YANMAR
EXCAVATOR

OPERATION & MAINTENANCE MANUAL

⚠ WARNING

- **Never attempt to operate or service this Excavator until you have first read and understood all of the applicable Safety Instructions that are set forth in this Manual.**

  The failure to comply with all relevant Safety Instructions could result in bodily injury.

- **To assure that this Manual will be conveniently available to future users, always return it to its storage compartment, when it is not being used.**

LGBVIO10.0(EP)300703

MODEL ViO10 **(EP)**

S/N 20501 & Above

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6. Contents

1. Introduction 0-1
2. Safety Information 0-2
3. Product Overview 0-3
3-1. Intended uses 0-3
3-2. Break in period 0-3
4. Operation License 0-4
5. Ordering Replacement Parts and Service Calls 0-5
5-1. Location of machine serial number plate 0-5
5-2. Location of engine serial number plate 0-5
5-3. Ordering replacement parts and service calls 0-5
6. Contents 0-6

SAFETY

7. Basic Precautions 1-2
8. Operating Precautions 1-6
8-1. Precautions before starting the engine 1-6
8-2. Precautions for starting the engine, working and parking 1-8
8-3. Precautions for transportation 1-13
8-4. Precautions for the battery 1-14
8-5. Precautions for towing 1-15
8-6. Precautions for hooked bucket 1-16
9. Precautions for Servicing 1-19
9-1. Precautions before servicing 1-19
9-2. Precautions during servicing 1-21
10. Safety Messages (Warning Labels) 1-25
10-1. Location of warning labels 1-25

OPERATION

11. Identification of Important Parts 2-2
11-1. Overview of the machine 2-2
11-2. Controls and switches 2-3
12. Description of Control Devices 2-4
12-1. Monitors 2-4
12-2. Switches 2-6
12-3. Control levers and pedals 2-8
12-4. Engine hood 2-14
12-5. Storage compartment for the operation & maintenance manual 2-14
12-6. Fuse 2-15

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SAFETY

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26. Specifications and Dimensional Diagrams

■ Specifications

Items \ Type	ViO10
	Rubber crawler
	Variable track gauge
	Canopy (Option)

• Weight (in compliance with SAE standards)

Operating mass	lbs. (kg)	2503 (1135)
Machine mass (without implement)	lbs. (kg)	1852 (840)

• Working range and performance

Bucket capacity, standard	cu.ft (cu.m)	-
Bucket width, standard	in. (mm)	-
Maximum digging depth <with the blade down>	in. (mm)	76.8 (1950) <80.7 (2050)>
Maximum vertical wall digging depth	in. (mm)	65.0 (1650)
Maximum cutting height	in. (mm)	124.0 (3150)
Maximum dumping height	in. (mm)	93.3 (2370)
Maximum digging radius of the ground	in. (mm)	128.7 (3270)
Front minimum swing radius <with the boom swing right>	in. (mm)	52.4 (1330) <42.5 (1080)>
Boom swing angle : left / right	degrees	50 / 90
Maximum digging force (bucket)	lbs. (kN)	3087 (13.7)
Travel speed	MPH (km / h)	1.3 (2.1)
Swing speed	rpm	10.0
Average ground pressure, standard crawler	PSI (kPa)	3.3 (22.9)
Hydraulic pump displacement	GPM (L / min)	2.90 (11.0)×2 <Variable displacement pump>
System relief set pressure	PSI (MPa)	2986 (20.6)×2

• Engine

Type	-	Vertical four cycle water-cooled diesel engine
Model	-	3TNE68-EBVB
Rated output/revs	HP (kW) / rpm	11.5 (8.6) / 2000
Displacement	cu.in. (cu.cm)	47.7 (782)
Compression pressure	PSI (MPa)	469.3 (3.2) at 300 rpm
Nozzle injection pressure	PSI (MPa)	2844 (19.6)
Fan belt (V-belt) size	-	HM34
Generator capacity	V / A	12 / 9

• Battery type and capacity.....55B24L / 12V, 36Ah (5 hours rated capacity)

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17-4. Troubleshooting

17-4-1. Engine and electrical equipment

- Contact your dealer for assistance, regarding the measures indicated in parentheses in the list below.
- If any abnormalities or troubles are encountered that are not included among those shown below, ask your dealer for assistance.

Trouble		Cause	Measure
Engine	Steam comes out of top of radiator.	• Shortage of cooling water	• Check cooling water level. Refill, if necessary. (Check cooling water for leak from water port.)
	Water temp. alarm lamp lights.	• Loose fan belt	• Adjust belt tension.
		• Buildup of dust and water scale on cooling system	• Replace cooling water. Clean inside of cooling system.
		• Defective thermostat	• Replace thermostat.
		• Clogged radiator fin or inclined fin	• Clean or repair fin.
		• Defective electrical system	• Check or replace electrical system.
	Turning on starter motor does not start engine.	• Shortage of fuel	• Refill fuel tank.
		• Air mixed in fuel system	• Repair air leak. • Release air from fuel system.
		• Defective fuel injection pump or deteriorated nozzle performance	(• Replace pump or nozzle.)
		• Improper compression	(• Check and repair.)
		• Blown out slow-blow fuse	• Replace slow-blow fuse.
		• Damaged starter switch key stop solenoid. Link disengagement	(• Check and repair.)
	Dark fumes come out of machine.	• Clogged air cleaner element	• Clean or repair element.
		• Deteriorated nozzle performance	(• Check and repair.)
		• Improper compression	(• Check and repair.)
	Fume color is white or bluish white.	• Too much oil in oil pan	• Drain oil from oil pan to specified level.
		• Improper fuel	• Replace fuel with recommended one.
		• Worn cylinder or piston ring	(• Repair.)
Electrical equipment	Turning starter switch to "START" dose not start starter motor.	• Defective wiring system	• Check and repair wiring system.
		• Defective starter switch	• Replace starter switch.
		• Insufficiently charged battery	• Recharge battery.
		• Defective starter motor	(• Check and repair.)
	Maximum engine speed does not provide enough brightness of lamp.	• Defective wiring system	• Check terminals for looseness and disconnection. Repair terminal, if necessary.
		• Defective generator or regulator	(• Check and repair.)
	During engine operation, lamp is extremely bright, and frequently burns out.	• Defective regulator	(• Repair or replace regulator.)
	Electrolyte leaks from battery.	• Defective battery	(• Repair or replace battery.)
		• Defective regulator	(• Repair or replace regulator.)
	Speed of starter motor is too low.	• Defective wiring system	(• Check and repair wiring system.)
		• Insufficiently charged battery	• Recharge battery.
		• Defective starter motor	(• Check and repair.)

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24. Maintenance Table

Daily and periodic inspection are important to keep the machine in its best condition. The following is a summary of inspection and servicing requirements by inspection interval. Periodic inspection intervals vary depending on the use, loads, fuels and lube oils used and handling conditions, and are hard to establish definitively. The following should be treated only as a general standard.
When the time for an inspection approaches, study the relevant pages in the Operation & Maintenance Manual. Keep a record of daily operation and the results of maintenance work.

24-1. Table of service time intervals

Check and service points	Page
■ **At first 50 hours (only once after the new machine has started to be used)**	
Replace the engine oil and the engine oil filter	3-22
■ **At first 100 hours (only once after the new machine has started to be used)**	
Replacing the travel reduction gear oil	3-22
■ **At first 250 hours (only once after the new machine has started to be used)**	
Replacing the return filter in the hydraulic oil tank	3-22
Cleaning the suction filter in the hydraulic oil tank	3-22
■ **Nonperiodic services**	
Checking the rubber crawlers	3-23
Checking and adjusting the rubber crawler tension	3-25
Replacing the rubber crawler	3-28
Replacing the bucket teeth	3-31
Cleaning the inside of the cooling system	3-33
■ **Checking before start-up**	
Checking and replenishing the cooling water	3-37
Checking and replenishing the engine oil	3-38
Checking and replenishing the fuel in the fuel tank	3-39
Checking and replenishing the hydraulic oil in the hydraulic oil tank	3-40
Checking and adjusting the fan belt tension	3-41
Checking and replenishing the battery electrolyte	3-42
Greasing	3-43
Checking the electrical equipment	3-44

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22-2. Torque table

Bolts or nuts in the metric system should be tightened at the torque described below unless specified otherwise.

Item		Thread size × pitch	Tightening torque ft•lbf (N•m)	Remarks
Hexagon bolt (7T) Nut	Coarse threads	M6 × 1	7.2 to 8.7 (9.8 to 11.8)	1) Apply 80% tightening torque when tightened to aluminum. 2) Apply 60% tightening torque for 4T bolt and lock nut. 3) Use fine threads for engine only.
		M8 × 1.25	16.7 to 20.9 (22.6 to 28.4)	
		M10 × 1.5	32.5 to 43.4 (44.1 to 58.8)	
		M12 × 1.75	58 to 72.4 (78.5 to 98.1)	
		M14 × 2	86.8 to 108.5 (117.7 to 147.1)	
		M16 × 2	123 to 151.9 (166.7 to 206.0)	
		M18 × 2.5	173.6 to 209.8 (235.4 to 284.4)	
		M20 × 2.5	238.7 to 296.6 (323.6 to 402.1)	
		M24 × 3	354.7 to 441.6 (480.5 to 598.2)	
	Fine threads	M14 × 1.5	94 to 108.5 (127.5 to 147.1)	
		M16 × 1.5	155.5 to 177.2 (210.8 to 240.3)	
PF plug PT plug		1/8	7.2 (9.8)	
		1/4	14.5 (19.6)	
		3/8	21.7 (29.4)	
		1/2	43.4 (58.8)	
Pipe joint bolt		M8	9.4 to 12.3 (12.7 to 16.7)	
		M12	18.1 to 25.3 (24.5 to 34.3)	
		M14	28.9 to 36.1 (39.2 to 49)	
		M16	36.1 to 43.4 (49.0 to 58.8)	

IMPORTANT

If a part to be tightened is made of resin like a panel board, excessive tightening torque may damage the tightened part. Be careful when tightening.

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21. Fueling, Oiling and Greasing Based on Temperature Range

21-1. Fuel and oil

Select fuel and oil based on the air temperature range.
The prescribed amount of oil means the total amount of oil included in the piping and equipment. The amount of oil to be changed means the amount of oil replaced in checking and servicing.
If you start the engine at air temperatures lower than 32°F (0°C), use SAE10W, SAE10W-30, or SAE15W-40 even if the temperature in the daytime rises to 50°F (10°C) or so.

21-2. Cooling water

Because a YANMAR genuine long-life coolant (LLC) is added to the cooling water, you need not change it unless the temperature falls bellow -31°F (-35°C).
If the temperature falls below -31°F (-35°C), refer to Section "25-2. Nonperiodic services" to control the density of the cooling water.

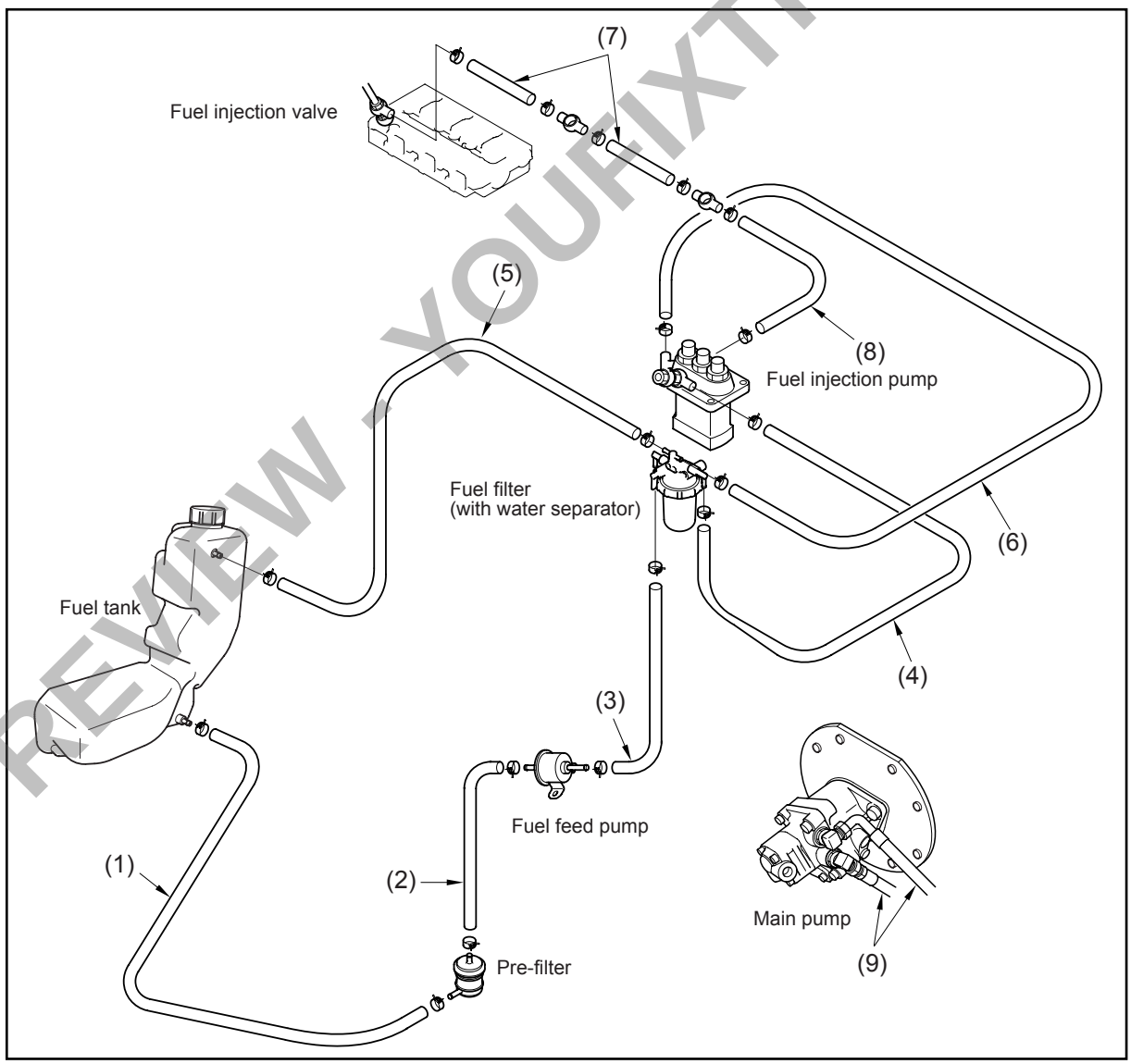
Part be refilled	Oil type	Recommendations based on temperature ranges (°F) -4 14 32 50 68 86 / (°C) (-20) (-10) (0) (10) (20) (30)	Prescribed amount of oil	Amount of oil to be changed
Engine oil pan	Engine oil	SAE 10WCD SAE 10W-30CD SAE 15W-40CD	3.2 Qts. (3.0 L)	3.2 Qts. (3.0 L)
Travel reduction gear	Gear oil	SAE 30CD	0.35 Qts. (0.33 L) (For right and left each)	0.35 Qts. (0.33 L) (For right and left each)
Hydraulic oil system	Hydraulic oil	ISO VG46	In the tank 2.1 Gals. (7.8 L) Other parts 1.8 Gals. (6.9 L)	2.1 Gals. (7.8 L)
Fuel tank	Light oil	No.2-D No.3-D No.3-D (S)	3.2 Gals. (12.0 L)	–
Cooling system	Water	YANMAR genuine long-life coolant (LLC) added	Radiator 2.2 Qts. (2.1 L) Subtank 0.42 Qts. (0.4 L)	–

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■ List of essential parts

No.	Essential parts to be replaced periodically	Q'ty	Replacement time intervals
1	Fuel hose (fuel tank to pre-filter)	1	Every 2 years or every 4000 service hours, whichever first occurs.
2	Fuel hose (pre-filter to feed pump)	1	
3	Fuel hose (feed pump to fuel filter)	1	
4	Fuel hose (fuel filter to fuel injection pump)	1	
5	Fuel hose (fuel filter to fuel tank)	1	
6	Fuel hose (fuel injection pump to fuel filter)	1	
7	Fuel hose (fuel injection valve to fuel injection valve)	2	
8	Fuel hose (fuel injection valve to fuel injection pump)	1	
9	Main pump outlet hose (P1, P2, to C/V)	2	



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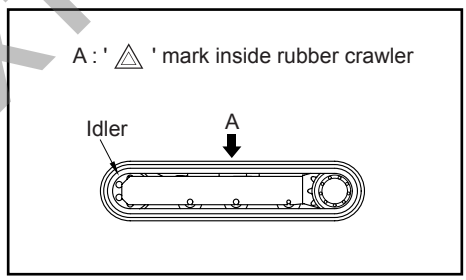
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25-2-2. Checking and adjusting the rubber crawler tension

⚠ WARNING

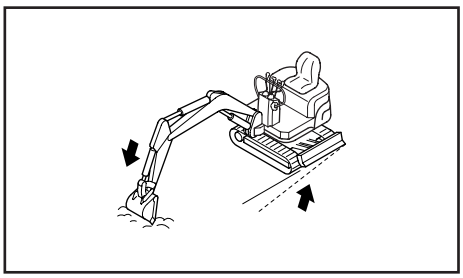
- **When adjusting the rubber crawler tension while raising the machine, do not support the machine with the implement only.**
  The control levers could move or the hydraulic oil could flow out accidentally so that the machine would fall.
- **When raising the machine, support it with safety blocks of sufficient strength.**
  When the machine is being checked or adjusted by two persons, one must operate the machine in response to signs from the other.

How a rubber crawler wears out depends on the working conditions and the nature of the ground. Be sure to check the rubber crawlers for wear and tension from time to time. When a new rubber crawler is mounted, perform the first check after 30 hours operation.



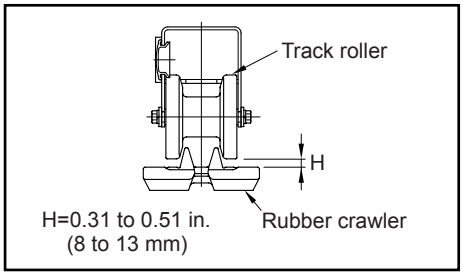
■ **Checking the rubber crawler tension**

1) Move the machine so that the joint (△ mark) on the inside surface of the rubber crawler is positioned at the upper center of the crawler frame.



2) Raise the machine with the implement and the safety blocks.
   To do this, operate the control levers slowly.

3) The tension is proper if the clearance (H in the figure at the right) between the outside rolling surface of the second track roller from the idler side and the inside surface of the rubber crawler is within the following range :
   • H=0.31 to 0.51 in. (8 to 13 mm)

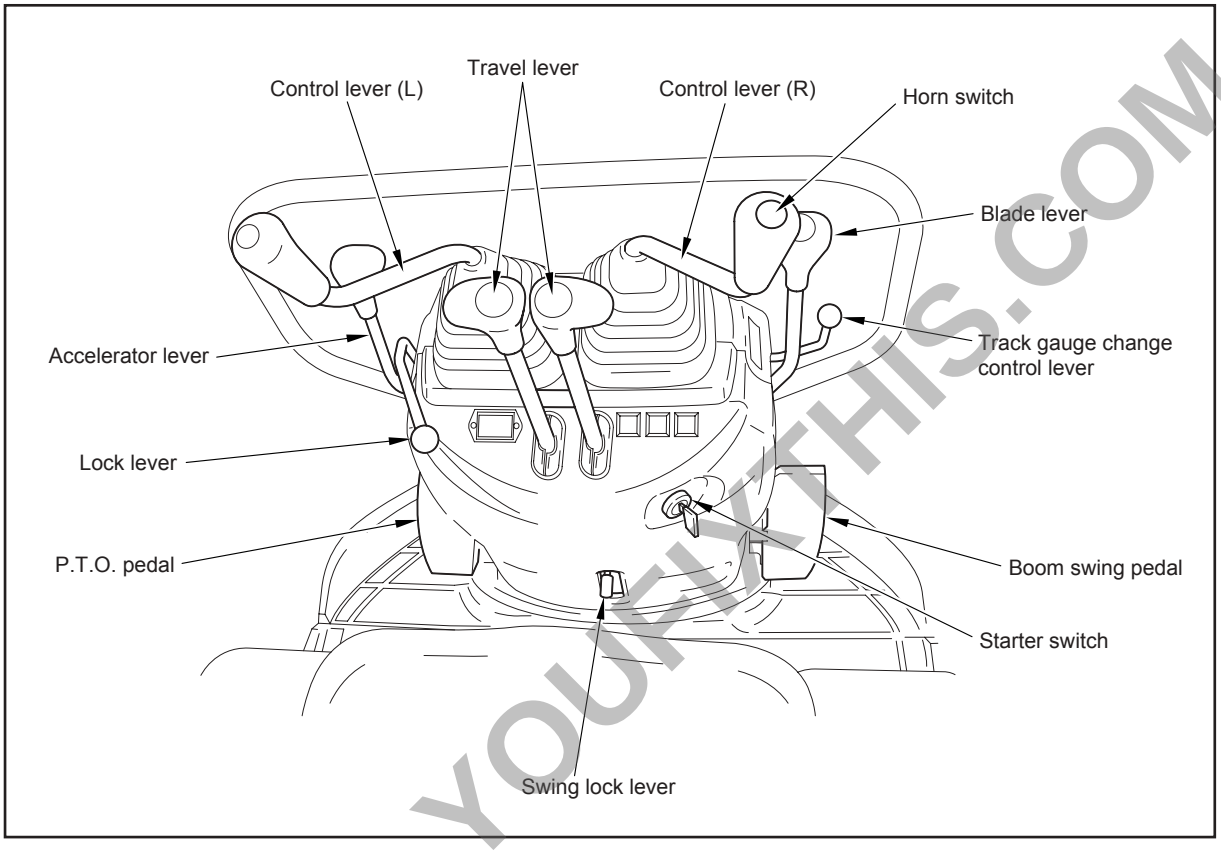


Working with the rubber crawler too loose will cause the rubber crawler to come off or the core metal to wear out earlier.

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11-2. Controls and switches



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13-14. Operations using the bucket

You can greatly widen the range of work described here by using optional attachments.

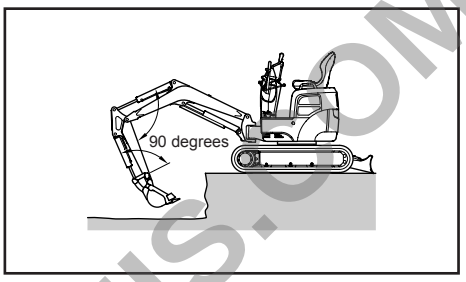
13-14-1. Backhoe operation

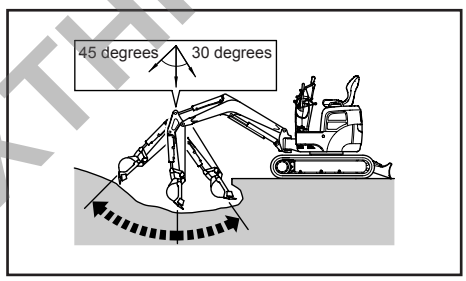
Backhoe operation is suitable for digging the ground below the machine.

Suppose that the machine is operating as illustrated in the figure at the right : a maximum digging force of each cylinder can be obtained when the angle between the bucket cylinder and the bucket arm as well as between the arm cylinder and the arm is maintained at 90 degrees.

When digging, make good use of this angle to increase the operating efficiency.

To excavate the ground efficiently by manipulating the arm, the arm needs to be operated within a range of angles between 45 degrees forward and 30 degrees backwards, as illustrated in the figure at the right. Though the range differs according to the depth of the work, do not move the implement to the cylinder stroke end.

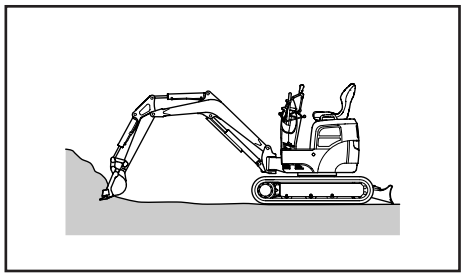




13-14-2. Shoveling

Shoveling is suitable for excavating ground that is higher than the machine bottom.

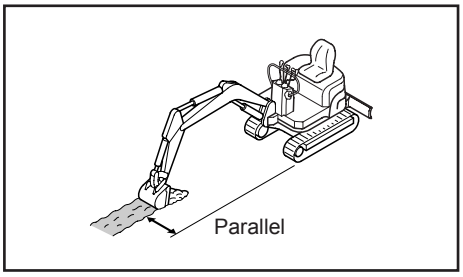
Install the bucket in the reverse position before operating. For the procedure for installing the bucket in the reverse position, Refer to Section "13-16. Reversing the bucket".



13-14-3. Ditching

To increase work efficiency, install a suitable bucket for ditching and position the crawlers in parallel with the ditch to be made.

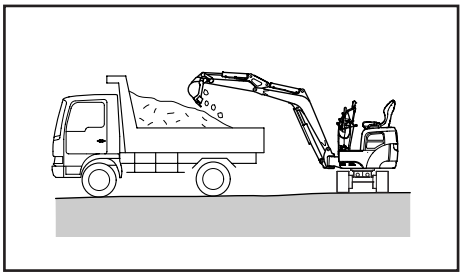
To make a wide ditch, first dig the two sides, and then dig the center.



13-14-4. Loading

To increase work efficiency, locate the dump truck at a position where the swing angle of the machine will be minimized and the operator can clearly view the dump truck.

Load earth from the rear of the dump truck, because it can be loaded more easily and in larger amounts than from the side.



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