Models 153, 193 & 223

Compact Excavators

GEHL®

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Operator's Manual

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; ALL OTHER TERMS WILL CONTINUE TO APPLY.

SOME STATES DO NOT PERMIT THE EXCLUSION OR 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 attachments; accident or other casualty.
6. Liability for incidental or consequential damages of any type, including, but not limited to lost profits or 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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NOTES

CHAPTER 1 – GENERAL INFORMATION

INTRODUCTION

The information in this Operator's Manual was written to give the owner/operator assistance in preparing, adjusting, maintaining and servicing the Compact Excavator. More important, this manual provides an operating plan for safe and proper use of the machine. Major points of safe operation are detailed in Chapter 2 – Safety.

Gehl Company asks that you read and understand the contents of this manual COMPETELY and become familiar with your new machine BEFORE attempting to operate it. Consult your Gehl dealer to obtain extra manuals, or manuals in other languages.

Throughout this manual, information is introduced by the word **NOTE** or **IMPORTANT**. Be sure to read carefully and comply with the message. Following this information will improve your operating and maintenance efficiency, help to avoid breakdown and damage and extend the machine's life.

Do not use this machine for any application or purpose other than those described in this manual. 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 making unauthorized modifications is responsible for the consequences.

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

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 equipment and the handling of loads. It is recommended that the operator be capable of obtaining a valid motor vehicle operator's license.

Gehl Company 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 unit previously delivered.

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

Serial Number Locations

Purchased From: _____

Date of Purchase: _____

Model No.: _____

Machine Serial No.: _____

Cab Serial No.: _____

Engine Type No.: _____

The machine serial number plate (A, Figure 1-1) is located on the front frame, below the operator's cab, and the cab serial number (B) is located on the door frame, above the left door opening when seated at the operator's controls. The engine type number (C) is located on the engine valve cover.

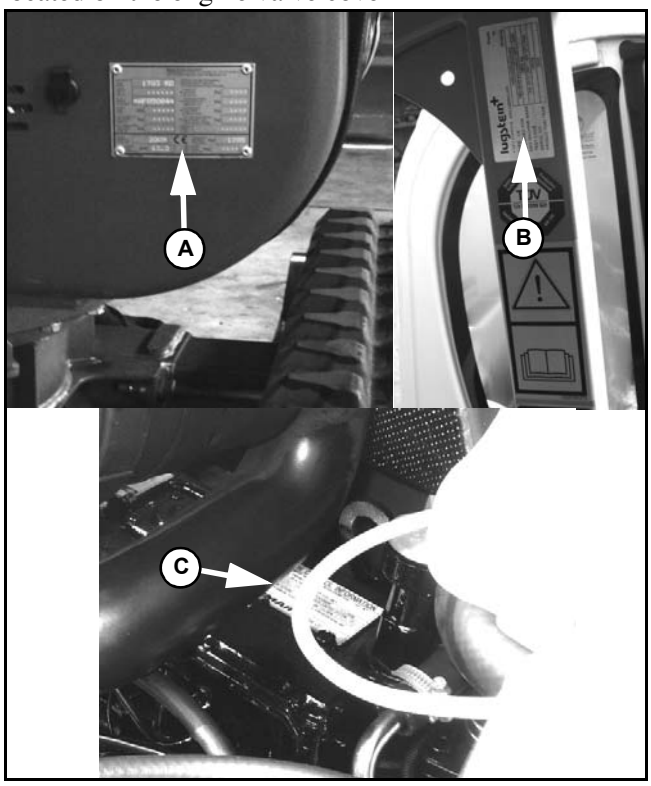


Figure 1-1 – Serial/Type Number Plate Locations

Ownership Change

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 numbers. 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.

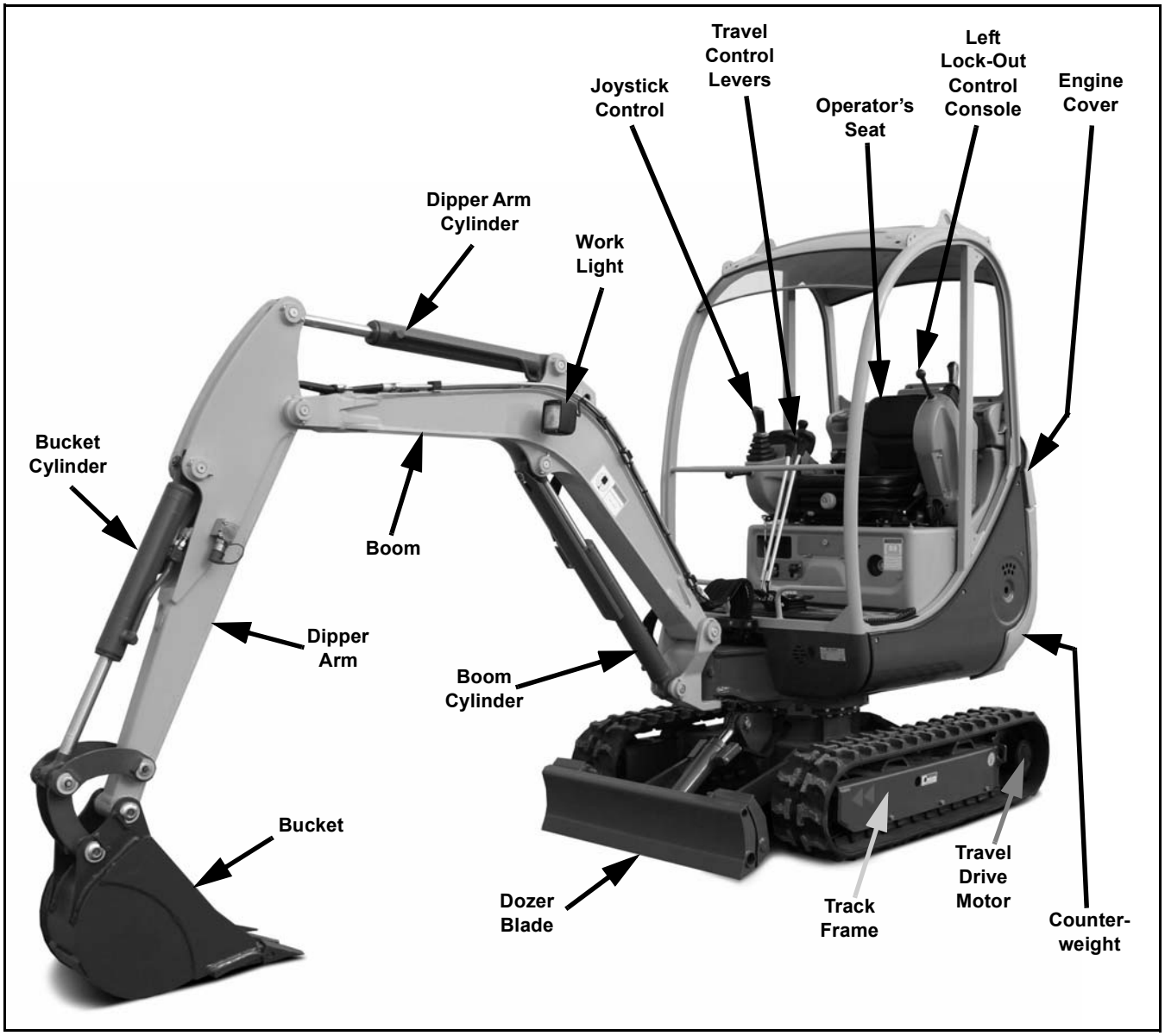


Figure 1-2 – Component Names

SPECIFICATIONS

153 Specifications

Engine

	SN AB00440–AC00303	SN AC00304–AE00004	SN AE00005 and up
Model	Yanmar 3TNE68-ENSR	Yanmar 3TNE74-ENSR2	Yanmar 3TNV76-SNS
Type	Water-cooled 3-cylinder diesel engine		
Capacity	47.6 cu. in. (0.78 L)	61.4 cu. in. (1.01 L)	68.1 cu. in. (1.12 L)
Horsepower (DIN)	19.4 hp (14.5 kW)	23.7 hp (17.7 kW)	17.9 hp (13.2 kW)
Revolutions Per Minute	2200 rpm		2375 rpm
Battery	12V/45Ah		
Fuel Tank	6.5 gal. US (24 L)		
Engine Oil	2.9 qts. US (2.7 L)	2.4 qts. US (2.3 L)	3.6 qts. US (3.4 L)
Coolant Capacity	3 qts. US (2.7 L)		4.8 qts. US (4.5 L)

Hydraulic System

Pump	Double axial piston pump and 2 gear pumps
Pump Capacity	6.5 gpm US (23.9 L/min) + 6.5 gpm US (23.9 L/min) + 5.0 gpm US (19.1 L/min) + 1.7 gpm US (6.5 L/min)
Operating Pressure (working and driving)	2,900 psi (200 bar)
Operating Pressure (swing unit)	1,813 psi (125 bar)
Hydraulic Fluid Cooler	Standard
Operating Pressure (dozer blade)	2,900 psi (200 bar)
Pilot Control Pressure	435 psi (30 bar)
Hydraulic Tank Capacity	5.5 gal. US (21 L)
Hydraulic System Capacity	7.9 gal. US (30 L)

Under carriage and Swing System

Travel Speed	
Low Speed	1.74 mph (2,8 km/h)
High Speed	3.3 mph (5,6 km/h)
Ground Clearance	7.8 in. (200 mm)
Swing Speed	10 rpm
Gradability	30° (58%)
Rubber Track Width	9 in. (230 mm)
Number of Track Rollers	3 per side
Average Ground Pressure	3.85 psi (27 kPa)

Dozer Blade

Width – Extended - Retracted	51.25 in. (1300 mm) - 39 in. (990 mm)
Height	10.25 in. (260 mm)
Maximum Lift Above Ground	10.25 in. (260 mm)
Maximum Depth Below Ground	9.00 in. (230 mm)

Bucket (Standard)

Width	11.75 in. (300 mm)
Capacity	1.13 cu. ft. (32 L)

Noise Levels

Sound Power	93 dB(A)
Sound Pressure	77 dB(A)

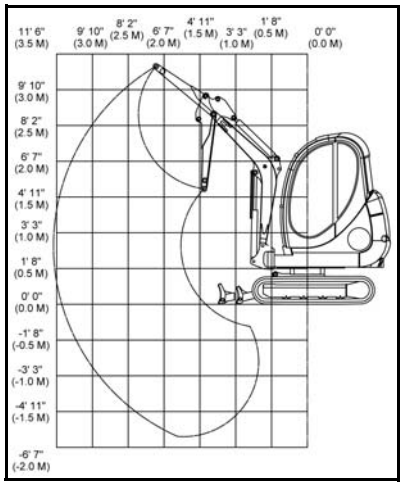
General Specifications

Operating Weight w/Cab (SAE)	3,760 lbs. (1705 kg)
Height	93 in. (2380 mm)
Width	39 in. (990 mm)
Length	150 in. (3810 mm)
Max. Digging Depth	86 in. (2185 mm)
Max. Digging Height	137.8 in. (3500 mm)
Max. Dumping Height	100 in. (2545 mm)
Max. Digging Radius	148.5 in. (3770 mm)
Bucket Tooth Breakout Force	3,825 lbf (17.0 kN)
Min. Tail Swing Radius	45.75 in. (1160 mm)
Min. Arm Clearance	61.25 in. (1555 mm)
Slew Angle - Left	80°
Slew Angle - Right	45°
Adjustable Track Width – retracted/extended	39/51 in. (990/1300 mm)

Model 153 Load Diagram

Maximum permissible loads

max	MAX	9' 10" (3.0 m)		8' 2" (2.5 m)		6' 7" (2.0 m)		4' 11" (1.5 m)	
A / B									
8' 2" (2.5 m)	871* (395*)	871* (395*)			849* (385*)	849* (385*)				
6' 7" (2.0 m)	871* (395*)	750 (340)			849* (385*)	849* (385*)				
3' 3" (1.0 m)	882* (400*)	650 (295)	948* (430*)	750 (340)	1113* (505*)	937 (425)	1444* (655*)	1334 (605)	2260* (1025*)	2083 (945)
0' 0" (0.0 m)	970* (440*)	661 (300)	1036* (470*)	717 (325)	1775* (805*)	882 (400)	1841* (835*)	1279 (580)	2833* (1285*)	1962 (890)
-3' 3" (-1.0 m)	1003* (455*)	871 (395)			1102* (500*)	849 (385)	1554* (705*)	1279 (580)	2227* (1010*)	2017 (915)
-4' 11" (-1.5 m)	981* (445*)	981* (445*)					1003* (455*)	1003* (455)	1477* (670*)	1477* (670)



Maximum permissible load on dipper arm	
A	Overhang from the center of the turntable
B	Height of load fixing point
*	Lifting capacity hydraulically limited

All table values are in lbs. (kg) and for a machine in a horizontal position on firm ground without bucket.

	Dozer blade support in drive direction
	Dozer blade support 90° to drive direction

If equipped with a bucket or other implements, lift capacity or tilt load is reduced by bucket or implement weight.

Calculation basis: According to ISO 10567.

The excavator's lift capacity is restricted by the settings of the pressure relief valves and the hydraulic system's stabilizing features.

Neither 75% of the static tilt load nor 87% of the hydraulic lift capacity is exceeded.

193 Specifications

Engine

	SN AB00440–AD04192	SN AE00001 and up
Model	Yanmar 3TNE74-ENSR2	Yanmar 3TNV76-SNS
Type	Water-cooled 3-cylinder diesel engine	
Capacity	61.4 cu. in. (1.01 L)	68.1 cu. in. (1.12 L)
Horsepower (DIN)	23.7 hp (17.7 kW)	17.9 hp (13.2 kW)
Revolutions Per Minute	2200 rpm	2375 rpm
Battery	12V/45Ah	
Fuel Tank	6.5 gal. US (24 L)	6.5 gal. US (24 L)
Engine Oil	3.0 qts. US (2.7 L)	3.7 qts. US (3.5 L)
Coolant Capacity	4.2 qts. US (4.0 L)	

Hydraulic System

Pump	Double axial piston pump and 2 gear pumps
Pump Capacity	6.5 gpm US (23.9 L/min) + 6.5 gpm US (23.9 L/min) + 5.0 gpm US (19.1 L/min) + 1.7 gpm US (6.5 L/min)
Operating Pressure (working and driving)	2,900 psi (200 bar)
Operating Pressure (swing unit)	1,813 psi (125 bar)
Hydraulic Fluid Cooler	Standard
Operating Pressure (dozer blade)	2,900 psi (200 bar)
Pilot Control Pressure	435 psi (30 bar)
Hydraulic Tank Capacity	5.5 gal. US (21 L)
Hydraulic System Capacity	7.9 gal. US (30 L)

Undercarriage and Swing System

Travel Speed	
Low Speed	1.2 mph (2.0 km/h)
High Speed	2.5 mph (4.0 km/h)
Ground Clearance	7.1 in. (180 mm)
Swing Speed	10 rpm
Gradability	30° (58%)
Rubber Track Width	10 in. (250 mm)
Number of Track Rollers	4 per side
Average Ground Pressure	3.85 psi (27 kPa)

Dozer Blade

Width – retracted / extended	51.25 in. (1300 mm) / 39 in. (990 mm)
Height	10.25 in. (260 mm)
Maximum Lift Above Ground	9.75 in. (245 mm)
Maximum Depth Below Ground	9.45 in. (238 mm)

Bucket (Standard)

Width	15.75 in. (400 mm)
Capacity	1.84 cu. ft. (52 L)

Noise Levels

Sound Power	94 dB(A)
Sound Pressure	75 dB(A)

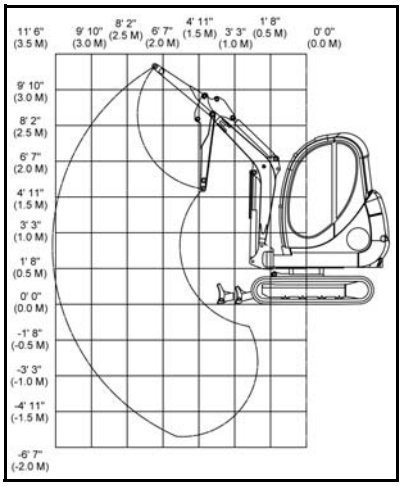
General Specifications

Operating Weight w/Cab (SAE)	4,290 lbs. (1945 kg)
Height	93.5 in. (2375 mm)
Width	39.0 in. (990 mm)
Length	157 in. (3990 mm)
Max. Digging Depth	98.5 in. (2500 mm)
Max. Digging Height	152 in. (3860 mm)
Max. Dumping Height	108.7 in. (2760 mm)
Max. Digging Radius	161 in. (4090 mm)
Bucket Tooth Breakout Force	3,276 lbf (14.6 kN)
Min. Tail Swing Radius	45.7 in. (1160 mm)
Min. Arm Clearance	61.3 in. (1575 mm)
Slew Angle - Left	80°
Slew Angle - Right	45°
Adjustable track width – retracted/extended	39/51 in. (990/1300 mm)

Model 193 Load Diagram

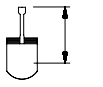
Maximum permissible loads

A / B	max	MAX	9' 10" (3.0 m)		8' 2" (2.5 m)		6' 7" (2.0 m)		4' 11" (1.5 m)	
9' 10" (3.0 m)	915* (415*)	915* (415*)			882* (400*)	882* (400*)				
6' 7" (2.0 m)	871* (395*)	728 (330)	860* (390*)	838* (380*)	882* (400*)	882* (400*)				
3' 3" (1.0 m)	893* (405*)	584 (265)	1003* (455*)	816 (370)	1213* (550*)	1047 (475)	1664* (755*)	1433 (650)	2423* (1105*)	1676 (760)
0' 0" (0.0 m)	937* (425*)	639 (290)	1124* (510*)	750 (340)	1466* (665*)	981 (445)	2028* (920*)	1356 (615)	2998* (1360*)	1543 (700)
-3' 3" (-1.0 m)	970* (440*)	794 (360)			1279* (580*)	981 (445)	1753* (795*)	1345 (610)	2524* (1145*)	1499 (680)
-4' 11" (-1.5 m)	959* (435*)	959* (435*)					1279* (580*)	1279* (580)	1830* (830*)	1565* (670)



Maximum permissible load on dipper arm
A Overhang from the center of the turntable
B Height of load fixing point
* Lifting capacity hydraulically limited

All table values are in lbs. (kg) and for a machine in a horizontal position on firm ground without bucket.

	Dozer blade support in drive direction
	Dozer blade support 90° to drive direction

If equipped with a bucket or other implements, lift capacity or tilt load is reduced by bucket or implement weight.

Calculation basis: According to ISO 10567.

The excavator's lift capacity is restricted by the settings of the pressure relief valves and the hydraulic system's stabilizing features.

Neither 75% of the static tilt load nor 87% of the hydraulic lift capacity is exceeded.

223 Specifications

Engine

	SN AB00440–AD04192	SN AE00001 and up
Model	Yanmar 3TNE74-ENSR2	Yanmar 3TNV76-SNS
Type	Water-cooled 3-cylinder diesel engine	
Capacity	61.4 cu. in. (1.01 L)	68.1 cu. in. (1.12 L)
Horsepower (DIN)	23.7 hp (17.7 kW)	17.9 hp (13.2 kW)
Revolutions Per Minute	2200 rpm	2375 rpm
Battery	12V/45Ah	
Fuel Tank	6.5 gal. US (24 L)	6.5 gal. US (24 L)
Engine Oil	3.5 qts. US (2.7 L)	3.7 qts. US (3.5 L)
Coolant Capacity	4.2 qts. US (4.0 L)	

Hydraulic System

Pump	Double axial piston pump and 2 gear pumps
Pump Capacity	6.5 gpm US (23.9 L/min) + 6.5 gpm US (23.9 L/min) + 5.0 gpm US (19.1 L/min) + 1.7 gpm US (6.5 L/min)
Operating Pressure (working and driving)	2,900 psi (200 bar)
Operating Pressure (swing unit)	2,176 psi (150 bar)
Hydraulic Fluid Cooler	Standard
Operating Pressure (dozer blade)	2,900 psi (200 bar)
Pilot Control Pressure	435 psi (30 bar)
Hydraulic Tank Capacity	5.5 gal. US (21 L)
Hydraulic System Capacity	7.9 gal. US (30 L)

Undercarriage and Swing System

Travel Speed	
Low Speed	1.2 mph (2.0 km/h)
High Speed	2.5 mph (4.0 km/h)
Ground Clearance	7.1 in. (180 mm)
Swing Speed	10 rpm
Gradability	30° (58%)
Rubber Track Width	10 in. (250 mm)
Number of Track Rollers	4 per side
Average Ground Pressure	3.85 psi (27 kPa)

Dozer Blade

Width	51.25 in. (1300 mm) - 39 in. (990 mm)
Height	10.25 in. (260 mm)
Maximum Lift Above Ground	9.75 in. (245 mm)
Maximum Depth Below Ground	9.45 in. (238 mm)

Bucket (Standard)

Width	15.75 in. (400 mm)
Capacity	1.85 cu. ft. (52 L)

Noise Levels

Sound Power	94 dB(A)
Sound Pressure	75 dB(A)

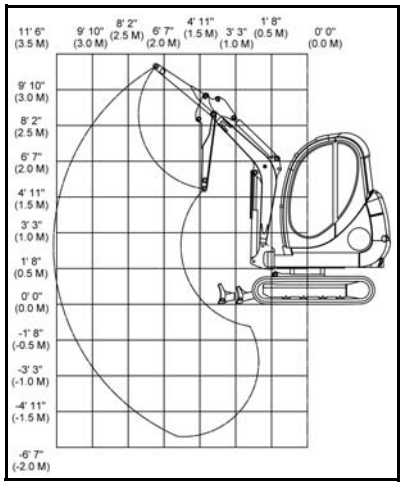
General Specifications

Operating Weight w/Cab (SAE)	4,450 lbs. (2020 kg)
Height	94.5 in. (2395 mm)
Width	39 in. (990 mm)
Length	157 in. (3990 mm)
Max. Digging Depth	97.6 in. (2480 mm)
Max. Digging Height	153 in. (3885 mm)
Max. Dumping Height	109.5 in. (2780 mm)
Max. Digging Radius	161 in. (4090 mm)
Bucket Tooth Breakout Force	4,070 lbf (18.1 kN kp)
Min. Tail Swing Radius	45.5 in. (1160 mm)
Min. Arm Clearance	62 in. (1575 mm)
Slew Angle - Left	80 degrees
Slew Angle - Right	45 degrees
Adjustable track width – retracted/extended	39/51 in. (990/1300 mm)

Model 223 Load Diagram

Maximum permissible loads

max	MAX	9' 10" (3.0 m)		8' 2" (2.5 m)		6' 7" (2.0 m)		4' 11" (1.5 m)	
A / B									
9' 10" (3.0 m)	904* (410*)	904* (410*)			871* (395*)	871* (395*)				
6' 7" (2.0 m)	871* (395*)	694 (315)	871* (395*)	794 (360)	882* (400*)	882* (400*)				
3' 3" (1.0 m)	904* (410*)	595 (270)	1036* (470*)	761 (345)	1213* (550*)	992 (450)	1676* (760*)	1356 (615)	2458* (1115*)	2127 (965)
0' 0" (0.0 m)	937* (425*)	617 (280)	1135* (515*)	739 (335)	1907* (865*)	937 (425)	2028* (920*)	1279 (585)	2998* (1360*)	2017 (915)
-3' 3" (-1.0 m)	970* (440*)	761 (345)			1290* (585*)	926 (420)	1742* (790*)	1279 (580)	2502* (1135*)	2028 (920)
-4' 11" (-1.5 m)	948* (430*)	948* (430*)					1279* (580*)	1279* (580)	1797* (815*)	1797* (815)



Maximum permissible load on dipper arm	
A	Overhang from the center of the turntable
B	Height of load fixing point
*	Lifting capacity hydraulically limited

All table values are in lbs. (kg) and for a machine in a horizontal position on firm ground without bucket.

	Dozer blade support in drive direction
	Dozer blade support 90° to drive direction

If equipped with a bucket or other implements, lift capacity or tilt load is reduced by bucket or implement weight.

Calculation basis: According to ISO 10567.

The excavator's lift capacity is restricted by the settings of the pressure relief valves and the hydraulic system's stabilizing features.

Neither 75% of the static tilt load nor 87% of the hydraulic lift capacity is exceeded.

NOTES

CHAPTER 2 – SAFETY

GENERAL SAFETY INFORMATION

Gehl Company, in cooperation with the Society of Automotive Engineers (SAE), has adopted this safety alert symbol: ⚠. This warning symbol, used with a "signal word," indicates situations or conditions that can cause injury or death if precautions are not followed. The signal words used with the safety alert symbol are: "**CAUTION**," "**WARNING**" and "**DANGER**," which indicate the level of risk and severity of hazards. All three levels indicate that safety is involved. Observe the precautions whenever you see the safety alert symbol, no matter which signal word is used.

The following signal words are used throughout this manual and on decals on the machine to warn of potential hazards:

⚠ 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.

IMPORTANT

"IMPORTANT" is used to draw attention to a procedure that must to be followed to prevent machine damage.

Before you operate the machine, read and study the following safety information. In addition, be sure that every individual who operates or works with the machine, whether family member or employee, is familiar with these safety precautions.

Replace damaged safety decals and lost or damaged Operator's Manuals.

Some illustrations in this manual may show doors, guards and shields open or removed for illustrative purposes only. Be sure all doors, guards and shields are secured in the proper operating positions BEFORE starting the engine to operate the machine.

Mandatory Safety Shutdown Procedure

Before leaving the machine:

1. Lower the working equipment to the ground and support it securely.
2. Run the engine at idle speed for a few minutes to allow systems to cool after operation at full speed.
3. Turn the key fully counter-clockwise to shut off the engine.
4. Lock out controls by raising left control console.
5. Remove the ignition key and take it with you.

Unauthorized Modifications

Any modification made to the machine without authorization from Gehl could create a safety hazard, for which the machine owner would be responsible.

For safety reasons, use only genuine Gehl parts. For example, using incorrect fasteners could lead to a condition in which the safety of critical assemblies is compromised.

Attachment Precautions

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

OPERATIONAL SAFETY

ALWAYS fasten the seatbelt before starting the engine. Never operate the machine without the seatbelt fastened.

The use of the machine is subject to certain hazards that cannot be eliminated by mechanical means—only by exercising intelligence, care and common sense. Such hazards include, but are not limited to: hillside operation, overloading, load stability, poor maintenance and use of the machine for purposes for which it was not intended or designed.

Do not let anyone operate the machine unless they have been fully trained in safety and in operation of the machine. It is essential to have competent and careful operators, not physically or mentally impaired, who are thoroughly trained in safe operation and proper load handling. It is recommended that operators be capable of obtaining a valid motor vehicle operator's license.

Do not use the machine for any application or purpose other than described in this manual, or in the operator's manual of approved attachments.

Only trained and authorized personnel, with a full awareness of safe procedures, should be allowed to operate or perform maintenance or service on the excavator.

All personnel at the work site should be aware of assigned individual responsibilities. Communication and hand signals used should be understood by everyone.

Terrain and soil conditions at the job site, approaching traffic, weather-related hazards and any above- or below-ground obstacles or hazards should be observed and monitored by all workcrew members.

Control the machine cautiously and gradually until you are fully familiar with all the controls and handling.

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

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

Depending upon the voltage in the line and atmospheric conditions, strong current shocks can occur if the boom or bucket is closer than 10 ft. (3 m) to the power line. Very high voltage and rainy weather can further increase the safe operating distance.

Before starting any type of operation near power lines (either above-ground or buried-cable type), always contact the power utility and establish a safety plan with them.

Contact the proper local authorities for utility line locations BEFORE starting to dig! In North America, 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.

Below-ground hazards also include natural gas lines, water mains, tunnels and buried foundations. Know what is underneath the work site before starting to dig.

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

Use care on loose ground. Working heavy loads over loose, soft ground or uneven, broken terrain can cause dangerous side-load conditions and possible tip-over and injury. Traveling with a suspended load or an unbalanced load can also be hazardous.

If temperatures are changing, be cautious of dark and wet patches when working or traveling over frozen ground. Stay away from ditches, overhangs and other weak support surfaces. Halt work and install support mats or blocking if work is required in an area of poor track support.

Use solid support blocking. Never rely on jacks or other inadequate supports when maintenance work is being done. Block tracks front and back to prevent any movement.

Overhangs are hazardous. Digging under an overhang is dangerous. Know the height and reach limits of the

excavator and plan ahead while working. Avoid creating dangerous situations caused by moving around the work site while making excavations. Move to another digging area before large overhangs are formed. Working around deep pits or along high walls or trenches may require support blocks, especially after heavy rainfalls or during spring thaws. Park the excavator away from overhangs.

Sloping terrain requires caution. Dig evenly around the work site whenever possible, trying to gradually level any existing slope. If it is not possible to level the area or avoid working on a slope, reduce the size and cycling rate of the load.

On sloping surfaces, use caution when positioning the excavator prior to starting a work cycle. Stay alert for instability situations. For example, always avoid working the bucket over the downhill crawler tracks when parked perpendicular to the slope. Slow all downhill swing movements and avoid full extensions of the bucket in a downhill direction. Lifting the bucket too high, too close to the machine, while the excavator is turned uphill can also be hazardous.

Stay alert for people moving through the work area. When loading a truck the operator should always know where the driver is.

Avoid loading over the cab of a truck, even if the driver is in a safe spot, because someone else could have gone inside.

Slow down the work cycle and use slower travel speeds in congested or populated areas. Use commonly understood signals so that other members of the work crew can warn the operator to slow or halt work in a potentially hazardous situation.

Operate ONLY while seated at operator's station. Never reach in through a window to work a control. Do not try to operate the excavator unless you are in the operator's position, seated at the controls. Stay alert and focused on your work at all times.

Use a signal person if you cannot see the entire work area clearly.

DO NOT raise or lower a loaded bucket suddenly. Abrupt movements under load can cause serious instability.

Additional Safety Equipment

Possible Severe Operation/Additional Safety Equipment Requirement

Work in mines, tunnels, deep pits or on loose or wet surfaces could produce the hazard of falling rock, roll over or falling objects.

Any operator protective system installed on the machine must comply with applicable safety standards and carry appropriate labeling and rating information. For example, the cab of an excavator used in applications with falling object hazards must meet Society of Automotive Engineers Standard SAE J1356, "Performance Criteria for Falling Object Guards for Excavators."

Never attempt to alter or modify the protective structure, by drilling holes, welding or re-locating fasteners. Any serious impact or damage to the system requires a complete integrity re-evaluation, and the replacement of the system may be necessary.

Install additional safety equipment if conditions require.

When working with a hydraulic breaker, a front guard over the windshield may be required.

Laminated glass or polycarbonate protection for the front, side or rear windows may also be recommended depending upon particular work conditions.

Contact your Gehl dealer for available safety guards and/or recommendations if there is any risk of being hit by objects that could strike the operator's cab.

Before Starting Engine

Do a "pre-start" safety check:

- Walk around the machine before getting in the cab. Look for leaking fluids, loose fasteners, misaligned assemblies and other possible equipment hazards.
- The operator's compartment, steps, and hand grips must be free of oil, dirt and ice.
- Make sure there are no loose or unsecured objects on the machine or in the operator's compartment. Loose/unsecured objects could shift and cause injury, damage to equipment or may interfere with safe operation.
- The lighting system must be checked for proper working condition before working in darkness.

- Always keep the windshield and windows clean. Poor visibility can cause accidents.
- All equipment covers and safety guards must be in place while the machine is being operated, to protect against injury.
- Look around the work site area for potential hazards, and for people or property that could be at risk while operation is in progress.
- **NEVER** start the engine if there is any indication that maintenance or service work is in progress, or if a warning tag is attached to controls in the cab.
- Check gauges and displays for normal operation prior to and after starting the engine. Listen for unusual noises and remain alert for other potentially hazardous conditions.
- Never use ether starting aids. Glow plugs are used for cold weather starting. Glow plugs can cause ether or other starting fluid to detonate, causing injury.
- Before starting or moving the machine, warn any personnel in the area.

General Safety Rules

Unless necessary for servicing the engine, the engine hood must not be opened while the engine is running.

Engine exhaust gases can cause unconsciousness and fatalities. Ensure adequate ventilation before starting the engine in an enclosed area.

Operators should also be aware of any open windows, doors or ductwork into which exhaust gases may be carried, exposing others to danger.

Make sure that no one comes inside the swing radius of the machine.

Anyone standing near the track frames, swing frame or the attachment is at risk of being caught between moving parts of the machine.

Fire Hazards

The machine has several components that operate at high temperature under normal operation conditions, primarily the engine and exhaust systems. Also, the electrical system, if not properly maintained or if damaged, can arc or produce sparks. These conditions make it extremely important to avoid circumstances where explosive dust or gases can be ignited by arcs, sparks or heat.

The machine must be cleaned on a regular basis to avoid the buildup of flammable debris such as leaves, straw, etc. Accumulated debris, particularly in the engine compartment, poses a fire hazard.

Add fuel, oil, antifreeze and hydraulic fluid to the machine only in a well ventilated area. The machine must be parked with controls, lights and switches turned off. The engine must be turned off before refueling or before service checks are performed.

Static electricity can produce dangerous sparks at the fuel-filling nozzle. In very cold, dry weather or other conditions that could produce static discharge, keep the tip of the fuel nozzle in constant contact with the neck of the fuel-filling nozzle, to provide a ground. Make sure that the static line is connected from the excavator to the service truck before fueling begins.

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

Fire Extinguisher Recommendation

It is recommended that a 5 lb. (2.27 kg) or larger, multi-purpose “A/B/C” fire extinguisher be mounted in the cab. Check the fire extinguisher periodically and be sure that work site crew members are trained in its use.

Jump-Starting or Charging Battery

Turn off all electrical equipment before connecting leads to the battery, including electrical switches on the battery charger or jump-starting equipment.

When jump-starting from another machine or vehicle, do not allow the machines to touch. Wear safety glasses or goggles while battery connections are made.

Batteries contain acid and produce explosive gases. Keep sparks, flames and lit cigarettes away from batteries at all times.

Connect the positive cable first when installing jumper cables. The final cable connection, at the metal frame of the machine being charged or jump-started, should be as far away from the batteries as possible.

Disconnect the negative cable first when removing the jumper cables. For specific model instructions refer to “Using a Booster Battery (Jump Starting)” on page 4-12 in the *Maintenance* chapter of this manual.

Seatbelt Requirement

Whenever the engine is running, the operator must be seated at the control station with the seatbelt fastened.

Possible Travel Controls Reversed Operation

Before starting the machine, always check to see which end of the track frames are under the operator's cab. In the normal travel configuration, travel motors are at the rear of the machine, under the engine, and with the dozer blade to the front.

If the operator rotates the swing frame 180º, travel motors will be underneath the front of the operator's cab, and operating travel will be reversed.

Use caution in reverse travel and swing frame rotation.

Travel Precautions

Superstructure control levers should not be operated while traveling.

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

Fold in work equipment while travelling so that the outer end of the boom is as close to the machine as possible, and is as low as possible [8"-12" (200 mm-300 mm)] to the ground.

Never travel over obstacles or slopes that will cause the machine to tilt severely. Travel around any slope or obstacle that would cause a tilt greater than 10°.

Use a signal person in high traffic areas and whenever the operator's view is not clear, such as when traveling in reverse.

Never allow anyone to ride on any part of the machine or attachment, including any part of the swing frame or operator's cab.

Snow, Ice and Cold Temperature Operation Precautions

In cold weather, avoid sudden travel movements and stay away from even very slight slopes. The machine can slide sideways on icy slopes.

Snow accumulation can hide potential hazards. Use care while operating and while using the machine to clear snow.

Parking

When shutting down the machine for the day, plan ahead so that the excavator will be on a firm, level surface away from traffic and away from high walls, cliff edges and any area of potential water accumulation or runoff. If parking on an incline is unavoidable, block the crawler tracks to prevent movement. Lower the bucket and dozer blade to the ground. There should be no possibility of unintended or accidental machine movement.

After the machine is properly parked, shut down the engine and cycle all controls to release any remaining hydraulic system pressure. Be sure all switches and operating controls are in the OFF position and the left console is raised, locking out the hydraulic functions.

Safety Reminders

Exposure to Crystalline Silica

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 that a significant risk (at least 1 in 100) 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-hour workday during a 40-hour workweek. NIOSH also recommends substituting less hazardous materials when feasible, using respiratory protection, and regular medical examinations for exposed workers.

Safety Equipment Maintenance

Machinery guards and body panel covers must be in place at all times. Keep clear of rotating parts, such as cooling fan and alternator belts, which could catch hair, jewelry or loose clothing.

All safety equipment must be maintained so it is always in good condition.

Safety-critical parts must be periodically replaced. Replace the following potentially fire-related components as soon as they begin to show signs of deterioration:

- Fuel system flexible hoses, fuel tank overflow drain hose and the fuel filler cap.
- Hydraulic system hoses, especially the pump outlet lines.

Keep mounting brackets and hose and cable routing straps tight. Hose routing should have gradual bends.

Safety Decals

Safety decals must be replaced if they become illegible. Part numbers for each safety decal and required mounting locations are shown starting on page 2-8.

Hydraulic Cylinder Seal Periodic Replacement

Check cylinder drift rate at regular intervals. Maximum allowable rates are included at the end of the Hydraulic section in the Excavator Service Manual. Overhaul seal kits are available through Gehl.

High Pressure Hydraulic Lines Store Energy

Exposed hydraulic hoses on the arm or boom could react with explosive force if struck by a falling rock, overhead obstacle or other job site hazard. Extra safety guards may be required. **NEVER** allow hoses to be hit, bent or interfered with during operation.

Operator's Cab and Swing Frame Deck Maintenance

Cleaning off accumulations of grease and dirt helps extend equipment service life. Cleaning also provides an opportunity to inspect equipment. Minor damage can be repaired or corrected before major problems result.

Eye Protection and Safety Clothing

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

Proper Tools Requirement

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

Breathing Masks and Ear Protection

Remember that some health risks may not be immediately apparent. Exhaust gases and noise pollution may not be visible, but these hazards can cause permanent injuries.

Battery Electrolyte and Explosive Gas Danger

Flush eyes with water for 10-15 minutes if battery acid is splashed in the face. Anyone swallowing battery acid must have immediate medical aid. Call the Poison Control Center listing in the telephone directory.

Sparks can set off explosive battery gas from incidental contact or static discharge. Turn off all switches and the engine when working on batteries. Keep battery terminals tight. Contact between a loose terminal and post can create an explosive spark.

Battery Disconnection Precaution

Disconnect battery before performing electrical service or electrical welding on the machine.

When disconnecting at the battery terminals, remove the cable connected to the negative terminal first. When installing a battery, connect the positive terminal cable first.

MAINTENANCE SAFETY

Warning Tag/Control Lockout Requirement

Alert others that service or maintenance is being performed and tag operator's cab controls—and other machine areas if required—with a warning notice.

Running Engine During Service

Do not run the engine if repairs or work is performed alone. There should always be at least two people working together if the engine must be run during service.

Supporting Equipment

Always use adequate equipment supports and blocking.

Lower bucket to the ground before leaving the operator's seat. Do not work under any equipment supported solely by a lift jack.

Track Tension Adjustment Caution

NEVER fully remove the track tension grease fittings. A fitting can be ejected under high pressure and cause injury. To release pressure from the frame track tension assembly, loosen the grease fitting only slightly—no more than two turns. Keep face and body away from the fitting. Refer to "Adjusting Track Tension" on page 4-17.

Hot Engine, Cooling and Hydraulic System Caution

Wait for the engine to cool after normal operation. Park the excavator on a firm, level surface and lower all equipment before shutting down and switching off controls. When engine oil, gearbox lubricant or other fluids require changing, wait for fluid temperatures to cool to a moderate level before removing drain plugs.

Note: *Temperatures below 120°F (49°C) will reduce the chances of scalding exposed skin while allowing the fluid to drain quickly and completely. However, do not let the fluid to fully cool or drain time will be substantially increased.*

Radiator/Hydraulic Reservoir Service Cool-down Requirement

Stop the engine and allow it to cool before performing service on the engine radiator or hydraulic reservoir. Both assemblies have pressure vents at the filler cap for venting pressure. LOOSEN CAPS SLOWLY. Vent the pressure before removing the filler caps.

Hydraulic System Pressure Caution

The hydraulic reservoir is pressurized. Release stored hydraulic pressure in lines by cycling the operator's controls in each direction after the engine is shut down. Release hydraulic reservoir pressure before removing the hydraulic reservoir access cover. Vent the system pressure by rotating the filler cap. LOOSEN CAP SLOWLY prior to removal.

Fluid leaks from hydraulic hoses and pressurized components can be difficult to see, but pressurized oil can have enough force to pierce the skin and cause serious injury.

Always use a piece of wood or cardboard to check for suspected hydraulic leaks. Never use your hands. Obtain immediate medical attention if pressurized oil pierces the skin. Failure to obtain prompt medical assistance could result in gangrene or other serious damage to tissue.

Disconnect battery before performing hydraulic service or welding on the machine. See "Battery Disconnection Precaution" on page 2-6.

Proper Fastener Use Requirement

Use correct replacement fasteners tightened to proper torque.

Refer to the Parts Manual for information on torques and assembly of components.

IMPORTANT

Always use the correct parts—incorrect fastener connections can dangerously weaken assemblies.

Proper Waste Oil/Fluids Disposal

Dispose of all petroleum-based oils and fluids properly. Used motor oil may pose a health risk. Wipe oil from your hands promptly and wash off any residue. Used motor oil is an environmental contaminant and may only be disposed of at approved collection facilities. Never drain any petroleum-based product on the ground or dispose of used oil in municipal waste collection containers, or in metropolitan sewer systems or landfills. Check state and local regulations for other requirements.

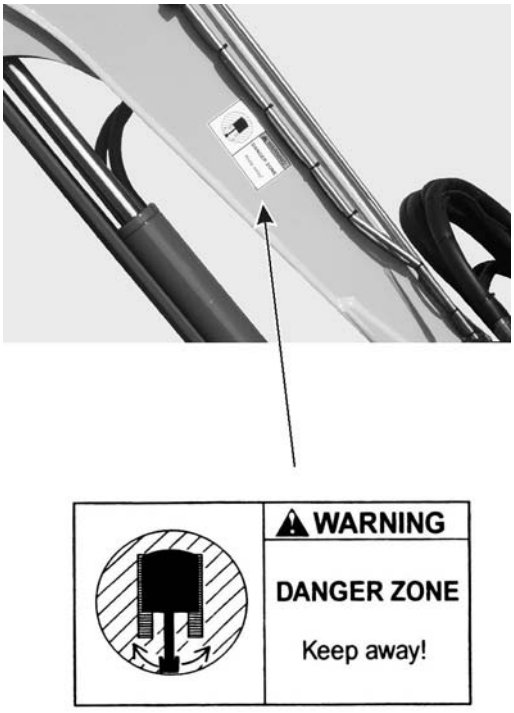
TRANSPORTING

Obey state and local over-the-road regulations. Check state and local restrictions regarding weight, width and length of a load. The hauling vehicle, trailer and load must all be in compliance with local regulations.

SAFETY DECAL LOCATIONS

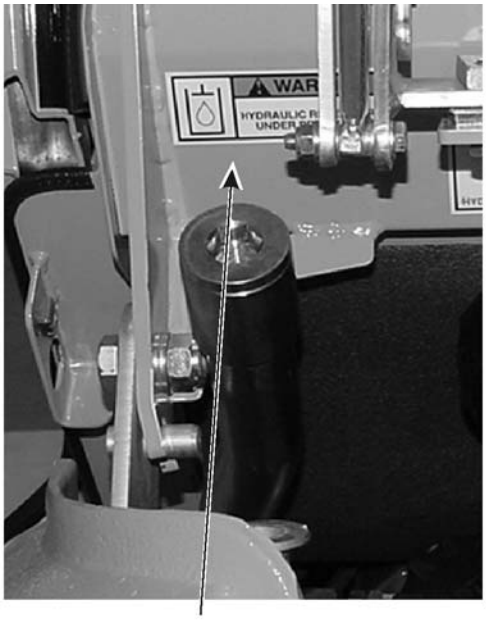
Safety Decals

Decal 1



1
PN 9705213G

Decal 2



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Decal 3

PN 9705214G

Decal 6 – Optional Cab Only

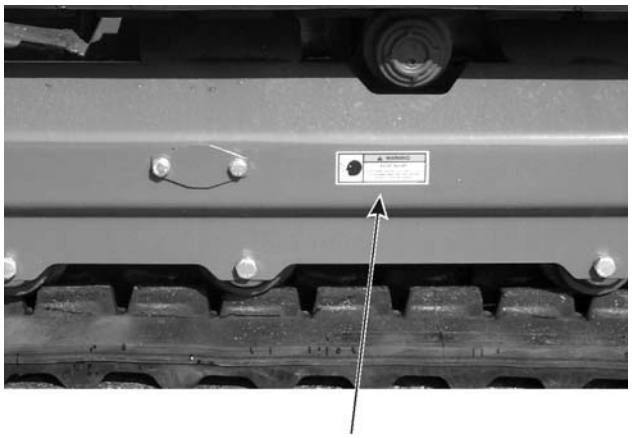
PN 9705281G

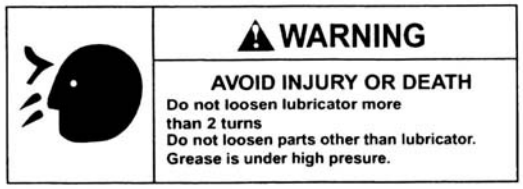
Decals 4 and 5

PN 9705272G

PN 9705274G

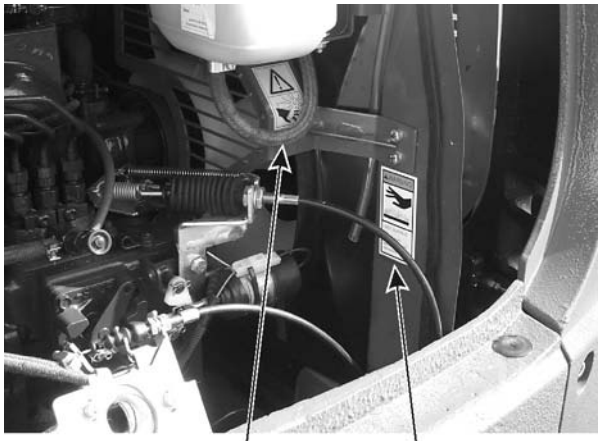
Decal 7

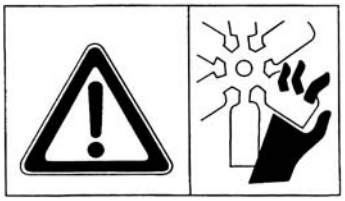




PN 9705273G

Decals 8 and 9





PN 9705215G

PN 9705326G

CHAPTER 3 – OPERATION

OPERATING CONTROLS

⚠ WARNING

- **Read and understand this entire manual. Follow warnings and instructions for operation and maintenance. Failure to follow instructions can result in injury or death.**
- **Read and understand all safety decals before operating the machine. DO NOT operate the machine unless all factory-installed guards and shields are in place.**
- **Be sure you are familiar with all safety devices and controls before operating the machine.**
- **Know how to stop the machine before starting.**
- **Use only with Gehl Company approved accessories or referral attachments. The Gehl Company cannot be responsible for safety if the unit is used with non-approved attachments.**
- **Check for correct function after adjustments or maintenance.**

Machine Orientation

Guards and Shields

Whenever possible, guards and shields are used to protect potentially hazardous areas on the machine. In many places, decals are also provided to warn of potential hazards and/or to display special operating procedures (see Chapter 2 – Safety).

With the open cab, either of the operator's consoles may be raised to enter and exit the cab. If the optional cab enclosure has been installed, either of the operator's consoles may be raised to enter and exit the cab. The left operator's console (A) is shown in the raised position in Figure 3-1. When a console is in the raised position, all hydraulic functions of the machine are disabled.

Figure 3-1 – Operator's Left Console in Lockout Position

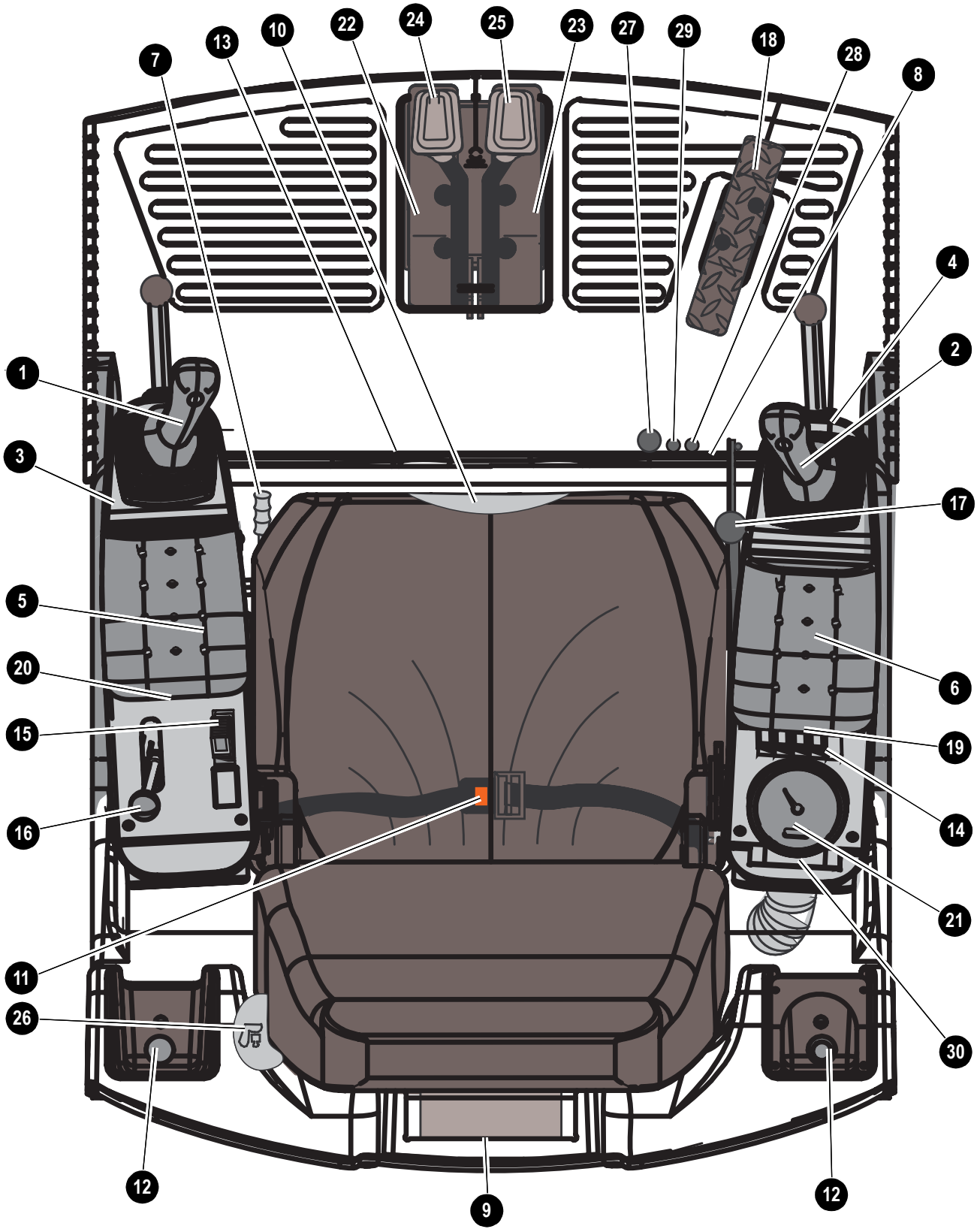


Figure 3-2 – Equipment and Controls

Item	Description	For more info, see page
1	Control Joystick (left)	page 3-9
2	Control Joystick (right)	page 3-9
3	Control Console (left)	page 3-1
4	Control Console (right)	page 3-1
5	Armrest (left)	
6	Armrest (right)	
7	Seat Adjustment Lever (horizontal adjustment)	page 3-13
8	Air Vents	
9	Storage	
10	Seat Backrest Adjustment	page 3-13
11	Seatbelt	page 3-14
12	Cup Holder	
13	Document Storage (under seat)	
14	Switch Panel (right)	
15	Switch Panel (left)	
16	Throttle	page 3-8
17	Dozer Blade Lever	page 3-8
18	Auxiliary Hydraulics Pedal	
19	Ignition Switch	page 3-7
20	Cigarette Lighter	
21	Round Display Element	
22	Drive Pedal (left)	page 3-9
23	Drive Pedal (right)	page 3-9
24	Drive Lever (left)	page 3-9
25	Drive Lever (right)	page 3-9
26	Seat Weight Adjustment	page 3-13
27	Upper Carriage Lock	page 3-12
28	Track Extension Control	page 3-12
29	Superstructure Tilt Control	page 3-12
30	Fuse Box	page 3-6

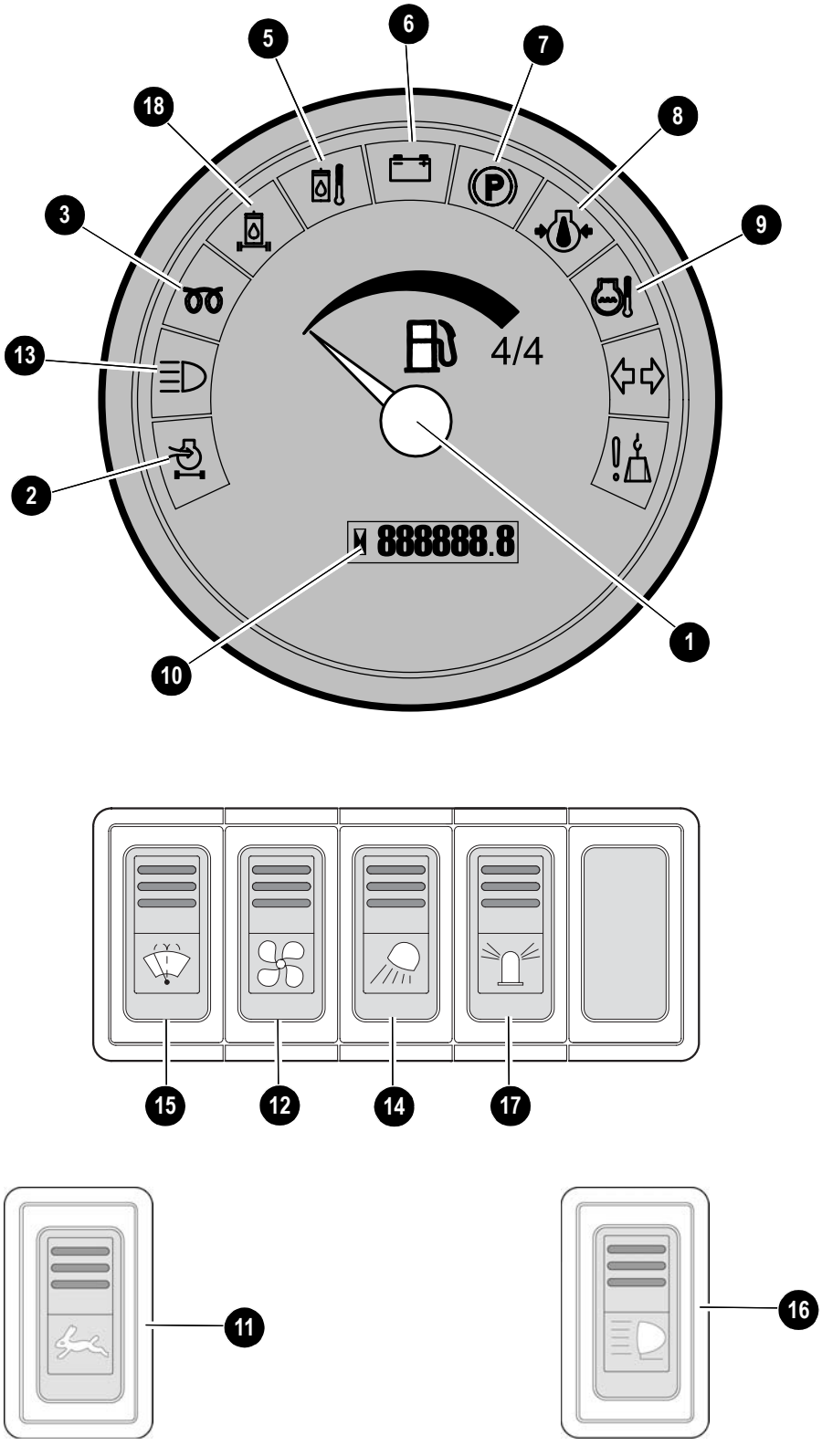


Figure 3-3 – Instrument Panel, Switches and Indicators (Later Models)

Item	Description
1	**Fuel level gauge** – Gauge shows the amount of fuel in the tank.
2	**Engine air cleaner indicator (red)** – Light comes on when the air cleaner requires servicing.
3	**Glow plug indicator (yellow)** – Light comes on when the ignition key is in the glow plug activation position; see "Ignition Key Switch" on page 3-7. Indicator will go out when the glow plugs have heated sufficiently to start the engine.
4	**Hydraulic oil filter indicator (red)** – Light comes on when hydraulic oil return filter requires servicing or while the hydraulic oil is cold.
5	**Hydraulic oil temperature indicator (red)** – Light comes on when hydraulic oil temperature rises above specification.
6	**Battery charge indicator (red)** – Light comes on when the ignition is turned on and goes off as soon as the engine is running. If the indicator light comes on while the engine is running, then the battery is no longer charging, indicating a faulty charging circuit in the alternator or problems with the V-belt. **NOTE:** A faulty V-belt affects cooling pump operation, which can lead to overheating and more serious engine problems. Shut off the engine IMMEDIATELY and determine the cause if this light comes on while the engine is running.
7	**Engine oil pressure indicator (red)** – Light comes on when the ignition is turned on and goes off as soon as the engine is running. During normal operation, this indicator should remain off. The indicator will light if the engine oil pressure drops too low. If this occurs, shut off the engine IMMEDIATELY and determine the cause of the pressure drop.
8	**Engine coolant temperature indicator (red)** – Light comes on when coolant temperature rises above specification.
9	**Engine oil temperature indicator (red)** – Light comes on when engine oil temperature rises above specification.
10	**Hourmeter** – Indicates the total operating hours of the machine. Use the hourmeter to track maintenance in the maintenance log.
11	**Auto2Speed switch (transport speed)** – Pressing the switch will enable high travel speed.
12	**Ventilation fan (two-speed)** – A two-position switch to turn on the ventilation fan. Pressing switch to the first position is the low fan speed position, and the second position is the high fan speed position. If the heater control (cab model only) is in the heating position, this switch will function as the cab heater ON/OFF switch.
13	**Work light indicator (option, cab only)** – Light comes on when the cab roof work lights are on.
14	**Boom light (option, cab only)** – Press switch ON to turn on the boom work light.
15	**Windshield wiper switch (cab models only)** – Pressing the two-position switch to the first position turns on the windshield wiper. Pressing and holding the switch indicator in the second position activates the washer fluid pump.
16	**Work lights (option, cab only)** – Press switch ON to turn on the cab roof work lights.
17	**Rotating beacon (option, cab only)** – Press switch ON to turn on the rotating beacon.

Instrument Panel, Switches and Indicators (Early Models)

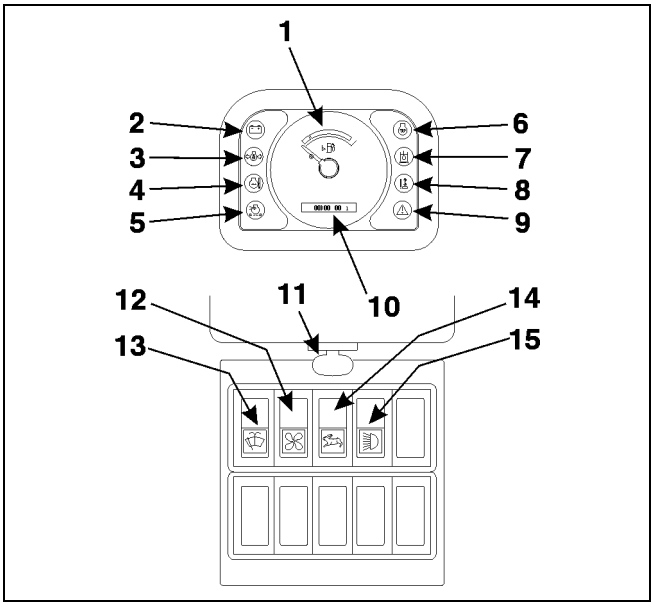


Figure 3-4 – Instrument Panel

1. Fuel Level Gauge
2. Battery Charge Indicator
3. Engine Oil Pressure Indicator
4. Coolant Temperature Indicator
5. Clogged Engine Air Filter Indicator
6. Glow Plug Indicator
7. Clogged Hydraulic Fluid Filter Indicator
8. Overload Warning Indicator (optional)
9. Work Light Indicator
10. Hourmeter
11. Ignition Key Switch
12. Windshield Wiper/Washer Switch
13. Heater Control Switch
14. Travel Speed Selector Switch
15. Boom Work Light Switch

Excavator Components

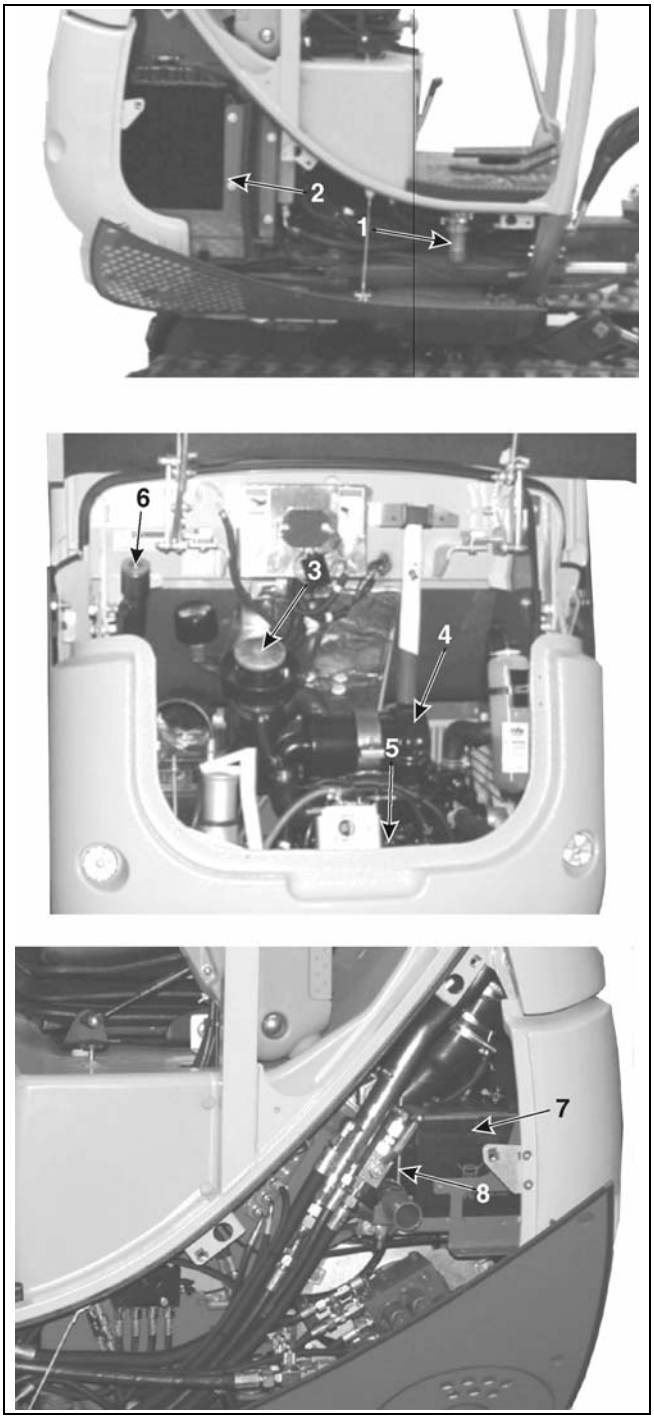


Figure 3-5 – Excavator Components

1. Diesel fuel water separator
2. Engine radiator
3. Diesel fuel tank filler
4. Air cleaner
5. Diesel fuel filter (below engine hood latch)
6. Hydraulic fluid filler cap
7. Battery
8. Hydraulic fluid diverter valve for auxiliary attachments

Fuse Panel

Fuse Panel (Later Models)

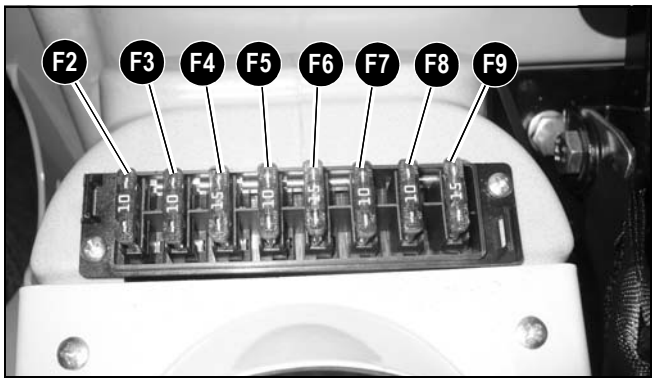


Figure 3-6 – Fuse Panel (Later Models)

Fuse Location	Fuse Application	Amps.
F2	Regulator, Instrument Panel	10
F3	Boom Light	10
F4	Roof Lights	15
F5	Valve, Cigarette Lighter	10
F6	Heater, Horn	15
F7	Wipers, Cab, Interior Light	10
F8	Cab, Rotating Beacon, Radio	10
F9	Accessory Socket	15

Fuse Panel (Early Models)

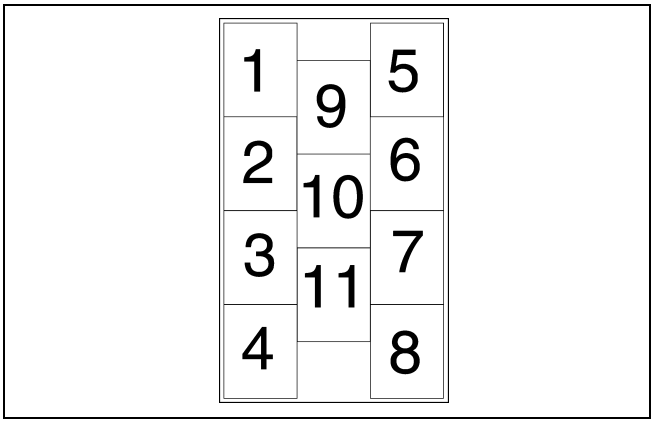


Figure 3-7 – Fuse Panel (Early Models)

Fuse Location	Fuse Application	Amps.
1	High Speed (Tilt Switch and Drive Lever)	7.5
2	Windshield Wiper and Washer	7.5
3	Engine Stop Solenoid	3
4	Switch Lighting, Instrument Panel and Lighting	7.5
5	Front Work Lights	15
6	Heating, Horn	15
7	Safety (rotating) Light, Free	10
8	Cab Lighting, Socket, Radio	10
9	Alternator, Starter	10
10	Fuel Pump, Free	15
11	Changeover Valve, Safety Solenoid Valve	10

Ignition Key Switch

Note: *The engine can only be started if the left control console is pivoted **down** into the operation position.*

See Figure 3-8 for the following positions on the ignition lock.

"O" position: All power is shut off. The key can be inserted or removed when the switch is in this position.

"1" position: Power is turned on to all controls and electrical circuits. The battery charge indicator light and the oil pressure indicator light will come on.

"2" position: The engine pre-hearter indicator will come on while the pre-heater warms intake air in cold weather.

"3" position: When turned and held in this position, the engine will start and all indicator lights should go out. Release the key after the engine starts and it will automatically return to the "2" position.

Note: *The key must be in the "2" position between attempts to start the engine to activate the pre-heat system.*

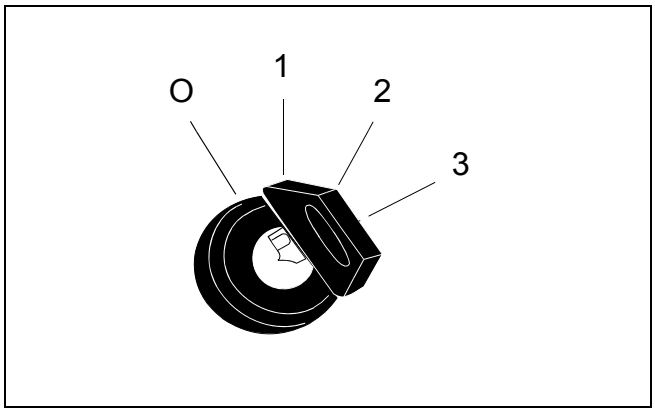


Figure 3-8 – Ignition Key Switch

Boom Pivot Control

The boom can be pivoted without moving the swing frame. See “Excavator Boom Slewing” on page 3-21.

Dozer Blade Control

The dozer blade is controlled by the dozer control lever (1) located next to the right joystick. See Figure 3-9.

- Push lever forward to lower the blade.
- Pull lever rearward to raise the blade.

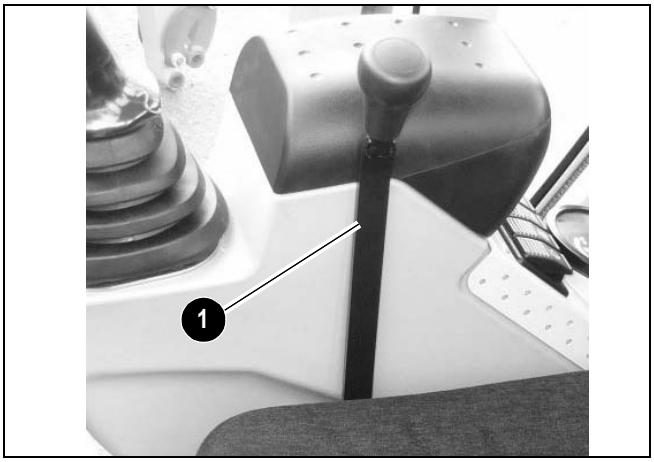


Figure 3-9 – Dozer Blade Lever

Engine Speed Control

The engine speed is controlled by the throttle lever (2) located behind the left joystick. See Figure 3-10.

- Push lever forward to decrease engine speed.
- Pull lever rearward to increase engine speed.

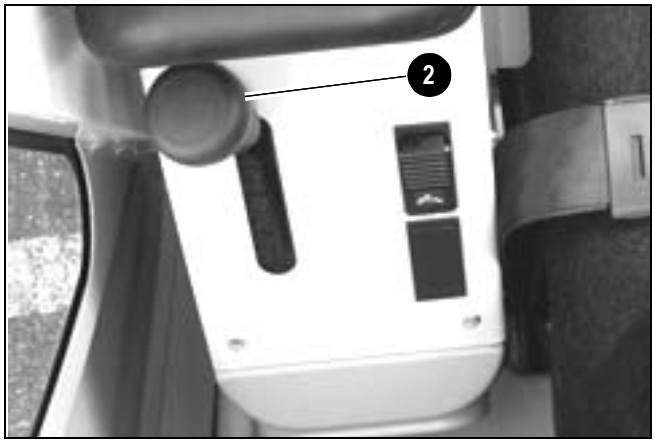


Figure 3-10 – Throttle Lever

Travel Controls

⚠ WARNING

- **Levers and controls should return to neutral position when released.**
- **Be sure the levers and controls are in the neutral (middle) position before starting the engine.**
- **Operate controls gradually and smoothly. Excessive speed and quick control movements without regard for conditions and circumstances are hazardous and could cause an accident.**

⚠ WARNING

Be sure that the dozer blade is "in front." When the operator's cab is facing forward, the blade will be visible and travel controls will operate as expected. If the dozer blade is not visible, the operator's cab is facing to the rear, and the travel controls will operate in reverse.

Forward Travel

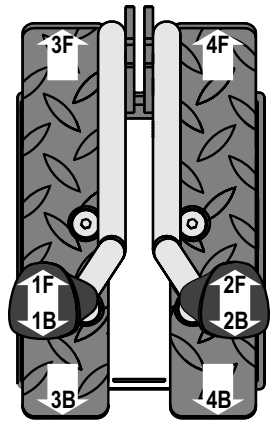
Both travel control levers or pedals must be moved forward. The farther they are moved forward, the faster the machine will travel. See Figure 3-11.

Reverse Travel

Both travel control levers or pedals must be moved rearward. The farther they are moved rearward, the faster the machine will travel. See Figure 3-11.

Turning During Travel

Pivot (wide) turns are made by rotating only one track forward or rearward so the machine pivots on the stationary track. **Spin turns** are made by rotating one track forward and one track rearward. The machine will spin around its mid-point. See Figure 3-11.



F=Forward; B=Rearward

Drive Levers

Move:	For Excavator To:
1F and 2F	Move Forward
1B and 2B	Move Rearward
1F	Wide Turn Right
1F and 2B	Spin Turn Right
2F	Wide Turn Left
1B and 2F	Spin Turn Left

Drive Pedals

Move:	For Excavator To:
3F and 4F	Move Forward
3B and 4B	Move Rearward
3F	Wide Turn Right
3F and 4B	Spin Turn Right
4F	Wide Turn Left
3B and 4F	Spin Turn Left

Figure 3-11 – Travel Controls

High-Speed Travel

The machine has two speed ranges. Press switch (2, Figure 3-12) to select high-speed travel. Pressing switch (2) a second time selects low-speed travel.

Press and hold switch (2) to change to high-speed travel momentarily.

Figure 3-12 – High-Speed Switch

⚠ CAUTION

High-speed can reduce traction and control when cornering.

SAE/ISO Operating Controls

SAE/ISO Selector Valve

Located on the right side of the upper frame, behind the right hand access panel, is the SAE/ISO format selector valve. See 1, Figure 3-13. This machine has been set at the factory for SAE format operation. To change to ISO format operation, move the selector valve to the opposite position.

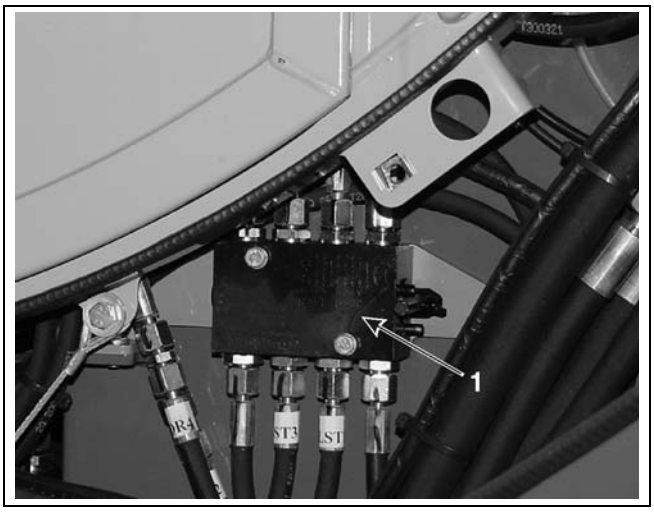


Figure 3-13 – SAE/ISO Selector Valve

SAE Format Operating Controls

All boom and bucket functions are controlled by the right and left control joysticks located on the seat consoles.

Left Joystick (SAE) – See Figure 3-14.

1 – Arm extend
2 – Arm retract
3 – Swing left
4 – Swing right

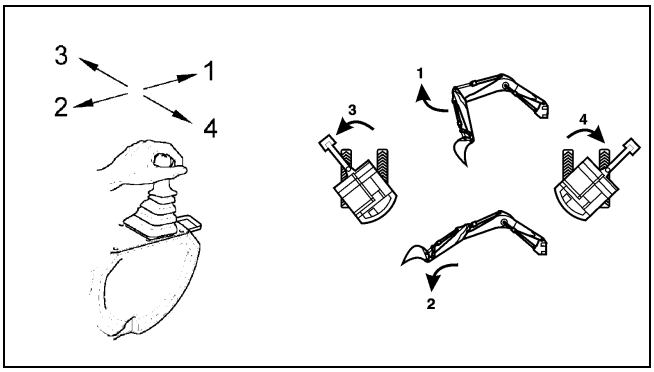


Figure 3-14 – Left Hand Joystick (SAE

Right Joystick (SAE) – See Figure 3-15.

5 – Boom lower
6 – Boom raise
7 – Curl bucket in
8 – Curl bucket out

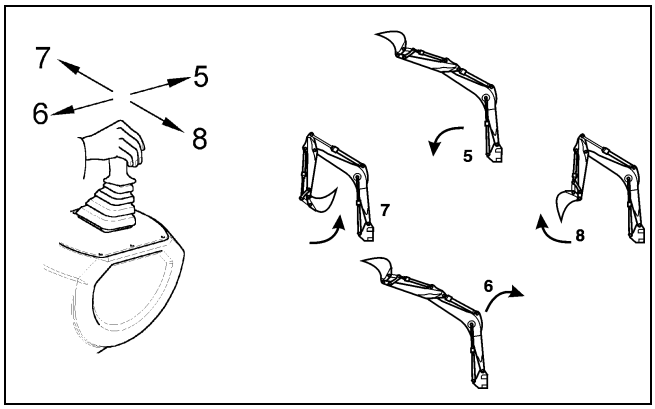


Figure 3-15 – Right Hand Joystick (SAE)

Note: *The joystick controls are pilot-operated. The farther the controls are moved from center, the faster the machine will function.*

ISO Format Operating Controls

ISO format boom and bucket functions are controlled by the right and left joystick control levers located on the seat consoles.

Left Joystick (ISO) – See Figure 3-16.

1 – Boom lower
2 – Boom raise
3 – Swing left
4 – Swing right

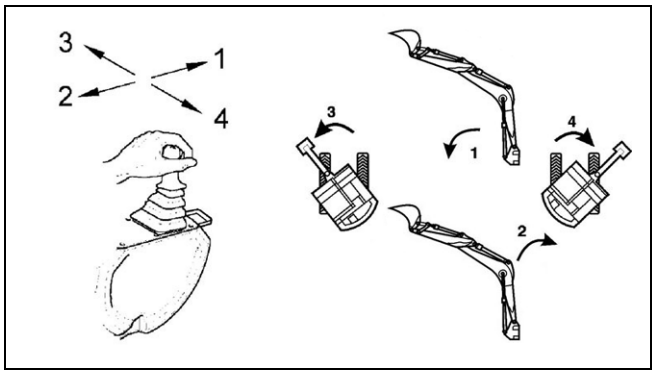


Figure 3-16 – Left Joystick (ISO)

Right Joystick (ISO) – See Figure 3-17.

5 – Arm extend
6 – Arm retract
7 – Curl bucket in
8 – Curl bucket out

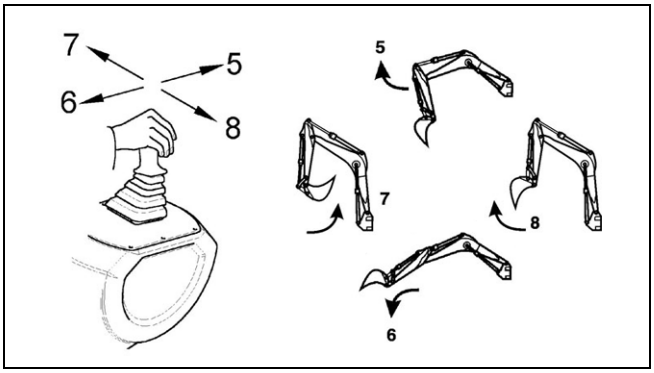


Figure 3-17 – Right Joystick (ISO)

Note: *The joystick controls are pilot-operated. The farther the controls are moved from center, the faster the machine will function.*

Dozer Blade

The dozer is controlled by the dozer lever located next to the right hand control console. See Figure 3-18.

- Push control forward to lower the blade.
- Pull control rearward to raise the blade.

Figure 3-18 – Bulldozer Blade Controls

The dozer blade can be expanded or retracted in width to match the width of the tracks. The extensions are stored behind the dozer blade, one extension on each end of the blade.

To extend the dozer blade, remove the quick-lock pin (2, Figure 3-19) and remove the blade extension (1) from the stored position.

Align the upper and lower blade extension pins (3) with the holes in the main blade.

Slide the blade extension into position (5) and secure with quick lock pin (6). Make sure to secure the quick lock pin using the round clip (4) attached to the pin.

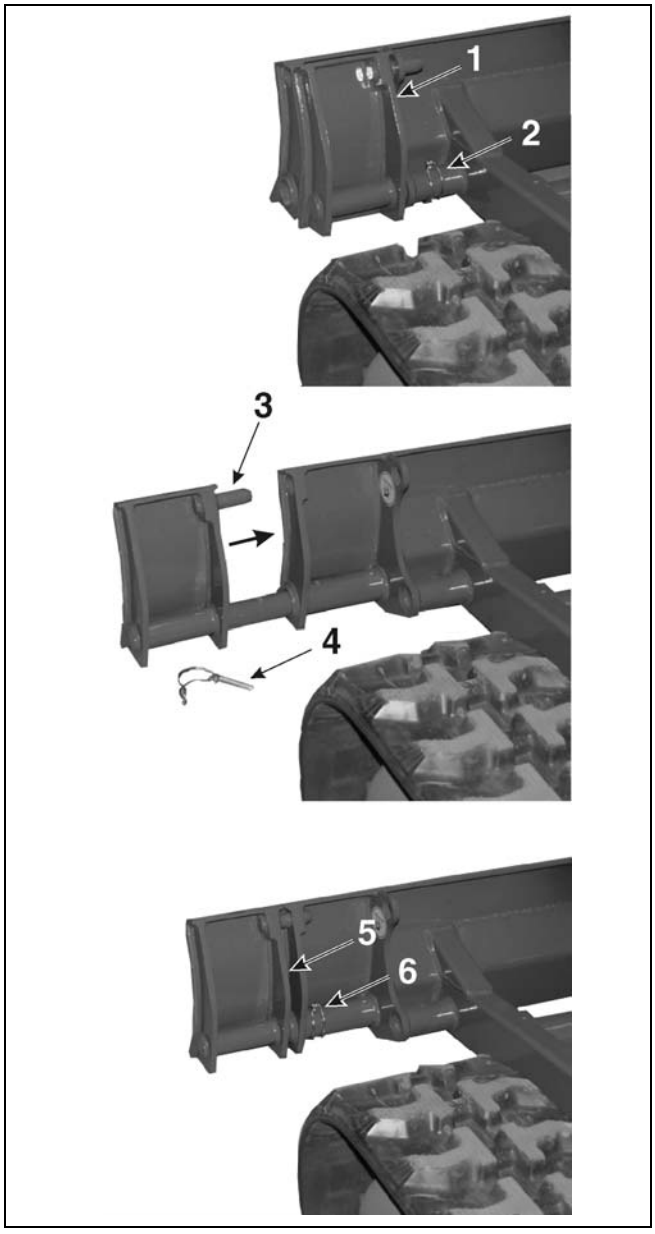


Figure 3-19 – Bull Dozer Blade Extension

Retract the blade by reversing the extension steps. Make sure to secure the stored blade extension with the quick-lock pin.

Superstructure Tilt (Model 223 Only)

The optional superstructure tilt control enables the operator to tilt model 223 15º by utilizing the cab tilt hydraulic control lever located below the operator's seat. See 1, Figure 3-20. Push lever forward to tilt the cab to the right (2). Pull the lever rearward to tilt the cab to the left (3).

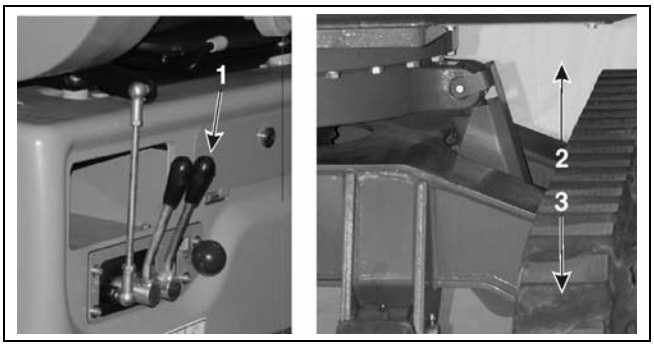


Figure 3-20 – Superstructure Tilt (Optional)

Track Extension

⚠ WARNING

When the tracks are retracted (narrower), machine stability is reduced. Lifting capacities over the side of the machine are reduced.

The track extension control, located next to the superstructure tilt control valve, enables the track width to be extended or retracted (1, Figure 3-21).

IMPORTANT

Extend and retract the track assemblies only while traveling slowly on a solid, level surface. Damage to the track can occur if the extension/retraction is done while the machine is stationary.

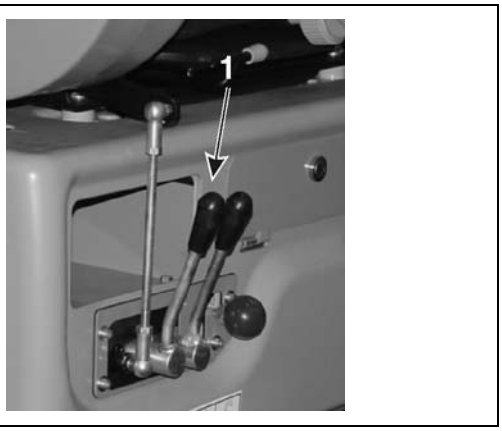


Figure 3-21 – Track Extension Control

Swing Lock Lever

Whenever the machine is to be stored for a prolonged period of time or is to be transported, engage the swing lock. The swing lock will prevent the upper frame from moving.

Rotate the upper frame until it is facing forward and is centered over the tracks. Lower the swing lock pin into the "LOCKED" position (1, Figure 3-22). Slowly rotate the upper frame either left or right until the pin drops into the locked position.

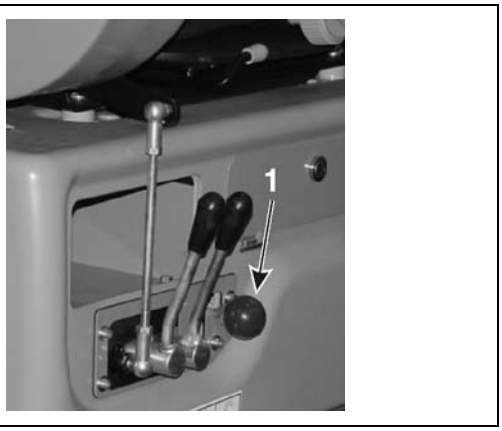


Figure 3-22 – Swing Lock Pin

Release the swing lock by raising the swing lock pin to the "UNLOCKED" position.

Attachment Return Flow Control Valve

When using front end attachments, rotate the Return Flow Control Valve to the closed position. See (1) Figure 3-23. Hydraulic fluid will be directed back to the tank without going through the control valves. This position should be used with single-acting attachments such as a breaker or compactor.

With the valve in the OPEN position, hydraulic fluid will be directed through the control valves. This position should be used with double-acting attachments, such as a hydraulic thumb or auger.

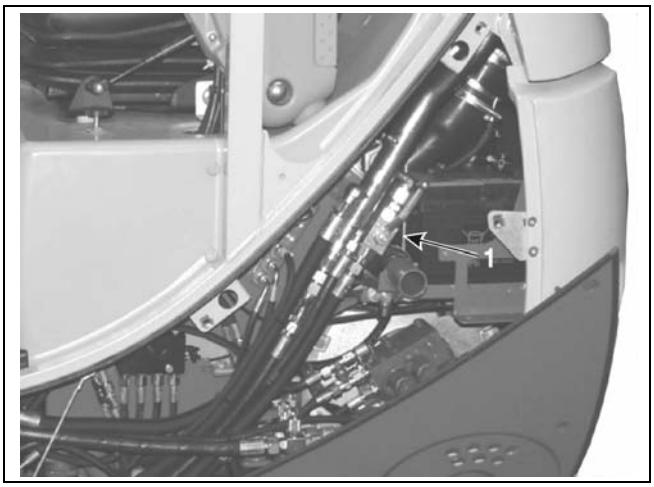


Figure 3-23 – Flow Control Valve

Auxiliary Hydraulics Control

Use the auxiliary hydraulics control pedal (1, Figure 3-24) to regulate oil flow through auxiliary attachments. Press the pedal forward (F) for oil to flow into the auxiliary attachments in one direction, and (R) for oil to flow in the opposite direction.

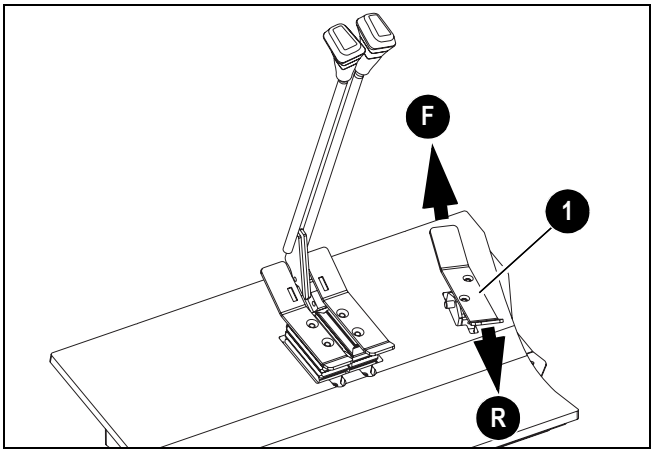


Figure 3-24 – Auxiliary Hydraulics Control Pedal

Operator's Seat Adjustments

Note: *The operator's seat left-hand or right-hand console must be raised to exit the cab. In the lowered or work position, all operational functions are activated, and operator exit is blocked by the Warning Arm/Lever on the end of the console. In the raised position, the all hydraulic functions of the machine are locked out.*

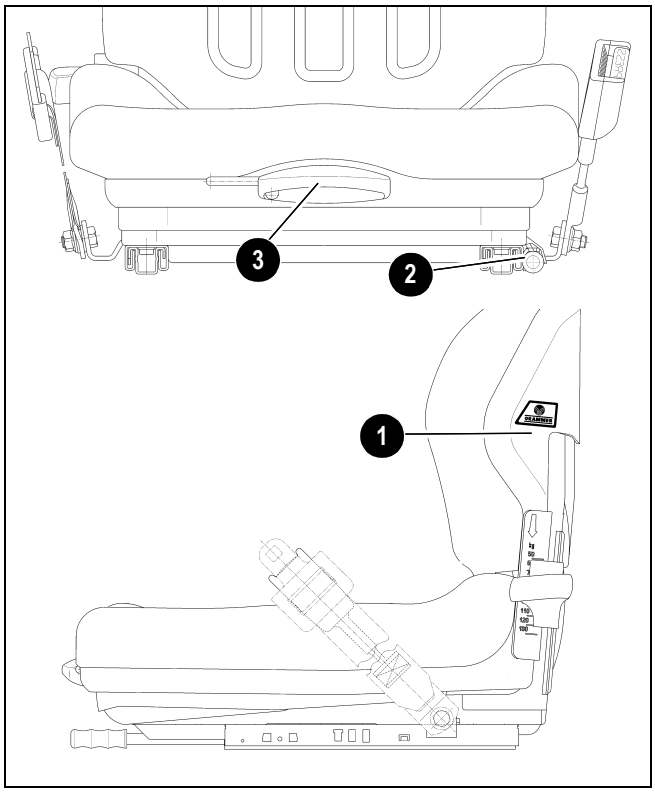


Figure 3-25 – Seat Adjustment (later machines)

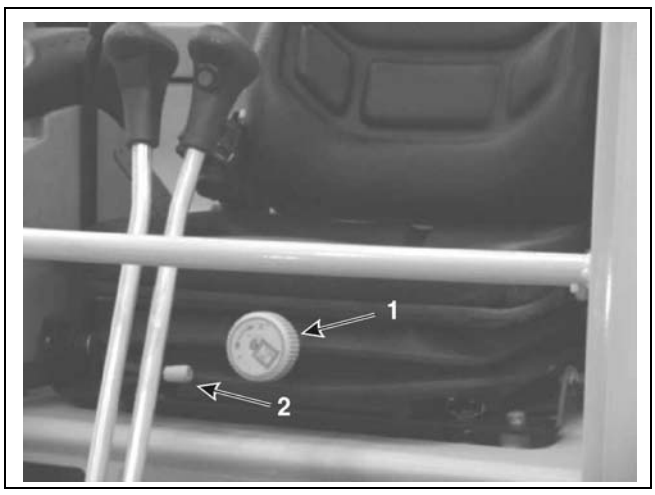


Figure 3-26 – Seat Suspension Adjustment (early machines)

1. **Seat Adjustment**

   The seat adjustment lever (2) allows the operator to move the seat forward and rearward.

2. **Backrest Adjustment**

   (Later Machines Only) Pull handle (3, Figure 3-25) forward and push the backrest into the desired position. Release handle (3) to lock into place.

3. **Seat Suspension Adjustment**

   Later Machines: Push lever (1, Figure 3-25) down to increase spring tension; pull lever (1) up to decrease spring tension.

   Early Machines: Rotate the knob (1, Figure 3-26) to adjust the seat suspension for the operator's weight. An indicator on the front of the seat base shows the weight adjustment.

Seatbelt

Always fasten the seatbelt whenever operating the machine.

⚠ WARNING

Do not operate the machine without the seatbelt fastened. Make sure the seatbelt is not twisted when it is fastened. Wear the seatbelt so it is fastened over the hips and not the stomach. Do not place the seatbelt over hard, edged or fragile items carried inside your pockets.

Check the seatbelt regularly. Have damaged parts replaced immediately by your dealer. Keep the seatbelt clean because dirt can impair proper function. Make sure the seatbelt buckle is not obstructed and latches firmly closed.

Remote Engine Cover Latch

The engine cover latch release is located below the operator's seat, behind the tool pocket cover. See 2, Figure 3-27.

To release the engine cover, unlock and open the tool pocket cover and pull the latch release (1). The engine cover can then be opened.

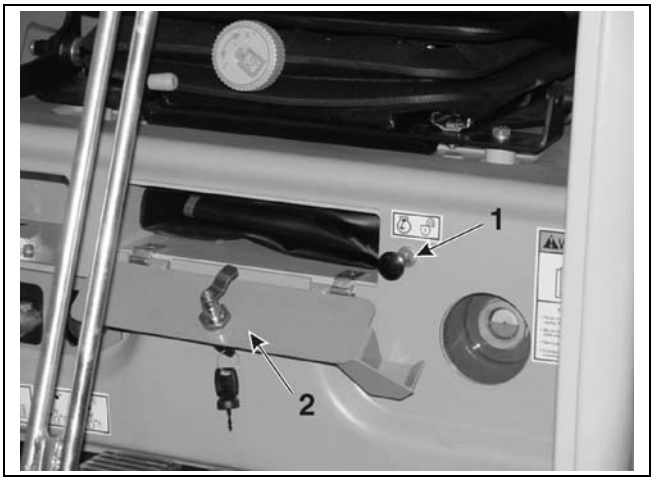


Figure 3-27 – Remote Engine Cover Latch Release

Ventilation

Windshield – Optional Cab

⚠ WARNING

When opening windshield, be sure to lock both latches. When closing windshield, keep both hands on handle and away from path of window.

1. The windshield can be opened for ventilation. Turn the latches located at the upper corners of the windshield. Grasp the handle and pull the windshield up until both latches lock in the open position. See Figure 3-28.
2. To close the windshield, turn the latches and then carefully lower the windshield until the latches lock in the closed position.

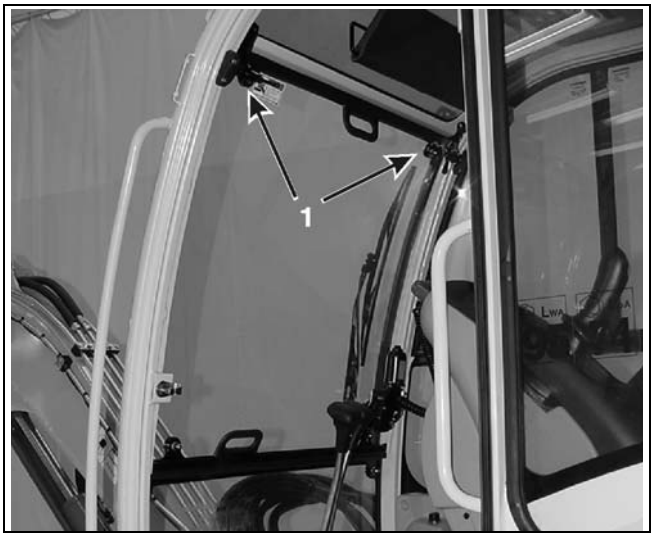


Figure 3-28 – Windshield Locks

Cab Door Latch – Optional Cab

When fully opened, the left cab door will lock in position to the side of the cab. To release the latch, use the black knob located at the lower edge on the inside of the door.

Both the right and left doors have a latch extension device (1, Figure 3-29) that will hold the doors open about 4 inches. Insert the extension into the door lock (2) and snap into position. Release the extension by pulling on the door release lever.

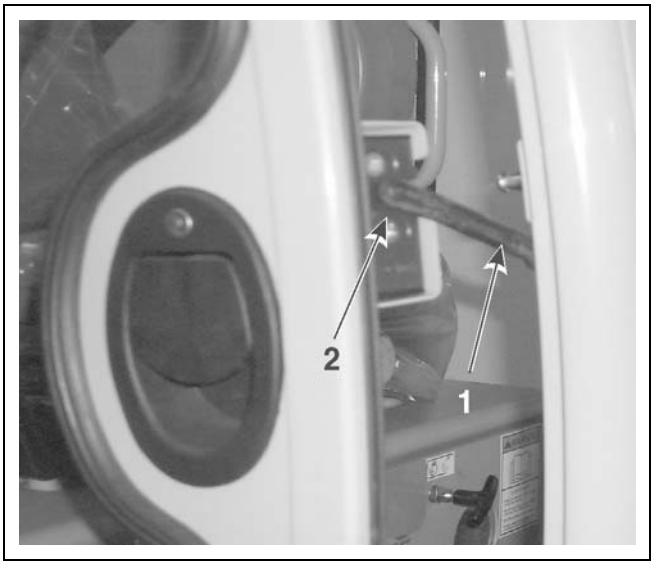


Figure 3-29 – Cab Door Latch Extension

Tool Kit

The machine tool kit is located in the storage pocket beneath the operator's seat (2, Figure 3-27). Unlock the panel cover to gain access to the storage pocket. Additional tools are stored in the engine compartment.

Cab Heat Control – Optional Cab

During the colder months, the operator's cab air temperature can be controlled through use of the temperature control knob (1, Figure 3-30), located on the left side control console next to the throttle lever. Rotate the knob to either the heat or cool position as required.

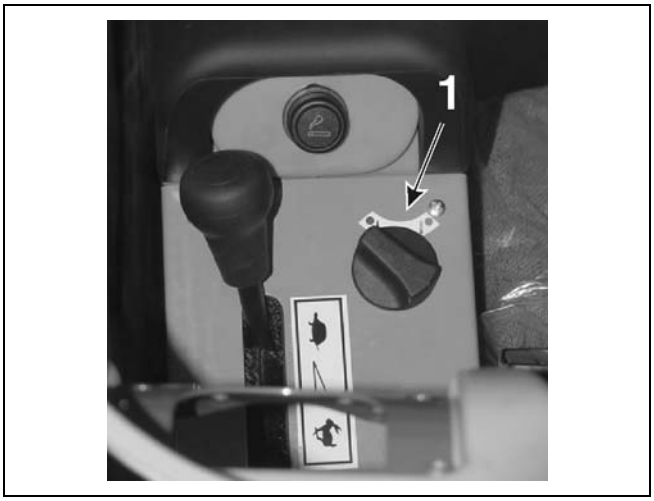


Figure 3-30 – Cab Heat Control

MACHINE OPERATION

⚠ WARNING

- **Read and understand this entire manual. Follow warnings and instructions for operation and maintenance. Failure to follow instructions can result in injury or death.**
- **Read and understand all safety decals before operating the machine. DO NOT operate the machine unless all factory installed guards and shields are in place.**
- **Be sure you are familiar with all safety devices and controls before operating the machine.**
- **Know how to stop the machine before starting.**
- **Use only with Gehl Company approved accessories or referral attachments. The Gehl Company cannot be responsible for safety if the unit is used with non-approved attachments.**
- **Check for correct function after adjustments or maintenance.**

Pre-operation Checklist

IMPORTANT

See the list of recommended lubricants in Chapter 4 – Maintenance for proper grade of engine oil and hydraulic oil. Only use oils specified on the list.

Check the following items at the beginning of each work day or every 12 working hours:

- Seatbelt and mounting hardware.
- Safety decals. Replace as required.
- Air cleaner and intake hoses.
- Engine coolant level and system for leaks.
- Clean engine area of any flammable materials.
- Check engine oil level and fill if required.
- Check hydraulic system for leaks and check hydraulic fluid level.
- Check all pivot points for proper operation.
- Check track tension.
- Check for broken and loose parts, and repair.
- Check fuel level.

IMPORTANT

Do not run the engine until the fuel tank is completely empty. If this happens, air will enter the fuel system, and the fuel system will have to be bled. Always fill the tank with fresh fuel at the end of the working day.

⚠ WARNING

Never use ether starting aids. Glow plugs are used for cold weather starting. The glow plug can cause ether or other starting fluid to detonate, causing injury.

Engine Start and Stop

Note: *When all machine controls are stationary (no pilot control pressure), the swing motor and travel motor brakes are automatically applied. When any control is activated, the appropriate brake is automatically released.*

Note: *All hydraulic functions are locked out with the operator's seat left-hand console in the raised position.*

Engine Start Procedure

⚠ DANGER

DO NOT run an engine in an enclosed area. Be sure that there is adequate fresh air if the machine is being used in an enclosed area.

1. Adjust the operator's seat to desired settings.

2. Be sure all levers and controls are in neutral positions.

   Insert ignition key into switch and turn right (clockwise) to the first position. Indicators for oil pressure and battery voltage will light. In cold weather, the glow plug indicator will come on while the glow plugs warm the engine.

3. Turn the key fully clockwise and hold until the engine starts, and then release the key.

Note: *The key must be returned to the OFF position between attempts to start the engine to activate the glow plug system.*

IMPORTANT

Do not engage the starter motor for longer than 20 seconds at each starting attempt. If the engine does not start, turn the key fully off, wait 30 seconds, and then attempt to start the engine again.

IMPORTANT

Indicator lamps must go out when engine starts. If they do not, turn the engine off IMMEDIATELY. Do not use machine until the problem has been identified and repaired.

4. Allow engine to warm up at idle speed for approximately 10 - 15 minutes to fully warm up all systems.

Cold-Weather Engine Start Procedure

Note: *Install an in-block or tank style engine heater, which will keep engine block and oil warm for easier cold-weather starting.*

Note: *Be sure engine oil is correct type and viscosity for the ambient (air) temperature.*

Note: *Be sure battery is fully charged.*

1. Follow all steps under Engine Start Procedure, above.
2. Advance the throttle to 1/4 engine speed for a faster warm up.
3. As the engine warms up, move the throttle lever to the idle position.

Engine Shut Down

Peform the "Mandatory Safety Shutdown Procedure" on page 2-1 before leaving the machine:

1. Lower the working equipment to the ground and support it securely.
2. Run the engine at idle speed for a few minutes to allow systems to cool after operation at full speed.
3. Turn the key fully counter-clockwise to shut off the engine.
4. Lock out controls by raising left control console.
5. Remove the ignition key and take it with you.

New Machine Break-in Procedure

A new machine requires reduced operational speed during the first 100 operating hours to properly break in various parts. If the machine is subjected to hard use during the break-in period, damage to operating systems may occur.

Perform the following when operating a new machine:

- Check all fluid levels:
  - Engine oil
  - Engine coolant
  - Hydraulic fluid
- Start engine and let it idle for 10 - 15 minutes so all components and systems can warm up.
- Operate machine at about 80% of maximum loads and speed.
- At the end of the first 100 operational hours, drain and replace the engine oil and engine oil filter.

Travel

⚠ WARNING

- **Before operating the travel levers, be sure that you know in which direction the machine is pointing. If the dozer blade is not visible from the operator's cab, you are looking at the rear of the machine and the travel controls will be the reverse of normal operation.**
- **Before moving, be sure that there are no personnel in the way of the machine. Sound the horn to alert workers that you are about to move the machine.**
- **Be sure the path is clear during travel.**
- **Use extreme caution when reversing travel. Be sure there is a clear path behind the machine.**
- **Operate the travel control levers smoothly to avoid sudden starts or stops.**
- **Before leaving the operator's seat, be sure to lock out all control systems and shut down the engine to avoid accidental activation.**

Travel Speed Change

Two travel speed ranges can be selected by using the Auto2Speed switch located on the control console (Figure 3-3, Item 11) or momentary speed adjustment by pressing the overdive button (Figure 3-31, Item 1) on the left-hand travel lever. See (1) Figure 3-31.

Travel speeds are:

- Slow Speed Maximum = 1.7 mph (2.8 km/h)
- High Speed Maximum = 3.3 mph (5.6 km/h)

Figure 3-31 – Travel Levers and Overdrive Button

General Travel Instructions

1. Avoid sudden movements and sharp turns.
2. Travel slowly on rough, frozen or uneven terrain.
3. Travel straight up and down slopes; never travel across the slope. See Figure 3-33. Extend arm and lower boom to keep the bucket about 12" (300 mm) off the ground. If the machine starts to slide or becomes unstable, lower the bucket to regain control. If the engine stalls, lower the bucket, make sure that all controls are in the neutral position and restart the engine.
4. If dirt or mud builds up in the track frame, raise each track frame using the boom and arm, and rotate the elevated track to clean it. Be sure that the build-up has been cleared from the track. Repeat for other track. See Figure 3-32.

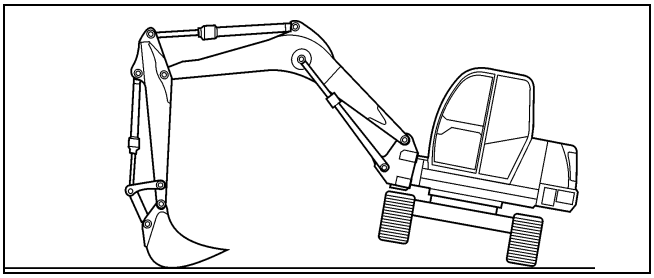


Figure 3-32 – Track Cleaning

Note: *When using the boom and arm to lift any portion of the machine, roll the bucket until the round base is against the ground. The angle of the arm to the boom should be at 90º. See Figure 3-32.*

5. To travel straight, push both travel control levers (or pedals) fully forward (or rearward). The farther the levers (or pedals) are moved, the faster the travel speed.
6. Pivot (or wide) turns are made by rotating only one track forward (or rearward). The machine will pivot on the non-moving track.
7. Spin turns are made by rotating one track forward and one track rearward. The machine will spin around its mid-point.
8. The excavator can travel in water that comes up to the top of the upper track rollers. Be sure that the footing is solid so that the machine will not sink.

Traveling on Slopes

⚠ WARNING

- **Do not travel up a slope steeper than 15°. Do not travel down a slope steeper than 25°. Keep the boom centered while traveling.**
- **Keep attachments as low as possible when traveling on slopes and or rough terrain.**

Traveling on a slope is hazardous. When traveling, use the following guidelines:

- Travel straight up and down slopes—never across. See Figure 3-33.
- See Figure 3-33 on where to place the dipper arm, boom and bucket for uphill and downhill travel. Raise the bucket no higher than 12" (300 mm) off the ground for better stability. If the machine starts to slide or becomes unstable, lower the bucket to regain control. If the engine stalls, lower the bucket, be sure that all controls are in the neutral position and restart the engine.
- When traveling down a slope, control the speed with the travel levers and the throttle control; reduce engine speed.
- For the best stability while excavating, lower the dozer blade to the ground.
- Avoid traveling over objects such as rocks, trees, stumps, etc.

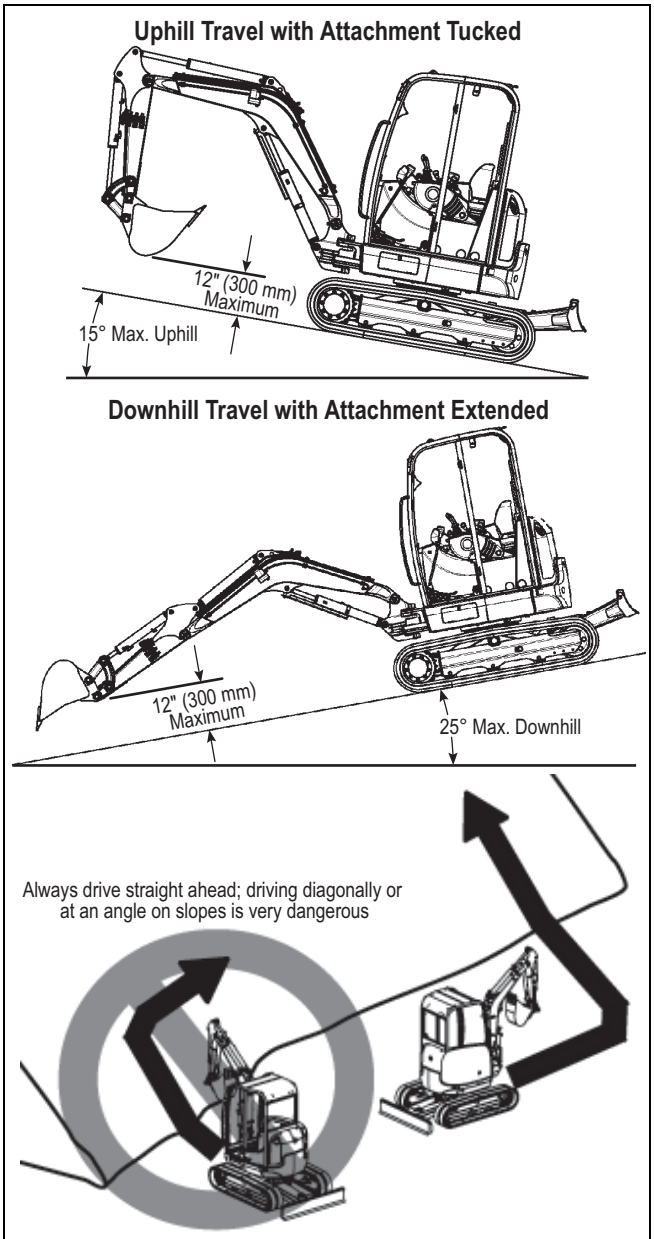


Figure 3-33 – Traveling Up and Down Slopes

- Stop the machine travel before moving the bucket or dozer controls.

Traveling in Water

1. In cold weather, mud and water should be removed from the machine before parking. If possible, park the machine on solid ground, or wood planks, to prevent the track or undercarriage from freezing to the ground.
2. Do not operate or immerse the machine in water higher than the tracks.
3. Thoroughly grease the machine if it has been operated in deep water.

Operating Instructions

Operating Precautions

DANGER

- **DO NOT elevate the front end of the tracks by use of downward pressure on the dozer blade. This will cause the machine to become unstable.**
- **DO NOT excavate underneath the machine.**
- **Always be sure that there is adequate support when working near trenches. Be aware of conditions that could cause the earth to collapse, resulting in risk of injury or death.**
- **Be sure that there is the proper clearance from overhead electrical lines.**
- **Be sure that all underground electrical power and gas supply lines are clearly marked and avoided.**

WARNING

- **DO NOT rest your feet on the travel pedals during normal machine operation. Unexpected machine movement could occur in this situation.**
- **When working close to the excavated edge, be sure that the ground the machine is sitting on is solid. Keep the travel motors to the rear. See Figure 3-34.**

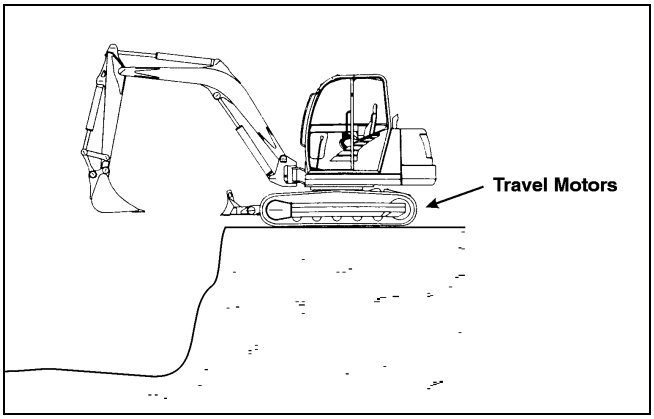


Figure 3-34 – Machine Position for Edge Excavating

DO NOT use machine travel or swing to provide additional breakout force when the bucket is in the ground.

DO NOT jam bucket into the ground and use machine weight to provide additional breakout force.

When working on soft or muddy ground, be sure that the machine is not sinking.

DO NOT use the bucket as a hammer or ramming device.

IMPORTANT

When digging at or near the maximum excavation depth, BE SURE that the dozer blade does not contact the boom cylinder. Damage to the boom cylinder may occur if the dozer blade contacts the boom cylinder. Position the machine so the lowered dozer blade is on the opposite side of excavating. See Figure 3-43

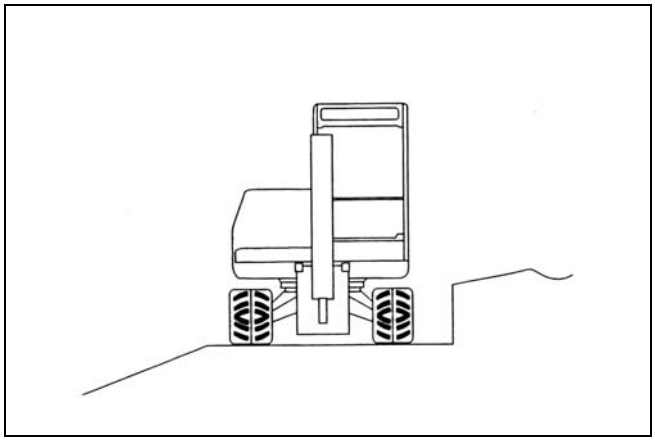


Figure 3-35 – Level Work Area on Slope

Excavator Boom Slewing

⚠ WARNING

Working with the boom slewed to the side reduces lifting capacity.

Overloading the bucket can cause an unstable condition and increases the possibility of tipping the machine.

1. The excavator boom can be slewed 45º to the right and 80º to the left from the basic front position. This allows excavation of trenches along walls, fences, etc. See Figures 3-36 and 3-41.

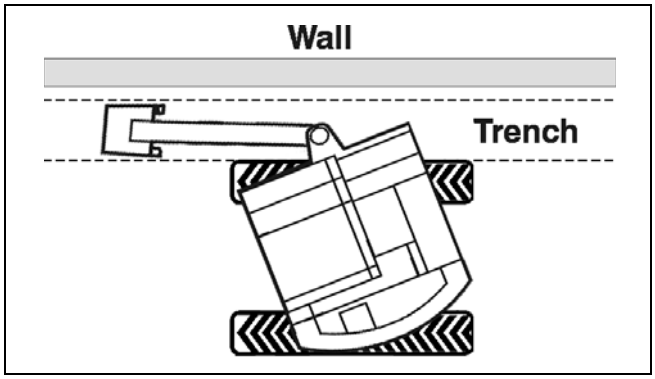


Figure 3-36 – Boom Slewed

2. Press and hold the auxiliary control button, located on top of the left hand joystick. Then press the auxiliary hydraulics pedal with your toe or heel. See Figure 3-37. Pressing the pedal down with your toe slews the boom to the left. Pressing the pedal down with your heel slews the boom to the right.
3. Bucket controls do not change when slewing the boom.

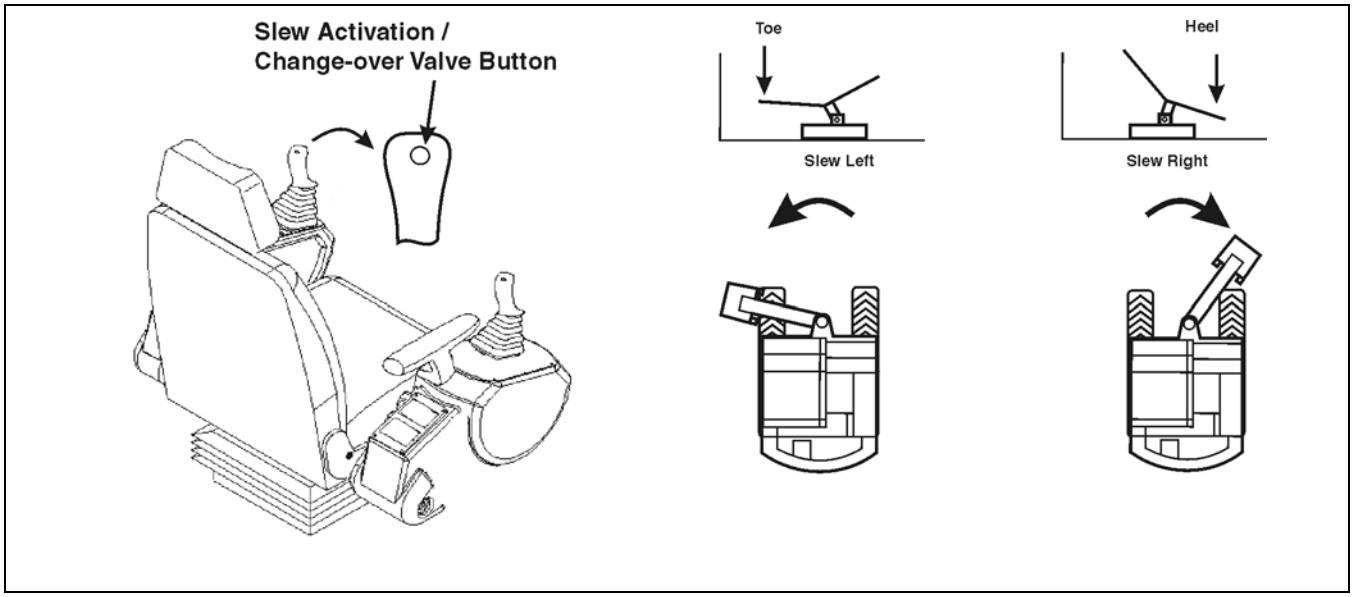


Figure 3-37 – Boom Slew Controls

Excavating

The following section applies to an excavator with a standard bucket, which is used mainly for digging into the ground to loosen, excavate and load loose or solid material.

IMPORTANT

Excavator buckets should never be used to perform actions other than digging, grading, loading and excavating. Equipment damage may result when:

- **the machine's slewing force is employed so the bucket serves as a hammer or battering ram (1, Figure 3-38).**
- **the bucket is lowered into the ground while rotating the upper carriage or driving the excavator (2).**
- **the dipper arm's falling force is employed so the bucket serves as a hammer or pile-driver (3).**
- **the machine's falling force is employed for digging or excavating (4).**
- **Use caution when retracting the bucket to prepare for driving or transport. Hitting the bucket into the dozer blade might damage either attachment, especially the bucket teeth.**
- **The dozer blade is intended for grading only; using it as a battering ram risks serious damage to the blade, its cylinder and connections.**
- **When excavating, lower the dozer blade to the ground to aid machine stability. It is best to position the dozer blade on the same side as the excavation, but damage to the boom cylinder may occur if the boom cylinder contacts the dozer blade. Position the dozer blade on the side opposite the excavation in cases where the boom cylinder may contact the dozer blade.**

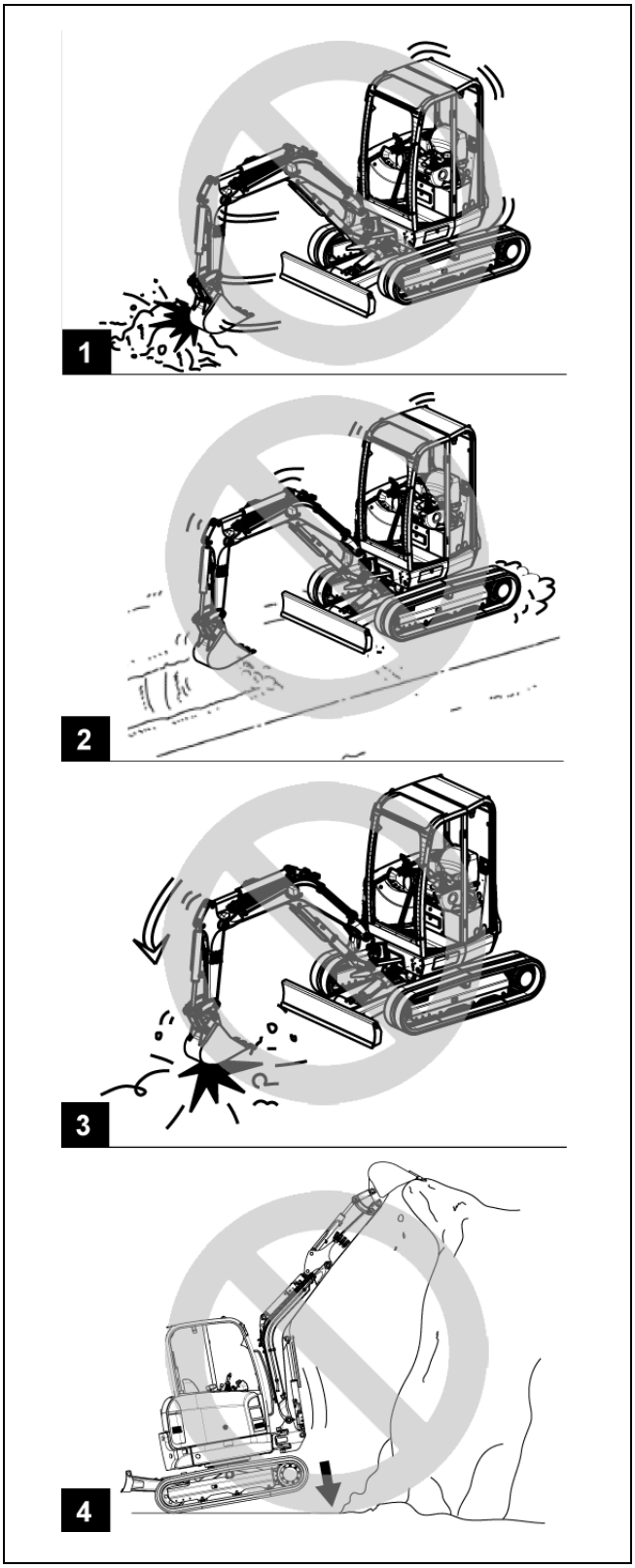


Figure 3-38 – Machine Operation Errors

Proper Digging Techniques

Proper Bucket Position

Position the flat side of the bucket so it is parallel to the ground (Figure 3-39).

IMPORTANT

Positions 2 and 3 in Figure 3-39 show improper positions for using the bucket. Position 2 forces the bucket downward into the ground, slowing down work and subjecting the engine and hydraulic pump to overloading.
Position 3 forces the bucket upward toward the ground surface, reducing productivity because of smaller loads being dug.

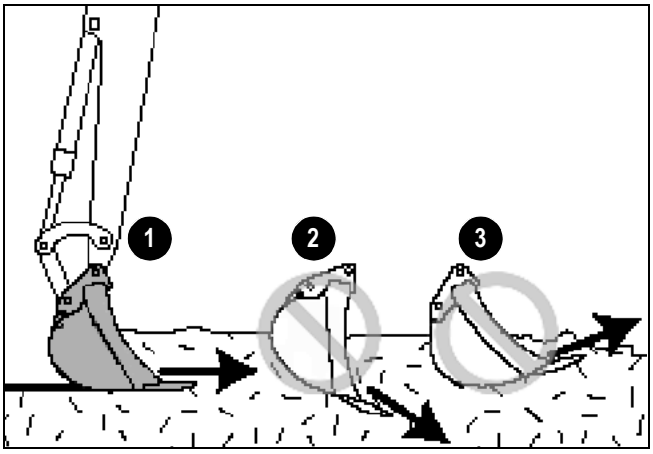


Figure 3-39 – Proper Bucket Position

Proper Digging Technique

1. Lower the bucket into the ground (4, Figure 3-40).
2. After the bucket penetrates the ground, adjust it so its flat side is parallel to the ground (5, Figure 3-40).
3. Pull the bucket toward the excavator by:
   a. Moving the dipper arm toward the excavator, and
   b. Lowering the boom.
4. After the bucket is sufficiently filled:
   a. Continue moving the dipper arm toward the excavator,
   b. Extend the dipper arm cylinder so the bucket is tilted upward (6, Figure 3-40), and
   c. Raise the boom.

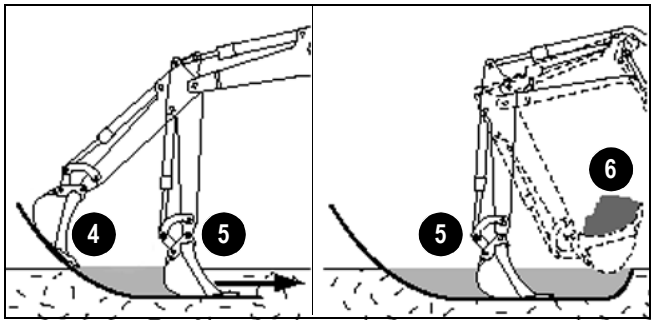


Figure 3-40 – Proper Digging Technique

Trench Excavating

Trench excavating is most efficient when the machine tracks are parallel to the line of the trench (Figure 3-41). For larger trenches, excavate each side first and then the center.

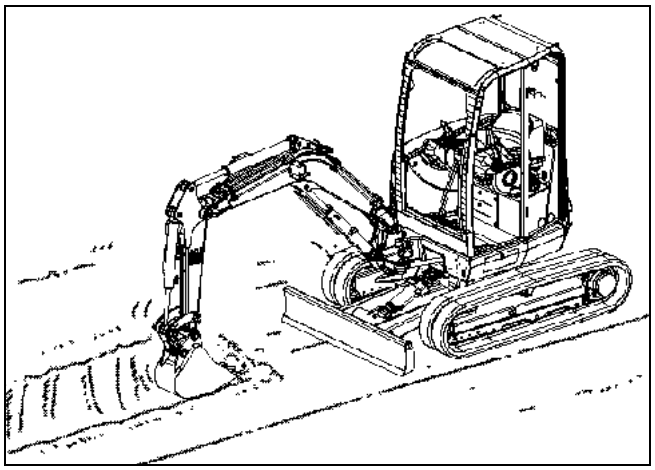


Figure 3-41 – Efficient Trench Excavating

When trench excavating is needed in confined areas, the excavating can be done by rotating the upper carriage and slewing the boom (Figure 3-42).

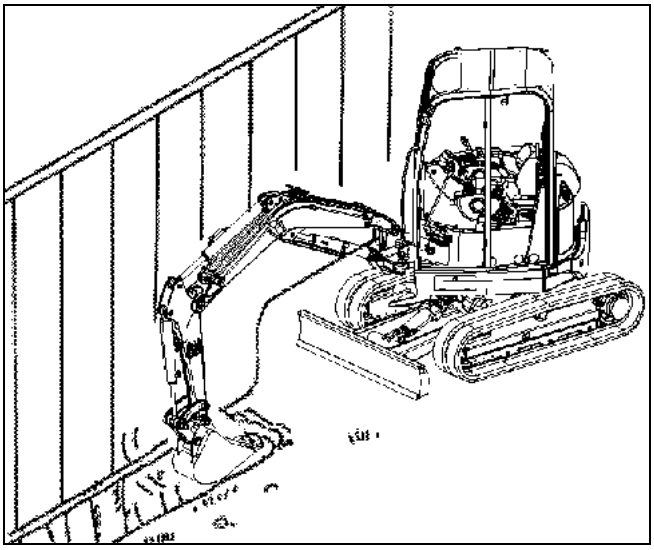


Figure 3-42 – Excavating Trenches Sideways

- Working alongside trenches and deep excavation are two applications where the dozer blade might restrict bucket movement. When working alongside trenches, lower and place the dozer blade onto the ground for greatest stability. When deep excavating, position the machine so the lowered dozer blade is on the side opposite the excavation to avoid contacting the boom cylinder against the dozer blade (Figure 3-43).

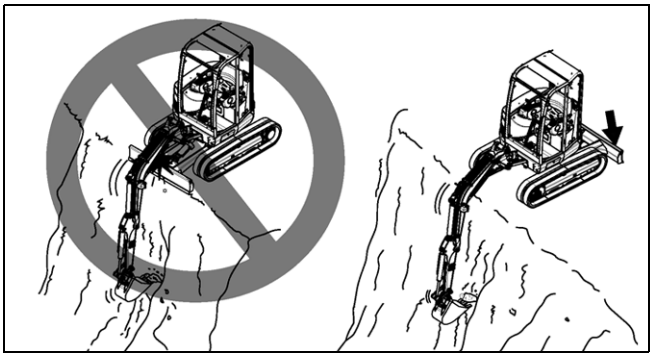


Figure 3-43 – Machine Position for Deep Excavating

⚠ WARNING

Placing the dozer blade on the opposite side of the excavation decreases machine stability. Always consider operator safety when operating the machine, especially in less-than-ideal working conditions.

Loading Trucks

When loading trucks, consider the following:

- Whenever loading in a confined area with a limited range of motion, position the truck so maximum visibility is ensured for the excavator operator.
- When work conditions permit, position the truck so the excavator can load material at the rear of the truck instead of the sides (1, Figure 3-44). The most effective way to load into the rear of the truck is when the truck and excavator form a 45° angle (2, Figure 3-44).
- Raise the boom and dipper arm to dump height just before rotating toward the truck.
- Whenever possible, dump upwind to keep dust and airborne debris away from the operator, and the excavator air filters and fans.

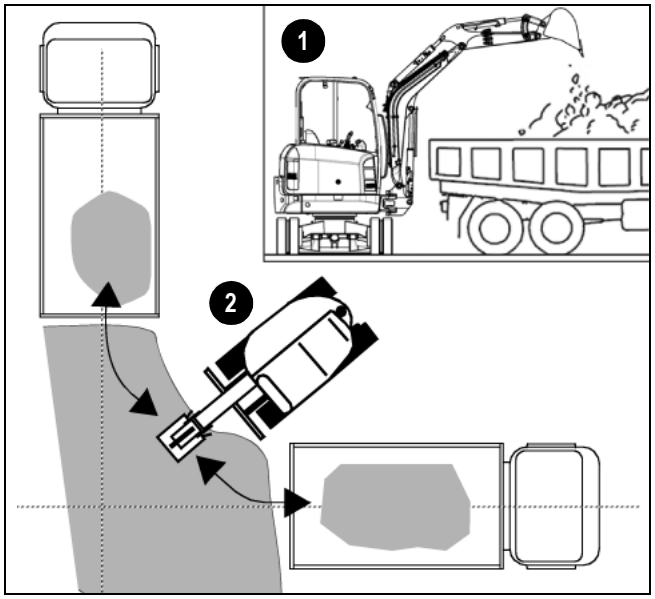


Figure 3-44 – Loading Trucks

Grading

Bulldozing

⚠ WARNING

- **Be sure there is proper clearance for the front end attachments when bulldozing.**
- **Be sure that the front end attachments do not contact any overhead power lines or obstructions during bulldozing.**
- **DO NOT drive machine into the excavation or onto loose soil, which will cause an unstable condition, and possibly tipping of the machine.**

1. Raise or lower the dozer blade using the control located alongside the right hand control console. See Figure 3-45. Move the control forward to lower the dozer blade, rearward to raise the dozer blade.
2. The boom must be fully raised and the bucket curled in (up) when grading.
3. When grading, the material may be pushed to the front or the side.
4. Raise the dozer blade slightly if excessive resistance occurs.
5. When the blade is in position, use the travel controls to move the machine as in normal travel.

Figure 3-45 – Bull Dozer Controls

Transporting

Towing

The excavator can be towed by using the towing bracket (1, Figure 3-46). Secure a towing shackle, shackle pin and lock (2) of adequate size to the towing bracket (1) as shown. Tow the machine slowly.

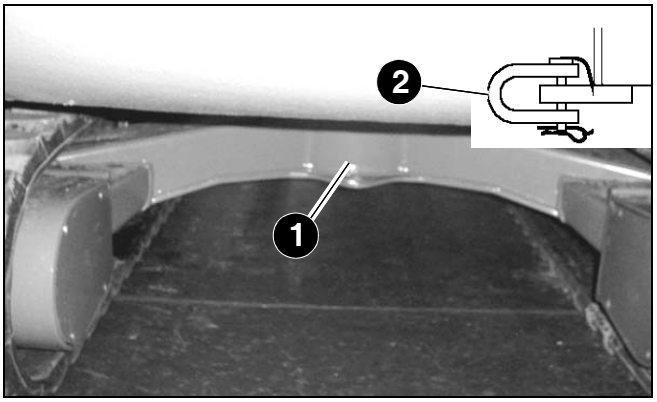


Figure 3-46 – Towing

Lifting the Machine

⚠ WARNING

- **Use a lifting device with sufficient capacity for the weight of the machine plus any attachments.**
- **Maintain the center-of-gravity and balance points on the machine (Figure 3-47).**
- **Make sure nobody is inside the machine.**
- **Do not swing the boom.**
- **Never lift the machine with the operator aboard.**

Lifting point decals on the cab identify the lifting point locations. Secure the lifting fixture sling to these lift points on the machine as follows:

1. Attach the standard bucket and lock it securely.
2. Empty the bucket.
3. Position the bucket, boom and dipper arm as shown in Figure 3-47.
4. Shut off the engine.
5. Tilt up the control lever console.
6. Remove the ignition key and take it with you.

7. Do not allow anyone to stay in the cab.
8. Close the doors and the engine cover.
9. Make sure the lifting gear has the required lengths, listed in the following table, and that the lifting gear and crane have adequated rated load capacity. See "Specifications" on page 1-3 for excavator weights.
10. Secure the lifting gear on the machine at points P1 and P2 (Figure 3-47).
11. Slowly raise the machine.

Required lengths L1 and L2 of the lifting gear:

Length	Dimension
L1	51.1" (1300 mm)
L2	51.1" (1300 mm)

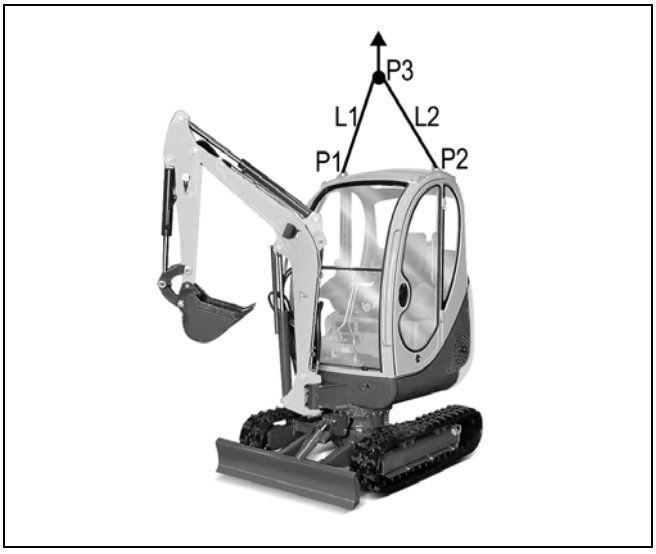


Figure 3-47 – Machine Lifting Points

Loading and Transporting

Use only transporters that are in proper working order and are approved for use on public roads.

When using ramps to load onto the transporter:

- Do not exceed an incline of 17°.
- Clean dirt, mud, ice and snow from the ramps and tracks.
- Use metal loading ramps with a slip-resistant surface, and with beveled ends to prevent damage to rubber tracks.

Loading Procedure:

1. Attach ramps securely to the transporter to prevent them from slipping off during loading.
2. Load the transporter on solid, even ground.
3. Engage the transporter parking brake and chock the tires.
4. Determine the direction of track movement (blade facing forward) before moving the excavator onto the ramps.
5. After the excavator is on the transporter, lower the boom to the trailer platform and position as shown in Figure 3-48.
6. Perform the "Mandatory Safety Shutdown Procedure" on page 2-1.
7. Engage the swing lock. See "Swing Lock Lever" on page 3-12.
8. Lock the cab door.
9. Place chocks around the excavator tracks.
10. Secure the excavator to the transporter at the tie-down points (2, Figure 3-48) to prevent the excavator from slipping, overturning or moving during transport.

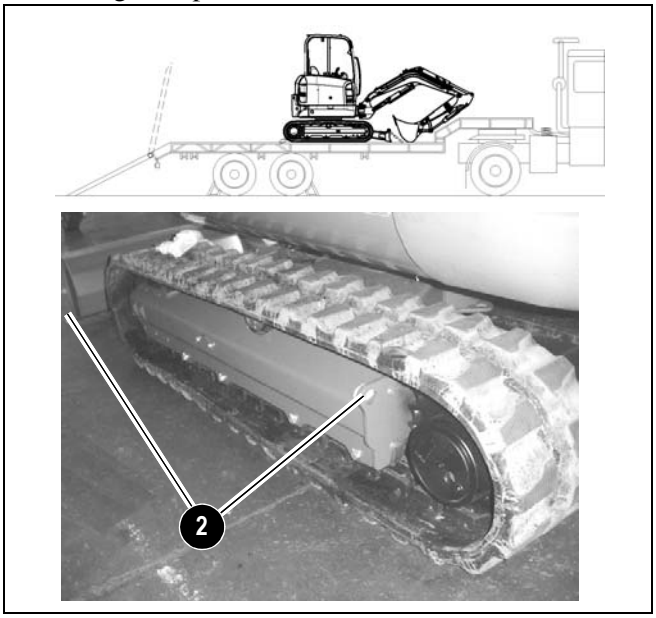


Figure 3-48 – Loading and Transporting

CHAPTER 4 – MAINTENANCE

GENERAL INFORMATIONCARE AND SERVICING

WARNING

Instructions are necessary before operating or servicing the machine. Read and understand this entire manual. Follow warnings and instructions for operation and maintenance. Check for correct function after adjustments and maintenance. Failure to follow instructions can result in injury or death.

WARNING

Be sure you are familiar with all safety devices and controls before operating or servicing the machine. Know how to stop before starting. This machine is designed for use only with Gehl Company approved accessories or referral attachments. The Gehl Company cannot be responsible for safety if the unit is used with non-approved attachments.

WARNING

Hydraulic reservoir is under pressure. Avoid contact with leaking hydraulic fluid and diesel fuel under pressure. It can penetrate the skin and eyes.

Care and Servicing

Care and servicing have a significant influence on the readiness for operation and service life of the machine.

For additional service information about the engine, see the engine manual provided with the machine.

Use of lubricants that do not correspond to the manufacturer's recommendations may invalidate warranty claims.

More frequent servicing, other than the recommended intervals, may be required under extreme operational conditions (extremely dusty or hot conditions).

Always dispose of waste lubrication oils and hydraulic fluids according to local regulations or take to a recycling center for proper disposal. **DO NOT** pour fluids onto the ground or down a drain.

DO NOT power-wash the main hydraulic pumps and controls, throttle solenoids and sealed bearings. High pressure water can be forced through seals and trapped within these components, causing premature failure.

The operating pressure settings of the hydraulic system should only be adjusted by trained, qualified personnel. If malfunctions are caused by unauthorized alteration of operating pressure settings, warranty responsibilities of the manufacturer are invalidated.

Maintenance Safety

- Never service the machine without reading the applicable instructions.
- Always lower bucket and dozer blade to the ground before performing any maintenance.
- Use correct procedures to lift and support the machine. Always lift the blade fully before installing jackstands.
- Keep engine cover and hydraulic valve cover closed except for service. Close and latch covers before operating the machine.
- Be sure to have area properly ventilated when grinding or welding parts. Wear a dust mask.
- Exhaust fumes can kill. Exhaust system must be tightly sealed. If working in an enclosed area, vent exhaust to outside when engine must be run for service.
- Never modify equipment or add attachments not approved by Gehl Company.
- Stop engine and let cool, then clean engine of any flammable materials before checking fluid levels.
- Never service or adjust machine with the engine running unless the service procedure requires it.
- Avoid contact with leaking hydraulic fluid or diesel fuel under pressure. It can penetrate the skin or eyes. NEVER use your hands to search for hydraulic fluid leaks; 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 familiar with this procedure or gangrene may result.
- Never fill fuel tank with engine running, while smoking or when near open flame.
- Keep body, jewelry and clothing away from moving parts, electrical contacts, hot parts and exhaust.
- Wear eye protection when servicing the machine.
- Lead acid batteries produce flammable and explosive gas. Keep arcs, sparks, flames and lighted tobacco away from batteries.
- Batteries contain acid which burns eyes and skin on contact. Wear protective clothing. If acid contacts body, flush well with water. For eye contact, flush well with water and get immediate medical attention.

Maintenance Schedule

IMPORTANT

Maintenance work must be done at regular intervals. Failure to perform scheduled maintenance work will result in excessive wear and early machine failures. The following service schedule is a recommended guide for servicing the machine.

Engine Systems

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check air filter	x				x		x
Check engine oil level	x						
Check fuel level	x						
Check engine for leaks	x						
Check coolant level	x						
Check engine mounting bolts		x					
Check v-belt condition and tension		x					
Clean radiator fins		x					
Check fuel filter		x					
Check exhaust system				x			
Change engine oil and filter			x*	x			x
Change fuel filter			x*	x			x
Check engine speed regulation				x			
Check valve clearance		x**			x		
Check cooling system and hoses					x		
Check electrical connections					x		
Check engine glow plug system					x		
Check coolant thermostat					x		
Check alternator and starter						x	
Clean fuel tank						x	
Check water pump						x	
Check pilot valve filter						x	

**1st engine oil change only*

*** New engine check only*

Hydraulic System

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check hydraulic fluid level	x						
Check hydraulic system for leaks	x			x		x	x
Check hydraulic pump bolts		x					
Clean hydraulic fluid cooler fins		x					
Change hydraulic filter		x*				x	
Change hydraulic oil		x*				x	x
Check hydraulic filter				x			
Check breather filter and filler strainer						x	

**1st hydraulic fluid change only*

Electrical System

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check indicator lights	x						
Check system function		x					
Check connectors				x			

Travel Drive Motor

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check for leakage		x					
Change final drive gear oil					x*	x	x

**1st oil change only*

Swing Gear Ring

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check gear ring					x		x
Check bearing system		x					x

Cab Heating System

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check fan			x				
Check system function			x				
Check heating system for leaks			x				
Check seals			x				

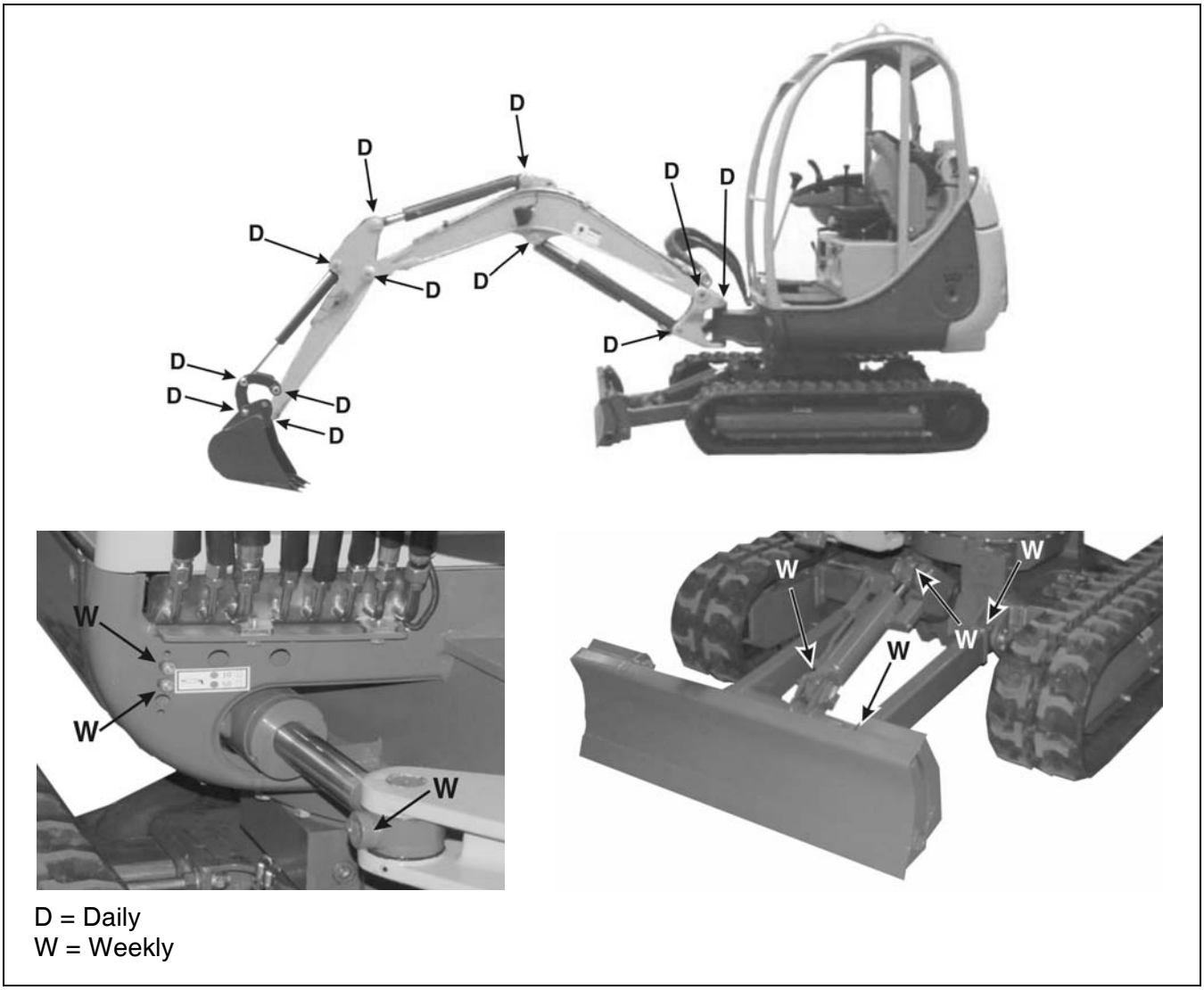
Bucket, Arm, Boom and Dozer Blade

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Lubricate daily service points	x						
Lubricate weekly service points		x					
Check bucket teeth for wear	x						
Check pin fastening	x						
Check hydraulic fittings for leaks	x						
Check piston rods	x						
Check hydraulic cylinder under load						x	
Check bearing play				x			

General

Service Activity	Daily	Weekly	Every 50 Hours	Every 125-250 Hours	Every 500 Hours	Every 1000 Hours	Annually
Check bolts	x						
Check lights	x						
Check windshield wipers		x					
Check all systems for leaks	x						

Lubrication



D = Daily
W = Weekly

Figure 4-1 – Lubrication Points

Recommended Lubricants

Engine Oil

Use a diesel engine oil conforming to SAE grade 10W-30 or 15W-40, and API classification CD (or higher, e.g, CH-4), such as BP Vanellus MG 15W-40, BP Vanellus C-Extra 10W-30, or Chevron Delo 400 15W-40.

Hydraulic Oil

Use a hydraulic oil with anti-wear, anti-foam and anti-oxidation additives that conforms to ISO Viscosity Grade 46, such as, Mobile DTE 15M, Amoco Rykon 46, or BP Energol HLP-HD 46.

Swing Ring

Lubricate with a heavy-duty lithium complex grease with 3% molybdenum disulfide, such as Chevron RPM Heavy-Duty Grease No. 2, Mobilgrease Moly 52 or BP Energrease Moly EP2.

Final Drive Unit

An EP grade gear oil that conforms to API GL5, such as Chevron Delo Gear 80W-90 or BP Transgear 80W-90 is required.

Swing Gear Unit

An EP grade gear oil that conforms to API GL5, such as Chevron Delo Gear 80W-90 or BP Transgear 80W-90 is required.

All Lubrication Points - Figure 4-1

Note: *The Model 223 remote lubrication point for the swing gear and slew cylinder base end is located to the left side of the boom base attachment point. See Figure 4-1.*

A heavy-duty lithium complex grease with 3% molybdenum disulfide such as Chevron RPM Heavy-Duty Grease No. 2, Mobilgrease Moly 52 or BP Energrease Moly EP2 should be used.

Ranges of Applications

From –13°F to +104°F (-25°C to + 40°C) outside temperature.

Engine

IMPORTANT

Be sure to read the engine manual supplied with this machine.

Checking Engine Oil Level

IMPORTANT

See the lubricant list for engine oil grade. Only use engine oil specified, or equivalent quality and grade, or damage to the engine could occur.

To check the engine oil, the machine must be on a level surface and the engine turned off.

1. Run the engine until it is at operating temperature, then turn off the engine.
2. Pull the engine cover latch lever (located beneath the operator's seat) and raise the engine cover.
3. Check the engine oil level using the dipstick located at front of the engine (1, Figure 4-2).
4. Add oil if required.

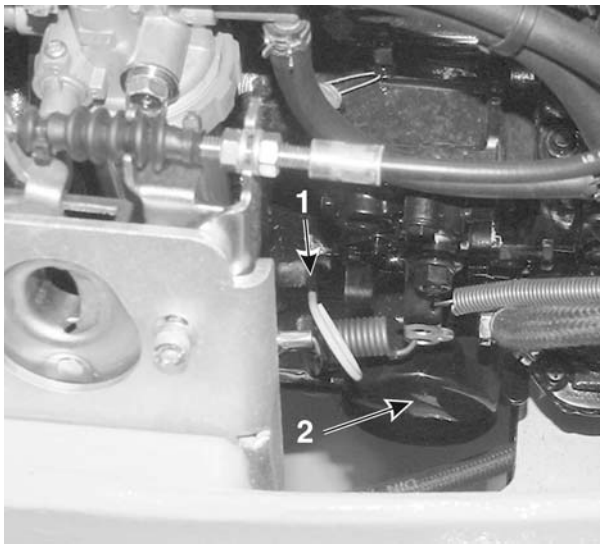


Figure 4-2 – Oil Dipstick and Filter Locations

Note: *The marks on the dipstick indicate the minimum and maximum oil levels.*

Changing Engine Oil and Filter

1. Place the machine on a level surface. Run the engine until it is at operating temperature, then turn off the engine.
2. Pull the engine cover latch handle (located beneath the operator's seat) and raise the engine cover.
3. Position waste oil collection container under engine oil pan.
4. Remove the drain plug from the oil pan and allow oil to drain into waste oil collection container.
5. Remove the oil filter, using a filter wrench as necessary. See (2, Figure 4-2).
6. Clean the filter housing surface. Put a film of clean oil on the filter gasket. Install the new filter with gasket and hand tighten.
7. Reinstall the drain plug.
8. Remove the oil fill cap from the engine. Pour in new oil. Crankcase capacity is 3.5 qts. (3.4 L).
9. Reinstall oil filler cap.
10. Start the engine and let it run for several minutes. Watch the engine oil light on the control panel. The light should turn off after several seconds. If it does not, shut off engine and determine cause.
11. Stop the engine and check for leaks at the oil filter and oil drain plug.
12. Check the oil level again and add oil if necessary.

Air Cleaner Service

1. The air cleaner is located under the engine cover. See (2, Figure 4-5). Pull the engine cover latch handle (located on the left side of the operator's seat) and raise the engine cover.
2. Turn the air cleaner cover bolt (Figure 4-3) to remove the air cleaner cover and gasket.
3. Remove the wingnut (Figure 4-3) and remove air cleaner element.
4. Clean air cleaner element with 30 psi (200 kPa) compressed air (Figure 4-3) from the inside.
5. Reinstall air cleaner element, wingnut, gasket, and air cleaner cover. Tighten cover bolt.
6. Close and secure engine cover.

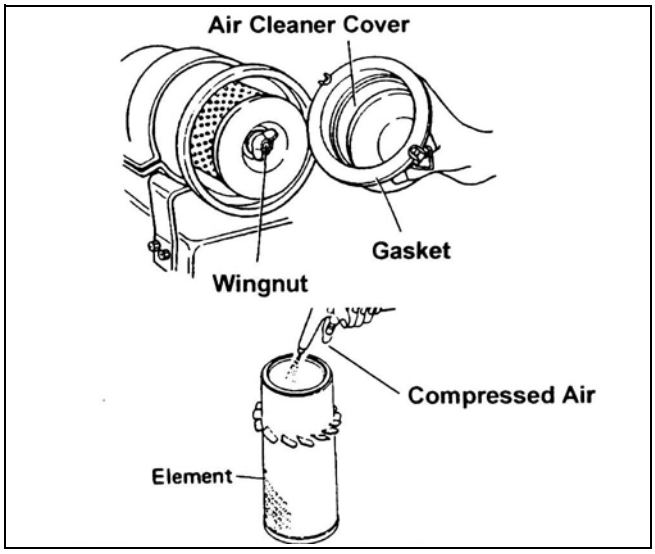


Figure 4-3 – Air Filter Service

IMPORTANT

Do not knock the element against a solid object to remove dust. The element may become distorted and damaged.

Do not operate engine without the air cleaner element installed or damage to the engine could occur.

Fuel System

Filling the Fuel Tank

⚠ WARNING

Stop and cool the engine before adding fuel. NO SMOKING! Failure to obey warnings can cause an explosion or fire.

The fuel level in the tank is indicated by the fuel gauge on the console (1, Figure 4-4).

To fill the tank, remove the fuel filler cap located inside the engine compartment on the left side of the opening. See (1, Figure 4-5). Fill using clean diesel fuel with a cetane rating over 45. Re-install fuel cap.

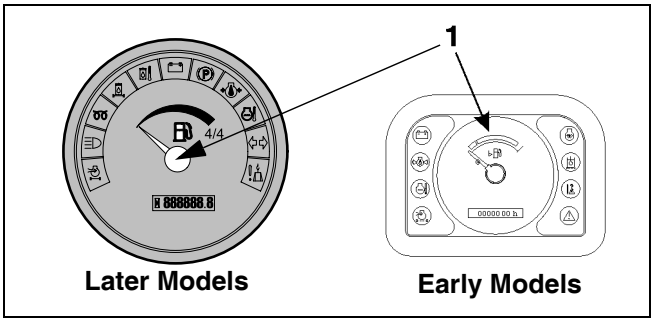


Figure 4-4 – Fuel Gauge

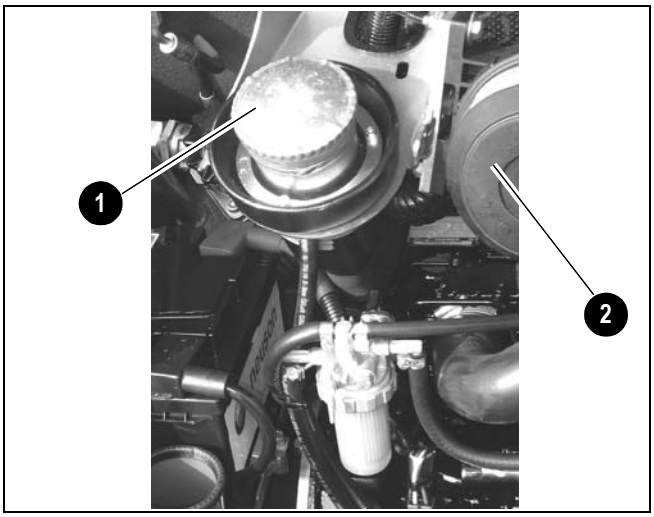


Figure 4-5 – Fuel Filler Cap

IMPORTANT

Never operate machine until fuel tank is completely empty. If this occurs, the fuel system will have to be bled of air. Always fill tank after use.

IMPORTANT

When using the machine in cold weather, make sure to use the proper fuel blend to prevent the fuel filters from "jelling" up. If this happens, the fuel filter and water separator elements will have to be replaced, and the fuel will have to be replaced with the proper fuel.

⚠ WARNING

Always clean up spilled fuel and oil. Keep heat, flames, sparks and lighted tobacco away from fuel and oil. Failure to use care around combustibles can cause explosion or fire, which can result in injury or death.

Fuel Filter

The fuel filter is located behind and below the engine hood latch.

1. Shut off fuel using the Fuel Filter Shut-off Valve. See (2, Figure 4-6).
2. Clean dirt from the housing and unscrew the clear plastic housing (1, Figure 4-6) to change the filter element.
3. Remove and discard old filter element properly.
4. Clean around the filter housing.
5. Put oil on the seal of the new filter element.
6. Install the fuel filter and hand tighten.
7. Open fuel valve.

The fuel system must be purged of air after changing the fuel filter, or if the fuel tank has been run dry.

Water Separator

If water is seen in the plastic water separator bowl, the bowl will need to be drained. See (1, Figure 4-7).

Note: *The water separator is located behind the access panel, beneath the right hand side of the swing frame.*

1. Shut off fuel using water separator fuel valve. See (2, Figure 4-7).
2. Unscrew and remove plastic water separator bowl (1).
3. Discard fuel/water according to local regulations. DO NOT pour fluids onto the ground or down a drain.
4. Reinstall filter bowl.
5. Open fuel valve.

Purging Air from the Fuel System

⚠ WARNING

DO NOT air bleed a hot engine. Spilled fuel can cause a fire.

The fuel system runs from the fuel tank, through the water separator, fuel filter, fuel injection pump and high pressure piping to the fuel injection nozzles. If the fuel tank has been run dry, or if the fuel filter, water separator or fuel lines have been replaced, trapped air will have to be removed, or bled, from the fuel system.

For late model excvators, turn the ignition key to the "1" position and wait five minutes.

For earlier model excvators, bleed air from the fuel system according to the following steps:

1. Place throttle in the "Run" position.
2. Make sure that the valve on the water separator valve (2, Figure 4-7) and on the fuel filter (2, Figure 4-6) are in the "open" (O) position.
3. Locate the primer pump lever on the fuel injection pump. See 1, Figure 4-8.
4. While operating the priming lever on the fuel pump:
   a. Bleed air by loosening the air bleeding screws on the water separator (3 and 4, Figure 4-7).

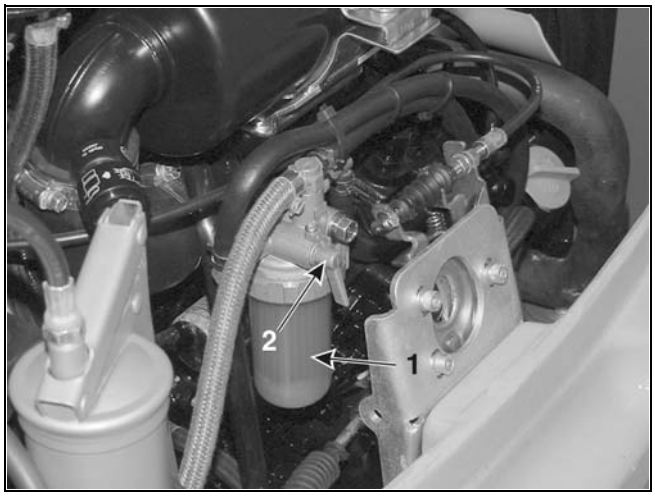


Figure 4-6 – Fuel Filter (early model shown; other models similar)

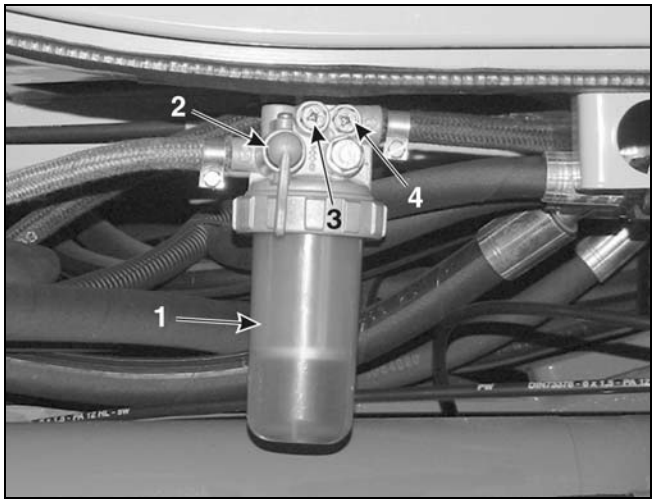


Figure 4-7 – Water Separator

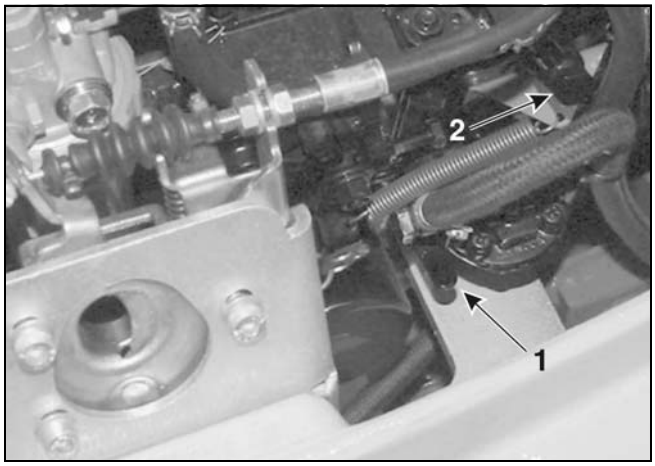


Figure 4-8 – Primer Pump Lever (early models)

b. First loosen bleed screw on left side of the filter (when facing filter) and allow fuel to come out until bubbles are not present in the fuel. Tighten the screw. Repeat procedure for right bleed screw.

c. Locate the bleed screw on the injection pump (2, Figure 4-8). This bleed screw looks like a bolt head on the "banjo" fitting at the right hand side of the fuel injection pump. Loosen the screw and allow fuel to come out until bubbles are not present. Tighten bleed screw.

Coolant System

Checking Coolant Level

Note: *Engine must be cold.*

1. Pull the engine cover latch handle (located beneath the operator's seat) and raise the engine cover.
2. Check the coolant level in the expansion reservoir. See Figure 4-9.
3. If low (2, Figure 4-9), remove cap and overflow tube.
4. Fill reservoir to FULL line (1). Refer to the engine manual for correct coolant mixture for the engine.

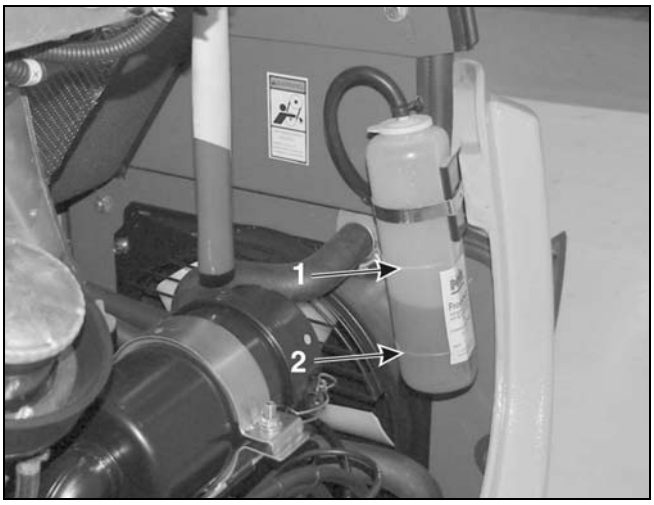


Figure 4-9 – Coolant Expansion Reservoir

Electrical System

Fuses

The fuse panel is located on the right-hand console, towards the rear, below the switches. See (18, Figure 4-10).

To replace a fuse, remove the panel cover and pull the old fuse from the socket. Install a new fuse of the same rating and re-install the fuse panel cover.

IMPORTANT

Determine what caused the fuse to blow and repair the defect.

Refer to page 3-6 for fuse identification.

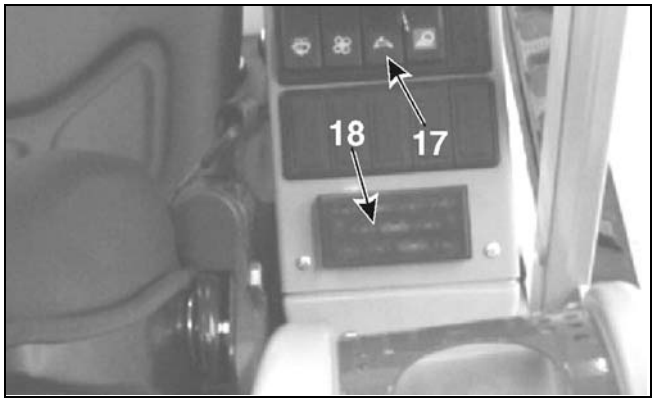


Figure 4-10 – Fuse Panel

Battery

WARNING

Batteries contain acid, which burns eyes and skin on contact. Wear safety goggles and protective clothing to keep acid off body.

In case of acid contact, wash immediately with water for several minutes. In case of eye contact, get medical attention immediately.

The battery is located under the engine cover, near the left rear counterweight. See (1, Figure 4-11).

To access the battery, pull the engine cover latch handle (located beneath the operator's seat) and open the engine cover.

The battery cables must be clean and tight. Remove any acid or corrosion from the battery and cables using a sodium bicarbonate and water solution. Cover the battery terminals and cable ends with battery saver grease.

Note: *The battery is maintenance-free and requires no other service.*

Using a Booster Battery (Jump Starting)

WARNING

- **Keep arcs, sparks, flames and lighted tobacco away from batteries. When jump starting from a booster battery, make final connection (negative) at engine frame away from the battery. A discharged battery can created flammable gases. Sparks or open flames can cause this gas, and the battery, to explode.**
- **DO NOT jump start or charge a frozen battery. Warm battery to 60°F (16°C) before connecting to a charger. Unplug charger before connecting or disconnecting cables to battery.**

Figure 4-11 – Battery Location (early model shown; other models similar)

IMPORTANT

When jump starting from another machine, be sure the second machine is not running while using the unstarted machine's glow plugs. High voltage spikes from a running machine can burn out the glow plugs.

IMPORTANT

Damage to the alternator can occur if:

- **Engine is operated with battery cables disconnected.**
- **Battery cables are connected when using a fast charger or when welding on the machine. When welding on the machine, remove both cables from the battery and ground welder to machine frame near repair area.**
- **Extra battery cables (booster cables) are incorrectly connected.**

Be very careful when jump starting the machine. Booster battery must be 12-volt.

Turn ignition key to the off position.

Pull the engine cover latch handle, located beneath the operator's seat and open the engine cover.

Connect one end of the cable to the positive (+) terminal on the booster battery. Connect the other end of the same cable to the positive (+) terminal on the battery of the machine to be started.

Connect one end of the second cable to the negative (-) terminal on the booster battery. Connect the other end of the same cable to the frame of the machine to be started.

Start the machine engine. Once the engine is running, remove the cable connected to the frame first. Disconnect the other cable from the machine battery positive (+) terminal.

IMPORTANT

DO NOT allow the cable ends to touch when removing them from the batteries. Arcs and dead short circuits can cause severe damage to the electrical system of the running machine.

Hydraulic System

⚠ WARNING

Hydraulic reservoir is under pressure. Never use your hands to search for hydraulic fluid leaks, use a piece of paper or cardboard to find leaks. Escaping fluid under pressure can be invisible and can penetrate the skin, causing a serious injury. If any fluid is injected into your skin, see a doctor at once. Injected fluid MUST be surgically removed by a doctor familiar with this procedure, or gangrene may result.

Checking Hydraulic Oil Level

1. Position the machine on a level surface.
2. Fully extend the bucket and boom, retract arm and position as shown in Figure 4-12.
3. Lower bucket and dozer blade to the ground. See Figure 4-12. Turn off the machine.

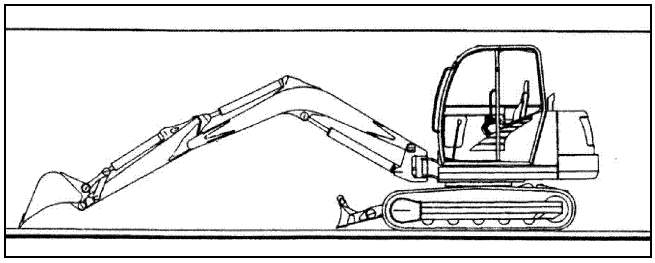


Figure 4-12 – Checking and Changing Hydraulic Oil

Figure 4-13 – Hydraulic Reservoir

4. Check the hydraulic oil level indicator. Oil level should be visible in the sight gauge. See (1, Figure 4-13). If hydraulic oil is required, proceed to step 5.
5. Slowly open the hydraulic oil filler cap (1, Figure 4-14) to relieve pressure, then remove cap.

Note: *A short hex shaft is included in the tool kit. This tool is designed to be used with a standard ratchet wrench to open the filler cap.*

6. Add hydraulic oil until oil level is between red and black marks on sight gauge.
7. Re-install hydraulic oil filler cap and tighten securely.
8. Start engine and let idle for a few minutes.
9. Check hydraulic functions. Recheck hydraulic oil level.

Changing Hydraulic Oil

1. Position the machine on a level surface.
2. Fully extend the bucket and boom, and retract arm as shown in Figure 4-12. Lower bucket and dozer blade to the ground. Turn off the machine.
3. Slowly open the filler cap to relieve pressure (1, Figure 4-14).
4. Remove the hydraulic reservoir cover (2, Figure 4-14) and remove filter assembly as shown in Figure 4-16.

IMPORTANT

The filler cap and filter assembly will be removed over the battery. Protect battery from spilled or dripping hydraulic fluid.

5. Open the drain plug and drain oil into a suitable container. Re-install drain plug and tighten securely.

IMPORTANT

Always dispose of hydraulic fluids according to local regulations or take to a recycling center for proper disposal. DO NOT pour onto the ground or down a drain.

6. Reinstall filter assembly and cap.
7. Fill reservoir with hydraulic oil until oil level is between red and black marks on sight gauge.
8. Re-install hydraulic oil filler cap and tighten securely.
9. Start engine and let idle for a few minutes.
10. Cycle all front attachment hydraulic functions and recheck hydraulic oil level.

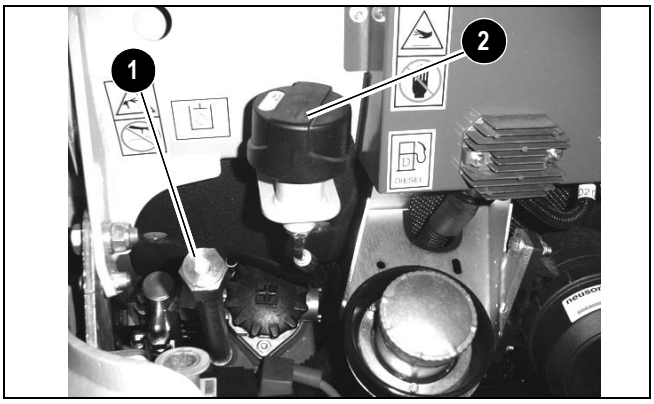


Figure 4-14 – Hydraulic Tank Filler (late models)

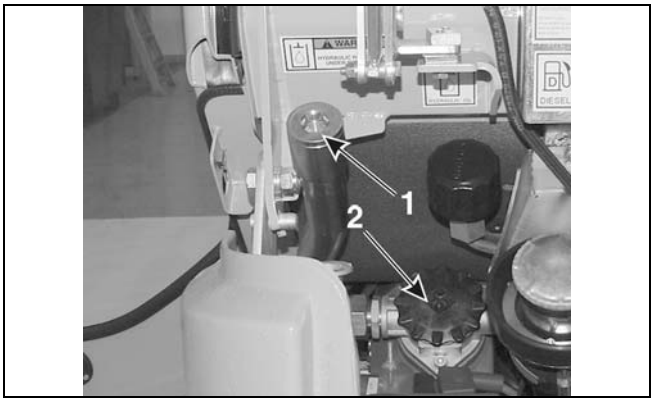


Figure 4-15 – Hydraulic Tank Filler (early models)

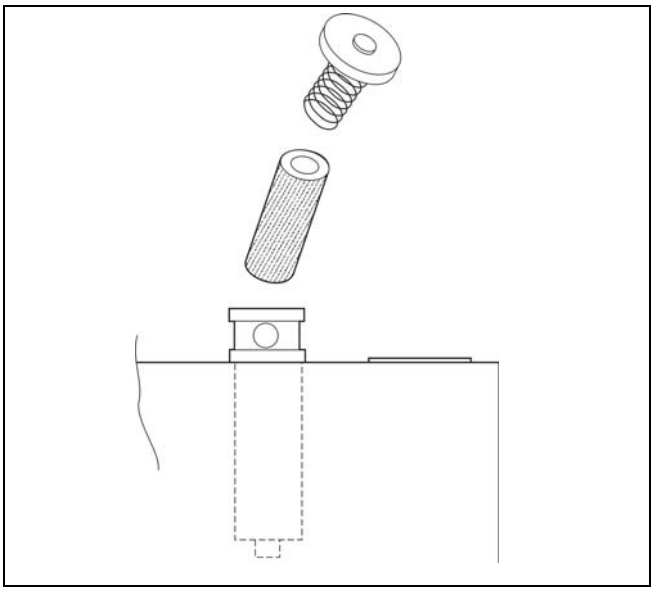


Figure 4-16 – Hydraulic Filter Assembly

Hydraulic Cooling System

The hydraulic system uses a hydraulic cooler to keep the hydraulic fluid at the proper temperature. The cooler is located inside the engine compartment (1, Figure 4-20) near the engine radiator. Inspect the cooler for leaks or damage.

Pilot Control Filter

IMPORTANT

To prevent damage to the pilot valve control spools, check the pilot control filter evern 1000 service hours and clean if necessary.

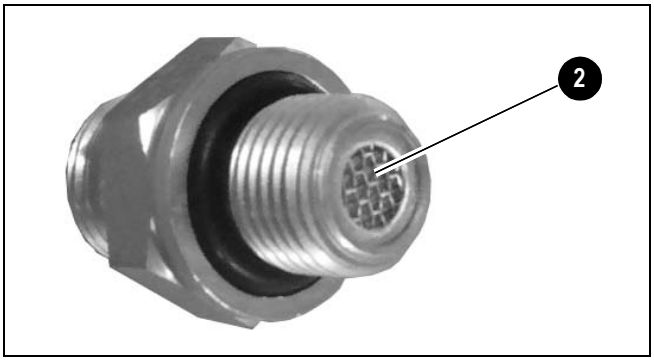


Figure 4-17 – Pilot Control Filter Screen

Check the pilot vave as follows:

1. Peform the "Mandatory Safety Shutdown Procedure" on page 2-1.
   a. Lower the working equipment to the ground and support it securely.
   b. Run the engine at idle speed for a few minutes to allow systems to cool after operation at full speed.
   c. Turn the key fully counter-clockwise to shut off the engine.
   d. Lock out controls by raising the control console.
   e. Remove the ignition key and take it with you.
2. Let the engine cool down
3. Slowly open the hydraulic system breather valve (1, Figure 4-14).
4. Open the drain plug and drain oil into a suitable container. Re-install drain plug and tighten securely.

IMPORTANT

Always dispose of hydraulic fluids according to local regulations or take to a recycling center for proper disposal. DO NOT pour onto the ground or down a drain.

5. Remove the floor mat.
6. Remove screws (A, Figure 4-18) securing the floor panel, and lift the floor panel for access to the drive valve.

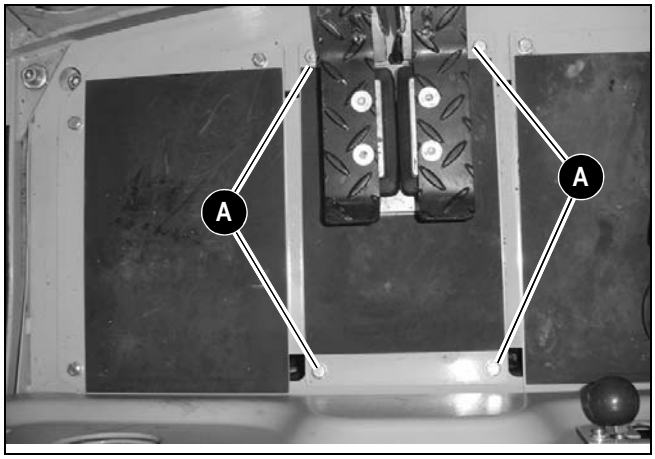


Figure 4-18 – Floor Panel

7. Remove pilot control hose (C, Figure 4-19) from the drive valve.

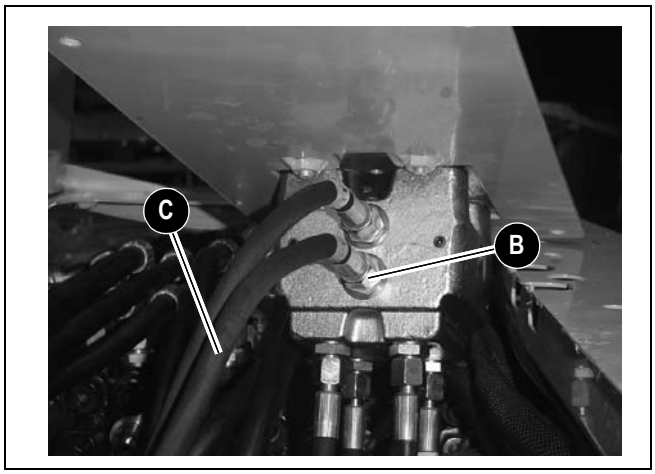


Figure 4-19 – Pilot Control Filter

8. Remove pilot control filter (B) from the drive valve.
9. Clean the pilot control filter screen if necessary. Replace the filter if it is damamged.
10. Re-assemble the pilot control filter, replace the hose; replace and secure the floor panel.
11. Fill the hydraulic system with the correct hydraulic oil (See "Recommended Lubricants" on page 4-7).

Track System

Changing Final Drive Oil

1. Position the machine on a level surface with final drive plugs positioned as shown in "Drain Position", Figure 4-21. Turn off the engine.
2. Open both plugs and drain oil into a suitable container. Re-install plugs.
3. Start the engine and move the machine slightly until plugs are positioned as shown in "Fill Position", Figure 4-21. Turn off the engine.
4. Remove both screw plugs. Pour fresh oil (Chevron Delo Gear 80W-90 or BP Transgear 80W-90) into the top hole until oil starts to run out of the bottom hole.
5. Re-install both plugs securely.

IMPORTANT

Always dispose of oil according to local regulations or take to a recycling center for proper disposal. DO NOT pour fluids onto the ground or down a drain.

Figure 4-20 – Hydraulic Cooler

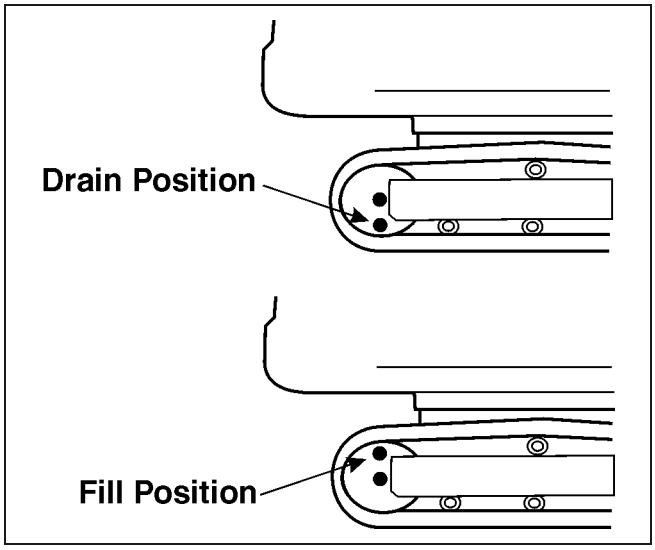


Figure 4-21 – Track Final Drive Oil Change

Adjusting Track Tension

1. Position the machine on a level surface.
2. Use the bucket and dozer blade to lift the unit up until tracks are just clear of the ground. Turn off the engine.
3. Remove the side plate from the left track to expose the adjustment fitting (Figure 4-22).
4. Using a grease gun, pump grease into the fitting until the idler wheel is centered as shown in Figure 4-22.

Note: *A grease gun is supplied with machine tool kit.*

IMPORTANT

Do not over-tension the track. If track is too tight, loosen the grease fitting to relieve pressure.

⚠ WARNING

Do not loosen grease fitting more than two turns, or grease fitting could be ejected under pressure and cause injury.

5. Reinstall side plate.
6. Repeat steps 4 and 5 for right side track.
7. Start the engine. Lower the unit to the ground.

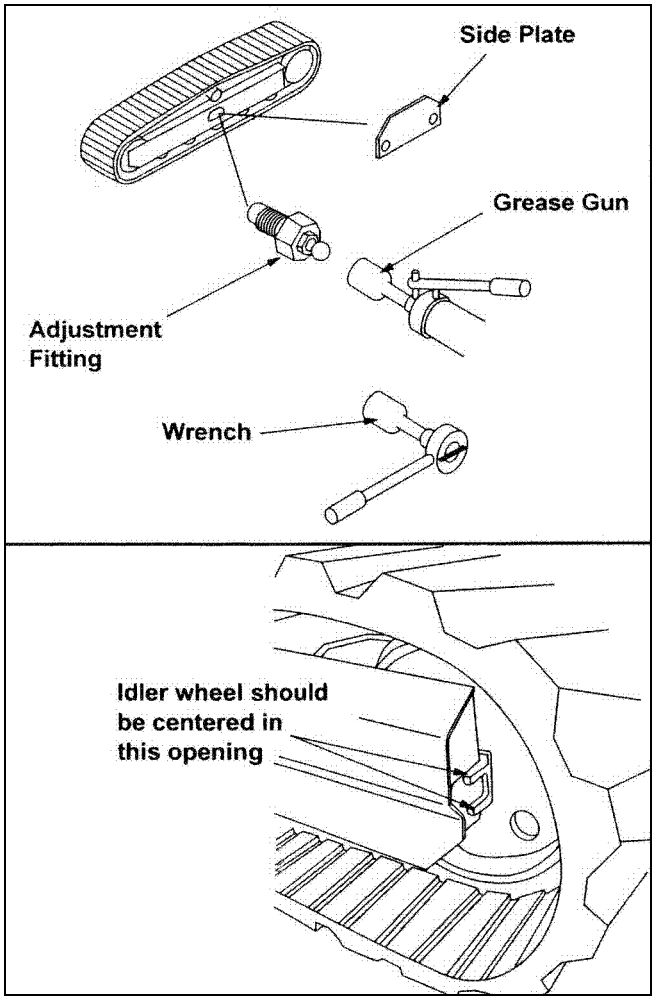


Figure 4-22 – Track Adjustment

LONG-TERM STORAGE

If the machine will not be operated for a month or longer, prepare and store it using the following procedure:

Before Storage

Perform the following prior to placing the machine in storage:

Wash off the entire machine.

Lubricate all grease fittings as directed in "Lubrication" on page 4-6.

Change the engine oil and filter as directed on page 4-7.

If the machine will not be operated for a month or longer, retract all cylinders so rod exposure is minimized. Apply grease to any rod areas that remain exposed.

Disconnect the battery cable clamps and cover the battery, or remove the battery from the machine and store it separately.

If the ambient temperature (at any time during the storage period) is expected to drop below freezing, make sure the engine coolant is either completely drained from the radiator and engine block or that the amount of anti-freeze in it is adequate to keep the coolant from freezing. Refer to the engine manual for anti-freeze recommendations and quantities.

During Storage

About once each month, connect the battery and check all fluid levels to make sure they are at the proper level before starting the engine.

Start the engine and allow it to run until it warms up and then move the machine a short distance to help relubricate the internal parts. Run the engine until the battery has a chance to recharge and then shut it off.

IMPORTANT

If it is desired to operate the hydraulic cylinders at this time, BE SURE to wipe the protective grease (and any adhering dirt) from the cylinder rods prior to starting the engine. After operating, BE SURE to recoat the cylinder rods with grease if the machine is to be returned to storage.

After Storage

After removing the machine from storage and before operating it, perform the following:

Change engine oil and filter to remove condensation or other residues.

Wipe off grease (and any adhering dirt) from cylinder rods.

Lubricate ALL grease fittings.

Review and re-familiarize yourself with all safety precautions as outlined starting on page 2-1.

Follow the starting and warm-up procedures as outlined starting on page 3-16 .

CHAPTER 5 – TROUBLESHOOTING

GENERAL INFORMATION

Problem	Possible Cause	Corrective Action
Engine will not start.	No fuel.	Add fuel to tank; bleed air from fuel system.
	Battery power insufficient.	Charge battery or replace if necessary.
	Fuel filter contaminated.	Clean fuel filter.
	Glow plug system not working.	Replace glow plug system. Contact authorized repair center.
Insufficient engine power.	Fuel line leakage.	Replace fuel line.
	Air filter plugged.	Clean air filter.
	Engine not at operating temperature.	Warm up the engine.
	Engine overheated.	Check cooling system.

Indicator Lamps

Problem	Possible Cause	Corrective Action
Engine oil pressure indicator light comes on during operation.	Engine oil pressure too low.	Stop engine immediately. Check oil level and add oil if necessary. If oil level is correct, oil pump may have failed.
	Engine oil level too low.	Add oil.
	Oil pump not working.	Replace oil pump. Contact authorized repair center.
Water temperature display light comes on during operation.	Coolant level too low.	Add coolant.
	Fan blades rotating too slowly.	Adjust v-belt tension.
	Air filter plugged.	Clean air filter.
	Engine overheated.	Check cooling system.
Battery voltage light comes on during operation.	Alternator not charging properly.	Adjust v-belt tension.
Fuel light comes on.	Low fuel.	Add fuel.

Seals and Hoses

Problem	Possible Cause	Corrective Action
Oil, coolant or fuel leakage under engine.	Loose hose connection.	Tighten hose connections.
	Seals or hoses damaged.	Change seals or hoses and check engine oil, engine coolant or fuel levels. Add engine oil, coolant or fuel if necessary.
Hydraulic fluid losses from hydraulic system.	Loose hose fittings.	Tighten hose connections.
	Seals, hoses or lines damaged.	Change seals, hoses and/or lines.

Traveling Gear

Problem	Possible Cause	Corrective Action
Machine will not travel in any direction.	Foreign object jammed in track.	Remove object.
	Gears not operative.	Repair gears. Contact authorized repair center.
Machine will not travel straight forward or backward.	Foreign object jammed in track.	Remove object.
	Track tension unequal.	Adjust track tension.
	Travel valves damaged.	Repair/replace valves. Contact authorized repair center.

Bucket, Boom and Dozer Blade

Problem	Possible Cause	Corrective Action
Rotating swing frame is difficult or impossible.	Swing lock pin engaged	Release swing lock pin.
	Insufficient lubrication.	Lubricate swing gear using remote grease fitting.
Front end attachments do not work or work only at a low performance level.	Low hydraulic fluid level.	Add hydraulic fluid.
	Low engine power.	Contact authorized repair center.
	Engine to pump coupling or hydraulic pump damaged.	Contact authorized repair center.
	Pressure limiting valves set too low.	Contact authorized repair center.
	Hydraulic cylinder damaged.	Contact authorized repair center.
	Control valves damaged.	Contact authorized repair center.
Hydraulic cylinders lower too quickly.	Seals contaminated or damaged.	Contact authorized repair center.
	Heavy internal leakage at control spools.	Contact authorized repair center.
	Secondary cartridge valves damaged.	Contact authorized repair center.
Hydraulic lines overheat.	Low hydraulic fluid in hydraulic fluid reservoir.	Fill hydraulic fluid reservoir.
	Secondary cartridges set too low.	Contact authorized repair center.
	Hydraulic fluid cooling system not in working order.	Clean hydraulic fluid cooler.

NOTES

TORQUE SPECIFICATIONS

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

Hydraulic fittings with various seals (light application). All torque values are in lb.-ft. (Nm) unless marked otherwise.

Thread	Straight pipe fitting with thread and screwed plug (GE)			Non-return valve with elastic seal	Identification aid outside Ø
	Sealing washer	Elastic seal	O-ring		
M10X1.0	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (10 mm)
M12X1.5	15 (20)	18 (25)	18 (25)	18 (25)	0.5 in. (12 mm)
M14X1.5	26 (35)	33 (45)	26 (35)	26 (35)	0.6 in. (14 mm)
M16X1.5	33 (45)	41 (55)	30 (40)	37 (50)	0.6 in. (16 mm)
M18X1.5	41 (55)	52 (70)	33 (45)	52 (70)	0.7 in. (18 mm)
M22X1.5	48 (65)	92 (125)	44 (60)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	74 (100)	107 (145)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	118 (160)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (48 mm)
G1/8A	7 (9)	13 (18)	11 (15)	13 (18)	0.4 in. (9.73 mm)
G1/4A	26 (35)	26 (35)	22 (30)	26 (35)	0.5 in. (13.16 mm)
G3/8A	33 (45)	52 (70)	33 (45)	37 (50)	0.7 in. (16.66 mm)
G1/2A	48 (65)	66 (90)	41 (55)	48 (65)	0.8 in. (20.96 mm)
G3/4A	66 (90)	133 (180)	74 (100)	103 (140)	1.0 in. (26.44 mm)
G1A	111 (150)	229 (310)	118 (160)	140 (190)	1.3 in. (33.25 mm)
G1 1/4A	177 (240)	332 (450)	155 (210)	266 (360)	1.7 in. (41.91 mm)
G1 1/2A	214 (290)	398 (540)	192 (260)	398 (540)	1.9 in. (47.80 mm)

Hydraulic fittings with various seals (heavy application). All torque values are in lb.-ft. (Nm) unless marked otherwise.

Thread	Straight pipe fitting with thread and screwed plug (GE)			Non-return valve with elastic seal	Identification aid outside Ø
	Sealing washer	Elastic seal	O-ring		
M12X1.5	15 (20)	26 (35)	26 (35)	26 (35)	0.5 in. (12 mm)
M14X1.5	26 (35)	41 (55)	33 (45)	33 (45)	0.6 in. (14 mm)
M16X1.5	33 (45)	52 (70)	41 (55)	41 (55)	0.6 in. (16 mm)
M18X1.5	41 (55)	66 (90)	52 (70)	52 (70)	0.7 in. (18 mm)
M20X1.5	41 (55)	92 (125)	59 (80)	74 (100)	0.8 in. (20 mm)
M22X1.5	48 (65)	100 (135)	74 (100)	92 (125)	0.9 in. (22 mm)
M27X2.0	66 (90)	133 (180)	125 (170)	100 (135)	1.0 in. (27 mm)
M33X2.0	111 (150)	229 (310)	229 (310)	155 (210)	1.3 in. (33 mm)
M42X2.0	177 (240)	332 (450)	243 (330)	266 (360)	1.7 in. (42 mm)
M48X2.0	214 (290)	398 (540)	310 (420)	398 (540)	1.9 in. (48 mm)
G1/8A	26 (35)	41 (55)	33 (45)	33 (45)	0.5 in. (13.16 mm)
G1/4A	33 (45)	59 (80)	44 (60)	44 (60)	0.7 in. (16.66 mm)
G3/8A	48 (65)	85 (115)	55 (75)	74 (100)	0.8 in. (20.96 mm)
G1/2A	66 (90)	133 (180)	125 (170)	107 (145)	1.0 in. (26.44 mm)
G3/4A	111 (150)	229 (310)	229 (310)	192 (260)	1.3 in. (33.25 mm)
G1A	177 (240)	332 (450)	243 (330)	266 (360)	1.7 in. (41.91 mm)
G1 1/4A	214 (290)	398 (540)	310 (420)	398 (540)	1.9 in. (47.80 mm)

With coarse-pitch thread. All torque values are in lb.-ft. (Nm) unless marked otherwise.					
Thread	**Threads according to DIN 912, DIN 931, DIN 933, etc.**			**Threads according to DIN 7984**	
	8.8	**10.9**	**12.9**	**8.8**	**10.9**
M5	4.1 (5.5)	6 (8)	7 (10)	4 (5)	5 (7)
M6	7 (10)	10 (14)	13 (17)	6.3 (8.5)	9 (12)
M8	18 (25)	26 (35)	31 (42)	15 (20)	22 (30)
M10	33 (45)	48 (65)	59 (80)	30 (40)	44 (59)
M12	64 (87)	81 (110)	108 (147)	51 (69)	74 (100)
M14	100 (135)	133 (180)	170 (230)	81 (110)	118 (160)
M16	155 (210)	203 (275)	258 (350)	125 (170)	184 (250)
M18	207 (280)	302 (410)	354 (480)	181 (245)	254 (345)
M20	302 (410)	420 (570)	509 (690)	251 (340)	361 (490)
M22	406 (550)	575 (780)	686 (930)	339 (460)	487 (660)
M24	524 (710)	738 (1000)	878 (1190)	435 (590)	620 (840)
M27	767 (1040)	1092 (1480)	1305 (1770)	642 (870)	922 (1250)
M30	1047 (1420)	1482 (2010)	1770 (2400)	885 (1200)	1254 (1700)

With fine-pitch thread. All torque values are in lb.-ft. (Nm) unless marked otherwise.					
Thread	**Threads according to DIN 912, DIN 931, DIN 933, etc.**			**Threads according to DIN 7984**	
	8.8	**10.9**	**12.9**	**8.8**	**10.9**
M8X1.0	18 (25)	27 (37)	32 (43)	16 (22)	24 (32)
M10X1.0	37 (50)	55 (75)	65 (88)	32 (43)	48 (65)
M10X1.25	36 (49)	52 (71)	61 (83)	31 (42)	46 (62)
M12X1.25	64 (87)	96 (130)	111 (150)	55 (75)	81 (110)
M12X1.5	61 (83)	92 (125)	107 (145)	53 (72)	77 (105)
M14X1.5	100 (135)	148 (200)	173 (235)	89 (120)	129 (175)
M16X1.5	155 (210)	229 (310)	266 (360)	133 (180)	195 (265)
M18X1.5	232 (315)	332 (450)	391 (530)	199 (270)	284 (385)
M20X1.5	325 (440)	465 (630)	538 (730)	277 (375)	391 (530)
M22X1.5	435 (590)	620 (840)	723 (980)	369 (500)	524 (710)
M24X2.0	546 (740)	789 (1070)	922 (1250)	465 (630)	664 (900)
M27X2.0	811 (1100)	1143 (1550)	1328 (1800)	679 (920)	959 (1300)
M30X2.0	1106 (1500)	1586 (2150)	1844 (2500)	959 (1300)	1364 (1850)

WARNING

THIS OPERATOR'S MANUAL IS PROVIDED FOR OPERATOR USE

DO NOT REMOVE FROM THIS MACHINE

Do not start, operate or work on the 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 the machine, contact your dealer or the Gehl 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 and other reproductive harm.

Battery post, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects and other reproductive harm. **Wash hands after handling battery**.

GEHL®

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