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V270
V270 (EU)

GEHL

Form No.
917387
BP0310
English

Skid-Steer Loader

Operator's Manual

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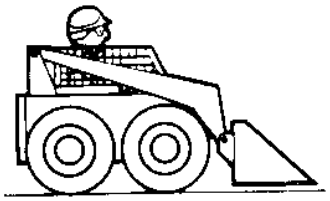
Gehl Company, in cooperation with the Society of Automotive Engineers, has adopted this Safety Alert Symbol to pinpoint precautions which, if not properly followed, can create a safety hazard. When you see this symbol in this manual or on the machine itself, you are reminded to BE ALERT! Your personal safety is involved!

Operators must have instructions before running the machine. Untrained operators can cause injury or death.

WRONG

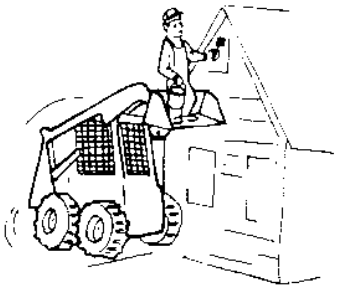


Never use loader without ROPS/FOPS. Never modify the ROPS/FOPS structure.

CORRECT

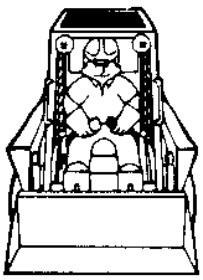
Read Operator's Manual before using machine.

WRONG



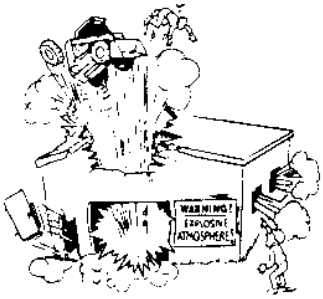
Never use the loader to lift personnel.

CORRECT



Always fasten seatbelt snugly. Always keep feet on the floor/pedals when operating loader.

WRONG



Do not use loader around explosive dust or gas, or where exhaust can contact flammable material.

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V270 Skid-Steer Loader
Operator's Manual

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Loader Model Number	
Loader Serial Number	
Engine Serial Number	

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GEHL

EC DECLARATION OF CONFORMITY

1. Manufacturer: **Gehl Company**
2. Address: **One Gehl Way**
   West Bend, WI 53095 U.S.A.
   FAX: 262-334-6687
3. Technical Construction File Location:
   Attn.: Quality Manager
   915 SW 7th St.
   Madison, SD 57042 U.S.A.
4. Authorized Representative: **Gehl Europe GmbH**
5. Address: **Burgsteinfurter Damm 89**
   D-48485 Neuenkirchen/Rheine
   GERMANY
6. **We hereby declare that the model(s) listed below conforms to EC Directives: 2004/108/EC (EMC), 97/23/EC (Pressure Equipment), 2006/42/EC (Machinery) and 2000/14/EC (Noise Emission), including all current amendments.**
7. In accordance with EN/ISO Standards:
   EN ISO 3450:1996, ISO 6165
8. Category: **EARTH-MOVING MACHINERY/ LOADERS/COMPACT**
9. Model(s): **V270**
10. Directive/Conformity Assessment Procedure/Notified Body:

2004/108/EC	**Type-test**	**Self-certification**
97/23/EC	**Self-certification**	**----------**
2006/42/EC	**Self-certification**	**----------**
2000/14/EC	**Annex VIII – Full Quality Assurance**	**TÜV Industrie Service GmbH – TÜV SÜD Group Westendst. 199, D-80686 München GERMANY**

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INTRODUCTION

This Operator's Manual provides the owner/operator with information for operating, maintaining and servicing model V270 skid-steer loaders. More important, this manual provides an operating plan for safe and proper use of the machine. Major points of safe operation are detailed in the *Safety* chapter of this manual.

Users should read and understand the contents of this manual completely and become familiar with the machine before operating it. Contact your authorized Gehl dealer if you have any questions concerning information in this manual, require extra manuals, and for information concerning the availability of manuals in other languages.

Throughout this manual information is provided set in *italic* type and introduced by the word ***Note*** or ***Important***. Read carefully and comply with those messages – it will improve operating and maintenance efficiency, help avoid breakdowns and damage, and extend the machine's life.

A manual storage box in the operator's compartment behind the seat holds the Operator's Manual and AEM Safety Manual (also available in Spanish). Please return the manuals to this box and keep them with the unit at all times. If this machine is resold, these manuals should be given to the new owner.

The attachments and equipment available for use with this machine have a wide variety of applications. Read the manual provided with the attachment to learn how to safely maintain and operate the equipment. Be sure the machine is suitably equipped for the type of work to be performed.

Do not use this machine for any applications or purposes other than those described in this manual or those applicable for approved attachments. If the machine is to be used with special attachments or equipment other than those approved by Gehl Company, consult your Gehl dealer. Any person using non-approved attachments or making unauthorized modifications is responsible for the consequences.

The Gehl dealership network stands ready to provide any assistance that may be required, including providing genuine Gehl service parts. All service parts should be obtained from your Gehl dealer. Provide complete information about the part and include the model and serial numbers of the machine. Record these numbers in the space provided on the Table of Contents page as a handy reference.

Please be aware that Gehl strives to continuously improve its products and reserves the right to make changes and improvements in the design and construction of any part without incurring the obligation to install such changes on any previously delivered unit.

If this machine was purchased "used," or if the owner's address has changed, please provide your Gehl dealer or Gehl Company Service Department with the owner's name and current address, along with the machine model and serial number. This will allow the registered owner information to be updated, so that the owner can be notified directly in case of an important product issue, such as a safety update program.

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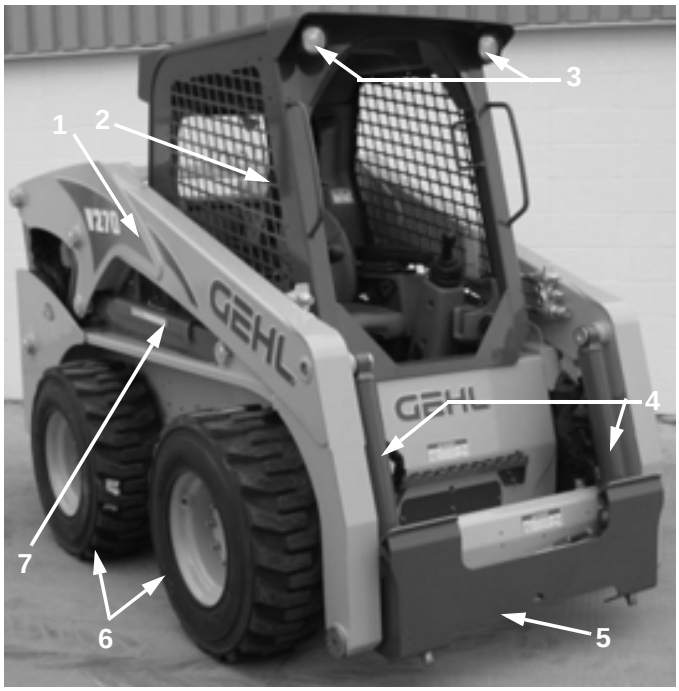
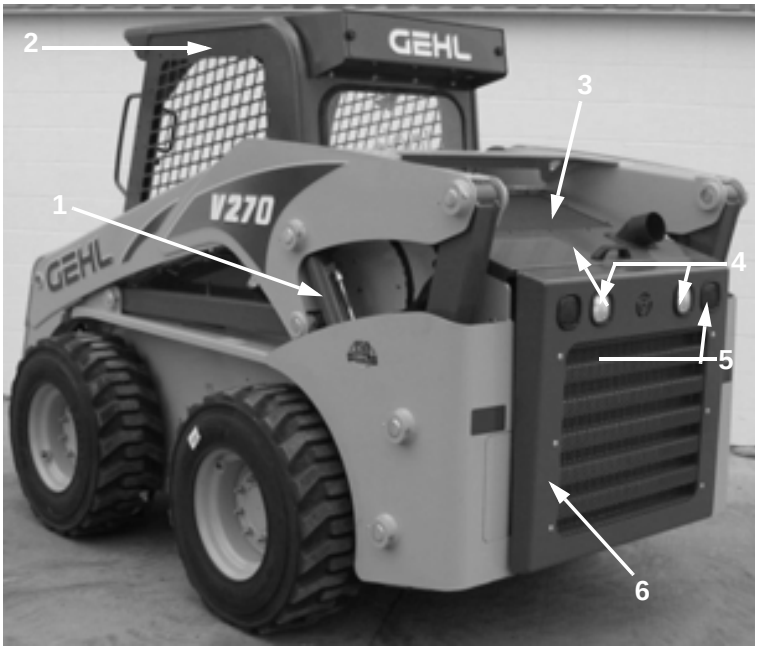
Loader Identification



1. Lift Arm
2. Restraint Bar
3. Front Work Lights
4. Tilt Cylinders
5. Attachment Bracket
6. Tires
7. Lift Arm Support Device



1. Lift Cylinder
2. Roll-Over/Falling Object Protective System (ROPS/FOPS)
3. Engine Cover
4. Rear Work Lights
5. Tail Lights (Position Lights)
6. Rear Door

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Control/Indicator Symbols

Power Off	Power On	Engine Start	Battery Charge	Electrical Power
Worklight w/Tail Lights	Worklight	Safety Alert	Hazard Flasher	Fasten Seatbelt
Horn	Read Operator's Manual	Volume – Full	Volume – Half Full	Volume – Empty
H-L High – Low	N Neutral	F Forward	R Reverse	Parking Brake
Engine Air Filter	Engine Oil	Engine Oil Filter	Engine Oil Pressure	Fuel Filter
Engine Temperature	Hydraulic System	Hydraulic Oil Temperature	Hydraulic Oil Filter	Grease Lubrication Point
Glow Indicator Lamp	Diesel Fuel	Chaincase Oil	Clockwise Rotation	Counterclockwise Rotation
Fast	Slow	Ride Control	Engine Malfunction Shutdown	Bucket – Float
Bucket – Rollback	Bucket – Dump	Lift Arm – Lower	Lift Arm – Raise	Service Hours
Lift Point	Tie-Down	Diesel Water Separator	Power-A-Tach®	

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Notes

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SAFETY

This safety alert symbol means Attention! Become alert! Your safety is involved! It stresses an attitude of safety consciousness and can be found throughout this Operator's Manual and on the decals on the machine.

Before operating this machine, read and study the following safety information. Be sure that everyone who operates or works with this machine, whether family member or employee, is familiar with these safety precautions. It is essential to have competent and careful operators, who are not physically or mentally impaired, and who are thoroughly trained in the safe operation of the machine and the handling of loads. It is recommended that the operator be capable of obtaining a valid motor vehicle operator's license.

The use of skid-steer loaders is subject to certain hazards that cannot be eliminated by mechanical means, but only by exercising intelligence, care and common sense. Such hazards include, hillside operation, overloading, instability of the load, poor maintenance and using the equipment for a purpose for which it is not intended or designed.

Gehl ALWAYS considers the operator's safety when designing its machinery, and guards exposed moving parts for the operator's protection. However, some areas cannot be guarded or shielded in order to assure proper operation. This Operator's Manual and decals on the machine warn of additional hazards, and they should be read and observed closely.

Some photographs in this manual may show doors, guards or shields open or removed for illustrative purposes only. Be sure that all doors, guards and shields are in their proper operating positions before starting the engine to operate the unit.

Different applications may require optional safety equipment, such as a back-up alarm, mirror, strobe light or an impact-resistant front door. Be sure you know the job site hazards and equip the machine as needed.

DANGER **"DANGER" indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury.**

WARNING **"WARNING" indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.**

CAUTION **"CAUTION" indicates a potentially hazardous situation, which, if not avoided may result in minor or moderate injury. May also alert against unsafe practices.**

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Mandatory Safety Shutdown Procedure

Before cleaning, adjusting, lubricating or servicing the unit, or leaving it unattended:

1. Move the drive control handle(s) to the neutral position.
2. Lower the lift arm and attachment completely. If the lift arm *must* be left in the raised position, BE SURE to properly engage the lift arm support device (page 22).
3. Move the throttle to the low idle position, shut off the engine and remove the key.
4. Before exiting, move the lift/tilt control(s) to verify that the controls do not cause movement of the lift arm and hitch.

Safety Reminders

Before Starting

- Do not modify the ROPS/FOPS unless instructed to do so in installation instructions. Modifications such as welding, drilling or cutting can weaken the structure and reduce the protection it provides. A damaged ROPS/FOPS cannot be repaired – it must be replaced.
- To ensure safe operation, replace damaged or worn-out parts with genuine Gehl service parts.
- Gehl loaders are designed and intended to be used only with Gehl attachments and approved attachments. To avoid possible personal injury, equipment damage and performance problems, use only attachments that are approved for use on and within the operating capacity of the machine. Contact your dealer or Gehl Company for information on attachment approval and compatibility with specific machine models. Gehl cannot be responsible if the machine is used with a non-approved attachment.
- Remove all trash and debris from the machine each day, especially in the engine compartment, to minimize the risk of fire.
- Always face the loader and use the handholds and steps when getting on and off the loader. Do not jump off the loader.
- Never use starting fluid (ether).
- Walk around the machine and warn all nearby personnel before starting the machine.
- Always perform a daily inspection of the machine before using it. Look for damage, loose or missing parts, leaks, etc.

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During Operation

- Machine stability is affected by: load being carried, height of the load, machine speed, abrupt control movements and driving over uneven terrain. **DISREGARDING ANY OF THESE FACTORS CAN CAUSE THE LOADER TO TIP, THROWING THE OPERATOR OUT OF THE SEAT OR LOADER, RESULTING IN DEATH OR SERIOUS INJURY.** Therefore: ALWAYS operate with the seatbelt fastened and the restraint bar lowered. Do not exceed the machine's Rated Operating Capacity. Carry the load low. Move the controls smoothly and gradually, and operate at speeds appropriate for the conditions.
- When operating on inclines or ramps, always travel with the heavier end of the loader toward the top of the incline for additional stability.
- Do not raise or drop a loaded bucket or fork suddenly. Abrupt movements under load can cause serious instability.
- Never activate the float function with the bucket or attachment loaded or raised, because this will cause the lift arm to lower rapidly.
- Do not drive too close to an excavation or ditch; be sure that the surrounding ground has adequate strength to support the weight of the loader and the load.
- Never carry riders. Do not allow others to ride on the machine or attachments, because they could fall or cause an accident.
- Always look to the rear before backing up the skid-steer loader.
- Operate the controls only from the operator's seat.
- Always keep hands and feet inside the operator's compartment while operating the machine.
- New operators must operate the loader in an open area away from bystanders. Practice with the controls until the loader can be operated safely and efficiently.
- Wear safety goggles and head protection while operating the machine. Operator must wear protective clothing when appropriate.
- Exhaust fumes can kill. Do not operate this machine in an enclosed area unless there is adequate ventilation.
- When parking the machine and before leaving the seat, check the restraint bar for proper operation. The restraint bar, when raised, deactivates the lift/tilt control and auxiliary hydraulics, and applies the parking brake.

Maintenance

- Never attempt to by-pass the key switch to start the engine. Use only the jump-starting procedure detailed in the *Operation* chapter of this manual.
- Never use your hands to search for hydraulic fluid leaks. Instead, use a piece of paper or cardboard. Escaping fluid under pressure can be invisible and can penetrate the skin and cause serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid must be surgically removed by a doctor or gangrene may result.

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- Always wear safety glasses with side shields when striking metal against metal. In addition, it is recommended that a softer (chip-resistant) material be used to cushion the blow. Failure to heed could lead to serious injury to the eyes or other parts of the body.
- Do not smoke or have any spark-producing equipment in the area while filling the fuel tank or while working on the fuel or hydraulic systems.

Potential Hazards

A skid-steer loader operator must ALWAYS be conscious of the working environment. Operator actions, the environmental conditions and the job being preformed require the full attention of the operator so that safety precautions can be taken.

ALWAYS maintain a safe distance from electric power lines and avoid contact with any electrically charged conductor or gas line. Accidental contact or rupture can result in electrocution or an explosion. Contact the North American One-Call Referral System at 8-1-1 in the U.S., or 1-888-258-0808 in the U.S and Canada, for the local “Digger's Hotline” number or the proper local authorities for utility line locations BEFORE starting to dig!

Exposure to crystalline silica (found in sand, soil and rocks) has been associated with silicosis, a debilitating and often fatal lung disease. A Hazard Review (Pub. No. 2002-129) by the U.S. National Institute for Occupational Safety and Health (NIOSH) indicates a significant risk of chronic silicosis for workers exposed to inhaled crystalline silica over a working lifetime. NIOSH recommends an exposure limit of 0.05 mg/m^3 as a time-weighted average for up to a 10-hr. workday during a 40-hr. workweek. NIOSH also recommends substituting less hazardous materials when feasible, using respiratory protection and regular medical examinations for exposed workers.

Safety Decals

The skid-steer loader has decals that provide safety information and precautions around the loader. These decals must be kept legible. If missing or illegible, they must be replaced promptly. Replacements can be obtained from your Gehl dealer. If there is a decal on a part that is to be replaced, be sure that the decal is applied to the replacement part.

New Decal Application

Surfaces must be free of dirt, dust, grease and foreign material before applying the decal. Remove the smaller portion of the decal backing paper and apply the exposed adhesive to the clean surface, maintaining proper position and alignment. Peel the rest of the backing paper and apply hand pressure to smooth out the decal surface. Refer to the following pages for proper decal location. Text decals begin on page 9; no-text decals begin on page 13.

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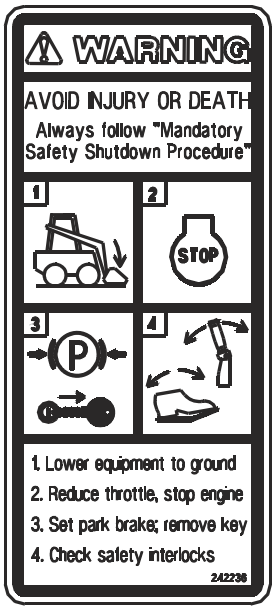
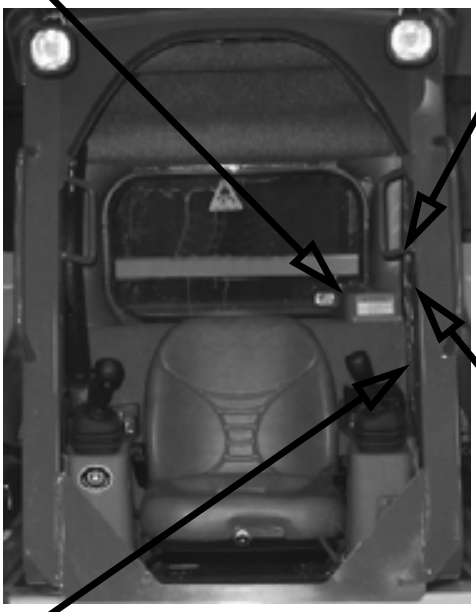
ANSI-Style Safety Decals inside the ROPS/FOPS

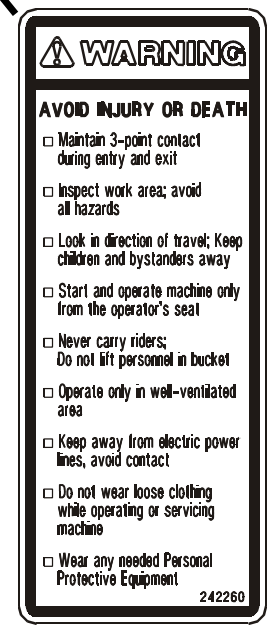
242582 – Located behind operator's left shoulder



242236 – Located on upper left instrument panel



242397 – Located on lower left instrument panel



242260 – Located on upper left instrument panel

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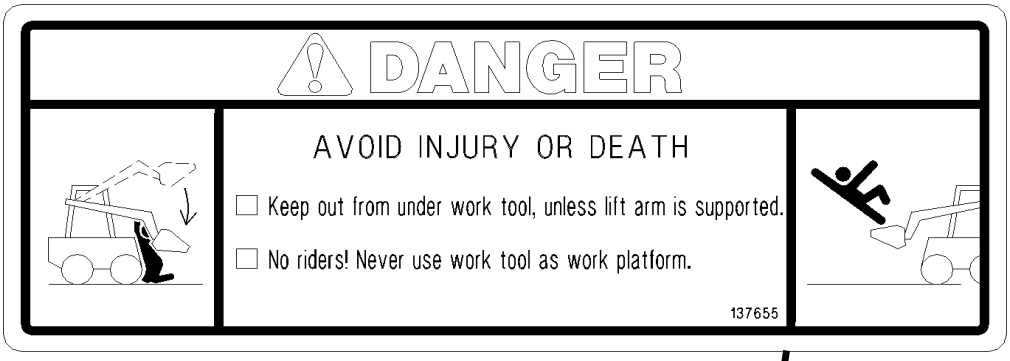
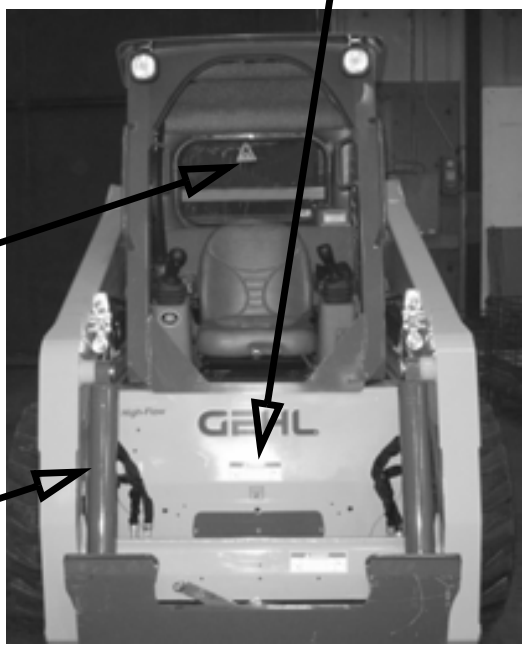
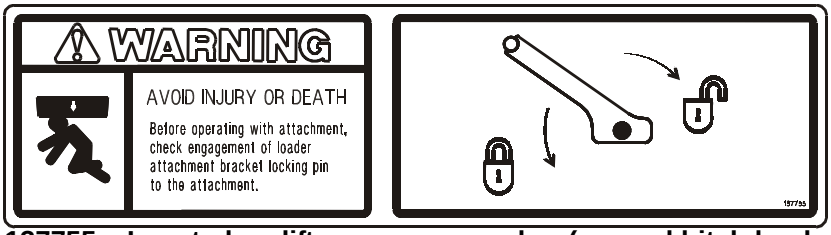
ANSI-Style Safety Decals on the outside of the Loader



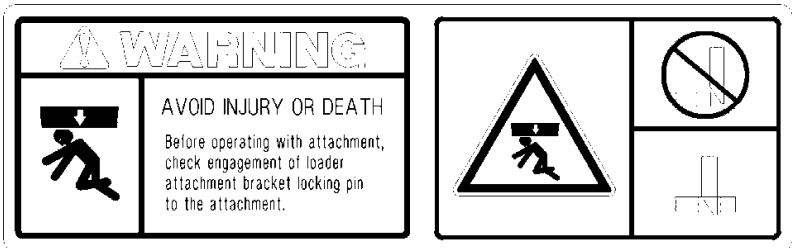
137655 – Located on front of loader

132166 – Located on rear window emergency exit





137755 – Located on lift arm crossmember (manual hitch loaders only)



139101 – Located on lift arm crossmember (power hitch loaders only)

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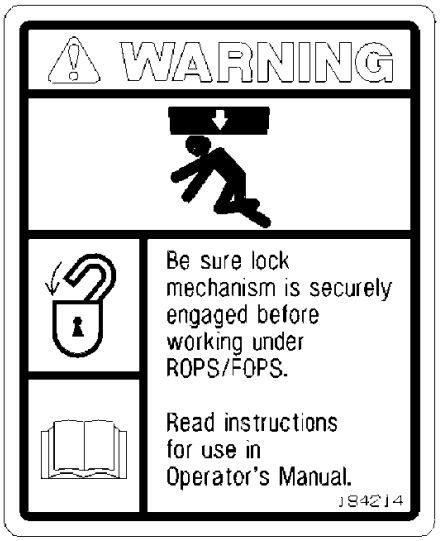
ANSI-Style Safety Decals on the outside of the Loader

137637 – Located on lift arm support device



184214 – Located under the ROPS/FOPS

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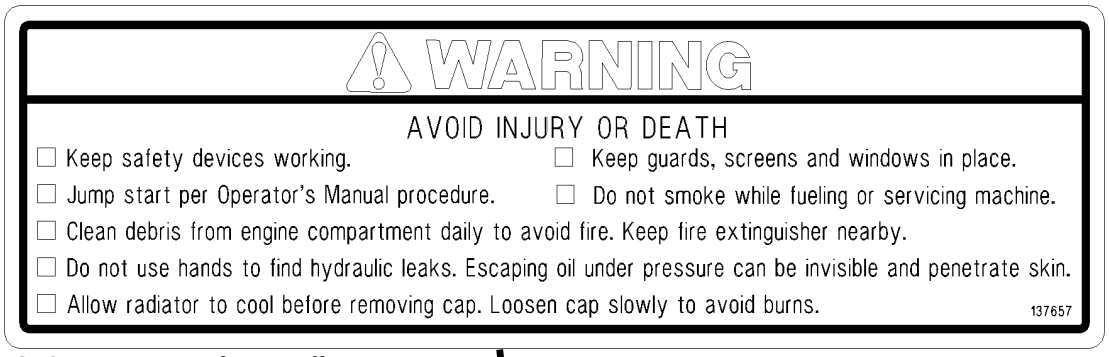
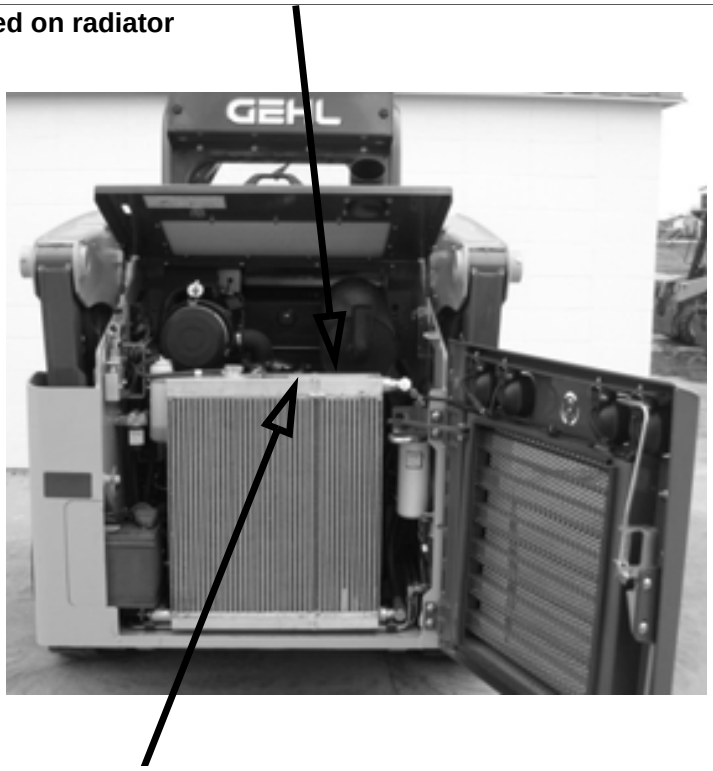
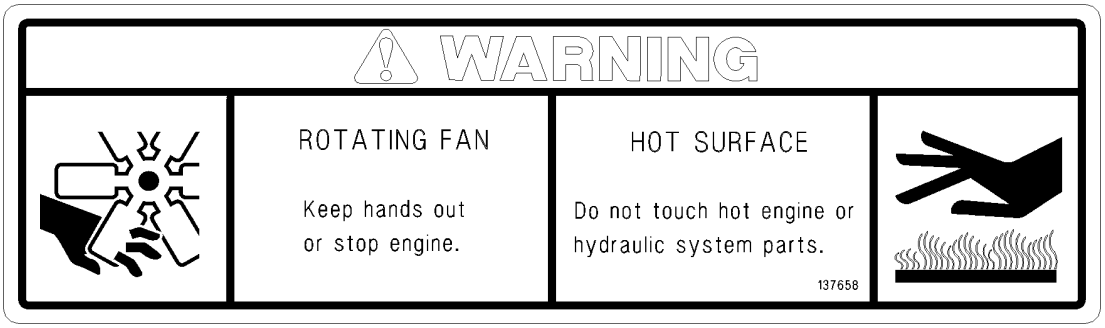
ANSI-Style Safety Decals in the Engine Compartment



137657 – Located on radiator





137658 – Located on fan shroud

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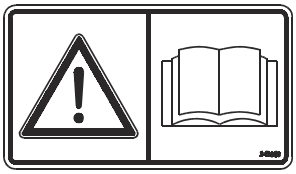
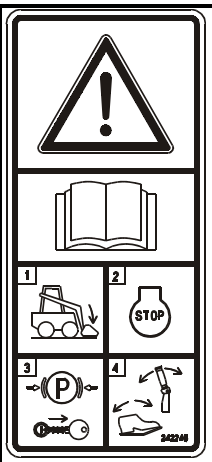
ISO-Style (used Internationally) Safety Decals inside the ROPS/FOPS



242568 – Located behind operator's left shoulder

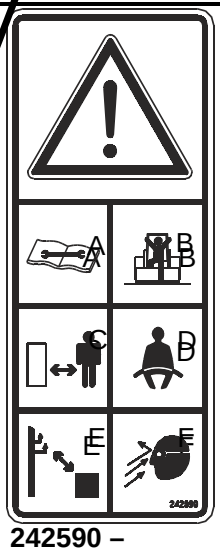
Safety alert: Read Operator's Manual and all safety signs before using machine. The owner is responsible to ensure all users are instructed on safe use and maintenance.



Safety alert: Always follow "Mandatory Safety Shutdown Procedure" in Operator's Manual.

1 – Lower equipment to ground.
2 – Reduce throttle, stop engine.
3 – Apply parking brake; remove key.
4 – Check safety interlocks.

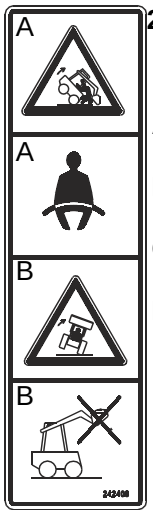
242246 – Located on left instrument panel



242590 – Located on left instrument panel

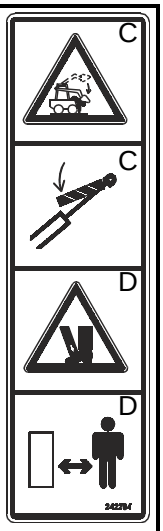
Safety alert:

A – Check machine before operating; Service per Operator's Manual. Contact dealer (or manufacturer) for information and service parts.
B – Maintain 3-point contact during entry and exit.
C – Inspect work area. Avoid all hazards. Look in direction of travel. Keep children and bystanders away.
D – Start and operate machine only from seat.
E – Keep away from power lines; avoid contact.
F – Wear any needed Personal Protective Equipment. Do not wear loose clothing while operating or servicing machine.



242408 – Located on operator's lower left side

A – Forward tip hazard: Fasten seat belt. Carry load low. Do not exceed Rated Operating Load.
B – Side tip hazard: Avoid steep slopes and high speed turns. Travel up and down slopes with heavy end uphill.
C – Crush hazard: Keep out from under lift arm unless lift arm is supported.
D – Crush hazard: Keep hands, feet and body inside cab when operating.



137843 – Located on operator's lower right side

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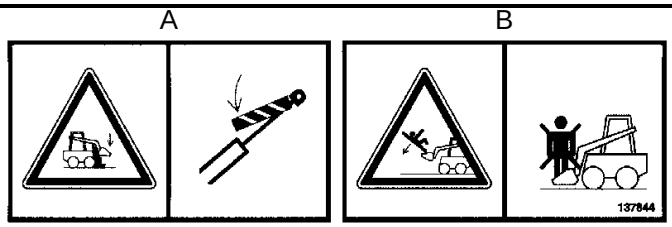
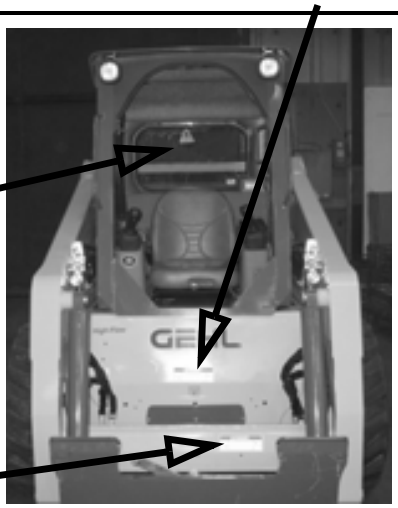
ISO-Style (used Internationally) Safety Decals on the outside of the Loader

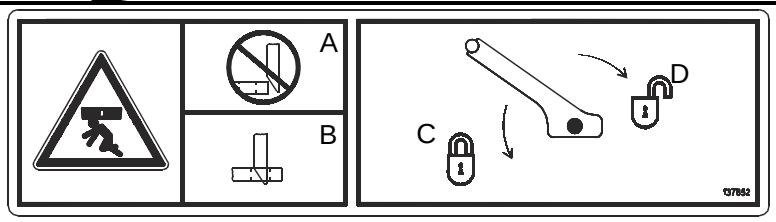


137844 – Located on front of loader

A – Crush hazard: Keep out from under work tool unless lift arm is supported.
B – Fall hazard: No riders. Never use work tool as work platform.

132166 – Located on rear window emergency exit

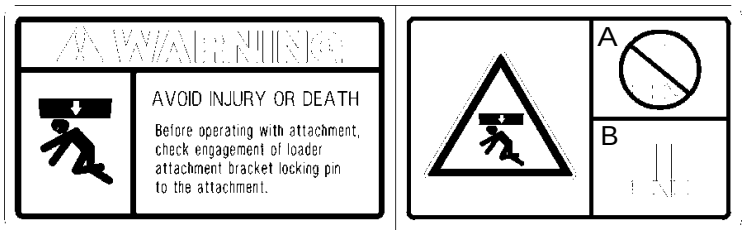




137852 – Located on hitch (manual hitch loaders only)

Crush hazard: Before operating with attachment, check engagement of hitch locking pin to the attachment:

A – Incorrect attachment engagement
B – Correct attachment engagement
C – Lock hitch lever
D – Unlock hitch lever



139101 – Located on hitch (power hitch loaders only)

Crush hazard: Before operating with attachment, check engagement of hitch locking pin to the attachment:

A – Incorrect attachment engagement
B – Correct attachment engagement

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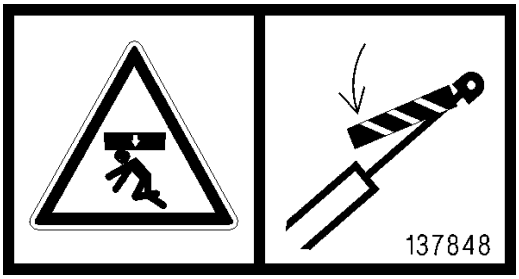
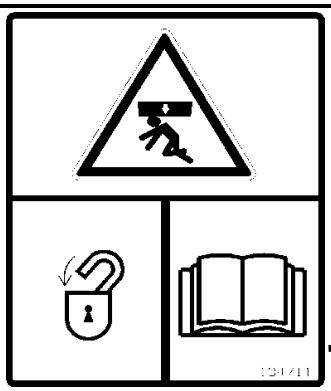
ISO-Style (used Internationally) Safety Decals on the outside of the Loader



137848 – Located on the lift arm locking device

Crush hazard: Hose removal or component failure can cause lift arm to drop. Always use lift arm support device when leaving lift arm raised for service.



184711 – Located under the ROPS/FOPS

Crush hazard: Be sure lock mechanism is securely engaged before working under ROPS/FOPS. Read instructions for use in Operator's Manual.

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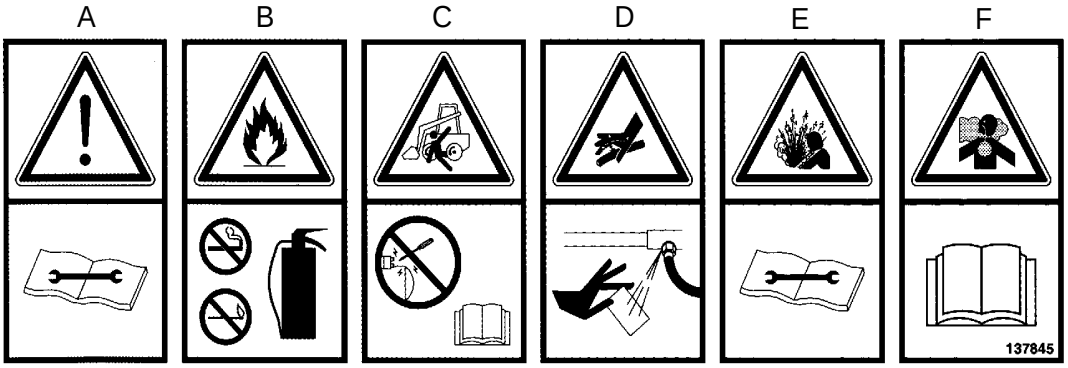
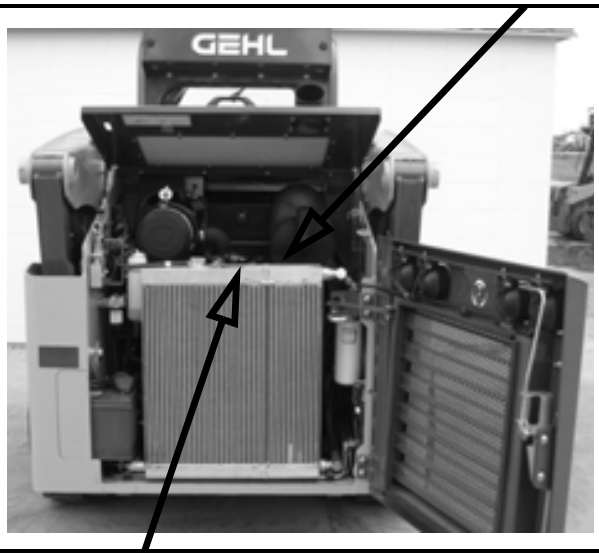
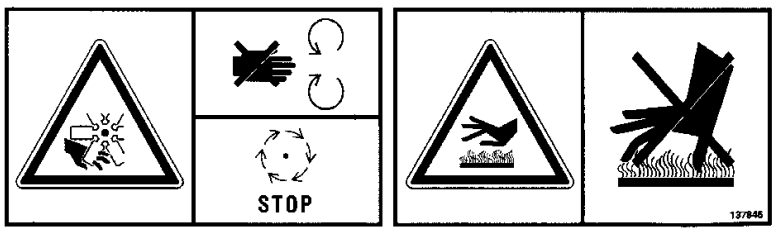
ISO-Style (used Internationally) Safety Decals in the Engine Compartment



137845 – Located on radiator

A – Safety alert: Keep safety devices in place and in working order. Keep guards, screens and windows in place.
B – Fire hazard: Do not smoke while fueling or servicing machine. Clean debris from engine compartment daily to avoid fire. Keep fire extinguisher nearby.
C – Run-over hazard: Jump-start per Operator's Manual procedure.
D – Oil injection hazard: Do not use hands to find hydraulic leaks. Escaping oil under pressure can be invisible and penetrate skin. Use a piece of cardboard to find leaks.
E – Burn hazard: Allow radiator to cool before removing cap. Loosen cap slowly to avoid burns.
F – Suffocation hazard: Operate only in a well-ventilated area.





137846 – Located on radiator

A – Rotating fan: Keep hands out or stop engine.
B – Hot surface: Do not touch hot engine or hydraulic system parts.

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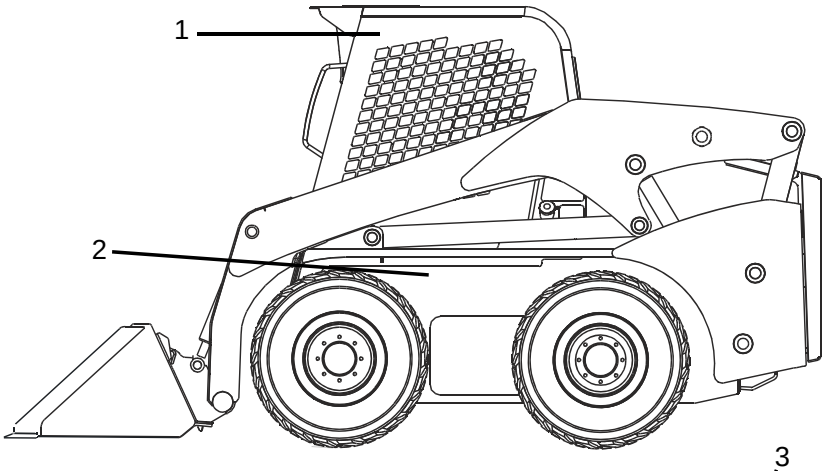
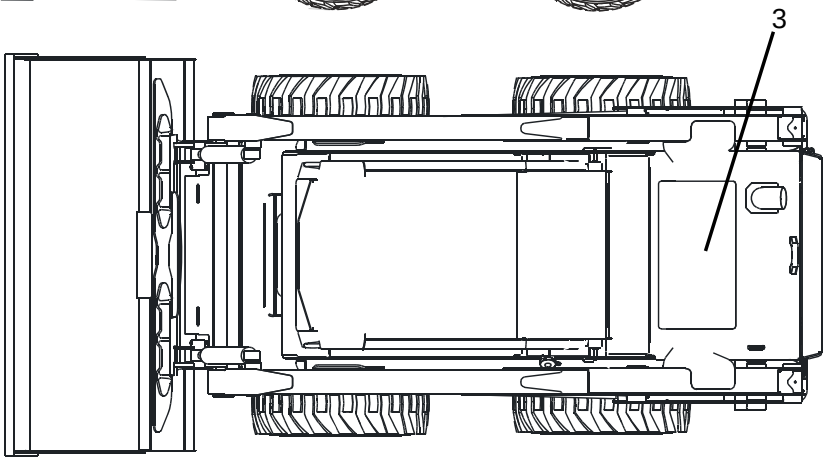
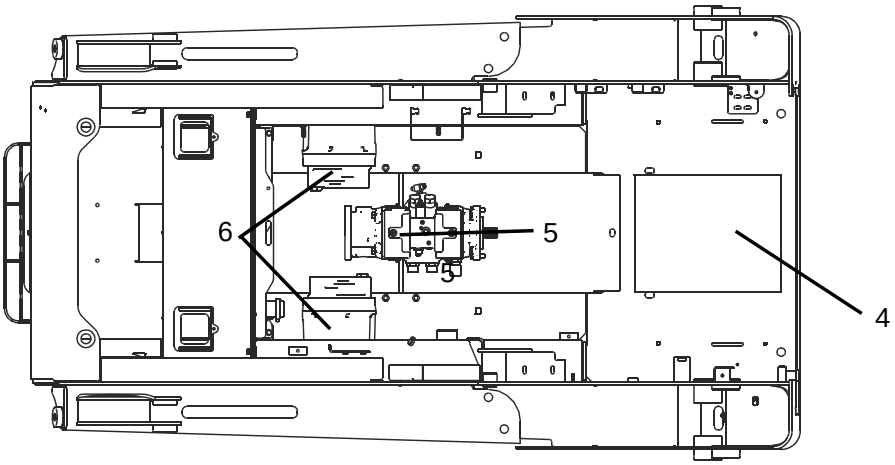
Product and Component Plate Locations







Product and Component Plates

1. Operator protective system plate: with, e.g., model, certification and operator protective system serial number
2. Seat plate according to ISO 7096
3. Product plate: with Product Identification Number and, e.g., model/type designation
4. Engine plate: with, e.g., type designation, product and serial numbers
5. Component plate hydrostatic pump: with, e.g., product and serial numbers
6. Component plate drive motor: with, e.g., product and serial numbers

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Notes

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CONTROLS AND SAFETY EQUIPMENT

WARNING **Become familiar with and know how to use all safety devices and controls on the skid-steer loader before operating it. Know how to stop loader operation before starting it. This Gehl loader is designed and intended to be used only with Gehl attachments or Gehl-approved referral attachments or accessories. Gehl cannot be responsible for operator safety if the loader is used with non-approved attachments.**

Guards and Shields

Whenever possible and without affecting loader operation, guards and shields are provided to protect against potentially hazardous areas. In many places, safety decals are also provided to warn of potential hazards and/or to display special operating procedures.

WARNING **Read and thoroughly understand all safety decals on the loader before operating it. Do not operate the loader unless all factory-installed guards and shields are properly secured in place.**

Operator Restraint Bar

Lower the operator restraint bar after entering the operator's compartment and sitting in the seat. The restraint bar is securely anchored to the ROPS/FOPS. The operator must be seated with the restraint bar in its lowered position to start or operate the skid-steer loader. Refer to *Safety Interlock System* on page 20 for more information.

The restraint bar provides for-aft adjustment that allows the operator to determine the most comfortable position of the restraint bar. The right and left portions of the restraint bar system can be adjusted independent of one another by pushing the lever on the lower inside of either pad. The restraint pad can then be used to adjust to the desired position. The restraint pad locks in place when it is released.

WARNING **Never defeat the operator restraint bar or seat switch electrically or mechanically. Always wear the seatbelt.**

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Operator's Seat

The seat is mounted on rails for rearward and forward repositioning. A spring-loaded lever activates the seat position adjustment mechanism.

Suspension seat: A weight adjustment knob is provided for individual operator adjustment.

Air Suspension Seat: Adjust air suspension seat by pushing in the knob on the air seat to increase the amount of suspension. Pull knob out to release air and decrease the suspension level.

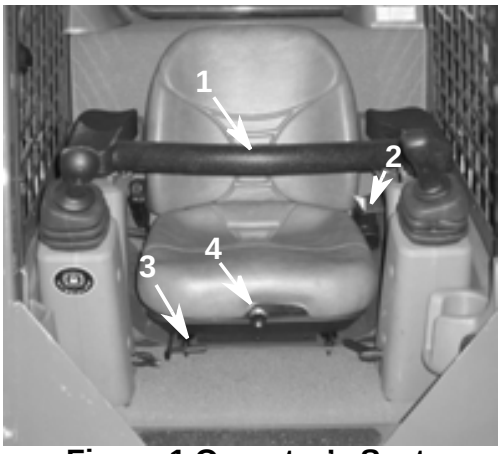

Figure 1 Operator's Seat

1. Restraint Bar
2. Seatbelt
3. Seat Position Adjustment Lever
4. Suspension Seat Weight Adjustment Knob (optional)

Upper-Torso Restraint

WARNING **Always wear the upper-torso restraint when operating in high speed.**

The seatbelt should always be fastened during operation.

Important: *Inspect the seatbelt(s) for damage before use, and replace if damaged. Keep seatbelt(s) clean. Use only soap and water to wash seatbelt(s). Cleaning solvents can cause damage to seatbelt(s).*

Safety Interlock System

Hydraloc™

WARNING **NEVER defeat the safety interlock system by mechanically or electrically bypassing any switches, relays or solenoid valves.**

An interlock system is provided on the loader for operator safety. Together with solenoid valves, switches and relays, the interlock system:

- Prevents the engine from starting unless the operator is sitting on the seat and the operator restraint bar is lowered.
- Disables the lift arm, auxiliary hydraulics, attachment tilt and wheel drives whenever the operator leaves the seat, turns the keyswitch to OFF or raises the restraint bar.

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Note: *The auxiliary hydraulic circuit can be detented in the "on" position for continuous operation with the restraint bar raised and operator out of the seat. (See Auxiliary Hydraulic Controls, page 36.)*

Testing the Safety Interlock System

Before exiting the machine, check the safety interlock system for proper operation:

Restraint Bar

With the engine running, raise the restraint bar. Test each of the controls. There should be no more than a slight movement of the lift arm, hitch and machine. If there is any significant movement, troubleshoot and correct the problem immediately. Contact your dealer if necessary.

Seat Switch

With the engine off and the restraint bar lowered, unfasten the seatbelt, and lift your weight off the seat. Try to start the engine. If the engine starts, turn off the engine, troubleshoot and correct the problem. Contact your dealer if necessary.

ROPS/FOPS

The ROPS/FOPS (Roll-Over/Falling Object Protective Structure) is designed to provide protection for the operator from falling objects and in a tip over accident, if the operator is secured inside the operator's compartment by the seatbelt and restraint bar.

WARNING **Never operate the loader with the ROPS/FOPS removed or locked back.**

Parking Brake

This skid-steer loader is equipped with a spring-applied, hydraulic-released parking brake. The parking brake engages when the operator lifts the restraint bar, exits the seat or shuts off the engine. The brake can also be applied manually by using the switch located on the left instrument panel. A red indicator in the switch lights when the parking brake is applied.

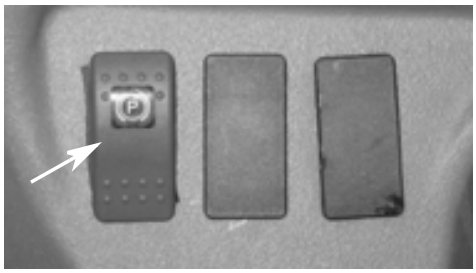

Figure 2 Parking Brake Switch

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Horn (optional)

Pressing the button on the right side of the left hand control handle sounds the horn.

Rear Window Emergency Exit

The ROPS/FOPS rear window has three functions: noise reduction, flying objects barrier and emergency exit.

To use the emergency exit, pull on the yellow warning tag at the top of the window and remove the seal. Push or kick out the window and then exit.

See your local automotive glass specialist to reinstall the window.

Lift Arm Support Device

The lift arm support device is used as a cylinder lock to prevent the raised lift arm from lowering unexpectedly. Be sure to install the support device when the lift arm is raised for service. When the support device is not being used, return it to its storage position. The support device is a safety device, which must be kept in proper operating condition at all times. The following steps ensure correct usage:

WARNING With the key switch OFF and the solenoid valve working properly, the lift arm will stay raised when the lift control is moved to lower the lift arm. If the valve does not hold the lift am and it begins to lower do not leave the operator's compartment. Instead, lower the lift arm and exit the machine. Then, contact your Gehl dealer immediately to determine why the lift arm lowers while the key switch is OFF.

Installation

To install the lift arm support device:

1. Raise the lift arm to full height.
2. Stop the engine.
3. Move the lift arm control to "lower" to verify that the lift arm is being held in the raised position by the safety interlock system.
4. Have an assistant remove the lift arm support device from its storage location (Figure 4) on the right side of the machine and install the lift arm support device on the left lift cylinder (Figure 3).

   A) Or if an assistant is not available, double-check that the lift arm is being held in the raised position, and then carefully exit the machine, and install the lift arm support device on the left lift cylinder (Figure 3).

Figure 3 Lift Arm Support Device Engaged

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5. Restart engine.
6. Slowly lower the lift arm until it engages and locks against the lift arm support device.
7. Stop the engine, and exit that machine.

Removal

WARNING The safest method of installing and removing the lift arm support device requires two people – one person inside the loader and another person outside the loader to install the support device.

To return the lift arm support device to its storage position:

1. Start the engine;
2. Raise the lift arm fully;
3. Stop the engine;
4. Verify that the lift arm is being held in the raised position by the safety interlock system.

WARNING **With the key switch OFF and the solenoid valve for the safety interlock system functioning properly, the lift arm will stay raised when the lift control is moved to "lower". If the lift arm moves, do NOT leave the operator's compartment. Instead, have an assistant remove the support device for you. Then, contact your Gehl dealer to determine the reason why the lift arm lowers while the key switch is in the OFF position.**

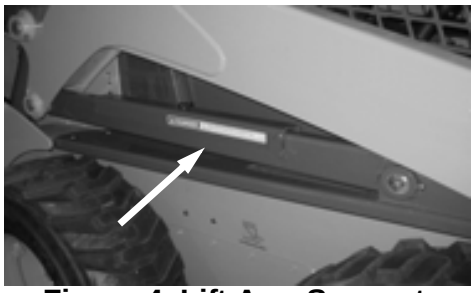

Figure 4 Lift Arm Support Device Storage Location

5. Have an assistant remove the lift arm support device.

   A) Or, if an assistant is not available verify that the lift arm is being held in the raised position, and then exit the machine, remove the lift arm support device and carefully re-enter the machine.
6. Lower the lift arm and secure the lift arm support device with the hand knob in the storage location (Figure 4).

Accessory Plug

The 12-v accessory plug is located at the bottom of the right instrument panel.

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Dome Light

The dome light is located on the right side of the ROPS/FOPS headliner. Push on the dome light to switch it on.

Work Lights

Loaders have two sets of work lights. The front work lights are located at the top of the ROPS/FOPS. The rear work lights are located at the top of the rear door.

Heater (optional)

Loaders with the optional heater have a rotary switch on the left instrument panel to control the fan speed.

Heater and Air Conditioner (optional)

Loaders with the combination heater/air conditioner have two controls on the left instrument panel: fan speed, heater/air conditioner on/off.

1. **Fan Speed:** Controls the air flow.
2. **Heater/Air Conditioner Selector Switch:** Turns on either the heater or the air conditioner.

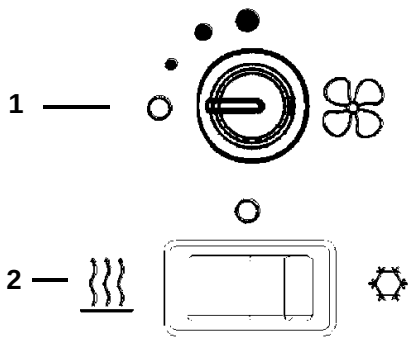

Figure 5 Heater/ Air Conditioner Controls

Engine Speed Control

An engine speed control (Figure 6) is provided for setting the engine speed. Move the control clockwise to increase the engine speed, and counter-clockwise to decrease the engine speed.

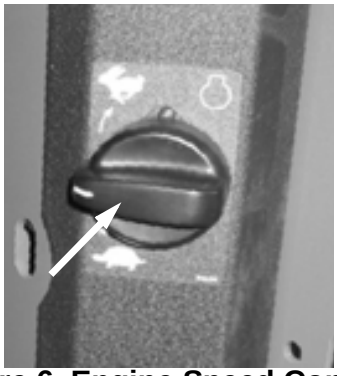

Figure 6 Engine Speed Control

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With joystick controls, a foot pedal is provided as a secondary throttle, which can be used to override the engine speed control. If the foot throttle is released, the engine will return to the speed set by the engine speed control.

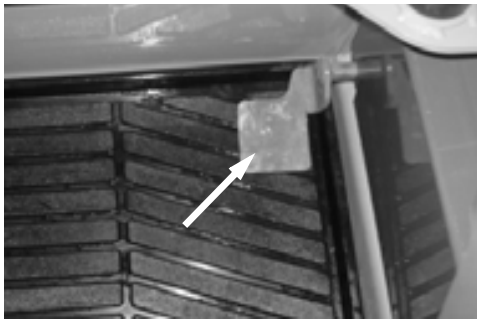

Figure 7 Foot Throttle (Joystick control units)

Two-Speed Drive (optional)

Loaders with the optional two-speed transmission use the left button on the left control handle for shifting between High (H) and Low (L). Shifting to High allows the machine to exceed 8 mph (13 km/h), up to a maximum speed of 11.2 mph (18 km/h). When the loader is in High (H) an H icon on the Indicator and Warning Light Display (page 27) will illuminate.

Hydraglide™ Ride Control System

The right button on the right control handle is used for shifting between normal mode and ride control mode. The ride control system provides a smoother ride over uneven surfaces. Press the button once to activate the system, and again to deactivate. The ride control system is automatically deactivated when the machine is shut off.

WARNING **When ride control is activated, the lift arm may drop slightly without a load, or several inches with a heavy load.**

Attachment Mounting

The skid-steer loader is equipped with either the standard manual All-Tach® hitch or optional Power-A-Tach® hitch for mounting a bucket or other attachments (Figure 8).

All-Tach® Hitch

A manual latch lever engages the latch pins. While standing outside the machine, rotate the lever all the way to the left to engage the latch pins. Rotate the lever (as viewed from the front) all the way to the right to disengage the latch pins. (Refer to page 40 for more information.)

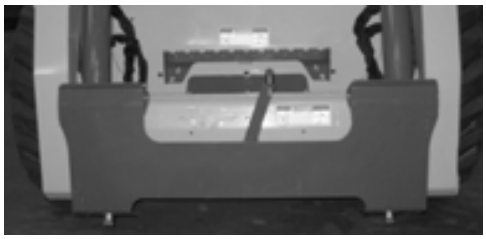

Figure 8 All-Tach® Hitch

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WARNING **To prevent unexpected release of the attachment from the hitch, be sure to secure the latch pins by rotating the levers all the way to the stops.**

Power-A-Tach® System

Two switches are used to operate the Power-A-Tach System hitch. The Power-A-Tach switch on the left instrument panel energizes the system. To operate the Power-A-Tach system, press and hold this switch.

Then with the circuit energized, the Power-A-Tach switch on the right instrument panel is used to move the latch pins. Press the top of the switch to retract the latch pins (and disengage the attachment.) Press the bottom of the switch to extend the latch pines and engage the attachment. (Refer to page 40 for more information.)

WARNING To prevent unexpected release of the attachment from the hitch, be sure the latch pins are secure by verifying that the pin flags have moved fully to the outside of the hitch.

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Indicator and Warning Lamp Display

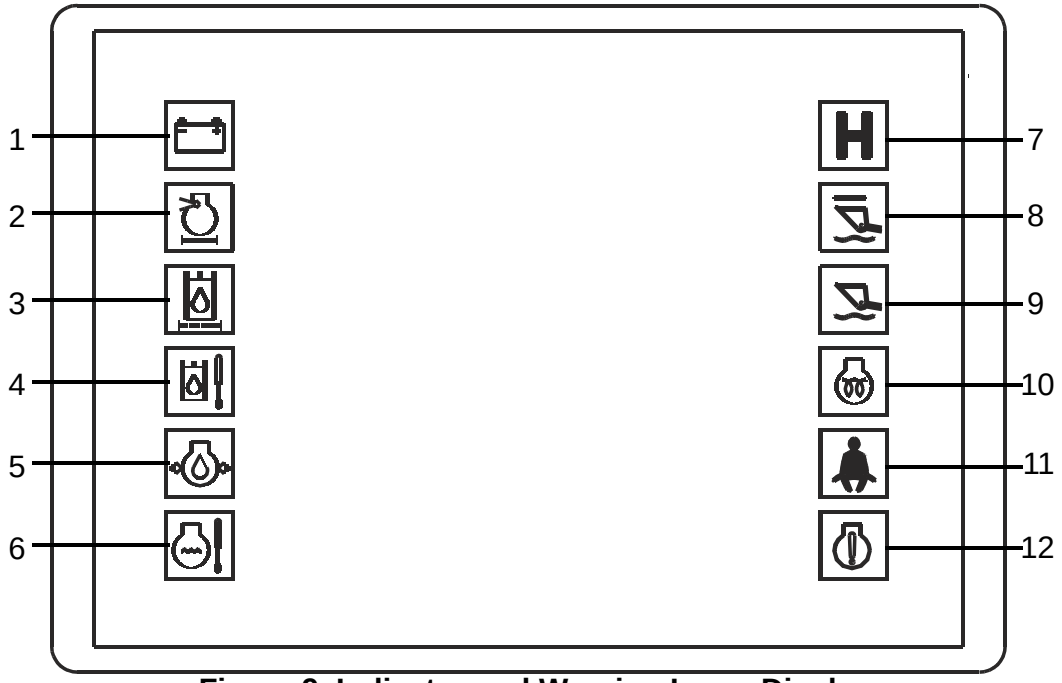

Figure 9 Indicator and Warning Lamp Display

The instrument panels and the indicator and warning lamp display (Figure 9) contain the switches and indicator lamps. Symbols on the indicator lamps are visible only when the indicator lamp are on.

Indicator and Warning Lamp Display

1. **Battery** – Lights if the charging voltage is too high or too low. During normal operation this indicator should be OFF.
2. **Engine Air Filter** – Lights when a restriction in the engine air filter is detected. Warning the operator to clean or replace the element in the engine air cleaner. During normal operation this indicator should be OFF.
3. **Hydraulic Oil Filter** – Lights if the hydraulic filter becomes restricted, warning the operator to stop the engine, allow the engine to cool, and then change the oil and filter. During normal operation this indicator should be OFF.
4. **Hydraulic Oil Temperature** – Lights if the hydraulic oil is too hot, warning the operator to reduce the hydraulic load and determine the cause of the high temperature. During normal operation this indicator should be OFF.
5. **Engine Oil Pressure Warning** – Lights if the engine oil pressure is too low, warning the operator to immediately stop the engine and determine the cause for the low pressure. During normal operation this indicator should be OFF.
6. **Engine Coolant Temperature** – Lights if the engine coolant is too hot, warning the operator to stop the engine and determine and correct the cause of the high temperature. During normal operation this indicator should be OFF.
7. **High-Speed** – Lights when high speed is engaged.
8. **Hydraglide™ Ride Control System** – Lights when the ride control system is activated.

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9. **Float Indicator** – Lights when the lift arm “float” function is activated.
10. **Pre-heat Indicator Lamp** – Lights when the (automatic) pre-heat is active. During normal operation this indicator should be OFF.
11. **Fasten Seatbelt** – A momentary visual (and audible) indicator to remind the operator to fasten the seatbelt(s).
12. **Engine Malfunction Shutdown Indicator** – Lights when the engine electronic control unit (ECU) has detected a failure warranting an automatic shutdown. The indicator lamp also displays error codes when the key switch is turned to the “on” position. See Engine Diagnostics chart on page 63.

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Left Panel

1. **Indicator and Warning Lamp Display** – See page 27.
2. **Rotating Beacon/Strobe Switch (optional)** – Controls the warning lamp (strobe or beacon).
3. **Hazard/Flasher Switch (optional)** – Controls hazard/flasher.
4. **High/Low Beam Switch (EU optional)** – Controls road head lights between main/upper beams and dimmed/lower beams. Switch does not turn lights on or off.
5. **Turn Signal Switch (EU optional)** – Used to turn on turn indicator lights. Directional indicator lights are the same lights as the flashers. The flashers will override the turn signals.
6. **High-Flow Auxiliary Switch (optional)** – Controls the direction of hydraulic oil flow. Push the right side of the rocker switch for forward flow, or the left side for reverse flow. To disengage, push and release either side of the switch, or raise the restraint bar. Turning off the machine and restarting the engine will also reset the high-flow to neutral.
7. **Power-A-Tach® System Switch** – Used to energize Power-A-Tach System. (See page 31, Number 8)

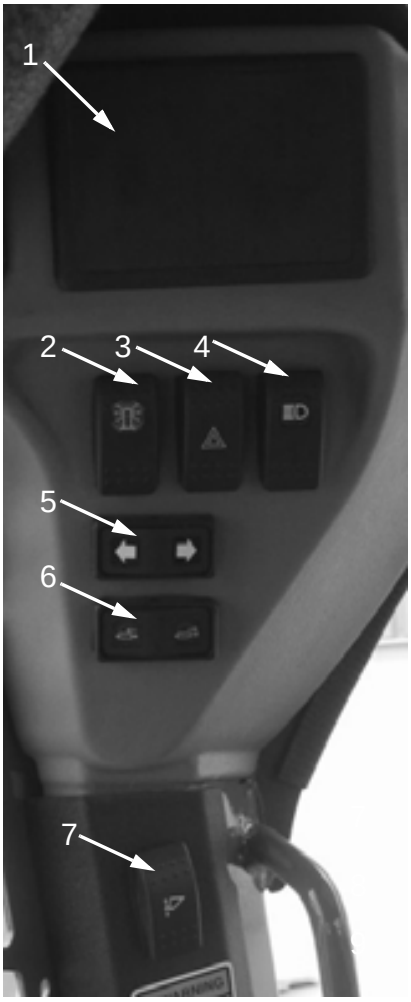

Figure 10 Left Panel

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8. **Light Switch** – Controls all the lights on the loader. Symbols denote the four positions of the light switch. In a clockwise direction these are:

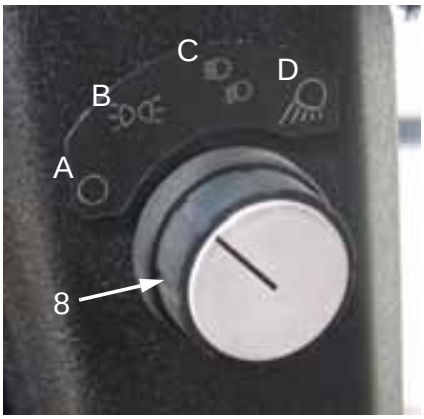

Figure 11 Lower Left Panel

Domestic Machines:

A – Off

B – Tail lights (position lights), if the machine has the optional flasher kit, the lights will be on steady. If the flasher switch is set to on, the position lights be over-ridden and the lights will flash.

C – Front work/road lights with rear tail lights (position lights)

D – Front and rear work lights

Eu Machines:

A – Off

B – Position lights on the four corners of the machine (EU-light kit) are lighted steady. If the turn signal (EU Option) is activated while the position lights are on, the selected side will flash, while the other side will be lighted steady.

C – Road lights are on as rear tail lights (position lights)

D – Front and rear work lights

For the lights to function, the keyswitch must be in the RUN position.

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Right Panel

1. Fuel Level Gauge – Displays the amount of fuel in the tank.
2. **Engine Coolant Temperature Gauge** – Displays the temperature of the engine coolant.
3. **Parking Brake Switch** – Used to manually apply the parking brake. Lights when the parking brake is applied.
4. **Front Wiper/Washer (optional)** –
5. **Rear Wiper/Washer (optional)** –
6. **Hourmeter** – Displays the total operating hours of the loader.
7. **Keyswitch** – In a clockwise rotation, the positions are:
   - **OFF Position** – With the key vertical, power from the battery is disconnected from the controls and instrument panel electrical circuits. This is the only position from which the key can be inserted or removed.
   - **ON (or RUN) Position** – With the key turned one position clockwise from vertical, power from the battery is supplied to all control and instrument panel circuits.
   - **START Position** – With the key turned fully clockwise, the electric starter engages, to start the engine. Release the key to RUN position after the engine starts.

Note: *The engine cannot be started unless the operator is sitting in the seat and the restraint bar is lowered.*

8. **Power-A-Tach® System Switch** – Used to actuate the Power-A-Tach® System.Used with the Power-A-Tach System Energize Switch (page 29, Number 7) Press the top of the switch to retract (release) the hitch pins; press the bottom of the switch to extend (engage) the hitch pins.

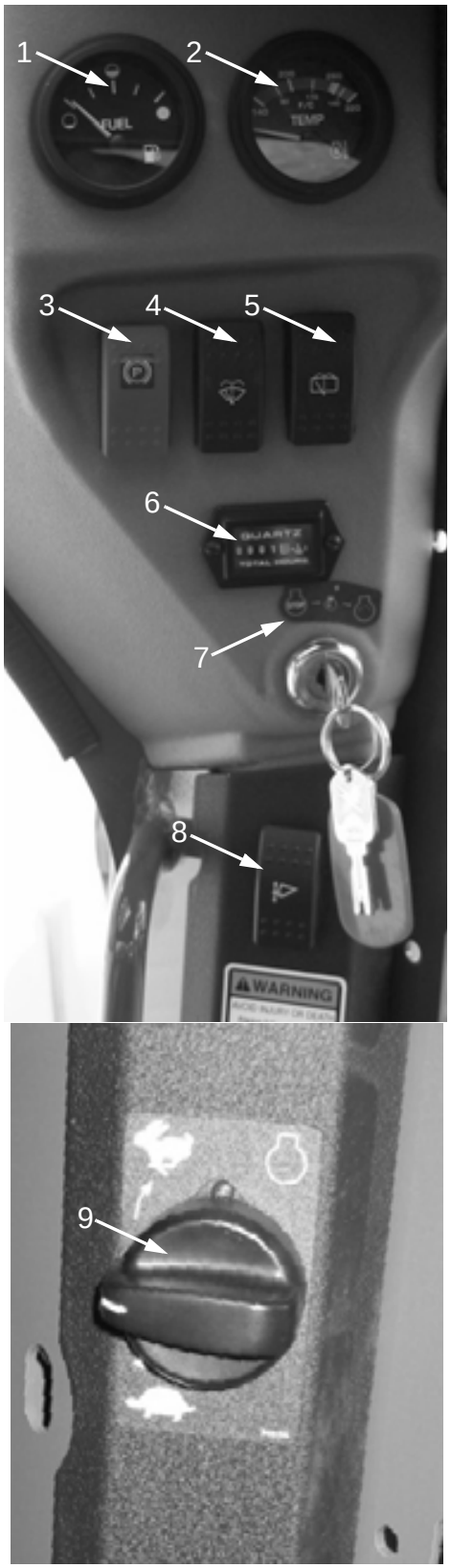

Figure 12 Right Panel

9. **Engine Speed Control** – Controls the engine speed. Move the control clockwise to increase and counter-clockwise to decrease the engine speed.

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Joystick Controls

The loader may be equipped with dual joystick controls, (Figure 13). The left joystick controls the drive, and the right joystick controls the lift/tilt.

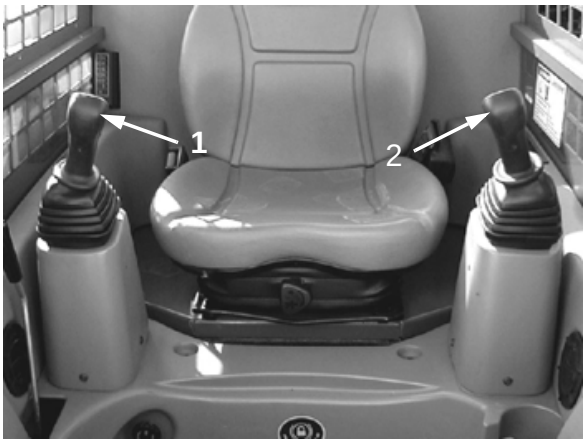

Figure 13 Joystick Controls

1. Lift/Tilt Control
2. Drive Control

Drive Controls

Forward, reverse, speed and turning maneuvers are accomplished by movement of the left joystick. To go **forward**, push the drive control forward; for **reverse**, pull the control rearward. To turn **right**, push the control right; to turn **left**, push the control left. To go **forward and left**, move the control forward and left. To go **forward and right**, move the control forward and right. To move **back and left**, move the control back and to the right. To move **back and right**, move the control back and to the left.

WARNING **Be sure the joystick controls are in neutral before starting the engine. Operate the controls gradually and smoothly. Excessive speed and quick control movements without regard for conditions and circumstances are hazardous and could cause an accident.**

Moving the joystick farther from neutral increases the speed steadily to the maximum travel speed. Tractive effort decreases as speed increases. For maximum tractive effort, move the joystick only slightly away from the neutral position. The engine may stall if the control is moved too far forward when loading the bucket.

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Lift/Tilt Control

Moving the lift arm and tilting the attachment are accomplished by movement of the right joystick. To **raise** the lift arm, pull the control straight rearward; to **lower** the lift arm, push the control straight forward. To **tilt the attachment forward and downward**, move the control to the right; to **tilt the attachment up and back**, move the control to the left.

Note: *The speed of the lift/tilt motion is directly proportional to the amount of joystick movement and engine speed.*

To place the lift arm into the “float” position, push and hold the left button on the right joystick. This mode allows the lowered lift arm to follow the ground contour while traveling over changing ground conditions. An indicator lamp in the left instrument panel will blink when float is activated.

WARNING **Never push the float control button with the attachment raised, because this will cause the lift arm to lower very rapidly.**

Releasing the float button will cancel the float mode if the button was pressed less than five seconds. If the float mode button is pressed longer than five seconds, the float feature will stay on and the float indicator lamp will stay lighted until the button is pressed again or the machine is turned off.

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Hand/Foot Controls

The loader may be equipped with hand/foot controls (Figure 14). The handles control the drive and the foot pedals control the lift/tilt.

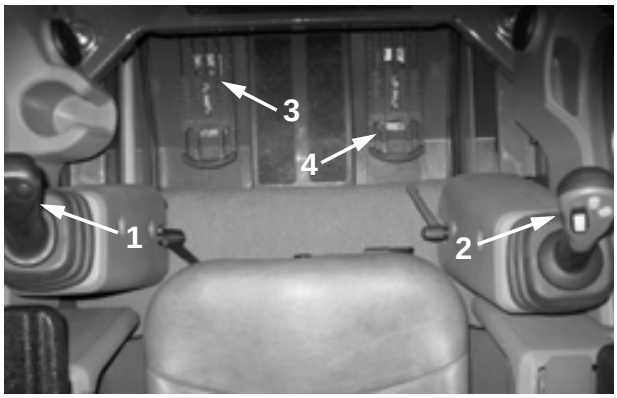

Figure 14 Hand/Foot Controls

1. Left Drive Control Handle
2. Right Drive Control Handle
3. Lift Control Pedal
4. Tilt Control Pedal

Drive Controls

Forward, reverse, speed and turning maneuvers are accomplished by movement of the control handles. To go **forward**, push both handles forward; for **reverse**, pull both handles rearward. For **turning**, move one handle farther forward or rearward than the other handle. Turn direction is determined by which handle is moved farther forward. To turn left, move the right handle farther forward than the left handle; to turn right, move the left handle farther forward than the right handle. For sharp turns, move the handles in opposite directions.

⚠ WARNING Be sure the controls are in neutral before starting the engine. Operate the controls gradually and smoothly. Excessive speed and quick control movements without regard for conditions and circumstances are hazardous and could cause an accident.

Moving the handles farther from neutral increases the speed steadily to the maximum travel speed. Tractive effort decreases as speed increases. For maximum tractive effort, move the handles only slightly away from the neutral positions. The engine will stall if the handles are moved too far forward when loading the bucket.

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Lift/Tilt Controls

Moving the lift arm and tilting the attachment are accomplished by movement of the foot pedals. The left pedal raises and lowers the lift arm; the right pedal tilts the attachment. To **raise** the lift arm, push down on the back of the left pedal with your left heel; to **lower** the lift arm, push down on the front of the left pedal with the toes of your left foot. To **tilt the attachment forward and down**, push down on the front of the right pedal with the toes of your right foot; to **tilt the attachment up and back**, push down on the back of the right pedal with your right heel.

Note: *The speed of the lift/tilt motion is directly proportional to the amount of pedal movement and engine speed.*

To place the lift arm into the “float” position, push and hold the left button on the right-hand control. This mode allows the lowered lift arm to follow the ground contour while traveling over changing ground conditions. An indicator lamp in the left instrument panel will blink when float is activated.

WARNING **Never push the float control button with the attachment raised, because this will cause the lift arm to lower very rapidly.**

Releasing the float button will cancel the float mode if the button was pressed less than five seconds. If the float mode button is pressed longer than five seconds, the float feature will stay on and the float indicator lamp will stay lighted until the button is pressed again or the machine is turned off.

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Auxiliary Hydraulic System

Auxiliary hydraulics are used with attachments that have a mechanism requiring hydraulic power.

WARNING Always be sure the auxiliary hydraulic control is in neutral before starting the loader or disconnecting the auxiliary hydraulic couplers.

Standard-Flow Auxiliary Hydraulic Control

Loaders are equipped with a standard-flow auxiliary hydraulic system with flat-face couplers. The couplers are located under the lift arm on the left side.

Hand/Foot and Joystick Control Loaders Equipped with Electric Auxiliary: The yellow thumb switch located on the right-hand control controls the direction and amount of flow. The farther the switch is moved from center, the higher the flow to the auxiliary circuit. The direction of flow is reversed when the thumb switch is moved in the opposite direction from the center. For continuous operation, move the switch in either direction and pull the red trigger button, located on the front of the grip for 5 seconds, and release. To cancel continuous operation, pull the red button or move the yellow switch in either direction.

Figure 15 T-Bar/Joystick Electric Auxiliary Control

High-Flow Auxiliary Hydraulic Control (optional)

In addition to a standard-flow auxiliary hydraulic system, some loaders are equipped with a reversible high-flow auxiliary hydraulic system. These couplers are located on the right lift arm. The high-flow auxiliary hydraulic system is used for operating certain hydraulic attachments (e.g., cold planer, snowblower) that require higher flows.

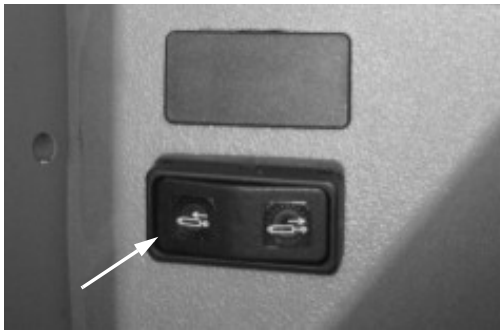

Figure 16 High-Flow Auxiliary Switch

The high-flow auxiliary switch controls the direction of hydraulic oil flow. The switch is located on the upper left side instrument panel. Push the right side of the rocker switch for forward flow, or the left side for reverse flow. To disengage, push and release either side of the switch. Turning off the machine, raising the restraint bar, or restarting the engine will also reset the high-flow to neutral. A lamp on either side of the switch will illuminate when the high-flow auxiliary hydraulic system is engaged.

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OPERATION

WARNING **Before starting the engine and operating the loader, review and comply with all safety recommendations in the *Safety* chapter of this manual. Know how to stop the loader before starting it. Also, be sure to fasten and properly adjust the seatbelt(s) and lower the operator restraint bar.**

Before Starting the Engine

Before starting the engine and running the loader, refer to the *Controls and Safety Equipment* chapter and become familiar with the various operating controls, indicators and safety devices on the loader.

Fuel

The engine requires low sulfur (“LSD”) or ultra-low sulfur diesel (“ULSD”) fuel to maintain proper engine performance. Yanmar will allow up to a 5% (B5) mixture of BioDiesel.

Important: *The use of fuel other than LSD or ULSD will damage the engine.*

Starting the Engine

The following procedure is recommended for starting the engine:

1. Carefully step up onto the back of the bucket or attachment and grasp the handholds to enter the operator’s compartment.
2. Fasten the seatbelt(s) and lower the restraint bar.
3. Verify the following:
   - the lift/tilt, drive and auxiliary hydraulic controls are in their neutral positions,
   - the parking brake switch is ON.

Note: *When the key is turned to the RUN position, an indicator lamp will light on the instrument panel and a buzzer will sound momentarily to remind users to fasten the seatbelt.*

4. Turn the key to the START position.

Note: *If temperature is below 32°F (0°C), see Cold-Starting Procedure, on page 38.*

Important: *Do not engage the starter for longer than 15 seconds at a time. Longer use can overheat and damage the starter. If the engine fails to start within 15 seconds, return the key to the OFF position. Allow the starter to cool for 20 seconds and repeat step 4.*

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After the engine starts, allow a five minute low idle warm-up period before operating the controls.

Important: *If the indicator warning lamps do not go off, stop the engine and investigate the cause.*

Cold-Starting

If the temperature is below 32°F (0°C), the following is recommended to make starting the engine easier:

- Replace the engine oil with SAE 10W-30 oil, or lighter as recommended by the viscosity chart;
- Make sure the battery is fully charged;
- Install a block heater on the engine.

Let the engine run for a minimum of five minutes to warm the engine and hydraulic fluid before operating the loader.

A block heater is recommended for starting in temperatures of 20°F (-7°C) or lower. See your dealer for heater options.

Cold-Starting Procedure

WARNING **Do not use starting fluid (ether) with pre-heat systems. An explosion can result, which can cause engine damage, injury or death.**

1. Turn the key to the RUN position. If the pre-heat lamp on the right instrument panel comes on, wait until it goes out.
2. Turn the key to the START position.
3. If engine does not start, return key to OFF position, wait seconds and repeat steps 1 and 2.

Stopping the Loader

The following procedure is the recommended sequence for stopping the loader:

1. Check that the drive control handle(s) is (are) in neutral position.
2. Lower the lift arm and rest the attachment on the ground.
3. Turn throttle knob back to the low idle position (and release the throttle pedal for joystick control machines).
4. Turn the keyswitch to the OFF position and remove the key.
5. Move the lift/tilt control to verify that the safety interlock system is preventing movement.
6. Raise the restraint bar, unfasten the seatbelt(s) and grasp the handholds while climbing out of the operator’s compartment.

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Note: *The skid-steer loader is equipped with a spring-applied automatic parking brake. The parking brake is applied when the operator lifts the restraint bar, leaves the operator's seat or shuts off the engine, or actuates the parking brake switch.*

Parking the Loader

Park the loader away from traffic on level ground. If this is not possible, park the loader across the incline and block the tires to prevent movement.

Jump-starting

If the battery becomes discharged or does not have enough power to start the engine, use jumper cables and the following procedure to jump-start the engine.

WARNING **The ONLY safe method for jump-starting a discharged battery is for TWO PEOPLE to perform the following procedure. The second person removes the jumper cables so that the operator does not have to leave the operator's compartment with the engine running. NEVER make jumper cable connections directly to the starter solenoid of either engine. DO NOT start the engine from any position other than on the operator's seat and then ONLY after being sure ALL controls are in "neutral."**

Closely follow the procedure, in order, to avoid personal injury. In addition, to protect your eyes wear safety glasses and avoid leaning over the batteries while jump-starting.

DO NOT jump-start the battery if it is frozen, because it may rupture or explode.

Note: *BE SURE the jumper battery is a 12-volt D.C. battery.*

1. Turn the keyswitches of both vehicles to OFF be sure both vehicles are in "neutral" and NOT touching each other.
2. Connect the positive (+) jumper cable to the positive (+) battery terminal on the disabled loader first. DO NOT allow the positive clamps to touch any metal other than the positive (+) battery terminals. The battery may be easily accessed by removing the access panel located on the left-rear tower.
3. Connect the other end of the positive jumper cable to the jumper vehicle's battery positive (+) terminal.
4. Connect the negative (-) jumper cable to the jumper vehicle's battery negative (-) terminal.
5. Make the final negative (-) jumper cable connection to the disabled loader's engine block or loader frame (ground) – NOT to the disabled battery's negative post. If connected to the engine, keep the jumper clamp away from the battery, fuel lines and moving parts, and the negative jump stud (if equipped.).
6. Start the loader. If it does not start at once, start the jumper vehicle's engine to avoid excessive drain on the booster battery.

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7. After the disabled loader is started and running smoothly, have the second person remove the jumper cables [negative (-) jumper cable first] from the jumper vehicle's battery and then from the disabled loader, while being careful NOT to short the two cables together.

Allow sufficient time for the skid-steer loader battery to build up a charge before operating the loader or shut off the engine.

Changing Attachments

WARNING **To prevent unexpected release of the attachment from the hitch, be sure to properly secure the hitch latch pins by rotating the latch levers fully (manual All-Tach® hitch), or by verifying that the pin flags moved fully to the outside of the hitch. (Power-A-Tach® hitch.)**

On a manual hitch (Figure 17), two latch levers engage the latch pins to secure the attachment.

Connecting Attachments

1. **Manual hitch:** Rotate the latch lever to the right as view from the front to fully retract the latch pins.

   Power hitch: *Activate the switches to unlock the hitch and fully retract the latch pins. (See page 25 for a detailed description of this procedure.)*
2. Start the loader engine and be sure the lift arm is lowered and in contact with the loader frame.
3. Align the loader squarely with the back of the attachment.

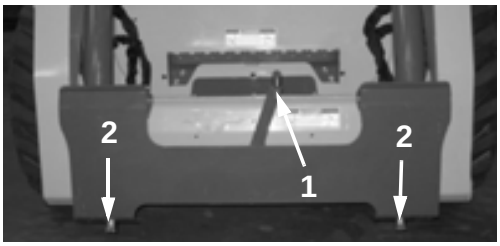

Figure 17 Manual Hitch – disengaged

1. Latch Lever
2. Latch Pins

4. Tilt the hitch forward until the top edge of the hitch is below the flange on the back side of the attachment and centered between the vertical plates.
5. Slowly drive the loader forward and, at the same time, tilt the hitch back to engage the flange on the back side of the attachment.
6. Stop forward travel when the flange is engaged, but continue to tilt the hitch back to lift the attachment off the ground.
7. **Manual hitch:** Exercise the MANDATORY SAFETY SHUTDOWN PROCEDURE (page 6). Leave the operator's compartment and rotate the latch lever to the left when viewed from the front to fully engage the latch pins.

   Power hitch: *Press and hold the switch on the left instrument panel to energize the system. press the bottom of the rocker switch on the right instrument panel to extend the hitch pins and to lock the hitch and fully engage the latch pins.*

Important: *To check that the attachment is properly installed tilt the attachment forward slightly, apply downward pressure to the attachment prior to operating.*

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Connecting Auxiliary Hydraulic Couplings

Note: *With the engine off, key in the ON position and the restraint bar down, the auxiliary hydraulic control can be moved to relieve any pressure in the hydraulic system. Because the auxiliary hydraulics system is controlled using pilot pressure stored in an accumulator, the engine must have been run recently.*

Standard-Flow Auxiliary Hydraulics

Couplers are located on the left lift arm. When the auxiliary control switch is activated, the top coupler is “pressure,” and the bottom coupler is “return.” The smaller center coupler is for the case drain.

High-Flow Auxiliary Hydraulics

Couplers are located on the right lift arm. When the auxiliary control is activated, the top coupler is “pressure,” and the bottom coupler is “return.” The smaller center coupler is for the case drain.

WARNING **Only connect high-flow attachment couplers to the high-flow auxiliary couplers.**

Removing Attachments

1. Tilt the hitch back until the attachment is off the ground.
2. Exercise the MANDATORY SAFETY SHUTDOWN PROCEDURE (page 6).
3. With the engine off, leave the operator’s compartment and disconnect the auxiliary hydraulic hoses.
4. **Manual hitch:** Rotate the latch lever to the right when viewed from the front to fully retract the latch pins.

   Power hitch: *Start the engine, press and hold the switch on the left instrument panel to energize the system and press the top of the rocker switch on the right instrument panel to retract the hitch pins to unlock the hitch and fully retract the latch pins.*
5. Start the engine (if it is not already on) and be sure that the lift arm is fully lowered and in contact with the loader frame.
6. Tilt the hitch forward and slowly back the loader away until the attachment is free from the loader.

Self-Leveling (optional)

The feature is intended to automatically keep the attachment level while the lift arm is being raised.

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Using a Bucket

WARNING **Always maintain a safe distance from electric power lines and avoid contact with any electrically charged conductor or gas line. Accidental contact or rupture can result in electrocution or an explosion. Contact the "Call Before You Dig" referral system at 8-1-1 in the U.S., or 888-258-0808 in the U.S. and Canada or proper local authorities for utility line locations before starting to dig.**

Driving over Rough Terrain

When traveling over rough terrain, drive slowly with the bucket lowered.

Driving on an Incline

When traveling on an incline, travel with the heavy end pointing uphill.

Digging with a Bucket

Approach the digging site with the lift arm slightly raised and the bucket tilted forward until the edge contacts the ground. Dig into the ground by driving forward and gradually lowering the lift arm (Figure 18).

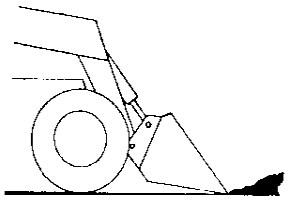

Figure 18 Digging

When the bucket is filled, tilt the bucket back, and back the loader away from the material. Rest the lift arm against the loader frame before proceeding to the dumping area.

WARNING **Always carry the loaded bucket with the lift arm resting on the loader frame. For additional stability when operating on inclines, always travel with the heavier end of the loader toward the top of the incline.**

Loading a Bucket

Approach the pile with the lift arm fully lowered and the bucket tilted slightly forward until the edge contacts the ground. Drive forward into the pile, lifting the lift arm and tilting back the bucket to fill it. Back away from the pile (Figure 19).

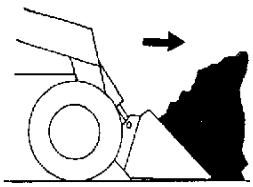

Figure 19 Loading

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Dumping the Load onto a Pile

Carry a loaded bucket as low as possible until the pile is reached. Gradually stop forward motion and raise the lift arm high enough so that the bucket clears the top of the pile. Then, slowly move the loader ahead to position the bucket to dump the material on top of the pile. Dump the material and then back the loader away while tilting the bucket back and lowering the lift arm.

WARNING **Never push the "float" button with the bucket or attachment raised, because this will cause the lift arm to lower rapidly.**

Dumping the Load into a Truck (or Hopper)

Carry the loaded bucket low and approach the vehicle (or hopper.) Stop as close to the side of the truck (or hopper) as possible while allowing for clearance to raise the lift arm and loaded bucket. Next, raise the lift arm until the bucket clears the top of the truck (or hopper) and move the loader ahead to position the bucket over the inside of the truck (or hopper.) Dump the material and then back away while tilting the bucket back and lowering the lift arm (Figure 20).

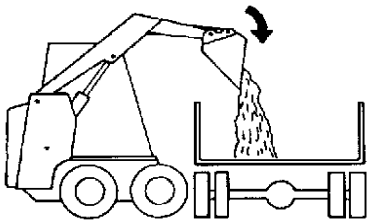

Figure 20 Dumping into a Truck (or Hopper)

Dumping the Load over an Embankment

WARNING **Do not drive too close to an excavation or ditch. Be sure the surrounding ground has adequate strength to support the weight of the loader and the load.**

Carry the loaded bucket as low as possible while traveling to the dumping area. Stop the loader where the bucket extends half-way over the edge of the embankment. Tilt the bucket forward and raise the lift arm to dump the material. Dump the material, and then back away from the embankment while tilting the bucket back and lowering the lift arm.

Scraping with a Bucket

For scraping, the loader should be operated in the forward direction. Position the lift arm down against the loader frame. Tilt the bucket cutting edge forward at a slight angle to the surface being scraped. While traveling slowly forward with the bucket in this position, material can flow over the cutting edge and collect inside the bucket (Figure 21).

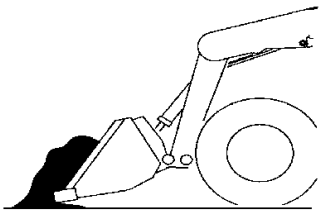

Figure 21 Scraping

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Leveling the Ground

Drive the loader to the far edge of the area to be leveled. Tilt the bucket forward to position the bucket cutting edge at a 30 to 45 degree angle to the surface being leveled. Then place the lift arm into "float" position and drive the loader rearward, dragging the dirt and, at the same time, leveling it (Figure 22).

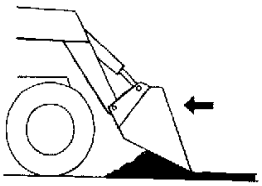

Figure 22 Leveling the Ground

Note: *The "float" detent is activated by pressing the left button on the right control handle.*

WARNING **Check that the work area is clear of people and obstacles. Always look in the direction of travel.**

Vibration Information

Compact construction equipment is generally used in harsh environments. This type of usage can expose an operator to uncomfortable levels of vibration. It is useful to understand exposure to vibration levels when operating compact equipment and what can be done to reduce vibration exposure. As a result, equipment operation can be more efficient, productive and safe.

An operator's exposure to vibration occurs in two ways:

- Whole-Body Vibration (WBV)
- Hand-Arm Vibration (HAV)

This section will cover primarily WBV issues, because evaluations have shown that operation of mobile compact construction equipment on jobsites typically results in HAV levels less than the allowed exposure limit of 2.5 m/s^2.

Employers in Member States of the European Union must comply with the Physical Agents (vibration) Directive, 2002/44/EC.

Effective control of vibration exposure for an operator involves more than just vibration levels on the machine. The job site, how the machine is used, and proper training all play important roles in reducing vibration exposure.

Vibration exposure results from:

- worksite conditions
- how the machine is operated
- the machine characteristics

Common causes of high WBV vibration levels:

- Using a machine that is improper for the task
- Work site with potholes, ruts and debris

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- Improper operating techniques, such as driving too fast
- Incorrect adjustment of the seat and controls
- Other physical activities while using the machine

Vibration Measurement and Actions

The vibration directive places the responsibility for compliance on employers. Actions that should be followed by employers include:

- Assess the levels of vibration exposure.
- Determine from this assessment if operators will be exposed to vibration levels above the limits stated in the directive.
- Take appropriate actions to reduce operator's exposure to vibration.
- Provide operators with information and training to reduce their exposure to vibration.
- Keep good records and update operations and training on a regular basis.

If the assessment concludes that vibration level exposure is too high, one or more of the following actions may be necessary:

1. Train operators
   - Perform operations (accelerating, steering, braking, etc.) in a smooth manner.
   - Adjust machine speed appropriately.
   - Adjust the controls, mirrors and seat suspension for comfortable operation.
   - Travel across the smoothest parts of the work site and avoid ruts and pot-holes.
2. Choose proper equipment for the job
   - Use machines with the proper power and capacity.
   - Select machines with good suspension seats.
   - Look for controls that are easy to use.
   - Ensure good visibility from the operator's position.
3. Maintain the work site
   - Smooth ruts and fill potholes in traffic areas whenever possible.
   - Clean up debris frequently.
   - Vary traffic patterns to avoid exposure to rough terrain.
4. Maintain the equipment
   - Ensure correct tire pressures.
   - Check that seat suspension and all controls work smoothly and properly.

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Vibration Levels

The following table shows typical Whole-Body Vibration levels for Gehl skid-steer loaders.

Figure 23 - Vibration measurement axes

Typical Whole-Body Vibration Levels*

Activity	Range of Readings	Vibration Levels		
		x-axis	y-axis	z-axis
		meter/ second^2	meter/ second^2	meter/ second^2
V-Pattern Loading	Highest	0.53	0.50	1.03
	Lowest	0.28	0.24	0.34
Load & Carry Motion	Highest	0.37	0.36	0.83
	Lowest	0.25	0.28	0.36
Roading	Highest	0.42	0.43	0.73
	Lowest	0.28	0.29	0.30

*Vibration levels were recorded using a range of skid-steer loader models driven by an experienced operator on flat conditioned soil and handling gravel in the activities indicated. For additional vibration data, refer to ISO TR 25398.

The data above indicates that Gehl skid-steer loaders, when used in a similar manner as described above, do not exceed the limit value for Whole-Body Vibrations, and can therefore be operated by one operator for at least 8 hours per day.

Note: *When the skid-steer loader is operated in accordance with the instructions in the operator's manual, the hand-arm vibration levels are below the exposure action value of 2.5 m/s^2.*

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Highway Travel

If it becomes necessary to move the loader a long distance, use a properly rated trailer. (See *Transporting the Loader* on page 48.) For short distance highway travel, attach an SMV (Slow-Moving Vehicle) emblem (purchased locally) to the back of the loader. For highway operation, install the optional amber strobe light. Check state and local laws and regulations.

Storing the Loader

If the skid-steer loader is to be stored for a period in excess of two month, the following procedures are suggested:

1. Fully inflate the tires.
2. Lubricate all grease zerks.
3. Check all fluid levels and replenish as necessary. (Review and follow the engine manufacturers recommendations from the Engine Operator's Manual.)
4. Add stabilizer to the fuel per the fuel supplier's recommendations.
5. Remove the battery, charge fully and store in a cool, dry location.
6. Protect against extreme weather conditions such as moisture, sunlight and temperature.

Removing Loader from Storage

1. Check the tire air pressure and inflate the tires if they are low.
2. Connect the battery.
3. Check the fan belt tension.
4. Check all fluid levels (engine oil, transmission/hydraulic oil, engine coolant and any attached implements). (Review and follow the engine manufacturers recommendations from the Engine Operator's Manual.)
5. Start the engine. Observe all gauges. If all gauges are functioning properly and reading normal, move the machine outside.
6. Once outside, park the machine and let the engine idle for at least five minutes.
7. Shut the engine off and walk around machine. Make a visual inspection looking for evidence of leaks.

Storing the Loader

If the skid-steer loader is to be stored for a long period of time, the following procedure is suggested:

1. Fully inflate the tires.
2. Lubricate all grease zerks. (Review and follow the engine manufacturers recommendations from the Engine Operator's Manual.)
3. Check all fluid levels and replenish as necessary.

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4. Add stabilizer to the fuel per the fuel supplier's recommendations.
5. Remove the battery, charge fully and store in a cool, dry location.
6. Protect against extreme weather conditions such as moisture, sunlight and temperature.

Transporting the Loader

WARNING **Park the truck or trailer on a level surface. Be sure the vehicle and its ramps have the weight capacity to support the loader. Make sure the vehicle surface and its ramps are clear of debris and slippery material that may reduce traction. Move the loader on and off the vehicle ramp slowly and carefully. Failure to follow these instructions could result in an overturn accident.**

Observe all local regulations governing the loading and transporting of equipment (Reference: U.S. Federal Motor Carrier Safety Regulations, Section 392). Ensure that the hauling vehicle meets all safety requirements before loading the skid-steer loader.

1. Block the front and rear of the hauling vehicle's tires.
2. If the loader has an attachment, lift it slightly off the ground.
3. Back the loader slowly and carefully up the ramp onto the vehicle.
4. Lower the loader attachment to the vehicle deck, turn off the engine and remove the key.
5. Fasten the loader to the hauling vehicle at the points indicated by the tie-down decals (Figure 24 and Figure 25).
6. Measure the clearance height of the loader and hauling vehicle. Post the clearance height in the cab of the vehicle.

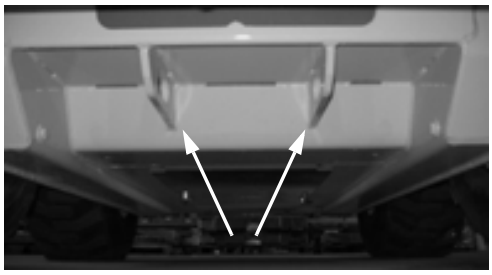

Figure 24 Front Tie-Down/Front Retrieval

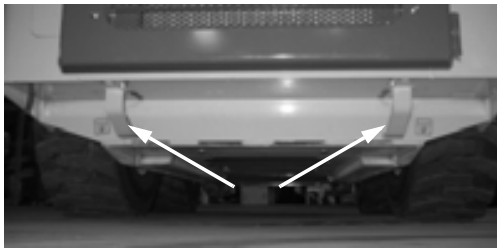

Figure 25 Rear Tie-Down/Rear Retrieval

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Lifting the Loader

The loader can be lifted using a single-point or four-point lift kit, which are available from your Gehl dealer.

WARNING

- **Before lifting, check the lift kit for proper installation.**
- **Never allow riders in the operator's compartment while the loader is lifted.**
- **Keep everyone a safe distance away from the loader while it is lifted.**
- **Loader may only be lifted with an empty bucket or empty pallet forks, or with no attachment. Never lift the loader with attachments other than those stated.**

Lift equipment used and its installation is the responsibility of the party conducting the lift. All rigging MUST comply with applicable regulations and guidelines.

1. Using suitable lift equipment, hook into the lift eyes. Adjust the length of the slings or chains to lift the loader level.

Note: *The loader my be slightly off level (10 degrees max.) when lifted.*

2. Center the hoist over the ROPS/FOPS. To prevent shock loading of the equipment and excessive swinging, slowly lift the loader off the ground. Perform all movements slowly and gradually. As needed, use a tag line to help position the loader and keep it from swinging.

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Notes

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SERVICE

WARNING **Before servicing the machine, unless expressly instructed to the contrary, exercise the MANDATORY SAFETY SHUTDOWN PROCEDURE (page 6).**

After service has been performed, be sure to restore all guards, shields and covers to their original positions before resuming operation.

This *Service* chapter details procedures for performing routine maintenance checks, adjustments and replacements. Most procedures are referred to in the *Troubleshooting* and *Maintenance* chapters of this manual. Refer to the *Maintenance Interval Chart* (page 81) for service intervals. Refer to the separate engine manual for engine-related adjustments, lubrication and service procedures.

Note: *All service procedures, except those described under the Dealer Services topic are owner-operator responsibilities.*

Important: *Always dispose of waste lubricating oils and hydraulic fluids according to local regulations or take to a recycling center for disposal. Do not pour onto the ground or down the drain.*

Dealer Services

The following areas of component service, replacement and adjustments require special tools and knowledge for proper servicing and should be performed only by your authorized Gehl skid-steer loader dealer: hydrostatic drive components, hydraulic system pumps, valves, hydraulic cylinders, electrical components (other than battery, fuses or relays).

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Replacement Parts

Part Description	Gehl Part No.
Air Cleaner Element, Primary (outer)	184146
Air Cleaner Element, Secondary (inner)	184195
Hydraulic Oil Filter Element	074830
Engine Oil Filter Element	195568
Fuel Filter Cartridge	193024
Fresh Air Intake Filter (heater option)	195660
Recirculation Air Filter (heater option)	242832 (2 per)

Note: *Part numbers may change. Your Gehl dealer will always have the latest part numbers.*

Important: *To ensure continued warranty coverage, use only genuine Gehl replacement filters.*

Loader Raising Procedure

To raise the skid-steer loader so all four tires are off the ground, use the procedure below:

WARNING **Do not rely on a jack or hoist to maintain the raised position without additional blocking and supports. Serious personal injury could result from improperly raising or blocking the loader.**

1. To block the loader, obtain enough solid wooden or metal blocks so all of the tires are raised off the ground.

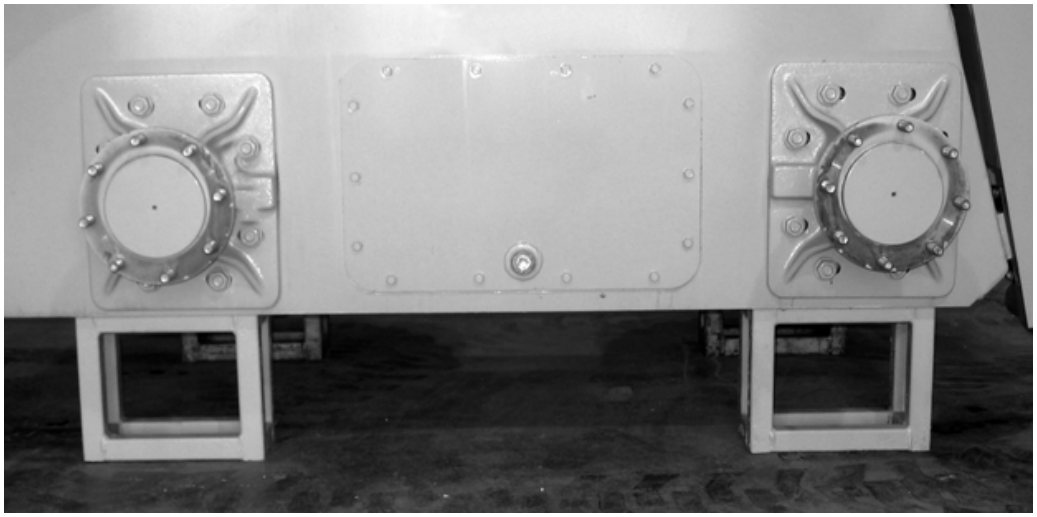

Figure 26 Loader Properly Blocked
(Tires and wheels removed to show blocks)

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2. Using a jack or hoist capable of lifting the fully-equipped weight of the loader (with all attached options), lift the rear of the loader until the rear tires are off the ground.
3. Stack wooden blocks under the flat part of the loader chassis. They should run parallel with, but not touch, the rear tires.
4. Slowly lower the loader until its weight rests on the blocks. If the tires still touch the ground, raise the loader again, add more blocks and lower again.
5. Repeat steps 2 through 4 for the front end. When the procedure is finished, all four tires are off the ground, so they could be removed.

Loader Lowering Procedure

When service or adjustment procedures are complete, the loader can be lowered from the raised position. To lower the loader onto its tires:

1. Using a jack or hoist, raise the front of the loader until its weight no longer rests on the front blocks.
2. Carefully remove the blocking under the front of the loader.
3. Slowly lower the loader until the front tires are resting on the ground.
4. Repeat steps 1 through 3 for the rear of the loader. When the procedure is finished, all four tires will be on the ground and the blocks removed from under the loader.

Engine Compartment Access

To open the engine compartment, lift the engine cover. Then pull the rear door latch and carefully swing open the rear door.

Figure 27 Engine Compartment Access Door and Cover

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Tilting Back the ROPS/FOPS

A manual hydraulic pump in the engine compartment is used to tilt back the ROPS/FOPS. The pump handle is stored in the rear door. A manual lock mechanism engages to lock the ROPS/FOPS in a tilted-back position. To tilt back the ROPS/FOPS, use the following procedure:

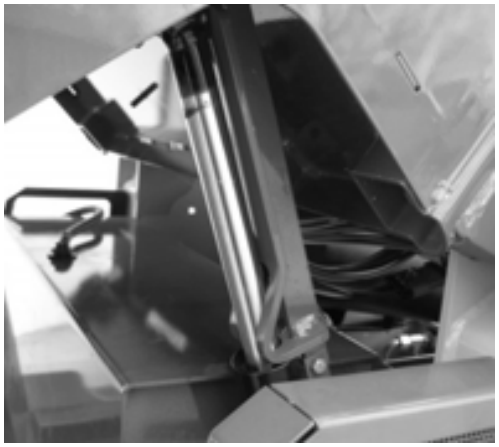

Figure 28 ROPS/FOPS Lock Mechanism – Engaged

1. Remove the two anchor bolts at the front of the ROPS/FOPS.
2. Insert the pump handle in to the pump.
3. Tighten the needle valve.
4. Pump until the ROPS/FOPS is tilted back enough that the lock mechanism underneath the right side of the ROPS/FOPS engages.
5. To lower the ROPS/FOPS, return the lock mechanism to the unlocked position, and gradually loosen the needle valve. The ROPS/FOPS will slowly lower. Reinstall the anchor bolts, washers and locknuts. Refer to the Torque Specifications chart (page 91) for torque information.

WARNING **Never operate the loader with the ROPS/FOPS removed or tilted back. Be sure the lock mechanism is securely engaged when the ROPS/FOPS is tilted back. Be sure to reinstall the anchor bolts, washers and locknuts before resuming operation.**

Adjustments

Control Handles

The control handles do not require routine adjustment. Refer to the *Service Manual* for the initial setup procedure.

Removing Foreign Material

The loader should be cleared daily of dirt and other foreign materials in the following areas:

- around the lift cylinders
- at the front of the loader
- on the hitch, especially around tilt cylinder
- around the hydraulic oil reservoir breather
- in the engine compartment
- in the operator’s compartment

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Important: *Build-up of foreign materials in these areas can interfere with the operation of the loader, cause component damage or become a fire hazard.*

Lubrication

Listed below are the temperature ranges and types of lubricants for this machine. Refer to the separate engine manual for more information regarding engine lubricants, quantities and grades required.

Note: *Refer to the specific service sections for detailed information on periodic checking and replenishing of lubricants.*

Refer to Figure 29 for grease fitting locations. Wipe dirt from the fittings before greasing them to prevent contamination. Replace any missing or damaged fittings. To minimize dirt build-up, avoid excessive greasing.

Important: *Always dispose of waste lubricating oils and hydraulic fluids according to local regulations or take to a recycling center for disposal. Do not pour onto the ground or down the drain.*

System	Lubricant
Hydraulic System Oil	Use Petro Canada HVI60, Mobil DTE 15M or equivalent, which contain anti-rust, anti-foam and anti-oxidation additives, and conforms to ISO VG46. **Capacity:** 11 U.S. gallons (42,0 L)
Chaincase Oil	Use SAE grade 15W-40 or 10W-30 motor oil. **Capacity** (each side): 10 U.S. quarts (9,5 L)
Grease Fittings	Use lithium-based grease.
Engine Oil	Important: Refer to the Engine Operator's Manual for specific engine oil recommendations. Below 32°F (0°C) – Use SAE Grade* 10W-30 Above 32°F (0°C) – Use SAE Grade* 15W-40 *Service Classification: API – CI - 4 **Capacity:** 11 U.S. quarts (10,4 L)

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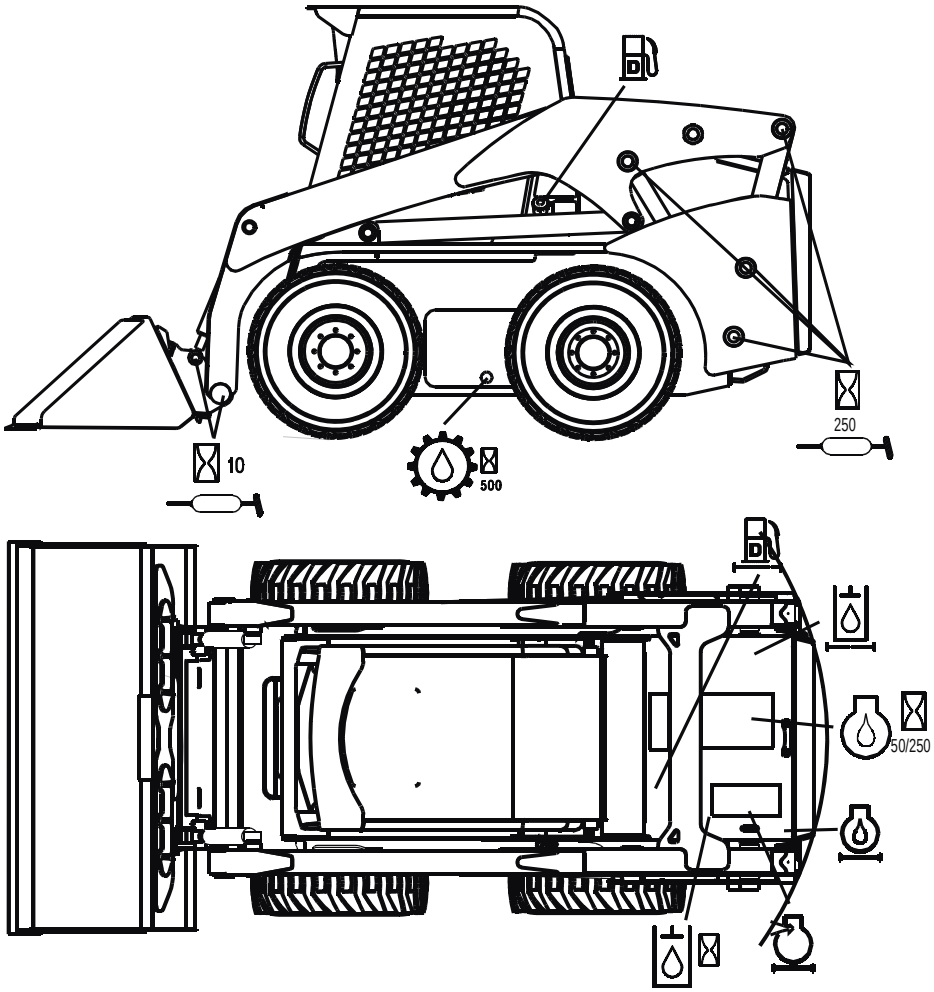

Figure 29 Service Locations

Lubrication Procedure	10 Hours (or Daily)	250 Hours	500 Hours (or Yearly)	1000 Hours (or Yearly)
Check Engine Oil Level (page 62)	●			
Check Hydraulic Oil Level (page 67)	●			
Grease Hitch, Hitch-related Cylinder Pivots and Latch Pins (page 55)	●			
Check Oil Level in Chaincases (page 57)		●		
Change Engine Oil and Filter (page 62)	◆	●		
Change Hydraulic Oil Filter (page 67)	◆		●	
Change Hydraulic Oil (page 68)				●
Change Chaincase Oil (page 57)	◆			●
Check & Drain Water Separator (page 63)	●			

◆ Perform the initial procedure at 50 hours, then at the indicated intervals.

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Chaincases

There is a chaincase on each side of the loader. Refer to the *Maintenance Interval Chart* (page 81) for change intervals. Refer to the *Lubrication* chart (page 56).

Checking and Adding Oil

1. Park the loader on a level surface. Stop the engine.
2. Remove the fill check plug (Figure 30) from each chaincase cover. The oil level should be at the plug level or no more than 1/4 in. (6 mm) below.
3. If the level is low, add fluid through the fill plug (Figure 30) until the oil level reaches the check plug hole. Reinstall the plugs.

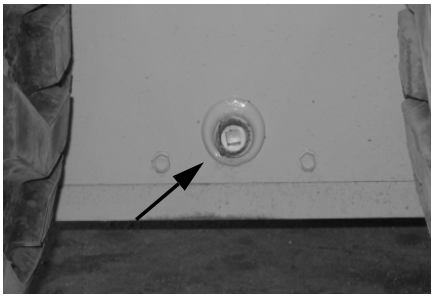

Figure 30 Fill Plug Location

Draining Oil

1. Park the loader on a level surface, or on a sloping surface with the loader facing downhill and the tires blocked.
2. Remove the drain plug on each chaincase (Figure 31) and drain the oil into a suitable container.
3. Reinstall and tighten the drain plugs.
4. Refill the chaincases at the fill plugs.

Figure 31 Drain Plug

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Drive Chains

Drive chains are located in the chaincase on each side of the machine. Refer to the *Maintenance Interval Chart* (page 81) for tension check interval.

Checking Chain Tension

1. Raise the loader following the *Loader Raising Procedure* (page 52).
2. Rotate each tire by hand. The proper amount of chain defection should be 1/8 in. to 1 in. (3 to 25 mm) forward and rearward tire movement. If the chain defection is more than 1 in. (25 mm) or less than 1/8 in. (3 mm) in either direction, the chains should be adjusted.

Adjusting Chain Tension

1. Raise the loader following the *Loader Raising Procedure* (page 52).
2. Remove the tire from the axle to be adjusted.
3. Loosen (but **DO NOT** remove) the bolts holding the axle to the chaincase.
4. **Front Chain Tension** – To tighten the front chain, move the front axle assembly toward the front of the loader. To loosen the chain, move the front axle assembly toward the rear of the loader.

   Rear Chain Tension *– To tighten the rear chain, move the rear axle assembly rearward. To loosen the chain, move the rear axle assembly toward the front of the loader.*
5. After proper tension is achieved, retighten the bolts.

Important: *Be careful not to over-tighten the drive chains. Over-tightening will cause premature drive chain and axle sprocket wear.*

6. Reinstall the tire.
7. Repeat steps 2 through 6 for any other axle requiring adjustment.
8. Lower the loader following the *Loader Lowering Procedure* (page 53).

Engine Air Cleaner

Important: *Failure to follow proper filter servicing instructions could result in catastrophic engine damage.*

The air cleaner assembly consists of an outer (primary) filter element and an inner (secondary) filter element. An air filter restriction indicator for monitoring the condition of the elements is located on the front of the air cleaner. If the air filter becomes restricted, this indicator turns red to warn the operator that the air cleaner requires service. Push the reset button located at the end of the indicator after fitting a clean element. For replacement elements, refer to the *Replacement Parts* chart (page 52).

Note: *Before replacing the filter element(s), push the reset button on the indicator. Start the engine and adjust the throttle to full speed. If the indicator does not turn red, do* ***not*** *replace the element(s).*

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The outer element should be replaced only when the restriction indicator turns red. The inner element should be replaced every third time the outer element is replaced, unless the outer element is damaged or the inner element is visibly dirty.

Along with a daily check of the restriction indicator, check that the air cleaner intake hose and clamps, and the mounting bracket hardware are properly secure.

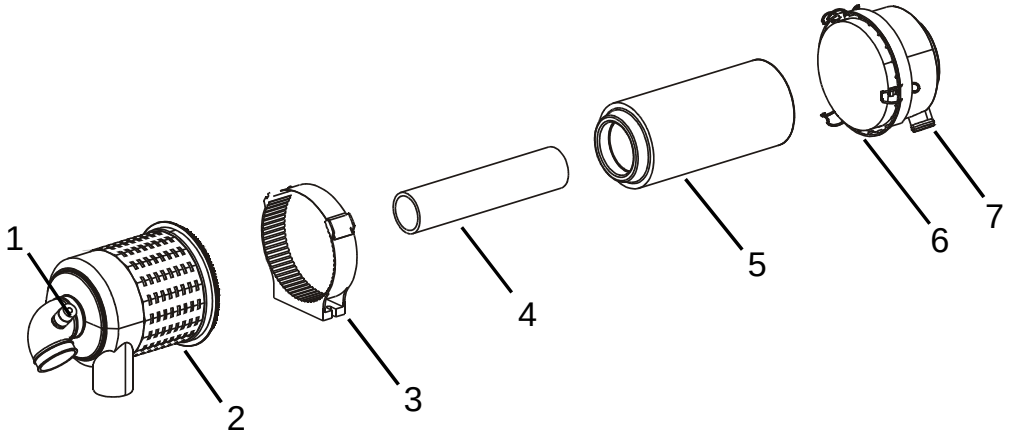

Figure 32 Dual-Element Air Cleaner

1. Restriction Indicator
2. Element Housing
3. Mounting Bracket
4. Inner Filter Element
5. Outer Filter Element
6. Element Cover
7. Dust Ejector

Access

1. Open the engine cover and then the rear door (page 53).
2. Unlatch the three clamps on the air cleaner and remove the cover. Clean out any dirt built up in the cover assembly.

Outer Element

1. Carefully pull the outer element out of the housing. Never remove the inner element unless it is to be replaced.
2. Clean out any dirt built up in the housing. Leave the inner element installed during this step to prevent debris from entering the engine intake manifold.
3. Use a trouble light inside the outer element to inspect for bad spots, pinholes or ruptures. Replace the outer element if any damage is noted. The outer element must be replaced if it is oil- or soot-laden.

Note: *Cleaning the outer element is not recommended.*

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Inner Element

Note: *Replace the inner element only if it is visibly dirty or if the outer element has been replaced three times.*

1. Before removing the inner element from the housing, clean out any dirt built up in the housing. Leave the inner element installed during this step to prevent debris from entering the engine intake manifold.
2. Remove the inner element.

Reinstallation

1. Check the inside of the housing for any damage that may interfere with the elements.
2. Be sure that the element sealing surfaces are clean.
3. Insert the element(s), making sure that they are seated properly.
4. Secure the cover to the housing with the three clamps.
5. Check the hose connections and make sure they are all fitted and tightened properly.
6. Reset the indicator by pressing the reset button.

Note: *Periodically inspect intake system tubes, rubber elbows and connections. Inspect for cracks, loose fits and loose clamps. Tighten or replace as needed. Intake system must be air tight.*

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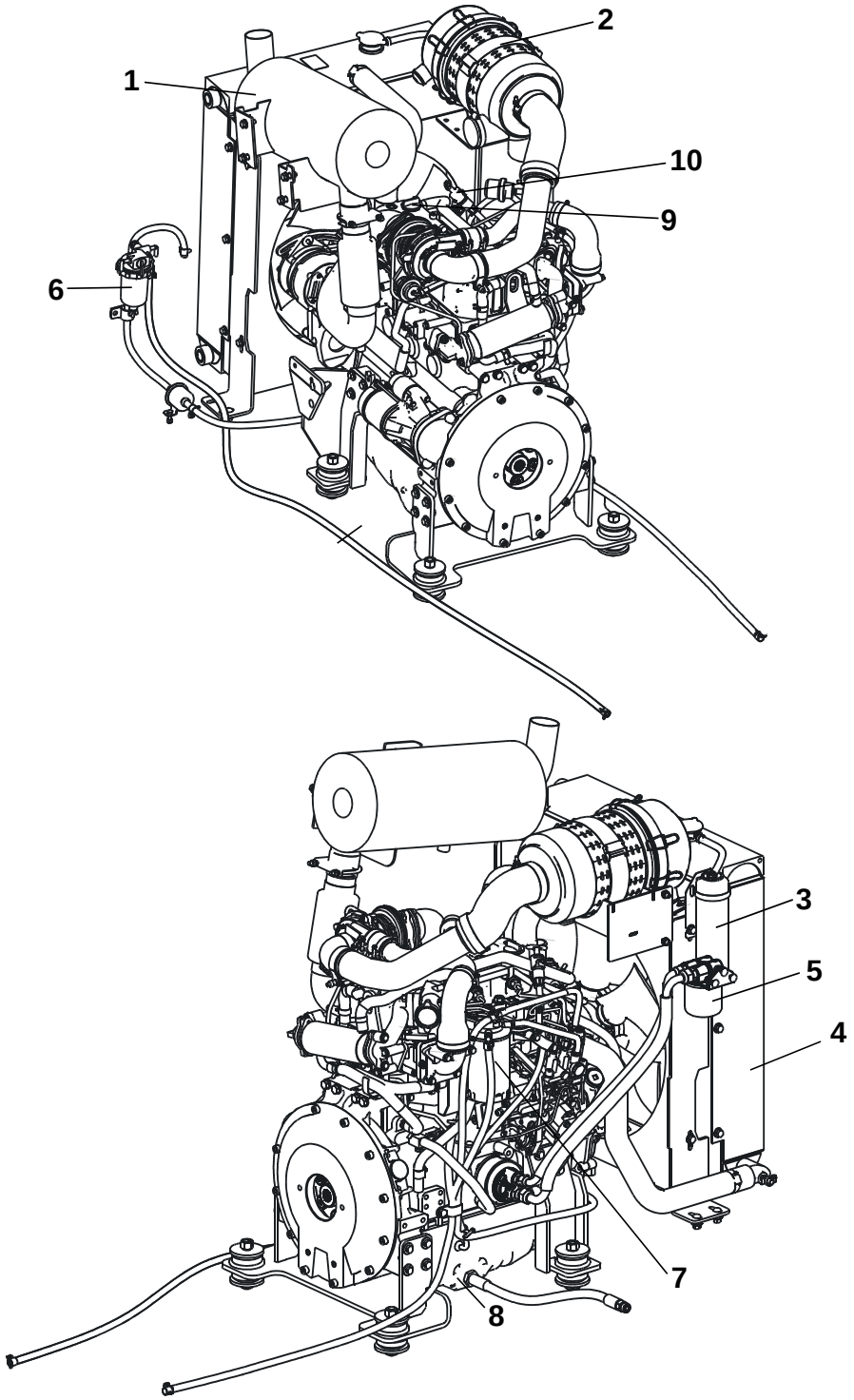

Figure 33 Engine Service Components

1. Muffler
2. Air Cleaner
3. Coolant Recovery Tank
4. Radiator/Cooler
5. Engine Oil Filter
6. Water Separator
7. Fuel Filter
8. Engine Oil Drain
9. Engine Oil Fill Cap
10. Engine Oil Dipstick

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Refer to the *Maintenance Interval* chart (page 81) for change intervals. Refer to the *Replacement Parts* chart (page 52) for filter part numbers.

Refer to the Engine Operator's Manual for detailed engine information.

Checking Engine Mounting Hardware

All bolts that secure the engine mounting brackets to the engine and the loader frame should be checked and re-torqued as necessary. Refer to the *Torque Specifications Chart* (page 91) for torque information.

WARNING **Allow hot engine and hydraulic system components to cool before servicing.**

Checking Engine Oil Level

Open engine cover (page 53), pull out the dipstick and check the oil level. Markings on the dipstick represent FULL and LOW (add oil) levels.

Changing Engine Oil and Filter

Note: *For new units, the initial oil change should be after the first 50 hours.*

Important: *Always dispose of waste lubricating oil according to local regulations or take to a recycling center for disposal; do not pour onto the ground or down the drain.*

The engine oil filter is located on the left side of the radiator.

Access for draining the engine oil is located behind the left rear tire.

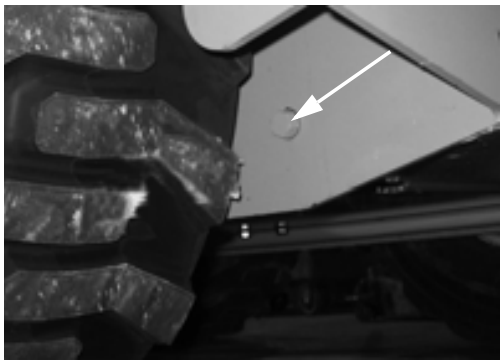

Figure 34 Remote Engine Oil Drain

To add new oil, open the engine access cover. Remove the oil fill cap and add the recommended type and quantity of oil. Refer to the *Lubrication* chart, page 55. Visually inspect the remote oil drain hose for damage or leaks.

Changing Fuel Filter

The fuel filter located is on the left side of the engine, by the battery. Raise the ROPS/FOPS and follow the ROPS/FOPS and Lock Mechanism procedure (page 54) to the ROPS/FOPS and access the filter clean dirt from around the filter head. Close fuel valves on tank and separator to stop fuel flow BEFORE replacing the filter. Remove the spin-on filter cartridge. Install the new cartridge start the engine and check for leaks. See page 61.

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Checking the Water Separator

The separator is located between the fuel tank and main fuel filter and is used to remove finely dispersed water in diesel fuel. Check on a daily basis and drain if necessary. Water can be drained from the separator by opening the valve located at the bottom of the separator bowl.

Engine Diagnostic Chart

When detecting failures, the engine electronic control unit (ECU) flashes the failure lamp to alert the operator to the occurrence of the failure conditions. The failure lamp will light for two seconds when the engine electronic control unit is powered on. This allows checking if the engine electronic control unit is supplied with power normally. (The failure lamp is an essential way for checking or diagnosing the engine electronic control unit.)

Flashing patterns of the failure lamp are showing in Figure 35. When accelerator sensor failure (flashing 5 short (0.5 seconds) times) and Exhaust Gas Recirculation valve failure (flashing 1-3 long (1.5 seconds) and 3 short times) occurs, the failure lamp flashes as shown in Figure 35. When two or more failures have occurred simultaneously, the failure lamp indicates all the failures in order of increasing number of flashes cyclically.

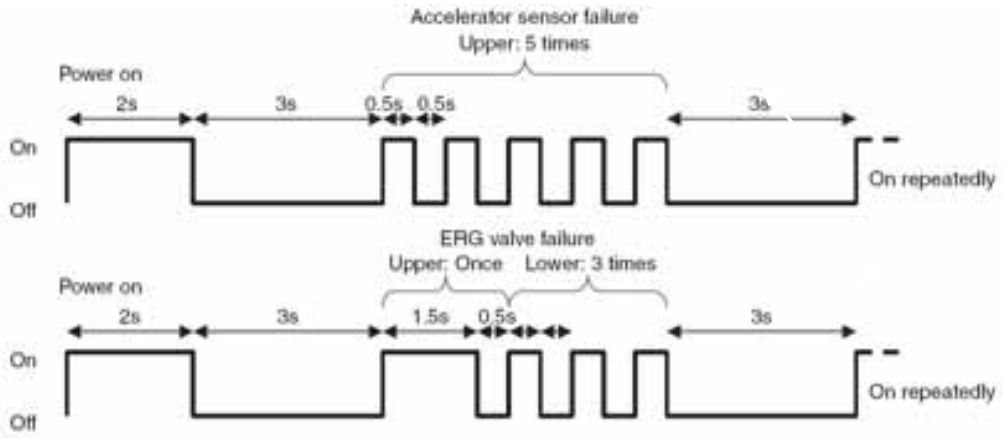

Figure 35 Flashing Patterns of the Failure Lamp

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Engine Diagnostic Chart (cont.)

No.	Item	Failure detection conditions	Operation when failure occurs	Action/ condition for recovery	Category	Number of flashes
1	Coolant temperature sensor failure	Sensor voltage is 4.8 V or more, or 0.2 V or less.	Engine runs with a coolant temperature of 30°C.	Correct failure.	Always enable	4
2	Accelerator sensor failure	Sensor voltage is 4.6 V or more, or 0.2 V or less.	[Without optional backup accelerator sensor] Engine runs at 1500 min^{-1}. (Option can change) [With optional backup accelerator sensor] Select backup accelerator sensor: No limitation Backup accelerator sensor failure: Engine runs at 1500 min^{-1}.(Option can change)	Correct failure.	Default to disable	5
3	Speed sensor failure	Engine start signal (E8) is on, but the engine speed is zero.	[With optional backup speed sensor] Backup speed sensor becomes active; speed is limited to 1800 min^{-1}.(Option can change) Backup speed sensor failed: Engine stops. [Without optional backup speed sensor] Engine stops.	Turn key off.	Always enable	6
		Engine speed decreases by 480 min^{-1} or more in 40 ms.				
4	Rack position sensor failure	Correlation between rack actuator output and rack position exceeds threshold upper limit by 0.32 sec. or more.	Engine runs with limited output and speed. (Rack position control is inactive and speed control is active).	Turn key off.	Always enable	7
		Correlation between rack actuator output and rack position exceeds threshold lower limit by 0.16 sec. or more.				
5	Rack actuator failure	Rack actuator current is too high.	Engine stops.	Turn key off.	Always enable	8
		Rack actuator current is too low.				
		Engine accelerates with minimum rack actuator output.				
		Engine stalls while rack position sensor is failed.				
6	Overspeed	Idling engine speed exceeds high idling speed plus 600 min^{-1}.	Engine stops.	Turn key off.	Always enable	9

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Engine Diagnostic Chart (cont.)

No.	Item	Failure detection conditions	Operation when failure occurs	Action/ condition for recovery	Category	Number of flashes
7	Backup speed sensor failure	Engine start signal (E8) is on, but the engine speed is zero.	Engine continues to run while main speed sensor is used. Backup speed sensor failed: Engine stops.	Turn key off.	Default to disable	1-1
		Engine speed decreases by 480 min^{-1} or more in 40 ms.				
8	CAN communication failure	CAN communication packets cannot be received.	Last value is retained. Backup sensor becomes active.	Correct failure.	Default to enable	1-2
9	EGR valve failure	Low status is detected even through port is off.	Engine runs with limited output(92%) and speed(1800min^{-1}).	Turn key off.	Default to disable	1-3
		High status is detected even through port is on.				
10	CSD solenoid valve failure	High status is detected even through port is off.	Engine continues to run with port being off.	Turn key off.	Always enable	1-4
		Low status is detected even through port is on.				
11	Air heater relay failure	High status is detected even through port is off.	Engine runs with air heater relay being off.	Turn key off.	Default to enable	1-5
		Low status is detected even through port is on.				
12	Main relay failure	Power is not shut off even though main relay is off.	Engine runs normally.	Correct failure.Or turn key off.	Default to disable	1-6
13	Rack actuator relay failure	Low status is detected even through port is off.	Engine stops.	Turn key off.	Always enable	1-7
		High status is detected even through port is on.				
14	Backup accelerator sensor failure	Sensor voltage is 4.6 V or more, or 0.2 V or less.	Engine continues to run while main accelerator sensor is used. Main accelerator sensor failure: Engine runs at 1500 min^{-1}.(Option can change)	Correct failure.	Default to enable	1-8
15	Atmospheric pressure sensor failure		Atmospheric pressure compensation is canceled.	Turn key off.	Default to enable	1-9
16	Oil pressure switch failure	Oil pressure switch fails to turn on when engine is off.	Engine runs normally.(Option can change)	Turn key off.	Default to enable	2-1
17	Charge switch failure	Charge switch fails to turn on when engine is off.	Engine runs normally.	Turn key off.	Default to enable	2-2
18	Power supply voltage abnormal	E-ECU supply voltage exceeds 10.0 V.	Engine runs normally.	Correct failure.	Always enable	2-3
		E-ECU supply voltage exceeds 16.0 V.				

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Engine Diagnostic Chart (cont.)

No.	Item	Failure detection conditions	Operation when failure occurs	Action/ condition for recovery	Category	Number of flashes
19	Sensor 5V failure	Monitoring voltage is approx. 0 V.	Engine runs normally.	Turn key off.	Always enable	2-4
		Monitoring voltage is 4.5 V or less.				
		Monitoring voltage is 5.5 V or more.				
20	E-ECU overheat alarm	E-ECU temperature exceeds 105°C. Alarm is canceled when E-ECU temperature decreases to 100°C. (Option can change)	Engine runs normally.(Option can change)	Correct failure.	Default to enable	2.5
21	Oil pressure low	Oil pressure switch fails to turn off when engine is running.	Engine runs normally.(Option can change)	Correct failure.	Default to enable	3-1
22	Charge failure	Charge switch fails to turn off when engine is running.	Engine runs normally.	Turn key off.	Default to enable	3-2
23	Coolant temperature abnormal	Coolant temperature switch turns on.	Engine runs normally.(Option can change)	Turn key off.	Default to enable	3-3
24	Air cleaner blockage alarm	Air cleaner switch turns on.	Engine runs normally.(Option can change)	Turn key off.	Default to enable	3-4
25	Oily water separator alarm	Oily water separator switch turns on.	Engine runs normally.(Option can change)	Turn key off.	Default to enable	3-5
26	Coolant temperature high alarm	Coolant temperature is 115°C or higher. Alarm is canceled when Coolant temperature decreases to 110°C. (Option can change)	Engine runs normally.	Correct failure.	Default to enable	3-6
27	E-ECU failure [ROM error]	FlashROM suffers checksum error.	Engine stops.	Turn key off.	Always enable	4-1
28	E-ECU failure [EEPROM error]	Reading/Writing fails.	Engine runs normally.	Turn key off.	Always enable	4-1
		EEPROM suffers checksum error.				
29	E-ECU failure [Sub CPU failure]	E-ECU fails to communicate with sub CPU.	Engine runs normally.	Turn key off.	Always enable	4-1
30	E-ECU failure [Mapping error]	Map format is invalid.	Engine stops.	Turn key off.	Always enable	4-1
31	E-ECU failure [E-ECU temperature sensor failure]	Sensor voltage is 4.6 V or more, or 1.0 V or less.	Engine runs normally.	Correct failure.	Always enable	4-1

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Hydraulic System

Refer to the *Maintenance Interval Chart* (page 81) for service intervals. Refer to the *Replacement Parts* chart (page 52) for filter part numbers.

WARNING **Before servicing the hydraulic system, be sure the lift arm is lowered.**

Checking Hydraulic Oil Level

The loader has a sight gauge located at the back wall of the skid-steer loader engine compartment (Figure 36). Check the fluid level with the lift arm lowered and the attachment on the ground.

Add hydraulic oil as required. Refer to the *Lubrication* chart (page 55). Replace the fill cap.

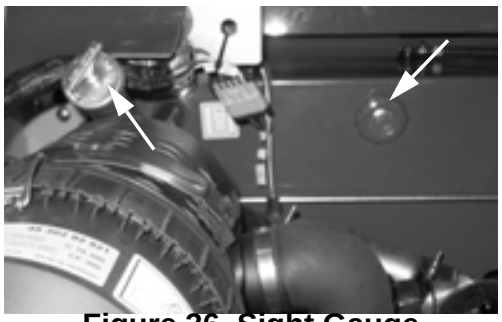

Figure 36 Sight Gauge and Fill Tube

Changing Hydraulic Oil Filter

To check the hydraulic filter element, run the engine at full throttle and normal operating temperature. Lift the engine access cover. Observe the hydraulic filter indicator located on the filter head (Figure 37). The indicator is located in a transparent cover on the left side of the filter head. If a red plunger is exposed the filter needs to be changed.

Figure 37 Hydraulic Oil Filter and Indicator

1. Turn off the engine.
2. Open the reservoir drain plug located behind right rear tire.
3. Drain the oil to a level below the point where the filter attaches to the reservoir.
4. Replace the reservoir drain plug.
5. Spin off the old hydraulic filter element and spin on the new filter element.
6. Refill the hydraulic oil reservoir with oil. Refer to the *Lubrication* chart (page 55).

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Changing Hydraulic Oil

The hydraulic oil must be replaced if it becomes contaminated, after major repairs and after 1000 hours or one year of use.

1. Install a catch pan of sufficient capacity under the oil reservoir. See page 55.
2. Remove the drain plug located behind the right rear tire. Allow the oil to drain.
3. Reinstall the drain plug.
4. Change the oil filter.
5. Refill the reservoir. Refer to the *Lubrication* topic (page 55).
6. Start the engine and operate the hydraulic controls.
7. Stop the engine and check for leaks at the filter and reservoir drain plug.
8. Check the fluid level and add fluid if needed.

Bucket Cutting Edge

The bucket cutting edge should be replaced when it is worn to within 1 in. (25 mm) of the bucket body.

Alternator/Fan Belt

Refer to the separate engine manual for setting proper belt tension. If the belt is worn, cracked or otherwise deteriorated, replace the belt following the procedure in the engine manual.

Wheel Nuts

Wheel nut torque must be checked before initial operation and every two hours thereafter until the wheel mounting hardware torque remains at 180 ft.-lbs. (244 N·m). When wheels are removed and reinstalled this procedure must be repeated.

Lift Arm Pivots

The All-Tach® pivot should be torqued every 250 hours to 240 ft. lbs. (325 N·m). Refer to the *Maintenance Interval Chart* (page 81).

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Cooling System

Important: *Check the cooling system daily to prevent overheating, loss of performance and engine damage.*

Cleaning the Cooling System

WARNING Allow sufficient time for the oil radiator to cool before working on or near it. Parts get extremely hot during operation and can burn you.

The radiator assembly is mounted between the engine and the hinged rear door. When operating correctly, air is blown through the openings between the fins by the engine fan. During operation dust and debris can build up on the engine side of the radiator and restrict air flow through the fins. To remove this restriction, use compressed air or a water hose and direct the flow through the fins from the rear of the radiator toward the engine.

Tires

WARNING Inflating or servicing tires can be dangerous. When possible, trained personnel should service and mount tires. To avoid possible death or serious injury, follow the safety precautions below.

To keep tire wear even, rotate the tires from front to rear and rear to front.

It is important to keep the same size tire on each side of the loader to prevent excessive wear on tires, chains, or other damage. If different sizes are used, tires will be turning at different speeds, causing excessive wear.

Note: *The tread bars of all tires should point the same direction.*

- BE SURE the rim is clean and free of rust.
- Lubricate the tire beads and rim flanges with a soap solution. Do NOT use oil or grease.
- Use a clip-on tire chuck with remote hose and gauge, allowing you to stand clear while inflating the tire.
- NEVER inflate beyond 35 psi (240 kPa) to seat the beads. If the beads have not seated by the time the pressure reaches 35 psi (240 kPa), deflate the assembly, reposition the tire on the rim, lubricate both parts and re-inflate. Inflation pressure beyond 35 psi (240 kPa) with unseated beads may break the bead or rim with explosive force sufficient to cause death or serious injury.
- After seating the beads, adjust the inflation pressure to the recommended operating pressure.
- Do NOT weld, braze or otherwise attempt to repair and use a damaged rim.

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Checking Tire Pressure

Correct tire pressure should be maintained to enhance operating stability and extend tire life. Refer to the chart below for proper inflation pressures.

Tire Size	Inflation Pressure	
	psi	kPa
12 x 16.5 10-ply Heavy-Duty Flotation	65	450
14 x 17.5 12-ply Heavy-Duty Flotation	65	450
12 x 16.5 12-ply Severe-Duty	65	450
33 x 15.5 x 16.5 Extra-Wide Flotation	60	415

Heater/Air Conditioner Filters

The optional heater and heater/air conditioner include two filters: fresh air intake and recirculation air.

Refer to the *Replacement Parts* topic (page 52) for filter part numbers. Filters should be replaced as needed.

Fresh Air Intake Filter: Located directly behind the cover on the HVAC (heating, ventilating and air conditioning) housing mounted on the upper rear corner of the cab. Remove the threaded knobs on both sides of the cover to access the filter.

Recirculation Air Filters: Located behind the covers in the headliner directly above the rear window. The access, remove the screws on either side of the covers.

Important: *Keeping the cab clean will reduce need for service and help ensure proper air conditioner and heater operation. Failure to do so can cause evaporator and heater core plugging, fan noise, vibration and failure.*

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Fuse Panel

The main fuse panel is located behind the cover in the operator's compartment above the chaincase on the left side of the operator's foot area. The loader also has a distribution panel located above and to the front of the battery in the engine compartment.

Battery

WARNING Before servicing the battery or electrical system, be sure the battery disconnect switch is in the OFF position or disconnect the negative (ground) battery cable.

The battery on the loader is a 12-volt, wet-cell battery. The battery can be accessed on the back left rear of the machine.

The battery top must be kept clean. Clean it with an alkaline solution (ammonia or baking soda and water). After foaming has stopped, flush the battery top with clean water. If the terminals and cable connection clamps are corroded or have a build-up, disconnect the cables and clean the terminals and clamps with the same alkaline solution.

WARNING Explosive gas is produced when a battery is in use or being charged. Keep flames and sparks away from the battery area. ALWAYS charge the battery in a well-ventilated area.

Never lay a metal object on top of a battery, because a short circuit can result.

Battery acid is harmful on contact with skin or fabrics. If acid spills, follow these first-aid tips:

1. **Immediately remove any clothing on which acid spills.**
2. **If acid contacts the skin, rinse the affected area with running water for 10 to 15 minutes.**
3. **If acid contacts the eyes, flood the eyes with running water for 10 to 15 minutes. See a doctor at once. Never use any medication or eye drops unless prescribed by the doctor.**
4. **To neutralize acid spilled on the floor, use one of the following mixtures:**
   a. **1 pound (0.5 kg) of baking soda in 1 gallon (4 L) of water, or**
   b. **1 pint (0.5 L) of household ammonia in 1 gallon (4 L) of water**

Whenever the battery is removed, be sure to disconnect the negative (-) battery terminal connection first.

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TROUBLESHOOTING

Electrical System

Problem	Possible Cause	Remedy
Entire electrical system does not function.	Battery disconnect switch is in OFF position.	Turn battery disconnect switch to ON.
	Main wiring harness connectors at rear of ROPS/ FOPS not properly plugged in.	Check main harness connectors.
	Faulty keyswitch.	Replace keyswitch.
	10 amp fuse blown (key switch).	Replace keyswitch.
	Battery terminals or cables loose or corroded.	Clean battery terminals and cables and retighten them.
	Battery is faulty.	Test battery, replace as needed.
No instrument panel lamps with keyswitch turned to "ON."	Fuse has blown.	Replace fuse.
	Main wiring harness connectors at rear of ROPS/ FOPS not properly plugged in.	Check main harness connectors.
	Battery terminals or cables are loose or corroded.	Clean battery terminals and cables and retighten them.
Fuel gauge does not work.	Faulty fuel gauge sender.	Replace fuel gauge sender.
	Faulty fuel gauge.	Replace fuel gauge.
	Fuse has blown gauge.	Replace fuse.
	Loose wiring/terminal connections.	Verify wiring connections.
Engine temperature gauge does not work.	Faulty temperature sender.	Replace temperature sender.
	Faulty temperature gauge.	Replace temperature gauge.
	Fuse has blown gauge.	Replace fuse.
	Loose wiring/terminal connections.	Verify wiring connections.
Hourmeter does not work.	Loose wiring/terminal connections.	Verify wiring connections.
	Faulty alternator.	Repair alternator.
	Fuse has blown.	Replace fuse.
	Faulty hourmeter.	Replace hourmeter.

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Electrical System

Problem	Possible Cause	Remedy
Starter will not engage when key is turned to START.	Battery terminal or cables loose or corroded.	Clean terminal, cables and retighten
	Battery discharged or defective.	Recharge or replace battery.
	Seat or restraint bar switch malfunctioning or not actuated.	Contact your dealer.
	Ignition wiring, seat switch, restraint bar switch, etc. loose or disconnected.	Check wiring for poor connections, broken leads; repair wiring or connection.
	Start safety relay malfunction located in fuse panel.	Verify proper operation.
	Starter solenoid not functioning.	Contact your dealer.
	Starter relay malfunctioning.	Verify relay is working properly, replace.
	Starter or pinion faulty.	Remove starter; repair/ replace as needed.
	Engine fault code: (ECU will not allow crank if certain faults are present).	Contact your dealer.
Work lights not functioning properly.	Single light not working; light bulb burned out, faulty wiring.	Check and replace light bulb as needed. Check wiring connection to light.
	No lights; 30 ampere light fuse blown.	Check circuit and locate trouble before replacing fuse.
	Faulty light switch or poor ground.	Check ground wire connections. Replace light switch.
	Engine fault code: (ECU will not allow crank if certain faults are present)	Contact your dealer.
Lift/Tilt and/or drive solenoids do not work.	Wiring to solenoids disconnected or faulty.	Troubleshoot circuit, repair.
	Restraint bar or seat switch malfunction.	Contact your dealer.
	Faulty solenoid valve coil.	Contact your dealer.
	Solenoid relay malfunctioning.	Verify relay is working properly, replace.
	Faulty fuse panel.	Verify relay is working properly if not, replace.

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Engine

Problem	Possible Cause	Remedy
Engine turns over but will not start.	Engine cranking speed too slow.	Battery requires recharging or replacing, or, in cold temperatures, pre-warm the engine.
	Auxiliary valve engaged.	Return control valves to neutral.
	Fuel tank empty.	Refill fuel tank.
	Fuel valves turned off.	Open fuel valves.
	Engine fault codes displayed.	Identify problem and correct.
	Engine not warm enough.	Install block heater.
	Ambient temperature too low.	Install block heater.
	Fuel filter plugged.	Replace filter.
	Fuel pump not working.	Contact your dealer.
Engine overheats.	Crankcase oil level too low or too high.	Add or remove oil as required.
	Fan air circulation blocked or restricted.	With engine off, remove blockage or restriction.
	Fan shroud improperly positioned.	Contact your dealer.
	Grade of oil improper or excessively dirty.	Drain and replace with proper grade new oil.
	Exhaust restricted.	Allow exhaust to cool, remove restriction.
	Air filter restricted.	Replace filter(s).
	Low coolant level.	Add coolant.
	Fan belt loose.	Tighten fan belt.

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Hydrostatic Drive System

Problem	Possible Cause	Remedy
No response from either hydrostatic drive or the lift/tilt systems.	Hydraulic oil viscosity too heavy.	Allow longer warm-up or replace oil with proper viscosity oil.
	Hydraulic oil too low.	Check for low oil level in reservoir, add oil.
	Drive coupling failure.	Replace coupling.
Traction drive will not operate in either direction.	Parking brake is engaged.	Disengage parking brake.
	Hydraulic oil level low.	Check for low oil level in reservoir, add oil.
	Low or no charge pressure.	Contact your dealer.
	Hydrostatic pump(s) relief valves malfunctioning.	Contact your dealer.
Sluggish acceleration.	Air in hydraulic system.	Cycle lift and tilt cylinders to maximum stroke and maintain pressure for short time to clear air from system. Also check for low oil level in reservoir, fill as needed.
	Hydraulic oil level too low.	Check for low oil level in reservoir, add oil.
	Hydrostatic system charge pressure low.	Contact your dealer.
	Drive motor(s) or hydrostatic pump(s) have internal damage or leakage.	Contact your dealer.
Hydrostatic drive overheating.	Drive system overloaded continuously.	Improve efficiency of operation.
	Lift/tilt or auxiliary system overloaded continuously.	Improve efficiency of operation.
	Drive motor(s) or hydrostatic pump(s) have internal damage or leakage.	Contact your dealer.
	Oil cooler fins plugged with debris.	Clean oil cooler fins.
	Hydrostatic oil filter plugged or restricted.	Replace filter.
	Loader being operated in high temperatures with no air circulation.	Reduce duty cycle; improve air circulation.

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Hydraulic System

Problem	Possible Cause	Remedy
Hydrostatic (drive) system is noisy.	Hydraulic oil viscosity too heavy.	Allow longer warm-up or replace oil with proper viscosity oil.
	Air in hydraulic system.	Cycle lift and tilt cylinders to maximum stroke and maintain pressure for short time to clear air from system. Also check for low oil level in reservoir, fill as needed.
	Drive motor(s) or hydrostatic pump(s) have internal damage or leakage.	Contact your dealer.
Right side doesn't drive in either direction. Left side operates normally.	Relief valves on rear hydrostatic pump malfunctioning.	Contact your dealer.
Right side doesn't drive in one direction.	Relief valve on rear hydrostatic pump malfunctioning.	Contact your dealer.
	Rear hydrostatic pump malfunctioning.	Contact your dealer.
Left side doesn't drive in either direction. Right side operates normally.	Relief valves on front hydrostatic pump malfunctioning.	Contact your dealer.
Left side doesn't drive in one direction.	Relief valve on front hydrostatic pump malfunctioning.	Contact your dealer.
	Front hydrostatic pump malfunctioning.	Contact your dealer.
Lift/Tilt controls fail to respond.	Restraint bar raised.	Lower restraint bar.
	Hydraulic oil viscosity too heavy.	Allow longer warm-up or replace with proper viscosity oil.
	Hydraulic oil level low.	Check oil level in reservoir. If oil is low, check for external leak, repair and add oil.
	Solenoid valve malfunctioning.	Check electrical connections to pilot solenoid and repair.
	Restraint bar or seat switch malfunctioning.	Contact your dealer.

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Hydraulic System

Problem	Possible Cause	Remedy
Hydraulic cylinder action is slow for lift and/or tilt functions.	Low engine speed.	Operate engine at higher speed.
	Hydraulic oil viscosity too heavy.	Allow longer warm-up or replace with proper viscosity oil.
	Hydraulic oil level low.	Check oil level in reservoir. If oil is low, check for an external leak. Repair and add oil.
	Hydraulic oil leaking past cylinder piston seals.	Contact your dealer.
	Worn pump.	Contact your dealer.
	Solenoid valve malfunctioning or one of the two cartridges on solenoid valve is malfunctioning.	Check electrical connections to pilot solenoid and repair connections as needed. If solenoid valve is still not functioning properly, contact your dealer.
Bucket does not level on the lift cycle.	Self-leveling valve misadjusted or malfunctioning.	Contact your dealer.
Jerky lift arm and bucket action.	Seat or restraint bar switch malfunctioning.	Contact your dealer.
	Air in hydraulic system.	Cycle/lift and tilt cylinders to maximum stroke and maintain pressure for short time to clear air from system.
	Oil in hydraulic reservoir low.	Check and add oil.
No down pressure on the bucket.	Float or Hydroglide activated.	Turn off float and Hydroglide.
	Tilt cylinders malfunctioning.	Contact your dealer.
Bucket drifts down with tilt control in neutral.	Oil leaking past tilt cylinder seals (internal or external).	Contact your dealer.
	Self-leveling valve is malfunctioning.	Contact your dealer.
	Leaking hydraulic hoses, tubes or fittings between control valve and cylinders.	Check oil level in reservoir. If oil is low, check for external leaks, repair and add oil.
Bucket will not tilt, lift arm works properly.	Tilt spool in control valve not actuated or leaking.	Check tube connections to valve.
Lift arm does not raise, bucket tilt works properly.	Lift spool in control valve not actuated or leaking.	Check tube connections to valve.

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Hydraulic System

Problem	Possible Cause	Remedy
Lift arm does not maintain raise position with left control in NEUTRAL.	Oil leading past lift cylinder seals (internal or external).	Contact your dealer.
	Oil leaking past lift spool in control valve.	Contact your dealer.
	Self-leveling valve malfunctioning.	Contact your dealer.
	Leaking hydraulic hoses, tubes or fittings between control valve and cylinders.	Inspect hoses and tubes, tighten fittings as needed. Replace as needed.
Lift arm will not lower or raise.	Lift arm support device engaged.	Raise lift arm and remove support device.
	Restraint bar not lowered.	Lower restraint bar.
	Seat or restraint bar switch malfunction.	Contact your dealer.
Auxiliary hydraulics do not function.	Restraint bar raised.	Lower the restraint bar.
	Pilot solenoids malfunctioning.	Check electrical connections to pilot solenoids, repair connections as needed. If still not functioning properly, contact your dealer.
	Restraint bar or seat switch malfunctioning.	Contact your dealer.
High-flow auxiliary functions slowly.	Low engine speed.	Operate engine at higher speed.
	Hydraulic oil level low.	Add oil.
	Hydraulic oil viscosity too heavy.	Allow longer warm-up, or replace oil with proper viscosity oil.
High-flow auxiliary does not function.	Restraint bar raised.	Lower the restraint bar.
	Pilot solenoids malfunctioning.	Check electrical connections to solenoid, repair connections as needed. If still not functioning properly, contact your dealer.
	Restraint bar or switch malfunctioning.	Contact your dealer.

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MAINTENANCE

This *Maintenance Interval* chart was developed to match the *Service* chapter of this manual. Detailed information on each service procedure is in the *Service* chapter. A *Maintenance Log* follows this chart for recording maintenance performed. Recording 10-hour (or daily) service intervals is impractical and is not recommended.

Important: *Under severe operating conditions, more frequent service than the recommended intervals may be required. You must decide, based on your use, if your operation requires more frequent service.*

Service Procedure	Maximum Interval		
	10 Hours (or Daily)	250 Hours	500 Hours (or Annually)
Remove Foreign Material (page 54)	●		
Check Engine Air Cleaner Restriction Indicator (page 58)	●		
Check Engine Oil Level (page 62)	●		
Check Hydraulic Oil Level (page 67)	●		
Check Tire Pressures (page 70)	●		
Grease Lift Arm, Hitch, Cylinder Pivots and Latch Pins (page 55)	●		
Check Bucket Cutting Edge (page 68)	●		
Test Safety Interlock System (page 20)	●		
Check Coolant Level (page 69)	●		
Clean Cooling System (page 69)	●		
Check Drive Chain Tension (page 58)		●	
Check Wheel Nuts Torque (page 68)	❍	●	
Check All-Tach® Pivot Torque (page 68)		●	
Check Oil Level in Chaincases (page 57)		●	
Check Alternator/Fan Belt Tensions (page 68)		●	
Change Engine Oil and Filter (page 62)	❑	●	
Change Hydraulic Oil Filter (page 67)	❑		●
Check Battery (page 71)			●
Check Engine Mounting Hardware (page 62)			●
Change Fuel Filter (page 62)			●
Change Hydraulic Oil (page 68)			◆
Check and Drain Water Separator (page 63)	●		
Change Chaincase Oil (page 57)	❑		◆

❍ Perform the initial procedure at 2 hours then at "●" intervals.
☐ Perform the initial procedure at 50 hours then at "●" or "◆" intervals.
❖ Severe operating conditions.
◆ Perform the procedure at 1000 hours.

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Maintenance Log

Date	Hours	Service Procedure

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Maintenance Log

Date	Hours	Service Procedure

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Maintenance Log

Date	Hours	Service Procedure

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SPECIFICATIONS

Loader Specifications

Specification	V270
Operating Weight (approx)	8000 lbs. (3629 kg)
Shipping Weight (approx)	7200 lbs. (3266 kg)
Rated Operating Load[1]	2700 lbs. (1225 kg)
Engine	
Make	Yanmar
Model	4TNV98T
Displacement	202 cu. in. (3,31 L)
Power (net)	84 hp (63 kW) @ 2500 rpm
Peak Torque	215 ft.-lb. (292 N·m) @ 1850 rpm
Hydraulic System (theoretical)	
Main Hydraulic System Pressure	3300 psi (228 bar)
Standard-Flow Rating	21.75 gpm (81 L/min)
Electrical	
Battery	12-Volt DC, 950 CCA
Starter	12-Volt DC (3.0 kW)
Alternator	95-amperes
Capacities	
Chaincase (each)	10 U.S. qts. (9,5 L)
Engine Oil	11 U.S. qts. (10,4 L)
Engine Coolant	9 U.S. qts. (8,5 L)
Fuel Tank	22 U.S. gal. (83 L)
Hydraulic Reservoir	11 U.S. gal. (42 L)
Sound Levels (with EU Sound Attenuation Package)	
Sound Pressure Level (Operator Ear)	85 dB(A)
Sound Power Level (Environmental)	102 dB(A)

1. Operating load rated with an 70 in. (1778 mm) 16.9 cu. ft. (0.48 m^3) Dirt Construction and 12 x 16.5 NHS tires in accordance with SAE J818 and ISO 14397-1.

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Standard Features

- Fuel Level Gauge
- Engine Coolant Temperature Gauge and Indicator Lamp
- Hourmeter
- Hydraulic Oil Temperature Indicator Lamp
- Battery Charge Indicator Lamp
- Seatbelt Indicator Lamp and Buzzer
- Choice of two control types: Hand/Foot or Dual Joystick
- Hand Throttle
- Acoustical Cab Material and Headliner
- Adjustable Operator Restraint Bar with Armrests
- ROPS/FOPS (ISO 3471, ISO 3449 Level II)
- Skid Plate for Clean Out
- Interior Dome Light
- Hydraloc™ System – Brakes and Interlock for Starter, Lift Cylinders, Tilt Cylinders, Auxiliary Hydraulics, Wheel Drives
- Dual-Element Air Cleaner with Visual Indicator
- Anti-Vandalism Rear Door
- Pre-Heat Starting Assist
- Servo-Controlled Hydrostatic Drive
- Lift Arm Support Device
- Dual Front and Rear Halogen Work Lights and Dual Tail Lights
- Bi-directional Auxiliary Hydraulics with Flat-Faced Couplers
- All-Tach® Attachment Mounting System: Single-Lever (manual)
- Engine Auto-Shutdown System
- Emergency Exit Rear Window
- Remote Engine Oil Filter
- Adjustable Suspension Seat
- Hydraglide™ Ride Control System

Optional Features

- Upper-torso Restraint (required with 2-speed transmission)
- 3-inch Wide Seatbelt – where required by law
- Sliding Side Windows
- Rear-View Mirror
- Front Door with Wiper
- Operator's Compartment Heater/Defroster/Air Conditioner with Filters
- Audible Back-Up Alarm
- Strobe Light
- Bucket Bolt-On Cutting Edge Kits
- Hydraulic Couplers Kit
- Engine Block Heater
- 2-Speed Drive
- Bi-directional High-Flow Auxiliary Hydraulics with Flat-Faced Couplers
- Horn
- Battery Disconnect Switch
- Impact-Resistant Front Door Window
- Deluxe Sound Package
- Engine Air Pre-Cleaner
- Single and Four-Point Lift
- Power-A-Tach®
- EU Completing Package (EU Only)
- Self-Leveling Lift Action
- Air Suspension Seat

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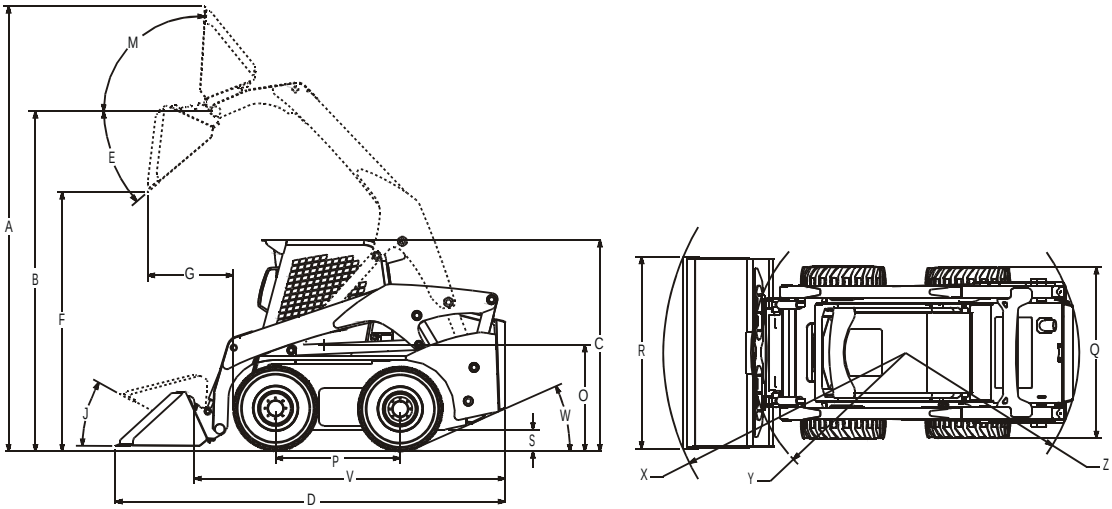

V270		16.9 ft³ (0.48 m³) Bucket w/12 x 16.5 Tires	
		inches	**mm**
A	Overall Operation Height – Fully Raised	169.8	4313
B	Height to Hinge Pin – Fully Raised	130.3	3310
C	Overall Height – of ROPS	80.5	2045
D	Overall Length – Bucket Down	149.2	3790
E	Dump Angle at Full Height	42°	
F	Dump Height	99	2515
G	Dump Reach – Bucket Full Height	34	864
J	Rollback at Ground	28.5°	
M	Rollback Angle at Full Height	93.6°	
O	Seat to Ground Height	40.2	1021
P	Wheel Base – Nominal	49.4	1255
Q	Overall Width – Less Bucket[1]	67	1701
R	Bucket Width – Overall	70	1778
S	Ground Clearance – to Chassis (Between Wheels)	8	203
V	Overall Length (Less Bucket)	115	2921
W	Departure Angle	27.2°	
X	Clearance Circle – Front (With Bucket)	93	2362
Y	Clearance Circle – Front (Less Bucket)	74.6	1895
Z	Clearance Circle – Rear	65.5	1664

1. Overall width (Q) is dependent upon the amount of wheel offset.

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V270

Note: *Use the Common Materials and Densities table (page 89) for selecting the appropriate bucket.*

Dirt/Construction Buckets

Description	Weight	V270 Rating
70 in./16.9 ft^3 (1778 mm/0.48 m^3)	469 lbs. (213 kg)	2700 lbs. (1225 kg)
74 in./20.2 ft^3 (1879 mm/0.57 m^3)	563 lbs. (255 kg)	2505 lbs. (1136 kg)

Pallet Forks - 48 in. (1229 mm)

Description	Weight	V270 Rating
For 15.7 in. (400 mm) Load Center per EN 474-3	470 lbs. (213 kg)	2200 lbs. (998 kg)
For 19.7 in. (500 mm) Load Center per EN 474-3	470 lbs. (213 kg)	2070 lbs. (939 kg)
For 24 in. (610 mm) Load Center per SAE J1197	470 lbs. (213 kg)	1965 lbs. (891 kg)

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Common Materials and Densities

Material	Density	
	lbs./cu. ft.	kg/m³
Ashes	35-50	560-800
Brick-common	112	1792
Cement	110	1760
Charcoal	23	368
Clay, wet-dry	80-100	1280-1600
Coal	53-63	848-1008
Concrete	115	1840
Cinders	50	800
Coal-anthracite	94	1504
Coke	30	480
Earth-dry loam	70-90	1121-1442
Earth-wet loam	80-100	1281-1602
Granite	93-111	1488-1776
Gravel-dry	100	1602
Gravel-wet	120	1922
Gypsum-crushed	115	1840
Iron ore	145	2320
Lime	60	960
Lime stone	90	1440
Manure-liquid	65	1040
Manure-solid	45	720
Peat-solid	47	752
Phosphate-granular	90	1440
Potash	68	1088
Quartz-granular	110	1760
Salt-dry	100	1602
Salt-rock-solid	135	2160
Sand-dry	108	1728
Sand-wet	125	2000
Sand-foundry	95	1520
Shale-crushed	90	1440
Slag-crushed	70	1120
Snow	15-50	240-800
Taconite	107	1712

Note: *The densities listed are average values and intended only as a guide for bucket selection. For a material that is not in the table, obtain its density value before selecting the appropriate bucket.*

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Bucket Selection

To use the table, find the material to be loaded and its maximum density. Then multiply the volumetric rating of the attachment by the material density to determine if the attachment can safely be used. See page 88 for a listing of attachments and their ratings.

Where the material density is listed as a range (snow at 15-50 lbs./ft^3, for example), always use the maximum density (50 lbs./ft^3 in this example) for making calculations. Also, see the following examples.

Example 1: Clay (density of 80-100 lbs./cu. ft.) is to be hauled with a V270 model skid loader using a 70 in. dirt/construction bucket (SAE J742-rated heaped capacity of 16.9 cu. ft.). With this bucket, the V270 has a rating of 2700 lbs. Multiplying the maximum density of the material by the bucket capacity (100 x 16.9) yields a load that weighs 1690 lbs. This number is less than the machine rating and thus indicates that the loader/bucket combination is safe to use in this application.

Example 2: Granite (density of 1488-1776 kg/m^3) is to be hauled with a V270 model skid loader using a 1778 mm earth and foundry bucket w/high back (SAE J742-rated heaped capacity of 0.43 m^3). With this bucket, the V270 has a rating of 1225 kg. Multiplying the maximum density of the material by the bucket capacity (1776 x 0.43) yields a load that weighs 763 kg. This number is less than the machine rating and thus indicates that the loader/bucket combination is safe to use in this application.

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TORQUE SPECIFICATIONS

Use these torque values when tightening hardware (excluding locknuts, and self-tapping, thread-forming, and sheet metal screws) unless otherwise specified.

UNIFIED NATIONAL THREAD	GRADE 2		GRADE 5		GRADE 8	
	DRY	LUBED	DRY	LUBED	DRY	LUBED
8-32	19*	14*	30*	22*	41*	31*
8-36	20*	15*	31*	23*	43*	32*
10-24	27*	21*	43*	32*	60*	45*
10-32	31*	23*	49*	36*	68*	51*
1/4-20	66*	50*	9	75*	12	9
1/4-28	76*	56*	10	86*	14	10
5/16-18	11	9	17	13	25	18
5/16-24	12	9	19	14	25	20
3/8-16	20	15	30	23	45	35
3/8-24	23	17	35	25	50	35
7/16-14	32	24	50	35	70	55
7/16-20	36	27	55	40	80	60
1/2-13	50	35	75	55	110	80
1/2-20	55	40	90	65	120	90
9/16-12	70	55	110	80	150	110
9/16-18	80	60	120	90	170	130
5/8-11	100	75	150	110	220	170
5/8-18	110	85	180	130	240	180
3/4-10	175	130	260	200	380	280
3/4-16	200	150	300	220	420	320
7/8-9	170	125	430	320	600	460
7/8-14	180	140	470	360	660	500
1-8	250	190	640	480	900	680
1-12	270	210	710	530	1000	740

METRIC COARSE THREAD	GRADE 8.8		GRADE 10.9		GRADE 12.9	
	DRY	LUBED	DRY	LUBED	DRY	LUBED
M6-1	8	6	11	8	13.5	10
M8-1.25	19	14	27	20	32.5	24
M10-1.5	37.5	28	53	39	64	47
M12-1.75	65	48	91.5	67.5	111.5	82
M14-2	103.5	76.5	145.5	108	176.5	131
M16-2	158.5	117.5	223.5	165.5	271	200

*All torque values are in ft.-lbs., except those marked with an *, which are in in.-lbs. For metric torque value (N·m), multiply ft.-lbs. value by 1.355, or the in.-lbs. value by 0.113.

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GEHL COMPANY

WARRANTY

GEHL COMPANY, hereinafter referred to as Gehl, warrants new Gehl equipment to the Original Retail Purchaser to be free from defects in material and workmanship for a period of twelve (12) months from the Warranty Start Date.

GEHL WARRANTY SERVICE INCLUDES:

Genuine Gehl parts and labor costs required to repair or replace equipment at the selling dealer's business location.

GEHL MAKES NO REPRESENTATIONS OR WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED (INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE), EXCEPT AS EXPRESSLY STATED IN THIS WARRANTY STATEMENT.

ANY OF THESE LIMITATIONS EXCLUDED BY LOCAL LAW SHALL BE DEEMED DELETED FROM THIS WARRANTY STATEMENT; ALL OTHER TERMS WILL CONTINUE TO APPLY.

SOME STATES DO NOT PERMIT THE EXCLUSION OF LIMITATION OF THESE WARRANTIES AND YOU MAY HAVE GREATER RIGHTS UNDER YOUR STATE LAW.

GEHL WARRANTY DOES NOT INCLUDE:

1. Transportation to selling dealer's business location or, at the option of the Original Retail Purchaser, the cost of a service call.
2. Used equipment.
3. Components covered by their own non-Gehl warranties, such as tires, batteries, trade accessories and engines.
4. Normal maintenance service and expendable, high-wear items.
5. Repairs or adjustments caused by: improper use; failure to follow recommended maintenance procedures; use of unauthorized parts or attachments; accident or other casualty.
6. Liability for incidental or consequential damages of any type, including, but not limited to lost profits and expenses of acquiring replacement equipment.

No agent, employee or representative of Gehl has any authority to bind Gehl to any warranty except as specifically set forth herein.

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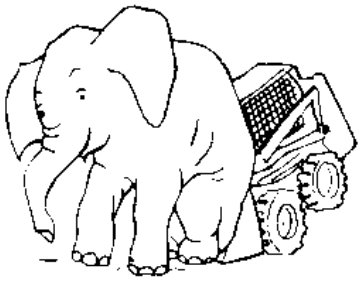
WRONG



Never exceed rated operating load.

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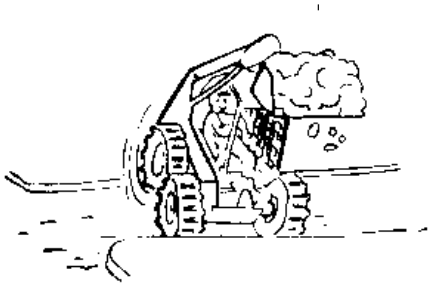
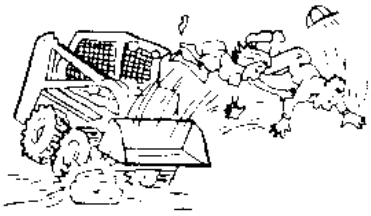


Always carry attachment as low as possible. Do not travel or turn with the lift arm raised. Load, unload and turn on flat level surface.

WRONG



Never carry riders.

Keep bystanders away from work area.

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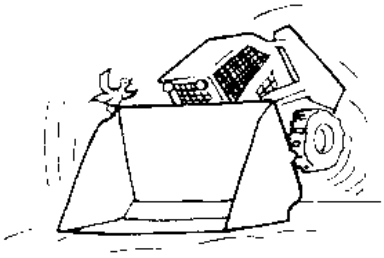
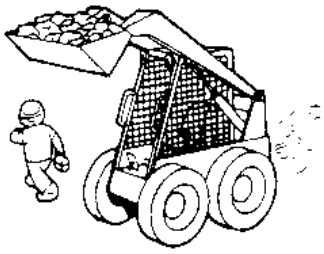


Never modify equipment.

Use only attachments approved for model loader.

WRONG



Never leave loader with engine running or with lift arm up. To park, engage parking brake and put attachment flat on the ground.

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⚠ WARNING ⚠

THIS OPERATOR'S MANUAL IS PROVIDED FOR OPERATOR USE

DO NOT REMOVE FROM THIS MACHINE

Do not start, operate or work on this machine until you carefully read and thoroughly understand the contents of this Operator's Manual.

Failure to follow safety, operating and maintenance instructions can result in serious injury to the operator or bystanders, poor operation, and costly breakdowns.

If you have any questions on proper operation, adjustment or maintenance of this machine, contact your dealer or the Mustang Manufacturing Company Service Department before starting or continuing operation.

California Proposition 65 Warnings

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer and birth defects or other reproductive harm.
Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. Wash hands after handling battery.

GEHL

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