3. FUEL TANK
4. HYDRAULIC OIL TANK
5. PUMPS
6. MUFFLER
7. COUNTERWEIGHT
8. ENGINE
9. RADIATOR AND OIL COOLER
10. AIR CLEANER
11. CONTROL VALVES
12. ARM CYLINDER
13. BOOM
14. BOOM CYLINDER
15. CAB
16. SEAT
17. CENTER JOINT
18. SWING MOTOR
19. ENGINE AIR INTAKE PRECLEANER
20. TRAVEL MOTOR
21. LOWER ROLLER
22. UPPER ROLLER
23. TRACK GUIDE
24. TRACK ADJUSTER
25. IDLER
26. TRACK LINK AND SHOE
27. TRAVEL LEVER
28. WORK LEVER (JOYSTICK) CONTROLS
29. TOOTH POINT
30. SIDE CUTTER
31. BUCKET
32. PUSH LINK
33. GUIDE LINK
34. BUCKET CYLINDER
35. ARM

OPERATOR'S AREA

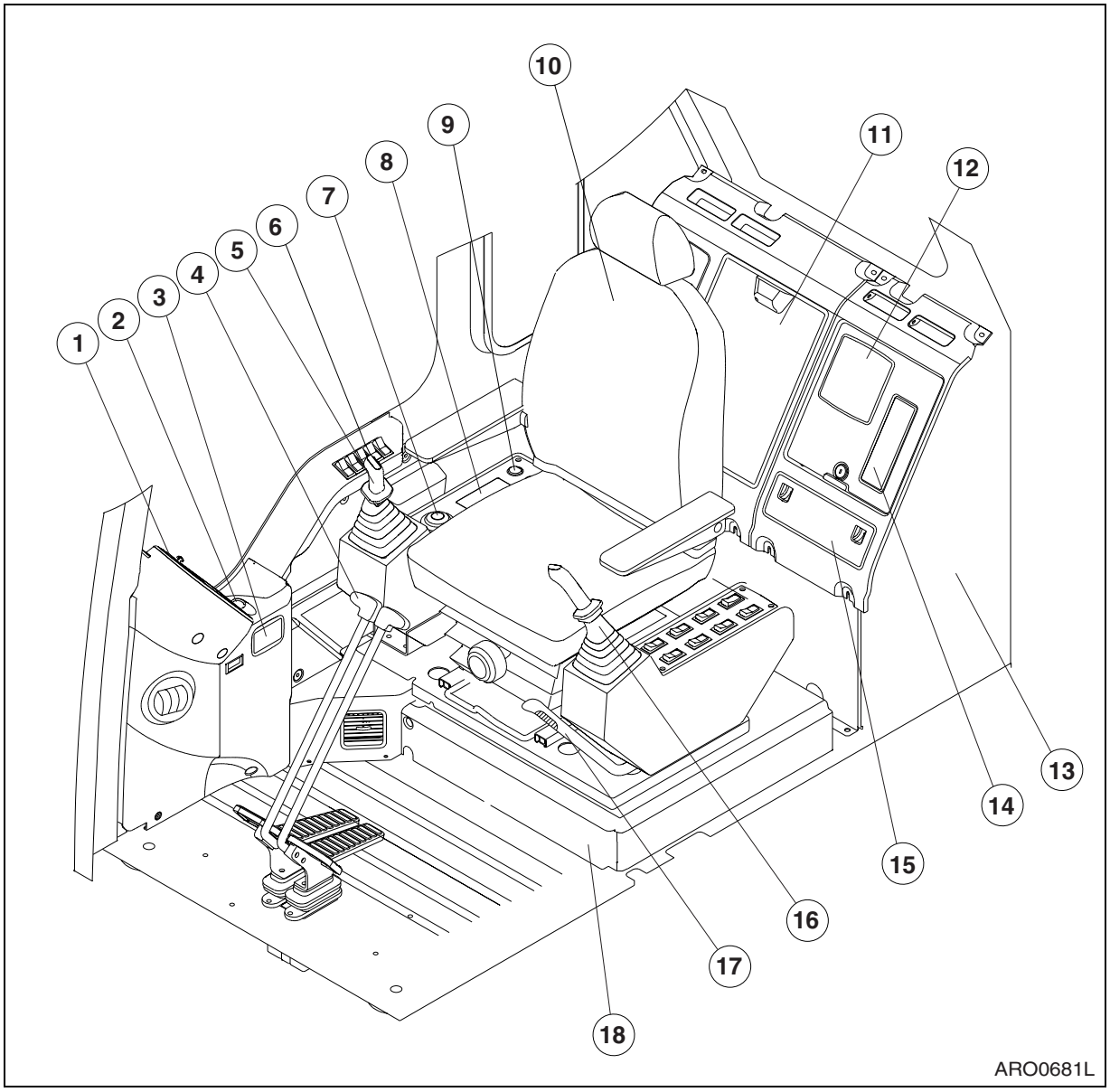


Figure 2

1. INSTRUMENT PANEL
2. CIGAR LIGHTER
3. ASHTRAY
4. TRAVEL LEVERS
5. RIGHT-HAND WORK LEVER (JOYSTICK)
6. SWITCH PANEL
7. ENGINE SPEED CONTROL DIAL
8. HEATER AND AIR CONDITIONER CONTROL PANEL
9. STARTER SWITCH
10. SEAT
11. STORAGE COMPARTMENT
12. SPEAKERS
13. HEATER AND AIR CONDITIONER UNIT
14. STEREO
15. FUSE BOX
16. LEFT-HAND WORK LEVER (JOYSTICK)
17. SAFETY LEVER
18. ELECTRICAL BOX

OPERATIONAL CONTROLS AND PANELS

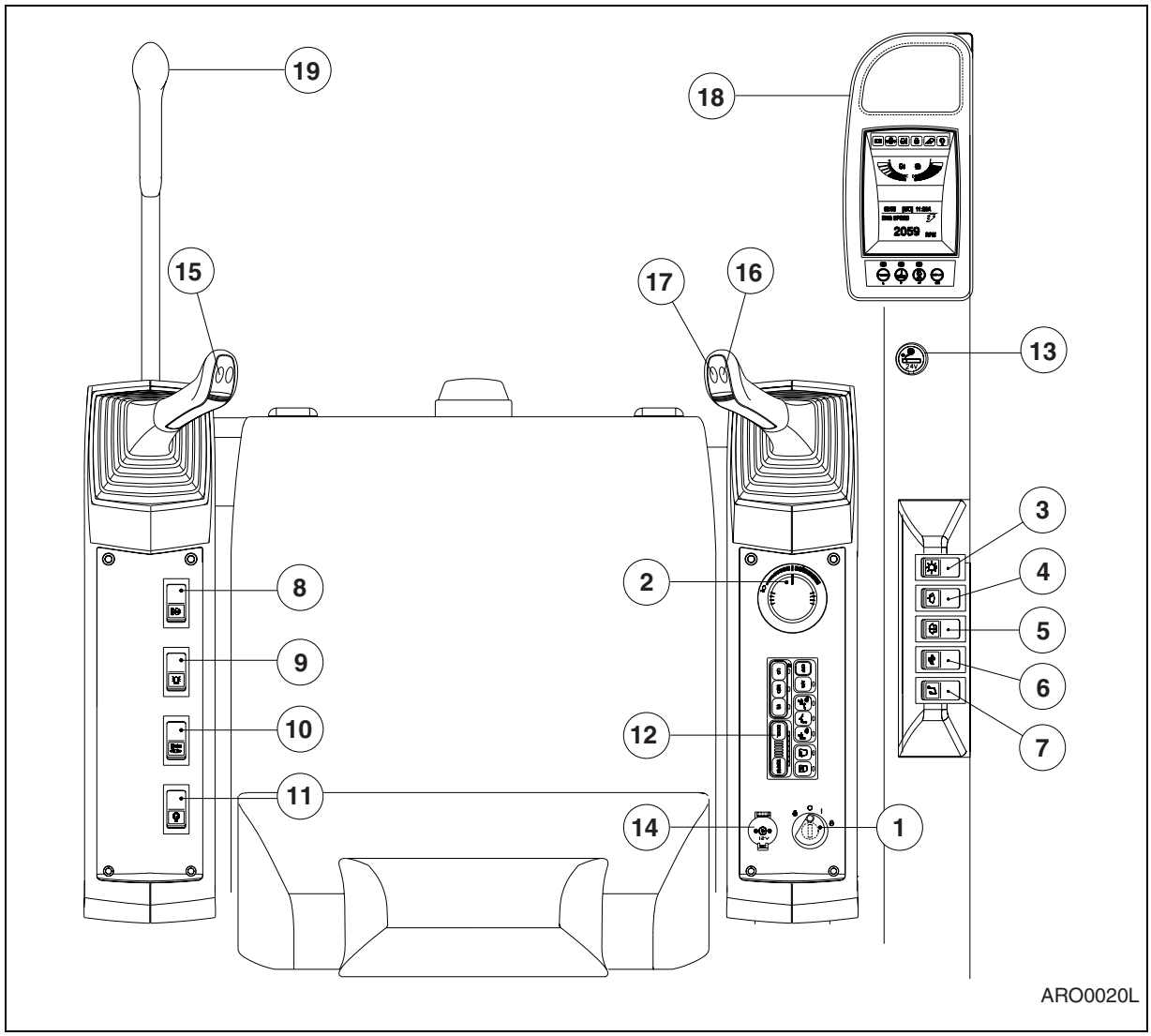


Figure 3

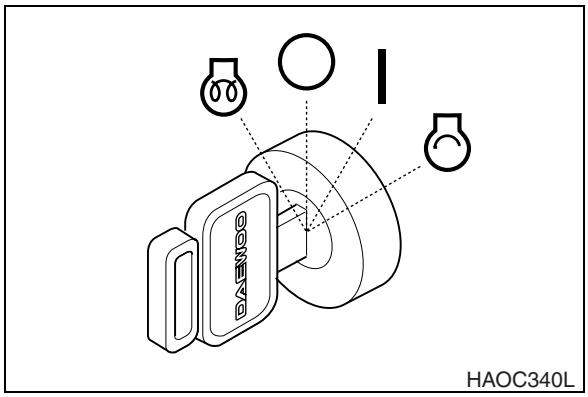
1. STARTER SWITCH
2. ENGINE SPEED CONTROL DIAL
3. LIGHT SWITCH
4. WIPER SWITCH
5. WINDSHIELD WASHER SWITCH (OPTIONAL)
6. TRAVEL SPEED SELECTOR SWITCH
7. STEREO ON/OFF SWITCH
8. CAB WORK LIGHT SWITCH (OPTIONAL)
9. WARNING LIGHT SWITCH (OPTIONAL)
10. TRAVEL/SWING ALARM SWITCH (OPTIONAL)
11. OVERLOAD WARNING SWITCH (OPTIONAL)
12. HEATER AND AIR CONDITIONER CONTROL PANEL (See page 2-30)
13. CIGAR LIGHTER
14. POWER SOCKET FOR 12 VOLT
15. HORN BUTTON
16. BOOSTER BUTTON
17. BREAKER BUTTON
18. INSTRUMENT PANEL (See page 2-14)
19. SAFETY LEVER (See page 3-14)

1. STARTER SWITCH

A four-position starter switch is used to start or shut down engine for equipment operation.

O. Turning the switch to this position turns the engine "OFF" along with its electrical system. In this position the engine is "OFF" but the interior cab light and fuel tank transfer pump (if equipped) are functional.

I. Turning the switch to this position turns the engine electrical system "ON." The charge indicator light and the oil pressure warning light should be "ON" at this time.



HAOC340L

Figure 4

. Moving switch to this position will crank engine. When engine starts, release key and allow it to return to "I" (ON) position. Do not operate the starter switch for more than 15 seconds at a time. This will help prevent damage to starter.

WARNING!

DO NOT USE STARTING FLUIDS. The preheat system could cause the starting fluid to explode. Starting fluids should never be used.

. Preheat position. Used to aid engine starting in cold weather. When key is in this position, engine preheater is operating. When preheat indicator light turns "ON" engine preheat cycle is complete. Immediately turn key to crank position and start engine.

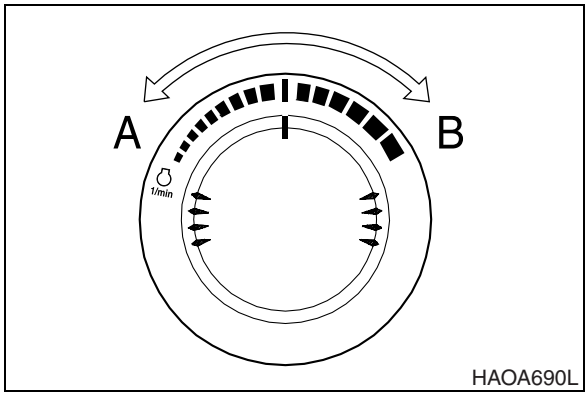
2. ENGINE SPEED CONTROL DIAL

The engine speed is controlled by the dial. Rotating it clockwise increases engine speed (rpm) and counterclockwise decreases engine speed.

A Low idle (Lowest engine speed)

B High idle (Highest engine speed)

NOTE: *The auto idle system will automatically reduce engine speed to idle speed approximately 4 seconds after all of the control levers are in the neutral position. This system is designed to reduce fuel consumption and noise. See "3. Auto Idle Selector Button" on page 2-24.*



HAOA690L

Figure 5

3. LIGHT SWITCH

This switch is used to turn on the lights.

O. In this position, all lights are "OFF."

I. In this position, all illumination lights of the instrument panel and the control switches are turned "ON."

II. In this position, all illumination lights, work lights and headlights are turned "ON."

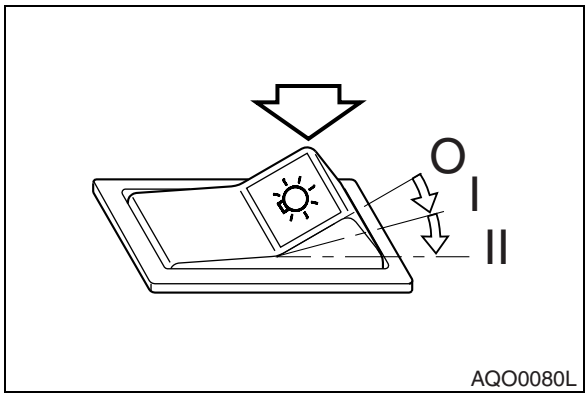


Figure 6

CAUTION!

Do not leave instrument panel or headlights "ON" when the engine is not running. Leaving lights "ON" with the engine shut down will discharge batteries.

4. WIPER SWITCH

O. In this position, windshield wiper is "OFF."

I. In this position, windshield wiper runs at constant speed.

II. In this position, windshield wiper runs on approximately five seconds intermittent cycle.

NOTE: *Operating wiper without washer fluid or when there is sand or dirt present will damage the window and/or wiper.*

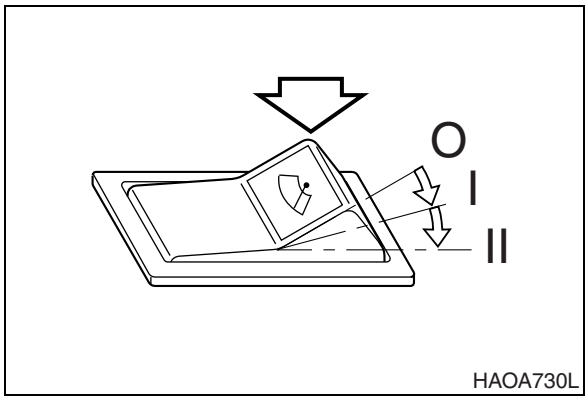


Figure 7

5. WINDSHIELD WASHER SWITCH

While the windshield wiper is running, depress the washer switch to spray windshield washer fluid onto the windshield. Use only the proper windshield washer fluid in the system.

O. In this position, the washer is "OFF."

I. In this position, the washer sprays fluid. When released the switch returns to the "O" (OFF) position.

NOTE: *Do not operate the windshield washer without any fluid. If you operate it in spite of running out of fluid, the washer motor may be damaged. Check level in washer tank, and add fluid as required.*

NOTE: *If you use soapy water or synthetic detergent instead of window cleaning fluid, the wiper blade or painted surfaces may be damaged. Use standard window cleaning fluid: SSK703*

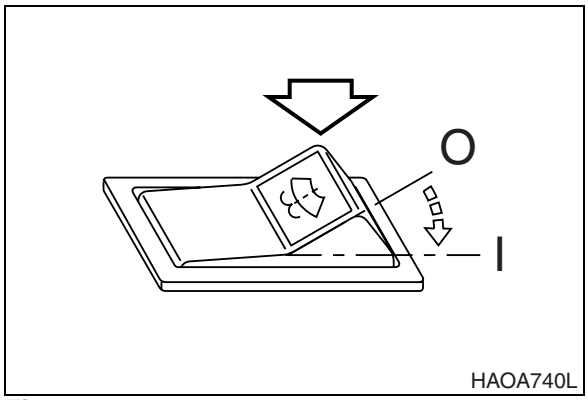


Figure 8

6. TRAVEL SPEED SELECTOR SWITCH

WARNING!

Do not operate the Travel Speed Switch when unit is in motion. Temporary loss of control could result.

This switch activates the automatic speed range for travel.

O. In this position, "LOW" travel speed is selected.

I. In this position, "HIGH" travel speed is selected.

II. In this position, "AUTOMATIC" travel speed is selected. The travel speed automatically changes from low to high range depending on engine speed and travel motor load.

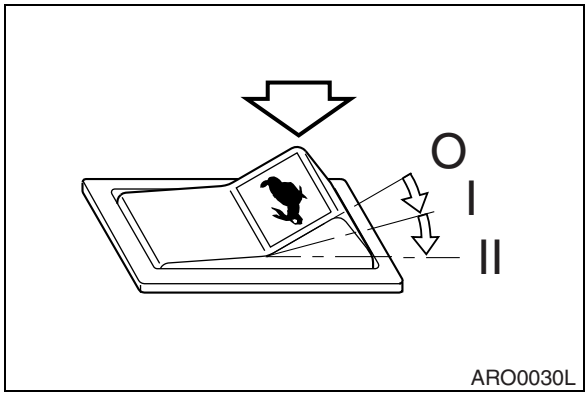


Figure 9

7. STEREO ON/OFF SWITCH

This switch is used to turn the main power supply from the fuse box to the stereo "ON" or "OFF."

Main power to the stereo will only be turned "ON" when the starter switch is turned to the "I" (ON) position, and the stereo switch is set to the "I" (ON) position. When this is done, the normal stereo “1. Power/Volume Control Knob” on page 2-36 can be used to control the stereo.

If either the starter switch or the stereo on/off switch (Figure 10) is turned "OFF" the stereo will be turned "OFF" despite the actual “1. Power/Volume Control Knob” on page 2-36.

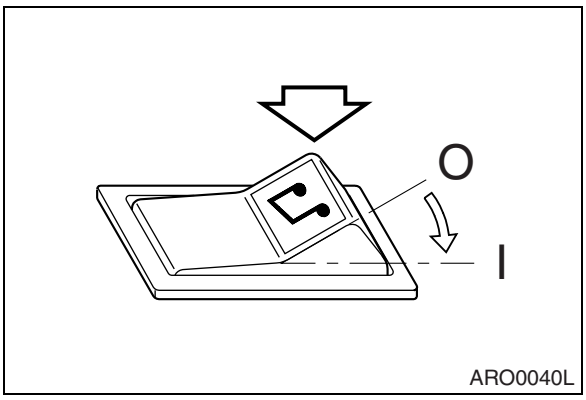


Figure 10

8. CAB WORK LIGHT SWITCH (OPTIONAL)

This switch is used to control the cab work lights, if unit is equipped with them.

O. In this position, all cab work lights are turned "OFF."

I. In this position, the front cab work lights on the front top of cab will turn "ON."

II. In this position, the front cab work lights on the front top of cab and rear cab work lights on rear top of cab will turn "ON."

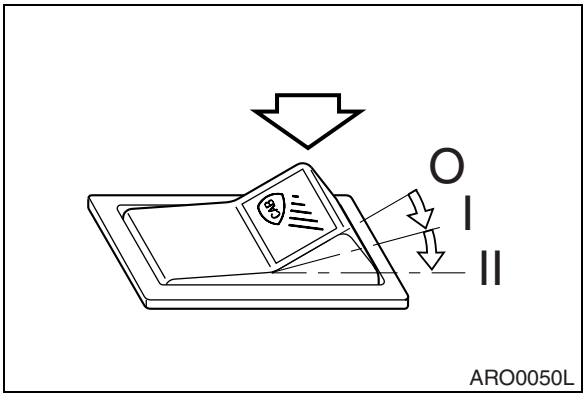


Figure 11

9. WARNING LIGHT SWITCH (OPTIONAL)

If unit is equipped with a warning light, push this switch to activate it.

O. In this position, the warning light is turned "OFF."

I. In this position, the warning light turns "ON" and will start flashing.

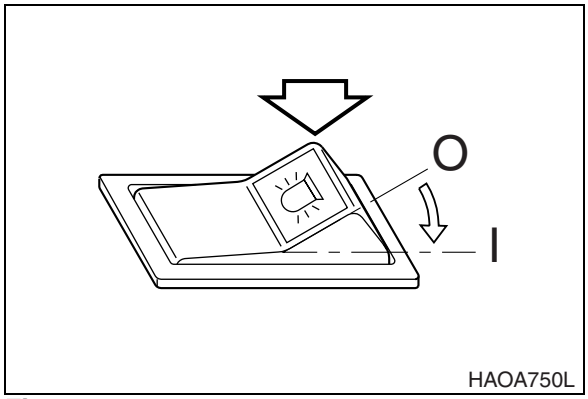


Figure 12

10. TRAVEL/SWING ALARM SWITCH (OPTIONAL)

If unit is equipped with an alarm buzzer for travel/swing alarm, push this switch to activate the alarm whenever swinging or traveling.

O. In this position, the travel/swing alarm system is turned "OFF."

I. In this position, only the travel alarm will sound, when the machine is moving.

II. In this position, the alarm will sound while swinging, and traveling, if equipped with a swing alarm device.

NOTE: *If only equipped with a travel alarm device, the alarm will not sound while swinging although the switch is turned to the "II" position.*

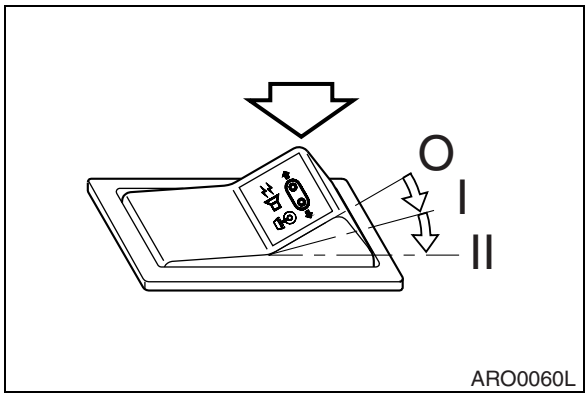


Figure 13

11. OVERLOAD WARNING SWITCH (OPTIONAL)

If unit is equipped with an overload warning device, push this switch to activate it.

O. In this position, the overload warning device is turned "OFF."

I. In this position, when the lifting load is reached to limit, a warning light on the instrument panel will turn "ON" and a warning buzzer will sound.

WARNING!

To prevent injury, do not exceed the rated load capacity of the machine. If the machine is not on level ground, load capacities will vary. There may be local government regulations about the use of excavators for the lifting of heavy objects.

Please observe those regulations.

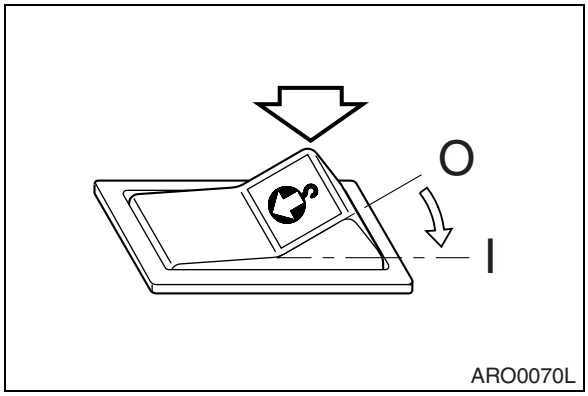


Figure 14

12. HEATER AND AIR CONDITIONER CONTROL PANEL

Used to control air conditioner and heater in operator's compartment. Refer to “Heater and Air Conditioner Control Panel” on page 2-30 for more details.

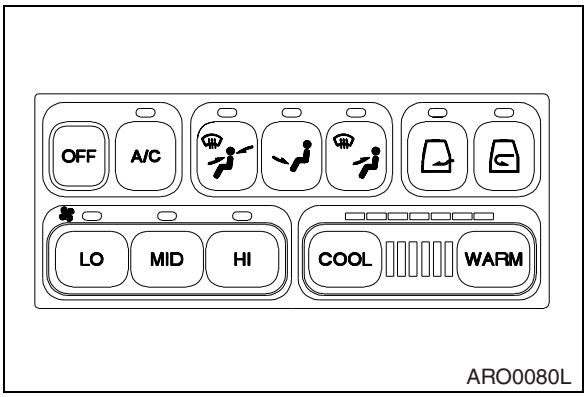


Figure 15

13. CIGAR LIGHTER

Push the lighter all the way into the socket and release your hand. After pushing it in, it will be ejected when it is heated. If it does not eject after a short time, pull it out and have it serviced.

IMPORTANT
The cigar lighter is powered by a 24 volt circuit. Never plug any 12 volt device into the cigar lighter.

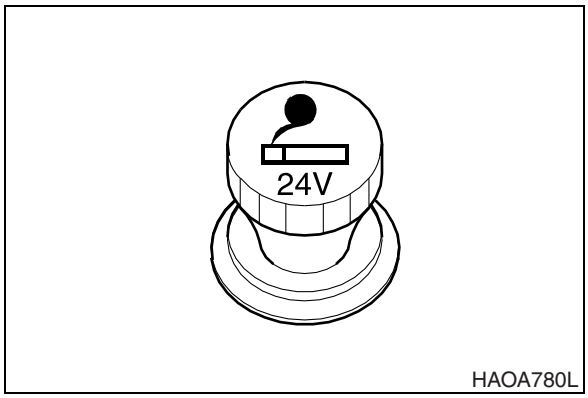


Figure 16

14. POWER SOCKET FOR 12 VOLT

This is a power socket for only 12V DC devices.

This socket can be used for charging a cellular phone or powering a small 12V DC electrical device.

Open the cap when using it.

NOTE: *This socket is designed for small electrical capacity devices. Do not use this socket for large electrical capacity devices. Thus damage can be avoided.*

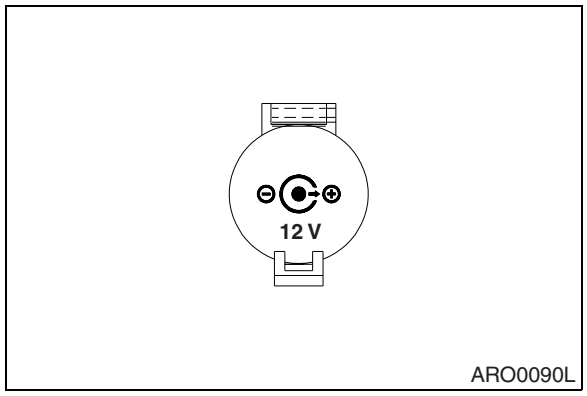


Figure 17

15. HORN BUTTON (LEFT-HAND WORK LEVER (JOYSTICK))

Press the left side button on the top of the left-hand work lever (joystick) to sound horn.

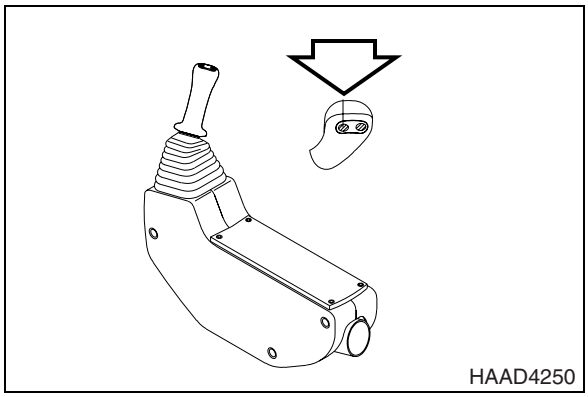


Figure 18

16. BOOSTER BUTTON (RIGHT-HAND WORK LEVER (JOYSTICK))

Press the right side button on the top of the right-hand work lever (joystick) to boost the hydraulic pressure. Refer to the “Boost Mode” on page 3-24.

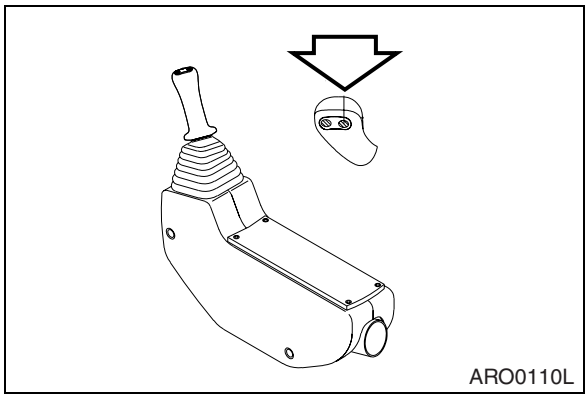


Figure 19

17. BREAKER BUTTON (RIGHT-HAND WORK LEVER (JOYSTICK))

Press the left side button on the top of the right-hand work lever (joystick) to activate the hydraulic breaker.

Release the left side button on the top of the right-hand work lever (joystick) to deactivate the hydraulic breaker.

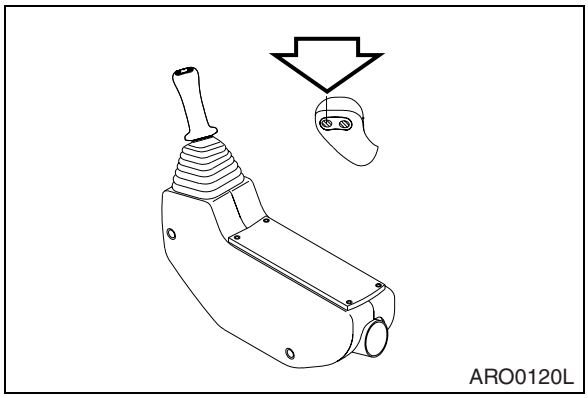


Figure 20

18. INSTRUMENT PANEL

See “Instrument Panel” on page 2-14.

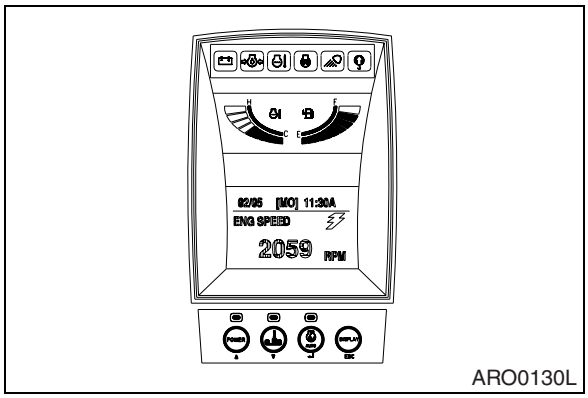


Figure 21

19. SAFETY LEVER

See “Safety Lever” on page 3-14.

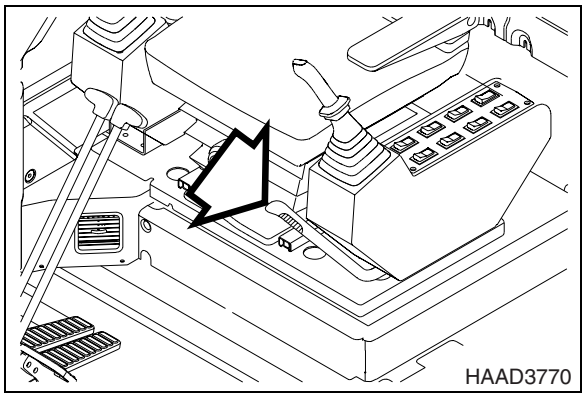


Figure 22

INSTRUMENT PANEL

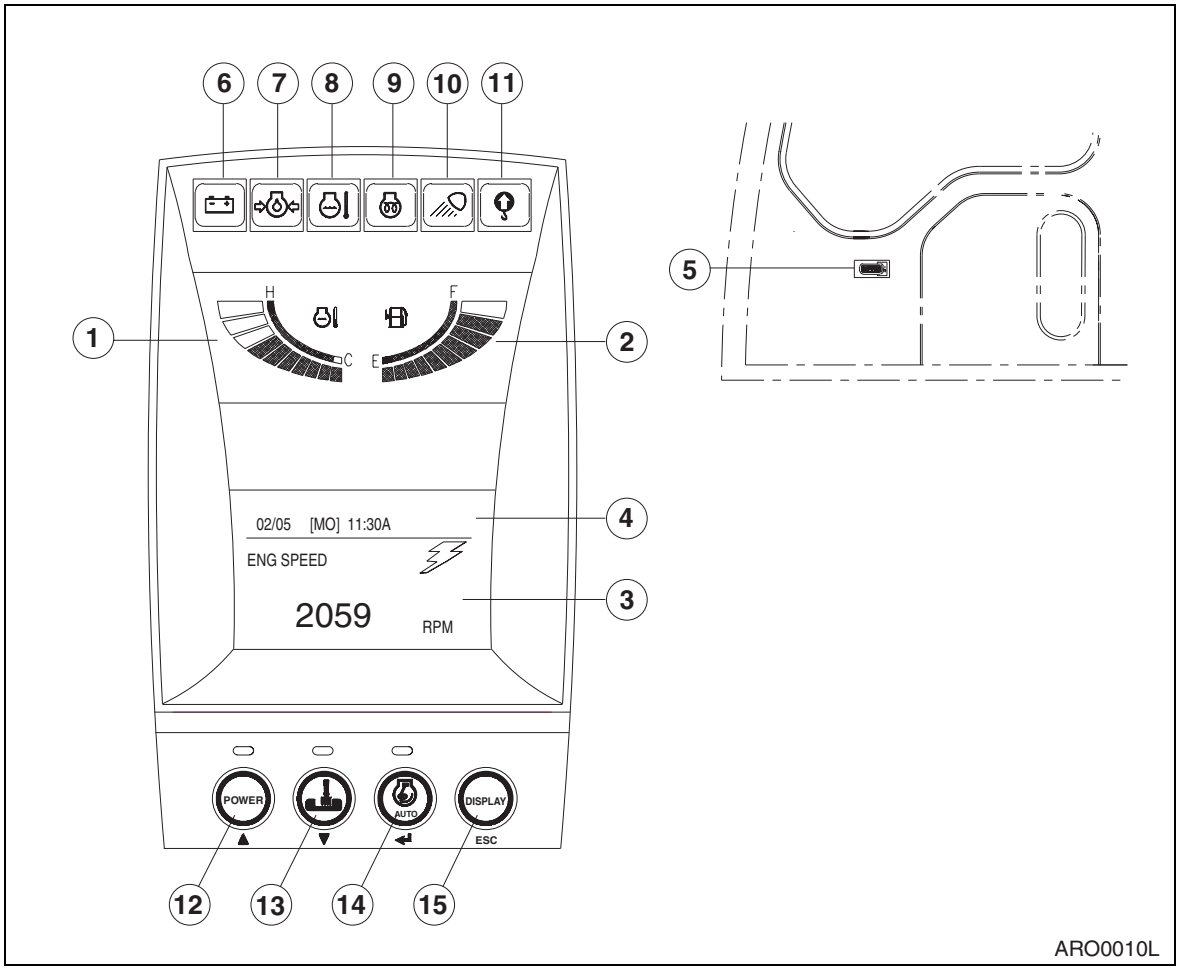


Figure 23

1. ENGINE COOLANT TEMPERATURE GAUGE
2. FUEL GAUGE
3. MULTIFUNCTION GAUGE AND GRAPHIC INFORMATION AREA (See page 2-19)
4. DIGITAL CLOCK
5. HOUR METER
6. BATTERY WARNING LIGHT
7. ENGINE OIL PRESSURE WARNING LIGHT
8. ENGINE COOLANT TEMPERATURE WARNING LIGHT
9. PREHEAT INDICATOR LIGHT
10. WORK LIGHT INDICATOR LIGHT
11. OVERLOAD WARNING LIGHT (OPTIONAL)
12. POWER MODE SELECTOR BUTTON (See page 2-23)
13. WORK MODE SELECTOR BUTTON (See page 2-24)
14. AUTO IDLE SELECTOR BUTTON (See page 2-24)
15. DISPLAY SELECTOR BUTTON (See page 2-25)

FUNCTIONAL CHECK

When the engine starter switch is turned to the "I" (ON) position, all bands of gauges, indicator lights of switches/buttons and indicator/warning lights will turn "ON" and the alarm buzzer will sound for about 2 seconds.

During this time, a moving excavator will appear on the digital clock and graphic information area (3 and 4, Figure 23).

1. ENGINE COOLANT TEMPERATURE GAUGE

The colored bands indicate the temperature of the engine coolant.

WHITE ZONE - Indicates temperature is lower than the normal operating temperature.

GREEN ZONE - Indicates temperature is within the normal operating range.

RED ZONE - Indicates temperature is too high.

During operation, the bands must be in the green zone.

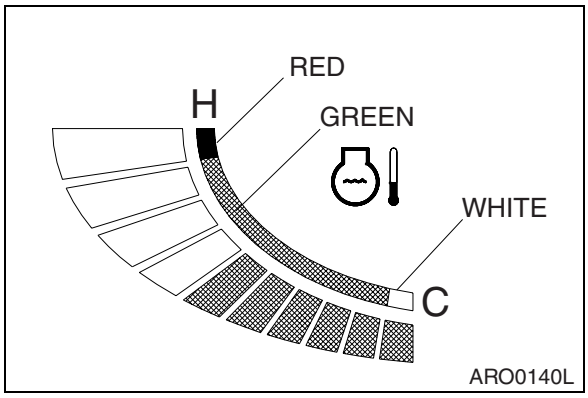


Figure 24

If the band in the red zone starts to blink, a warning buzzer will sound and the engine speed will be automatically reduced. At this time, allow the engine to run at low idle speed until the temperature gauge registers in the green zone again. When the green zone is reached, shut down engine. Check the coolant level, for a loose fan belt, inspect for debris around radiator and so on.

When the temperature reaches the normal range, the engine speed will automatically recover.

2. FUEL GAUGE

Shows remaining fuel quantity in tank.

GREEN ZONE - Indicates a normal fuel quantity.

RED ZONE - Indicates that the fuel level is low.

If the band in the red zone starts to blink, add fuel immediately.

Check the fuel level on smooth, level ground.

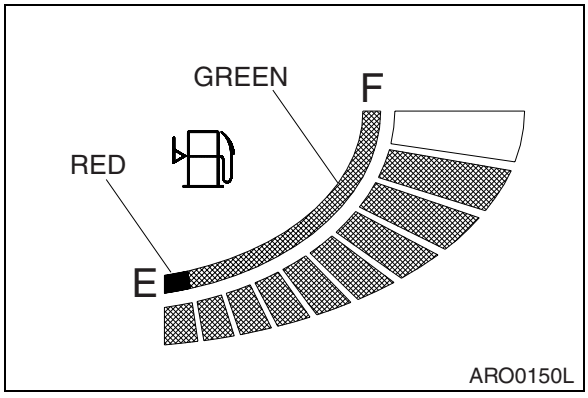


Figure 25

3. MULTIFUNCTION GAUGE AND GRAPHIC INFORMATION AREA

See “Multifunction Gauge and Graphic Information” on page 2-19.

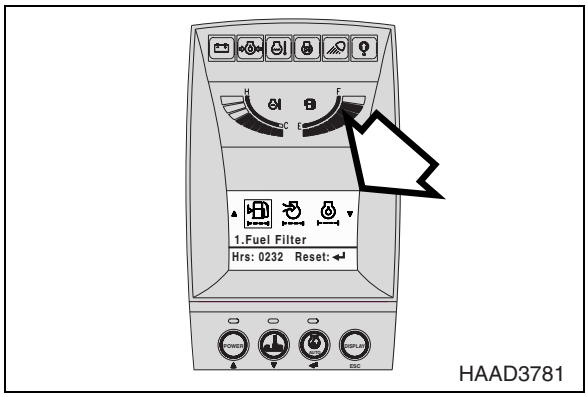


Figure 26

4. DIGITAL CLOCK

As a digital clock, it indicates the current time. The displayed contents are as follows.

Display	Description
MM	Month
DD	Date
W	Day
HH	Hour
mm	Minute
A (P)	AM (PM)

Refer to the “Setting Method for Main Menu” on page 2-26" for time setting.

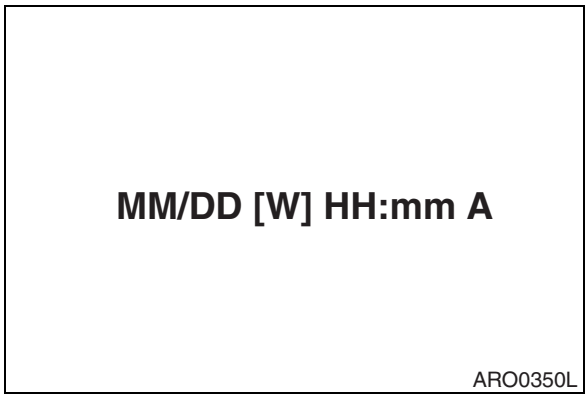


Figure 27

5. HOUR METER

The hour meter is used to indicate the total number of running hours on the engine. The meter will flash every 4 seconds when the engine is running to indicate that it is functioning properly.

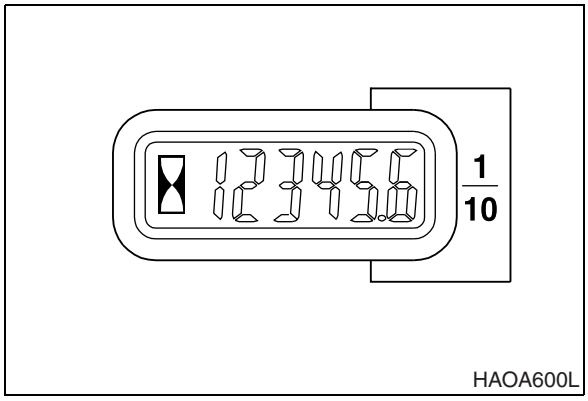


Figure 28

6. BATTERY WARNING LIGHT

This indicator light will turn "ON" when the engine starter switch is turned "ON," and should go "OFF" after the engine starts. If it does not turn "OFF," shut the engine down immediately and determine the cause of the problem.

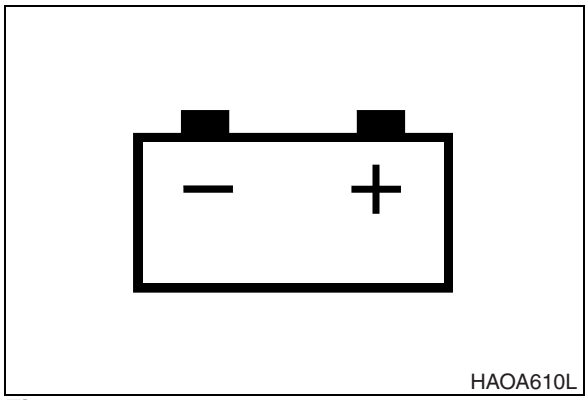


Figure 29

7. ENGINE OIL PRESSURE WARNING LIGHT

This indicator light will turn "ON" when the engine starter switch is turned "ON," and should go "OFF" after the engine starts. For example, if the engine oil pressure becomes too low, the light will turn "ON" and a warning buzzer will sound. If this happens, shut the engine down immediately and determine the cause of the problem. If you continue to work when this light is "ON," it will result in serious engine damage.

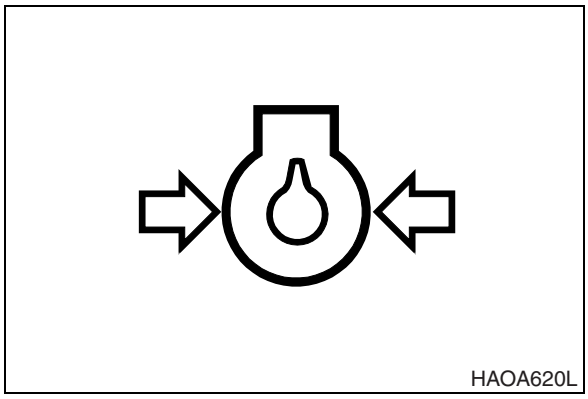


Figure 30

8. ENGINE COOLANT TEMPERATURE WARNING LIGHT

If engine coolant overheats, this light will turns "ON" and an alarm will sound. If light turns "ON," reduce engine speed until coolant temperature drops. Do not turn engine "OFF" because this will cause coolant temperature to rise and may cause engine to siege due to heat surge.

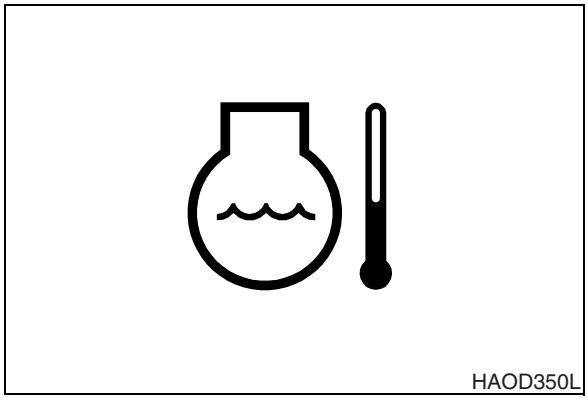


Figure 31

NOTE: *Check the engine coolant temperature gauge. If the band in the red zone starts to blink, a warning buzzer will sound and the engine speed will be automatically reduced. At this time, allow the engine to run at low idle speed until the temperature gauge registers in the green zone again. When the green zone is reached, shut down engine. Check the coolant level, for a loose fan belt, inspect for debris around radiator and so on.*

When the temperature reaches the normal range, the engine speed will automatically recover.

9. PREHEAT INDICATOR LIGHT

This light indicates that the engine preheat function has been completed.

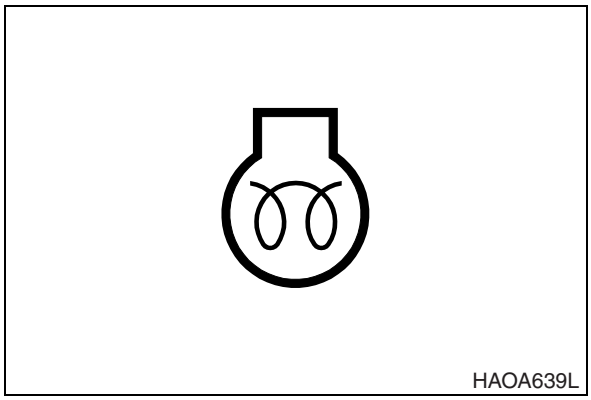


Figure 32

10. WORK LIGHT INDICATOR LIGHT

The indicator light indicates that the work lights are turned on.

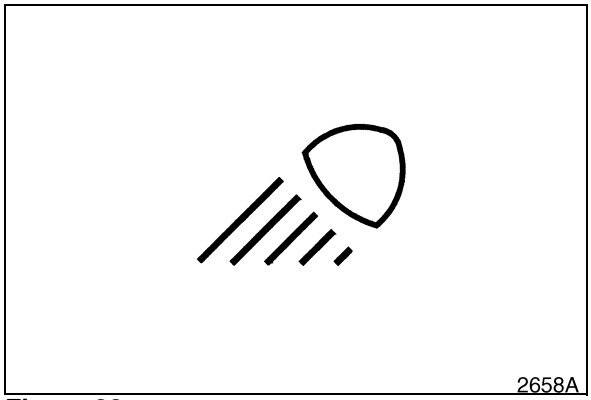


Figure 33

11. OVERLOAD WARNING LIGHT (OPTIONAL)

On machine with an overload warning device, this indicator light will turn "ON" and a warning buzzer sounds when the load limit has been reached.

WARNING!

If this indicator light turns "ON" during the lifting operation, reduce the load immediately.

If you continue to work when this light is "ON" the machine can be overturned or damage to hydraulic components and structural parts could occur.

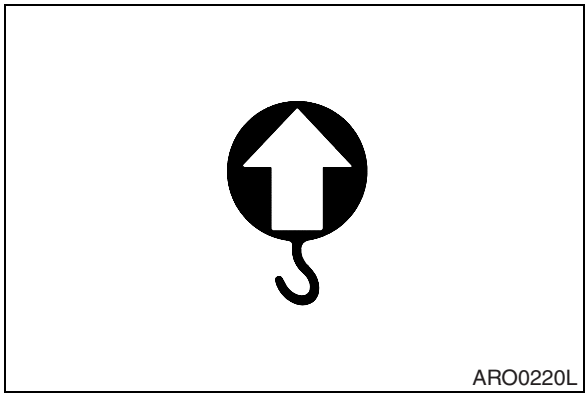


Figure 34

MULTIFUNCTION GAUGE AND GRAPHIC INFORMATION

When the engine starter switch is turned to "I" (ON) position, a moving excavator will appear on the screen for about 2 seconds.

When the moving excavator disappears, a screen for multifunction and digital clock will sequentially appear.

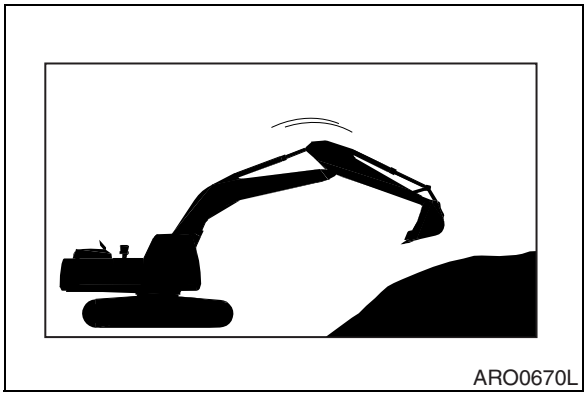


Figure 35

The engine rpm, battery voltage and hydraulic pump pressure are displayed with numeric readings and a digital clock is found in the upper portion of the display.

Each time the display selector button (15, Figure 23) is pressed, the digital readout changes in the following sequence; Engine speed (RPM) -> Battery voltage (VOLT) -> Front pump pressure (BAR) -> Rear pump pressure (BAR).

NOTE: *See Figure 39 thru Figure 42.*

By using a combination of the mode selector buttons, information for filters and oils can also be displayed.

The display can be set for the desired language.

Refer to the “Setting Method for Main Menu” on page 2-26 for the language selection and information display method.

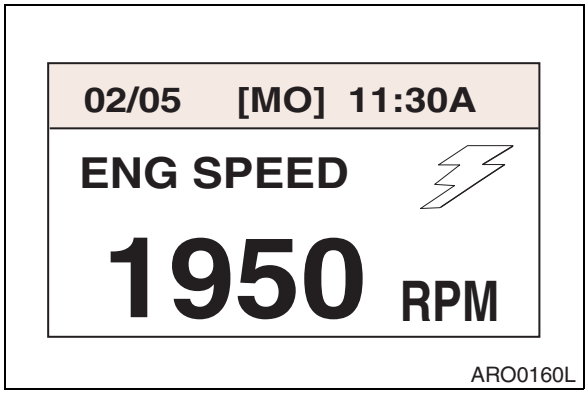


Figure 36

COMMUNICATION INDICATOR

Indicates the condition of communication between main controller and instrument panel.

1. Normal Condition:

   The symbol will sequentially move like lightening.

   NOTE: *See Figure 39 thru Figure 42.*

2. Abnormal Condition:

   If the symbol is not displayed, it means there is a communication error.

   NOTE: *See Figure 38.*

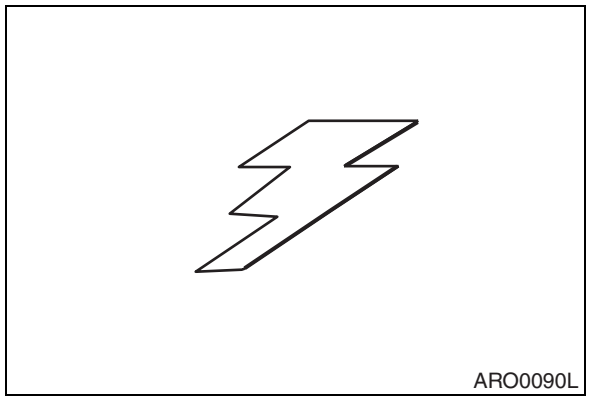


Figure 37

COMMUNICATION ERROR WARNING

If a communication error is generated between e-EPOS controller and instrument panel, this screen will be displayed.

When this screen is displayed, contact a DAEWOO distributor or sales agency.

NOTE: *If a communication error occurs during operation, the last mode setting is stored. E.g. power mode, work mode and auto idle are stored during failure.*

NOTE: *When starter switch is turned to the "I" (ON) position during a state of communication error failure, the e-EPOS controller will default to the following modes.*

Power mode: Standard mode
Working mode: Digging mode
Auto idle: "ON" (Selection state)

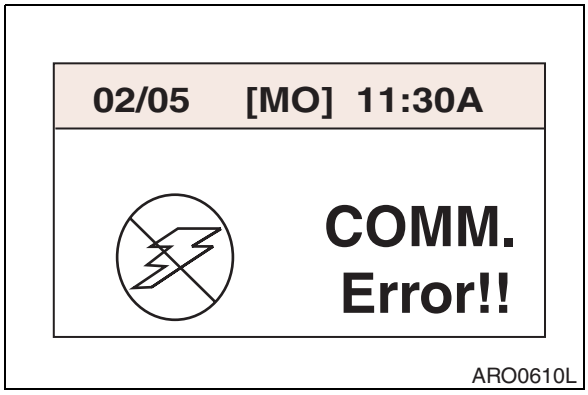


Figure 38

1. ENGINE SPEED

The engine speed is numerically displayed.

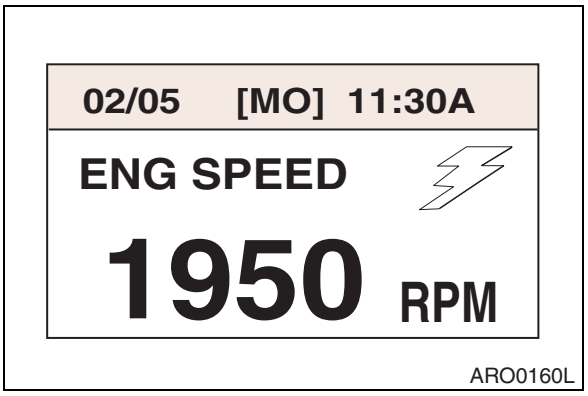


Figure 39

2. BATTERY VOLTAGE

The battery voltage is numerically displayed. With the engine running, the reading should be between 26V - 30V.

When the starter is engaged or the preheat system is being used, the voltage can temporarily drop below 24V, but this is a normal condition.

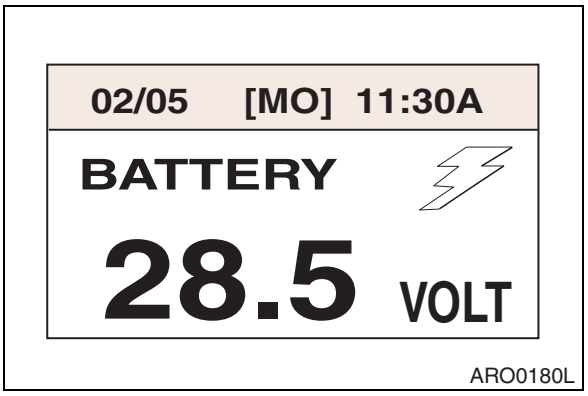


Figure 40

3. FRONT HYDRAULIC PUMP PRESSURE

The front pump pressure is numerically displayed.

NOTE: *This pump is closest to engine flywheel housing or is the upper one of hydraulic pump.*

It displays the reading in BARs.

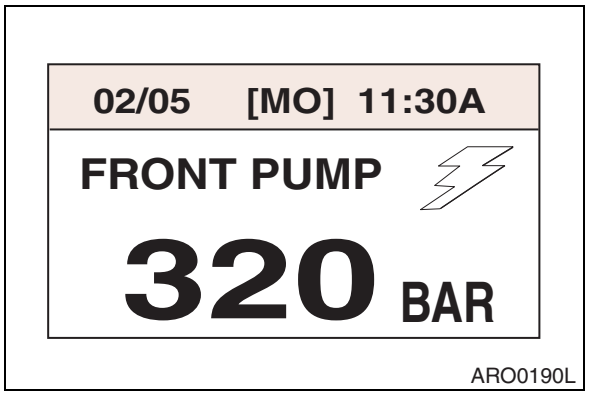


Figure 41

4. REAR HYDRAULIC PUMP PRESSURE

The rear pump pressure is numerically displayed.

NOTE: *This pump is the farthest from engine flywheel housing or is the lower one of hydraulic pump.*

It displays the reading in BARs.

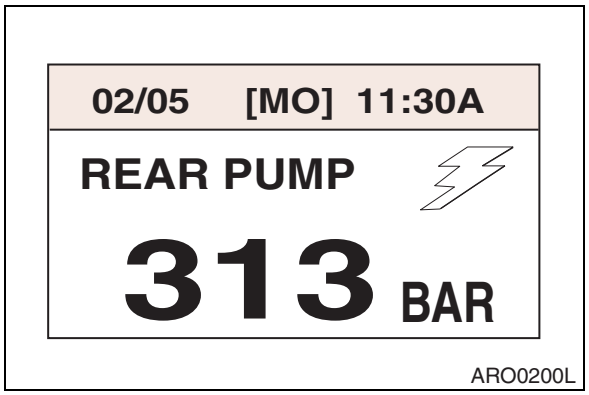


Figure 42

5. ABNORMAL STATE WARNING OF FILTERS

NOTE: *See Figure 43 thru Figure 45.*

This display indicates abnormal state of the following filters; air cleaner filter. return filter, and pilot filter.

If the abnormal state of filter is simultaneously produced more than two, the warning screen will appear "Air Cleaner Filter," "Return Filter" and "Pilot Filter" according to order and each warning screen returns after 3 seconds.

A. Air Cleaner Clogged Warning

This screen indicates when the air cleaner is clogged. When this screen appears, the air cleaner symbol on the screen will start to blink.

If this screen is displayed, immediately stop operation and replace or clean the air filter.

After the air filter has been serviced, the engine speed and a symbol of communicative state will be displayed again.

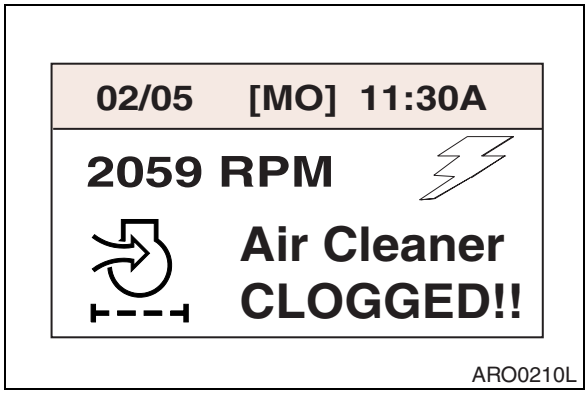


Figure 43

B. Return Filter Clogged Warning (Optional)

This screen indicates when the return filter clogged. When this screen appears, the return filter symbol on the screen will start to blink.

If this screen is displayed, immediately stop operation and replace the return filter.

After the return filter has been serviced, the engine speed and a symbol of communicative state will be displayed again.

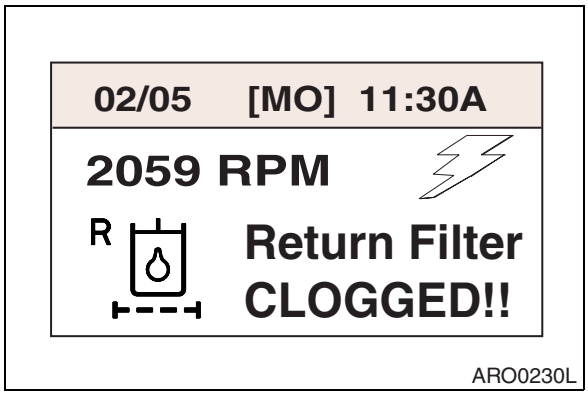


Figure 44

C. Pilot Filter Clogged Warning (Optional)

This screen indicates when the pilot filter clogged. When this screen appears, the pilot filter symbol on the screen will start to blink.

If this screen is displayed, immediately stop operation and replace the pilot filter.

After the pilot filter has been serviced, the engine speed and a symbol of communicative state will be displayed again.

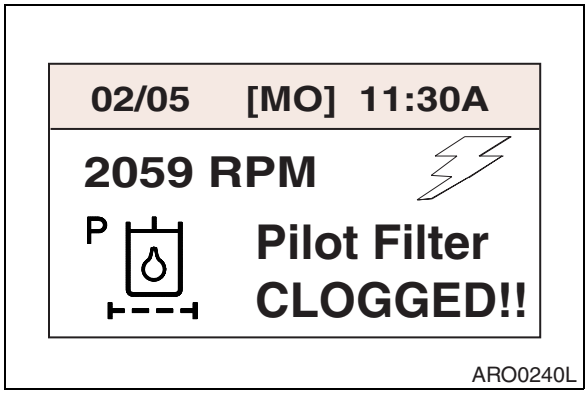


Figure 45

MODE SELECTOR BUTTONS

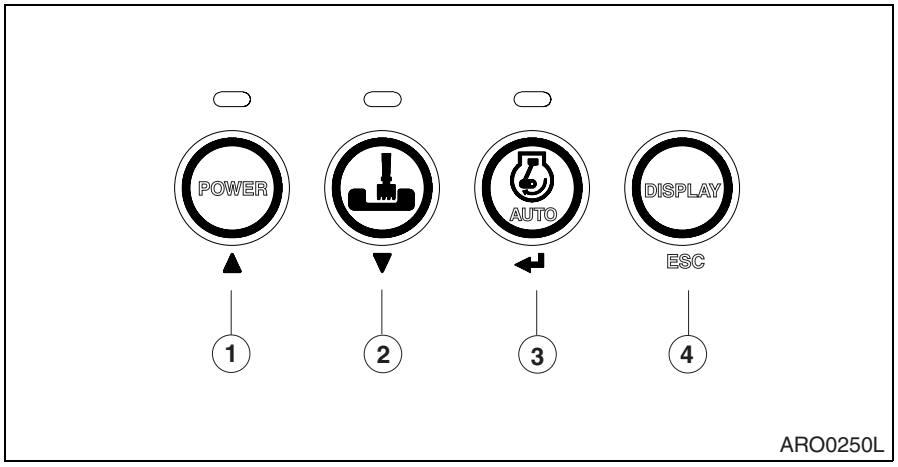


Figure 46

1. POWER MODE SELECTOR BUTTON
2. WORK MODE SELECTOR BUTTON
3. AUTO IDLE SELECTOR BUTTON
4. DISPLAY SELECTOR BUTTON

1. POWER MODE SELECTOR BUTTON

This power mode is suitable for heavy-duty work that requires a high operating speed. Push this button to turn power mode "ON" or "OFF."

When the power mode button is pushed to the "ON" position, an indicator light above it turns "ON."

When the power mode button is pushed again, it is turned "OFF" and the power mode is deactivated and returns to the standard operating mode.

When you turn the engine starter switch to the "I" (ON) position, the power mode is automatically defaulted to "Standard Mode."

NOTE: *When setting the main menu, this button is used to function as the change (UP: ▲) button. For further details, see "Mode Selection."*

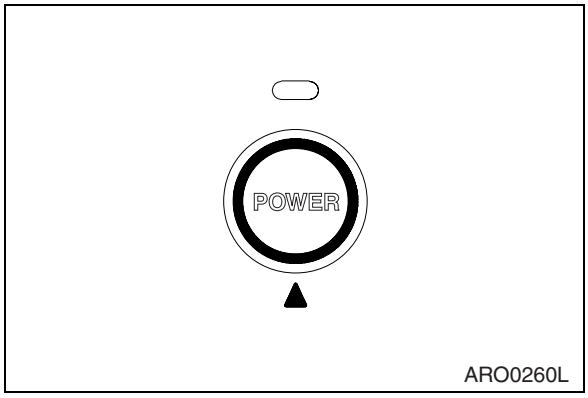


Figure 47

2. WORK MODE SELECTOR BUTTON

The work mode selector button is used to control wether the excavator is operated in "Digging Mode" or "Trenching Mode."

When the work mode button is pushed to the "ON" position, an indicator light above it turns "ON," and "Trenching Mode" is activated. This mode is suitable for a smooth trench or smooth trench wall.

When the work mode button is pushed again, it is turned "OFF" and the trenching mode is deactivated and the excavator returns to the "Digging Mode."

NOTE: *When you turn the engine starter switch to the "I" (ON) position, the work mode is automatically defaulted to "Digging Mode."*

NOTE: *When setting the main menu, this button is used to function as the change (DOWN:▼) button. For further details, see "Mode Selection."*

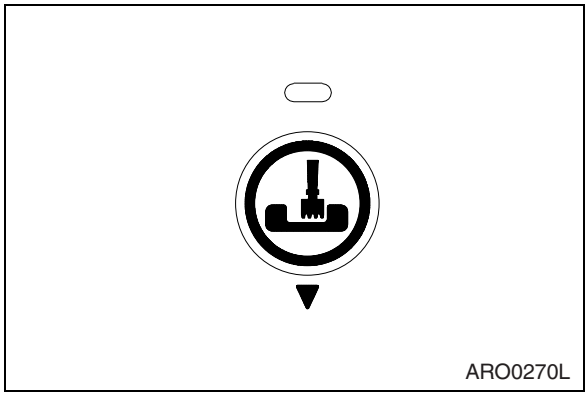


Figure 48

3. AUTO IDLE SELECTOR BUTTON

When the auto idle system is activated, the engine will automatically reduce speed to "IDLE" approximately 4 seconds after all of the control levers are in the neutral position. This system is designed to reduce fuel consumption and noise.

When the auto idle selector button is pushed to the "ON" position, an indicator light above it turns "ON."

When the auto idle selector button is pushed again, it is turned "OFF" and the engine speed will return to the setting of the engine speed dial and will remain at this speed despite control lever position, until the engine speed dial is moved.

NOTE: *When setting the main menu, this button is used to function as the select (ENTER:↵) button. For further details, see "Mode Selection."*

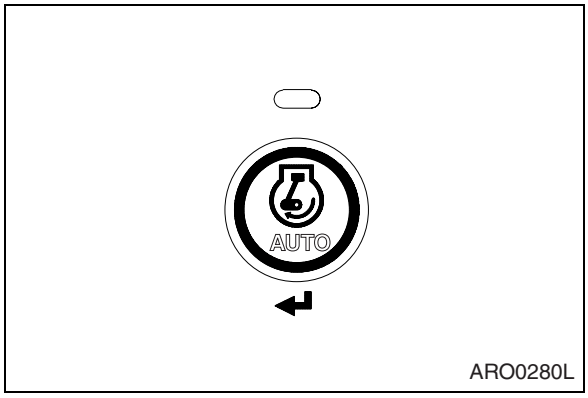


Figure 49

4. DISPLAY SELECTOR BUTTON

This button is used to change the displayed information on the screen. Each time the display selector button is pressed, the digital readout changes.

NOTE: *When setting the main menu, this button is used as the menu / exit button (ESC).*

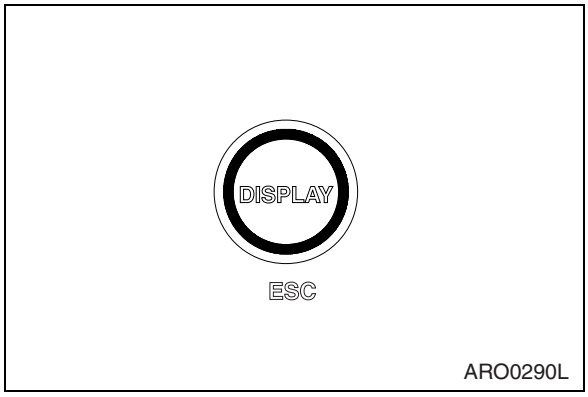


Figure 50

SETTING METHOD FOR MAIN MENU

By the combination of the mode selector buttons, you can check the setting contents of language, time and filter/oil information. If necessary, you can set some information.

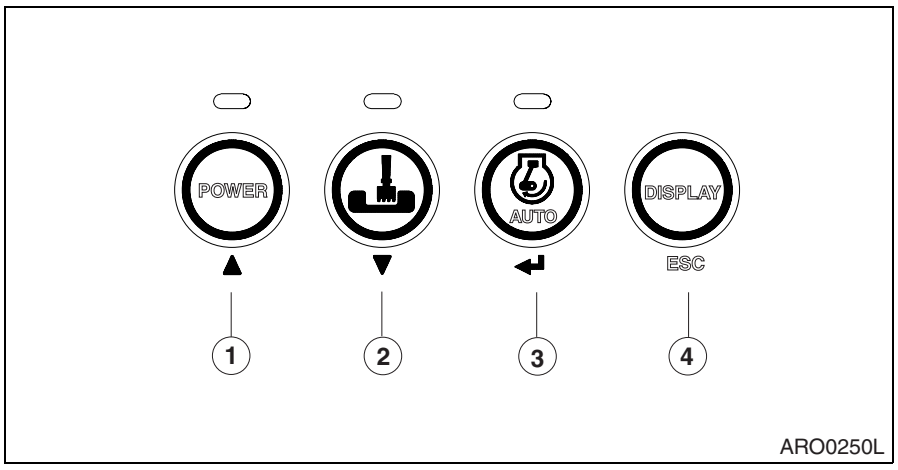


Figure 51

- Up Arrow Button (▲, 1 on Figure 51): Used to move a menu item to "Up" or "Left" direction.
- Down Arrow Button (▼, 2 on Figure 51): Used to move a menu item to "Down" or "Right" direction.
- Enter Button (↵, 3 on Figure 51): Used to set a menu or clear the operating hour of filter/oil.
- Menu / Exit Button (ESC, 4 on Figure 51): Used to access to main menu or return to previous screen from each sub-menu.

MAIN MENU

When the "ESC" button is pressed for more than 3 seconds, the main menu screen is displayed. Three main menu items will be displayed. They are;

1. “Language” on page 2-27.
2. “Set Clock” on page 2-27.
3. “Filter / Oil Info” on page 2-28.

The screen will return from the main menu to the normal display, by again pressing the ESC button for more than 1 second.

If more than 20 seconds are spent in any menu, without changing the screen, it will return to the normal display.

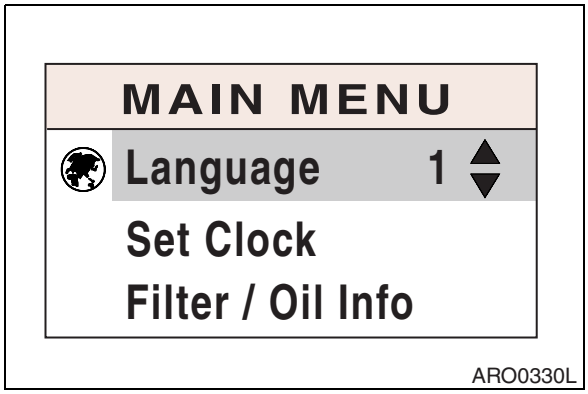


Figure 52

The menu selection can be changed by pressing the "UP" (▲) or "DOWN" (▼) buttons. The selected menu item will be highlighted, and a cursor will appear by the menu item.

When the selected menu item is highlighted, press the "ENTER" (↵) button to enter the next submenu.

LANGUAGE

When the cursor is on language setting, press the "ENTER" (↵) button and then the language setting submenu will appear.

The desired language can be selected by using the "UP" (▲) or "DOWN"(▼) buttons.

The display can be set for the desired language.

Press the "ENTER" (↵) button to set the selected language.

If more than 20 seconds are spent in the menu, without changing the screen, it will return to the normal display.

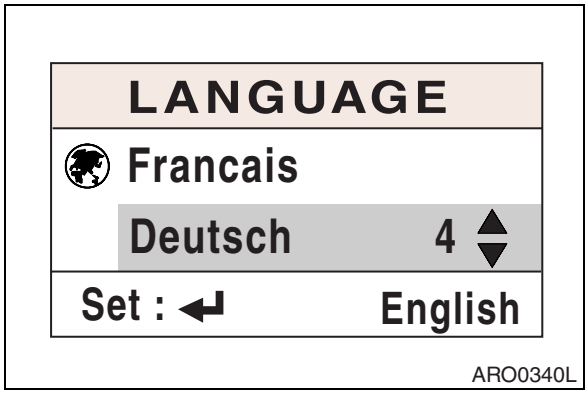


Figure 53

SET CLOCK

When the cursor is on "Set Clock," press the "ENTER" (↵) button and then the clock setting submenu will appear.

If more than 20 seconds are spent in the menu, without changing the screen, it will return to the normal display.

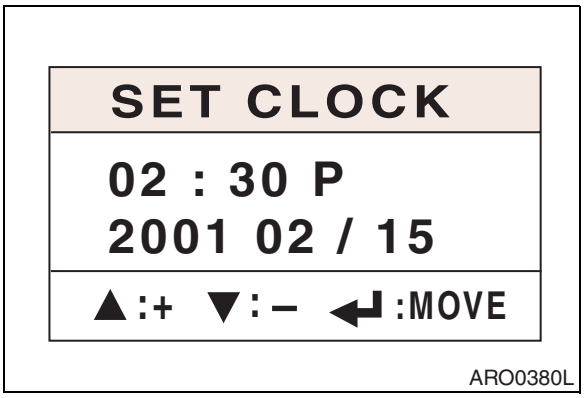


Figure 54

Setting Method

1. Move the cursor to desired part by using the "ENTER" (↵) button.
2. Set the time by using the button "UP" (▲) or "DOWN"(▼).
3. + (▲), - (▼): Increase or decrease of figure.
4. MOVE (↵): Confirm and move the cursor to next part.
5. ESC: Move to the main menu by pressing for more than 1 second.

'00' Minute Setting

1. Simultaneously press the "ENTER"(↵) button and "UP" (▲) button.
2. If the displayed time is 30 minutes or less, the clock will display the preceding hour.
3. If the displayed time is more than 30 minutes, the clock will display the succeeding hour.
4. When the preceding hour is more than 23, the day will be increased.

FILTER / OIL INFO

When the cursor is on the filter and oil information, press the "ENTER" (↵) button and then the filter and oil information submenu will appear.

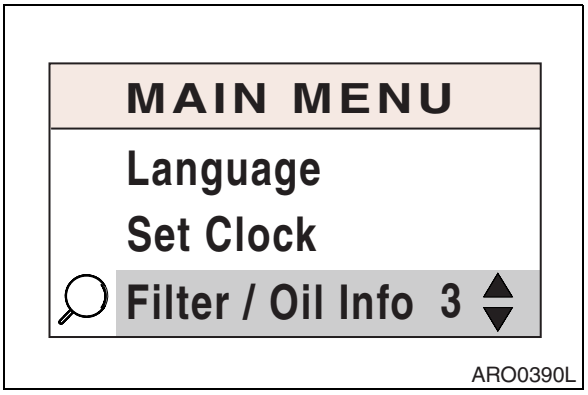


Figure 55

Each mode can be changed by pressing the "UP" (▲) or "DEFAULT" (▼) buttons. This screen indicates operating hour (Hrs) of filters and oils.

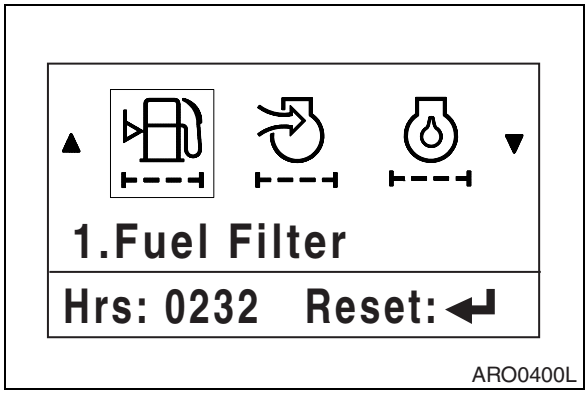


Figure 56

Menu Display Order and Icon Explanation

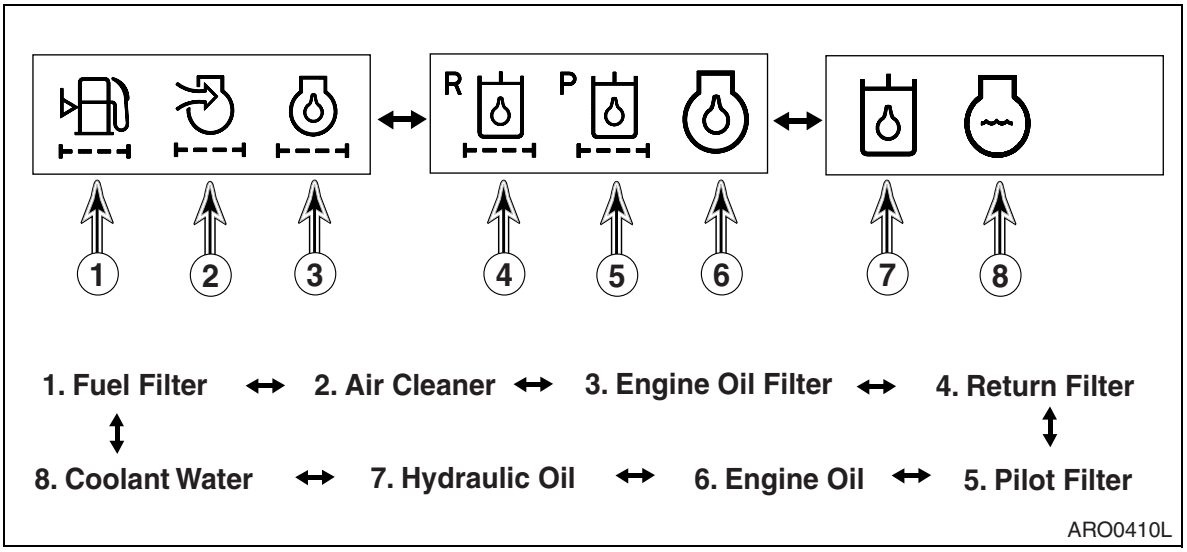


Figure 57

Filter / Oils Operating Hour Reset

After changing a filter or oil, reset the operating hour to zero (Hrs: 0000). The next replacement period can than be easily checked. The operating hours are only accumulated while the engine is running.

On the filter and oil information screen, press the "ENTER" (↵) button and then the reset screen will be displayed.

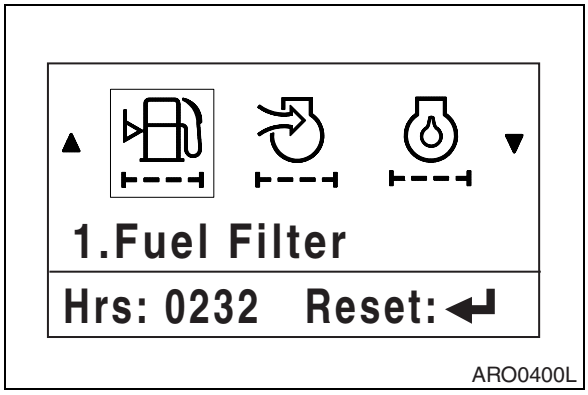


Figure 58

On the reset screen, the operating hour can be changed to zero hour (Hrs: 0000) by pressing the "ENTER" (↵).

If the "ENTER" (↵) button is pressed, the reset will be completed. At the same time, the screen will be returned to a previous menu.

If the "ESC" button is selected, the screen will be returned to a previous menu without resetting.

The screen is moved to previous menu by pressing the "ESC" button.

If more than 20 seconds are spent in the menu, without changing the screen, it will return to the normal display.

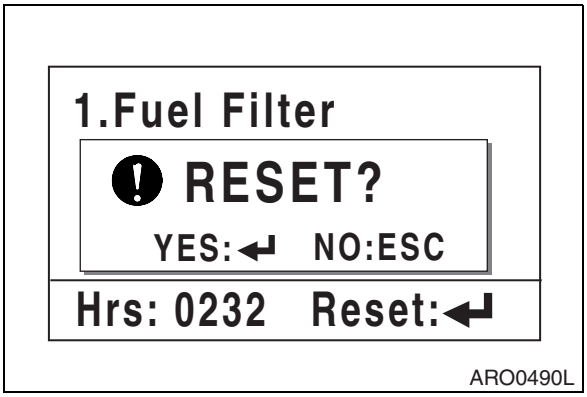


Figure 59

HEATER AND AIR CONDITIONER CONTROL PANEL

LOCATION OF CONTROLS AND VENTS

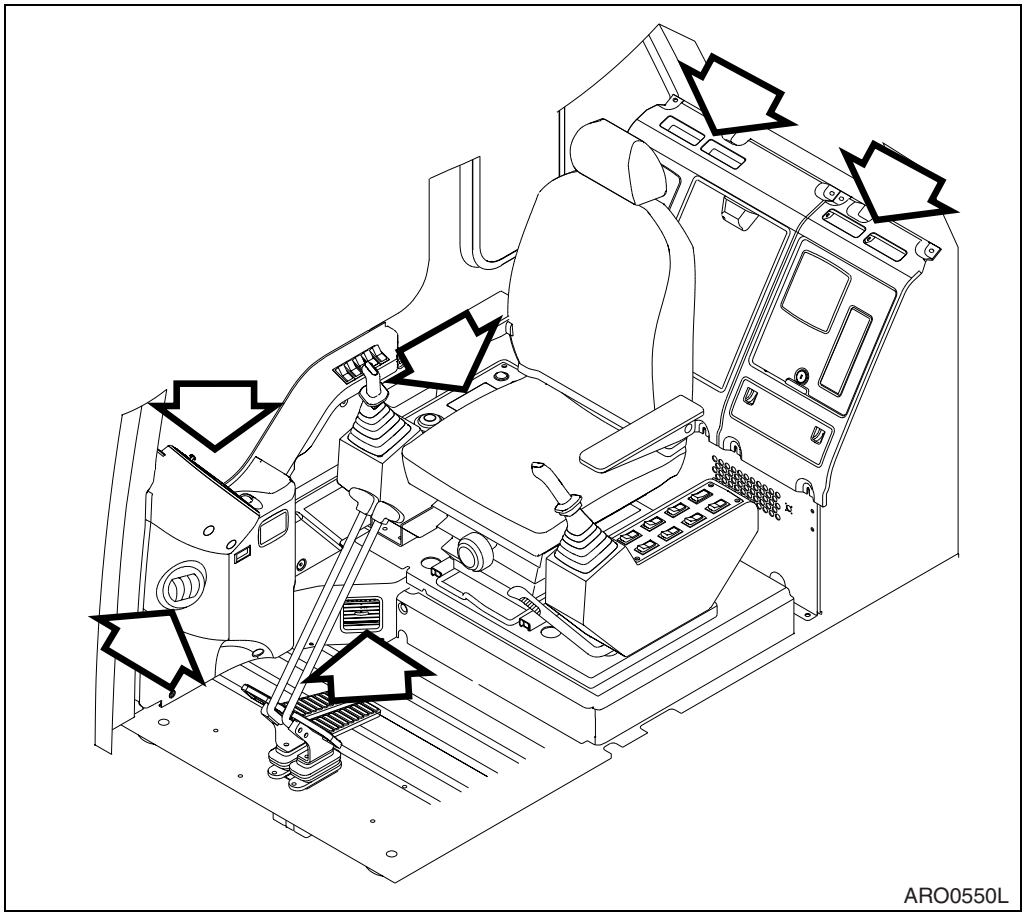


Figure 60

The heater and air conditioner are combined into one unit in the rear cover behind the operator's seat. If necessary, the operator can control inner temperature using the operation panel installed in the right-hand control stand.

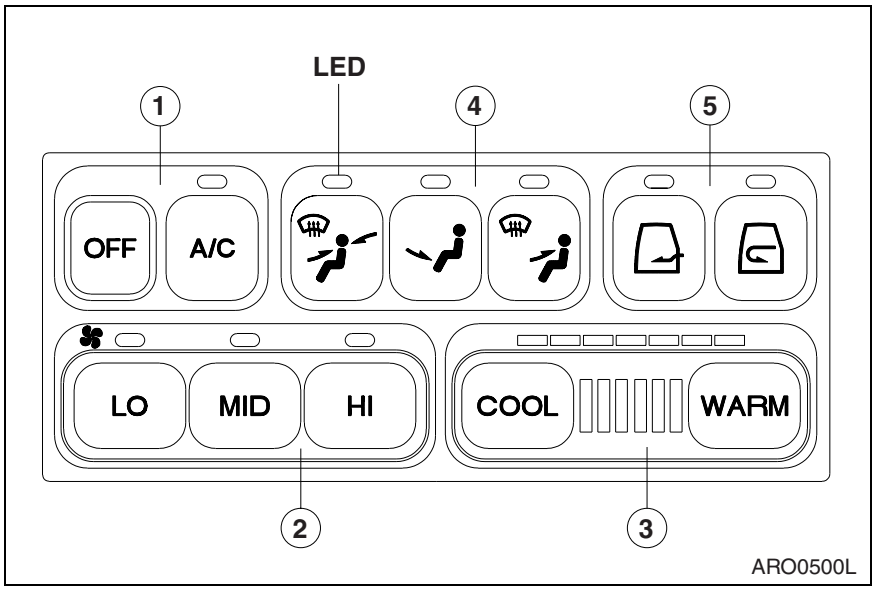


Figure 61

1. FAN AND AIR CONDITIONER SWITCH
2. FAN SPEED SELECTOR SWITCHES
3. TEMPERATURE CONTROL SWITCH
4. AIR OUTLET SELECTOR SWITCH
5. AIR INLET SELECTOR SWITCH

When a switch is selected, the LED indicator for the switch will turn "ON" to indicate that the switch is functioning and give an activation sound.

When the light switch is turned to "I" or "II" position, the LED for illumination in the control panel will turn "ON."

1. FAN AND AIR CONDITIONER SWITCH

A. "OFF" Switch - This switch is used to control the heater and air conditioner off function by the fan stop.

B. "A/C" Switch - This switch is used to control the air conditioner ON/OFF. If you do not select a fan speed, the air conditioner will not work. When the air conditioner starts to work, the LED indicator will turn "ON."

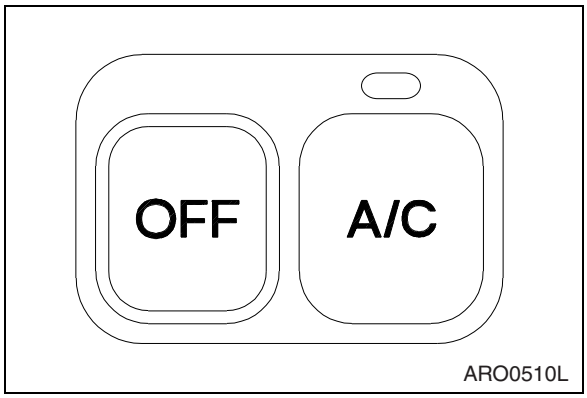


Figure 62

2. FAN SPEED SELECTOR SWITCHES

These switches are used to control the speed of the blower fan.

A. "LO" Switch - Used for low speed.

B. "MID" Switch - Used for intermediate speed

C. "HI" Switch - Used for high speed.

NOTE: *If you do not select a blower speed the heater and air conditioner will not work.*

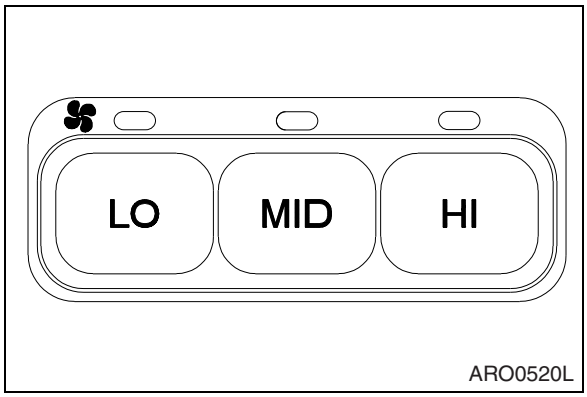


Figure 63

3. TEMPERATURE CONTROL SWITCH

The temperature control consists of 24 stages. An LED is turned "ON" for every three stages. Whenever pushing it, it changes in stages. Pushing it continuously, it changes continuously.

A. "COOL" Switch - Lowers the temperature.

B. "WARM" Switch - Raises the temperature.

LED COLOR STATUS

Green LED - Air conditioner. Full green, maximum operation of air conditioner.

Red LED - Heater. Full red, maximum operation of heater.

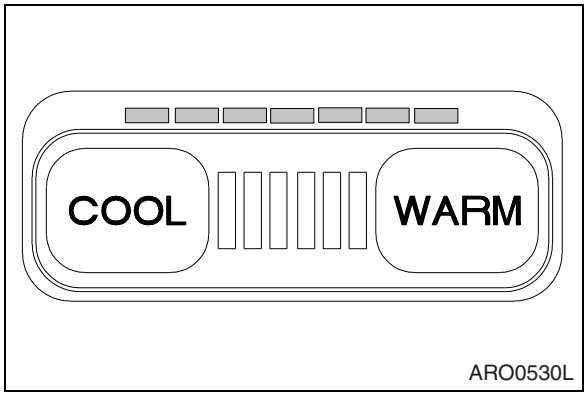


Figure 64

When the unit is used only for air conditioning, push the "A/C" switch and make all the LEDs fully green by pressing the "COOL" switch.

When the unit is used only for heat, make the LEDs fully red by pressing the "WARM" switch. The "A/C" switch has to be turned "OFF."

To set the desired temperature of air coming out of the air outlets, turn the "A/C" switch "ON" and combine red LEDs with green LEDs by pressing the temperature control switch. The more LEDs in the green range that turn "ON," the cooler the temperature will become. The more LEDs in the red range that turn "ON," the warmer the temperature will become.

4. AIR OUTLET SELECTOR SWITCH

This switches are used to select the position of each air outlet.

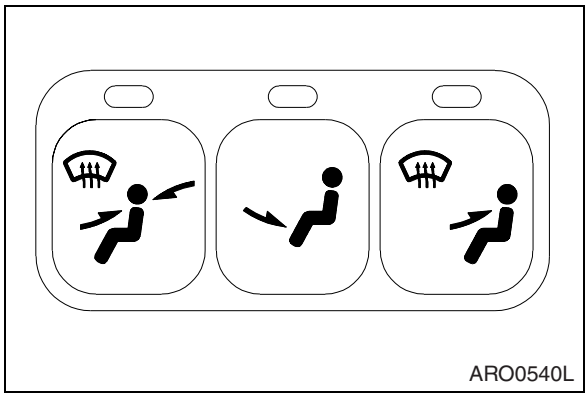


Figure 65

A. Used to direct air flow to upper portion of operator's cab from both the front and rear. It will also direct air to the front window and feet.

The defroster nozzle can be manually opened or closed. If necessary, the operator can close this nozzle to enhance the cooling capacity to the upper portion of the cab in the direction of his face.

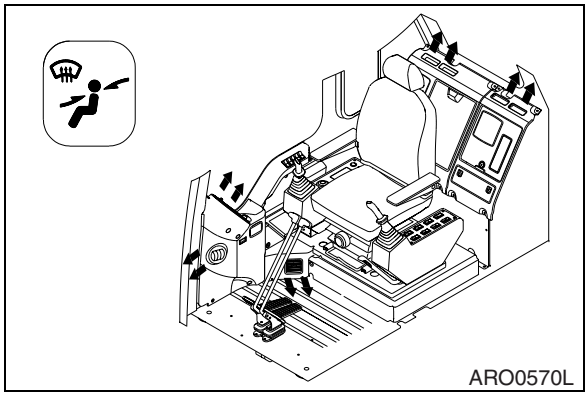


Figure 66

B. Used to direct air flow to lower portion of operator's cab and feet.

This mode is mainly used for heating.

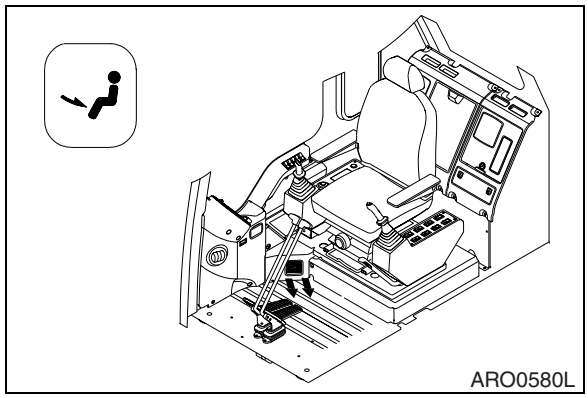


Figure 67

C. Used to direct air flow to upper portion of operator and front window.

The face nozzle on the instrument panel can be manually opened or closed. If this nozzle is closed, the defrosting effect will enhance. If necessary, the operator can close the defroster nozzle to enhance cooling capacity in the direction of his face.

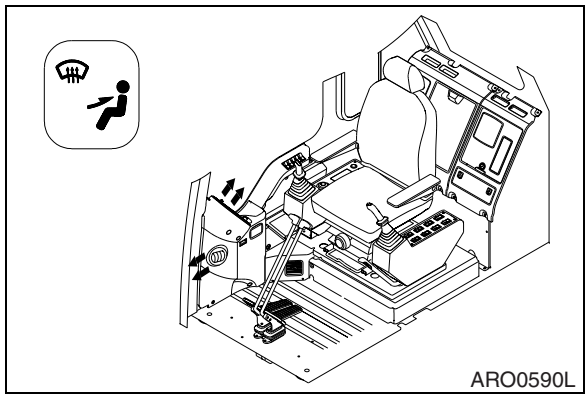


Figure 68

5. VENTILATION SELECTOR SWITCH

A. "A" Switch - Draws fresh air into operator's compartment. Used to remove condensation or ice on windows (Winter / Rainy season).

B. "B" Switch - Recirculates air within the operator's compartment. Used to quickly warm or cool the operator's cab.

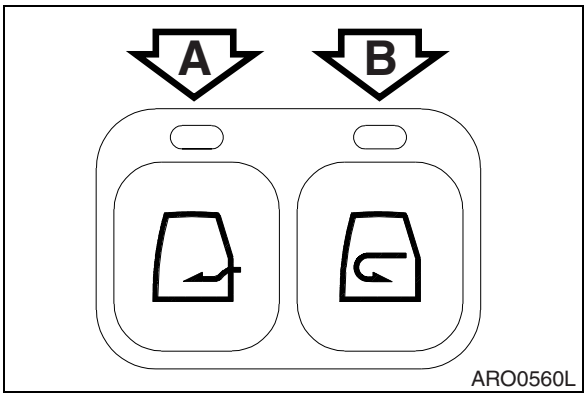


Figure 69

MEMORY FUNCTION OF USED MODE

The air conditioner panel has a memory function. When the starter switch is turned "OFF" the settings for the panel will be stored. When the excavator is started, the last setting will be used.

ADDITIONAL OPERATING INSTRUCTIONS

A proper indoor temperature in summer is 5 - 6°C (10 - 12°F) less than the outdoor temperature.

Operate the air conditioner from 20 - 30 minutes a week to circulate the refrigerant in the system.

NOTE: *The blower switch should be on "LO" speed.*

Clean filter every 500 hours or when required due to operating conditions. Replace filter when required.

If operating the air conditioner or heater for a long time, operate the ventilation switch, and when smoking, vent the air to the outside to prevent irritation to eyes.

STEREO

SECURITY AND AREA CODE SETTING

1. Set Security and Area Code
   - When installing the unit.
   - When replacing or charging the 'BATTERY'.
2. Security Code
   - A combination of four figures.
3. Area Code
   - Code area to set up frequency.

Code	Area
1	NORTH AMERICA
2	EUROPE
3	CENTRAL/SOUTH AMERICA
4	KOREA, ASIA

4. The security and area code is stated on proffered ID card when you purchase the machine. Keep this card in a safe location such as the machine file. Do not store the card in the machine.

ORDER TO SET UP SECURITY AND AREA CODE

1. Turn the starter switch "ON."
2. Press the power on/off button (1, Figure 70).
3. (AF: --) signal is displayed on the LCD.
4. Set up area code (Use the preset station button 6, Figure 70).

   NOTE: *In the USA: (AF: ---) -> (AF: 1) (Press preset station button #1).*
5. (AF: 1) will blink twice and (code: ---) will blink.
6. Set up security code "1156" (Use the preset memory button 6, Figure 70).
7. If FM 87.5 signal is displayed on the LCD, all of set up is finished.

   NOTE: *If you do not set the security and area code, the stereo will not work.*

   NOTE: *If the stereo switch mounted on cab switch panel is not turned "ON," the stereo will not work. Refer to item “7. Stereo On/Off Switch” on page 2-9 for details.*

FRONT PANEL

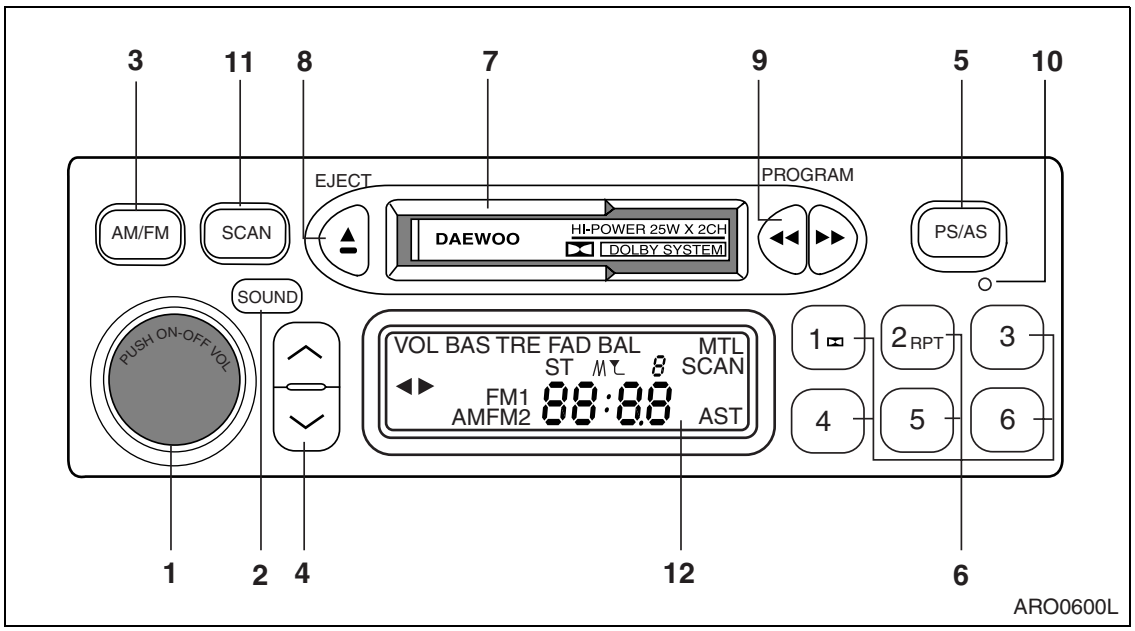


Figure 70

1. POWER / VOLUME CONTROL KNOB
2. SOUND MODE SELECTOR BUTTON
3. BAND SELECTOR SWITCH
4. TURNING UP / DOWN
5. AUTOMATIC MEMORY (AME) AND PRESET SCAN BUTTON
6. PRESET STATION BUTTON
7. CASSETTE SLOT
8. TAPE EJECT BUTTON
9. CASSETTE AND PROGRAM BUTTON
10. SECURITY WARNING LED
11. SCAN
12. LCD

1. POWER/VOLUME CONTROL KNOB

Power ON: Press this knob to turn the audio system "ON."

Power OFF: Press the knob again to turn the audio system "OFF." All displays will disappear on the LCD.

When control button is rotated clockwise (counterclockwise) during normal operation, the volume is increased (decreased), the volume level will appear as a numeric value on the LCD. After adjusting, the LCD will return to its original condition 5 seconds later.

NOTE: *Audio system will be operated at the mode which you operated before turning off the audio system.*

2. SOUND MODE SELECTOR BUTTON

To select the desired audio mode, press the sound mode selector button. The audio mode indicator and numeric value will appear on the LCD.

Each time you press the button, the sound mode changes in the following order:

VOL -> BAS -> TRE -> FAD -> BAL.

When the desired mode is selected, adjust the volume by rotating power / volume control knob (1).

Bass Control

Bass control is used to adjust the bass (low frequency) sound quality.

1) Select the bass control mode using the sound mode selector button (2).

2) When the "BAS" indicator appears on the LCD, rotate volume control knob (1) clockwise to increase the bass and counterclockwise to decrease it. The bass level will appear as a numeric value on the LCD.

Treble Control

Treble control is used to adjust the treble (high frequency) sound quality.

1) Select the treble control mode using the sound mode selector button (2).

2) When the "TRE" indicator appears on the LCD, rotate volume control knob (1) clockwise to increase the treble and counterclockwise to decrease it. The treble level will appear as a numeric value on the LCD.

Balance Control

Balance control is used to adjust the volume of the left and right speakers.

1) Select the balance control mode using the sound mode selector button (2).

2) When the "BAL" indicator appears on the LCD, rotate volume control knob (1) clockwise to decrease the volume of the left speaker.

3) To decrease the volume of the right speaker, rotate volume control knob (1) counterclockwise.

4) When the numeric value "0" appears on the LCD, the volume of left and right speaker is equal.

Fader Control

This mode is not used for this machine as a control mode.

3. BAND SELECTOR SWITCH

Press the band selector button (3) to select the desired band. Band changes as follows:

FM1 -> FM2 -> AM -> LW.

4. TUNING UP/DOWN

Seek Tuning

To quickly search for next receivable lower station, press the tuning down (9, Figure 70) button (4) for more than 0.5 second. To quickly search for next receivable higher station, press the tuning up (9, Figure 70) button (4) for more than 0.5 second.

Manual Tuning

Press the tuning up or down (9, Figure 70) button (4) for less than 0.5 second to increase or decrease the frequency. The frequency of AM band changes 9 kHz each time, the frequency of LW band changes 1kHz and the frequency of FM band changes 50kHz each time.

5 & 6.AUTO MEMORY AND PRESET SCAN BUTTON / PRESET STATION BUTTON

Preset Scan

To hear the preset station stored on the preset buttons, press the preset scan button (5) for less than 2 seconds.

In FM band (FM1or FM2), all of the preset stations stored on the preset buttons 1 through 6 in the FM1 or FM2 band will be turned in for about 5 seconds each in turn. In AM or LW band, all of the preset stations stored on the preset buttons 1 through 6 in the AM or LW band will be turned in for about 5 seconds each in turn.

While operating this function, the relevant frequency and preset button number will be flashed on the LCD.

After scanning all of the preset stations, this function is automatically cancelled and the station you heard before operating this function is turned on. When desired station is turned on, press this button again or the corresponding preset button to stop the scan function.

Auto Memory

1) Select the desired band using the band selector button (3).
2) Press the auto memory button (5) for more than 2 seconds. Then, the strongest available stations are automatically stored on the preset buttons 1 through 6 in sequence.
3) After storing, all of the preset stations are scanned in sequence for 5 seconds each, and the station you heard before this function is automatically tuned in.

Manual Memory

1) Select the desired band using the band selector button (3)
2) Turn in the desired station using tuning up/down button (4).
3) Press one of 6 preset buttons (6) for more than 2 seconds, The preset button number will be displayed on the LCD, then the station will be stored in the memory.

By the same way, you can store the desired stations into the 6 preset buttons.(6).

7. TAPE SLOT

Press the power button (1) to turn the audio system on. Insert a cassette tape fully into the cassette slot with the exposed tape side facing the right. Then the player starts playback and "PLAY" signal appears on the LCD.

8. TAPE EJECTION BUTTON

To eject the tape, press the tape eject knob (8). Then, the mode is automatically transferred to the radio.

9. CASSETTE AND PROGRAM BUTTONS

Fast Forward

To fast wind the tape, press the fast forward button (9, Figure 70). The tape direction indicator will blink on the LCD. When the tape reaches its end, it is automatically reversed and played back from the beginning of the opposite side. To stop the fast forward movement, press the rewind button (9, Figure 70).

Rewind

To rewind the tape, press the rewind button (9, Figure 70). The tape direction indicator will blink on the LCD. When the tape is fully rewound, it is played back from the beginning of the same side. To stop the rewind movement, press the fast forward button (9, Figure 70).

Program

To play the opposite side of tape while playing one side, press the fast forward (9, Figure 70) and rewind (9, Figure 70) buttons simultaneously.

NOTE: *When the tape reaches at the end of one side, it will automatically reverse and play back the other side of tape.*

NOTE: *Press 'MTL" button (metal tape button) when playing a high composition tape, like a metal tape, a chrome tape etc. The metal tape indicator "MTL" will be illuminated in the LCD. Switch off for a normal composition tape.*

10. SECURITY WARNING LED

The security warning LED will flash when the key in the starter switch is removed, and will disappear when starter switch is turned to the "ON" position.

11. SCAN

To hear each station on the current menu band in turn for about 5 seconds.

12. LCD

A. Tape Direction Indicator

B. FM/AM Band Indicator

C. FM Stereo On Indicator

D. Frequency / Tape Signal / Audio Level Condition Indicator

E. Auto Memory Indicator

F. Metal Tape Indicator

G. Preset Number Indicator

H. Weak FM Station Indicator

I. Balance Indicator

J. Fader Indicator

K. Treble Indicator

L. Bass Indicator

M. Volume Indicator

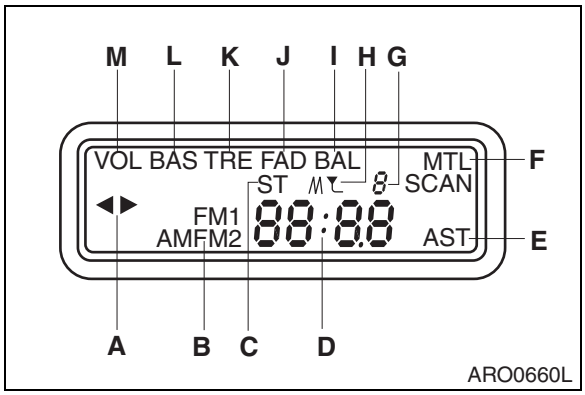


Figure 71

CARE OF STEREO

Do not use a tape that has a longer playing time than C-90 (90 minutes). Avoid use of C-120 tapes because tapes are made of a thinner material that may break and get tangled inside stereo.

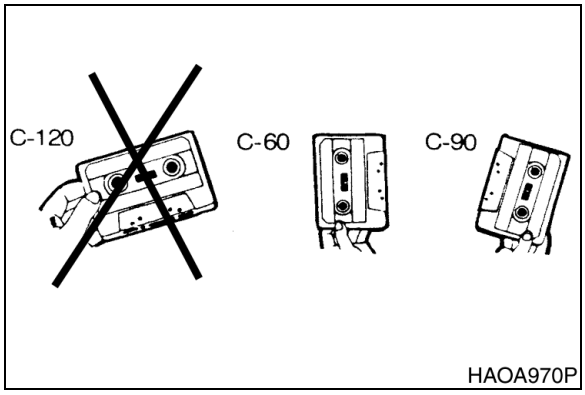


Figure 72

Make sure tapes are wound tight. If you use a loose tape, it may cause a problem in a deck. If they are loose, use a pencil or similar device to wind up slack.

Do not use poor quality tapes.

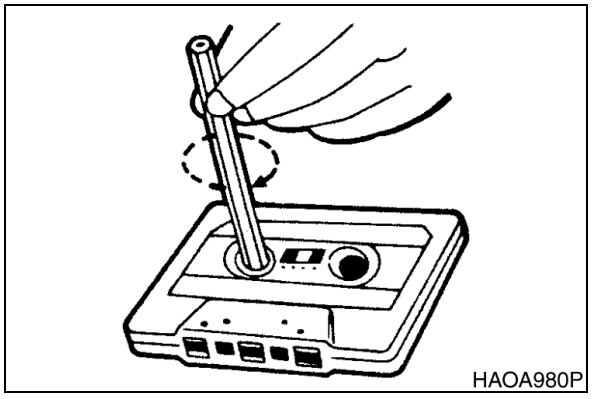


Figure 73

Do not store cassette tapes in the following places or under the following conditions. Damage to tape and stereo may result.

- Direct sunlight.
- Humid place.
- Dusty place.
- Around heater or heater vents which discharge heat.
- Around speakers and other magnet devices that generate a strong magnetic field (solenoid valves).

Clean head and pinch roller periodically. They continuously contact the tape. If they are not kept clean, stereo and tapes may be damaged. Keep them clean for optimum performance.

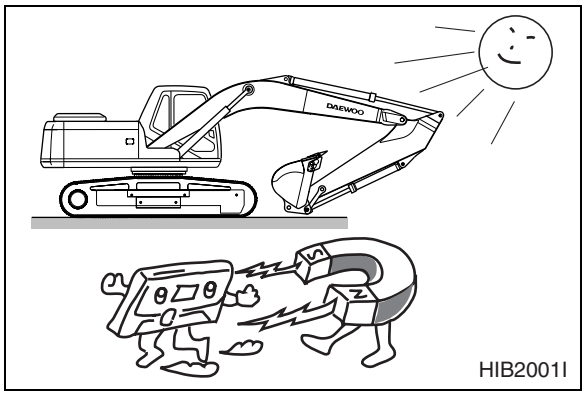


Figure 74

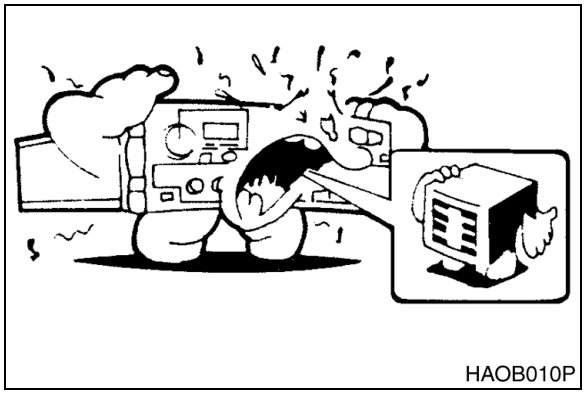


Figure 75

If head gets dirty, clean it with a soft cotton swap through cassette slot.

It is recommended t0 use a cassette deck cleaning tape for easy and efficient cleaning of head, capstan and pinch roller.

When you turn "OFF" power, be sure to take out cassette tape by pressing eject button.

When not using a cassette tape, keep it stored in a plastic case.

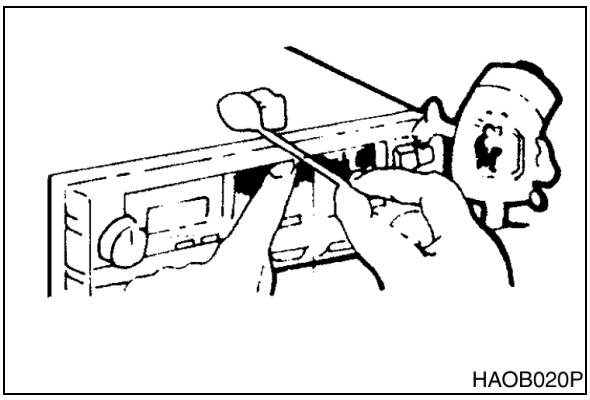


Figure 76

FUSE BOXES

There are two fuse boxes (1 and 2, Figure 77) on the left side of the heater box. Fuses prevent electrical devices from overloading or shorting.

A decal attached to the inside of the fuse box's cover indicates the function and amperage of each fuse.

NOTE: *For a further explanation see “Fuse Boxes” on page 4-60.*

Spare fuses are mounted on the inside of fuse box's cover.

Change a fuse if the element separates. If the element of a new fuse separates, check the circuit and repair the circuit.

CAUTION!

Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

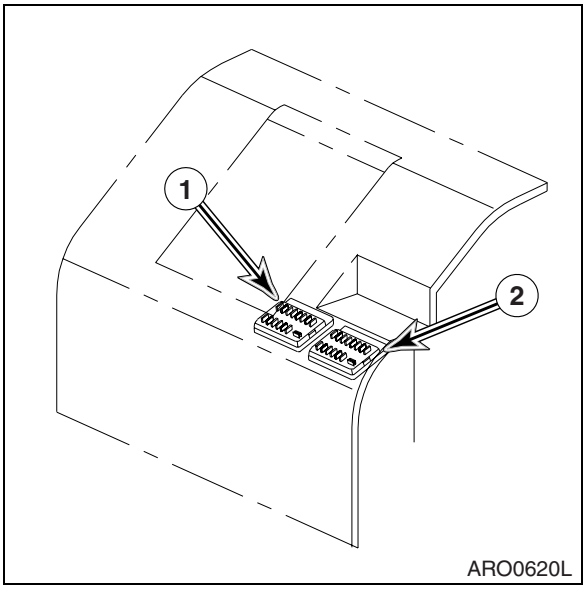


Figure 77

MISCELLANEOUS ELECTRICAL DEVICES

1. CAB LIGHT

A light is installed on the rear right of the operator's compartment.

Press the push button to turn it "ON." Press the button again to turn it "OFF." The light will work despite starter switch position.

NOTE: *If light is left "ON" for a long time while the engine is not running, the battery will be discharged.*

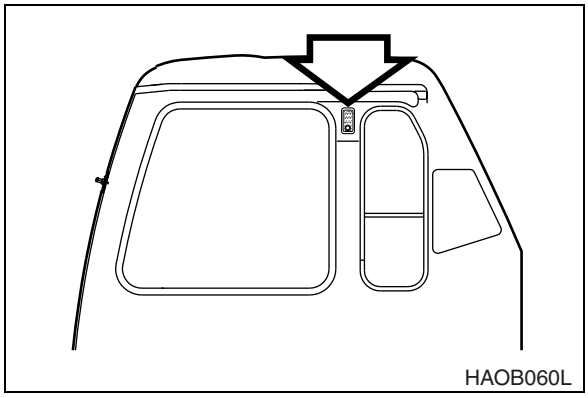


Figure 78

2. PILOT CUTOFF SWITCH

The pilot cutoff switch is by the hinge part of left-hand stand. When the safety lever is raised, the switch deactivates the work and travel levers. With the work and travel levers deactivated no digging/operational work can be done.

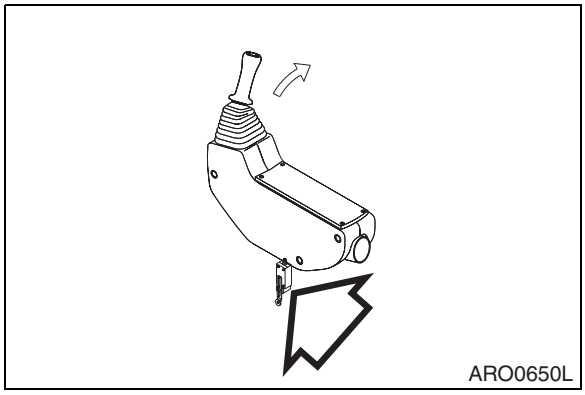


Figure 79

3. CIRCUIT BREAKER

A main circuit breaker is in the battery box. It will automatically cut off in the event of an electrical circuit short or overload. This will prevent the electric wiring and components from being burned or damaged.

If the circuit breaker is cut off, check all related circuits, this means something is wrong in the electric circuit.

After maintenance, press the red button for normal operation of circuit breaker.

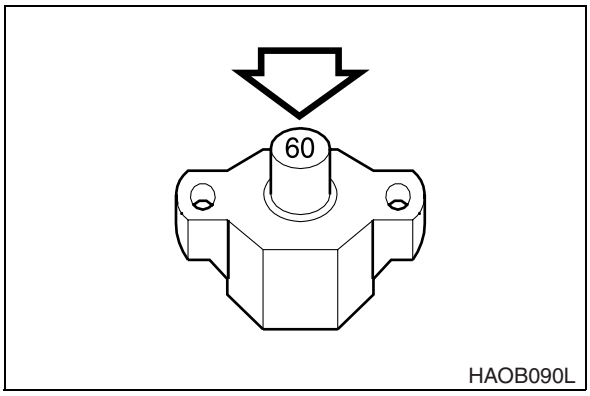


Figure 80

4. FUSIBLE LINK

A fusible link is in the battery box.

If the engine does not crank, first check that the starter switch is turned "ON" and that no power is available (No indicator lights will light.). Check that the "A" portion (Figure 81) of the fusible link is not broken or burned through. Replace the fusible link if damage and investigate cause.

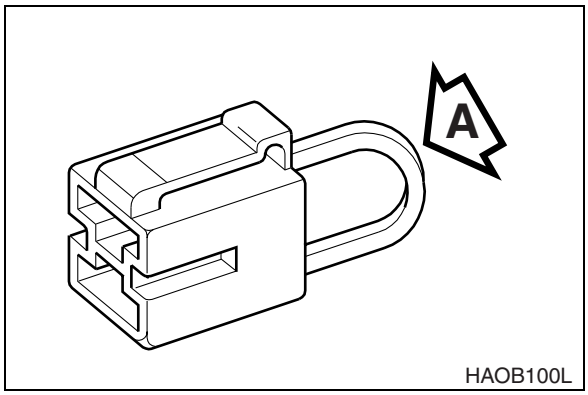


Figure 81

WARNING!

When changing the fusible link, replace the fusible link with the same capacity part. Otherwise, a fire could break out in the wiring harness and/or other components of the circuit. Always use original Daewoo parts.

SEAT ADJUSTMENT

⚠ WARNING!

Whenever the operator or operating condition has changed, check to see that the seating position is suitable for the condition at hand. Always fasten your seat belt while operating vehicle. Adjust the backrest so that the operator can fully reach and operate the pedals. When setting the safety lever to the "LOCK" position, first make sure the left arm rest is completely raised to the upright position.

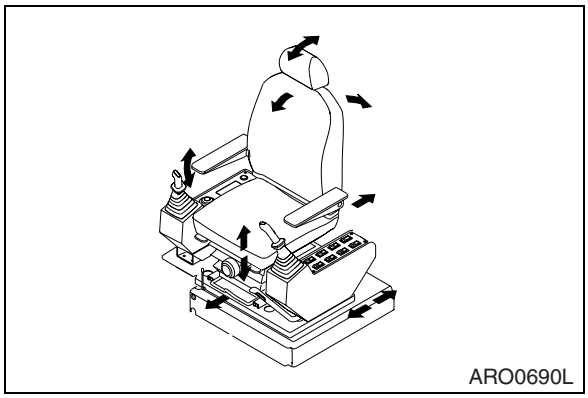


Figure 82

1. FORWARD / BACKWARD ADJUSTMENT (FIGURE 83)

Holding lever (1, Figure 83), raise it up, while pushing or pulling the seat to desired position. Release lever once desired position is reached. Adjustment range is 160 mm (6.3 in)

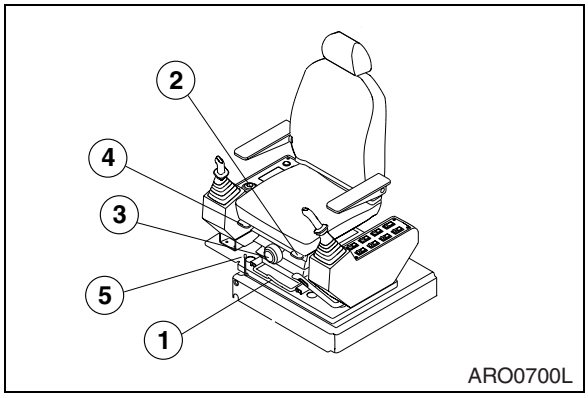


Figure 83

2. ADJUSTING THE SEAT'S TILT AND SEAT HEIGHT (FIGURE 83)

Forward Tilt

Push lever (2, Figure 83) down to adjust the angle of the front of the seat.

Rear Tilt

Pull lever (2, Figure 83) up to adjust the angle of the rear of the seat.

Seat Height

It is possible to move the seat up or down by combining adjustments forward and rear tilt. Adjust the seat according to operator's size and work conditions. Height adjustment is 60 mm (2.4 in).

3. WEIGHT ADJUSTMENT (FIGURE 83)

Turning knob (3, Figure 83) to right makes the suspension harder. Turning knob to left makes the suspension softer. Adjust according to operator's weight by checking the weight indicator dial. Adjustment range is from 50 - 120 kg (110 - 265 lb).

4. ADJUSTING RECLINING (FIGURE 83)

Pulling up the right lever (4,Figure 83) allows the seat backrest to be moved forward or backward.

5. MOVING THE WHOLE SEAT SETTING FORWARD/BACKWARD (FIGURE 83)

Turning lever to right allows the whole seat (seat, work levers (joysticks), safety lever) to be moved forward and backward. Adjustment range is 140 mm (5.51 in).

6. ANGLE ADJUSTMENT OF ARMREST (FIGURE 84)

Adjustment angle of left and right armrest is done by turning a dial (6, Figure 84) in bottom of armrest. When you adjust the angle, manually raise the armrest before turning the dial.

7. HEADREST (FIGURE 84)

The headrest (7, Figure 84) can be adjusted forward/backward and up/down. Move it by holding both sides.

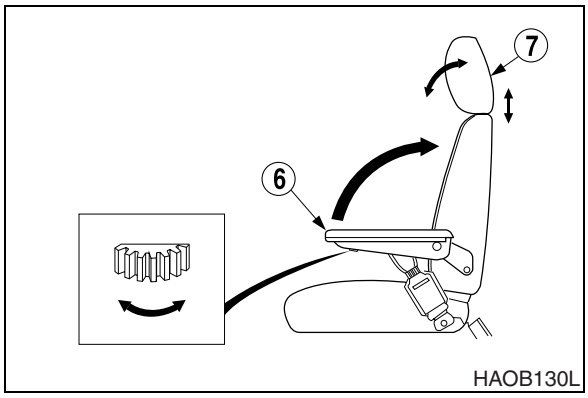


Figure 84

SEAT BELT

⚠ WARNING!

The seat belt is for the operator's safety and should be worn at all times. Before driving the machine, adjust the seat to the desired position for maximum comfort and machine control, then fasten the seat belt. Seat belts must be worn across the pelvic region and adjusted snugly to lessen the chance and severity of injury in the event of an accident. Never fasten a seat belt across the abdomen.

Under no circumstances should the operator be standing in the cab when operating the excavator.

Do not adjust the seat position while the vehicle is moving because a loss of control may result. Stop the machine, apply the parking brake, and then adjust the seat.

Always, check the condition of seat belt and belt bracket before fastening it. Do not use it with twists in it. Replace belt or bracket if damaged or worn.

SEAT BELT LOCKING AND UNLOCKING

Insert belt end (1, Figure 85) into the buckle (2). Pull the belt to check that belt end is locked into buckle.

Adjust belt length so that it comfortably tight against the operator's pelvic region (hipbone).

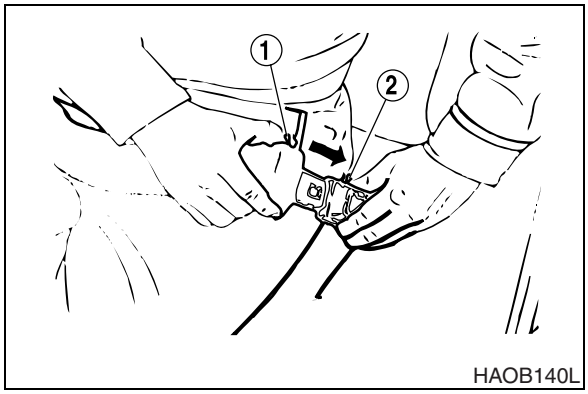


Figure 85

Press the button (3, Figure 86) in the center of buckle (2) and pull out belt (1) to unlock.

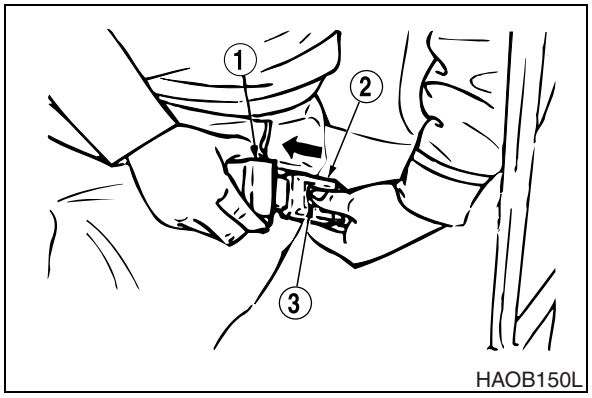


Figure 86

CEILING COVER

WARNING!

When leaving operator's seat, set the safety lever to "LOCK" (Figure 87) position, if not a serious accident could occur by accidentally moving the work levers (joysticks).

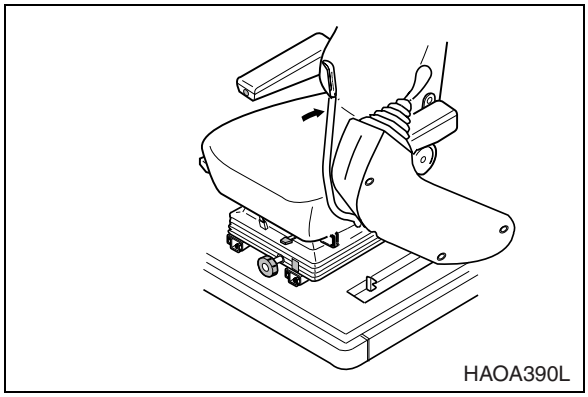


Figure 87

OPENING THE CEILING COVER

1. Lower bucket to ground.
2. Set safety lever (Figure 87) on "LOCK."
3. Pull the lock (1, Figure 88) in front center of ceiling cover and push it up with handle (2).

CLOSING THE CEILING COVER

1. Lower bucket to ground.
2. Set safety lever (Figure 87) on "LOCK."
3. Pull down cover with the handle (2, Figure 88) so that the lock (1) can be locked in the bracket in the ceiling frame.

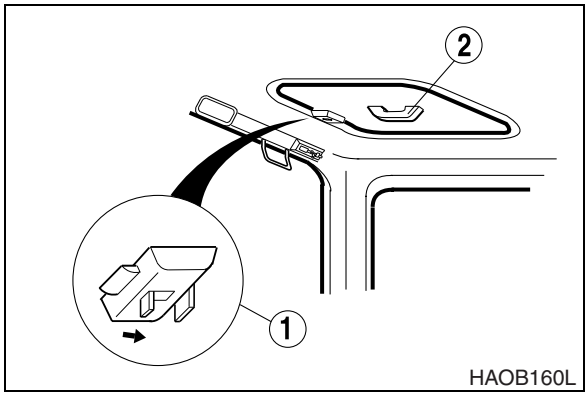


Figure 88

FRONT WINDOWS

WARNING!

When leaving operator's seat, set the safety lever to "LOCK" (Figure 89) position, if not a serious accident could occur by accidentally moving the work levers (joysticks).

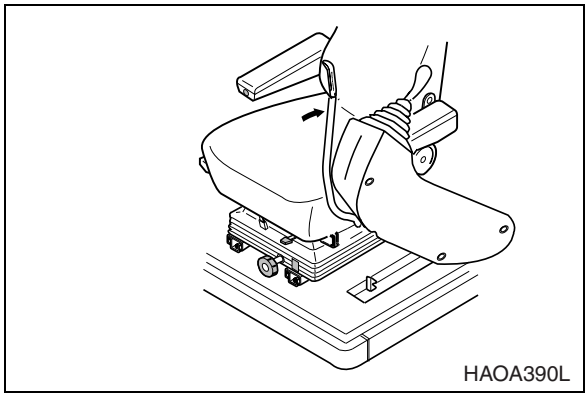


Figure 89

FRONT UPPER WINDOW

This can be housed in the cab's ceiling.

Opening the Window

WARNING!

When stowing front window in the cab roof, secure left lock lever (1, Figure 90) so they do not fall out.

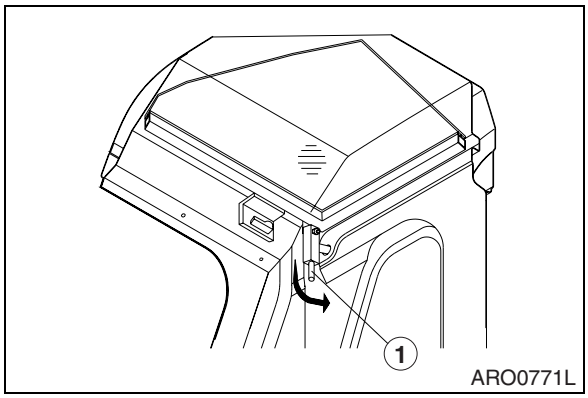


Figure 90

1. Lower bucket to ground.
2. Set safety lever (Figure 89) on "LOCK."
3. Set engine speed control dial to “LOW IDLE." Allow engine to idle for 3 - 5 minutes.
4. Shut down engine by turning key to "O" (OFF) position and remove key from starter switch.
5. Unplug wiper connector (1, Figure 91) on right front upper side of cab.

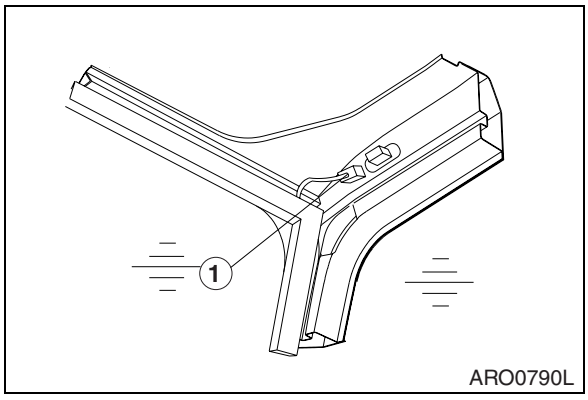


Figure 91

6. Push release levers (1, Figure 92) on both sides of front window. This will allow front window to move.

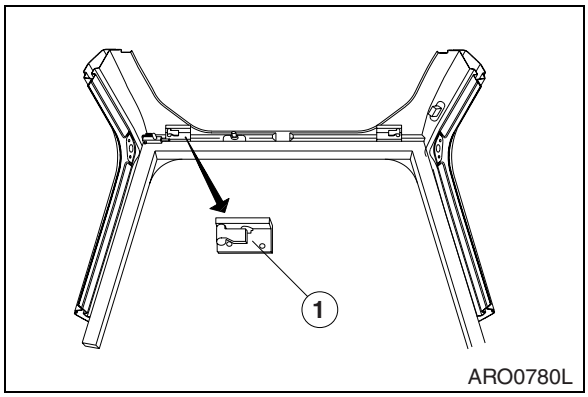


Figure 92

7. Holding window handles (one at top and the other at bottom of window) pull window up and then push it back. Make sure window is secured with latch (1, Figure 93).

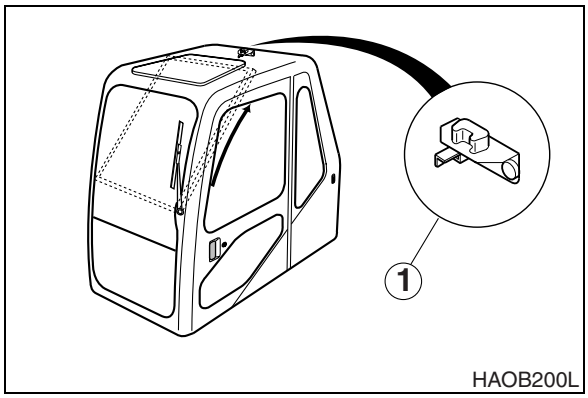


Figure 93

8. Pull lock lever (1, Figure 94) down until pin on lever goes into the hole of cab.

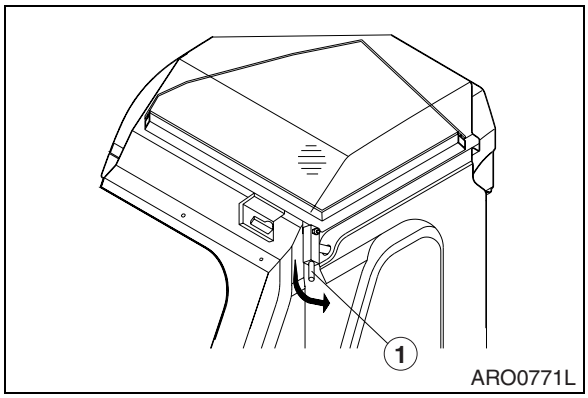


Figure 94

Closing the Window

WARNING!

Be careful that your hands are not caught in window frame.

1. Lower bucket to ground.
2. Set safety lever (Figure 89) on "LOCK."
3. Unlock it pulling the lever (1, Figure 95) up (in direction of allow).
4. Holding upper handle of front window with right-hand, push release lever (1, Figure 96) (in direction of arrow) to unlock catch (2).
5. Slowly lower front window into position.
6. Push front window to secure front window by lock catches (1, Figure 97).
7. Plug in wiper connector (1, Figure 91) on right front upper side of cab.

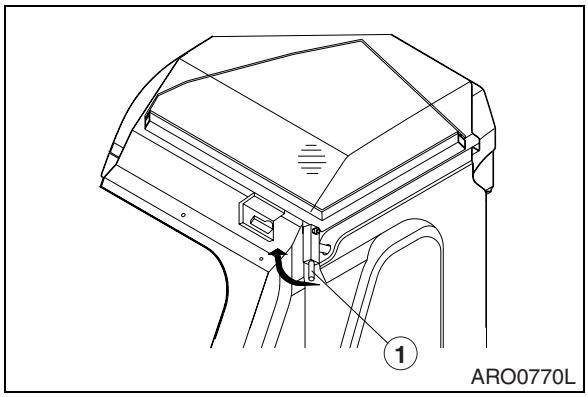


Figure 95

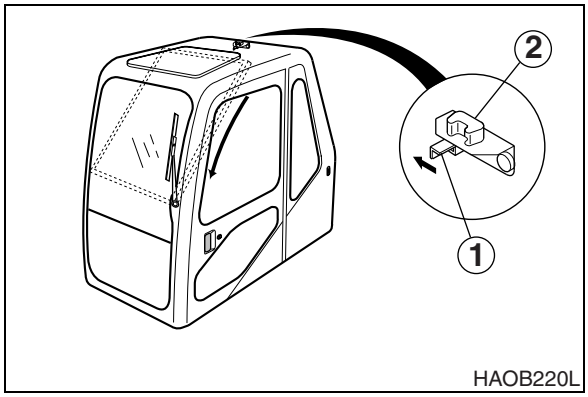


Figure 96

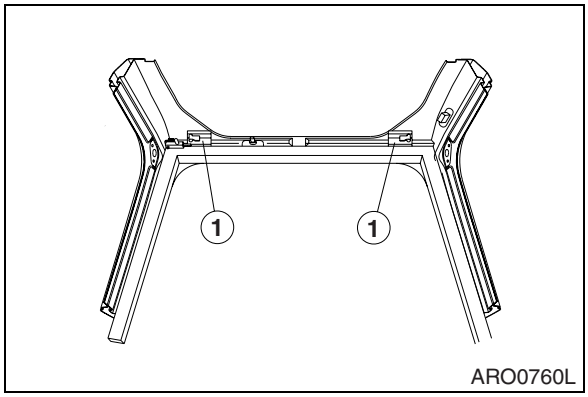


Figure 97

FRONT BOTTOM WINDOW

The front bottom window can be removed and stored to cabin rear.

1. After stowing the front upper window in the cab roof, remove bottom window from cab in direction of the arrow (Figure 98).

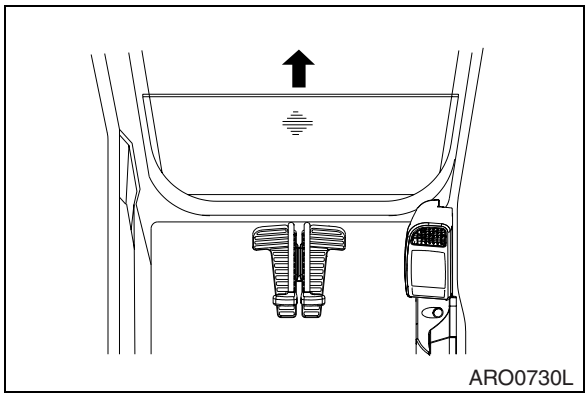


Figure 98

2. Set bottom window in rubber holders (1, Figure 99) behind operator's seat. Secure window to cab with left and right knobs (2).

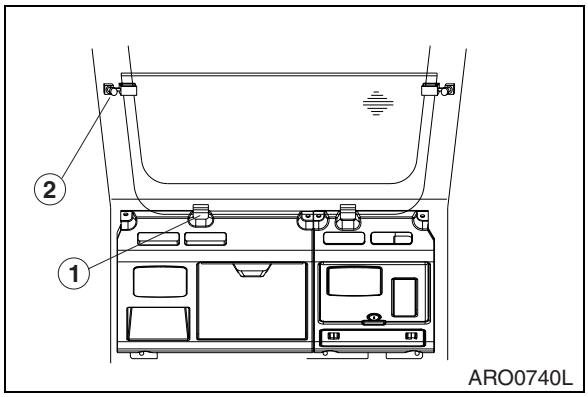


Figure 99

DOOR SIDE LATCH

1. The door side latch (1, Figure 100) is used to secured the door to the side of the cab when it is opened.

   NOTE: *Keep the door closed and locked when machine is not in use.*

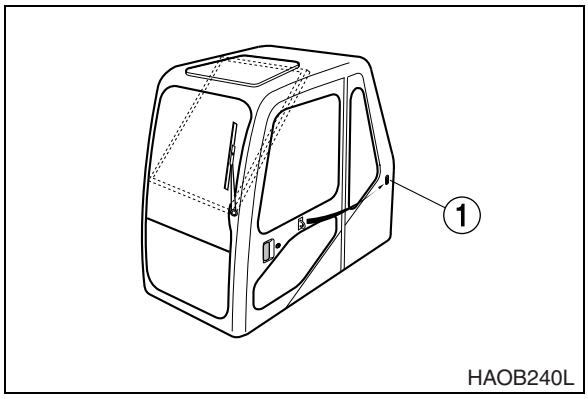


Figure 100

2. To release door from side of cab, push the latch lever (Figure 101) down. The latch lever is to the left of the operator's seat.

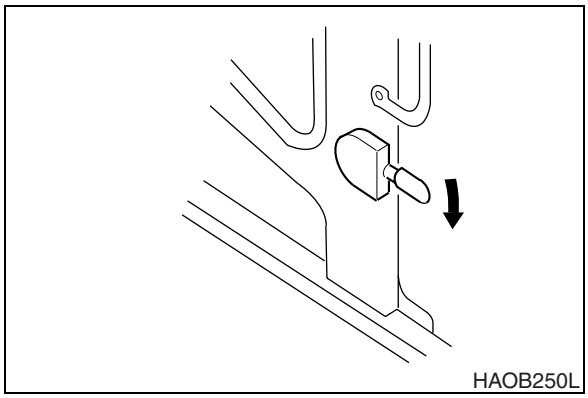


Figure 101

MISCELLANEOUS ACCESS COVERS AND DOORS

SIDE DOOR

Pull out prop rod (1, Figure 102) from housed position and insert it into hole (2) to secure side access door.

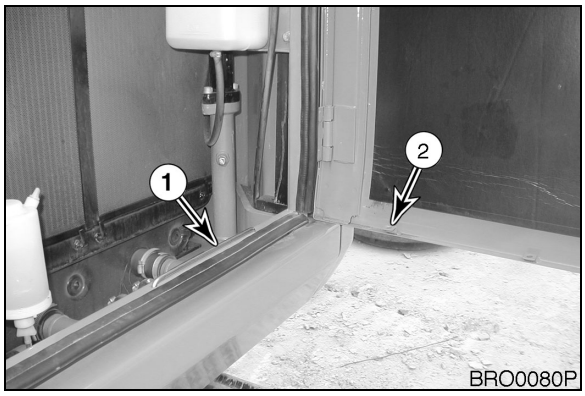


Figure 102

BATTERY BOX DOOR

Open door and slide prop rod (1, Figure 103) in slot (2) until it locks in notch at end of slot.

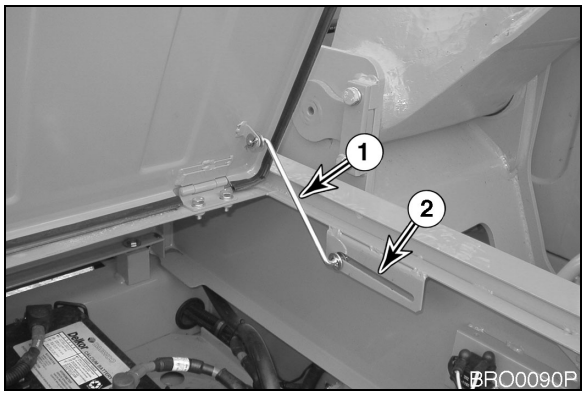


Figure 103

ENGINE COVER

Open the cover and slide prop rod (1, Figure 104) in the slot (2) to support the cover.

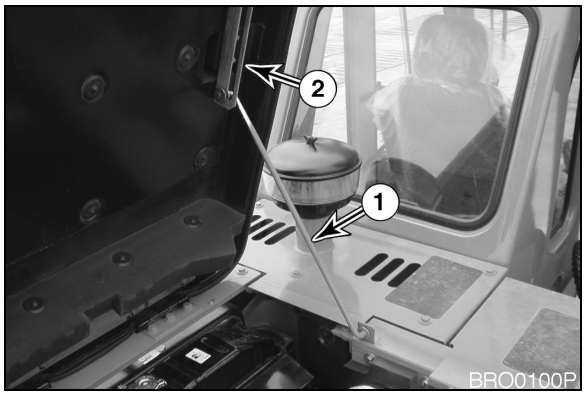


Figure 104

CAB STORAGE COMPARTMENTS

Two storage compartments are behind the operator's seat.

The large compartment (1, Figure 105) has a cover. Keep the operation and maintenance manual in it so it can be referred to when operating the machine or performing maintenance.

Keep small objects such as cassette tapes, etc. in the small personal box (2, Figure 105).

There is a separate case (1, Figure 106) which is on the right side of operator's seat.

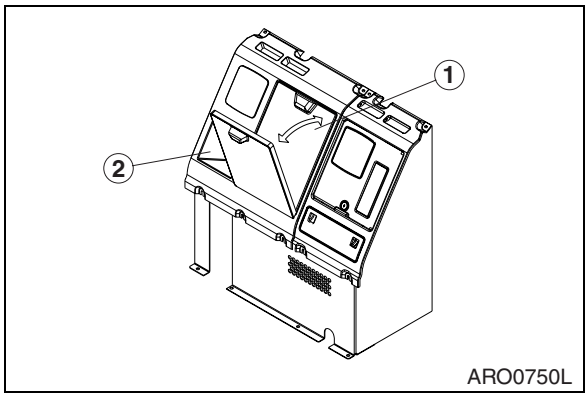


Figure 105

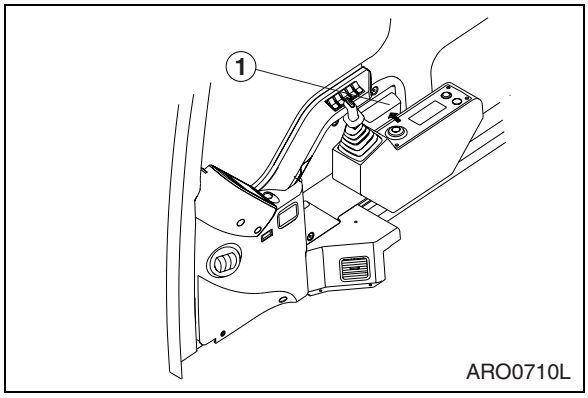


Figure 106

ASHTRAY

An ashtray (1, Figure 107) is to the right side of the operator's seat on the side of the cab. Pressing end of ashtray will revolve it open. Always close ashtray after putting out a cigarette.

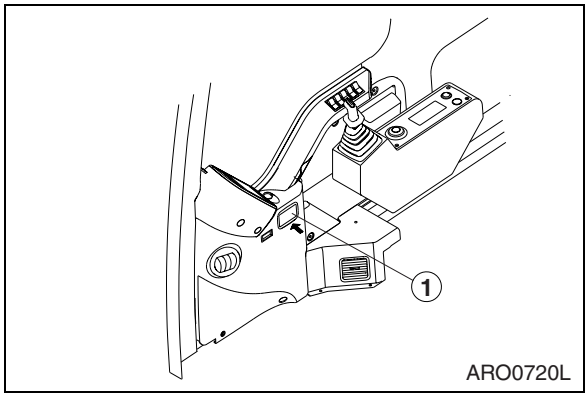


Figure 107

WINDOW GLASS BREAKING TOOL

This excavator is equipped with a glass breaking tool. It is behind the operator seat in the upper right corner of the cab. This tool can be used in case of an emergency situation which requires the breaking of glass to exit from the operator's cabin. Grip the handle firmly and use the sharp point to break the glass.

WARNING!

Protect your eyes when breaking the glass.

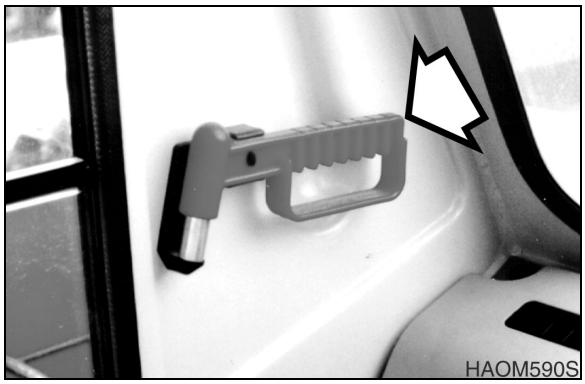


Figure 108

TO HANDLE A NEW EXCAVATOR

All Daewoo excavators are inspected and adjusted before leaving the factory. However, it is required that the operator follow these steps during the initial break-in period. Failure to follow these steps may result in damage to the equipment or reduced performance.

Hour	Load
For first 50 hours of operation.	Maintain about 80% load of full capacity (Engine rpm: 80% of rated rpm)
After first 50 hours of operation.	Full load

If machine is used at full load before it is broken in, it may affect the life cycle and safe running operations. This could lead to problems later.

NOTE:
1. *Check daily for leakage of coolant, fuel, engine oil and hydraulic oil.*
2. *Inspect all lubricants daily, add appropriate lubricants as required.*
3. *During operation, monitor all instruments and gauges from time to time.*
4. *Avoid an extreme engine load.*
5. *Operate unit at 80% load until engine and all other components are at operating temperature.*
6. *Check that work equipment is operating normally during operation.*
7. *Check machine for loose parts or for damage that may have occurred during shipping.*
8. *Check for loose wiring or terminals, check gauge operation and battery electrolyte level.*

LUBRICATION AND FILTERS

1. Change engine oil and replace oil filter after first 50 hours of operation.
2. Change swing reduction device oil after first 250 hours of operation.
3. Change hydraulic line filter after first 250 hours of operation.
4. Replace travel and reduction gear oil after first 250 hours of operation.

NOTE: *For the replenishment of oil or grease, refer to “Inspection, Maintenance and Adjustment” on page 4-1 of this manual.*

STARTING AND STOPPING THE ENGINE

INSPECTION BEFORE STARTING ENGINE

⚠ WARNING!

If flammable materials such as leaves, paper, etc. are allowed to accumulate on high temperature components, such as the engine muffler and turbo, a fire may occur. Fuel, lubricant and hydraulic oil leaks, may cause a fire. If there is anything wrong, perform the appropriate corrective action.

Before starting engine, inspect the following items;

1. Electric system - Check for damaged electric cables, and loose or missing connectors.
2. Fuel system - Drain water and sediment from fuel tank and water separator.
3. Hydraulic system - Check for hydraulic oil leaks, damaged tubing and hoses, and interference points of components.
4. Lubrication - Perform all daily and periodic maintenance services. Perform services according to reading shown on hour meter.
5. Safety - Perform a machine walk-around. Make sure that no one is under the machine or performing any maintenance on it, before starting engine.
6. After starting machine - Check that all operational controls and components, are in proper operating condition, and are functioning correctly. Stop operation and correct any malfunction before continuing work.

OPERATIONAL CHECKS BEFORE STARTING ENGINE

⚠ WARNING!

When leaving operator's seat, set the safety lever to "LOCK" (Figure 1) position, if not a serious accident could occur by accidentally moving the travel or work levers (joysticks).

1. Set safety lever on "LOCK" (Figure 1).
2. Fasten seat belt. Check for proper operation and condition.
3. Set all operation levers in "NEUTRAL."

   NOTE: *Be careful not to touch any switches when starting engine.*

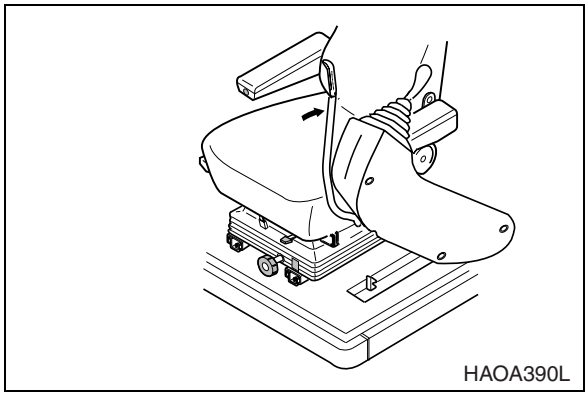


Figure 1

4. Rotate the starter switch to the "I" (ON) position (Figure 2). Check all indicator lights. After 2 seconds, all lights except the following will turn "OFF."

   - Engine coolant temperature gauge
   - Charging warning light
   - Fuel gauge
   - Engine oil pressure warning light
   - Engine rpm (0 rpm)

   NOTE: *If all of the indicator lights do not come "ON" when the key is first turned, there is a problem.*

   A warning buzzer will sound for about 2 seconds.

   The sound of the engine control motor may be heard while it rotates to the correct starting position.

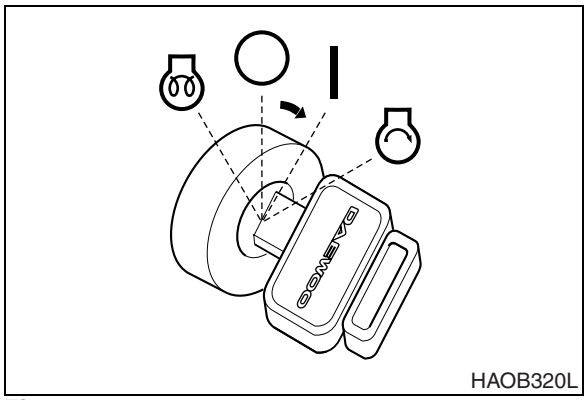


Figure 2

WARNING!

Start the engine after sounding horn and making sure that there are no people or obstacles in the area.

1. Perform all steps in “Operational Checks Before Starting Engine” on page 3-2.
2. Set engine speed control dial slightly above “LOW IDLE” (Figure 3).
3. Sound horn.

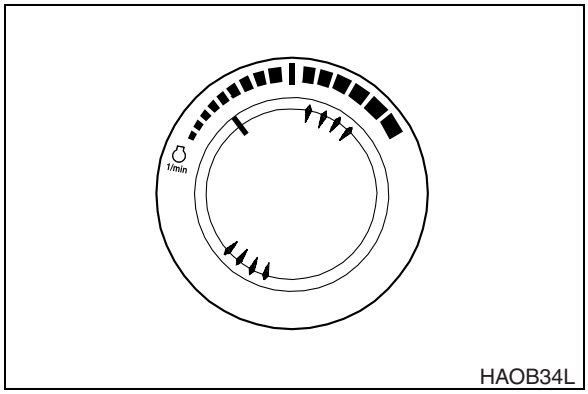


Figure 3

4. Turn starter switch to "⏢" (START) position (Figure 4). Engine should start in approximately 5 seconds.

WARNING!

If the engine does not start after approximately 15 seconds of cranking, release the starter switch. Wait about 5 minutes and repeat above step.

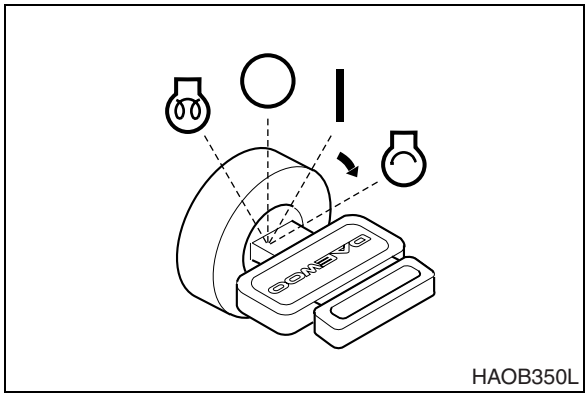


Figure 4

5. After engine has started, release key. Key will return to "I" (ON) position (Figure 5).
6. Follow procedures in “Hydraulic System Warm-up” on page 3-10.

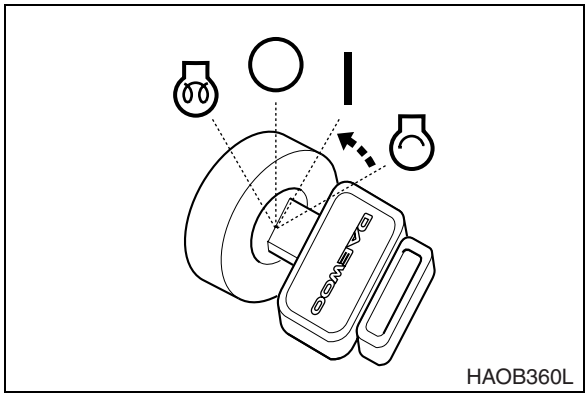


Figure 5

7. After warming unit, check all operating indicators to make sure that all engine systems (oil pressure, coolant, etc.) are in the normal operating range. If any problems are noticed, shut down engine. Normal indicators are:

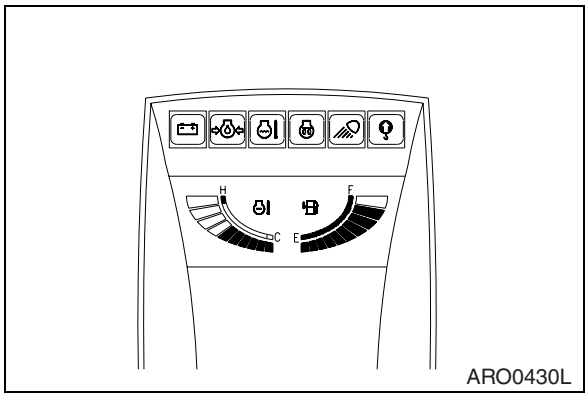


Figure 6

Instrument Panel Light or Gauge	Indicator Reading
Engine Coolant Temperature Gauge	GREEN RANGE
Fuel Gauge	GREEN RANGE
Charging Warning Light	OFF
Engine Oil Pressure Warning Light	OFF
Preheat Indicator Light	OFF
Pilot Filter Clogged Warning Light	OFF
Return Filter Clogged Warning Light	OFF
Air Cleaner Clogged Warning Light	OFF

8. Check color of exhaust smoke.
   - No color or light blue - Engine is running in good condition.
   - Black - Incomplete combustion. Check cause.
   - White or dark blue - Engine is burning engine oil. Check cause.
9. Check for usual engine vibration and noises. If any are heard or felt, investigate cause.

NOTE: *If engine coolant temperature gauge shows red while running, take the following action; Discontinue work and allow engine to run at low idle. Open engine compartment cover for good ventilation. Once engine temperature gauge returns to the green zone, shut down engine. After engine has cooled, check coolant level, look for leaks, clogged or dirty radiator fins (radiator core), and fan belt tension.*

⚠ WARNING!

DO NOT USE STARTING FLUIDS. The preheat system could cause the starting fluid to explode. Starting fluids should never be used.

1. Perform all steps in "Operational Checks Before Starting Engine."
2. Set engine speed control dial slightly above “LOW IDLE” (Figure 7).
3. Sound horn.

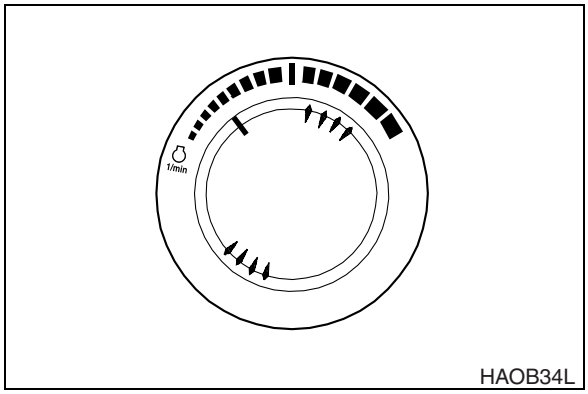


Figure 7

4. Turn starter switch to "⌀" (PREHEAT) position (Figure 8). Hold it there for 19 seconds. When preheat cycle is completed, the preheat indicator light (1, Figure 9) will turn "ON."

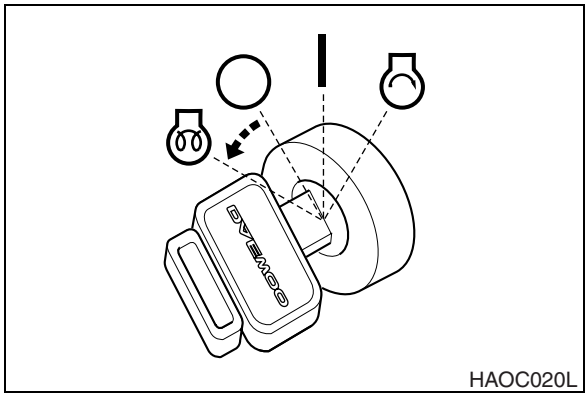


Figure 8

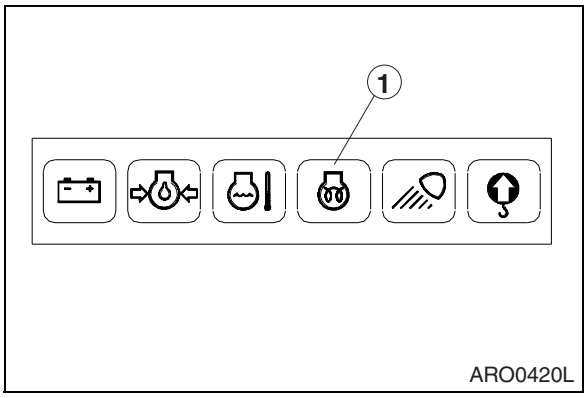


Figure 9

5. After the preheat indicator light turns "ON," immediately turn starter switch to "⏻" (START) position (Figure 10). Engine should start in approximately 5 seconds.

> **⚠ WARNING!**
>
> **If the engine does not start after approximately 15 seconds of cranking, release the starter switch. Wait about 5 minutes and repeat above step.**

6. After engine has started, release key. Key will return to "I" (ON) position (Figure 11).
7. After the engine starts, check all operating indicators to make sure that all engine systems (oil pressure, coolant, etc.) are in the normal operating range. If any problems are noticed, shut down engine.
8. Follow "Hydraulic System Warm-up" procedures in this section. (See page 3-10)

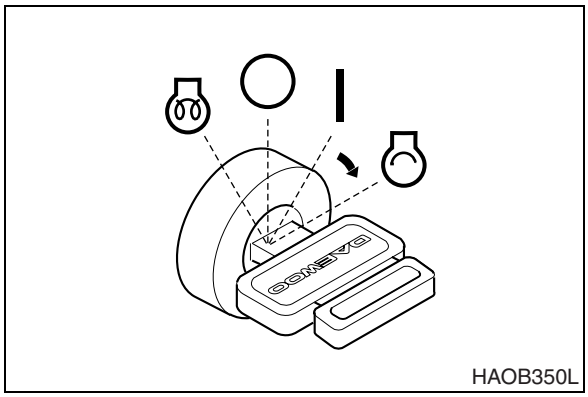


Figure 10

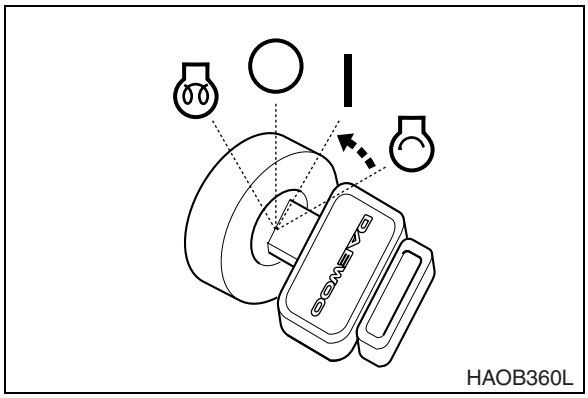


Figure 11

STARTING ENGINE WITH A BOOSTER CABLE

⚠ WARNING!

1. **An explosive gas is produced while batteries are in use or being charged. Keep flames or sparks away from the battery area.**
2. **Charge batteries in a well-ventilated area.**
3. **Always wear eye protection when starting a machine with jumper cables.**
4. **Improper jump starting procedures can cause an explosion resulting in personal injury.**
5. **Jump start vehicles on dry ground or concrete. Do not jump start the machine on a steel floor, because the floor is always grounded.**
6. **When starting from another machine, make sure the machines do not touch.**
7. **Always connect the auxiliary battery positive (+) terminal to depleted battery positive (+) terminal first. Then connect auxiliary battery negative (-) terminal to the frame of the depleted battery machine second.**
8. **Connect positive cable first when installing cables and disconnect the negative cable first when removing.**

Figure 12

IMPORTANT

The machine has a 24V (-) negative ground electrical system. Use the same capacity 24V booster batteries when jump starting engine.

If the batteries are drained during starting procedures, jump start engine using auxiliary or booster batteries according to the following procedure;

Connecting the Booster Batteries

1. Shut down engine of the machine on which booster batteries are mounted.
2. Connect one end of red cable (1, Figure 13) to the positive (+) terminal of the machine batteries, and the other end to the positive (+) terminal of the booster batteries.
3. Connect one end of black cable (2, Figure 13) to the negative (-) terminal of the booster batteries, and then make ground connection to the upper frame of the machine to be started with the other end of black (-) cable (2, Figure 13). When making the last connection to upper frame, be sure to connect the cable end as far away from the machine batteries as possible. DO NOT CONNECT DIRECTLY TO THE NEGATIVE BATTERY TERMINAL.
4. Start the engine.

Disconnecting the Booster Batteries

1. Disconnect black negative (-) cable (2, Figure 13) from the machine frame first.
2. Disconnect the other end of black negative (-) cable (2, Figure 13) from the booster batteries.
3. Disconnect red positive (+) cable (1, Figure 13) from the booster batteries.
4. Disconnect red positive (+) cable (1, Figure 13) from the machine batteries.

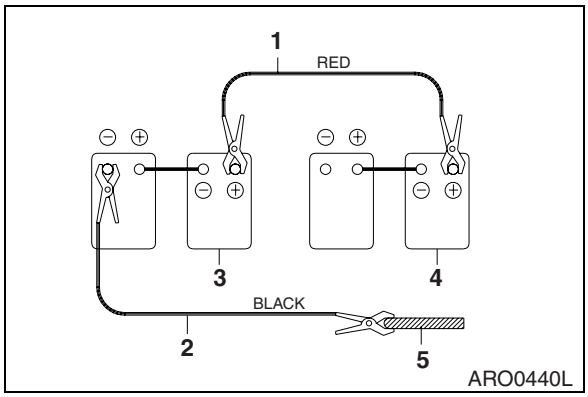


Figure 13

⚠ WARNING!

If a problem or abnormal operation occurs, immediately shut down engine. Allow excavator to reach normal operating temperature before starting work, especially in cold weather.

The correct operating temperature of the hydraulic oil is 50° – 80°C (120° – 175°F). Make sure to follow the procedures listed below for hydraulic fluid warm-up.

1. Run engine for approximately 5 minutes set at the middle of the speed range, without a load.

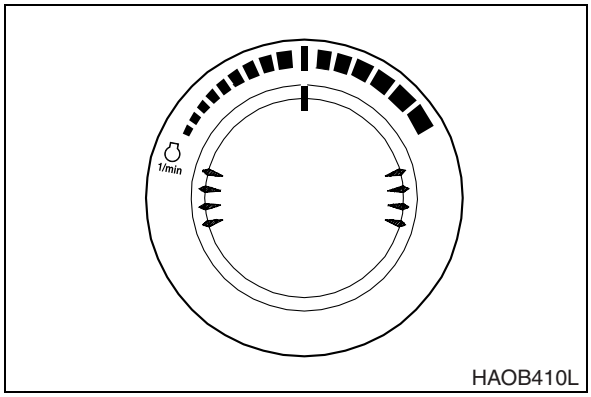


Figure 14

2. Set safety lever (1, Figure 15) on "UNLOCK" position.

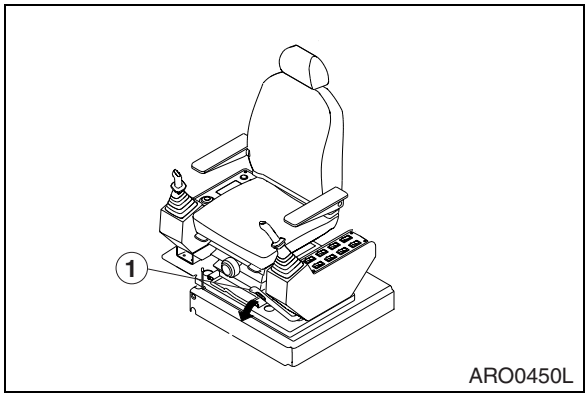


Figure 15

3. Slowly cycle boom, arm and bucket cylinders about five times without a load to circulate the oil through the system. Do this for 5 minutes.
4. Check for clearance and fully raise the front attachment. Swing clockwise 3 revolutions. Swing counterclockwise 3 revolutions.
5. Travel forward and reverse at low speed for two revolutions of the drive sprocket.

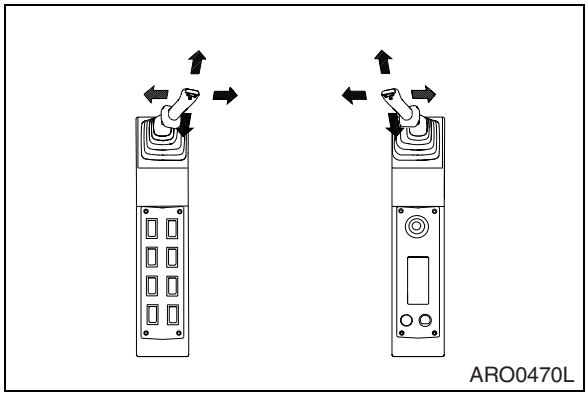


Figure 16

HYDRAULIC SYSTEM WARM-UP – COLD WEATHER

1. Run engine at “LOW IDLE” (no load) for 5 minutes (Figure 17).

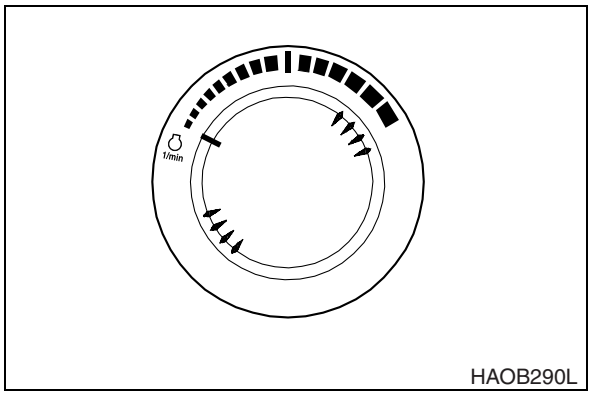


Figure 17

2. Run engine for approximately 5 minutes set at the middle of the speed range, without a load (Figure 18).

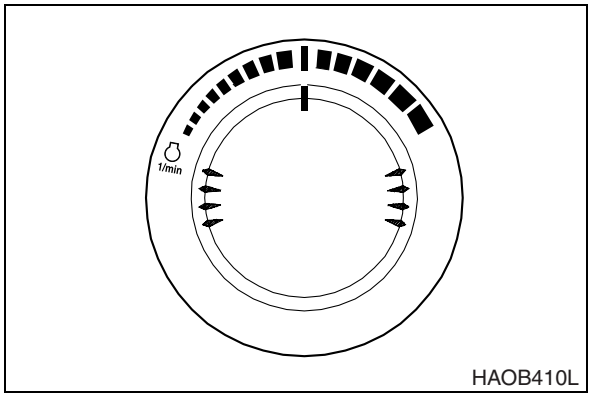


Figure 18

3. Set safety lever (1, Figure 19) on "UNLOCK" position.

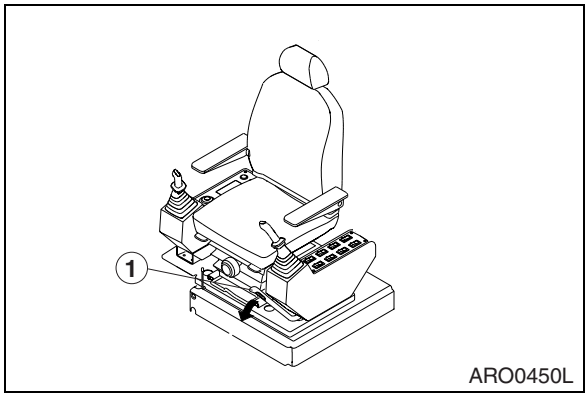


Figure 19

4. Slowly cycle boom, arm and bucket cylinders about five times without a load to circulate the oil through the system. Do this for 5 minutes.

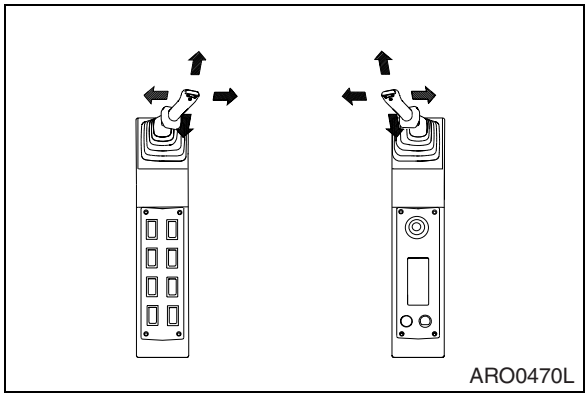


Figure 20

5. Set engine speed control dial to “HIGH IDLE” (Figure 21).
6. Repeat Step 4 for 5 minutes. If working speeds continue to be slow, continue to operate, but use extreme caution because the machine function may be erratic.
7. Check for clearance and fully raise the front attachment. Slowly swing clockwise 3 revolutions. Slowly swing counterclockwise 3 revolutions.
8. Travel forward and reverse at low speed for two revolutions of the drive sprocket.

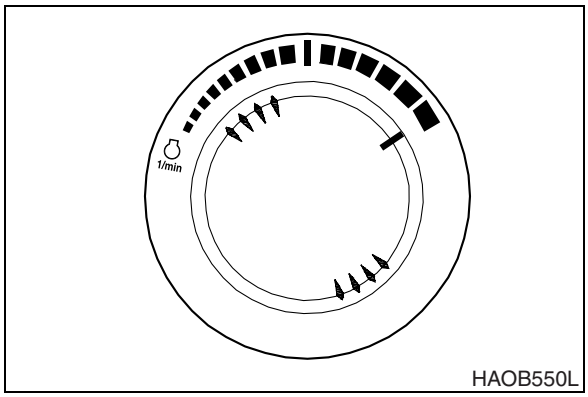


Figure 21

ENGINE SHUT DOWN

NOTE: *Allow engine to idle for 3 - 5 minutes before shutting down the engine. If not allowed to idle, heat surge may develop which will damage the engine. Allowing the engine to idle will dissipate heat.*

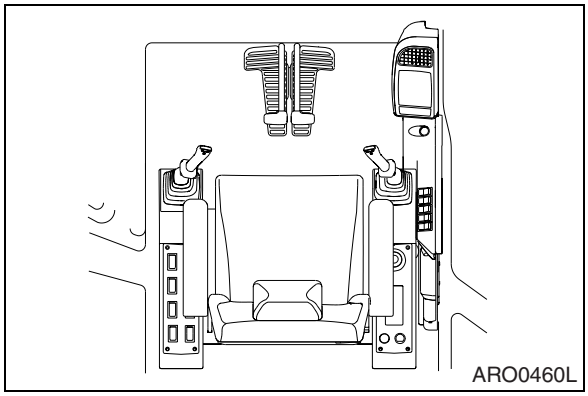


Figure 22

1. Park excavator on level and firm ground.
2. Lower front end attachment to ground and make sure all operating controls are in "NEUTRAL."

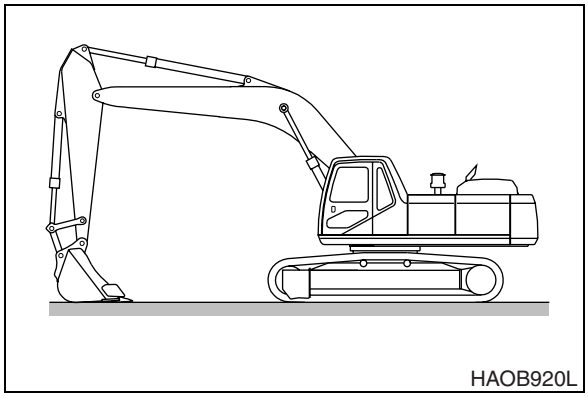


Figure 23

3. Set safety lever on "LOCK" position by pulling it up (Figure 24).

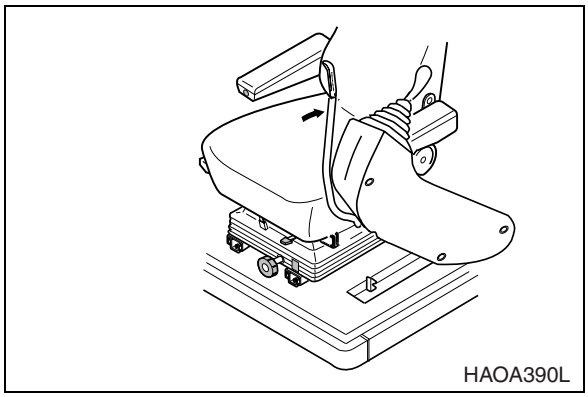


Figure 24

4. Set engine speed control dial to “LOW IDLE” (Figure 25). Allow engine to idle for 3 - 5 minutes.

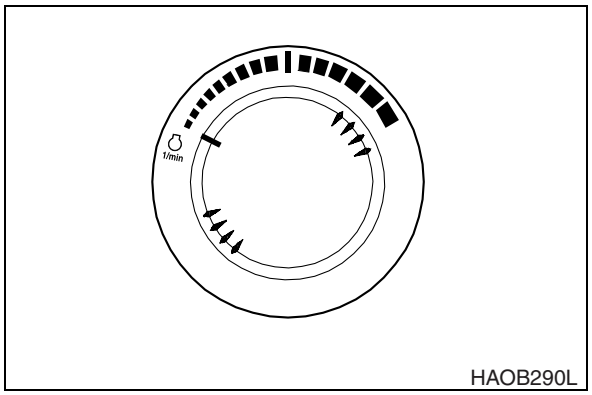


Figure 25

5. Shut down engine by turning key to "O" (OFF) position (Figure 26).
6. Remove key from starter switch.

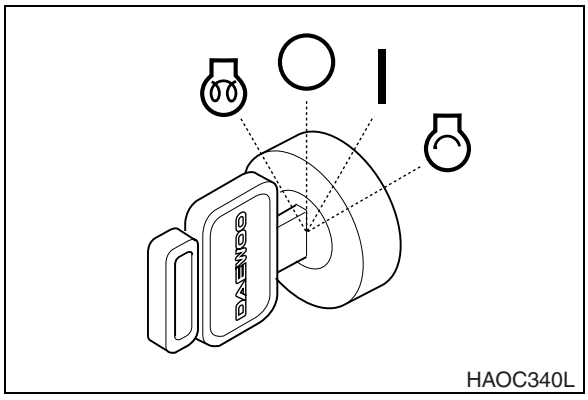


Figure 26

CHECK AND CONFIRMATION AFTER STOPPING ENGINE

1. Repair excavator, if there are any coolant or oil leaks.
2. Inspect front attachment and under carriage for abnormal appearances. Correct any problems.
3. Fill fuel tank.
4. Get rid of any accumulated flammable materials such as leaves and paper etc. in engine compartment.
5. Clean all mud, etc. from undercarriage and tracks. Make sure that all steps and hand holds are clean, and that the operator's compartment is clean.

SAFETY LEVER

⚠ WARNING!

When stopping engine or leaving the operator's seat, "LOCK" the safety lever, otherwise, a serious accident may occur by accidental movement of travel and work levers (joysticks).

Whenever leaving the operator's seat, make sure the engine is shut down and the safety lever is "LOCKED."

Be careful not to move the work levers (joysticks) when raising up or pushing down the safety lever.

1. Pull safety lever (Figure 27) up to allow left-hand control console to raise into the "LOCKED" position. Make sure that the safety lever is "LOCKED" into the raised (up) position. When safety lever is in the "LOCKED" position, the front attachment, swing and travel movement will be disabled even though a lever is moved.

   NOTE: *Lower bucket (front attachment) to ground. Place all control levers in "NEUTRAL" and shut down engine.*

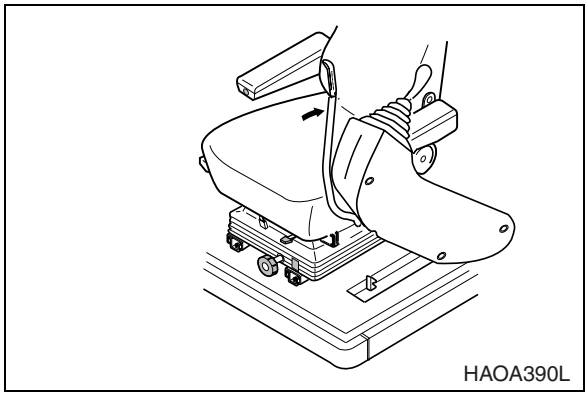


Figure 27

2. Set safety lever (1, Figure 28) on "RELEASE/UNLOCK" position, by pushing it down before starting work.

   NOTE: *When the engine is not running, but the safety lever is "RELEASED" and the starter key is tuned "ON," moving the work levers (joysticks) may result in movement. The charged accumulators in the system will provide pilot pressure for control valve spool movement.*

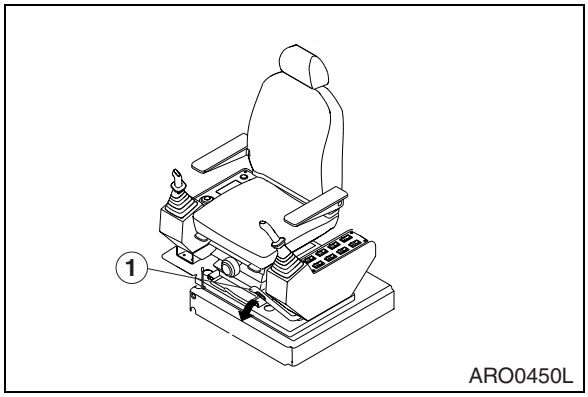


Figure 28

TRAVEL

⚠ WARNING!

1. **Before operating the travel levers, make sure that you know in which direction the machine is pointing. Look at the end of the track assemblies. If the drive motors are visible while sitting in the operator's seat, you are looking at the back end of the track assembly (therefore, you are looking backwards). In this case, the response of the travel levers will be the reverse of normal operation.**
2. **Before moving, make sure that there are no personnel in the way or on the machine. Sound the horn to alert workers that you are about to move the machine.**
3. **Be sure the path is clear during travel.**
4. **Use extreme caution when reversing travel. Be sure there is a clear path behind the machine.**
5. **Make sure to operate the travel control levers smoothly to avoid sudden starts or stops.**
6. **Before leaving the operator's seat, make sure to lock out all control systems and shut down the engine to avoid accidental activation.**

AUTOMATIC TRAVEL SPEED CONTROL

⚠ WARNING!

Do not change the travel mode while traveling. Always use speed mode "O" when traveling down a slope. It is very dangerous to change to speed modes indicated "I" or "II" while going down a slope. Only change travel mode after coming to a complete stop.

Two travel speed ranges can be selected by using the speed selector switch on the control panel (Figure 29).

"O" (LOW) - In this position low travel speed and a higher torque are selected.

"I" (HIGH) - In this position high travel speed and a lower torque are selected.

"II" (AUTOMATIC) - Setting the control at the "II" position enables the machine to automatically change to a different speed range. This change happens automatically depending on the hydraulic oil pressure in the travel circuit. When hydraulic oil pressure rises, the travel speed is automatically set to low. An example is if the machine is traveling on a flat, solid surface, the higher speed range would be used. When a slope is encountered, the speed drops and the travel circuit hydraulic pressure rises, causing the control circuit to shift to the higher torque, lower speed range.

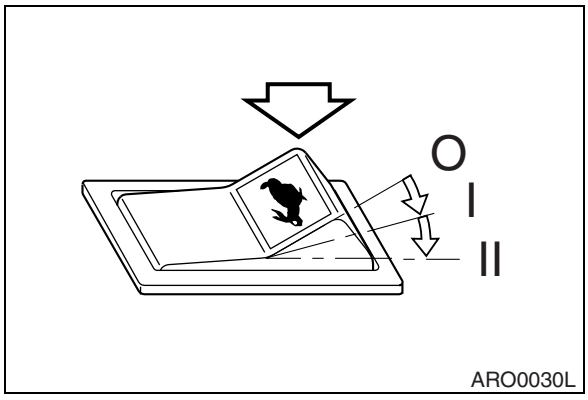


Figure 29

GENERAL TRAVEL INSTRUCTIONS

1. Set engine speed control dial (Figure 30) on desired speed.

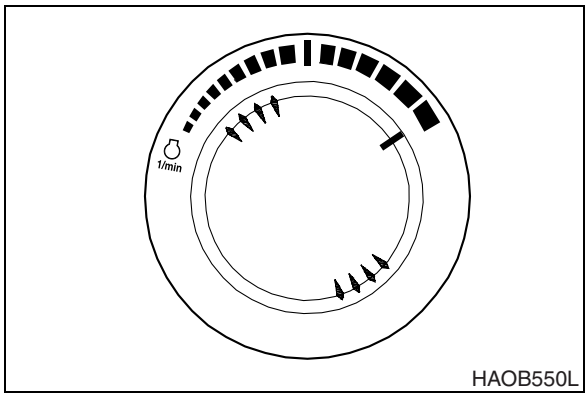


Figure 30

2. Set safety lever on "UNLOCK" position and folding the front, raise it up 40 - 50 cm (16 - 20 in) above ground. See Figure 31.

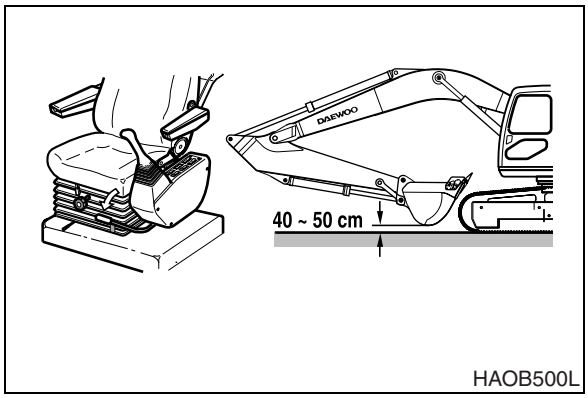


Figure 31

3. As much as possible, travel on firm, level ground. Avoid sudden movements and sharp turns.
4. When traveling on rough ground, travel at a slow speed [1.0 - 1.5 km/h (0.62 - 0.93 MPH)]. Reduced engine speed, to avoid shock loading the equipment. Be careful that an excessive force is not added to equipment by touching or climbing on rocks.
5. On rough, frozen or uneven terrain, travel slowly.

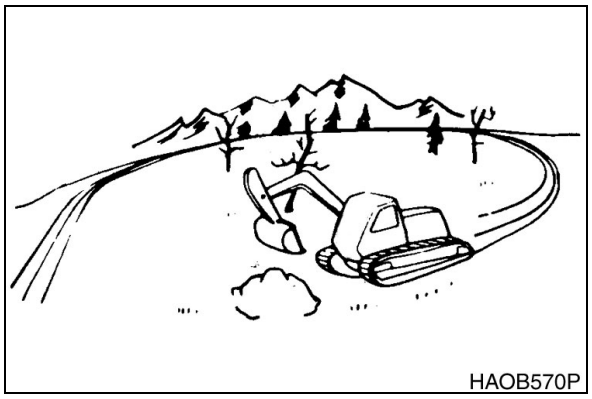


Figure 32

⚠ WARNING!

When traveling, keep bucket from 20 - 30 cm (8 - 12 in) above ground.

Do not travel backward on a slope.

Never turn or travel crosswise on a slope.

Choose a safe alternate route before climbing a slope.

If excavator starts to slip or becomes unstable, lower the bucket immediately into the ground, using it as a brake.

Avoid working on slopes, because there is a danger of overturning by becoming unbalance while swinging and performing front attachment operations.

It is very dangerous to swing towards bottom of slope with a loaded bucket.

In unavoidable cases level the slope with fill soil, to make the vehicle as horizontal as possible. See Figure 33.

Do not travel on slopes over 30° due to turnover danger.

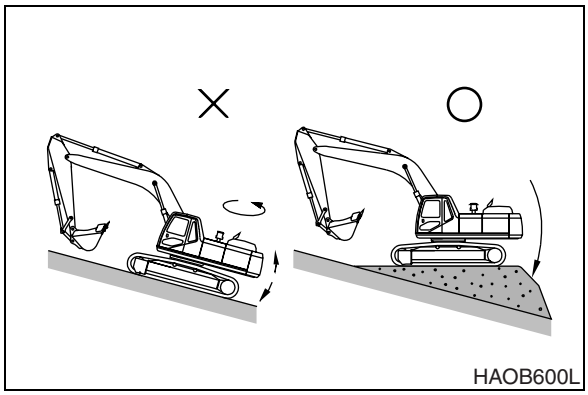


Figure 33

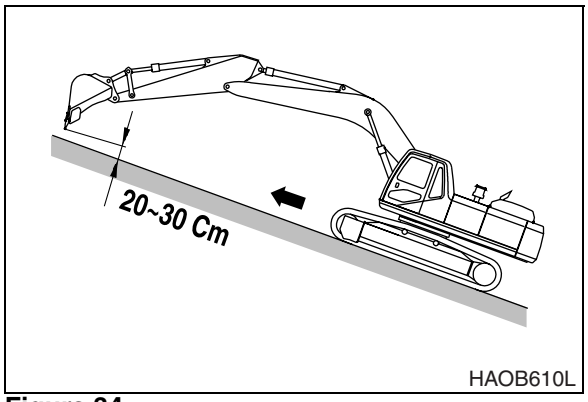


Figure 34

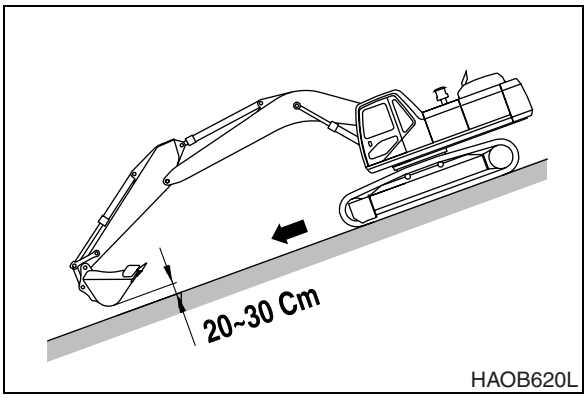


Figure 35

6. Travel straight up or down slopes, never diagonally across the slope. See Figure 34 and Figure 35. Extend the arm and lower the boom to keep the bucket about 20 - 30 cm (8 - 12 in) off the ground. If the machine starts to slide or becomes unstable, lower the bucket to regain control. If the engine stalls, lower the bucket, make sure that all controls are in the neutral position and restart the engine.

   NOTE: *Even though engine stops on a slope, do not operate swing control. The hydraulic accumulators may cause the unit to swing.*

   NOTE: *Do not open or close operator's door on a slope. Make sure door is latched.*

7. If dirt or mud builds up in the track frame, raise each track and rotate and clean that track.

> **CAUTION!**
>
> **When using the boom and arm to lift any portion of the machine, roll the bucket until the round base is against the ground. The angle of the arm to the boom should be at 90°.**

Make sure that the material build-up has been cleared. See Figure 36 and Figure 37.

8. The excavator can travel in water that comes up to the top of the upper carriage rollers. Make sure that footing is solid so that the machine will not sink. See “Working in Water” on page 3-29.

   NOTE: *If the machine is submerged to the point that water or mud gets into the swing bearing or center joint, stop machine operation. Remove the machine from the submerged location to firm, dry ground. Do not operate until proper inspection and maintenance have been completed. Refer to the Shop Manual or contact your distributor.*

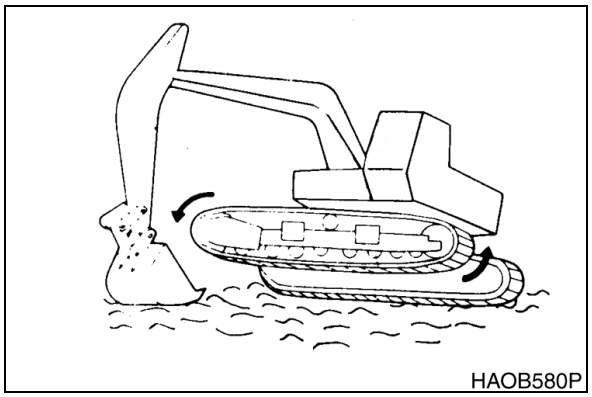


Figure 36

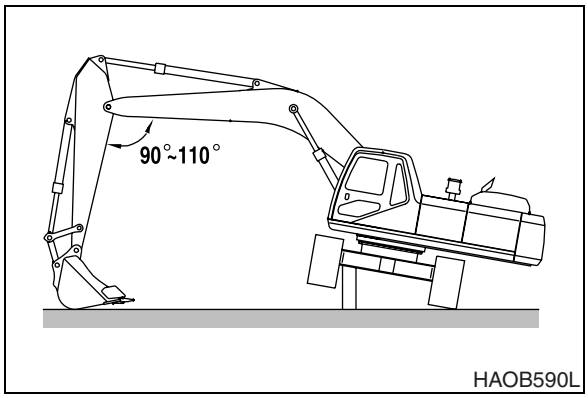


Figure 37

TRAVEL CONTROL LEVER OPERATION

1. To travel straight (Figure 38), push both travel control levers/pedals fully forward or backwards. The farther the levers/pedals are pressed, the faster the travel speed.

   NOTE: *"X" is the sprocket end of the track.*

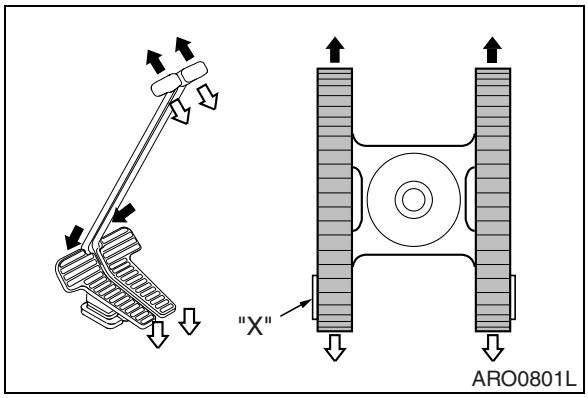


Figure 38

2. Pivot turns (Figure 39) are made by rotating only one track forward or backward. The machine will pivot on the nonmoving track.

   NOTE: *"X" is the sprocket end of the track.*

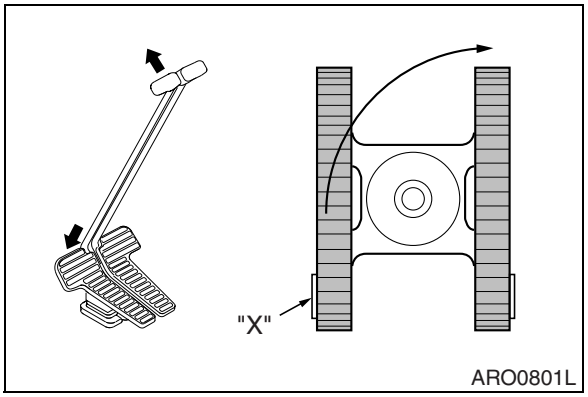


Figure 39

3. Spin turns (Figure 40) are made by rotating one track forward and one track backward. The machine will spin around its center point, thus counter-rotating.

   NOTE: *"X" is the sprocket end of the track.*

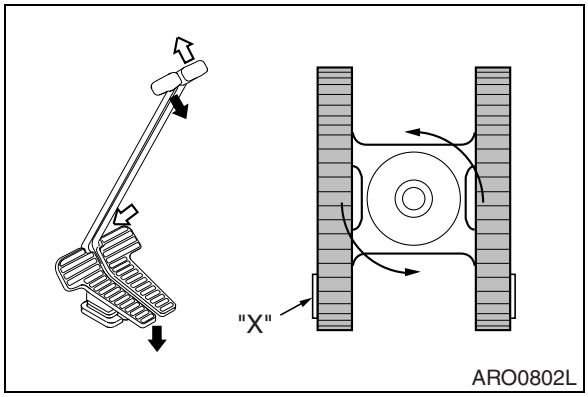


Figure 40

4. Stopping travel (Figure 41) - Returning travel levers to "NEUTRAL" position will automatically apply brakes and stop excavator.

   NOTE: *"X" is the sprocket end of the track.*

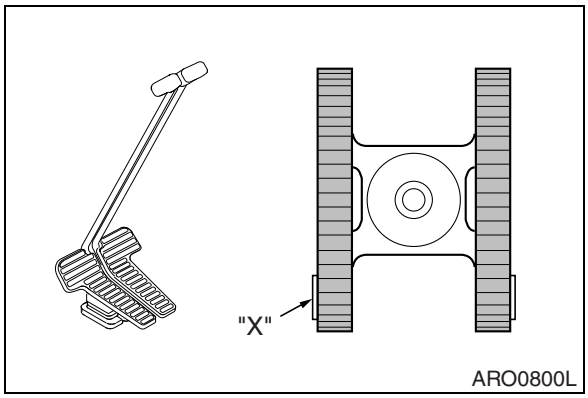


Figure 41

OPERATING INSTRUCTIONS

ENGINE SPEED CONTROL

Engine speed can be manually adjusted using the engine speed control dial, Increase engine speed by rotating the control knob clockwise. Decrease engine speed by rotating the control knob counterclockwise.

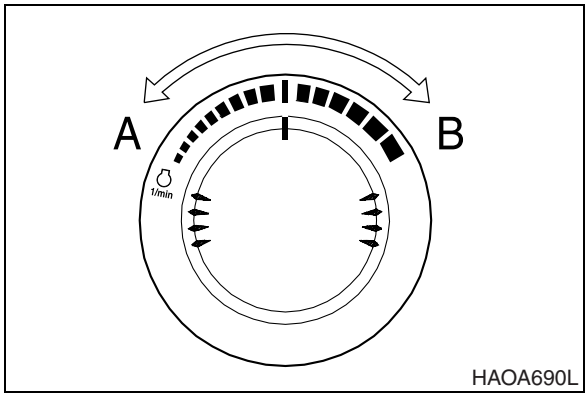


Figure 42

IMPORTANT

The engine speed control system has been set at the factory and should not require adjustment as part of routine maintenance.

If the engine speed control system should have an electrical malfunction, the engine throttle system can be set for manual operation. Use the following procedure;

IMPORTANT

If the engine rpm is being manually adjusted, the equipment will not function in its optimum capacity. Please contact a DAEWOO distributor or service center for repairs.

1. Park on firm, level ground.
2. Lower bucket to ground.
3. Set safety lever on "LOCK" position.
4. Set engine speed control dial to “LOW IDLE." Allow engine to idle for 3 - 5 minutes.
5. Shut down engine. Remove key from starter switch.
6. Attach tag, "DO NOT START" on right-hand work lever (joystick).
7. Disconnect control cable (1, Figure 44) by removing nut and spring washer (2) and loosening the nuts (3) holding cable to bracket.

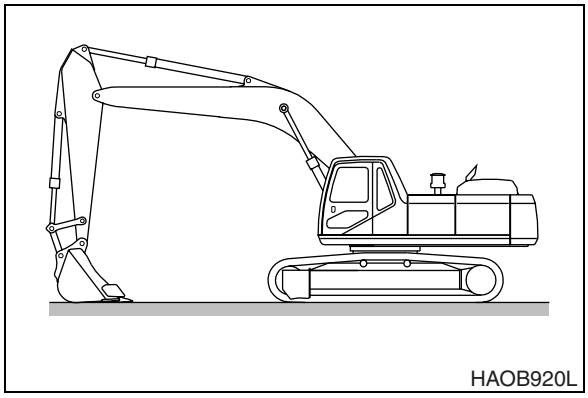


Figure 43

8. Remove nut and spring washer (5, Figure 44) from manual engine control cable (4) and loosen the nuts (10) holding cable to bracket. Attach manual engine control cable ball joint to hole (6) by using nut and spring washer (5).
9. Start the engine.
10. Display the engine rpm on the instrument panel by pressing the "DISPLAY" button.

11. On the rear of left control stand in cabin is a vernier caliper throttle control. The throttle control is a push/pull and/or screw type assembly. The locking collar (7, Figure 44) at base of mechanism must be turned to the released position before the throttle can be adjusted. Quick adjustment of engine speed can be made by turning the locking collar to the "RELEASED" position and "DEPRESSING" the button (9) (in center of knob (8)). Pulling the knob "OUT" increases rpm's, or pushing it "IN" decreases rpm's. Fine adjustment of engine speed can be made by turning the knob. Turn knob counterclockwise to increase engine speed and clockwise to decrease engine speed. Once the desired rpm is obtained, turn the locking collar (7) to the locked position.

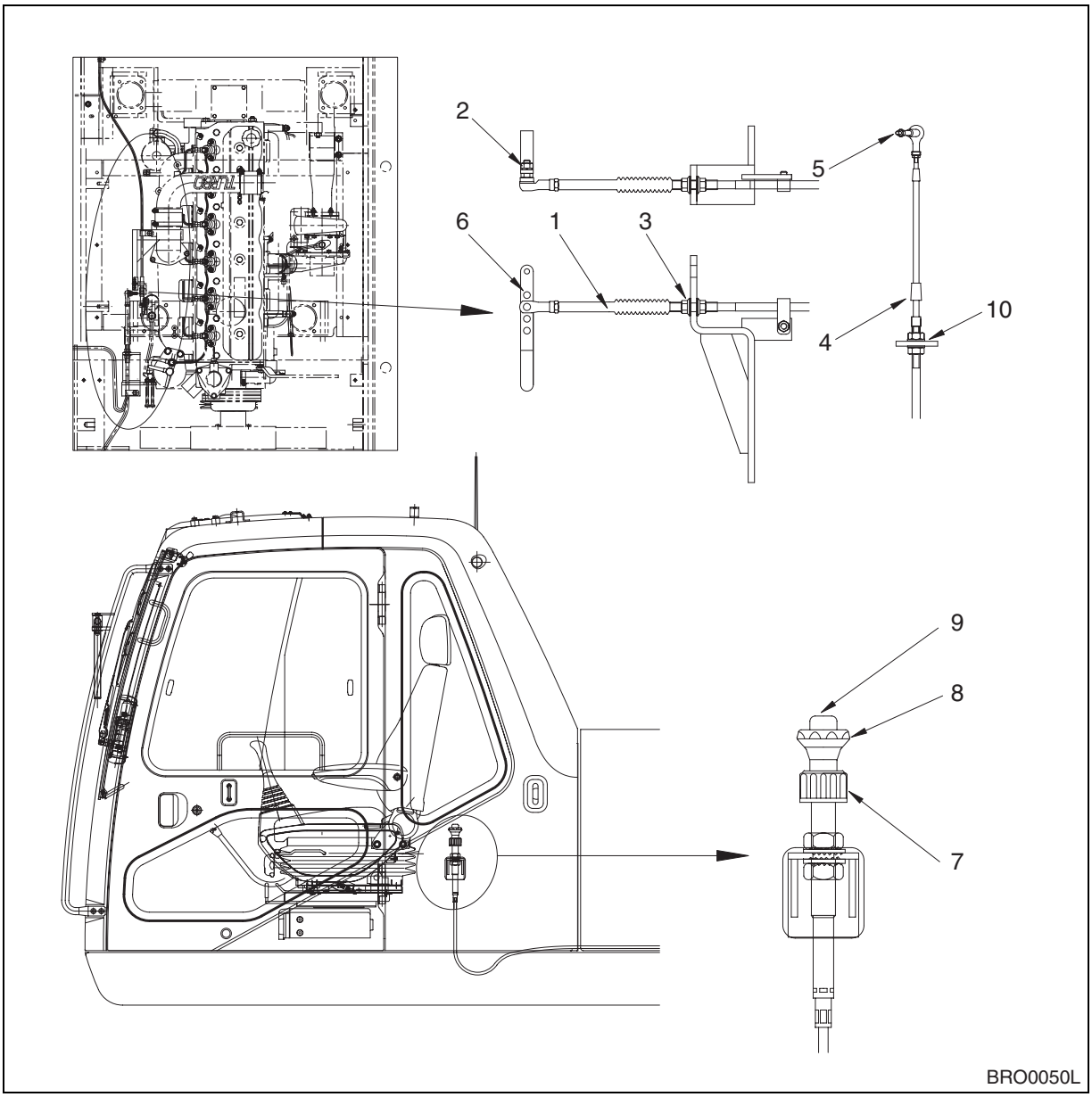


Figure 44

MODE SELECTION

More efficient work can be done by choosing a proper power and work mode combination, suitable to type of work and conditions. Use the mode selection according to following guide.

Power Mode

1. When the starter switch is turned "ON" the power mode is automatically defaulted to "Standard Mode."
2. Select a proper power mode using buttons (Figure 45) before starting work.
3. When the power mode button (1, Figure 45) is pressed, a signal sounds, changing the power mode to either "Power Mode" or "Standard Mode." When the power mode is turned "ON," the LED indicator (5, Figure 45) turns "ON."

   Deactivate the power mode by pressing it a second time. When the power mode is turned "OFF," the LED indicator (5, Figure 45) turns "OFF" and the power mode returns to the standard mode.

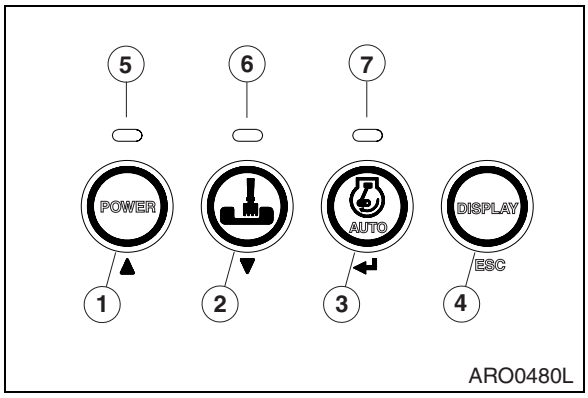


Figure 45

Mode	Selection Point
STANDARD MODE	General work. Minimize fuel consumption.
POWER MODE	Required to perform heavy work in a short period of time. Fast speed loading. Fast speed travel.

Work Mode

1. When the starter switch is turned "ON" the work mode is automatically defaulted to "Digging Mode."
2. Select the work mode using button (2, Figure 46) before starting work.
3. When the work mode button (2, Figure 46) is pressed, a signal sounds, changing the work mode to either "Digging Mode" or "Trenching Mode." When the trenching mode is selected, the LED indicator (6, Figure 46) turns "ON." When the digging mode is selected, the LED indicator (6, Figure 46) turns "OFF."
4. When the trenching mode is selected, the control valve is set to optimum condition for trenching work.

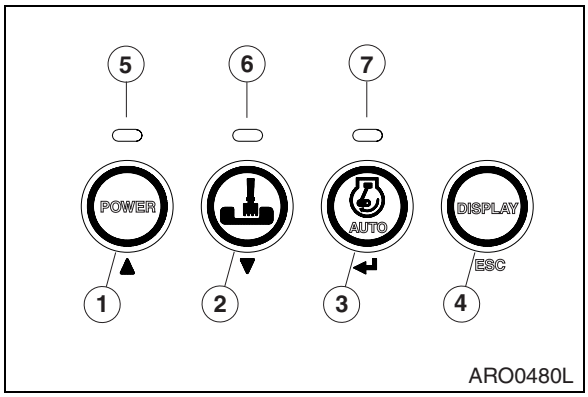


Figure 46

Mode	Selection Point	Future of Control
DIGGING MODE	General excavation. Loading dump trucks. Lifting and transport of heavy objects. Breaker.	General standard.
TRENCHING MODE	Trenching. Excavating of side wall. Required to constant swinging.	The swing is faster and stronger than boom or arm.

Auto Idle Mode

1. The system will automatically reduce engine speed to idle speed approximately 4 seconds after all of the control levers are in the neutral position. As soon as a pilot function is activated, engine speed is automatically returned to the preselected range.
2. When the starter switch is turned "ON," the work mode is automatically defaulted to "AUTO IDLE."
3. When the LED indicator (7, Figure 46) is turned "ON," the auto idle function is activated. Deactivate the auto idle function by again pressing the auto idle selector button (3, Figure 46). At this time the LED indicator will be turned "OFF."

WARNING!

Turn "OFF' auto idle function when performing work in close operating area, i.e. work in a narrow area and loading / unloading on or off a trailer.

Boost Mode

1. Power boost switch is used to gain maximum digging force.
2. The power boost is activated while the right side button is being pressed on top of the right-hand work lever (joystick).

   NOTE: *The power boost mode does not affect forward and reverse travel.*

   Do not use this switch for more than 10 seconds.

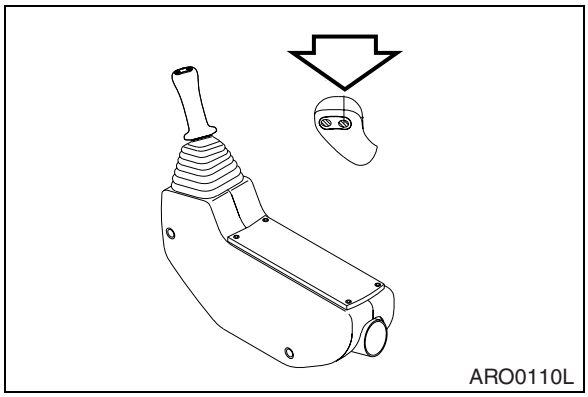


Figure 47 RIGHT-HAND WORK LEVER (JOY-STICK)

WORK LEVERS (JOYSTICKS) (ISO STYLE)

WARNING!

Check surrounding area before swinging. When operating a lever while in auto idle, do it carefully, because the engine speed will increase rapidly.

NOTE: *When starting work, move work levers (joysticks) slowly and check movement of swing and front attachment.*

This equipment is manufactured using the lever configuration described in ISO standards. Do not change valving, hoses, etc., that would change this standard. The boom, arm and bucket movements and swing direction of work levers (joysticks) are as follows:

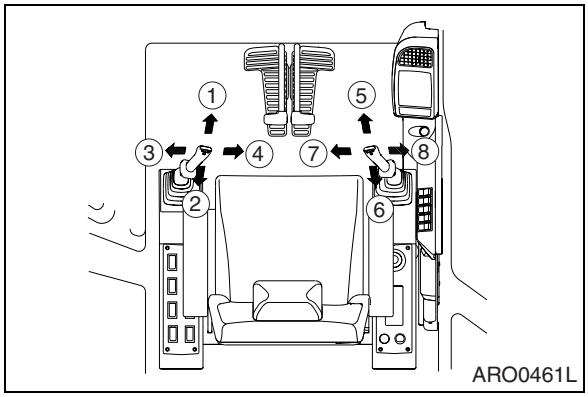


Figure 48

Left-hand Work Lever (Joystick) (Figure 48 and Figure 49)

1. Arm dump
2. Arm crowd
3. Left swing
4. Right swing

NOTE: *The swing brake is spring applied and hydraulically released. It is always engaged when the work lever (joystick) is in "NEUTRAL" or the engine is shut down.*

NOTE: *The following is not a mechanical malfunction but a proper phenomenon of the excavator. When operating the arm, it may stop momentarily. When the arm is operated, the weight of the arm may cause it to move faster than the amount of oil being supplied.*

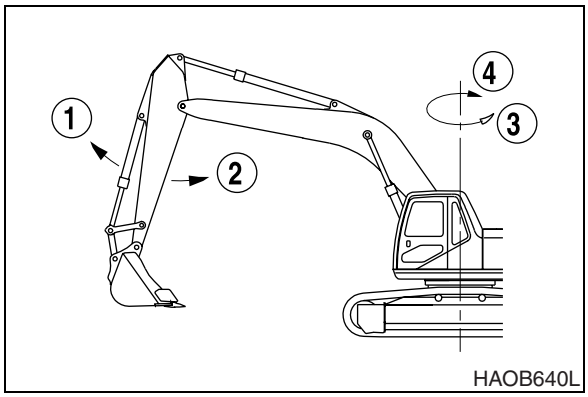


Figure 49

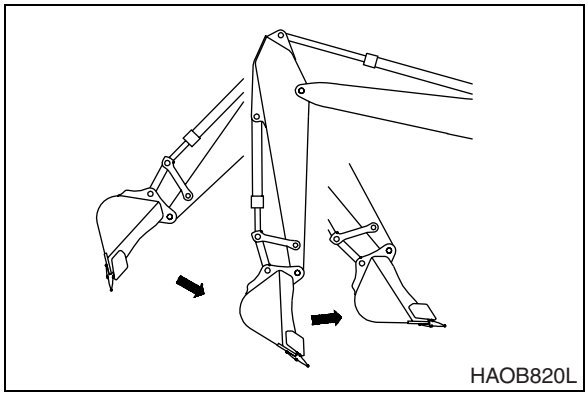


Figure 50

Right-hand Work Lever (Joystick) (Figure 48 and Figure 51)

5. Boom down
6. Boom up
7. Bucket crowd
8. Bucket dump

NOTE: *Even after stopping the engine, the front can be lowered to the ground by operating work lever (joystick). Set safety lever on "UNLOCK" position and turn starter switch "ON."*

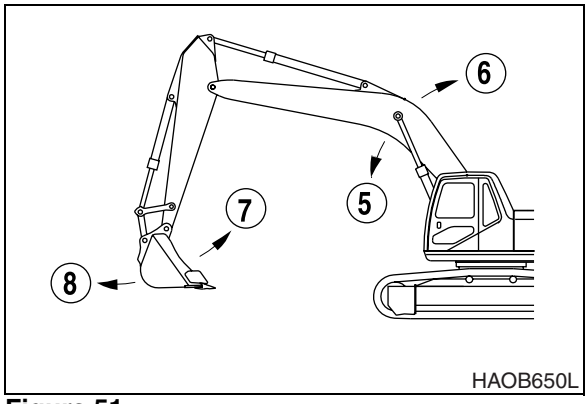


Figure 51

OPERATING PRECAUTIONS

⚠ WARNING!

Do not rest your feet on the travel pedals during normal machine operation. Unexpected machine travel may occur in this situation.

1. Before starting work, investigate terrain and soil condition. Level ground and drain area if necessary.
2. Install window guards when working where there is a possibility of falling rocks or other objects.

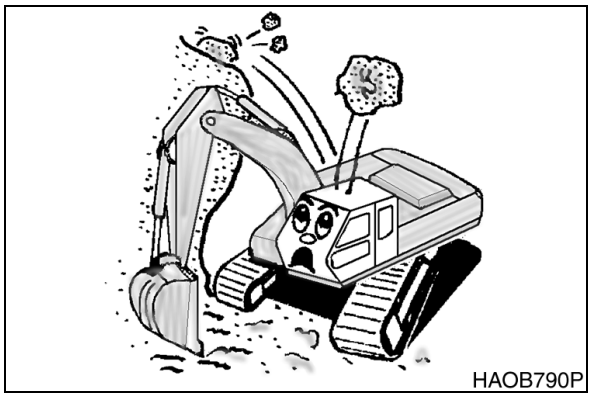


Figure 52

3. Check strength of supported structures in advance before working on them. If insufficient, reinforce it. If any doubt exists about structural strength, refuse to operate unit.
4. It is possible that the boom, arm or bucket may come into contact with the upper or lower structure of the machine. There are digging conditions which could allow this to happen.

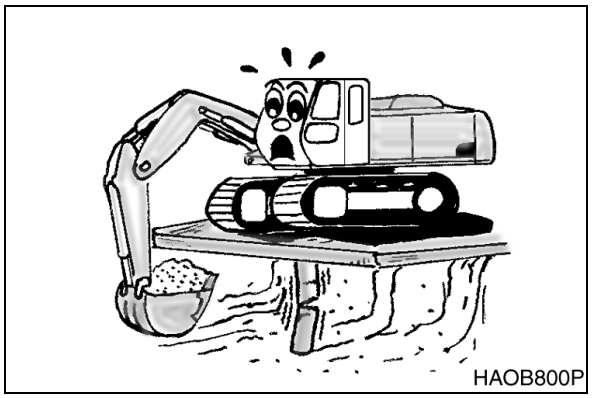


Figure 53

5. Do not continually "bottom out" the hydraulic cylinders. Machine damage may occur if the cylinders are fully extended or retracted, example: arm cylinder fully retracted and the bucket cylinder is extended to rotate the bucket into the ground.

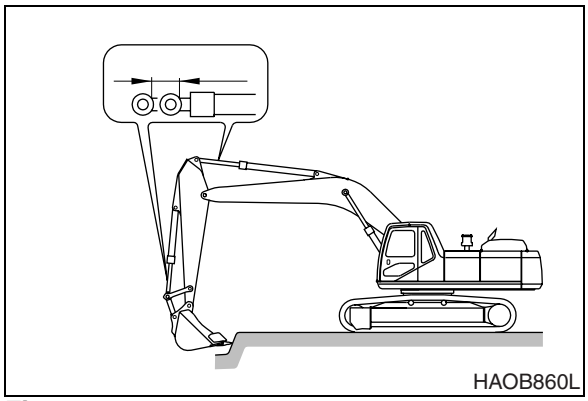


Figure 54

6. Do not use machine travel or swing when the bucket is in the ground to provide additional breakout force. See Figure 55.

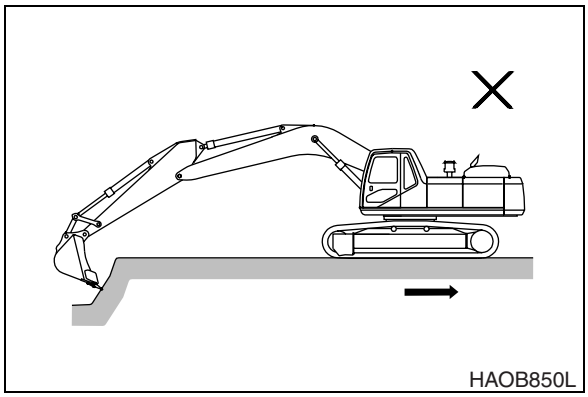


Figure 55

7. Do not use machine weight to provide additional breakout force. See Figure 56.
8. When working on soft or muddy ground, make sure that the machine is not sinking.

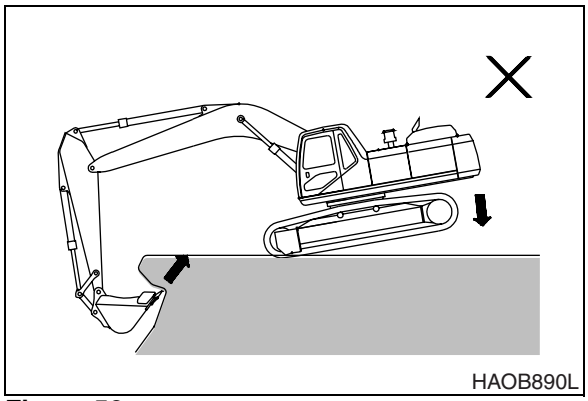


Figure 56

9. When working close to the excavated edge make sure that the ground the machine is sitting on is solid. Keep the travel motors to the rear. See Figure 57.

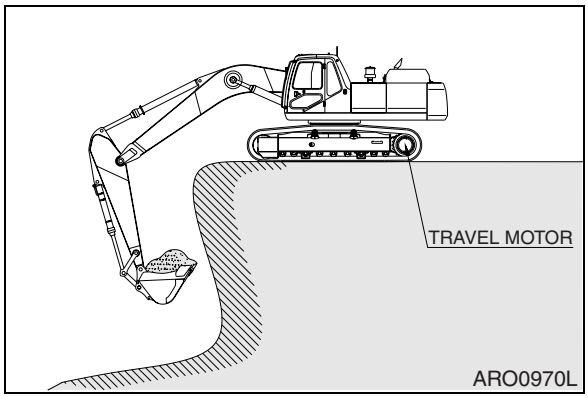


Figure 57

10. Do not excavate underneath the machine. See Figure 58.

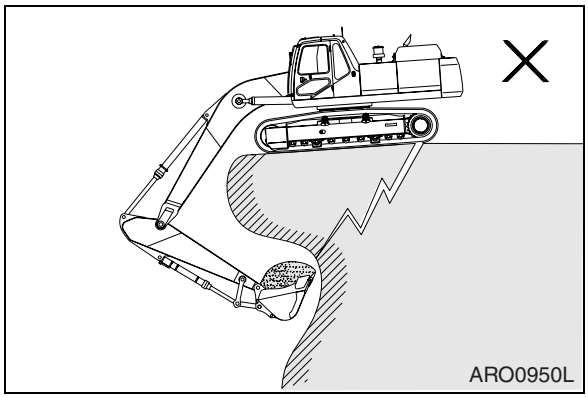


Figure 58

11. Make sure that there is adequate clearance from overhead electrical supply lines. See Figure 59.

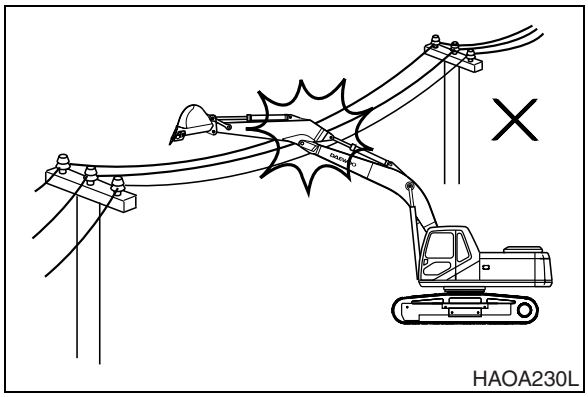


Figure 59

12. If the excavation is in an underground location or in a building, make sure that there is adequate overhead clearance and that there is adequate ventilation. See Figure 60.

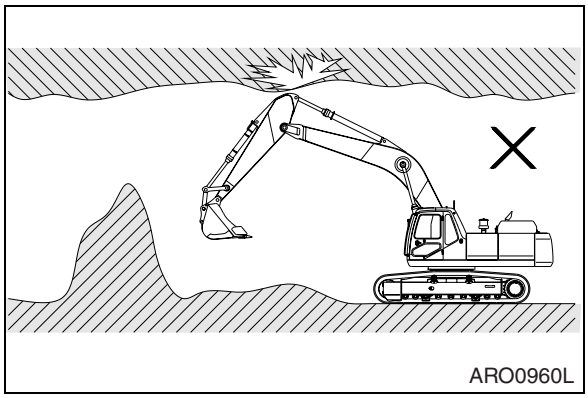


Figure 60

13. Do not use the bucket as a hammer or ramming device. This is dangerous and causes damage to the front attachment. See Figure 61.

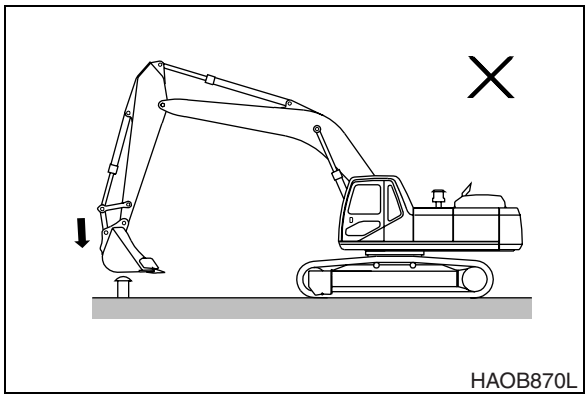


Figure 61

14. Do not dig with the excavator tracks raised. This can result in structural and mechanical failures.

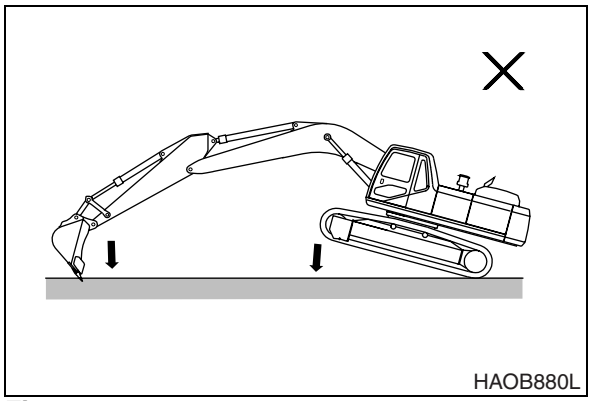


Figure 62

15. Do not operate travel lever quickly when traveling in high range.

    A. Avoid sudden starts.

    B. When traveling in one direction come to a complete stop before reversing directions. Do not rock excavator back and forth with levers.

    C. Avoid sudden stops. Return levers to neutral by hand. Do not let them snap back to neutral on their own.

16. If the optional long fronts or attachments or heavy duty front end attachments are used, the machine balance will be altered. Follow these additional operating precautions.

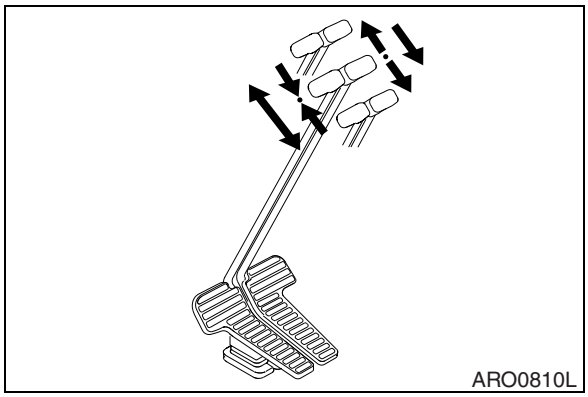


Figure 63

⚠ WARNING!

Do not travel downhill with the front end attachments raised.

Do not travel across slopes; travel straight up or down slope.

Use extreme caution when swinging the upper frame when positioned on a slope.

Allow extra swing stopping room. The additional momentum generated by the longer or heavier front end equipment will increase the amount of time needed to stop the swing motion.

Make sure that all optional equipment has been authorized and installed properly.

17. Do not move dirt or objects by swinging the excavator into them. This can result in structural and mechanical failures.

WORKING IN WATER

IMPORTANT

When working in water, do not exceed a slope of more than 15°. If the slope is over 15°, the rear part of the upper structure will be immersed in water, resulting in radiator fan damage.

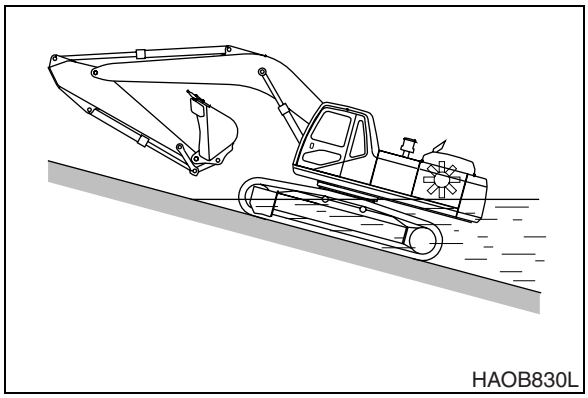


Figure 64

When working in water, do not operate in water over center of upper roller (1, Figure 65).

If swing bearing gets wet, immediately grease it until all old grease is purged from bearing.

If water gets into swing gear housing, drain water immediately by removing lower inspection cover. Apply new grease.

After working in water, purge old grease on bucket pins.

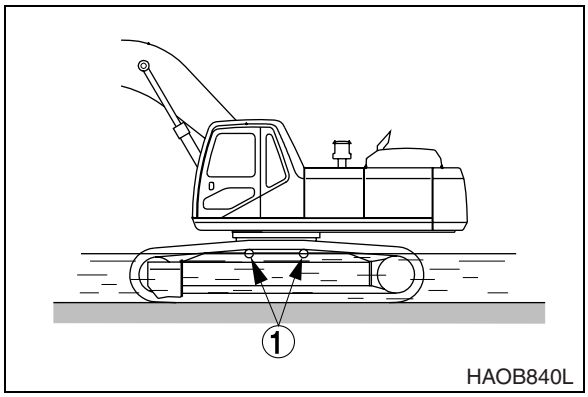


Figure 65

PARKING EXCAVATOR

WARNING!

Park excavator on firm, level ground. Avoid parking on slopes. If excavator must be parked on a slope, block tracks and place bucket teeth in ground. See Figure 66.

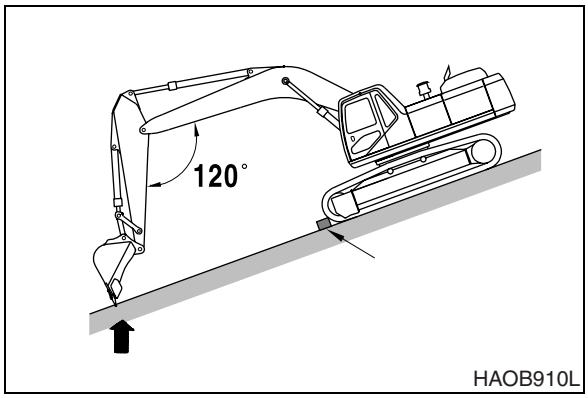


Figure 66

1. Park excavator on firm, level ground. Lower bucket to ground as shown in Figure 67.

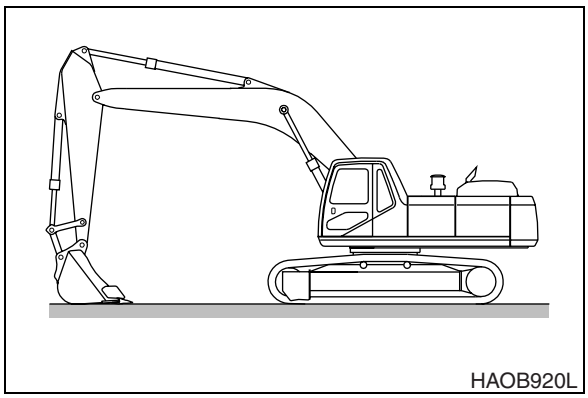


Figure 67

2. Set engine speed control dial on "LOW IDLE."

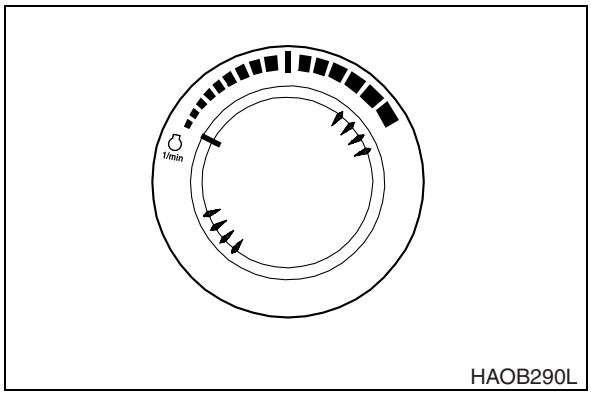


Figure 68

3. If you touch the work levers (joysticks) unintentionally, it may create a serious accident. Before leaving operator's seat, set safety lever on "LOCK" position.

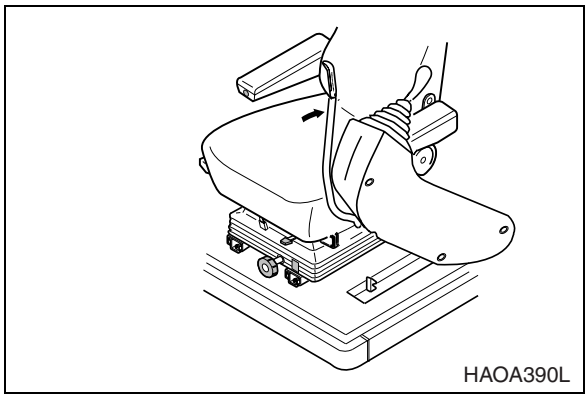


Figure 69

TOWING PROCEDURE

⚠ WARNING!

Never use a damaged wire rope or chain. They could brake and cause a serious accident.

Always wear gloves when handling a chain or wire rope.

When towing excavator use a wire rope or chain capable of handling the load.

Attach chain or wire rope to track frame as shown in Figure 70.

Insert protective material such as thick cloths between track frame and wirerope to prevent the wire rope from being damage.

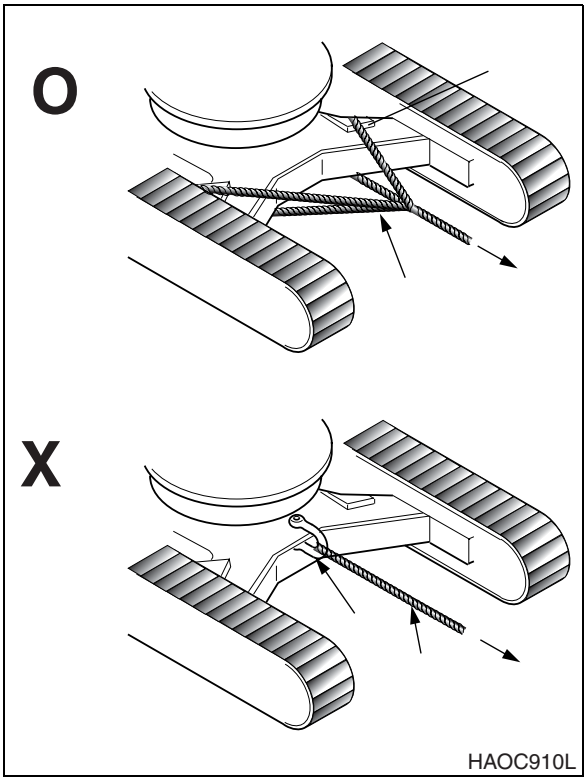


Figure 70

IMPORTANT

Use shackle hook on track frame to only haul objects that weigh less than 5 metric tons (5.51 U.S. Tons). Never use it to haul objects over 5 metric tons (5.51 U.S. Tons).

HYDRAULIC BREAKER

IMPORTANT

If a hydraulic breaker and piping is installed without DAEWOO's authorization, it may create a serious malfunction which will not be covered under the excavator warranty.

SELECTION OF HYDRAULIC BREAKER

If a hydraulic breaker is installed, consider equipment's stability and suitability for such modification. Also consider hydraulic oil pressure and quantity. When selecting a hydraulic breaker consult with a DAEWOO distributor or sales agency.

HYDRAULIC HOSES AND TUBING FOR BREAKER

1. When installing hydraulic breaker, assemble according to drawings provided with kit.
2. If breaker is taken off excavator, be sure to plug and cap all hoses and tubing to prevent contamination from entering hydraulic system.
3. Plug and cap all connectors and fittings on breaker to prevent contamination.
4. Check all hydraulic connections for signs of leaks or loose components before starting operation.

HYDRAULIC BREAKER OPERATION

NOTE: *Hydraulic pressure and flow settings may need to be changed. Refer to the Maintenance Section of this manual for further information.*

1. Make sure to read and understand the breaker user's manual.
2. Inspect all mechanical and hydraulic connections.
3. Do not use the breaker as a hammer. See Figure 71.

   Do not drop breaker from extreme heights.

   The breaker is relatively heavy and drops fast. Do not drop breaker from extreme heights or damage to upper structure may result.

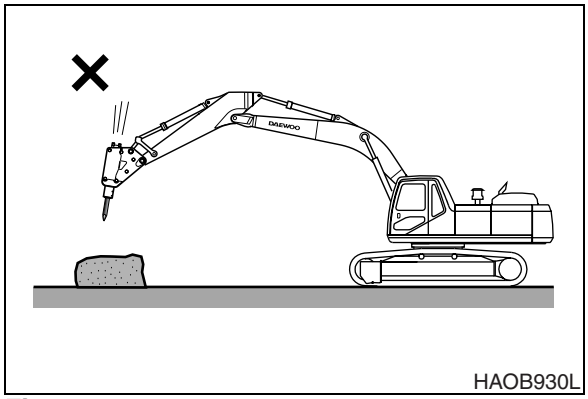


Figure 71

4. Do not operate the breaker with the boom or arm cylinders fully extended (bottomed out). See Figure 72.

   Leave over 100 mm (4 in) of clearance between rod end of cylinder and cylinder head. This will help prevent damage to cylinders during breaker operation.

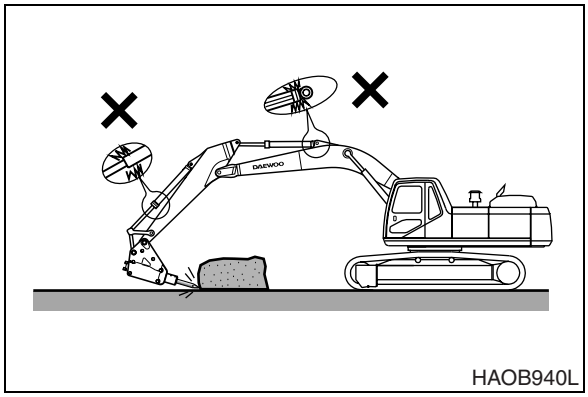


Figure 72

5. Do not use the breaker if the hydraulic hoses vibrate excessively. See Figure 73. Check the breaker's hydraulic accumulator (1) for damage and repair as required. If excavator is operated under this condition, structural and hydraulic components can be damaged.

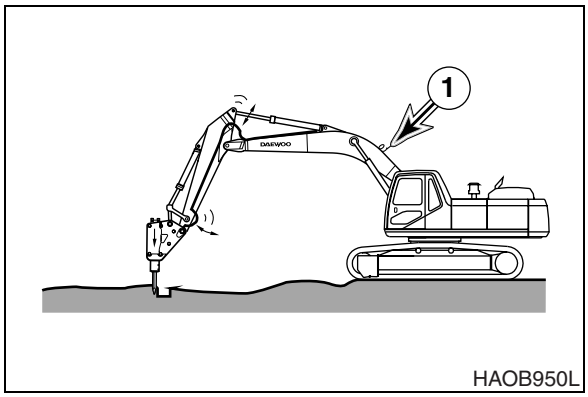


Figure 73

6. Do not allow the breaker body to go into water if not equipped for underwater operation. The breaker seal can be damaged and allow rust, foreign material or water to enter the hydraulic system and cause damage. Only insert the breaker tool into water. See Figure 74.

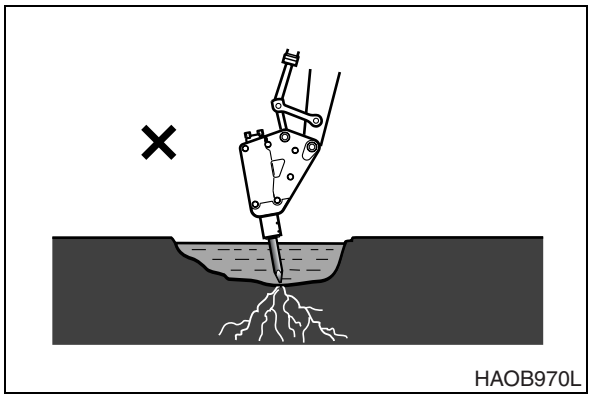


Figure 74

7. Do not any lifting or towing with a breaker. See Figure 75.

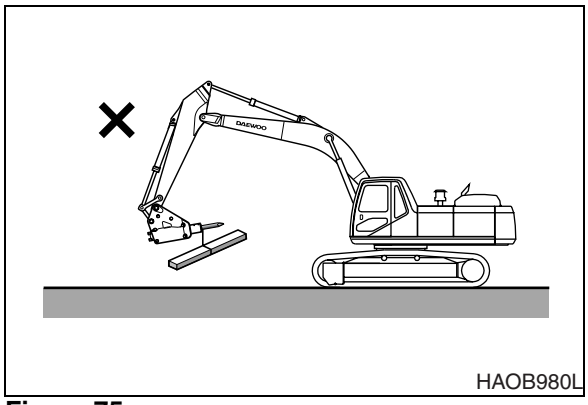


Figure 75

8. Operate the breaker only to the front and rear of the excavator. Do not use the breaker to either side of the excavator. Do not swing the breaker from side to side when operating it. See Figure 76.

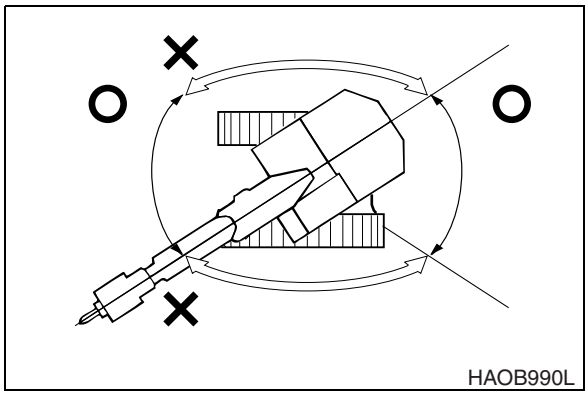


Figure 76

.

WARNING!

Operating a breaker with the upper body turned 90° to the tracks can result in tipping over the machine or reduction in service life.

9. Do not curl the breaker tool tip into the arm or boom when traveling or parking the excavator. See Figure 77.

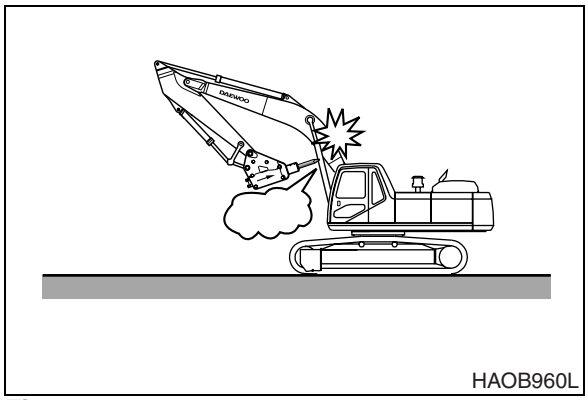


Figure 77

TO ACTIVATE BREAKER

1. Press the left side button on the top of the right-hand work lever (joystick) to activate the hydraulic breaker.
2. Release the left side button on the top of the right-hand work lever (joystick) to deactivate the hydraulic breaker.

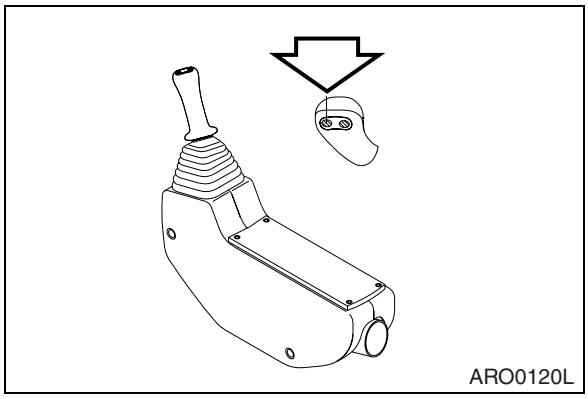


Figure 78

HYDRAULIC OIL AND FILTER SERVICE INTERVALS

When using a hydraulic breaker, the viscosity breakdown and contamination of hydraulic oil is faster because the work condition is more severe than during normal digging work. To prevent the hydraulic components (especially pump) from having a shortened life-cycle, replace the hydraulic oil and main hydraulic oil filter using the following schedule.

Attachment	Operation Rate	Hydraulic Oil	Filter
Bucket Work	100%	2,000 Hours	250 Hours (First Replacement) 500 Hours (After First Replacement)
Hydraulic Breaker Work	100%	500 Hours	100 Hours

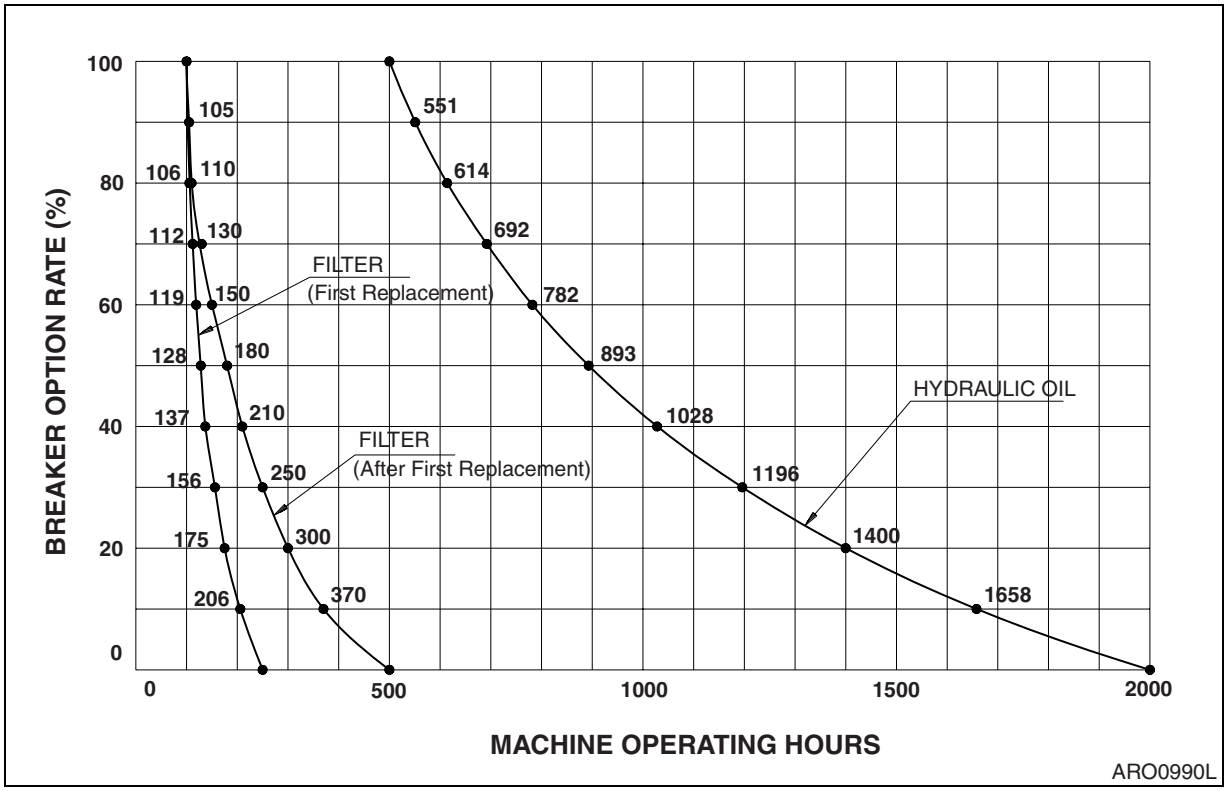


Figure 79

NOTE: *The replacement intervals of hydraulic oil and filter depend upon the amount of time the hydraulic breaker is being used. These intervals should be followed as opposed to regularly scheduled maintenance.*

OPERATING TECHNIQUES

LIFTING

IMPORTANT

There may be local or government regulations, about the use of excavators for the lifting of heavy loads. Always contact your local and government agencies in regards to these regulations.

To prevent injury, do not exceed the rated load capacity of the machine. If the machine is not on level ground, load capacities will vary.

Short slings will prevent excessive load swing.

Use the lifting eye on the bucket that is provided to lift objects.

Always try to maintain the lifting eye (Figure 80) straight below the centerline of the arm and bucket pin. In this manner the weight of the load is being primarily held only by the pin, and not by the bucket cylinder, link, and link pins.

When a lifting eye is used, the sling/lifting device must be fastened to the eye in a manner that will not allow it to come loose.

The most stable position is over the corner of the machine.

For best stability, carry a load as close to the ground and machine as possible.

Lift capacity decreases as the distance from the machine swing centerline is increased.

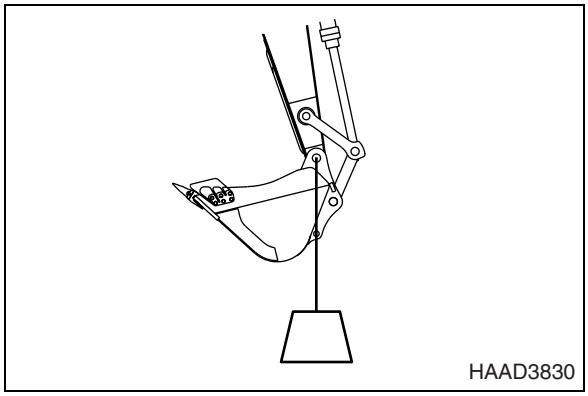


Figure 80

Lifting Unknown Weight

When loads are not accurately known are to be lifted, the person responsible for the job shall ascertain that the weight of the load does not exceed the machine LOAD RATING CHART at the radius at which it is to be lifted.

It is recommended that you feel your way into any lift as a precaution against tip-over. One method is to position the boom at 90° over the side of the machine. Slowly lift the load until it clears the ground. A lift over the side is the most unstable, and as the load is swung into the front zone of the excavator it will become more stable. DO NOT INCREASE SWING RADIUS AFTER THE LOAD IS LIFTED.

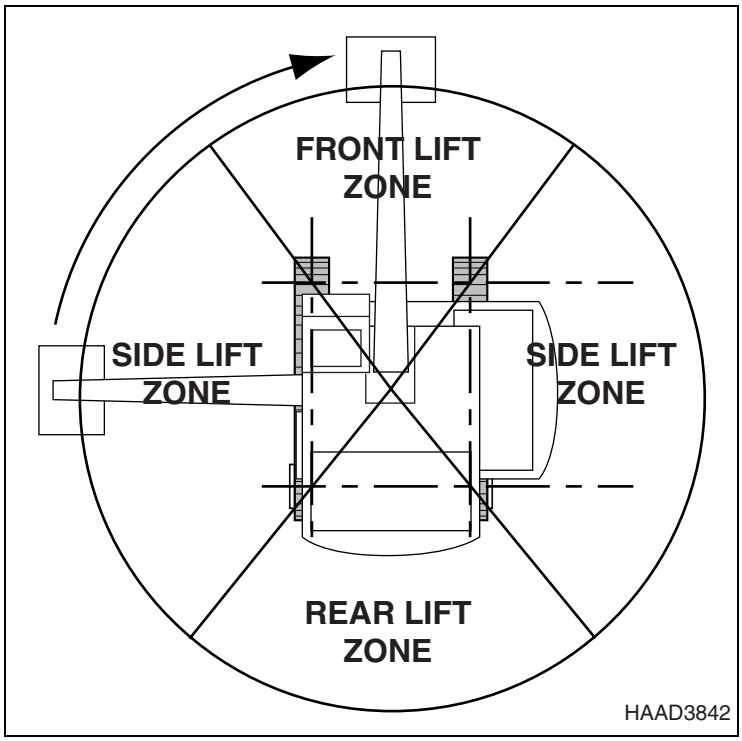


Figure 81

DANGER!

If a load is picked up from the front zone and swung into the side zone, a tip-over could result causing a deadly or fatal injury.

Lifting Known Weight

The load chart is the governing factor when lifting known weights. It is recommended that you feel your way into any lift as a precaution against tip-over. When ever possible, lift and swing payloads between the front idler area.

Pick and Carry

The machine has the ability to pick and carry payloads without added labor. We recommend when traveling with a suspended payload, you evaluate the prevailing conditions and determine the safety precautions required in each case. The following factors must be considered before attempting to pick and carry a load.

Align the boom with the forward direction of machine travel. Maintain this boom position when turning the machine. Turn only when necessary, at the slowest speed, and at a wide turning radius.

1. Use the shortest lifting radius distance possible.
2. Keep the load as close to the ground as conditions will permit.
3. Provide tag lines to prevent load from pendulating. Pendulating can cause a change in radius. A change in radius could exceed the load chart rating or cause a tip-over condition.
4. Govern travel speed to suit conditions.
5. Avoid sudden starts and stops.

OPERATION UNDER UNUSUAL CONDITIONS

NOTE: *See “Maintenance in Special Conditions” on page 4-68 for other recommendations.*

OPERATION IN EXTREME COLD

If machine is to be operated in extreme cold weather temperatures, certain precautions must be taken to assure continued normal operation. The following paragraphs detail checks to be made to be certain the machine is capable of operating at these temperatures.

1. Check the cooling system for correct antifreeze solution for lowest temperature expected. Carefully inspect cooling system and correct or report any leaks.
2. Keep batteries fully charged to prevent freezing. If water is added to batteries, run engine at least one hour to mix electrolyte solution.
3. Keep engine in best possible mechanical condition to assure easy starting and good performance during adverse weather conditions.
4. Use engine oil of the proper specifications for the expected temperatures. Refer to the "Lubrication Specifications" of the engine manual for details.
5. Keep fuel tank full at all times. Drain condensation from tank before and after operation. Drain and service fuel filter. To eliminate clogging of fuel filters due to wax crystal formation in the fuel, be sure that the fuel used has a cloud point specification below the lowest expected temperature.
6. Lubricate entire machine according to "Periodic Service Table and Chart" Section 4, in this manual or lubrication chart on machine.
7. Start engine and allow it to reach normal operating temperature before applying load.
    A. If mud and ice collects and freezes on any of the moving parts while machine is idle, apply heat to thaw the frozen material before attempting to operate machine.
    B. Operate hydraulic units with care until they have reached a temperature to enable them to operate normally.
    C. Check all machine controls and/or functions to be sure they are operating correctly.
8. An extra outer air filter should be kept in the operator's cab to replace element that could become iced and cause restricted air flow to engine.
9. If cold weather starting aid must be used, see "Engine Starting" COLD WEATHER START portion of this manual.
10. Clean off all mud, snow and ice to prevent freezing. Cover machine with tarpaulin if possible, keep ends of tarpaulin from freezing to ground.

OPERATION IN EXTREME HEAT

Continuous operation of the machine in high temperatures may cause the machine to overheat. Monitor engine and transmission temperatures and stop machine for a cooling-off period whenever necessary.

1. Make frequent inspections and services of the fan and radiator. Check coolant level in radiator. Check grills and radiator fins for accumulation of dust, sand and insects which could block the cooling passages.
    A. Formation of scale and rust in cooling system occurs more rapidly in extremely high temperatures. Change antifreeze each year to keep corrosion inhibitor at full strength.
    B. If necessary, flush cooling system periodically to keep passage clear. Avoid use of water with a high alkali content which increases scale and rust formation.

2. Check level of battery electrolyte daily. Keep electrolyte above plates preventing damage to batteries. Use a slightly weaker electrolyte solution in hot climates. Dilute 1.28 specific gravity electrolyte as issued to 1.20 to 1.24 specific gravity readings at full charge. Recharge batteries whenever they reach a 1.16 specific gravity reading. Batteries self-discharge at a higher rate if left standing for long periods at high temperatures. If machine is to stand for several days, remove batteries and store in a cool place.

> **WARNING!**
>
> **Do not store acid-type storage batteries near stacks of tires; the acid fumes have a harmful affect on rubber.**

3. Service fuel system as directed in "Engine Fuel System" Section 5, of this manual. Check for water content before filling fuel tank. High temperatures and cooling off cause condensation in storage drums.
4. Lubricate as specified in "Periodic Service Chart and Table" Section 4, in this manual or Lubrication Decal on the machine.
5. Do not park machine in sun for long periods of time. When practical park machine under cover to protect it from sun, dirt and dust.
   A. Cover inactive machine with tarpaulin if no suitable shelter is available. Protect engine compartment, transmission and hydraulics from entrance of dust.
   B. In hot, damp, climates corrosive action will occur on all parts of the machine and will be accelerated during the rainy season. Rust and paint blisters will appear on metal surfaces and fungus growth on other surfaces.
   C. Protect all unfinished, exposed surfaces with a film of preservative lubricating oil. Protect cables and terminals with ignition insulation compound. Apply paint or suitable rust preventive to damaged surfaces to protect them from rust and corrosion.

OPERATION IN DUSTY OR SANDY AREAS

Operation of the machine can cause dust in almost any area. However, when in predominantly dusty or sandy areas, additional precautions must be taken.

1. Keep cooling system fins and cooling areas clean. Blow out with compressed air, if possible, as often as necessary.

> **WARNING!**
>
> **Wear goggles when using compressed air.**

2. Use care when servicing fuel system to prevent dust and sand from entering the tank.
3. Service the air cleaner at frequent intervals, check air restriction indicator daily and keep dust cup and dust valve clean. Prevent dust and sand from entering engine parts and compartments as much as possible.
4. Lubricate and perform services outlined on current lubrication chart on machine and "Lubrication Chart and Table" Section 4. Clean all lubrication fittings before applying lubricant. Sand mixed with lubricant becomes very abrasive and speeds wear on parts.

5. Protect machine from dust and sand as much as possible. Park machine under cover or protect with tarpaulin to keep dust and sand from damaging unit.

OPERATION IN RAINY OR HUMID CONDITIONS

Operation under rainy conditions is similar to that as in extreme heat procedures listed previously.

1. Keep all exposed surfaces coated with preservative lubricating oil. Pay particular attention to damaged or unpainted surfaces. Cover all paint cracks and chip marks as soon as possible to prevent corrosive effects.

OPERATION IN SALT WATER AREAS

The corrosive effect of salt water and salt water spray is very extensive. When operating in salt water areas, observe the following precautions.

1. When exposed to salt water, dry machine thoroughly and rinse with fresh water as soon as possible.
2. Keep all exposed surfaces coated with preservative lubricating oil. Pay particular attention to damaged paint surfaces.
3. Keep all painted surfaces in good repair.
4. Lubricate machine as prescribed on lubrication chart on machine or "Periodic Service Table and Chart" Section 4, in this manual. Shorten lubricating intervals for parts subject to exposure to salt water, if found to be necessary.

OPERATION AT HIGH ALTITUDES

Normally, operation of machine at high altitudes will be as outlined in extreme cold. Before operating at high altitudes, engine fuel and air mixture may have to be adjusted according to appropriate engine manual.

1. Check engine operating temperature for evidence of overheating. The pressure cap on radiator must make a perfect seal to maintain coolant pressure in the system.

INSPECTION, MAINTENANCE AND ADJUSTMENT

PREVENTIVE MAINTENANCE

Routine maintenance and inspections are required to keep your machine in the correct operating condition. The following pages list the inspection intervals, the system or component checks and location references.

NOTE: *The following pages list the service checks and their required intervals. The service cycles may need to be shortened depending on the working conditions. Extremely hot or dusty conditions will require more frequent service. Operational hours are determined by the amount of time accumulated on the engine hour meter on the control console in the cab.*

NOTE: *Besides the normal hour meter, the multifunction gauge can be used to keep track of the hours on individual filters. See "Filter / Oil Info" on page 2-28.*

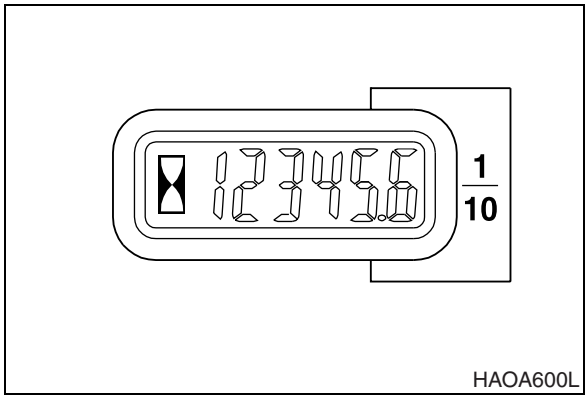


Figure 1

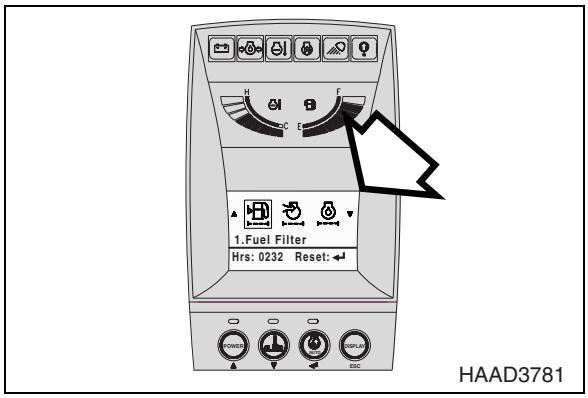


Figure 2

SERIAL NUMBERS

There are two serial number plates attached to the body of the excavator.

Please make note of these numbers and their locations. These will be required whenever warranty service work is requested.

Machine Serial Number

The machine serial number plate (Figure 3) is on the right side of the cab on the outside.

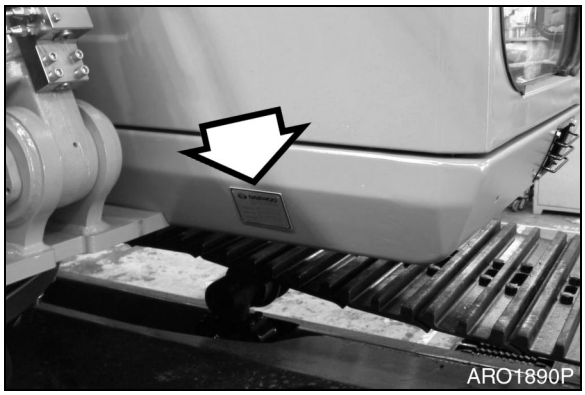


Figure 3

Engine Serial Number

The engine serial number is stamped on the rear left side of the engine block, above the starter. Additional engine information is described on a label (Figure 4) on the rocker cover.

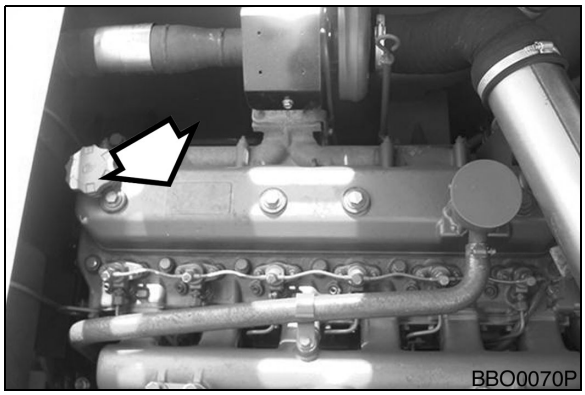


Figure 4

SAFETY PRECAUTIONS

1. Make sure to lock out the hydraulic controls and post a notice (Warning Tag) that the machine is being serviced to prevent any unauthorized operation.
2. Make sure to clean up any fluid spills, especially around the engine.
3. Inspect all fuel lines to make sure that fittings, lines, filters and O-rings, etc., are tight and are not showing signs of wear or damage.
4. If the inspection or test procedure requires that the engine be running, make sure to keep all unauthorized personnel away from the machine, and that all industry standard safety precautions are followed.

PRELIMINARY WORK MACHINE SETUP FOR MAINTENANCE

When performing maintenance specified in this manual, always park the excavator as follows.

NOTE: *Certain types of maintenance may require the machine to be positioned differently. Always return machine to this position.*

1. Park on firm, level ground.
2. Lower bucket to ground.

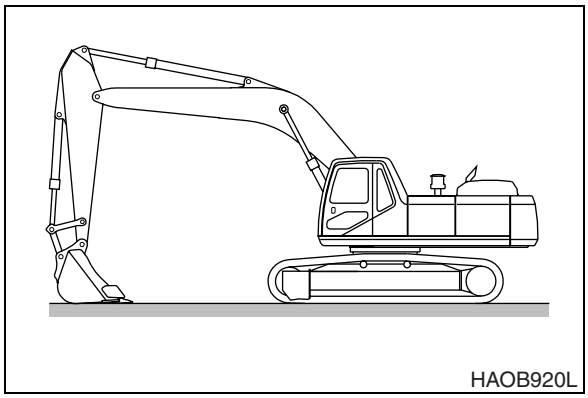


Figure 5

3. Set safety lever on "LOCK" position.

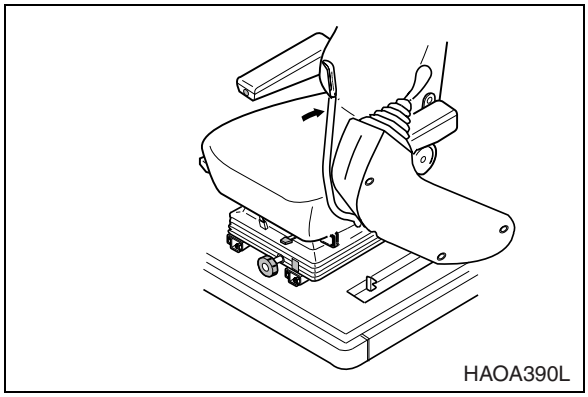


Figure 6

4. Allow engine to run at low idle for a minimum of 5 minutes to allow engine to cool. If this is not done, heat surge may occur.

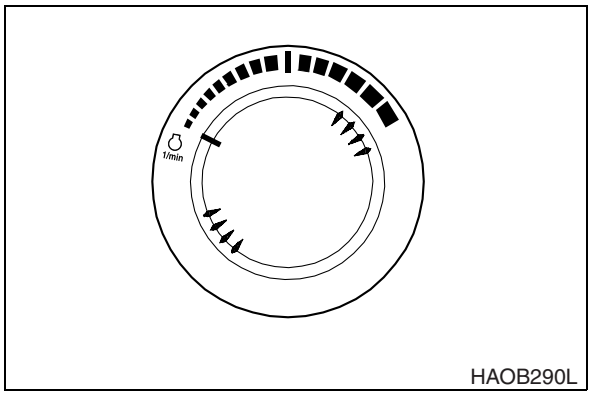


Figure 7

5. Shut down engine by turning key to "O" (OFF) position. Remove key from starter switch.

> **WARNING!**
>
> **If engine must be run while performing maintenance, use extreme care. Always have one person in the cab at all times. Never leave the cab with the engine running.**

6. Before starting maintenance work, hang up a tag, "Do Not Touch When Performing Inspection or Maintenance" on cab door or work lever.

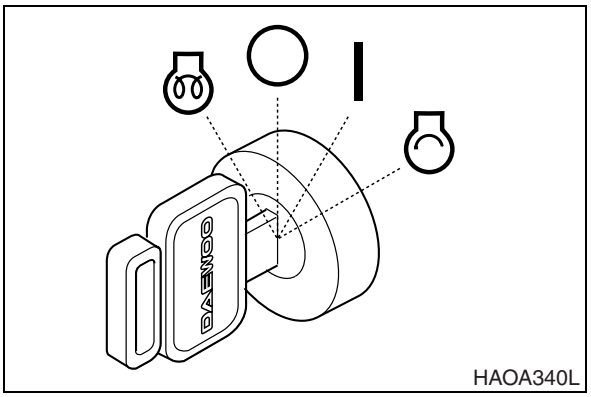


Figure 8

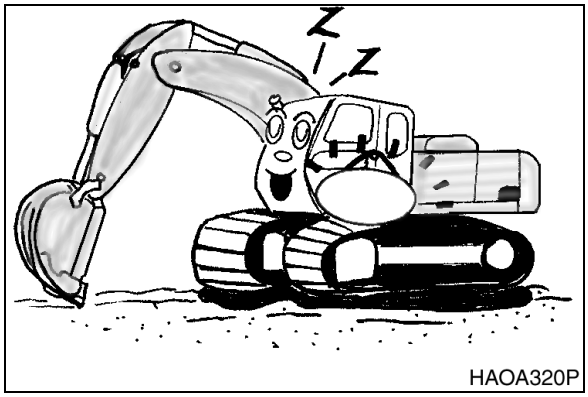


Figure 9

TABLE OF RECOMMENDED LUBRICANTS

IMPORTANT

Do not use lubricants other than those recommended, without prior written approval from Daewoo.

NOTE: *Refer to the Maintenance Intervals Table for application points.*

LUBRICANT MANUFACTURER	HYDRAULIC OIL*	ENGINE OIL**	LUBRICANT GREASE	GEAR OIL
CALTEX	CALTEX HD32	CALTEX RPM or DELO 300	MULTIFAC EP	MULTIPURPOSE EP90
EXXON/ESSO	NUTO (ANTI-WEAR) HD 32 (BELOW 0°C (32°F)) or HD 46 (ABOVE 0°C (32°F)) or TERESSTIC (ANTI-RUST)	EXXON 15W40	RONEX MP #2 or RONEX MP #1 (COLD TEMPS)	SPARTAN EP220 or EXXON GX 80W90
MOBIL	MOBIL DTE 13M (ALL-TEMP) or DTE 24 (SUMMER)	DELVAC 1300 or SUPER 15W40	MOBIL FAW #2 or MOBIL FAW #1 (COLD TEMPS)	MOBILUBE HD 80W90
SHELL	TELLUS 32	ROTELLA T15W40	ALVANIA EP #2	SPIRAX HD 80W90 or DONAX TD (TRANSMISSION)
PENNZOIL	PENNZBELL AW 32 (BELOW 0°C (32°F)) or AW 46 (ABOVE 0°C (32°F))	LONGLIFE SAE15W40	PENNZOIL 705 EP #2	PENZOIL MULTIPUPOSE 4092 or 80W90

* Hydraulic oil change interval is 2,000 hours, only when Daewoo Genuine Oil is used. If other brands of oil is used, guaranteed change interval is 1,000 hours.

** Engine oil must meet ACEA-E2, ACEA-E3 or API-CH-4 EQUIVALENT and be SAE 15W40 or 10W40.

LUBRICANT MANUFACTURER	HYDRAULIC OIL*	ENGINE OIL**	LUBRICANT GREASE	GEAR OIL
DRYDEN	PARADENE AW 32 (BELOW 0°C (32°F)) or AW 46 (ABOVE 0°C (32°F))	DIESELALL PLUS 15W40	EP #2 (RED)	AP80W90
CHEVRON	AW MV 32 (BELOW 0°C (32°F)) or AW MV 46 (ABOVE 0°C (32°F))	DELO 400 15W40	DELO GREASE EP-2	DELO GEAR OIL or RPM UNIV GEAR 80W90
TEXACO	RANDO HD32 (BELOW 0°C (32°F)) or HD46 (ABOVE 0°C (32°F))	URSA SUPER PLUS 15W40 or URSA PREMIUM TDX 15W40	STAR PLEX 2 STAR PLEX PREMIUM	MULTIGEAR EPSAE 80W90
IDEMITSU KOSAN	DAPHNE KOSAN 46WR	APOROIL MOTIRE S300	DAPHNE CORRONE #2	APOROIL GEAR HE 90
NIPPON SEIKIYU	SUPER HIGHLAND S26 or 32		LIPANOC GREASE	NISEKI SP90 or EP90
TOTAL	TOTAL EQUIVIS ZS46-III	TOTAL	TOTAL MUTRIS EP #2	TOTAL DA80W90

* Hydraulic oil change interval is 2,000 hours, only when Daewoo Genuine Oil is used. If other brands of oil is used, guaranteed change interval is 1,000 hours.

** Engine oil must meet ACEA-E2, ACEA-E3 or API-CH-4 EQUIVALENT and be SAE 15W40 or 10W40.

Antifreeze	
Recommended Concentration	**Manufacturers Meeting ASTM D3306**
50% Antifreeze - 50% Distilled Water	Dexcool ELC by Chevron Texaco
	Alugard G48 by BASF
	Others meeting or exceeding ASTM D3306

IMPORTANT

Do not mix oils from different manufacturers. Daewoo does not endorse specific brands but does suggest that owners select quality oils whose suppliers provide assurance that required standards will always be met or exceeded.

Fluctuating daily or weekly extremes of temperature, or operation in sub-zero freezing weather may make it impractical to use straight weight lubricants. Use good judgement in selecting lubricant types that are appropriate for climate conditions.

FLUID CAPACITIES

Component		Capacity
Engine	Oil Pan with Filter	19 liters (5 U.S. gal.)
	Cooling System	22 liters (5.8 U.S. gal.)
Fuel Tank		230 liters (61 U.S. gal.)
Hydraulic Oil	Tank Level	89 liters (24 U.S. gal.)
	System	165 liters (44 U.S. gal.)
Travel Reduction Device (Each)		2.5 liters (0.7 U.S. gal.)
Swing Device		3 liters (0.8 U.S. gal.)

LUBRICATION AND SERVICE CHART

Lubrication and service chart is on the inside of battery box cover. The symbols shown here are used in the lubrication and service chart on the next page.

Symbol	Description
	Lubrication
	Gear Oil (Swing Device, Travel Reduction Device)
	Engine Oil
	Engine Oil Filter
	Hydraulic Oil
	Hydraulic Oil Filter

Symbol	Description
	Coolant
	Air Cleaner Filter
	Fuel Filter
	Air Conditioner Filter
	Drain Water

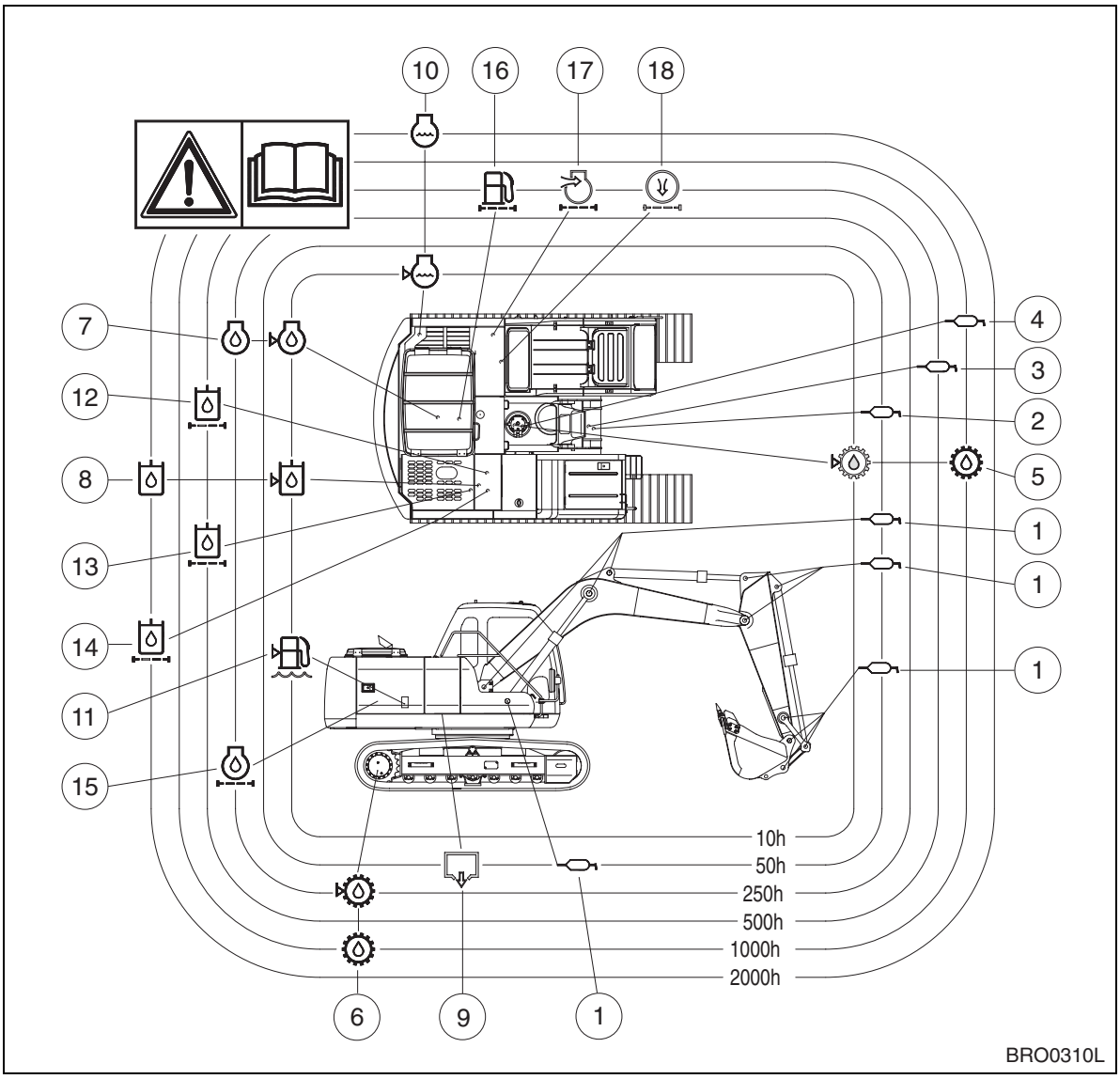

10
16
17
18
7
12
8
13
14
11
15
4
3
2
5
1
1
1
10h
50h
250h
500h
1000h
2000h
6
9
1
BRO0310L

Figure 10

SERVICE DATA									
No.	Items To Check	Service	S140LC-V						
			Qty.	Service Interval					
				10	50	250	500	1000	2000
1	Front Joint Pin	Grease	18	F100	W10				
2	Swing Bearing	Grease	3						
3	Swing Gear	Grease	1						
4	Swing Reduction Gear	Grease	1						
5	Swing Device	Gear Oil (80W90)	3 L	V		F			
6	Travel Reduction Device	Gear Oil (80W90)	2X2.5 L			F			
7	Engine Oil	Engine Oil (15W40)	19 L	V	F				
8	Hydraulic Oil Tank	Hydraulic Oil (Equivis 46)	143 L	V					
9	Fuel Tank	Diesel	230 L	V					
10	Radiator	Coolant (Antifreeze)	22 L	V					PG
	Coolant Recovery Tank	Coolant (Antifreeze)	1	V					PG
11	Water Separator	----------	1	V					
12	Hydraulic Full-flow Filter	Element	1			F			
13	Pilot filter	Element	1			F			
14	Hydraulic Oil Suction Filter	Strainer	1						C
15	Engine Oil Filter	Cartridge	1		F				
16	Fuel Filter	Cartridge	1		V				
17	Air Cleaner (Outer)	Element	1			C			
	Air Cleaner (Inner)	Element	1						
18	Air Conditioner Filter	Element	1				C		

V: Maintenance & Refill.

C: Cleaning.

F: First Time Exchange Only.

F100: Every 10 Hours For First 100 Hours.

W10: Every 10 Hours If Operating In Water.

PG: Propylene Glycol - Extended Life Antifreeze (Drain and replace using this interval.) See “Engine Cooling System” on page 4-62, for further explanation.

Gray Box: Replacement On Every Interval.

NOTE: *For additional service items see list of “Maintenance Intervals” on page 4-10.*

MAINTENANCE INTERVALS

10 HOUR / DAILY SERVICE

- Grease Boom, Arm and Front Attachment Pins (for first 100 hours) (See page 4-12)
- Check Engine Oil Level (See page 4-12)
- Check Level of Hydraulic Oil Tank (See page 4-13)
- Check for Leaks In Hydraulic System (See page 4-14)
- Check Fuel Level (See page 4-15)
- Check for Leaks In Fuel System (See page 4-15)
- Check Water Separator and Drain Water As Required (See page 4-16)
- Check Oil Level of Swing Reduction Device (See page 4-16)
- Clean Dust Net in Front of Oil Cooler (See page 4-17)
- Check Cooling System and Refill As Required (See page 4-18)
- Check Level of Window Washer Liquid (See page 4-18)
- Inspect the Bucket Teeth and Side Cutters for Signs of Wear (See page 4-19)
- Inspect Engine Fan Blade (See page 4-19)
- Check Air Intake System (See page 4-20)
- Inspect Seat Belt for Proper Operation (See page 4-20)
- Inspect the Structure for Cracks and Faulty Welds (See page 4-20)
- Check the Operation of All Switches (See page 4-20)
- Check the Operation of All Exterior Lights, Horn and Control Console Indicator and Monitor Lights (See page 4-20)
- Start Engine, Check Starting Ability, and Observe Exhaust Color at Start-up and at Normal Operating Temperature. Listen for Any Abnormal Sounds (See page 4-21)
- Check Operation of All Controls (See page 4-21)

50 HOUR / WEEKLY SERVICE

- Perform All Daily Service Checks (See page 4-22)
- Grease Boom, Arm and Front Attachment Pins (See page 4-22)
- Grease Swing Bearing (See page 4-24)
- Drain Water and Sediment from Fuel Filter (See page 4-25)
- Drain Water and Sediment from Fuel Tank (See page 4-25)
- Check Engine Fan Belt for Cracks, Wear and Correct Tension (After First 50 Hours) (See page 4-25)
- Change Engine Oil and Filter (After First 50 Hours) (See page 4-25)
- Inspect the Track Assemblies for Proper Tension and Loose, Worn or Damaged Parts (Links, Shoes, Rollers, Idlers) (See page 4-25)

250 HOUR / MONTHLY SERVICE

- Perform All Daily and 50 Hour Service Checks (See page 4-26)
- Change Swing Reduction Device Oil (Drain and Refill After First 250 Hours) (See page 4-26)
- Clean Outer Filter of Two Stage Air Cleaner (See page 4-26)
- Check Engine Fan Belt Tension (See page 4-27)
- Check Engine Fan Belt Wear (See page 4-27)
- Change Engine Oil and Filter (See page 4-28)
- Check Oil Level In Travel Reduction Device (One on Each Side of Unit) (See page 4-29)
- Change Oil in Travel Reduction Device (One on Each Side of Unit) (After First 250 Hours) (See page 4-29)
- Replace Full Flow Hydraulic Oil Filter (After First 250 Hours) (See page 4-29)
- Change Pilot Filter (After First 250 Hours) (See page 4-30)
- Inspect Pins and Bushings of the Front End Attachments for Signs of Wear (See page 4-30)
- Check Fluid Levels in Batteries and Battery Charge Levels (See page 4-30)
- Inspect for Any Loose or Missing Nuts and Bolts (See page 4-30)
- Inspect Fuel System Hose Clamps (See page 4-30)

500 HOUR / 3 MONTH SERVICE

- Perform All Daily, 50 and 250 Hour Service Checks (See page 4-31)
- Grease Swing Gear and Pinion (See page 4-31)
- Replace Full Flow Hydraulic Oil Filter (See page 4-32)
- Change Pilot Filter (See page 4-33)
- Clean Air Conditioning Filter (See page 4-34)
- Clean Radiator, Oil Cooler, Intercooler and Air Conditioner Condenser Core (See page 4-35)
- Replace Outer and Inner Air Cleaner Filters (See page 4-36)
- Change Fuel Filter (See page 4-37)

1,000 HOUR / 6 MONTH SERVICE

- Perform All Daily, 50, 250 and 500 Hour Service Checks (See page 4-39)
- Grease Swing Reduction Device (See page 4-39)
- Change Swing Reduction Device Oil (See page 4-39)
- Change Oil in Travel Reduction Device (One on Each Side of Unit) (See page 4-40)
- Clean Fuel Injection Priming Pump Strainer (See page 4-41)
- Check Air Conditioner Refrigerant (See page 4-42)
- Check and Adjust Engine ** (See page 4-43)
- Change Air Conditioner Filter (See page 4-43)

2,000 HOUR / YEARLY SERVICE

- Perform All Daily, 50, 250, 500 and 1,000 Hour Service Checks (See page 4-44)
- Check Alternator and Starter** (See page 4-44)
- Check All Rubber Anti-vibration Shock Mounts (See page 4-44)
- Perform and Record the Results of the Cycle Time Tests (See page 4-44)
- Inspect Machine to Check for Cracked or Broken Welds or other Structural Damage (See page 4-44)
- Check, Adjust Valve Clearance ** (See page 4-44)
- Check Head Bolt Torques (See page 4-44)
- Change Radiator Coolant (Propylene Glycol - Extended Life Antifreeze) (See page 4-44)
- Hydraulic Oil Exchange and Suction Strainer Cleaning (See page 4-46)

4,000 HOUR / BIENNIAL SERVICE

- Major Parts - Periodic Replacement (See page 4-49)

12,000 HOUR / SIX YEAR SERVICE

- Hose In-service Lifetime Limit (European Standard ISO 8331 and EN982 CEN) (See page 4-50)

** These checks need to be completed by an authorized Daewoo dealer.

10 HOUR / DAILY SERVICE

GREASE BOOM, ARM AND FRONT ATTACHMENT PINS (FOR FIRST 100 HOURS)

Grease every 10 hours for first 100 hours and every 50 hours thereafter (See page 4-22).

NOTE: *If the unit has been running or working in water the front attachment should be greased on a 10 hour / daily basis.*

CHECK ENGINE OIL LEVEL

WARNING!

Allow the engine to cool before checking the oil level to avoid burns by touching hot engine parts.

NOTE: *When checking level using a dipstick always remove and wipe it clean before making final level check.*

1. Shut down engine and wait for 15 minutes. This will allow all oil to drain back to oil pan.
2. Remove dipstick (1, Figure 11) and wipe the oil off with a clean cloth.
3. Insert dipstick fully in the oil gauge tube, then take it out again.
4. Engine oil level must be between "HIGH" and "LOW" marks on dipstick.

   NOTE: *If oil is above "HIGH" mark on dipstick, some must be drained to return oil to proper level.*
5. Add oil through engine oil fill cap (2, Figure 11), if the oil level is below the "LOW" mark.

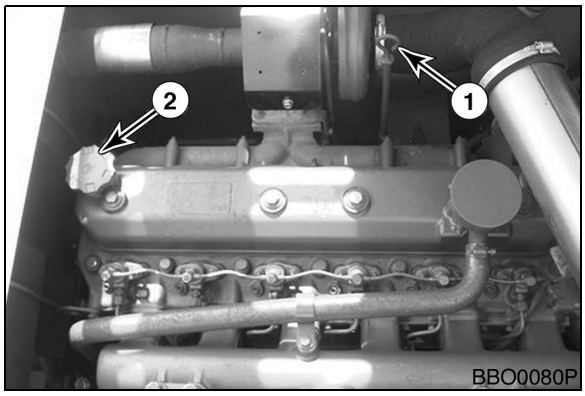


Figure 11

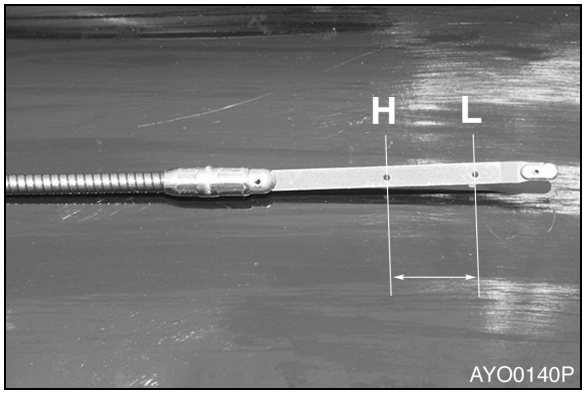


Figure 12

CHECK LEVEL OF HYDRAULIC OIL TANK

WARNING!

The hydraulic oil will be hot after normal machine operation. Allow the system to cool before attempting to service any of the hydraulic components.

The hydraulic tank is pressurized. Turn the breather cap slowly to allow the pressurized air to vent. After the pressure has been released, it is safe to remove either the fill cap or service covers.

1. Position the machine on firm, level ground. Lower boom and position bucket on ground as shown in Figure 14.
2. Set engine speed to "LOW IDLE."
3. Set safety lever to "LOCK" position.
4. Check level gauge by opening right access door. Oil level must be between marks on sight gauge.

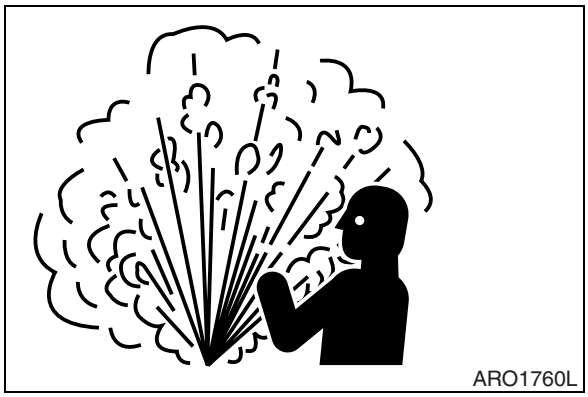


Figure 13

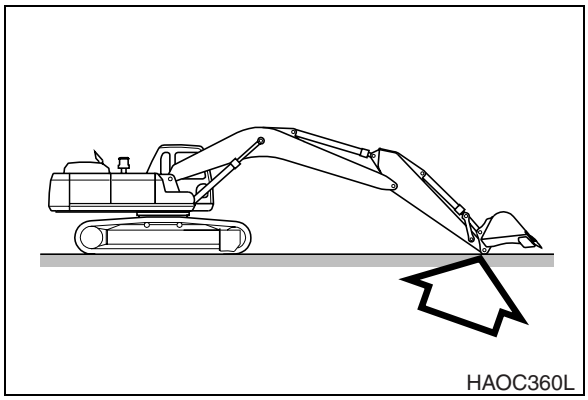


Figure 14

Figure 15

5. If the level is below "L" mark add oil.

   A. Shut down engine.

   B. The hydraulic tank is pressurized. Turn the breather cap slowly to allow the pressurized air to vent.

   C. Remove the upper cover of the hydraulic tank and add oil.

IMPORTANT
Do not fill above "H" mark on sight gauge. Overfilling can result in damage to equipment and oil leaking from hydraulic tank due to expansion.

6. If oil level is above the "H" mark drain oil.

   A. Shut down engine and wait for the hydraulic oil to cool down.

   B. Drain the excess oil from drain plug (Figure 17) at the bottom of the tank into a suitable container.

   NOTE: *Dispose of drained fluids according to local regulation.*

CHECK FOR LEAKS IN HYDRAULIC SYSTEM

1. Perform a daily walk-around inspection to make sure that the hoses, piping, fittings, cylinders and hydraulic motors are not showing any signs of leakage. If any is noted, determine the source of the leak and repair.

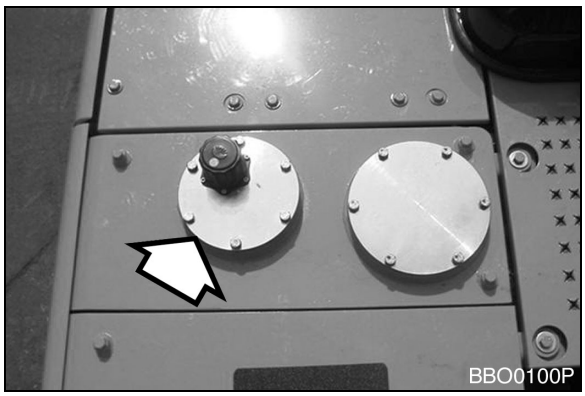


Figure 16

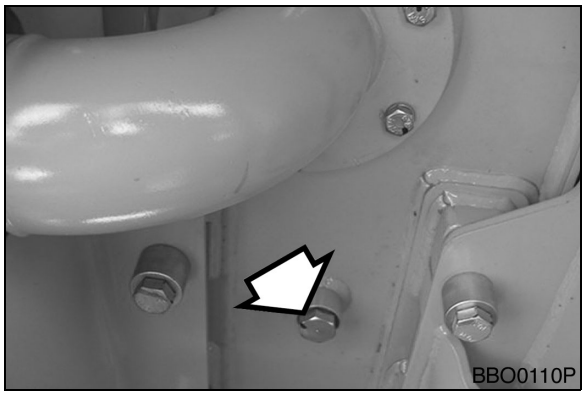


Figure 17

CHECK FUEL LEVEL

WARNING!

Use extreme safety precautions while refueling to prevent explosions or fire.

Immediately clean up any spilt fuel.

1. At end of each work day, fill fuel tank. Add fuel through fuel fill tube (1, Figure 18). When working at a temperature of 0°C (32°F) or higher, use ASTM No. 2-D or its equivalent. At temperatures below 0°C (32°F) use ASTM No. 1-D or its equivalent.
2. Make sure that the fuel fill hose is grounded to the excavator before fueling begins.
3. Check the amount of fuel in the tank by observing the fuel tank sight gauge (2, Figure 18).

   NOTE: *See "Fluid Capacities" on page 4-7. for capacity.*
4. The excavator may be equipped with the optional battery operated fuel fill pump. The pump assembly is in the hydraulic pump compartment. Put the suction hose of the pump into the fuel resupply tank. Turn the switch in the battery box "ON," and the fuel will be pumped into the excavator fuel tank.
5. Do not overfill the tank.
6. Securely tighten cap after fueling.

   NOTE: *If breather holes in cap are clogged, a vacuum may form in the tank preventing proper fuel flow to engine. Keep holes in fuel cap clean.*

CHECK FOR LEAKS IN FUEL SYSTEM

1. Perform an inspection of the engine compartment to verify that the fuel system is not leaking. If any is noted, determine the source of the leak and repair.

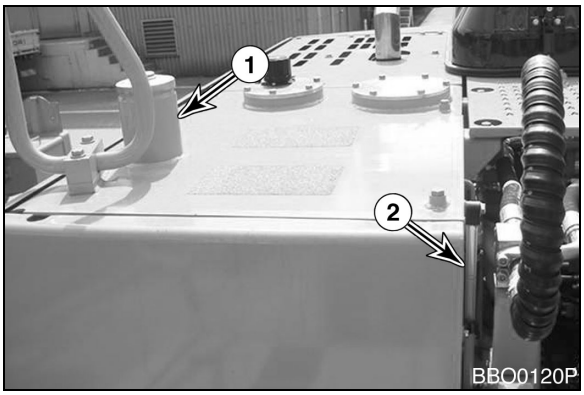


Figure 18

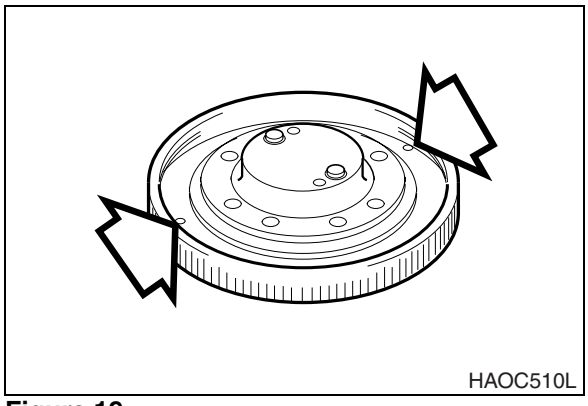


Figure 19

CHECK WATER SEPARATOR AND DRAIN WATER AS REQUIRED

1. A water separator is inside the right side access door.
2. Open the access door on right side of the machine.
3. If red ring in bowl reaches level line, loosen plug (Figure 20) at bottom of body and drain water into a suitable container.

   NOTE: *Dispose of drained fluids according to local regulation.*

4. Tighten plug (Figure 20) and prime fuel system. (See page 4-38)
5. Close access door.

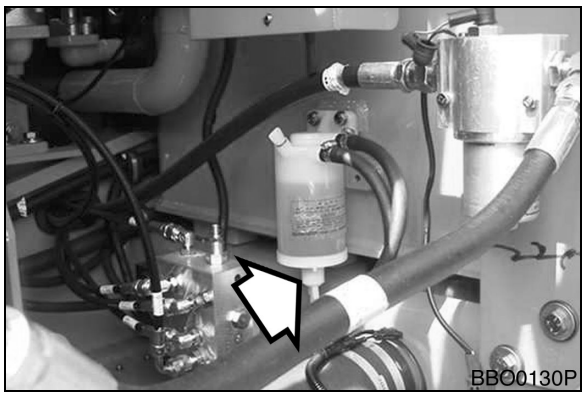


Figure 20

CHECK OIL LEVEL OF SWING REDUCTION DEVICE

WARNING!

The gear oil is very hot after the machine has been operating. Shut all systems down and allow them to cool. Before fully removing any motor case inspection port plug, etc., loosen the plug slightly to allow pressurized air to escape.

NOTE: *When checking level using a dipstick always remove and wipe it clean before making final level check.*

1. Remove dipstick (1, Figure 21) and wipe the oil from the dipstick with a cloth.
2. Insert dipstick (1, Figure 21) fully in the guide.

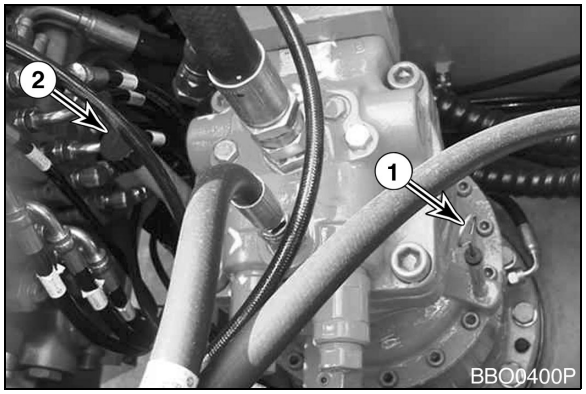


Figure 21

3. When dipstick is pulled out, oil level must be between "HIGH" and "LOW" marks on dipstick.

   NOTE: *If oil is above "HIGH" mark on dipstick, some must be drained to proper level.*

4. If the oil does not reach the "L" mark on the dipstick, add oil through fill port (2, Figure 21).

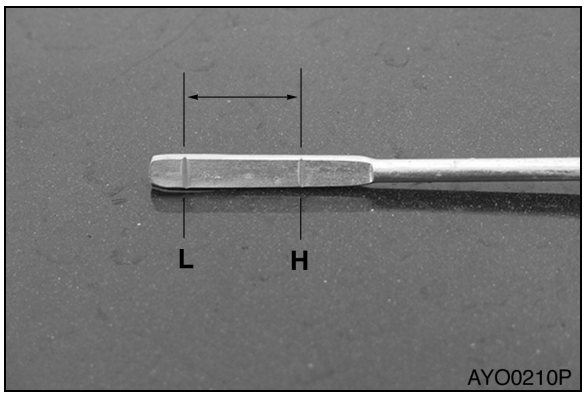


Figure 22

5. If the oil level exceeds the "H" mark on the dipstick, remove drain plug (Figure 23) and drain the excess oil into a suitable container.

   NOTE: *Dispose of drained fluids according to local regulations.*

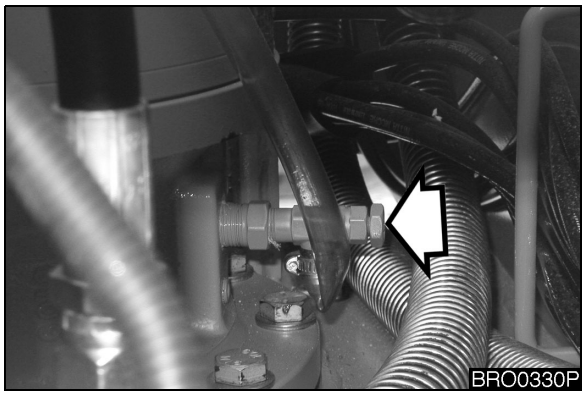


Figure 23

CLEAN DUST NET IN FRONT OF OIL COOLER

IMPORTANT

If running excavator in dusty area, check dust net everyday and clean it if dirty.

WARNING!

If using compressed air or water to clean the dust net, make sure that proper eye protection is worn.

1. Loosen the wing nut(s) and remove dust net.
2. Clean with compressed air or a water.

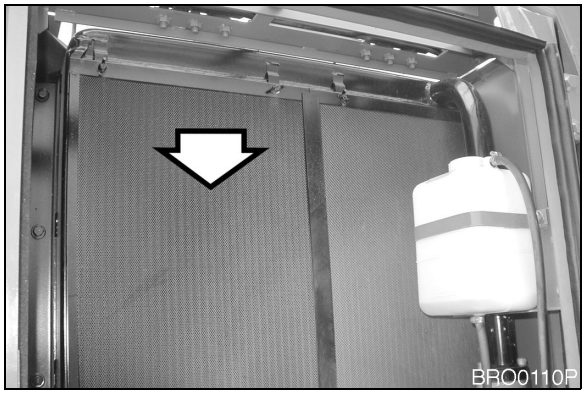


Figure 24

CHECK COOLING SYSTEM AND REFILL AS REQUIRED

WARNING!

Allow the engine to cool before releasing the radiator cap. Make sure to loosen the cap slowly to release any remaining pressure.

Radiator cleaning is performed while the engine is running. Take extreme caution when working on or near a running engine. Make sure to lock out and tag the controls notifying personnel that service work is being performed.

Do not remove the radiator cap unless it is required. Observe the coolant level in the coolant recovery tank.

1. When the engine is cold, remove the radiator cap and check the coolant level inside the radiator. Do not rely on the level of coolant in the coolant recovery tank. Refill radiator as required. Refer to coolant concentration table. (See page 4-63)
2. Check to make sure that the coolant transfer line from the coolant recovery tank to the radiator is free and clear of obstructions, or not pinched.
3. Observe the level of coolant in the coolant recovery tank. The normal cold engine fluid level should be between "FULL" and "LOW" marks on tank.
4. If the coolant is below the "LOW" mark, add coolant to this tank.

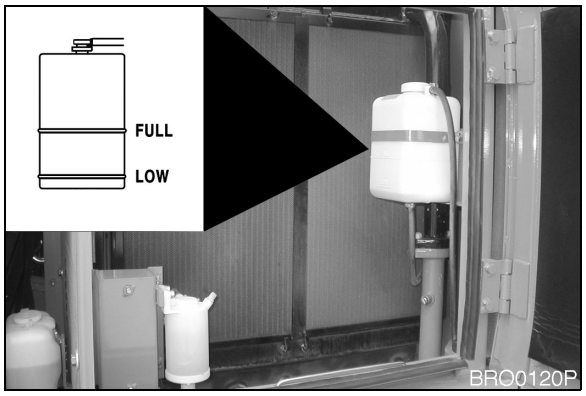


Figure 25

CHECK LEVEL OF WINDOW WASHER LIQUID

1. Open right front door and check fluid level in windshield washer tank.
2. Open fill cap and add fluid.

   NOTE: *Use a washer liquid that is rated for all seasons. This will prevent freezing during cold weather operation.*

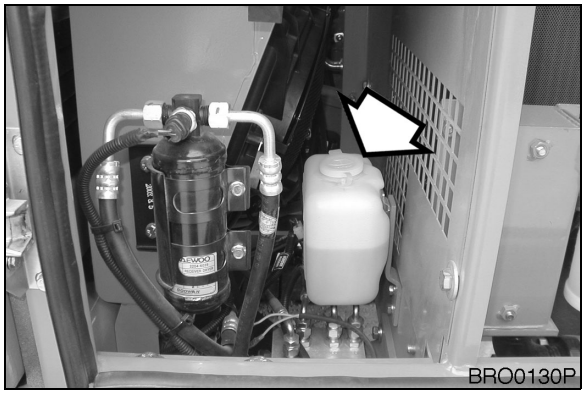


Figure 26

INSPECT THE BUCKET TEETH AND SIDE CUTTERS FOR SIGNS OF WEAR

1. On a daily basis, inspect the bucket teeth to make sure that tooth wear or breakage has not developed.
2. Do not allow the replaceable bucket teeth to wear down to the point that the bucket adapter is exposed. See Figure 27.

   NOTE: *These instructions are only for Daewoo OEM buckets. If you are using other manufacturers' buckets, refer to their specific instructions.*

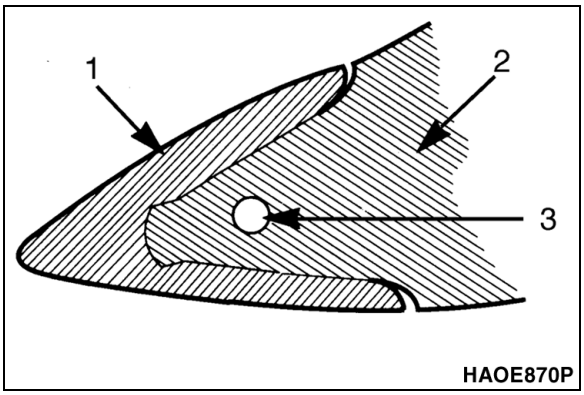


Figure 27 1. POINT, 2. ADAPTER & 3. PIN

INSPECT ENGINE FAN BLADE

WARNING!

Personal injury can result from a fan blade failure. Never pull or pry on the fan. This can damage the fan blade(s) and cause fan failure.

NOTE: *Manually rotate the crankshaft by using a wrench on the accessory drive pulley nut.*

1. An inspection of the cooling fan is required daily. Check for cracks, loose bolts, bent or loose blades, and for contact between the blade tips and the fan shroud. Check the fan to make sure it is securely mounted. Tighten the bolts if necessary. Replace any fan that is damage.

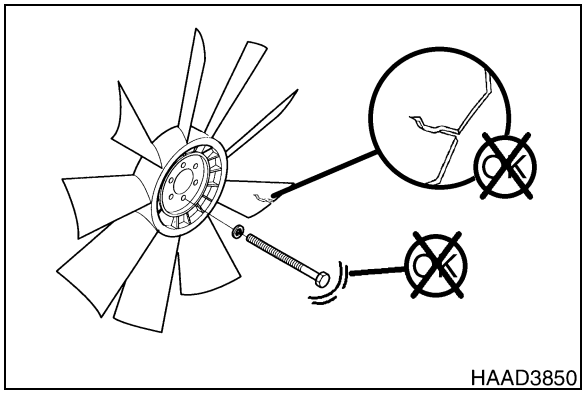


Figure 28

CHECK AIR INTAKE SYSTEM

⚠ CAUTION!

Hot engine components can cause burns.

Avoid contact with hot engine components

1. Park the machine on a level surface, lower the attachment to the ground, set safety lever to "LOCK" position, and shut down engine.
2. Check the engine intake hose, and hose bands for damage and tightness.
3. If damaged, wrinkled or loose, replace or retighten or contact your nearest Daewoo dealer.

IMPORTANT

Severe engine damage will result from running with unfiltered air.

Do not operate engine if any leaks or defects are found on air intake system.

Figure 29

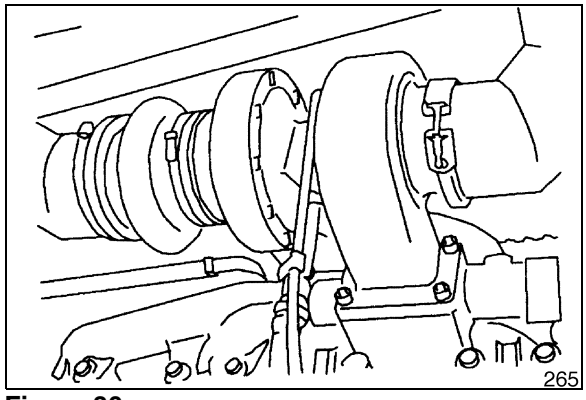


Figure 30

INSPECT SEAT BELT FOR PROPER OPERATION

INSPECT THE STRUCTURE FOR CRACKS AND FAULTY WELDS

1. During the daily walk-around inspection and when greasing the machine, look for any visible damage to the machine. Repair or replace any damaged parts before operating the machine.

CHECK THE OPERATION OF ALL SWITCHES

1. Verify the working condition of all switches before starting the engine.

CHECK THE OPERATION OF ALL EXTERIOR LIGHTS, HORN AND CONTROL CONSOLE INDICATOR AND MONITOR LIGHTS

1. Turn the engine starter switch to "ON" position and observe all of the indicator lights.
2. Restore operation of any light bulbs that do not turn "ON" at this time.
3. Sound the horn. Repair or replace if required.
4. Turn "ON" and inspect all exterior work lights. Replace any monitors, burned out bulbs or cracked or broken housings or lenses.

START ENGINE, CHECK STARTING ABILITY, AND OBSERVE EXHAUST COLOR AT START-UP AND AT NORMAL OPERATING TEMPERATURE. LISTEN FOR ANY ABNORMAL SOUNDS

CHECK OPERATION OF ALL CONTROLS

IMPORTANT

Cold weather operation requires that the operator fully warm up the hydraulic oil before beginning machine operation. Follow all warm up instructions listed in the Operating Instruction section of this manual. Make sure to cycle oil through all of the components, including all cylinders, both travel motors and the swing motor. Cold hydraulic oil in the lines and components needs to be warmed before beginning full operation. If this is not done, damage to the cylinders or hydraulic motors can occur.

1. With the engine at rated speed, operate all of the controls.
2. Follow cold weather hydraulic system warm-up procedures.
3. Note any slow operations or unusual movements. Determine the cause and repair the fault before operating.

50 HOUR / WEEKLY SERVICE

PERFORM ALL DAILY SERVICE CHECKS

GREASE BOOM, ARM AND FRONT ATTACHMENT PINS

Grease every 10 hours for first 100 hours and every 50 hours thereafter.

NOTE: *If the unit has been running or working in water the front attachment should be greased on a 10 hour / daily basis.*

- Position machine as shown below and lower the front attachment to the ground and shut down engine.
- Press the grease fitting and inject grease with the grease gun on the marked point.
- After injection, clean off the old grease that has been purged.

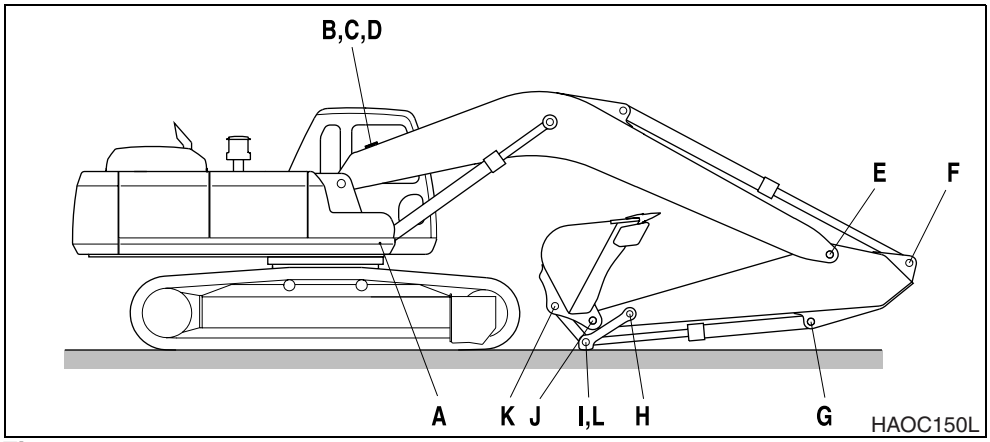


Figure 31

A. BOOM CYLINDER FOOT PIN (2 POINTS)
B. BOOM FOOT PIN (2 POINTS)
C. BOOM CYLINDER ROD PIN (2 POINTS)
D. ARM CYLINDER FOOT PIN (1 POINT)
E. BOOM ARM JOINT PIN (2 POINTS)
F. ARM CYLINDER ROD (1 POINT)
G. BUCKET CYLINDER FOOT PIN (1 POINT)
H. ARM LINK JOINT PIN (2 POINTS)
I. LINK JOINT PIN (2 POINTS)
J. ARM BUCKET JOINT PIN (2 POINTS)
K. BUCKET LINK JOINT PIN (1 POINT)
L. BUCKET CYLINDER ROD (1 POINT)

A. Boom cylinder foot pin (2 points)

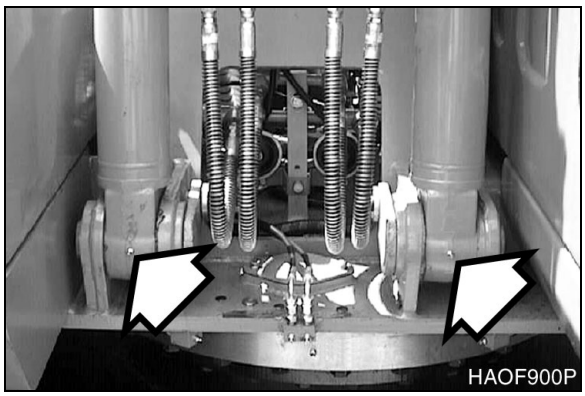


Figure 32

B. Boom foot pin (2 points)

C. Boom cylinder rod pin (2 points)

D. Arm cylinder foot pin (1 point)

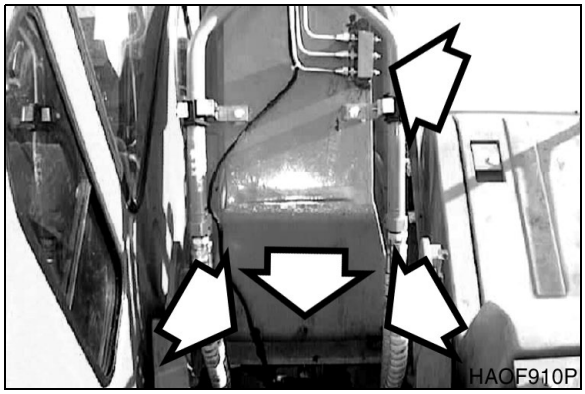


Figure 33

E. Boom arm joint pin (2 points)

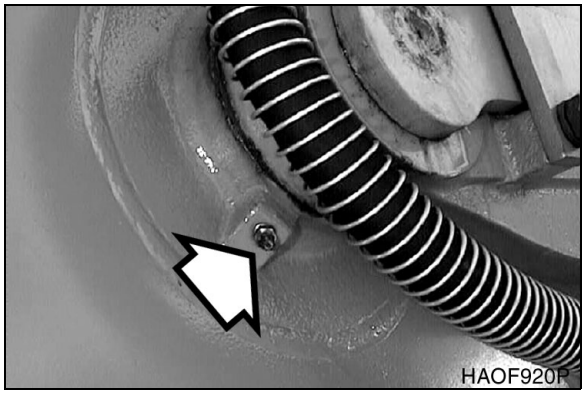


Figure 34

F. Arm cylinder rod (1 point)

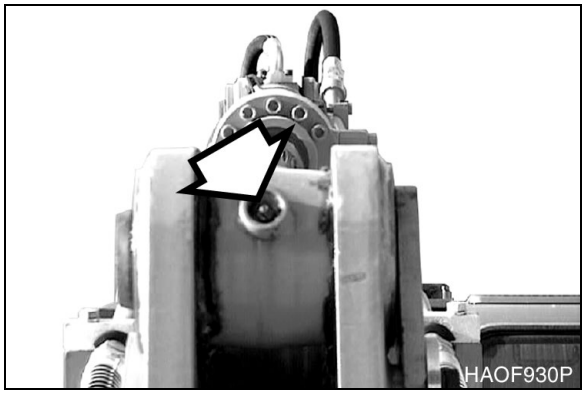


Figure 35

G. Bucket cylinder foot pin (1 point)

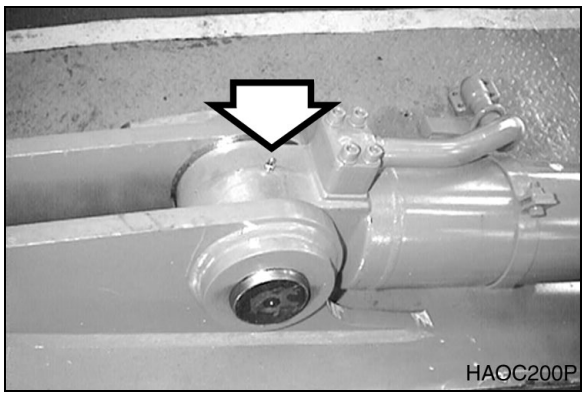


Figure 36

H. Arm link joint pin (2 points)

I. Link joint pin (2 points)

J. Arm bucket joint pin (2 points)

K. Bucket link joint pin (1 point)

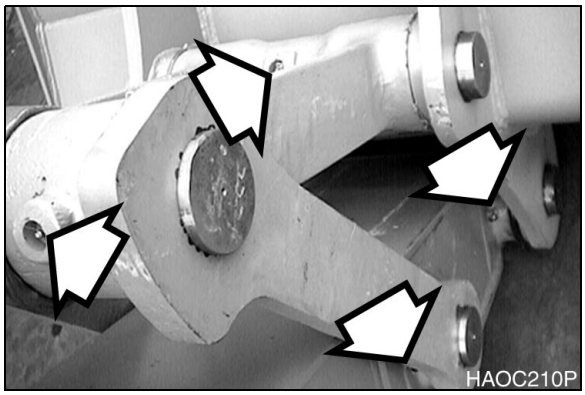


Figure 37

L. Bucket cylinder rod (1 point)

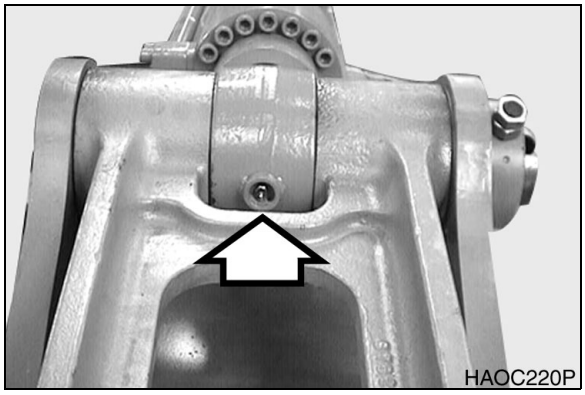


Figure 38

GREASE SWING BEARING

1. Lower the front attachment to the ground.
2. There are three grease fittings for the swing bearing. Do not over lubricate. Purge old grease with new. Remove all purged grease.

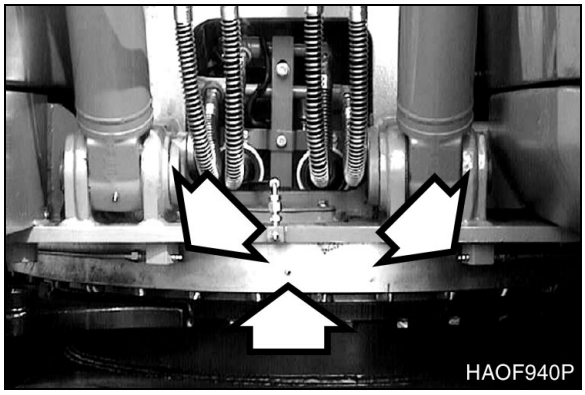


Figure 39

DRAIN WATER AND SEDIMENT FROM FUEL FILTER

1. Open drain valve on bottom of fuel filter and drain water and sediment into a suitable container.

   NOTE: *Dispose of drained fluids according to local regulation.*

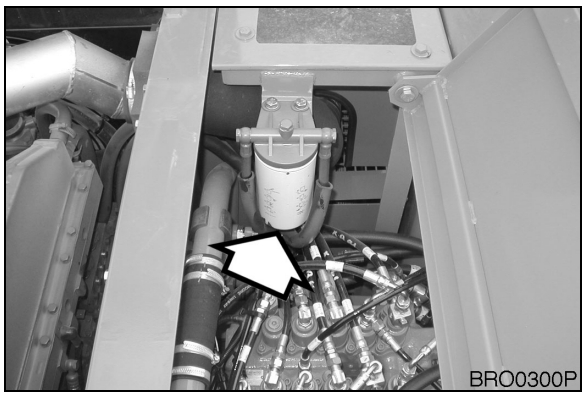


Figure 40

DRAIN WATER AND SEDIMENT FROM FUEL TANK

1. Perform this procedure before operating the machine.
2. Drain water and sediment from bottom of fuel tank into a suitable container.

   NOTE: *Dispose of drained fluid according to local regulations.*

   NOTE: *Always completely fill fuel tank at end of each workday to prevent condensation from forming on the inside walls of the tank.*

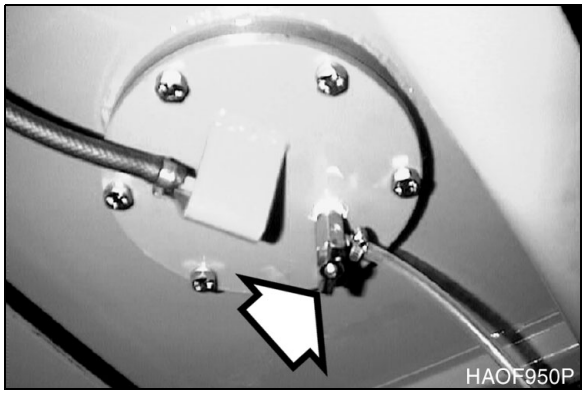


Figure 41

CHECK ENGINE FAN BELT FOR CRACKS, WEAR AND CORRECT TENSION (AFTER FIRST 50 HOURS)

1. Inspect after first 50 hours of operation or rebuild, and every 250 hours thereafter. For details, See “Check Engine Fan Belt Tension” on page 4-27.

CHANGE ENGINE OIL AND FILTER (AFTER FIRST 50 HOURS)

1. Change engine oil and filter after first 50 hours of operation or rebuild, then every 250 thereafter. For details, See “Change Engine Oil and Filter” on page 4-28.

INSPECT THE TRACK ASSEMBLIES FOR PROPER TENSION AND LOOSE, WORN OR DAMAGED PARTS (LINKS, SHOES, ROLLERS, IDLERS)

1. Do a daily walk-around inspection of all components including the track assemblies. Look for missing, damaged or excessively worn parts. See “Track Tension” on page 4-69.
2. Jack up each track and perform the two speed travel motor test.

250 HOUR / MONTHLY SERVICE

PERFORM ALL DAILY AND 50 HOUR SERVICE CHECKS

CHANGE SWING REDUCTION DEVICE OIL (DRAIN AND REFILL AFTER FIRST 250 HOURS)

NOTE: *Change swing reduction device oil after first 250 hours on a new machine and every 1,000 hours thereafter (See page 4-39).*

CLEAN OUTER FILTER OF TWO STAGE AIR CLEANER

WARNING!

Never clean or attempt to remove the air cleaner filter if the engine is running.

If using compressed air to clean the element, make sure that proper eye protection is worn.

1. Locate the air filter assembly. Remove access cover (1, Figure 43) and outer filter from air filter assembly.

   NOTE: *If indicator light (Figure 42) on instrument panel comes "ON" the air cleaner must be serviced.*

   NOTE: *Replace outer filter every 500 hours / 3 months of service.*

2. Remove and clean rubber evacuator valve (2, Figure 43) from bottom of air cleaner housing. Inspect seal lips for wear or damage. Replace valve if necessary.
3. Clean the outer filter by blowing compressed air from the inside of the filter towards the outside. Do not use more than 205 kPa (30 psi) air pressure.
4. Clean the inside of the air filter housing and the inside of the air filter housing cover.
5. Properly reinstall the air filter and cover. Tighten the cover wing nut finger tight. Do not use any tools to tighten the wing nut.

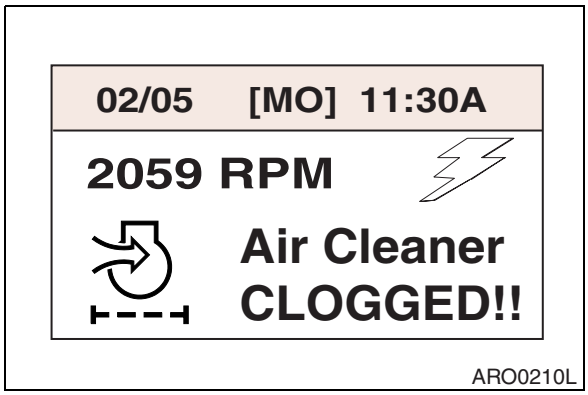


Figure 42

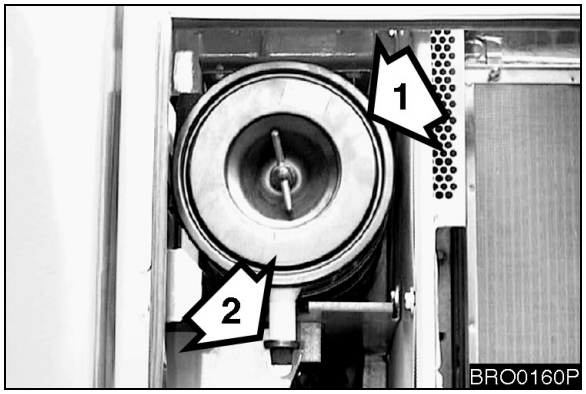


Figure 43

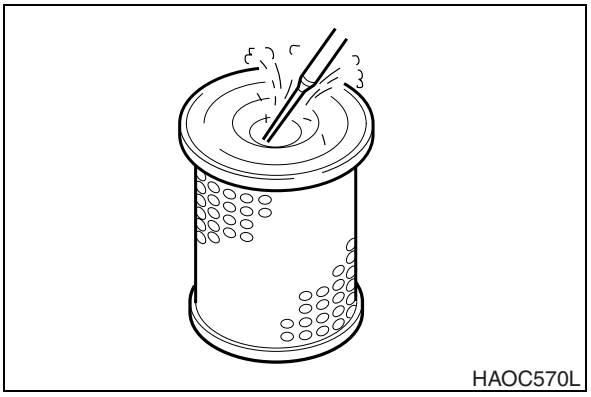


Figure 44

CHECK ENGINE FAN BELT TENSION

IMPORTANT

A loose fan belt can cause engine overheating, poor charging, and/or premature belt wear. A belt that is too tight can cause damage to the water pump, alternator bearing or belt.

1. Inspect every 250 hours. (Inspect after first 50 hours of operation.)
2. With the engine shut off, check the tension of the fan belt by pressing downwards on the belt, midway between the fan pulley and alternator pulley. The belt should flex approximately 10 mm (0.500 in). See Figure 45. To adjust the belt, loosen the alternator adjustment plate bolts, adjust the belt tension and retighten the bolts.

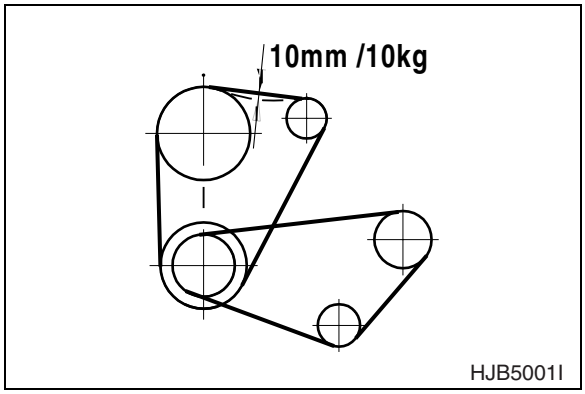


Figure 45

CHECK ENGINE FAN BELT WEAR

⚠ WARNING!

Keep clear of engine fan and fan drive belts when the engine is running. Rotating fan and belt contact can cause injury.

⚠ WARNING!

When checking, adjusting or replacing drive belts, care must be taken to prevent accidental cranking of the engine. Be sure the starter switch is in the "OFF" position and the controls are tagged.

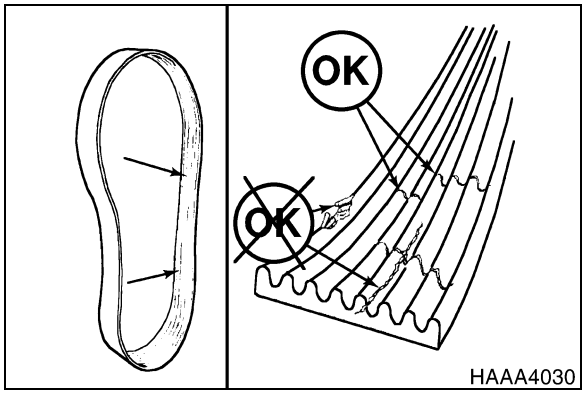


Figure 46

1. Replace badly worn, greasy or severely cracked belts immediately. These conditions prevent proper belt function. Visually inspect the belt. Check the belt for intersecting cracks. Transverse (across the belt width) cracks are acceptable. Longitudinal (direction of belt length) cracks that intersect with transverse cracks are not acceptable. Replace the belt if it is frayed or has pieces of material missing.
2. Before installing new belts, make sure all pulley grooves are clean and not worn. Replace pulley, if damaged, or if the grooves are worn.
3. All pulley support bearings, shafts, and brackets must be in working order.
4. When replacing belts and pulleys, pulley alignment must be checked with belts tensioned and brackets securely clamped. A misalignment that can be detected by the naked eye is detrimental to belt performance.

5. Do not force the belts into the pulley grooves by prying with a screwdriver or pry bar. This will damage the belt side cords which will cause the belts to turn and result in complete destruction of the belts in operation.

6. Belts on new machines and replacement belts lose their tension as they seat into the pulley grooves. Check the tension of new belts at 50 hour intervals until tension is stabilized and thereafter, every 250 hours. If the tension falls below the required minimum, the belt slips damaging the belts and pulley grooves.

   NOTE: *When operating in abrasive conditions, check tension every 100 hours.*

CHANGE ENGINE OIL AND FILTER

NOTE: *Change engine oil and filter after first 50 hours of operation or rebuild, then every 250 thereafter.*

⚠ WARNING!

Do not change oil on a hot engine. Allow the engine to cool down before attempting to change the engine oil and filter to avoid burns by touching hot engine parts.

1. Position a larger container under the engine. Remove cap (1, Figure 47) and install hose (2) to drain the engine oil. Remove hose (2) and install cap (1).

   NOTE: *Dispose of drained fluids according to local regulation.*

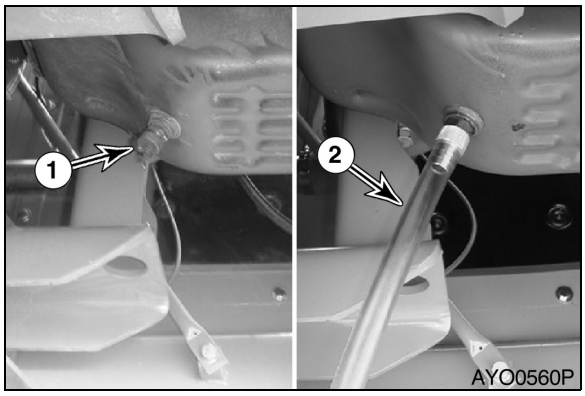


Figure 47

2. Replace engine oil filter by using filter wrench. The engine oil filter is a spin-on type. See Figure 48. Remove and discard filter.

3. Install new filter. Apply a small amount of oil around filter gasket. Screw filter on head until gasket contacts head, turn filter 1/2 turn more.

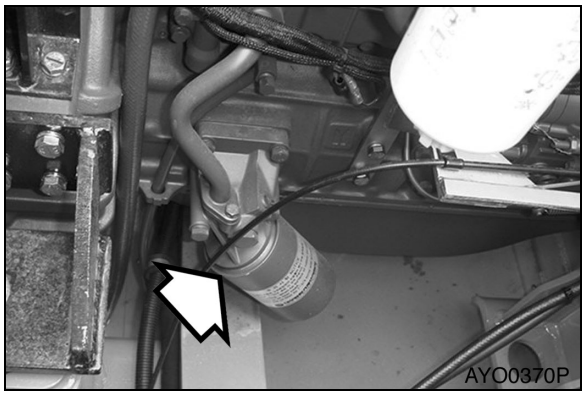


Figure 48

4. Refill the engine with the correct oil through the oil fill port (Figure 49). Refer to the Lubrication Table of this manual for the recommended oil for the operating conditions.

   NOTE: *See "Fluid Capacities" on page 4-7. for capacity.*

5. Start engine and check engine oil pressure warning light.

6. Shut down engine. Look for signs of leaks at filter. Recheck oil level.

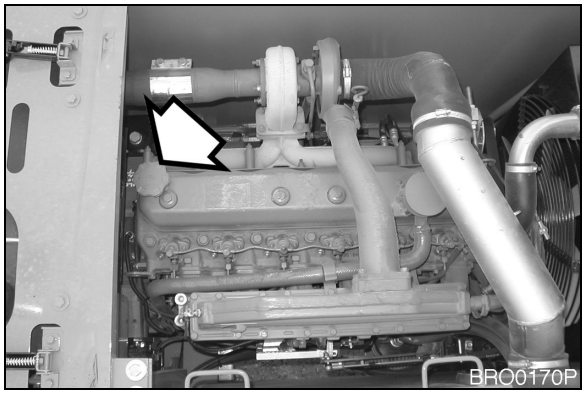


Figure 49

CHECK OIL LEVEL IN TRAVEL REDUCTION DEVICE (ONE ON EACH SIDE OF UNIT)

⚠ WARNING!

The gear oil is very hot after the machine has been operating. Shut all systems down and allow them to cool. Before fully removing any motor case inspection port plug, etc., loosen the plug slightly to allow pressurized air to escape.

1. Park machine on firm, level ground.

2. Rotate the track until ports (1 and 2, Figure 50) are in their proper positions as shown.

3. Remove oil level plug (1, Figure 50).

4. Check oil level. The oil should be near the bottom of the level plug opening.

5. Add oil through the level plug opening, if necessary.

6. Clean and install oil level plug (1, Figure 50).

7. Repeat this procedure on the other travel reduction device.

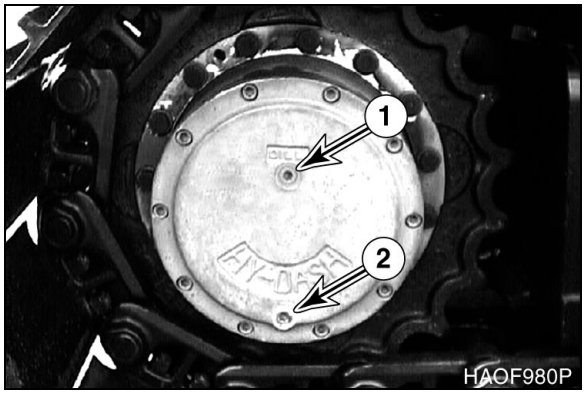


Figure 50

CHANGE OIL IN TRAVEL REDUCTION DEVICE (ONE ON EACH SIDE OF UNIT) (AFTER FIRST 250 HOURS)

NOTE: *Drain and refill oil after first 250 hours of operation or rebuild, and every 1,000 hours thereafter (See page 4-40).*

REPLACE FULL FLOW HYDRAULIC OIL FILTER (AFTER FIRST 250 HOURS)

NOTE: *Replace full flow hydraulic oil filter after first 250 hours of operation or rebuild, then every 500 hours thereafter (See page 4-32).*

CHANGE PILOT FILTER (AFTER FIRST 250 HOURS)

NOTE: *Change pilot filter after first 250 hours and every 500 hours thereafter (See page 4-33).*

INSPECT PINS AND BUSHINGS OF THE FRONT END ATTACHMENTS FOR SIGNS OF WEAR

CHECK FLUID LEVELS IN BATTERIES AND BATTERY CHARGE LEVELS

INSPECT FOR ANY LOOSE OR MISSING NUTS AND BOLTS

INSPECT FUEL SYSTEM HOSE CLAMPS

500 HOUR / 3 MONTH SERVICE

PERFORM ALL DAILY, 50 AND 250 HOUR SERVICE CHECKS

GREASE SWING GEAR AND PINION

1. Remove inspection cover and inspect the condition of the grease. Make sure that water or other contaminants are not noticeable.

   NOTE: *The upper structure must be rotated a little at a time so that the entire face of the swing gear can be lubricated. Use extreme caution when performing this operation.*

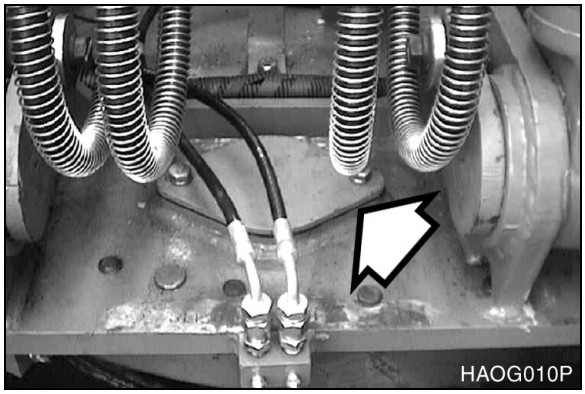


Figure 51

2. If water or other contaminations are found, remove the lower access cover so that the gear teeth can be thoroughly cleaned and lubricated.
3. Install access covers after lubricating gear teeth.

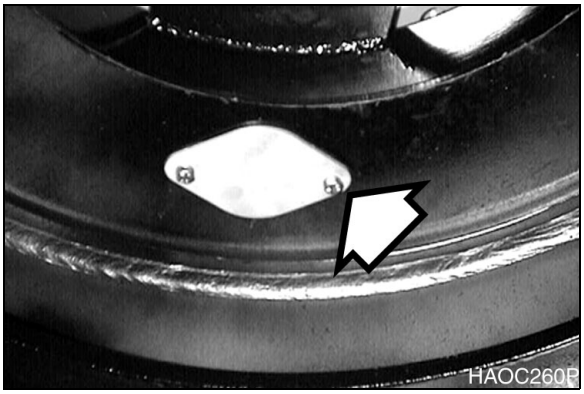


Figure 52

REPLACE FULL FLOW HYDRAULIC OIL FILTER

NOTE: *Change full flow hydraulic oil filter after first 250 hours of operation or rebuild, and every 500 hours thereafter.*

⚠ WARNING!

The hydraulic oil will be hot after normal machine operation. Allow the system to cool before attempting to service any of the hydraulic components.

The hydraulic tank is pressurized. Loosen the hydraulic air breather cap slightly to allow the pressurized air to vent. After the pressure has been released, it is safe to remove either the fill cap or service covers or drain water from the tank.

IMPORTANT

Make sure to clean any dirt or water from the top of the hydraulic tank, especially around the fill port and filter ports.

1. Position the machine on firm, level ground. Lower the front attachment to the ground and shut down engine.
2. Loosen the air breather cap slightly to release the internal pressure.
3. Remove bolts (1, Figure 53) and service cover (2). Remove spring (3), valve (4) and O-ring (5) from filter (6).
4. Remove filter and properly discard.
5. Install new filter and a new O-ring. Install valve and spring. Install service cover plate.
6. Run engine for 10 minutes at low idle to purge air from circuit.
7. Shut down engine.
8. Check level in hydraulic oil tank. Add oil if necessary.

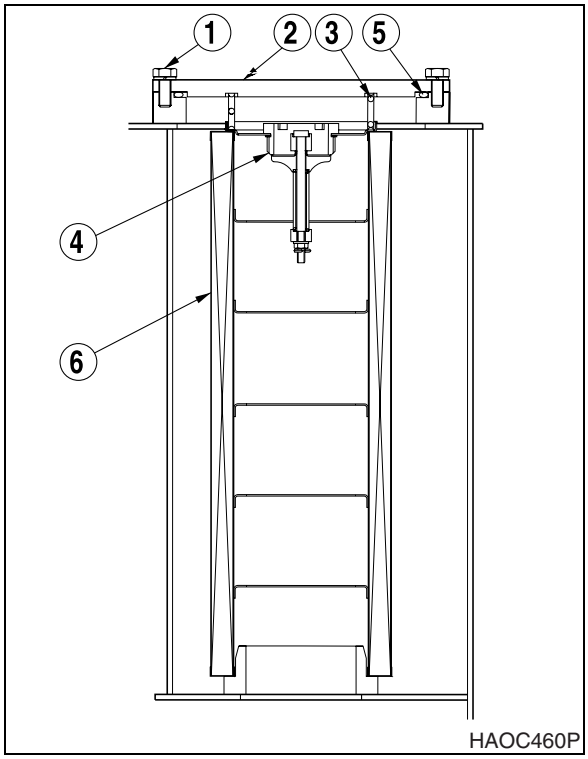


Figure 53

CHANGE PILOT FILTER

NOTE: *Change pilot filter after first 250 hours of operation or rebuild, and every 500 hours thereafter.*

WARNING!

The hydraulic oil will be hot after normal machine operation.

Allow the system to cool down before changing pilot filter.

1. Position the machine on the firm, level ground. Lower the front attachment to the ground and shut down engine.
2. Loosen the air breather cap slightly to release the internal pressure.
3. Locate pilot system filter assembly. See Figure 54.
4. Unscrew canister (5, Figure 55) and remove O-ring (3) and filter cartridge (4).

   NOTE: *The canister will be filled with oil. Use caution when removing this assembly.*

5. Insert a new filter cartridge and O-ring. Apply a small amount of oil around the entire O-ring and reinstall the canister assembly onto the filter head (1, Figure 55).
6. After changing pilot filter, vent air from pump and check level of hydraulic oil tank.

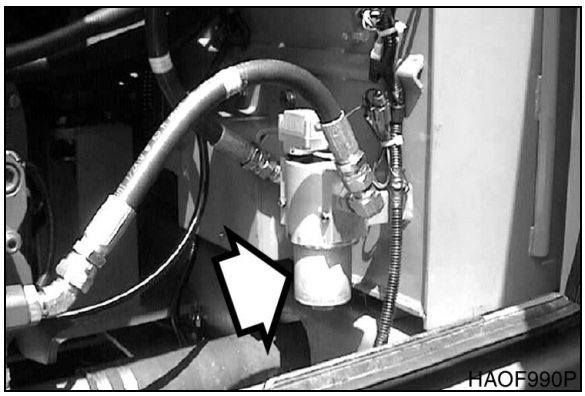


Figure 54

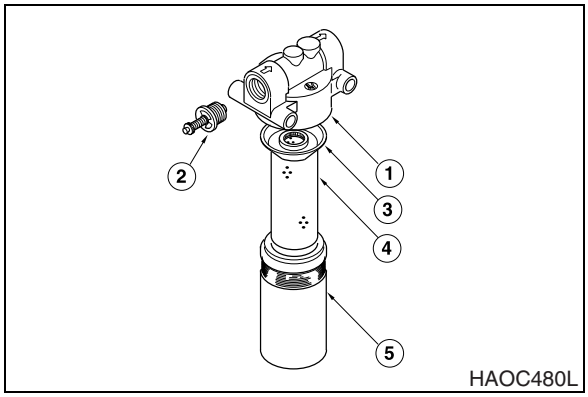


Figure 55

CLEAN AIR CONDITIONING FILTER

The unit is equipped with an air filtration system which filters out dirt and dust particles from air being circulated into operator's cab. This filter should be cleaned out.

NOTE: *In the event that the unit is being operated in a dusty environment, the cleaning and replacement should be performed more frequently. If filter is damaged, replace damaged filter by a new one.*

WARNING!

All service and inspection of air conditioning system should be performed with the starter switch in the "O" (OFF) position.

WARNING!

If using compressed air to clean the element, make sure that proper eye protection is worn.

NOTE: *All right and left call outs are based on the operator being seated in the operator's seat facing the front.*

1. Turn the key cylinder (1, Figure 56) to open cover (2, Figure 56) behind operator's seat.
2. Disconnect speaker harness.
3. Remove cover (2, Figure 56) from the rear box.
4. Remove filter cover (3, Figure 56) from air conditioning unit.

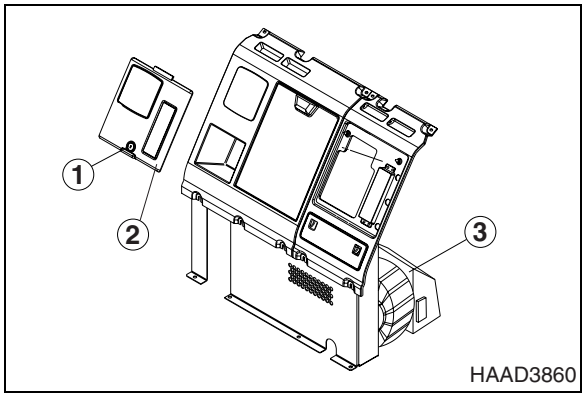


Figure 56

5. Remove filter (1, Figure 57) and inspect for any damage.
6. Use compressed air to clean filter. If filter is very dirty use a mild soap or detergent and water to clean it.

NOTE: *If water was used to clean filter, be certain it is completely dry before installing.*

NOTE: *When assembling the filter again, install so that the arrow on top of filter is facing the inside of the cab.*

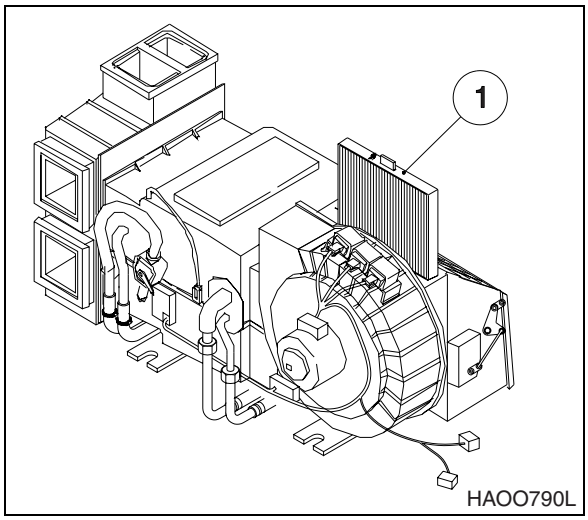


Figure 57

CLEAN RADIATOR, OIL COOLER, INTERCOOLER AND AIR CONDITIONER CONDENSER CORE

WARNING!

If compressed air, steam or water hit your body directly, there is danger of injury. Always wear protective glasses, mask and safety shoes. Make sure that all extra personnel are clear of the work area.

1. Make sure to wear all appropriate safety apparel (mask safety glasses, safety shoes, etc.) during the cleaning process.
2. Loosen the wing nut(s) and remove dust net from in front of oil cooler.
3. Clean the outside of the radiator and oil cooler with compressed air, steam or water. Wash from the outside of the engine compartment inwards. Repeat the cleaning process from the inside of the engine compartment outwards to remove all dirt and debris.

   NOTE: *Clean dust net and install it after cleaning radiator, oil cooler and intercooler.*
4. Clean air conditioner condenser core with compressed air, steam or water.

IMPORTANT

To prevent damage to the cores, apply compressed air from an appropriated distance. Damaged core may cause water leakage or overheating. In a dusty site, check the core daily, irrespective of the maintenance interval.

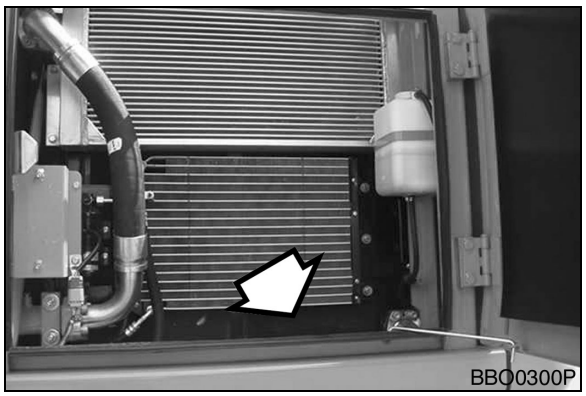


Figure 58

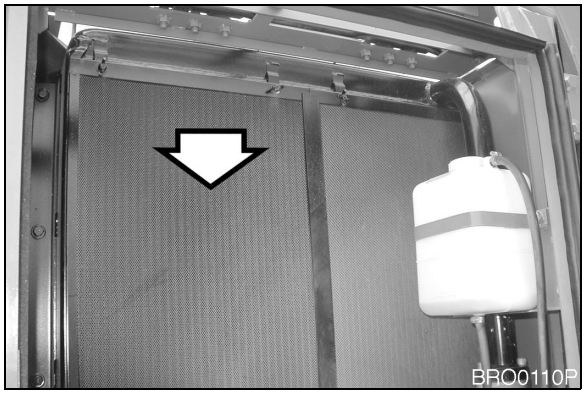


Figure 59

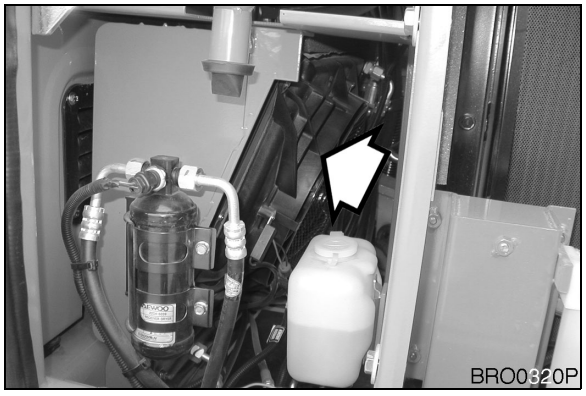


Figure 60

REPLACE OUTER AND INNER AIR CLEANER FILTERS

WARNING!

Never clean or attempt to remove the air cleaner filter if the engine is running.

NOTE: *Replace inner filter whenever a new outer filter is installed.*

1. Open the access door at the rear of the cabin.
2. Remove the wing nut and air cleaner cover.
3. Remove the wing nut and outer filter from the air cleaner housing.
4. Clean the air cleaner cover and the inside of the air cleaner housing.
5. Remove wing nut and inner filter.
6. Clean out inside of air cleaner housing. Do not use compressed air to blow out housing.
7. Install new inner filter, and secure it into position with wing nut. Do not clean and re-use inner filter.
8. Install new outer filter, and secure it into position with wing nut.
9. Install air cleaner cover.

NOTE: *Make sure that all gaskets on wing nuts and cover are properly installed and seated.*

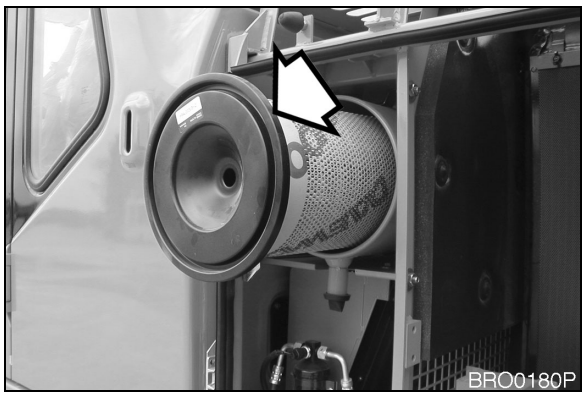


Figure 61

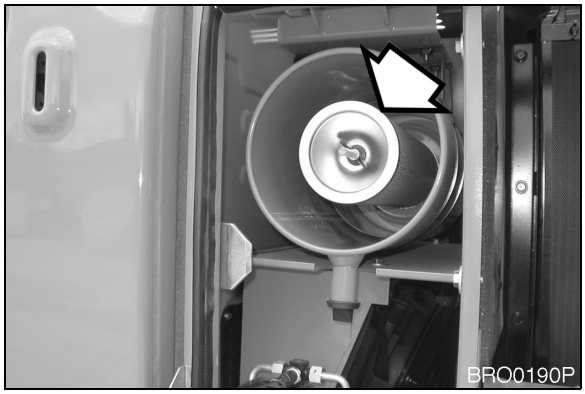


Figure 62

CHANGE FUEL FILTER

WARNING!

Exchange filter after waiting for engine to cool. Be careful of fire hazards. Do not smoke.

1. Locate fuel filter inside engine compartment.
2. Position a small container under fuel filter. Drain fuel by opening drain valve on bottom of filter.

   NOTE: *Dispose of drained fluids according to local regulation.*
3. Unscrew fuel filter from head assembly. Discard fuel filter.
4. After cleaning filter head, install new fuel filter. Screw filter on head until gasket contacts head, turn filter 1/3 - 1/2 turn more.

   NOTE: *Coat fuel filter gasket with fuel.*

   NOTE: *Fill fuel filter with clean fuel. This will help reduce fuel system priming.*
5. Start engine. After engine has run for a couple of minutes, shut down engine and look for leaks.

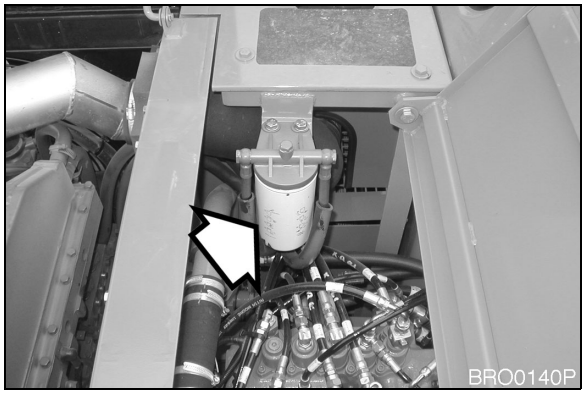


Figure 63

Prime the Fuel System

If engine does not start, the fuel system may need priming. Prime the fuel system using the following procedure;

1. Loosen plug (Figure 64) on top of fuel filter head.

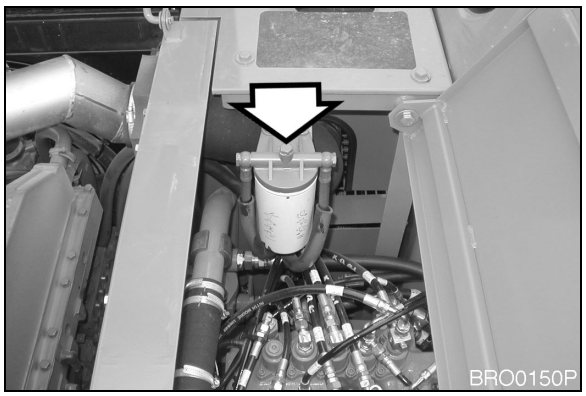


Figure 64

2. Unscrew and pump the hand operated primer pump (Figure 65) by the fuel injection pump. Pump primer until fuel is present at plug hole in fuel filter head.
3. Tighten plug in fuel filter head.
4. Continue to pump primer pump until a strong resistance is felt. Screw the primer pump knob back into housing.
5. Start engine and look for signs of leaks.
6. Repeat procedure if necessary.

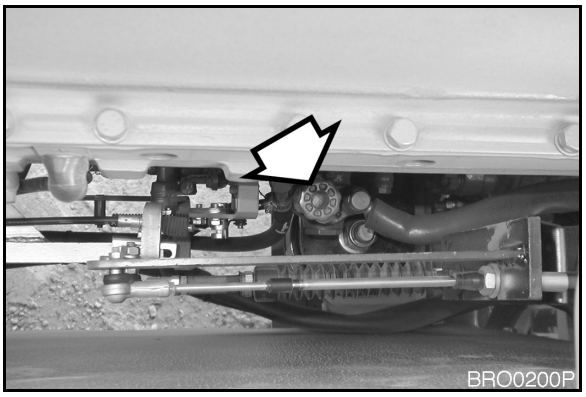


Figure 65

1,000 HOUR / 6 MONTH SERVICE

PERFORM ALL DAILY, 50, 250 AND 500 HOUR SERVICE CHECKS

GREASE SWING REDUCTION DEVICE

1. Lower front attachment to the ground.
2. Remove air vent plug (Figure 66) from swing reduction device.

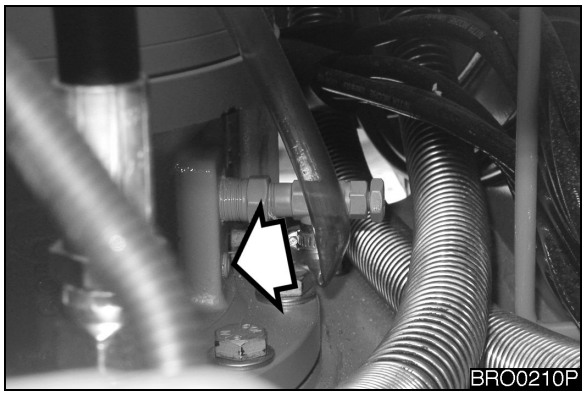


Figure 66

3. Press grease fitting and inject grease with the grease gun on the marked point. (Figure 67)
4. Reinstall air vent plug on swing reduction device.

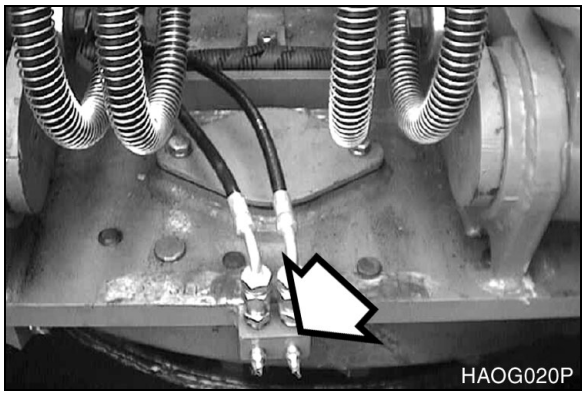


Figure 67

CHANGE SWING REDUCTION DEVICE OIL

NOTE: *Change swing reduction device oil after first 250 hours on a new machine and every 1,000 hours thereafter.*

⚠ WARNING!

The gear oil is very hot after the machine has been operating. Shut all systems down and allow them to cool.

1. Set a container under excavator.
2. Open drain plug (Figure 68).

   NOTE: *Dispose of drained fluids according to local regulation.*
3. After draining oil close drain plug.

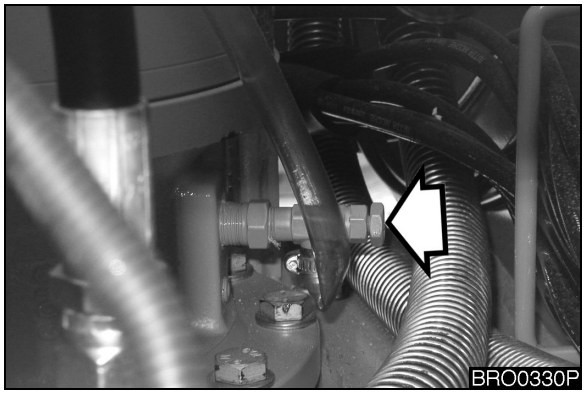


Figure 68

4. Remove breather/fill cap (2, Figure 69) and add oil to "H" mark on dipstick (1, Figure 69**)**

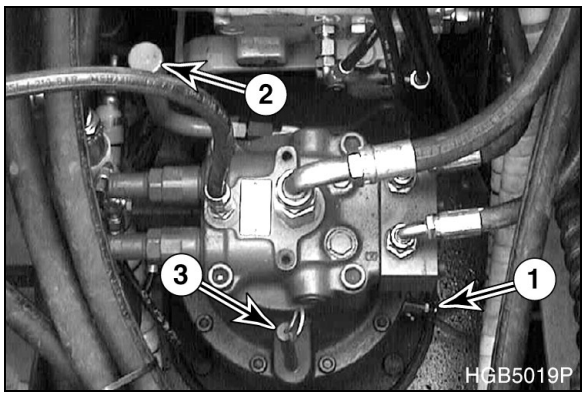


Figure 69

CHANGE OIL IN TRAVEL REDUCTION DEVICE (ONE ON EACH SIDE OF UNIT)

WARNING!

The gear oil is very hot after the machine has been operating. Shut all systems down and allow them to cool. Before fully removing any motor case, inspection port plug, etc., loosen the plug slightly to allow pressurized air to escape.

NOTE: *Drain oil after first 250 hours of operation or rebuild, and every 1,000 hours thereafter.*

1. Park machine on firm, level ground.
2. Rotate the track until ports (1 and 2, Figure 70) are in their proper positions as shown.
3. Place a container under drain plug (2, Figure 70) and remove plugs (1 and 2) to drain the travel motor fluid.

   NOTE: *Dispose of drained fluids according to local regulation.*
4. Install drain plug (2, Figure 70). Refill the travel motor case with fluid through fill port (1) until the fluid level is at port. Install level and fill plug (1).

   NOTE: *See “Fluid Capacities” on page 4-7. for capacity.*
5. Repeat this procedure on the other travel motor.

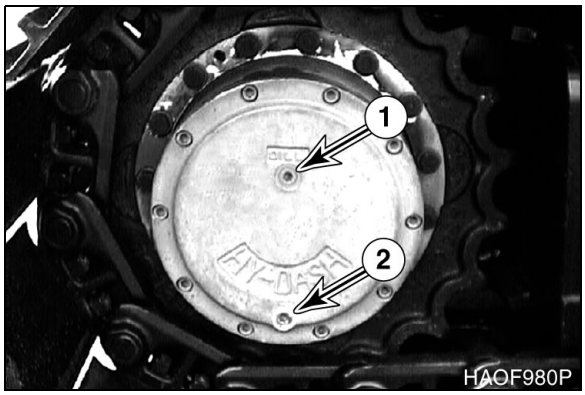


Figure 70

CLEAN FUEL INJECTION PRIMING PUMP STRAINER

1. Remove fitting, fuel line and strainer from side of priming pump.
2. Clean strainer.
3. Position strainer in priming pump and install fuel line and fitting.

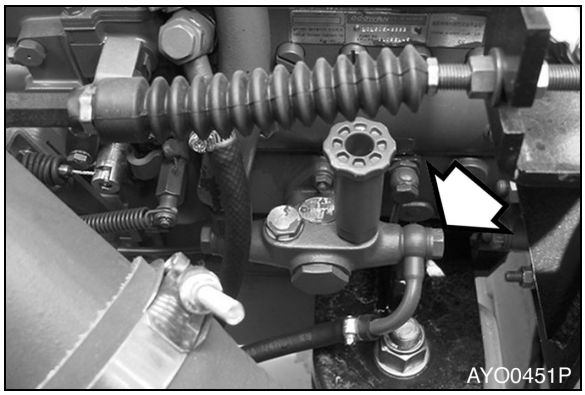


Figure 71

⚠ WARNING!

Mixing of tobacco smoke and freon is deadly.

Do not smoke while servicing or recharging air conditioning system.

1. Run engine about 1800 rpm. Operate for a minimum of ten minutes to stabilize the system.
2. Press the "HI" fan speed switch to set maximum air flow.
3. Put the temperature control switch in maximum cool position.
4. Press the "Internal Air Circulation" switch.
5. Compare the flow of bubbles in the sight glass of receiver dryer with the drawings in the following table.

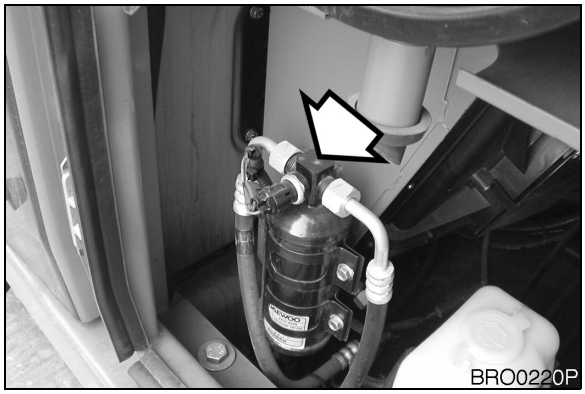
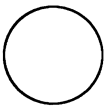
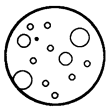


Figure 72

⚠ CAUTION!

Overfilling refrigerant may cause dangerous high-pressure and poor cooling action; and low refrigerant level may cause compressor damage.

Always maintain refrigerant at normal level.

Amount of Refrigerant	Appearance of the Sight Glass	Solutions
Normal	 Almost clear. Any bubbles disappear.	
High	 No bubble is seen.	Charge or with draw the system with the correct amount of HFC-134a refrigerant.
Low	 A flow of bubbles is visible.	

CHECK AND ADJUST ENGINE **

Contact your nearest Daewoo excavator dealer.

Engine dealer for checking and adjusting the following items:

- Engine Compression Pressure.
- Injection Pressure.
- Injection Timing.

CHANGE AIR CONDITIONER FILTER

NOTE: *Clean air conditioning filter every 500 hours and replace with a new one every 1000 hours of service. (See page 4-34)*

2,000 HOUR / YEARLY SERVICE

PERFORM ALL DAILY, 50, 250, 500 AND 1,000 HOUR SERVICE CHECKS

CHECK ALTERNATOR AND STARTER**

**These checks need to be completed by an authorized Daewoo dealer.

CHECK ALL RUBBER ANTI-VIBRATION SHOCK MOUNTS

PERFORM AND RECORD THE RESULTS OF THE CYCLE TIME TESTS

INSPECT MACHINE TO CHECK FOR CRACKED OR BROKEN WELDS OR OTHER STRUCTURAL DAMAGE

CHECK, ADJUST VALVE CLEARANCE **

CHECK HEAD BOLT TORQUES

CHANGE RADIATOR COOLANT (PROPYLENE GLYCOL - EXTENDED LIFE ANTIFREEZE)

NOTE: *Do not mix ethylene glycol and propylene glycol antifreeze together. If the two are mixed, the protection level will be reduced to the level of the ethylene glycol. See "Engine Cooling System" on page 4-62, for further details.*

⚠ WARNING!

1. **Allow the engine to cool before releasing the radiator cap. Make sure to loosen the cap slowly to release any remaining pressure.**
2. **Radiator cleaning is performed while the engine is running. Take extreme caution when working on or near a running engine. Make sure to lock out and tag the controls notifying personnel that service work is being performed.**
3. **Do not remove the radiator cap unless it is required. Observe the coolant level in the coolant recovery tank.**

1. Slowly open the radiator cap to allow any pressure to escape.
2. Place a container under the radiator and open the drain valve (Figure 73).

   NOTE: *Dispose of drained fluids according to local regulation.*

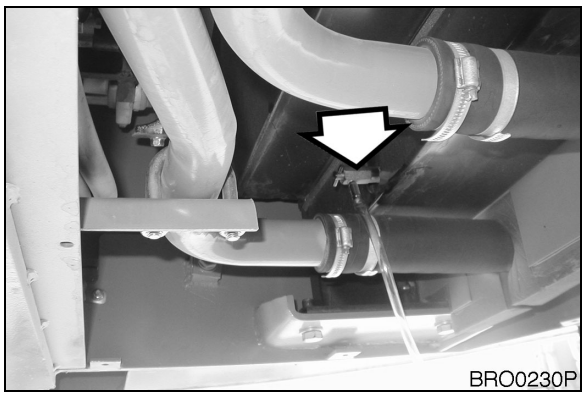


Figure 73

3. Open heater shut-off valves (Figure 74) to allow coolant to drain from heater core.

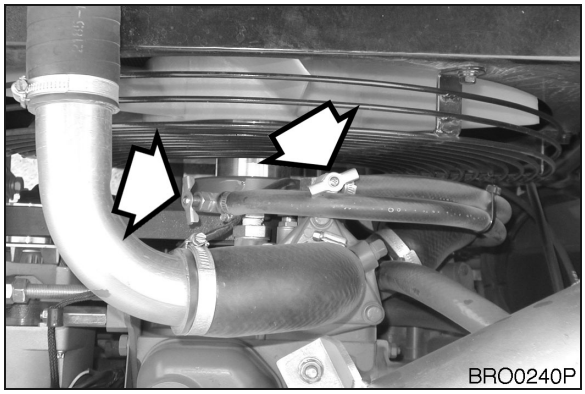


Figure 74

4. Remove coolant drain plug (1, Figure 75) from engine.
5. Install drain plug, and close drain valve after coolant has completely drained from system.
6. Fill cooling system with a flushing solution.
7. Run engine at low idle until the engine coolant temperature gauge reaches the "GREEN ZONE." Run engine for another 10 minutes.
8. After allowing engine to cool.
9. Drain flushing fluid and fill system with water.
10. Run engine again to allow water to completely circulate.
11. Drain water and fill system with proper antifreeze mixture for ambient temperature. Refer to coolant concentration table. (See page 4-63)
12. Run engine without radiator cap installed, so that all air will be purged from system. Fill radiator to fill neck.
13. Drain and fill radiator coolant recovery tank.

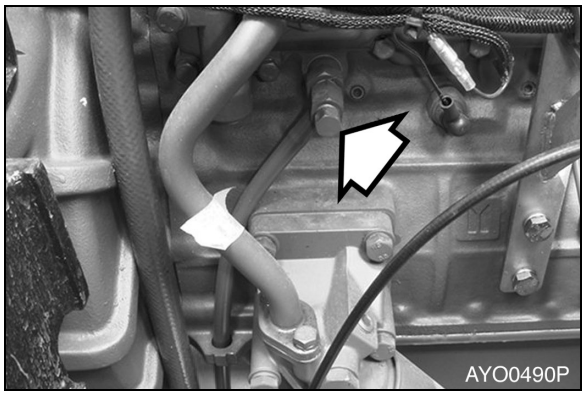


Figure 75

HYDRAULIC OIL EXCHANGE AND SUCTION STRAINER CLEANING

⚠ WARNING!

The hydraulic oil will be hot after normal machine operation. Allow the system to cool before attempting to service any of the hydraulic components.

The hydraulic tank is pressurized. Loosen the air breather cap to allow the pressurized air to vent. After the pressure has been released, it is safe to remove either the fill cap or service covers.

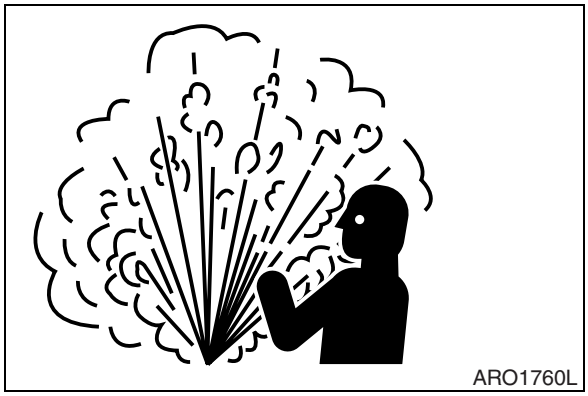


Figure 76

IMPORTANT

Make sure to clean any dirt or water from the top of the hydraulic tank, especially around the fill port and filter ports.

Hydraulic oil change interval is 2,000 hours, only when Daewoo Genuine Oil is used. If other brands of oil is used, guaranteed change interval is 1,000 hours.

NOTE: *Based on the type of excavating being completed, the working conditions (extremely hot or dusty) and the extra front end attachments being used (hydraulic breaker, etc.), the hydraulic fluid will need to be changed more frequently.*

1. Position the machine on firm, level ground. Swing upper structure perpendicular (90°) to tracks. Lower boom and position bucket on ground as shown in Figure 77.
2. Set safety lever on "LOCK" position.
3. Shut down engine.
4. Release pressurized air from hydraulic tank by rotating air breather cap (1, Figure 80).

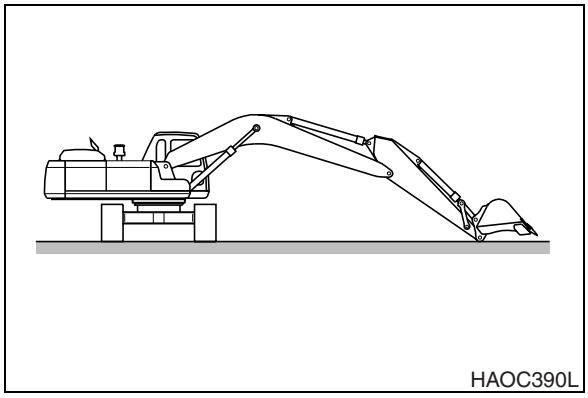


Figure 77

5. Drain hydraulic oil from tank into a container capable of holding 220 liters (58 U.S. gal.). After draining tank install drain plug.

IMPORTANT
Be careful of squirting oil when removing drain plug.

NOTE: *Used filter and used oil should always be disposed of according to local regulations.*

6. Carefully remove bolts and cover (2, Figure 80) from top of hydraulic oil tank. There is a spring (3) under the cover that will force the cover up.
7. Remove spring (3, Figure 80) and strainer (5), by pulling on rod (4).
8. Clean inside and outside of strainer. Replace strainer if it is broken.
9. Position strainer (5, Figure 80) on boss portion of suction pipe (6).

NOTE: *Measurement "A" is 548 mm (21.57 in).*

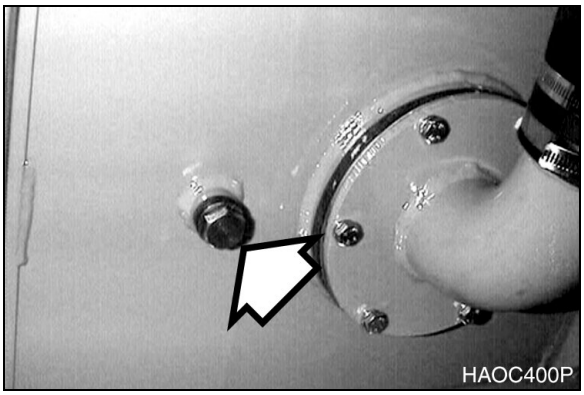


Figure 78

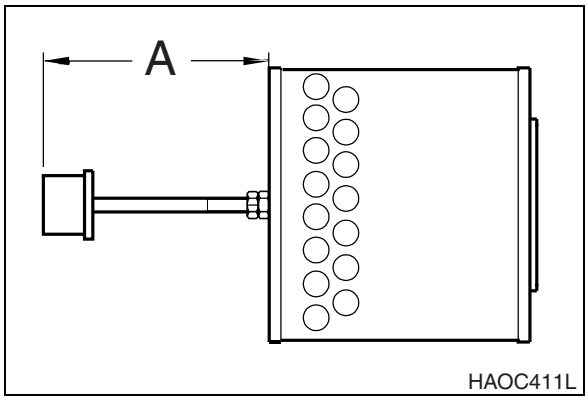


Figure 79

10. Fill the hydraulic oil tank. Check level using sight gauge on side of tank.
11. Place spring (3, Figure 80) on rod (4) and assemble cover (2).
12. After replacing and cleaning the hydraulic oil, filter and strainer, vent the system. See “Venting and Priming Hydraulic System” on page 4-71.

IMPORTANT

When the hydraulic breaker is being used, due to the higher heat generated by this unit, use replacement intervals recommended under the “Hydraulic Oil and Filter Service Intervals” on page 3-36.

13. Check level of hydraulic oil tank. (See page 4-13)

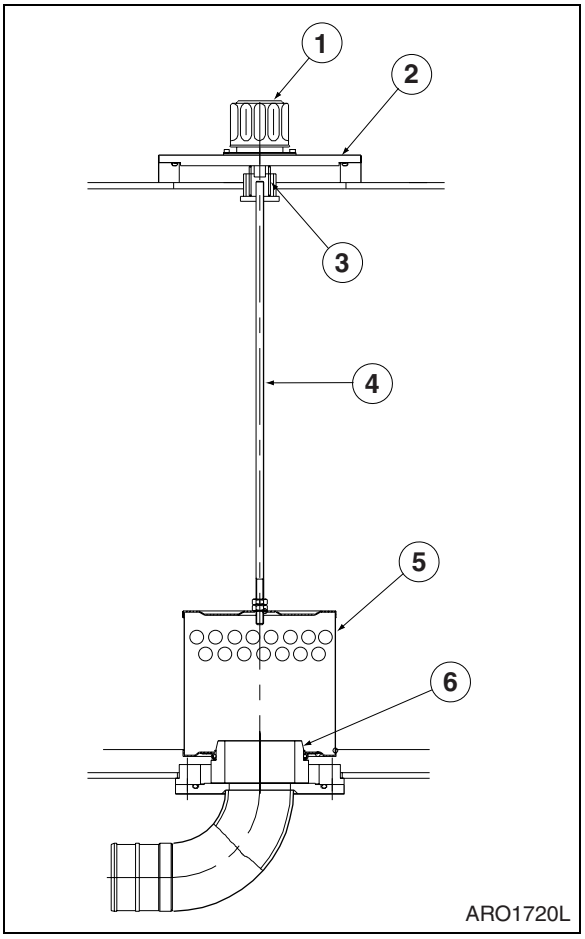


Figure 80

4,000 HOUR / BIENNIAL SERVICE

MAJOR PARTS - PERIODIC REPLACEMENT

To ensure safe operation and work, perform periodic inspections. Also, to increase safety, replace the following parts. These parts are the ones most often subjected to abrasion, heat and fatigue. Exchange these parts with new ones at the designated time intervals, even if the old parts look good.

Always replace all related parts such as gaskets and O-rings. Use only original equipment manufacturers parts.

Major Component		Parts Name To Be Exchanged Periodically	Time To Exchange
Engine		Fuel hose (Tank to water separator)	2 years or 4,000 hours
		Fuel hose (Water separator to fuel injection pump)	
		Fuel hose (Tank to fuel injection pump)	
		Heater hose (Heater to engine)	
		Heater hose (Heater to radiator)	
		Air conditioner hose	
Hydraulic System	Body	Pump suction hose	
		Pump discharge hoses	
		Pump side branch hoses	
		Swing motor hoses	
		Travel motor hoses	
	Work Device	Boom cylinder line hoses	
		Arm cylinder line hoses	
		Bucket cylinder line hoses	

12,000 HOUR / SIX YEAR SERVICE

HOSE IN-SERVICE LIFETIME LIMIT (EUROPEAN STANDARD ISO 8331 AND EN982 CEN)

European regulations state that the in-service life of any hydraulic hose may not exceed six years. Daewoo recommends the following;

- Hoses at the customer premises can not be stored more than 2 years before being discarded or installed on a machine.
- In-service lifetime of hoses fitted on a machine can never exceed 6 years, but replace hoses described in “Major Parts - Periodic Replacement” on page 4-49, every 2 years. Always replace hoses having exceeded the allowed in-service lifetime irrespective of the external appearance/wear.
- Always store hoses in a dark place at a maximum of 65% relative humidity, between 0°C (32°F) and 35°C (95°F) but as close as possible to 15°C (59°F) and away from copper, manganese or tube generating Ozone.

AIR CONDITIONING SYSTEM

NOTE: *See “Clean Air Conditioning Filter” on page 4-34.*

CHECK CONTROL PANEL

When a switch is turned "ON," the pilot LED of pressed switch should light up and buzzer should sound.

When the light switch is turned "ON," the LED display should light up.

CHECK AIR CONDITIONER HOSES

Check the hose for cracking and damage.

⚠ CAUTION!

When a leak occurs, dirt will accumulate in the area where the leak is. Consult a DAEWOO distributor or sales agency.

CHECK CONDENSER

Inspect the condenser for dust and debris. Clean if necessary.

NOTE: *See “Clean Radiator, Oil Cooler, Intercooler and Air Conditioner Condenser Core” on page 4-35.*

CHECK MAGNETIC CLUTCH

Check the magnetic clutch for dirt and interference.

Turn the starter switch to "I" (ON) position and check the magnetic clutch for operation. If a fan speed is not selected, the magnetic clutch will not operate.

CHECK BELT TENSION

NOTE: *See “Check Engine Fan Belt Tension” on page 4-27.*

BOLT AND NUT INSPECTION

Inspect ALL fasteners after the first 50 hours of operation or rebuild, and every 250 hours thereafter. If any are loose or are missing tighten them or install new hardware. Always use a calibrated torque wrench.

IMPORTANT

Always clean fasteners before tightening.

If counterweight is loose, contact a DAEWOO distributor or sales agent.

No.	Point To Be Inspected		Bolt Dia. mm	Qty.	Bolt Head Size	Torque		
						kg•m	N•m	ft lb
1	Joint bolt with engine mounting bracket and engine	pump side	12	8	19	9	88	65
		fan side	10	8	17	5	49	36
2	Joint bolt & nut between engine mounting bracket and frame	pump side	20	2	30	46	451	333
		fan side	20	2	30	46	451	333
3	Radiator mounting bolt		16	4	24	27	265	195
4	Tightening bolt for hydraulic oil tank		16	4	24	21	205	152
5	Tightening bolt for fuel tank		16	4	24	21	205	152
6	Tightening bolt for pump		16	4	S	24	235	174
7	Tightening bolt for control valve		12	4	19	9	88	65
8	Tightening bolt for swing reduction device		16	9	24	27	265	195
9	Tightening bolt for swing motor		12	10	S	14.4	141	105
10	Tightening bolt for battery		10	4	17	5	49	36
11	Joint bolt with cab mounting rubber and frame		10	16	17	6.7	66	48
	Joint bolt with cab mounting rubber and cab		16	4	24	21	206	152
12	Joint bolt with swing bearing and upper frame		20	35	30	55	539	398
	Joint bolt with swing bearing and bottom frame		20	36	30	55	539	398
13	Tightening bolt for travel reduction device		16	40	24	27	265	195
	Tightening bolt for sprocket		16	30	24	27	265	195
14	Tightening bolt for upper roller		12	8	19	9	88	65
15	Tightening bolt for bottom roller		16	56	24	27	265	195

No.	Point To Be Inspected	Bolt Dia. mm	Qty.	Bolt Head Size	Torque		
					kg•m	N•m	ft lb
16	Tightening bolt for track guard	16	8	24	27	265	195
17	Bolt for track shoes	16	344	23	38	372	275
18	Fixing bolt for front pin	16	9	24	21	205	152

BUCKET

BUCKET TOOTH REPLACEMENT

WARNING!

Due to the possibility of flying metal objects, always wear safety helmet, protective gloves and eye protection when changing bucket teeth.

Curl the bucket upwards and place the round rear surface of the bucket firmly on the ground. Shut the engine off and lock out the hydraulic controls before working on the bucket.

NOTE: *These instructions are only for Daewoo OEM buckets. If you are using other manufacturers buckets, refer to their specific instructions.*

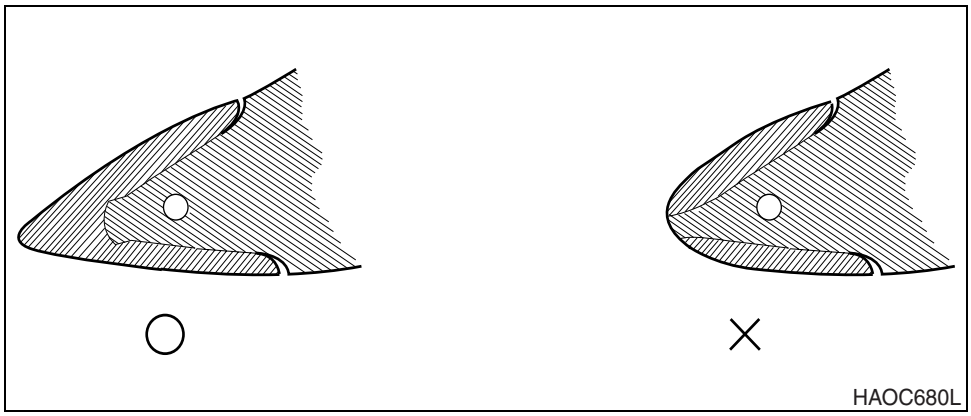


Figure 81

1. On a routine basis, inspect bucket teeth to make sure that tooth wear or breakage has not developed. Do not allow replaceable bucket teeth to wear down to a point that bucket adapter is exposed. See Figure 81.
2. To replace a tooth (1, Figure 82), use a hammer and punch to drive locking pin (2) and lock washer (3) out of tooth adapter (4).
3. Once worn tooth has been removed, use a putty knife to scrape adapter as clean as possible.
4. Slide new tooth into position and insert lock washer.
5. Insert locking pin into tooth and with a hammer, drive pin in until lock washer seats in locking groove.

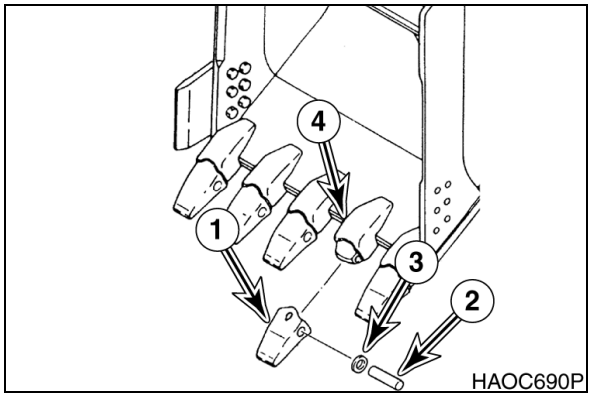


Figure 82

BUCKET O-RING REPLACEMENT

WARNING!

Due to possibility of flying metal objects, always wear safety helmet, protective gloves and eye protection when changing pins.

1. Inspect bucket O-rings on a routine basis. If worn or damaged, replacement is necessary.

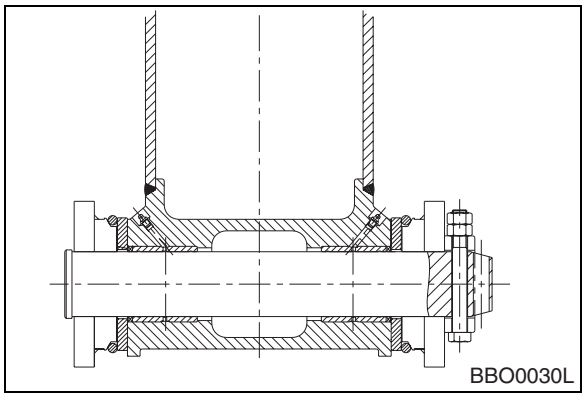


Figure 83

2. Roll old O-ring (1, Figure 84) onto boss (2) around bucket pin (3). Remove bucket pin and move arm or bucket link (4) out of way.

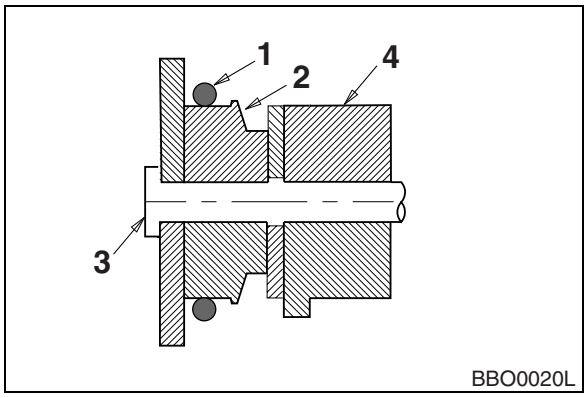


Figure 84

3. Remove old O-ring and temporarily install new O-ring (1, Figure 85) onto bucket boss (2). Make sure that O-ring groove on both bucket link (4) and boss have been cleaned.
4. Realign arm or link with bucket pin hole and insert bucket pin (3, Figure 84).

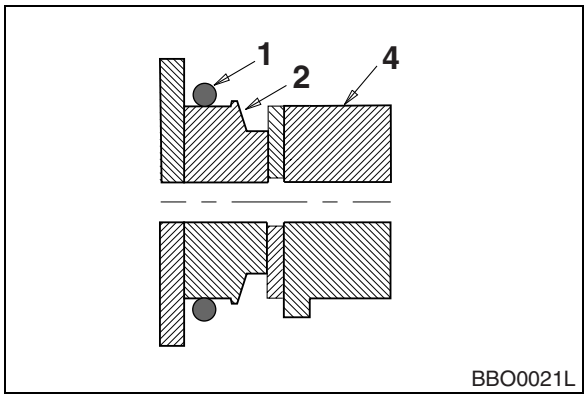


Figure 85

5. Roll new O-ring (1, Figure 86) into O-ring groove.

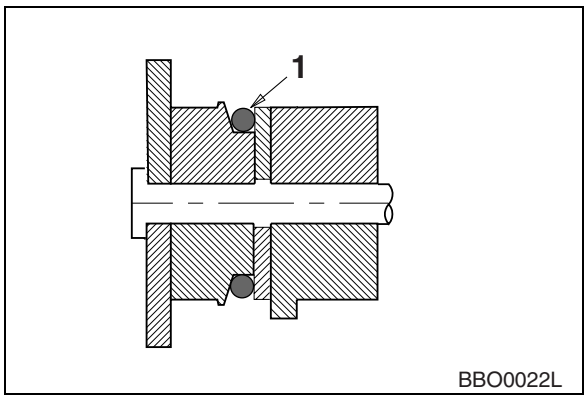


Figure 86

BUCKET SHIMMING PROCEDURES

NEW BUCKET INSTALLATION

1. If a new bucket is being installed on the excavator, measure the inside dimension between the bucket ears and the outside dimension across the arm mounting boss.
2. Subtract the clearance on both sides from the difference of the two and shim accordingly, before assembly.

⚠ WARNING!

To check end play (side-to-side) clearance at bucket attachment point, the bucket must be free to move but at all other times lower it to the ground or use support blocks to immobilize this assembly. Shut off engine and tag and lock out controls to prevent movement during this procedure.

SHIMMING PROCEDURES FOR INSTALLED BUCKET

1. With bucket attached, curl bucket and arm outward and lower boom so that bucket teeth are pointing away from excavator, just a few inches off ground. This position provides easy accessibility for dimensional measurements.
2. Force bucket to one side and check for end play (side-to-side) clearance under O-rings at attachment point. Total clearance should be 1 mm (0.04 in) between side face of boss and inside edge of ear bushing (Y, Figure 87). Too tight a fit (less than 1 mm (0.04 in)) can cause excessive wear while too much clearance may produce excessive noise and potentially hazardous slack control.
3. Recheck end play by forcing bucket towards opposite side and repeating clearance measurements.
4. If an adjustment is required, remove two jam nuts (1, Figure 87) and bolt (2) from pin (3). Add or remove shims (4) as required. Use equal amount of shims on each side. Install bolt (2) and two jam nuts (1). Jam nuts must clear boss by 1 - 2 mm (0.04 - 0.08 in) at point (X).

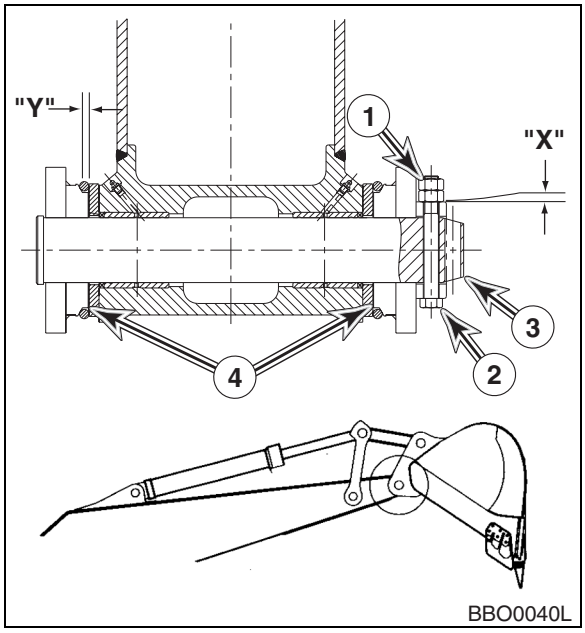


Figure 87

ELECTRICAL SYSTEM

NOTE: *Never disassemble electrical or electronic parts. Consult with a DAEWOO distributor or sales agency before servicing.*

BATTERY

⚠ WARNING!

Battery electrolyte contains sulfuric acid and can quickly burn the skin and eat holes in clothing. If you spill acid on yourself, immediately flush the area with water.

Battery acid could cause blindness if splashed into the eyes. If acid into the eyes, flush them immediately with large quantities of water and see a doctor at once.

If you accidentally drink acid, drink a large quantity of water or milk, beaten egg or vegetable oil. Call a doctor or poison prevention center immediately.

When working with batteries, always wear safety glasses or goggles.

Battery generates hydrogen gas, so there is danger of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.

Before working with batteries, shut down engine and turn the starter switch to the "OFF" position.

Avoid short circuiting the battery terminals through accidental contact with metallic objects, such as tool.

When removing or installing, check which is the positive (+) terminal and negative (-) terminal.

When removing the battery, first disconnect the negative (-) terminal. When installing the battery, first connect the positive (+) terminal.

If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion. When installing the terminals, install them tightly.

Batteries in Cold Weather

In colder weather a greater drain is placed on the batteries when they are used for the preheat cycle and when starting a cold engine. Battery performance decreases as the temperature gets lower.

In extremely cold weather, remove the batteries at night and move them to a warm location. This will help to keep them at a higher power level.

Inspection of Battery Electrolyte Level

This machine has two maintenance free batteries. They never require the addition to water.

When the charge indicator becomes transparency, it means low electrolyte state because of the leakage or charging system error. Determine the cause of problem and replace the batteries immediately.

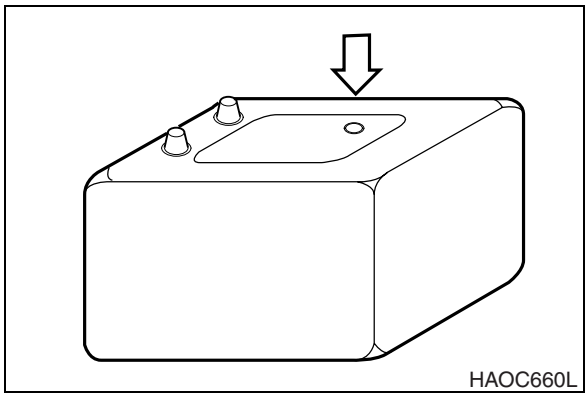


Figure 88

Check Charging State

Check charging state through the charging indicator.

- GREEN: Sufficiently charged.
- BLACK: Insufficient charged.
- TRANSPARENT: Replace battery.

Check the Battery Terminals

Be certain that the battery is held securely in its compartment. Clean the battery terminals and the battery cable connectors. A solution of baking soda and water will neutralize acid on the battery surface, terminals, and cable connectors. Petroleum jelly or grease can be applied to the connectors to help prevent corrosion.

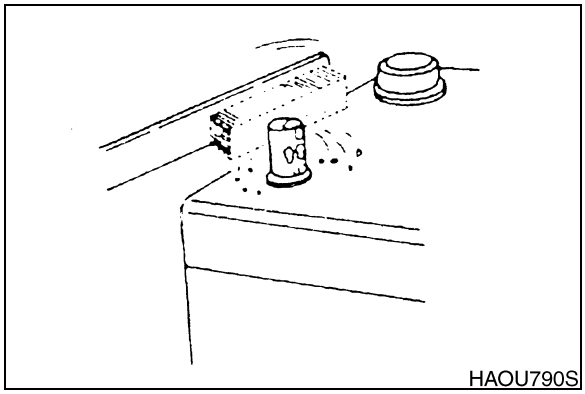


Figure 89

Battery Replacement

When the charging indicator indicates transparency state, replace the battery. The batteries should always be replaced in pairs.

Using an old battery with a new one will shorten the life span of the new battery.

FUSES

1. The fuses in the fuse box are used to protect the various electrical circuits and their components from damage. See Figure 90. The fuses used are standard automotive type fuses.
2. The section on “Fuse Identification” on page 4-61, lists the circuits and the fuse amperage required for each circuit. If a fuse blows, determine the cause and repair any faults or failures.
3. Do not insert a higher amperage fuse into a lower amperage slot. Serious damage to the electrical components or fire can result.

CAUTION!

Before replacing a fuse, be sure to turn starter switch to "O" (OFF) position.

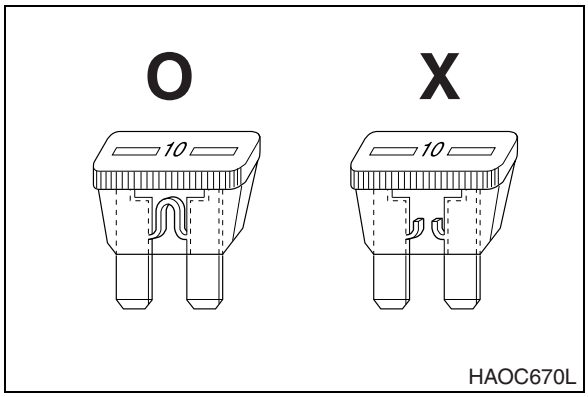


Figure 90

Fuse Boxes

There are two fuse boxes (1 and 2, Figure 91) on the left side of the heater box. Fuses prevent electrical devices from overloading or shorting.

A decal attached to the inside of the fuse box's cover indicates the function and amperage of each fuse.

Spare fuses are mounted on the inside of fuse box's cover.

Change a fuse if the element separates. If the element of a new fuse separates, check the circuit and repair the circuit.

CAUTION!

Always replace fuses with the same type and capacity fuse that was removed. Otherwise, electrical damage could result.

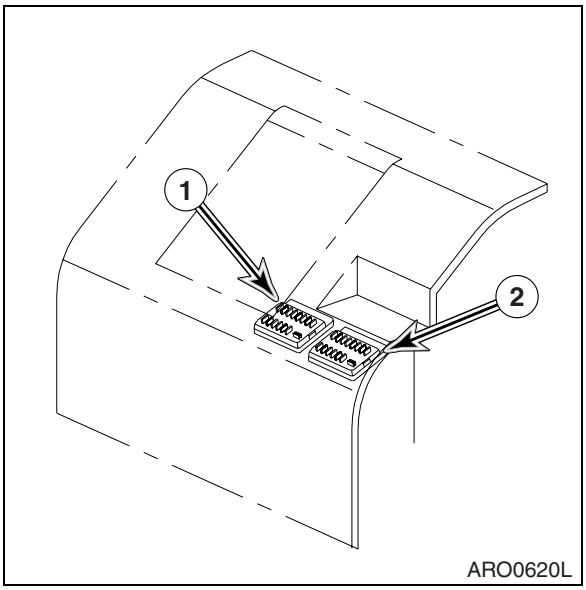


Figure 91

Fuse Identification

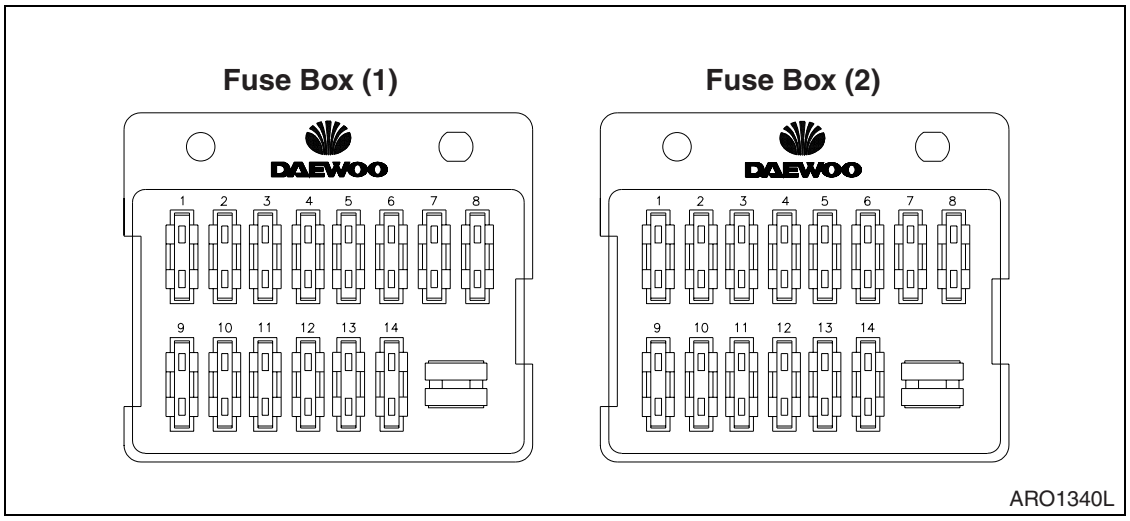


Figure 92

No.	Fuse Box One	
	Name	Capacity
1	Horn	10A
2	Instrument Panel, Pressure Sensor	10A
3	Beacon Light (Option)	10A
4	Window Washer	10A
5	Wiper	10A
6	Pilot Cut-off	10A
7	Engine Stop	10A
8	Starter Switch	10A
9	Air Conditioner, Heater	30A
10	e-EPOS, Booster, Travel Speed Change	20A
11	Spare	15A
12	Spare	15A
13	Spare	15A
14	Stereo	15A

No.	Fuse Box Two	
	Name	Capacity
1	Breaker, 2-Way Valve (Option)	10A
2	12V Power	10A
3	Engine Speed Control	10A
4	Travel Swing Alarm (Option)	10A
5	Spare	10A
6	Spare	10A
7	Memory Backup	10A
8	Cab Light, Hour Meter	10A
9	Cabin Light (Option)	30A
10	Work Light	20A
11	Headlight	15A
12	Cigar Lighter	15A
13	Spare	15A
14	Fuel Pump (Option)	15A

ENGINE COOLING SYSTEM

GENERAL

Keeping an engine's cooling system in peak operating condition, can have many benefits to keeping a machine in good operating condition. A properly functioning cooling system will; improve fuel efficiency, reduce engine wear, and extend component life.

Always use distilled water in the radiator. Contaminants in tap water neutralize the corrosion inhibitor components. If tap water must be used, it should not exceed 300 ppm hardness, or contain more than 100 ppm of either chloride or sulfate. Water that has been treated with a water-softener also contains salt that will cause corrosion of components. Water from creeks and stagnant pools usually contains dirt, minerals and/or organic material that are deposited in the cooling system and impair cooling efficiency. Distilled water is the best.

Engine overheating is often caused by bent or clogged radiator fins. The spaces between the fins can be cleaned by use of air or water under pressure. When straightening bent fins, use care not to damage the tubes or break the bond between the fins and the tubes.

⚠ WARNING!

Pressure at air nozzle must not exceed 30 PSI (2.1 kg/cm^2). Always wear goggles when using compressed air.

Do not pour cold water into radiator when engine is very hot and water level is below the top of the tubes. Such action could result in damage to engine cylinder heads.

Heavy duty diesel engines require a balanced mixture of water and antifreeze. Drain and replace the mixture every year or 2,000 hours of operation, which ever comes first. This will eliminate buildup of harmful chemicals.

Antifreeze is essential in any climate. It broadens the operating temperature range by lowering the coolant's freezing point and by raising its boiling point. Do not use more than 50% antifreeze in the mixture unless additional freeze protection is required. Never use more than 68% antifreeze under any condition.

Types of Antifreeze

There are two main classifications of antifreeze available on the market today.

1. Ethylene Glycol - Standard Life Antifreeze
2. Propylene Glycol - Extended Life Antifreeze

Ethylene glycol (standard life antifreeze) has been on the market for many years. Its chemical properties do not provide the improved corrosion resistance that propylene glycol (extended life antifreeze) does. Ethylene glycol is also very hazardous to the environment, people and animals. Daewoo recommends that ethylene glycol be replaced with propylene glycol.

The newer propylene glycol antifreeze comes in many different colors. Some of the colors are pink, red, orange and yellow. There are even some that come in a blue-green color. The blue-green color makes it very difficult to tell the difference of what type of antifreeze is in a cooling system. The colors are only a dye added to the clear antifreeze. Do not rely on color. Keep careful machine records of what brand and type of antifreeze is used in the unit. If you are unsure of what type of antifreeze is in the system, drain and flush the system.

NOTE: *Do not mix ethylene glycol and propylene glycol antifreeze together. If the two are mixed, the protection level will be reduced to the level of the ethylene glycol.*

ANTIFREEZE CONCENTRATION TABLES

Ethylene Glycol - Standard Life Antifreeze (1,000 Hour / 6 Months)		
Ambient Temperature	**Cooling Water**	**Antifreeze**
-10°C (14°F)	80%	20%
-15°C (5°F)	73%	27%
-20°C (-4°F)	67%	33%
-25°C (-13°F)	60%	40%
-30°C (-22°F)	56%	44%
-40°C (-40°F)	50%	50%

Propylene Glycol - Extended Life Antifreeze (2,000 Hour / Yearly)		
Ambient Temperature	**Cooling Water**	**Antifreeze**
-10°C (14°F)	78%	22%
-15°C (5°F)	71%	29%
-20°C (-4°F)	65%	35%
-25°C (-13°F)	59%	41%
-30°C (-22°F)	55%	45%
-40°C (-40°F)	48%	52%

FUEL TRANSFER PUMP (OPTION)

⚠ WARNING!

1. **Do not dry operate fuel pump for more than 15 seconds.**
   - **Cooling and lubrication of pump is achieved by fuel passing through pump. If pump is dry operated, heat generated by moving parts will cause damage to pump rotors, vanes and seals. To prevent unnecessary wear and/or damage to pump do not dry operate fuel pump for more than 15 seconds.**
2. **Do not operate pump for more than 15 minutes at a time.**
   - **Continuous usage of pump over recommended time interval will cause overheating of motor and will result in causing motor damage.**
3. **Do not use refueling pump for other types of fuel or fluids. (Use only for diesel fuel.)**
   - **Do not use refueling pump for other types of fuel which have a low flash point.**
   - **Do not use refueling pump for fuel contaminated with water or high humidity. Moisture in pump mechanism can cause rust and can create pump failure.**
4. **Always operate pump using strainer installed on inlet hose. This will prevent any foreign materials from being introduced into pump. Always maintain pump and all of its components in a clean condition.**
   - **If dirt or other foreign materials enter pump, it can become lodged between the rotor and/or vanes and generate heat which can cause pump damage.**
   - **Do not remove strainer or use a strainer with larger mesh to increase flow of fuel.**
5. **Be careful not to overfill or spill fuel.**
6. **Make sure direction of check valve is in line with flow direction of fuel.**
7. **If any pump parts or components become lost, damaged or inoperable, immediately replace it with a new ones.**

IMPORTANT

If there are any sign of leakage while operating transfer pump, inspect the following components to prevent any fires or hazardous fuel spills.

- **Check all hoses leading to and from the transfer pump.**
- **Check all hose clamps.**
- **Check transfer pump inlet port.**

The transfer pump is used to transfer fuel from a refueling source to the fuel tank. A check valve is installed in the inlet hose to prevent fuel from flowing back from fuel tank to source. A strainer is installed in inlet hose to prevent any foreign material from being introduced into transfer pump or fuel tank.

A thermal limiter, built into the motor, will automatically shut off power if motor is overheating to protect it from damage.

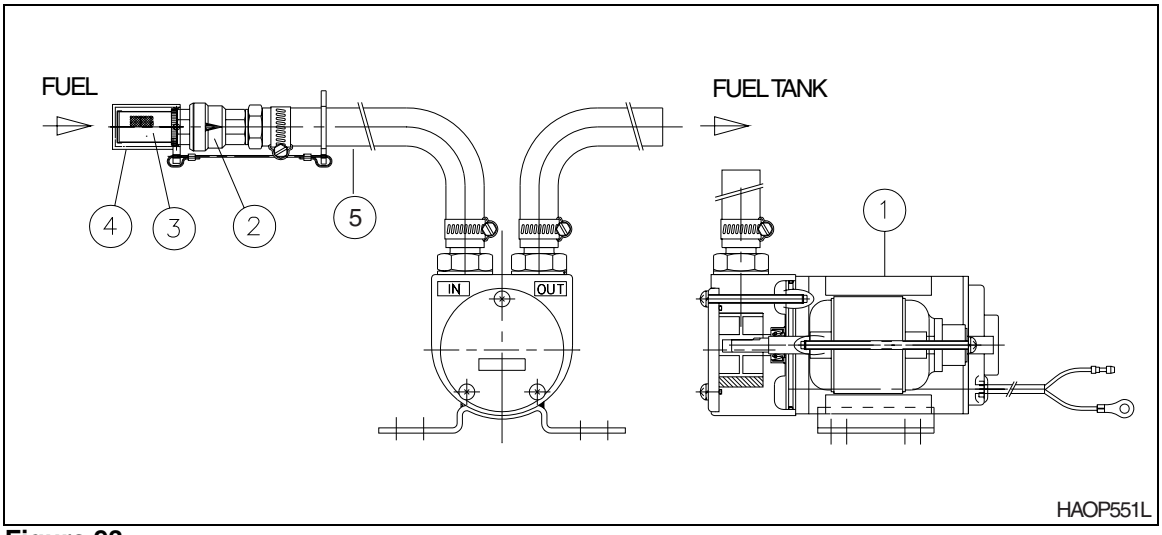


Figure 93

1. BODY
2. CHECK VALVE
3. STRAINER
4. STRAINER CAP
5. INLET HOSE

1. Remove strainer cap (4, Figure 93) from strainer (3) on end of inlet hose (5).

   NOTE: *Keep strainer cap (4*, Figure 93*) in a safe location to reseal strainer (3) after refueling is complete.*

2. Insert inlet hose (5, Figure 93) into refueling tank.
3. Turn fuel pump switch (Figure 94) inside of battery box on front side to “ON” position.

   NOTE: *Transfer pump rate of flow is approximately 35 liters/minute (9.24 U.S. gpm). Use extra care not to overfill fuel tank so that fuel does not over flow.*

4. Once fuel transfer is completed, immediately turn switch to “OFF” position to stop pump.
5. Lift inlet hose (5, Figure 93) from fueling source and turn switch to “ON” position for 2 - 3 seconds to drain remaining fuel from hose to fuel tank.
6. Install strainer cap (4, Figure 93) on inlet strainer (3) and return hose (5) to storage position.

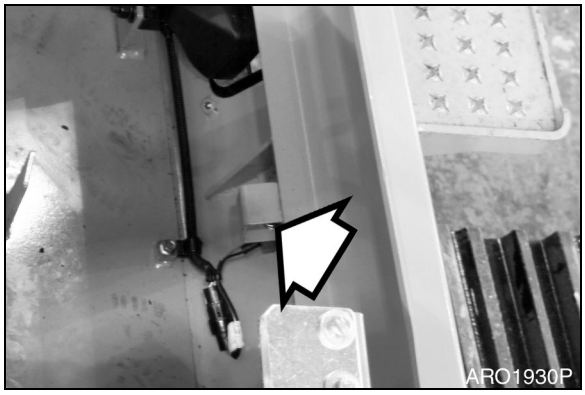


Figure 94

HANDLING OF ACCUMULATOR

⚠ WARNING!

Even though the engine is stopped, the hydraulic accumulators for the pilot system are still charged. Do not disconnect any pilot system hoses until accumulator pressure has been released from the circuit. To release pressure, turn the starter switch to "I" (ON) position and operate all hydraulic control levers and forward/reverse travel levers. Even though the engine is shut down, hydraulic actuated components may move while releasing pilot pressure. Keep all personnel away from excavator while performing this operation.

- **Set safety lever on "LOCK" position after stopping engine.**
- **Do not mishandle accumulator(s). They are very dangerous because they contain high-pressure nitrogen gas.**
- **Do not punch a hole or apply heat or fire to an accumulator.**
- **Do not weld on accumulator, or try attaching anything to it.**
- **When replacing an accumulator, contact a DAEWOO distributor or sales agency so the gas can be properly released.**
- **Wear safety goggles and protective gloves when working on an accumulator. Hydraulic oil under pressure can penetrate the skin and cause serious injuries.**

Release pilot accumulator pressure using the following procedure;

1. Lower front attachment (bucket) to the ground.
2. Shut down engine.
3. Set safety lever on "RELEASED" position.
4. Turn starter switch "ON."
5. Fully stroke work and travel levers in all directions.
6. Set safety lever on "LOCK" position.
7. Turn key to "OFF" position and remove from starter switch.
8. Remove accumulator by unscrewing it slowly.

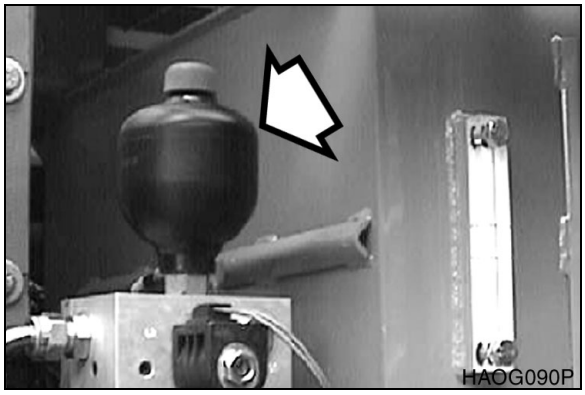


Figure 95

LONG TERM STORAGE

Perform the following if storing the excavator for more than one month.

Conditions	Maintenance Required
1. Cleaning	1. Pressure wash the undercarriage and track assemblies. Inspect for damage or loose or missing parts.
2. Lubrication	1. Perform all daily lubrication procedures. 2. Apply a coating of light oil to the exposed plated metal surfaces, such as hydraulic cylinder rods, etc. 3. Apply a coating of light oil to all of the control linkages and control cylinders (control valve spools, etc.).
3. Battery	1. Remove the battery from the excavator or remove the battery leads from the battery to fully charge and store.
4. Cooling System	1. Inspect the coolant recovery tank to make sure that the antifreeze level in the system is at the correct level. 2. Every 90 days, use a hydrometer to measure the protection level of the coolant. Refer to the antifreeze/coolant protection chart to determine the amount of protection the cooling system requires. Add coolant as required.
5. Hydraulic System	1. Once a month, start the engine and follow the "Hydraulic Oil Warm-up" procedures listed in this manual.

MAINTENANCE IN SPECIAL CONDITIONS

NOTE: *See "Operation Under Unusual Conditions" on page 3-39 for other recommendations.*

Conditions	Maintenance Required
Operating in mud, water or rain.	1. Perform a walk around inspection to check for any loose fittings, obvious damage to the machine or any fluid leakage. 2. After completing operations, clean mud, rocks or debris from the machine. Inspect for damage, cracked welds or loosened parts. 3. Perform all daily lubrication and service. 4. If the operations were in salt water or other corrosive materials, make sure to flush the affected equipment with fresh water.
Operating in an extremely dusty or hot environment.	1. Clean the air intake filters on a more frequent basis. 2. Clean the radiator and oil cooler fins to remove embedded dirt and dust. 3. Clean the fuel system intake strainer and fuel filter more frequently. 4. Inspect and clean as required the starter and alternator.
Operating in rocky terrain.	1. Check the undercarriage and track assemblies for damage or excessive wear. 2. Inspect for loose or damaged fittings or bolts. 3. Relax track tension. 4. On a more frequent basis, inspect the front end attachments for damage or excessive wear. 5. Install a top guard and front guard as required for protection against falling rock.
Operating in extreme cold.	1. Use the proper fuel for the temperature conditions. 2. Using a hydrometer, check the antifreeze to make sure that it is providing the proper cold weather freeze protection. 3. Verify the condition of the batteries. In extremely cold weather remove the batteries at night and store them in a warmer area. 4. Remove mud build-up as soon as possible to prevent it from freezing to the undercarriage and causing damage.

TRACK TENSION

⚠ WARNING!

Safely measuring track tension requires two people. One person must be in the operator's seat, running the controls to keep one side frame in the air, while the other person makes dimensional checks. Take all necessary precautions to make sure the machine won't move or shift position during service. Warm up the engine to prevent stalls, travel the excavator to an area that provides level, uniform ground support and/or use support blocks when necessary.

The track adjusting mechanism is under very high-pressure. NEVER release pressure too suddenly. The grease cylinder valve should never be backed off more than 1 complete turn from the fully tightened down position. Bleed off pressure slowly and keep your body away from the valve at all times.

Track shoe link pins and bushings wear with normal usage, reducing track tension. Periodic adjustment is necessary to compensate for wear and it may also be required by working conditions.

1. Track tension is checked by jacking up one side of the excavator. See Figure 96. Place blocking under frame while taking measurement.

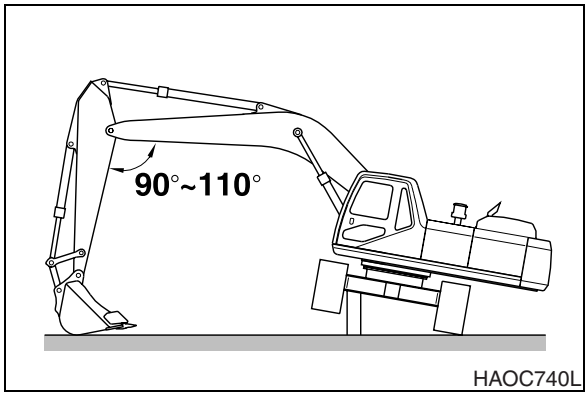


Figure 96

2. Measuring the distance (A, Figure 97) between the bottom of the side frame and the top of the lowest crawler shoe. Recommended tension for operation over most types of terrain is 260 - 270 mm (10.2 - 10.6 in)

   NOTE: *This measurement can be thrown off if there is too much mud or dirt or other material in the track assembly. Clean off the tracks before checking clearance.*

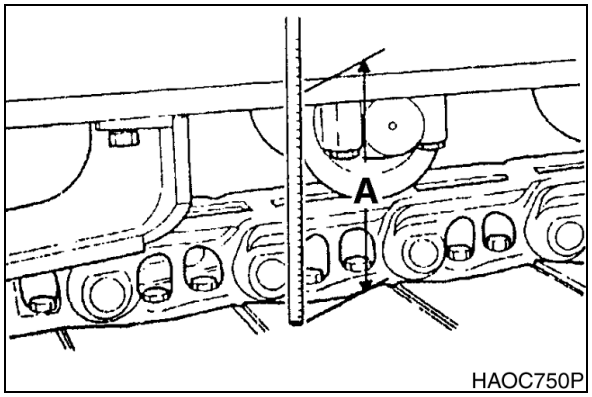


Figure 97

3. Too little sag in the crawler track (less than 260 mm (10.2 in) clearance) can cause excessive component wear. The recommended adjustment can also be too tight causing accelerated stress and wear if ground conditions are wet, marshy or muddy, or if the ground is hard and full of rocks or gravel.

4. The increased clearance recommended for muddy ground conditions is between 340 - 380 mm (13.39 - 15.0 in). The clearance should be approximately 380 mm (15.0 in) for operation over gravel, rocky terrain, or over sand or snow.

WARNING!

The track adjusting mechanism is under very high-pressure. NEVER release pressure too suddenly. The grease cylinder valve should never be backed off more than 1 complete turn from the fully tightened down position. Bleed off pressure slowly and keep your body away from the valve at all times.

5. Track tension adjustments are made through the grease fitting (1, Figure 98) in the middle of each side-frame. Adding grease increases the length of an adjustment cylinder (2). The longer the adjustment cylinder, the greater the pressure on the tension spring pushing the track idler wheel outward.

6. If there is not enough slack or clearance in the tracks and the adjustment is too tight, the idler wheel and adjusting cylinder can be retracted by bleeding off grease through hole in adjustment cylinder (2, Figure 98) by loosening valve slowly (3, Figure 98).

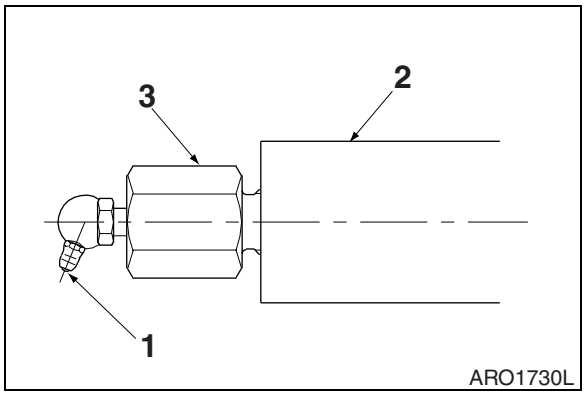


Figure 98

WARNING!

Do not loosen or remove the grease fitting (1, Figure 98) until the pressure is entirely bleed off by loosening valve (3, Figure 98) slowly.

VENTING AND PRIMING HYDRAULIC SYSTEM

MAIN SYSTEM PUMP

NOTE: *If pump is run without sufficient oil in the main hydraulic pump, damage can occur. Always vent pump of air after draining hydraulic system.*

1. With the engine stopped, remove vent plug (1, Figure 99) to see if any oil is present.
2. If oil is not present, remove drain hose (2, Figure 99) and fill pump with oil through port.

   NOTE: *Position drain hose so that oil dose not drain from it.*

3. Install vent plug (1, Figure 99) first, then connect drain hose (2, Figure 99).
4. Start engine and run it for several minutes at low idle engine speed. This will pressurize the hydraulic oil tank and system.

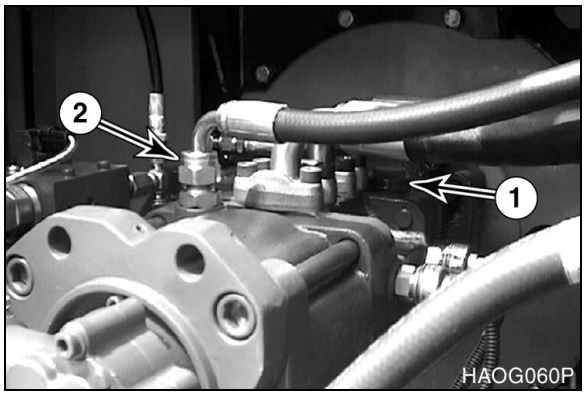


Figure 99

5. Slowly loosen vent plug (1, Figure 99) several turns, until hydraulic oil flows out of plug. This shows that air has been released.
6. Tighten the plug (Figure 99).

HYDRAULIC CYLINDERS

IMPORTANT

If cylinders are operated in high idle after the hydraulic system has been drained or the cylinder has been rebuilt, damage to piston packing and seals may occur. Always vent air from cylinders at low idle and at a slow speed.

1. Run engine at low idle. Extend and retract each cylinder to within 100 mm (4 in) of fully stroking it 4 - 5 times.
2. Operate fully extend and retract each cylinder 3- 4 times.
3. Repeat procedure until cylinders extend and retract smoothly.

SWING MOTOR

IMPORTANT

If the air is not vented from the system, it will cause damage to the swing motor and bearings.

NOTE: *Perform this only when oil has been drained from swing motor.*

1. Shut down engine.
2. Disconnect drain hose and fill swing motor case with hydraulic oil.
3. Connect the drain hose.
4. Start engine and set throttle at "LOW IDLE" and swing upper structure slowly two full revolutions to the left and right.

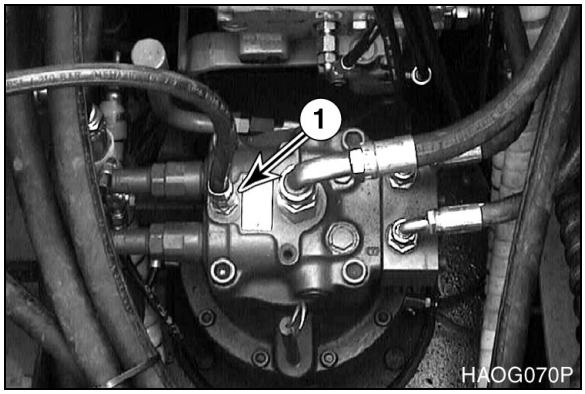


Figure 100

AIR RELEASE OF TRAVEL MOTOR

NOTE: *Perform this only when oil is drained from travel motor.*

1. Shut down engine.
2. Disconnect drain hose (Figure 101) and fill motor case with hydraulic oil.
3. Connect drain hose.
4. Start engine and set engine speed control dial to "LOW IDLE." Run the engine for one minute and slowly drive excavator forwards and backwards.

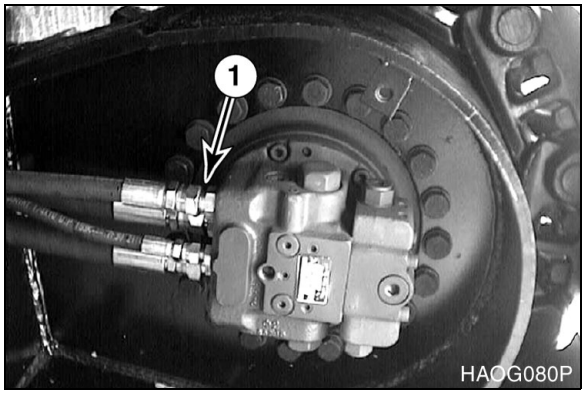


Figure 101

GENERAL VENTING

1. After venting air from all components, shut the engine down and check the hydraulic oil level. Fill hydraulic oil tank to "H" mark on sight gauge.
2. Start engine and operate all controls again, run engine for 5 minutes to ensure all system have been vent and purged of air. Shut down engine and check hydraulic oil level again. Add oil as necessary.
3. Check for oil leaks and clean all fill and venting locations.

TRANSPORTATION

Obey all local, state or federal regulations for the transportation of the excavator. If unsure of regulations check with local authorities.

Check the intended route for road width, overhead clearances, weight restrictions, and traffic control regulations. Special approval or permits may be required.

LOADING AND UNLOADING

DANGER!

Daewoo warns any user, that the removal of the counterweight from the machine, front attachment or any other part, may affect the stability of the machine. This could cause unexpected movement, resulting in death or serious injuries. Daewoo is not liable for any misuse.

Never remove the counterweight or front attachment unless the upper structure is in-line with the lower structure.

Never rotate the upper structure once the counterweight or front attachment has been removed.

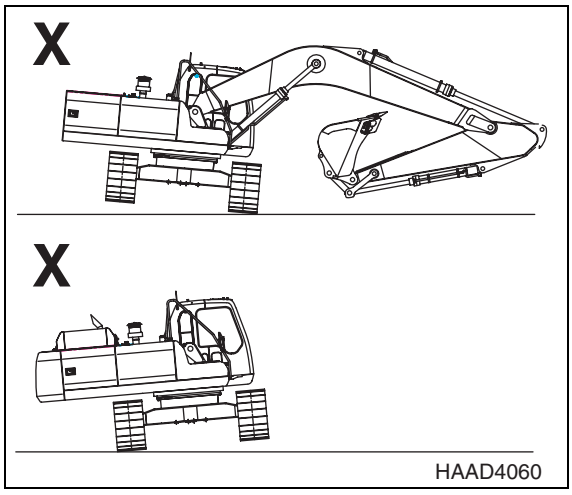


Figure 102

WARNING!

When transporting the machine, know the width, height, length and weight.

Loading or unloading the machine can be a dangerous operation. Make sure to run the engine at the lowest speed setting, and travel at the slowest speed possible.

Make sure that the ramp being used can handle the weight of the machine. If required, add blocking under the ramp for additional support.

Make sure that the ramp surface is free of grease or mud that could cause the machine to slip or slide.

Make sure that the trailer is parked on firm, level ground before attempting to load/unload the excavator.

If it is required to turn the machine while it is on the trailer, make sure to do this at the slowest engine and travel speeds possible.

Make sure to secure the excavator onto the trailer as required by local transportation laws.

Mono Boom				
Total Height	**Total Width**	**Total Length**	**Weight**	**Remarks**
2,760 mm (9' 1")	2,600 mm (8' 6")	7,700 mm (25' 3")	13.9 metric tons (15.30 tons)	4.6 m (15' 2") Boom 2.5 m (8' 2") Arm 600 mm (23.6 in) G Shoe

Articulated Boom				
Total Height	**Total Width**	**Total Length**	**Weight**	**Remarks**
2,910 mm (9' 7")	2,600 mm (8' 6")	8,030 mm (26' 4")	16.40 metric tons (18.08 tons)	1.85 m (6' 1") Lower Boom 3.5 m (11' 6") Upper Boom 2.5 m (8' 3") Arm 600 mm (23.6 in) G Shoe

1. Make sure that the trailer is parked on a firm and level surface. See Figure 1.
2. Make sure that the ramps that are being used are designed to handle the weight of the excavator. If required, add blocking under the ramp to provide additional support.
3. The ramp angle should be less than or not exceeding a 15° angle. Ramps steeper than this may cause a problem when loading or unloading.
4. The unit does not require disassembly for normal over-the-road transportation. If the boom and arm need to be removed, the counterweight will place more weight on the rear of the machine. Make sure to back the excavator onto the trailer so that the counterweight end of the excavator is positioned on the ramp first. See Figure 2.

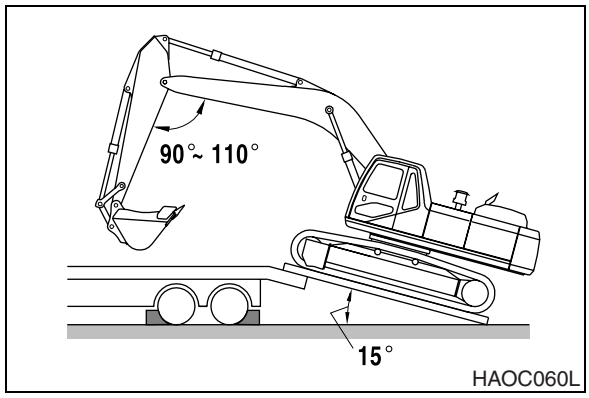


Figure 1

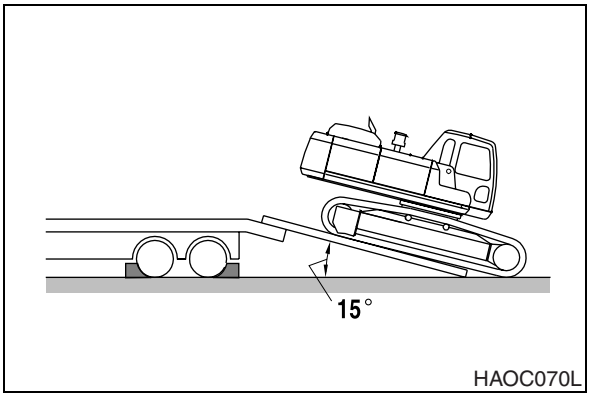


Figure 2

5. Set the travel speed selector switch to "O" (OFF) position. See Figure 3.

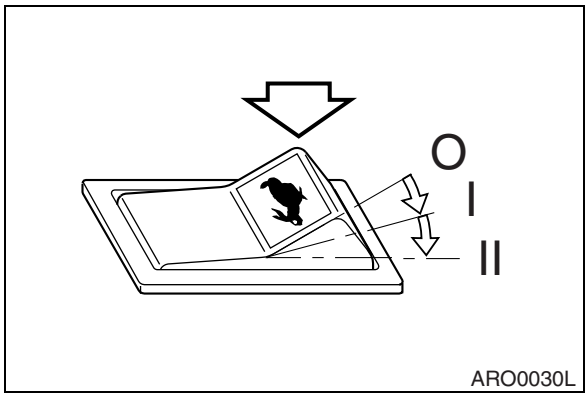


Figure 3

6. Turn "OFF" auto idle selector button (1, Figure 4). The indicator light (2) will not be lit.
7. Set engine speed to "LOW IDLE."

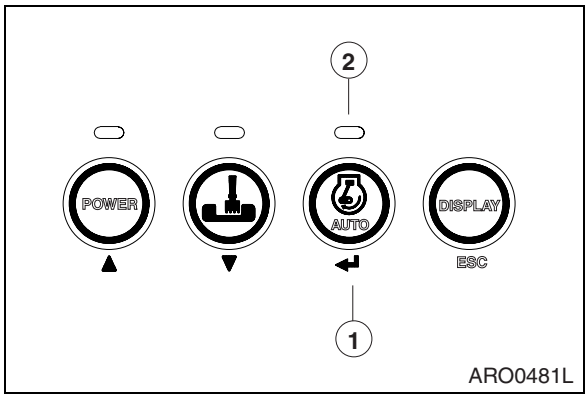


Figure 4

8. Extend bucket and arm cylinders to maximum length and then lower the boom slowly.

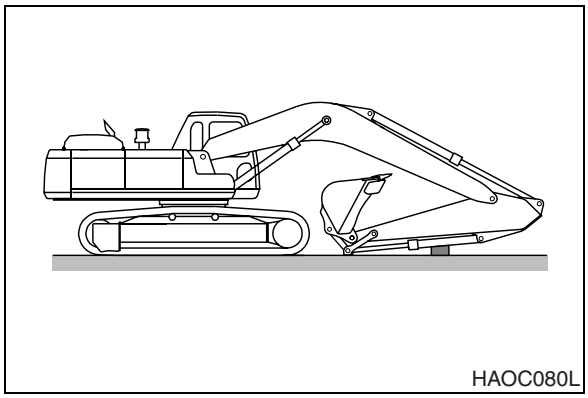


Figure 5

9. Set safety lever on "LOCK" position.

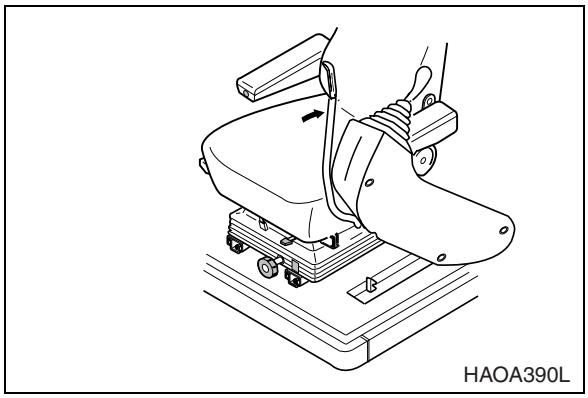


Figure 6

10. Shut down engine by turning key to "O" (OFF) position (Figure 7).
11. Remove key from starter switch.

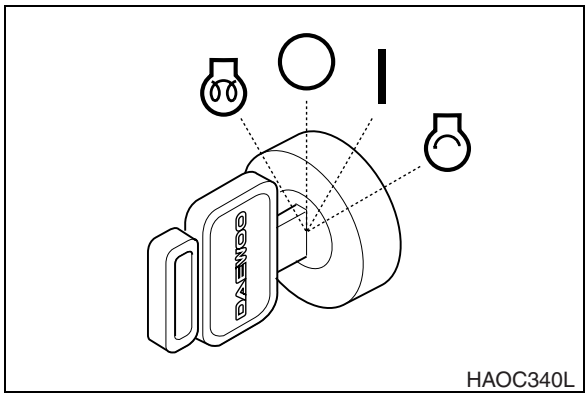


Figure 7

12. Make sure to secure the excavator onto the trailer before transporting. Place blocking (1, Figure 8) in front of and behind each track. Use chains or cable tie-downs (2) as required by local transportation laws.
13. Refer to the Dimensions for Transportation table and drawing for overall machine height and width measurements. Make sure to position the excavator as shown. If not transported in this position, the height measurements may be different.

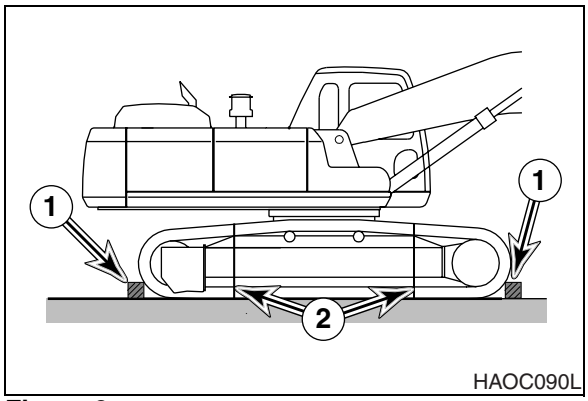


Figure 8

LIFTING WITH SLING

WARNING!

Improper lifting can allow load to shift and cause injury or damage.

1. Refer to “Specification” on page 7-1 of this manual for information on weight and dimensions.
2. Use properly rated cables and slings for lifting.
3. Position machine for a level lift.
4. Lifting cables should have a long enough length to prevent contact with the machine. Spreader bars may be required.

   NOTE: *If spreader bars are used, be sure that cables are properly secured to them and that the angle of the cables is factored into the lift strength.*

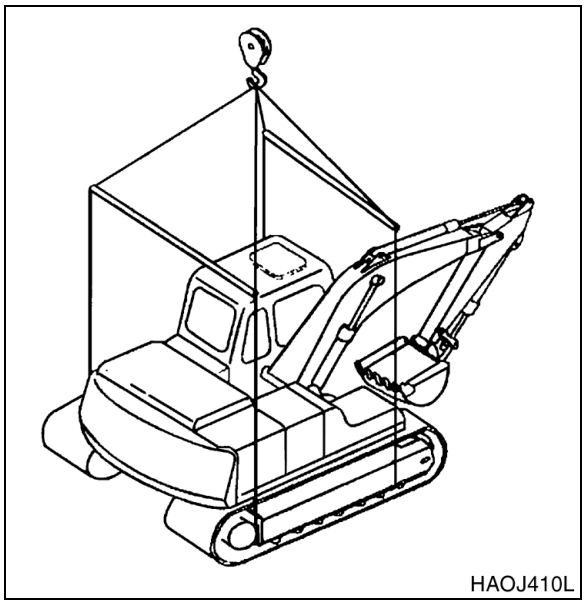


Figure 9

TROUBLESHOOTING

Anytime that a malfunction occurs, take immediate corrective action. Check for and investigate the cause of the malfunction. A schedule maintenance program can prevent malfunctions from occurring by doing preventative maintenance. A systematic approach should be taken to troubleshooting, since several overlapping malfunctions may give the appearance of a problem that does not exist. If cause for the malfunction cannot be determined, contact your Daewoo distributor. Never perform an adjustment of or disassembly of, hydraulic components, electrical and electronic components, without first consulting a Daewoo distributor.

ENGINE

Problem	Cause	Remedy
Starter does not operate.	Low battery power.	Charge battery.
	Poor terminal contact.	Clean and tighten connections.
	Starter switch failed.	Replace switch.
	Starter relay failed.	Replace relay.
	Starter controller failed.	Replace controller.
	Wiring harness faulty.	Replace harness.
	Battery relay failed.	Replace relay.
	Blown fuse.	Replace fuse.
Starter engages, engine does not start.	Fuel gelled in cold weather.	Replace fuel.
	Fuel filters plugged.	Replace filters.
	Water or dirt in fuel system.	Clean system and add new fuel.
	Air in fuel system.	Purge air from system.
	Engine stop control failed.	Replace stop control.
	Engine stop relay failed.	Replace relay.
	Blown fuse.	Replace fuse.
Engine starts, runs only at low speed or shuts down.	Engine oil viscosity incorrect.	Change oil.
	Clogged or dirty fuel injectors.	Clean injectors.
	Fuel filters plugged.	Replace filters.
	Engine stop motor cable out of adjustment.	Readjust.
	Engine speed control cable out of adjustment.	Readjust.

Problem	Cause	Remedy
Engine knocks, runs unevenly or surges.	Low engine oil.	Refill.
	Plugged air intake system.	Clean system and replace filter.
	Injection pump out of adjustment.	Contact your Daewoo dealer.
	Plugged fuel filter.	Replace fuel filter.
	Water or dirt in fuel system.	Clean system and add new fuel.
	Clogged or dirty fuel injectors.	Clean injectors.
Engine has poor power.	Plugged air intake system.	Clean system and replace filter.
	Clogged or dirty fuel injectors.	Clean injectors.
	Fuel filters plugged.	Replace filters.
	Engine speed control cable out of adjustment.	Readjust.
	Injection pump out of adjustment.	Contact your Daewoo dealer.
	Valve backlash faulty.	Adjust backlash.
Engine runs hot.	Low coolant level.	Add coolant.
	Thermostat faulty.	Replace thermostat.
	Radiator cap faulty.	Replace radiator cap.
	Radiator core plugged.	Clean radiator.
	Oil cooler core plugged.	Clean oil cooler.
	Fan belt loose or damaged.	Tighten or replace as required.
	Temperature sensor faulty.	Replace sensor.

HYDRAULIC SYSTEM

Problem	Cause	Remedy
None of the controls function (loud noise from pumps).	Hydraulic pump failed.	Contact your Daewoo dealer.
	Low hydraulic oil level.	Add hydraulic oil as required.
	Suction line plugged or damaged.	Clean or replace as required.
None of the controls function (no noise from pumps).	Pilot pump failure.	Contact your Daewoo dealer.
	Cut off solenoid valve failed.	Replace solenoid.
	Pilot cutoff switch is ON.	Adjust pilot cutoff switch clearance.

Problem	Cause	Remedy
All actuators have low power.	Low hydraulic oil level.	Add hydraulic oil as required.
	Suction filter clogged.	Clean filter.
	Hydraulic pumps faulty.	Contact your Daewoo dealer.
	Main relief pressure too low.	Contact your Daewoo dealer.
	Hydraulic pumps excavating.	Bleed air from hydraulic pumps.
Only one or two actions have little or no power.	Overload relief pressure too low.	Reset pressure.
	Makeup check valve leaking.	Clean or replace as required.
	Control valve spool faulty.	Replace valve spool.
	Dirt in valve spool.	Clean or replace as required.
	Actuator failed.	Repair or replace as required.
	Cylinder seal failed.	Repair or replace as required.
	Cylinder rod damaged.	Repair or replace as required.
	Remote control valve failed.	Replace control valve.
	Wrong pilot line connection.	Reconnect pilot lines.
Oil temperature too high.	Oil cooler faulty.	Contact your Daewoo dealer.
	Fan belt loose.	Tighten fan belting as required.

SWING SYSTEM

Problem	Cause	Remedy
No swinging motion.	Swing brake valve faulty.	Replace brake valve.
	Hydraulic timer faulty.	Replace timer.
	Low brake release pressure.	Adjust pressures.
	Swing motor failed.	Replace swing motor.
	Remote control valve failed.	Replace control valve.
	Wrong pilot line connection.	Reconnect pilot lines.
Swing motion jerky.	Swing gear worn.	Replace swing gear.
	Swing bearing damaged.	Replace bearing.
	Improper lubrication.	Add grease.

TRAVEL SYSTEM

Problem	Cause	Remedy
Travel motion does not function.	Center joint leaking.	Repair or replace as required.
	Parking brake will not release.	Repair parking brake.
	Travel motor failed.	Repair or replace as required.
	Remote control valve failed.	Repair or replace as required.
	Wrong pilot line connection.	Reconnect pilot lines.
Travel speed is too low.	Track tension too high or too low.	Adjust tension.
	Damaged rollers or idlers.	Repair or replace as required.
	Track frame damaged.	Repair as required.
	Parking brake will not release.	Repair parking brake.

ELECTRICAL SYSTEM

Problem	Cause	Remedy
Battery will not hold a charge.	Low battery power.	Clean and retighten.
	Alternator belt loose or bad.	Tighten or replace belt.
	Loose or corroded terminals.	Tighten or replace as required.
	Alternator faulty.	Repair or replace as required.
Low battery power.	Internal battery short.	Replace battery.
	Short circuit in wiring.	Repair as required.
Engine speed is not controllable.	Speed control dial failed.	Replace control dial.
	Throttle controller failed.	Replace controller.
	Speed control motor failed.	Repair or replace as required.
	Blown fuse.	Replace fuse.
	Wiring harness damaged.	Repair or replace as required.
	Connector failed.	Repair or replace as required.

Problem	Cause	Remedy
Power mode selector does not work.	Blown fuse.	Replace fuse.
	Power mode selector switch failed.	Replace switch.
	Connector failed.	Replace connector.
	Wiring harness damaged.	Repair or replace as required.
	e-EPOS controller failed.	Repair or replace as required.
Working mode selector does not work.	Blown fuse.	Replace fuse.
	Working mode selector switch.	Replace switch failed.
	Connector failed.	Replace connector.
	Wiring harness damaged.	Repair or replace as required.
	e-EPOS controller failed.	Repair or replace as required.

STANDARD SPECIFICATION

Component			Specification	
			Metric	English
Bucket Capacity	CECE		0.45 m^3	0.6 yd^3
	SAE (PCSA)		0.52 m^3	0.7 yd^3
Equipment Weight			13.9 metric tons	15.3 tons
Engine	Model		DB58TIS	
	Type		Water Cooled - 6 Cylinders	
	Rated Output		96 ps @1,850 rpm	95 hp @1,850 rpm
	Maximum Torque		3.8 kg•m @ 1,700 rpm	275 ft lb @ 1,700 rpm
	Fuel Tank Capacity		230 liters	61 U.S. gal.
Hydraulic Pump	Type		Axial Piston	
	Discharging Pressure		350 kg/cm^2	5,000 psi
	Maximum Discharge Quantity		2 x 116 liters/min	2 x 30.6 U.S. gpm
	Hydraulic Oil Capacity	Tank Level	89 liters	24 U.S. gal.
		System	165 liters	44 U.S. gal.
Performance	Digging Capability	Bucket	8.3 metric tons	9.15 tons
		Arm	6.3 metric tons	6.94 tons
	Swing Speed		12.0 rpm	
	Travel Speed	High Speed	4.9 km/h	3.04 mph
		Low Speed	3.4 km/h	2.11 mph
	Traction Force	High Speed	7.8 metric tons	8.6 tons
		Low Speed	11.4 metric tons	12.57 tons
	Gradeability		35° (70% slope)	
	Ground Pressure		0.35 kg/cm^2	4.98 psi
Ground Clearance			410 mm	16.14 in
Track Shoe Width			600 mm	23.6 in
Upper Roller Qty.			1 per side	
Bottom Roller Qty.			7 per side	

OVERALL DIMENSIONS

MONO BOOM

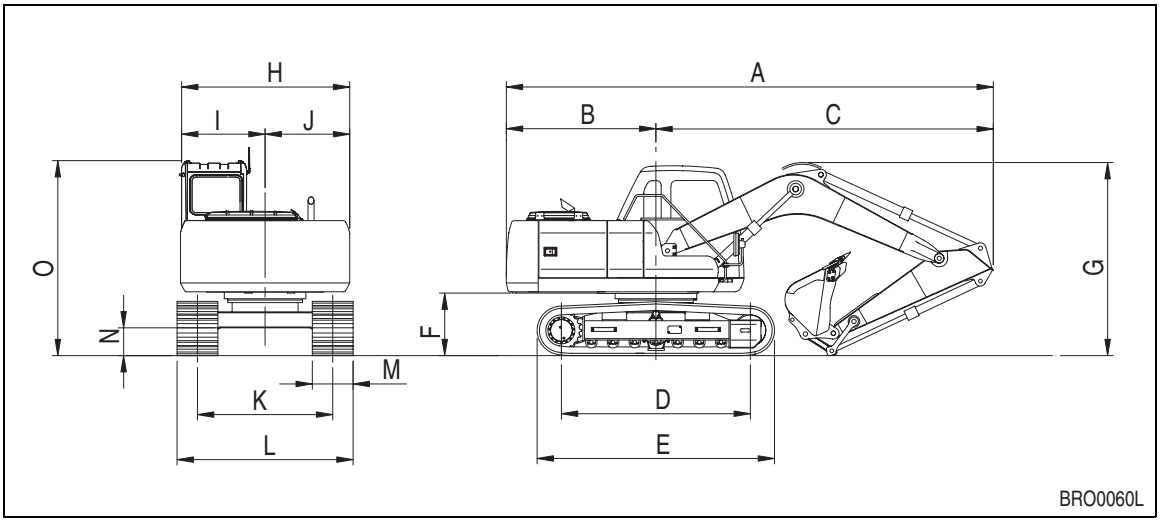


Figure 1

Dimension	4.0 m (13' 1") Boom	4.6 m (15' 1") Boom	4.6 m (15' 1") Boom
	1.9 m (6' 3") Arm	2.5 m (8' 2") Arm	3.0 m (9' 8") Arm
A	7,160 mm (23' 5")	7,700 mm (25' 3")	7,630 mm (25' 1")
B	2,200 mm (7' 2")		
C	4,960 mm (16' 3")	5,500 mm (18' 1")	5,430 mm (17' 8")
D	2,780 mm (9' 1")		
E	3,493 mm (11' 5")		
F	920 mm (3' 1")		
G	2,840 mm (9' 3")	2,760 mm (9' 1")	3,160 mm (10' 4")
H	2,490 mm (8' 2")		
I	960 mm (3' 2")		
J	1,530 mm (5' 1")		
K	2,000 mm (6' 6")		
L	2,600 mm (8' 5")		
M	600 mm (1' 10")		
N	410 mm (1' 4")		
O	2,830 mm (9' 3")		

ARTICULATED BOOM

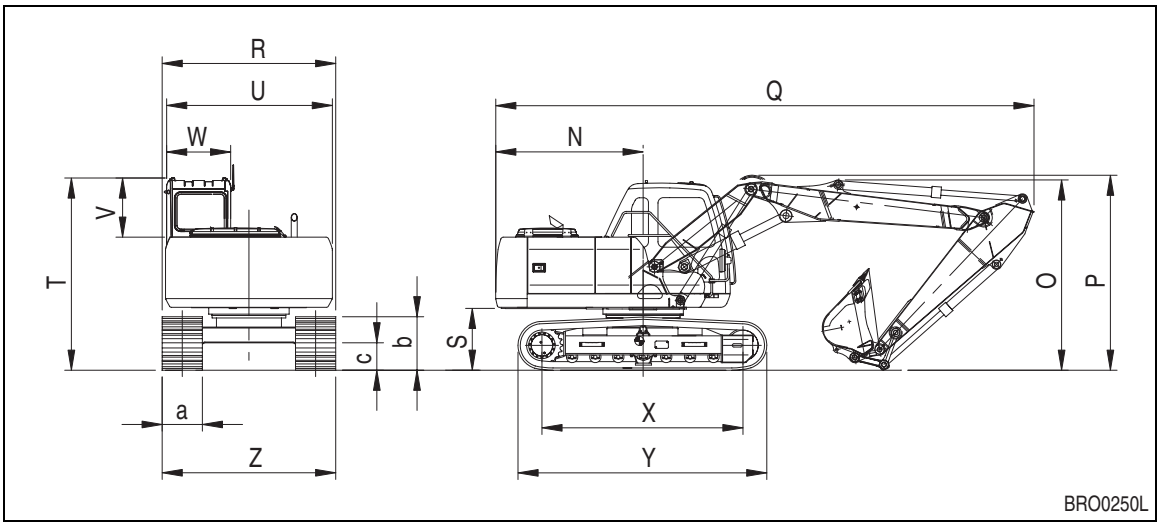


Figure 1

Boom	1.85 m (6' 1") Lower + 3.5 m (11' 6") Upper		
Arm	**2.5 m (8' 3")**	**2.1 m (7' 1")**	**3.0 m (9' 9")**
Bucket (SAE)	**0.40 m^3 (0.52 yd^3)**	**0.52 m^3 (0.68 yd^3)**	**0.40 m^3 (0.52 yd^3)**
N	2,200 mm (7' 2")		
O	2,840 mm (9' 3")	2,630 mm (8' 7")	3,400 mm (11' 3")
P	2,910 mm (9' 7")	2,780 mm (9' 1")	3,100 mm (10' 3")
Q	8,030 mm (26' 5")	8,090 mm (26' 6")	7,850 mm (25' 9")
R	2,600 mm (8' 5")		
S	920 mm (3' 1")		
T	2,830 mm (9' 3")		
U	2,490 mm (8' 2")		
V	840 mm (2' 9")		
W	960 mm (3' 2")		
X	2,780 mm (9' 1")		
Y	3,493 mm (11' 5")		
Z	2,600 mm (8' 5")		
a	600 mm (1' 10")		
b	820 mm (2' 8")		
c	410 mm (1' 4")		

WORKING RANGE

MONO BOOM

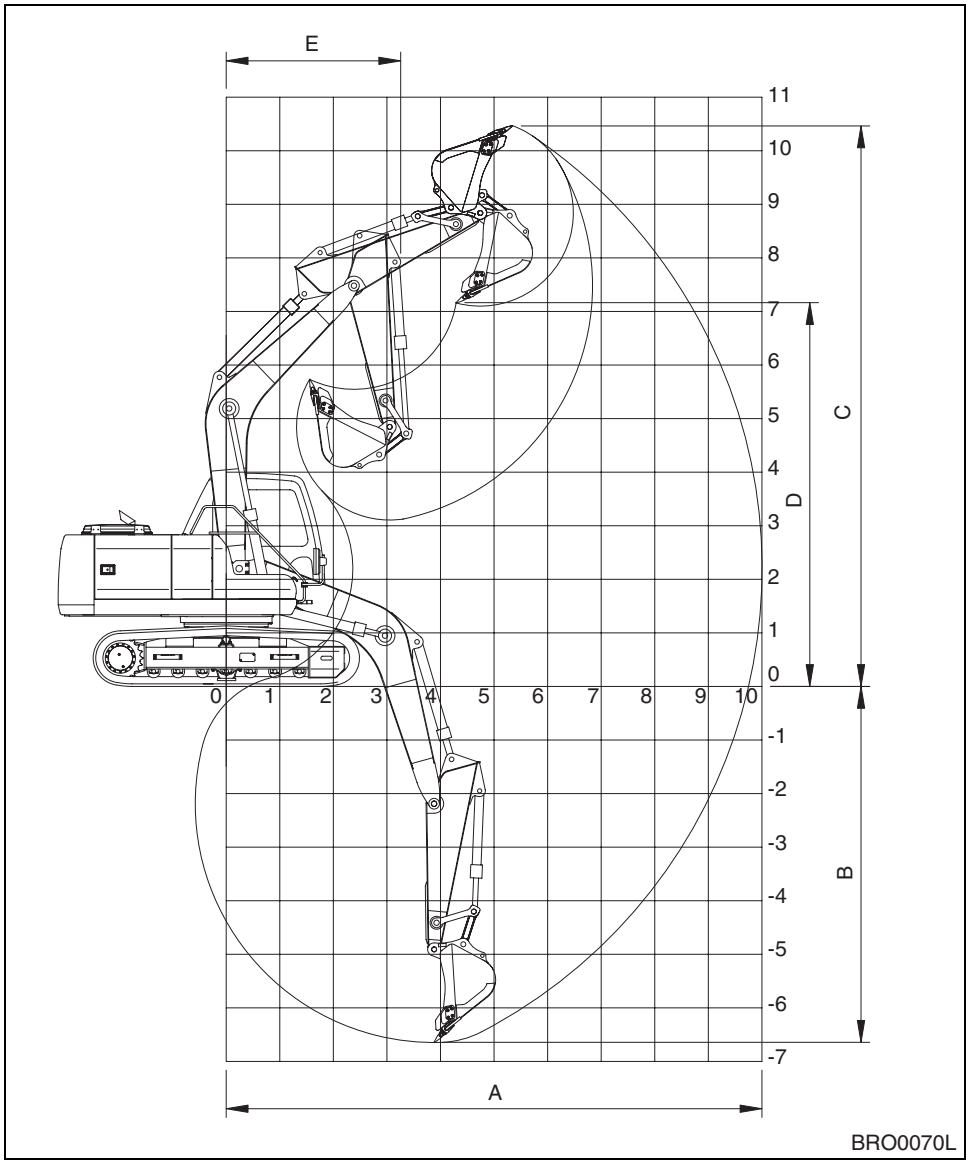


Figure 2

Dim.		4.0 m (13' 1") Boom	4.6 m (15' 1") Boom	4.6 m (15' 1") Boom
		1.9 m (6' 3") Arm	2.5 m (8' 2") Arm	3.0 m (9' 8") Arm
A	Max. Digging Radius	7,020 mm (23' 1")	8,260 mm (27' 1")	8,740 mm (28' 7")
B	Max. Digging Depth	4,670 mm (15' 3")	5,630 mm (18' 5")	6,130 mm (20' 1")
C	Max. Digging Height	7,350 mm (24' 1")	8,620 mm (28' 3")	8,950 mm (29' 4")
D	Max. Dump Height	4,990 mm (16' 4")	6,200 mm (20' 4")	6,530 mm (21' 4")
E	Min. Digging Radius	2,440 mm (8' 1")	2,545 mm (8' 4")	2,780 mm (9' 1")

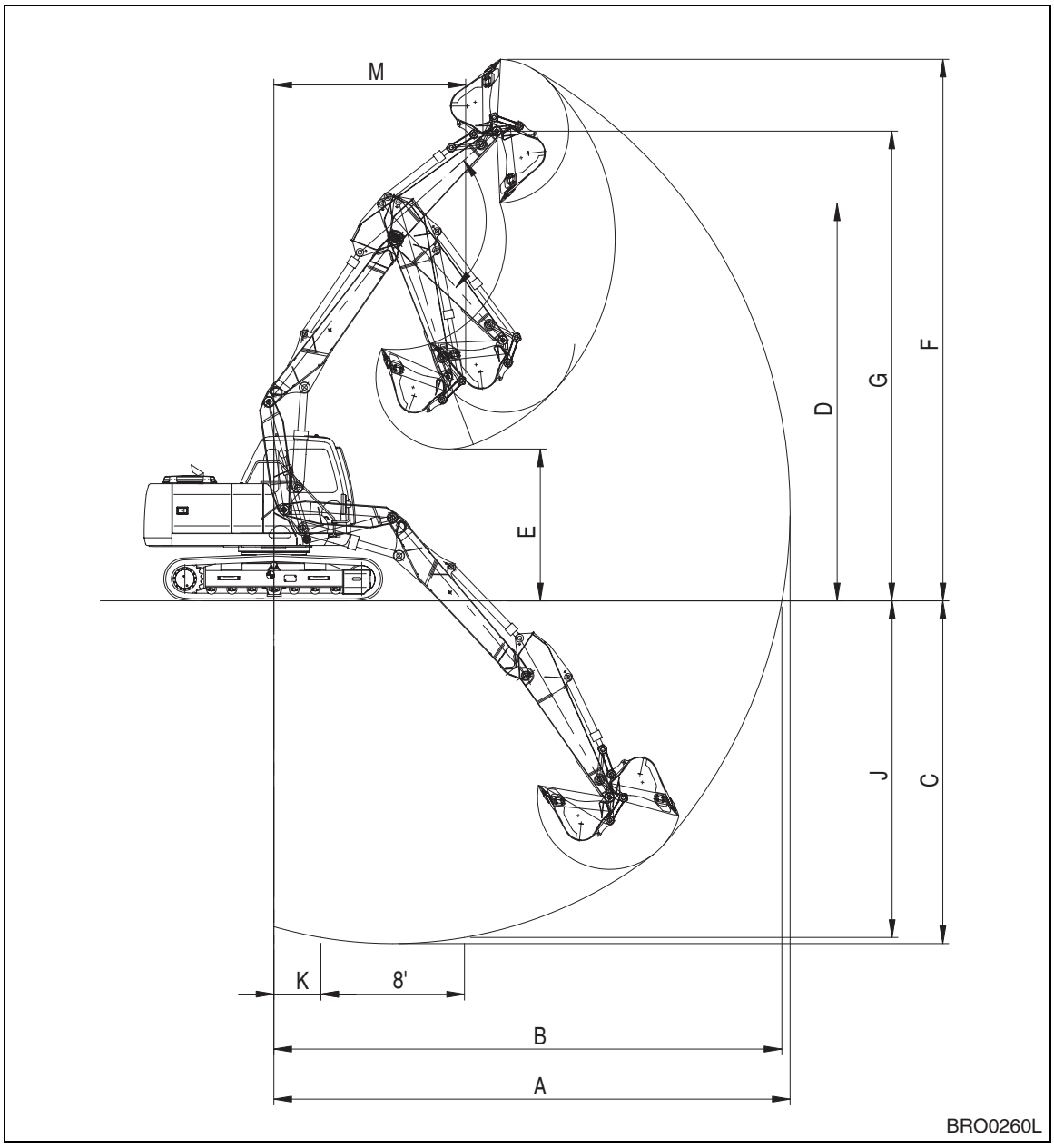


Figure 3

Boom		1.85 m (6' 1") Lower + 3.5 m (11' 6") Upper		
Arm		2.5 m (8' 3")	2.1 m (7' 1")	3.0 m (9' 9")
Bucket (SAE)		0.40m^3 (0.52 yd^3)	0.52 m^3 (0.68 yd^3)	0.40 m^3 (0.52 yd^3)
A	Max. Digging Reach	8,760 mm (28' 9")	8,335 mm (27' 4")	9,250 mm (30' 4")
B	Max. Digging Reach (Ground)	8,620 mm (28' 3")	8,190 mm (26' 10")	9,115 mm (29' 11")
C	Max. Digging Depth	5,815 mm (19' 1")	5,405 mm (17' 9")	6,315 mm (20' 9")
D	Max. Loading Height	6,745 mm (22' 2")	6,370 mm (20' 11")	7,125 mm (23' 4")
E	Min. Loading Height	2,575 mm (8' 5")	2,975 mm (9' 9")	2,150 mm (7' 1")
F	Max. Digging Height	9,185 mm (30' 2")	8,800 mm (28' 10")	9,560 mm (31' 4")
G	Max. Bucket Pin Height	7,965 mm (26' 2")	7,590 mm (24' 11")	8,340 mm (27' 4")
J	Max. Depth To 8' Line	5,710 mm (18' 9")	5,295 mm (17' 4")	6,215 mm (20' 5")
K	Min. Radius 8' Line	795 mm (2' 7")	795 mm (2' 7")	795 mm (2' 7")
M	Min. Swing Radius	3,255 mm (10' 8")	3,175 mm (10' 5")	3,545 mm (11' 8")
d	Bucket Angle	175°	175°	175°

APPROXIMATE WEIGHT OF WORKLOAD MATERIALS

IMPORTANT

Weights are approximations of estimated average volume and mass. Exposure to rain, snow or ground water; settling or compaction due to overhead weight and chemical or industrial processing or changes due to thermal or chemical transformations could all increase value of weights listed in table.

MATERIAL	LOW WEIGHT OR DENSITY 1,100 KG/M^3 (1,850 LB/YD^3), OR LESS	MEDIUM WEIGHT OR DENSITY 1,600 KG/M^3 (2,700 LB/YD^3), OR LESS	HIGH WEIGHT OR DENSITY 2,000 KG/M^3 (3,370 LB/YD^3), OR LESS
Charcoal	401 kg/m^3 (695 lb/yd^3)	----------	----------
Coke, blast furnace size	433 kg/m^3 (729 lb/yd^3)	----------	----------
Coke, foundry size	449 kg/m^3 (756 lb/yd^3)	----------	----------
Coal, bituminous slack, piled	801 kg/m^3 (1,350 lb/yd^3)	----------	----------
Coal, bituminous r. of m., piled	881 kg/m^3 (1,485 lb/yd^3)	----------	----------
Coal, anthracite	897 kg/m^3 (1,512 lb/yd^3)	----------	----------
Clay, DRY, in broken lumps	1,009 kg/m^3 (1,701 lb/yd^3)	----------	----------
Clay, DAMP, natural bed	----------	1,746 kg/m^3 (2,943 lb/yd^3)	----------
Cement, Portland, DRY granular	----------	1,506 kg/m^3 (2,583 lb/yd^3)	----------
Cement, Portland, DRY clinkers	----------	1,362 kg/m^3 (2,295 lb/yd^3)	----------
Dolomite, crushed	----------	1,522 kg/m^3 (2,565 lb/yd^3)	----------
Earth, loamy, DRY, loose	----------	1,202 kg/m^3 (2,025 lb/yd^3)	----------
Earth, DRY, packed	----------	1,522 kg/m^3 (2,565 lb/yd^3)	----------

MATERIAL	LOW WEIGHT OR DENSITY 1,100 KG/M^3 (1,850 LB/YD^3), OR LESS	MEDIUM WEIGHT OR DENSITY 1,600 KG/M^3 (2,700 LB/YD^3), OR LESS	HIGH WEIGHT OR DENSITY 2,000 KG/M^3 (3,370 LB/YD^3), OR LESS
Earth, WET, muddy	----------	----------	1,762 kg/m^3 (2,970 lb/yd^3)
Gypsum, calcined, (heated, powder)	961 kg/m^3 (1,620 lb/yd^3)	----------	----------
Gypsum, crushed to 3 inch size	----------	1,522 kg/m^3 (2,565 lb/yd^3)	----------
Gravel, DRY, packed fragments	----------	----------	1,810 kg/m^3 (3,051 lb/yd^3)
Gravel, WET, packed fragments	----------	----------	1,922 kg/m^3 (3,240 lb/yd^3)
Limestone, graded above 2	----------	1,282 kg/m^3 (2,160 lb/yd^3)	----------
Limestone, graded 1-1/2 or 2	----------	1,362 kg/m^3 (2,295 lb/yd^3)	----------
Limestone, crushed	----------	1,522 kg/m^3 (2,565 lb/yd^3)	----------
Limestone, fine	----------	----------	1,602 kg/m^3 (2,705 lb/yd^3)
Phosphate, rock	----------	1,282 kg/m^3 (2,160 lb/yd^3)	----------
Salt	929 kg/m^3 (1,566 lb/yd^3)	----------	----------
Snow, light density	529 kg/m^3 (891 lb/yd^3)	----------	----------
Sand, DRY, loose	----------	1,522 kg/m^3 (2,565 lb/yd^3)	----------
Sand, WET, packed	----------	----------	1,922 kg/m^3 (3,240 lb/yd^3)
Shale, broken	----------	1,362 kg/m^3 (2,295 lb/yd^3)	----------
Sulphur, broken	529 kg/m^3 (1,620 lb/yd^3)	----------	----------

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PUBLICATION REQUEST FOR PROPOSED REVISION

In Daewoo's continuing effort to provide the best customer satisfaction, we invite you to help us improve the manuals that you work with on a daily basis. This form is provided to give you a means of feedback to the publication department.

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Use additional paper if needed. Please include copy of current manual pages for reference. Attach any photos or illustrations. If digital photos are available, e-mail them to Bill.Bernhardt@dhiac.com (If possible, use 1024 x 768 resolution.).

HAS THIS BEEN DISCUSSED WITH A DAEWOO SERVICE REPRESENTATIVE: YES NO

IF YES - WHO:

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