

GEHL®

Form No.
918070
Revision F
Aug. 2011

503Z / 603

Compact Excavator

Beginning Serial Number: AC02471



Operator's Manual

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Engine

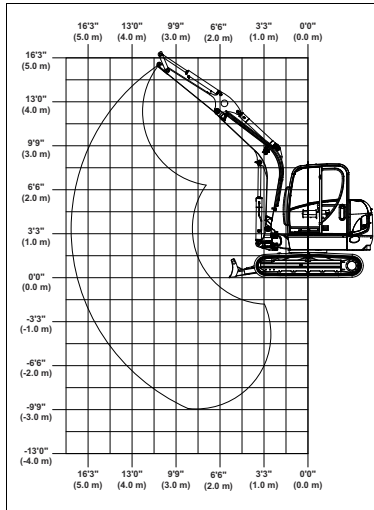
Engine	503Z	603
Engine Model	Serial Numbers AH00579 and up: Yanmar 4TNV88-BPNS EPA Tier III	Serial Numbers AH00645 and up: Yanmar 4TNV98-ZVNS EPA Tier III
	S/N AC02471-AH00578: Yanmar 4TNV88-PNS EPA Tier II	S/N AC02513-AH00644: Yanmar 4TNV98-VNS EPA Tier II
Type	Water-cooled 4-stroke, 4 cylinder diesel engine	
Displacement	134 cu. in. (2.19 L)	202 cu. in. (3.32 L)
Bore and Stroke	3.5 x 3.5 in. (88 x 90 mm)	3.9 x 4.3 in. (98 x 110 mm)
Horsepower (DIN)	37.8 hp (28.2 kW) @ 2400 rpm	57.0 hp (42.5 kW) @ 2100 rpm
Max. Torque	102 lb.-ft. (138 Nm) @ 1100 rpm	184 lb.-ft. (249 Nm) @ 1400 rpm
Max. Engine Speed (with no load)	2575 +/- 50 rpm	2275 +/- 50 rpm
Idle Engine Speed	1050 +/- 50 rpm	
Fuel Injection System	Direct injection	
Starting Aid	Glow plug (Preheating time 10-15 seconds)	
Max. Inclined Angle (engine still supplied with oil)	25° in all directions Note: <i>The machine's theoretical climbing ability (30°/58%) exceeds this angle!</i>	
Exhaust Emission Compliance	97/68 EC; U.S. EPA	
Engine Oil Capacity	8.2 qts. (7.8 L)	10.7 qts. (10.1 L)
Engine Coolant Capacity	7.4 qts. (7.0 L)	

Hydraulic System

Hydraulic System	503Z	603
Pump	Two variable-displacement + two gear pumps	
Flow Rate	2 x 14.2 gpm + 10.9 gpm + 3.0 gpm @ 2590 rpm (2 x 53.6 L/min + 41.4 L/min + 11.6 L/min) @ 2590 rpm	2 x 15.7 gpm + 11.8 gpm + 2.5 gpm @ 2290 rpm (2 x 59.6 L/min + 44.7 L/min + 9.6 L/min) @ 2130 rpm
Operating Pressure (working and driving)	3408 psi (235 bar)	3553 psi (245 bar)
Operating Pressure (swing unit)	3336 psi (230 bar)	3480 psi (240 bar)
Hydraulic Fluid Cooler	Standard	
Hydraulic Reservoir (system capacity)	21.1 gal. (80 L)	
Filter	Return filter	

503Z Load Diagram - Extended Dipper Arm with Counterweight

Maximum permissible loads



		13'0" (4.0 m)		9'9" (3.0 m)		6'6" (2.0 m)	
B	A	13'0"	13'0"	9'9"	9'9"	6'6"	6'6"
	13'3" (4.0 m)	2028* (920*)	1720 (780)	1885* (855*)	1885* (855*)		
9'9" (3.0 m)	2017* (915*)	1323 (600)	1907* (865*)	1907* (865*)			
6'6" (2.0 m)	2061* (935*)	1146 (520)	2315* (1050*)	1907* (865*)	2899* (1315*)	2899* (1315*)	
3'3" (1.0 m)	2138* (970*)	1069 (485)	2888* (1310*)	1764 (800)	4464* (2025*)	2657 (1205)	
0'0" (0.0 m)	2238* (1015*)	1080 (490)	3296* (1495*)	1642 (745)	5258* (2385*)	2447 (1110)	
-3'3" (-1.0 m)	2348* (1065*)	1190 (540)	3340* (1515*)	1587 (720)	5181* (2350*)	2392 (1085)	10,075* (4570*)
-6'6" (-2.0 m)	2447* (1110*)	1521 (690)	2756* (1250*)	1620 (735)	4343* (1970*)	2436 (1105)	7915* (3590*)

Maximum permissible load on extended dipper arm

A	Reach from live ring center
B	Load hook height
*	Lift capacity limited by hydraulics

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.

Remove all trash and debris from the machine every day, especially in the engine compartment, to minimize the risk of fire.

The operator's area, steps and hand holds must be kept free of oil, dirt, ice and unsecured objects.

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 or damage.

Walk around the machine and inspect it before using it. Look for damage, loose or missing parts, leaks, etc. Repair as required before using the machine.

Check the tracks for damage at regular intervals. Repair or replace as necessary.

Warn all nearby personnel before starting the machine.

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

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

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, or other obstructions.

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.

If a lighting system is installed, check its operation before working in darkness.

Use warning tag/control lockout procedures during service. Alert others that service or maintenance is being performed by tagging the operator's controls — and other machine areas if required — with a warning notice. **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.

Replace damaged safety decals and a lost or damaged operator's manual. Always store this operator's manual in the storage compartment provided for it inside the cab.

Work crew members should observe and monitor all terrain and soil conditions at the work site, along with traffic, weather-related hazards and any above- or below-ground obstacles and hazards.

If the machine is equipped with a cab, keep the windshield, mirrors and windows clean. If equipped, adjust the rearview mirrors to provide the best view to the rear of the machine. Poor visibility can cause accidents.

Adjust the seat to allow complete and comfortable access to the controls. Never adjust the seat during machine operation.

Stop the engine and lock out the controls by raising left control console before mounting attachments. Check that attachments are securely fastened to the excavator before using them.

Before working on or with the machine, remove jewelry, tie back long hair, and do not wear loose fitting garments, such as, scarves, ties, unzipped jackets, etc., which could become caught in the moving parts of the machine and cause injury.

Do not use the machine when maintenance is scheduled to be performed. Postponing maintenance can result in a serious reduction of the service life of the machine, more serious and costly equipment failures, and contribute to unsafe operating conditions.

During Operation

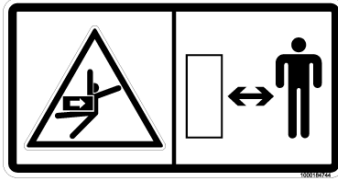
ALWAYS fasten the seat belt securely and properly. Never operate the machine without the seat belt fastened around the operator.

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

Always keep hands and feet inside the operator's compartment while operating the machine.

Control the machine cautiously and gradually until 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.

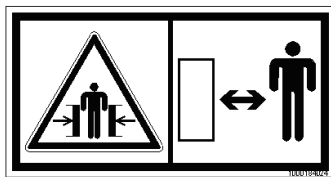
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WARNING! Danger Zone Decal
AVOID INJURY OR DEATH!

Located on the back of the swing frame.
 Keep bystanders away from the machine when it is in use.

12



WARNING! Danger Zone Decal
AVOID INJURY OR DEATH!

Located on both sides of the boom swivel bracket.
 Swiveling boom can cause crushing. Keep bystanders away from the machine when it is in use.

13



WARNING! Mandatory Safety Shutdown Decal

AVOID INJURY OR DEATH!

Before leaving the machine, or performing any service on the machine, perform the "Mandatory Safety Shutdown Procedure" on page 2-2..

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.

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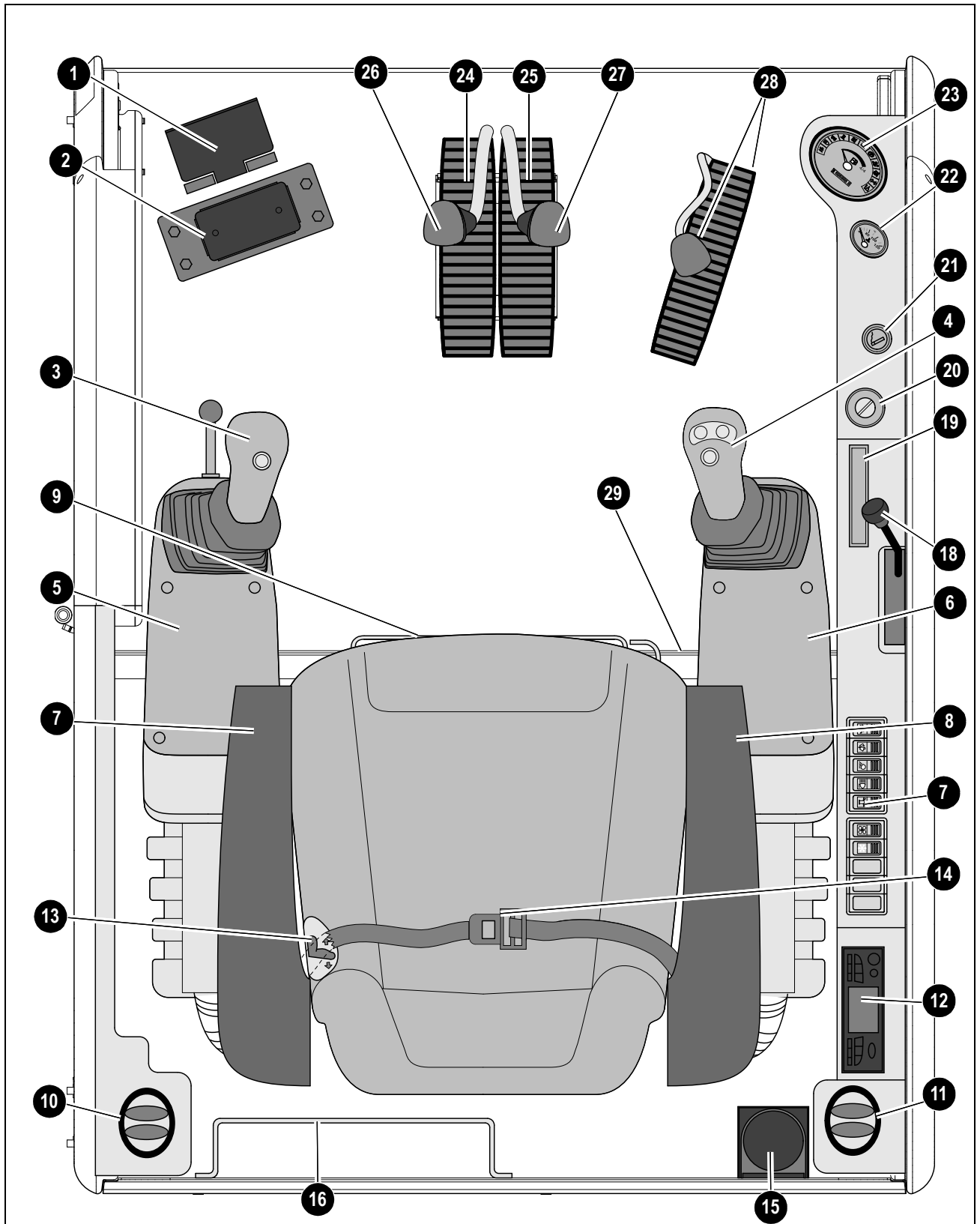


WARNING! Danger Zone Decal
AVOID INJURY OR DEATH!

Located next to the boom swivel bracket.
 Keep bystanders away from the machine when it is in use. Read the operator's manual before operating the machine.

Figure 3-4 Equipment and Controls

Model 503Z -- Serial Numbers up to AH02282; Model 603 -- Serial Numbers AH00578 and Before



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Tilting the Cab or Canopy

WARNING

- Always tighten cab lock-down nuts before driving or using the machine.
- Always close the cab door before tilting the cab.
- Stay clear from underneath the cab as it is tilted.
- Always secure the tilt rod in the support position when the cab is tilted.

Refer to items 1—10 in Figure 3-12 to safely complete the following procedure.

Tilting the cab or canopy up:

1. Follow “Mandatory Safety Shutdown Procedure” on page 2-2.
2. Raise the floor mat (1) on the right, front of the cab and remove cab lock-down nut (2). Remove cab lock-down nut (3) at the right rear of the cab.
3. Securely close the cab door.
4. Locate the jack handle tubes (4) from the tool kit in the engine compartment, insert them into the jack (5) and jack to the limit. The cab will be raised as far as the jack (5) will travel.
5. Pull on handle (7) until the cab is completely tilted and supported by the safety cable (8).
6. Remove the tilt rod (9) from the storage bracket (10) and slide the tilt rod (9) into the guide bracket (11) and secure with the retention pin (11) and secure with the retention pin.

Tilting the cab or canopy down:

1. Remove the tilt rod (9) from the guide bracket (11) by removing the retention pin and slide the tilt rod (10) out of the guide bracket (9) and secure with the retention pin back in the storage bracket (10).
2. Use handle (7) to slowly lower the cab back onto the jack (5).
3. Remove jack handle tubes (4) from the jack (5) and insert the opposite end of the jack handle tubes (4) onto the release pin (6). Slowly turn release pin (6) counter-clockwise until the cab is lowered.
4. Turn the release pin (6) clockwise.

5. Reinstall the cab lock-down nuts (2) and (3).
6. Place the jack handle tubes (4) back in the tool kit.

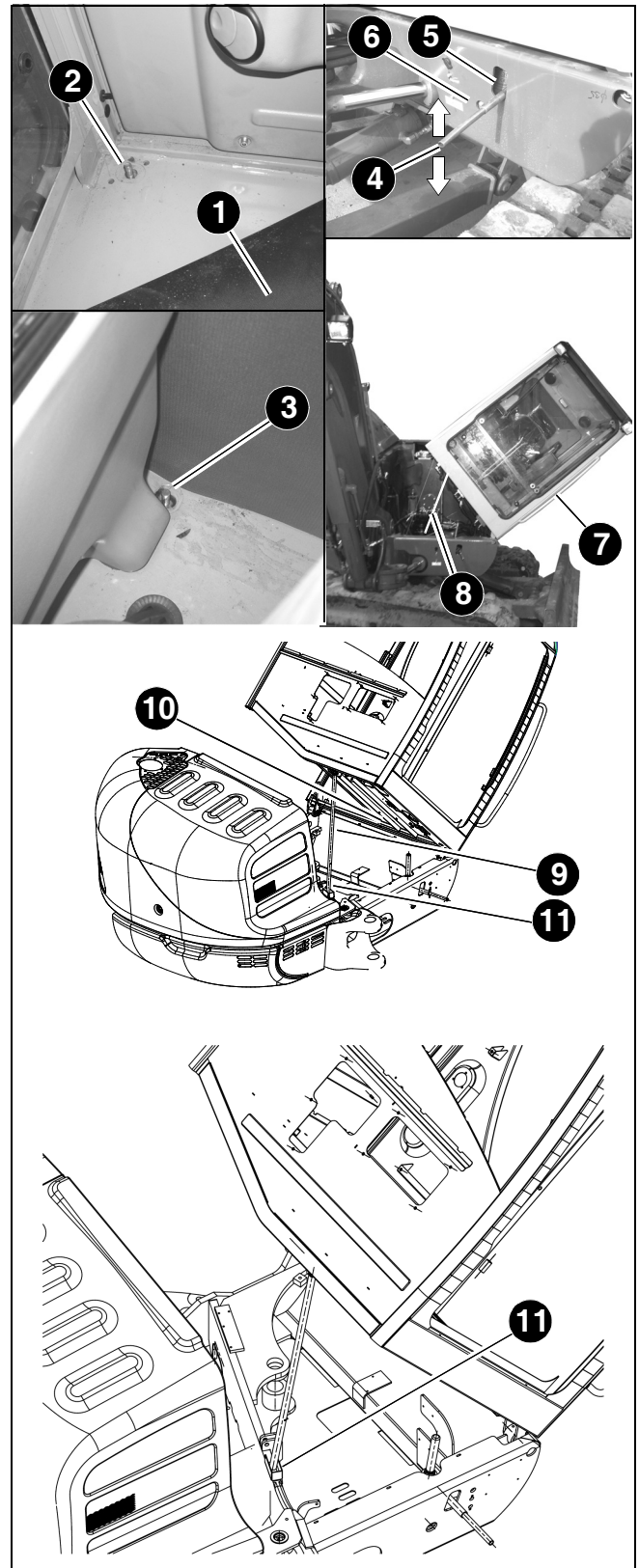


Figure 3-12 Tilting the cab or canopy

Preheated Fresh Air

Selection of “cold” or “preheated” fresh air in winter.

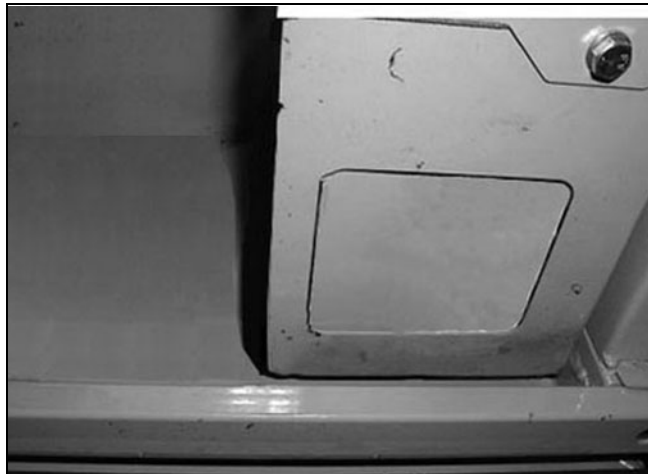


Figure 3-33 Fresh Air

A deflector plate on the heater baffle can be set to two different positions:

- Fresh air-heater takes in air from outside the cab. See Figure 3-33.
- Preheated fresh air-heater takes in air from the chassis. See Figure 3-34.



Figure 3-34 Preheated Fresh Air

Change from fresh air to preheated fresh air as follows:

- Tilt the cab. See “Tilting the cab or canopy” on page 3-15. The deflector plate is located on the heater under the cab.
- Loosen both attachment screws.
- Reposition and fit the deflector plate back on again.
- Tilt the cab back down again and secure it.

Mounting/Removing Buckets

ALWAYS wear protective goggles, helmets, gloves, steel-toed shoes, etc.

DO NOT service the bucket while the engine is running.

DO NOT stand behind the bucket when removing the pins.

DO NOT use your hands or fingers to align the bucket and dipper arm holes.

ALWAYS verify the bucket is safely locked before starting the engine and resuming operation.



WARNING

- **DO NOT** use a hammer directly on a securing pin to loosen it. The pounding may cause splintering, which may lead to serious injury.
- **The bucket can crush hands or feet. DO NOT** use your hands or feet as substitutes for the correct equipment.

Removing A Bucket

1. Lower the bucket to the ground with the flat side facing down (1, Figure 3-35).

IMPORTANT

Place the bucket against the ground with minimum pressure. More pressure increases resistance, which will make it more difficult to remove the pins.

2. Stop the engine.
3. Remove the two lynch pins (2A and 2B, Figure 3-35).

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 can cause an unstable condition, and possible tipping of the machine.

1. Raise or lower the dozer blade using the control lever/pedal located to the right of the travel levers/pedals. See Figure 3-44. 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 away 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.

Model 503Z/603 -- Serial Numbers AJ02993 and Up



Model 503Z/603 -- Serial Numbers to AH02282



Figure 3-44 Dozer Blade Control

CHAPTER 4 – MAINTENANCE

GENERAL INFORMATION

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 or 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 approved accessories or referral attachments. Manitou Americas, Inc. 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 service 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, all warranty responsibilities of the manufacturer are invalidated.

IMPORTANT

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

IMPORTANT

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

Fuel System

Filling the Fuel Tank

WARNING

Stop the engine and allow it to cool before filling the fuel tank. **NO SMOKING!** Failure to obey warnings can cause an explosion or fire.

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

To fill the tank, remove the fuel filler cap (2) located on the left rear of the unit behind the cab by rotating the lock cover (3) and inserting the ignition key into the lock and unlocking the cap. See Figure 4-4. Fill using clean diesel fuel with a cetane rating over 45. Re-install fuel cap.

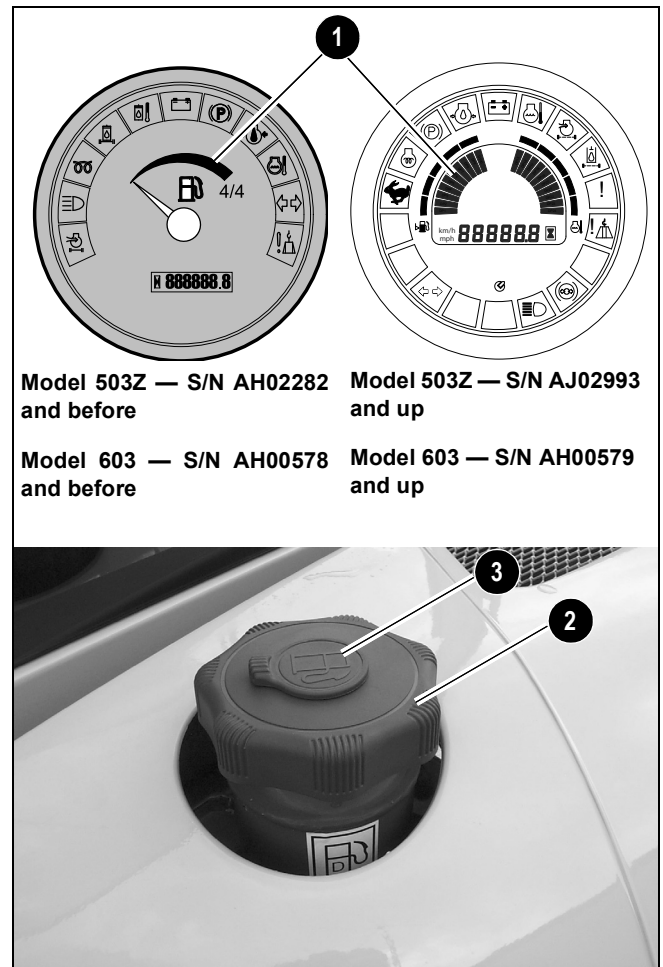


Figure 4-4 Fuel Gauge & Fuel Filler Cap

Hydraulic Hose Maintenance

WARNING

- Hydraulic hoses and connections must be inspected by a trained technician before the first use of the machine, and at least annually thereafter, for leaks and/or damage.
- Leakages and damaged pressure lines must be immediately repaired or replaced by an authorized service center.
- Never use your hands to check for suspected hydraulic leaks. Always use a piece of wood or cardboard.
- Leaks from hydraulic hoses or pressurized components can be difficult to see, but pressurized oil can have enough force to pierce the skin and cause serious injury.
- 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.
- Always relieve hydraulic system pressure before performing any maintenance on the machine. Do not tighten leaking connections when the hydraulic system is under pressure.
- Never weld or solder damaged or leaking pressure lines and/or screw connections. Always replace damaged hydraulic components.
- Hydraulic hoses must be replaced every six years from the date of manufacture, even if they do not appear damaged. The date of manufacture (month or quarter and year) is indicated on hydraulic hoses. See Figure 4-18.

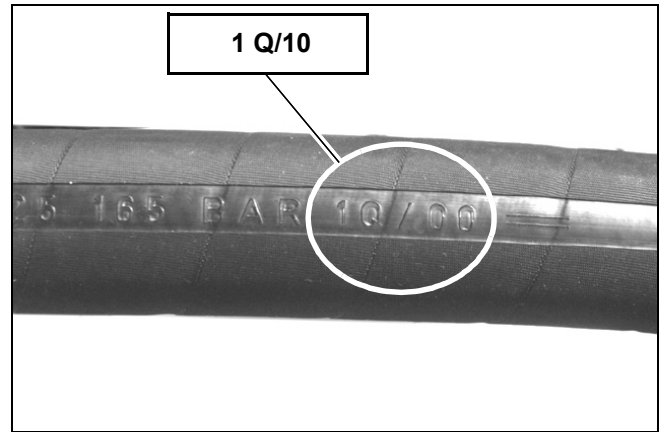


Figure 4-18 Hydraulic Hose Manufacture Date

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 engine oil; see "Checking Engine Oil Level" on page 4-9
	Oil pump not working	Replace oil pump. Contact authorized repair center
	Machine inclination too high	15° maximum inclination up and across slopes; 25° maximum inclination down slopes
	Incorrect engine oil SAE grade	Replace engine oil with proper grade; see "Fluid Capacities/Lubricants" on page 1-4
Water temperature display light comes on during operation	Coolant level too low	Add coolant; see "Checking Coolant Level" on page 4-14
	Fan blades rotating too slowly	Adjust v-belt tension; see "Checking and Adjusting V-Belt Tension" on page 4-22 or "Checking and Adjusting Air Conditioning V-Belt Tension" on page 4-22; contact authorized service center
	Air filter contaminated	Service air filter; see "Air Cleaner Service" on page 4-10
	Coolant system malfunction	Service cooling system; contact authorized service center
Battery voltage light comes on during operation	Alternator not charging properly / malfunctioning alternator	Adjust v-belt tension; see "Checking and Adjusting V-Belt Tension" on page 4-22 or "Checking and Adjusting Air Conditioning V-Belt Tension" on page 4-22; contact authorized service center
	Loose, or corroded charging circuit connections	Repair charging circuit; contact authorized service center
Fuel light comes on	Low fuel	Add fuel
Air filter light comes on	Air filter contaminated	Service air filter; see "Air Cleaner Service" on page 4-10

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

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