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.**

MODEL ViO15-2

S/N 25501 & Above

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7. Basic Precautions

⚠ WARNING **These instructions should be strictly followed for the safety of you, others and your machine.**

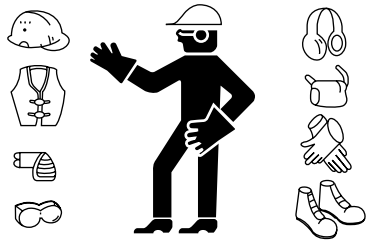
Follow safety rules at your workplace

- The operation and servicing of this machine is restricted to qualified persons.
- When operating or servicing the machine, follow all the safety rules, precautions and procedures.
- Any work performed by a team or with a signal person should be conducted in accordance with signals agreed on beforehand.

Install safety devices

- Make sure that all guards and covers are installed in their correct position. If any of them are damaged, repair them immediately.
- The proper use of all safety devices, such as lock levers, should be well understood by the machine operator.
- Never remove the safety devices. Always make sure that they operate properly.
  For lock levers, refer to Section "12-3. Control levers and pedals".
- Incorrect operation of the safety devices could cause serious bodily injury.

Wear proper clothing and safety items



- Do not wear loose clothing or jewelry that can be caught on the control levers and other machine parts. Also avoid wearing working clothes stained with oil as they can ignite.
- Be sure to wear a helmet, safety goggles, safety shoes, a mask, gloves and other protective items, as appropriate.
  Take particular precautions when generating metal debris, when striking metal objects with a hammer or when cleaning components with compressed air.
  Also make sure there are no persons near the machine.

For driving the pins, refer to Section "13-15. Replacing the bucket".
For cleaning the fuel, oil and air filter elements, refer to Section "25-2. Nonperiodic services".

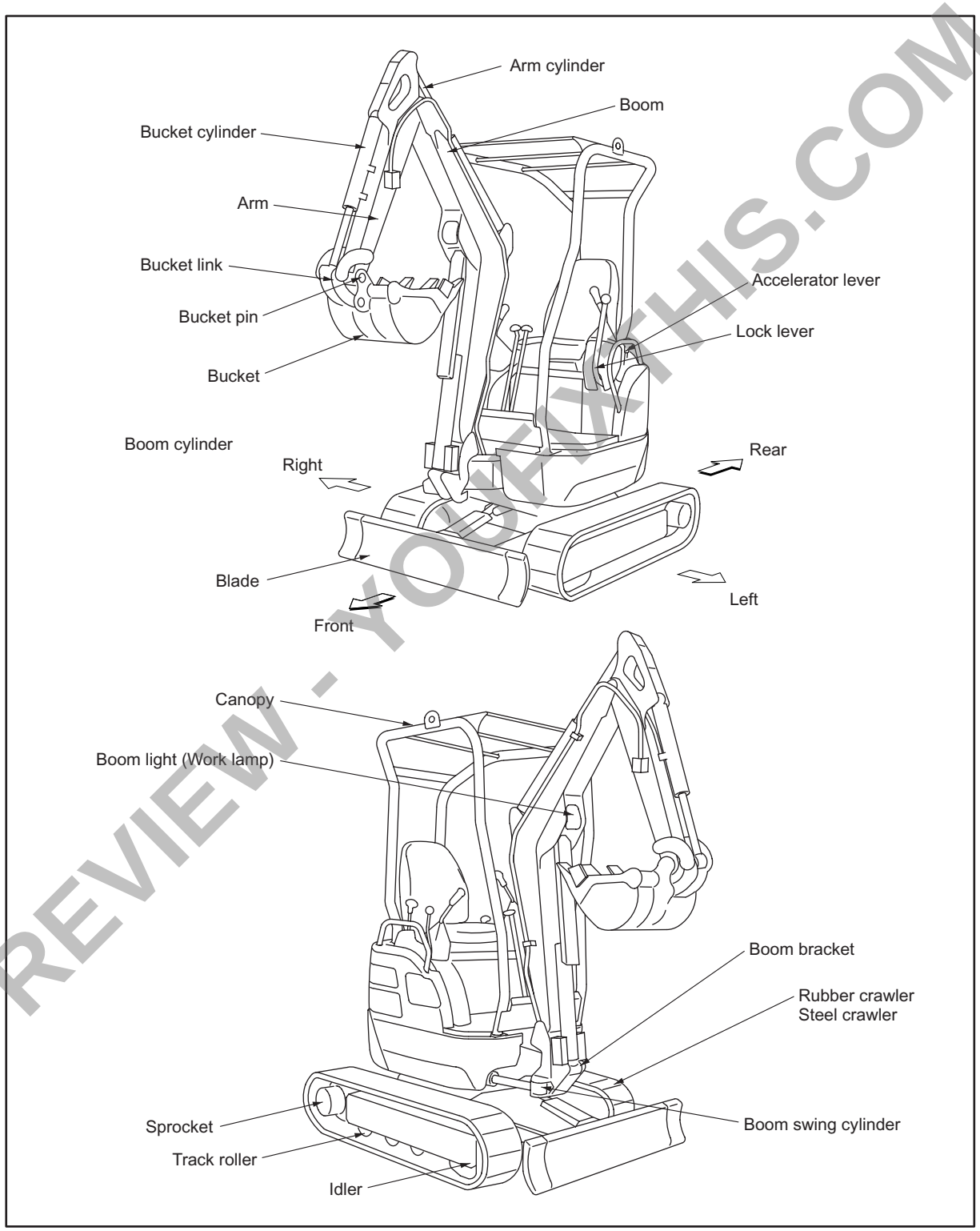
Alcohol

- Never operate the machine after consuming alcoholic beverages, or while you are under the influence of alcohol or if you feel ill or unwell, as that could result in accidental bodily injury to yourself or others.

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11. Identification of Important Parts

11-1. Overview of the machine



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20. Consumables

Replace consumable parts such as filter elements and bucket teeth periodically or before they reach their wear limit.
Periodic replacement prevents malfunction of the machine.
When you replace a part, be sure to use a Yanmar genuine part.
When ordering consumables, let us know the part numbers given in the parts catalog.

List of consumables
The parts in ( ) represent those which must be replaced at the same time.

Item	Part number	Name	Q'ty	Replacing time interval
Engine oil filter	119305-35150	Oil filter	1	Every 200 service hours (At first 50 service hours)
Hydraulic oil tank return filter	172448-73780	Return filter	1	Every 500 service hours (At first 250 service hours)
Fuel filter	124550-55700 (24311-240100)	Fuel filter element (O-ring)	1 1	Every 400 service hours
Air cleaner	119655-12560	Cleaner element	1	Every 400 service hours
Bucket	172448-82570 (172448-82580) (172448-82590)	Point teeth (Lock pin) (Rubber pin)	3 (3) (3)	-

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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 temperature 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 fuse	• Replace 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 up 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 lamps.	• 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	(• Replace regulator.)
	Electrolyte leaks from battery.	• Defective battery	(• Replace battery.)
	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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26. Specifications and Dimensional Diagrams

■ Specifications

Items \ Type	ViO15-2
	Rubber crawler
	Canopy

• Weight (in compliance with SAE standards)

Operating mass (without operator)	lbs. (kg)	3704 (1680)
Machine mass (without implement)	lbs. (kg)	2800 (1270)

• Working range and performance

Bucket capacity, standard	cu.ft (cu.m)	1.77 (0.050)
Bucket width, standard	in. (mm)	17.7 (450)
Maximum digging depth <with the blade down>	in. (mm)	82.7 (2100) <87.4 (2220)>
Maximum vertical wall digging depth	in. (mm)	68.9 (1750)
Maximum cutting height	in. (mm)	142.5 (3620)
Maximum dumping height	in. (mm)	100.8 (2560)
Maximum digging radius of the ground	in. (mm)	146.5 (3720)
Front minimum swing radius <with the boom swing right>	in. (mm)	59.1 (1500) <49.2 (1250)>
Boom swing angle : left / right	degrees	42 / 65
Maximum digging force (bucket)	lbs. (kN)	3087 (13.7)
Travel speed : high / low	MPH (km / h)	1.3 (2.1) / 2.7 (4.3)
Swing speed	rpm	8.5
Average ground pressure, standard crawler	PSI (kPa)	4.0 (27.3)
Hydraulic pump displacement	GPM (L / min)	2.38 (9)×2 <Variable displacement pump> 1.19 (4.5)×1 <Gear pump>
System relief set pressure	PSI (MPa)	2986 (20.6)×2, 355.5 (2.5)×1

• Engine

Type	-	Vertical three-cylinder water-cooled diesel engine
Model	-	3TNE68-EBVA
Rated output/revs	HP (kW) / rpm	11.4 (8.5) / 2000
Displacement	cu.in. (cu.cm)	47.8 (784)
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 / 20

• Battery type and capacity.....SY110-S6 / 12V, 36Ah (5 hours rated capacity)

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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 90 (GL-4)	0.37 Qts. (0.35 L) (For right and left each)	0.37 Qts. (0.35 L) (For right and left each)
Hydraulic oil system	Hydraulic oil	ISO VG46	In the tank 3.6 Gals. (13.8 L) Other parts 1.6 Gals. (6.2 L)	3.6 Gals. (13.8 L)
Fuel tank	Light oil	No.2-D No.3-D No.3-D (S)	5.3 Gals. (20.0 L)	–
Cooling system	Water	YANMAR genuine long-life coolant (LLC) added	Radiator 2.3 Qts. (2.2 L) Subtank 0.42 Qts. (0.4 L)	–

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■ List of periodic inspection and servicing

◇ : Check ○ : Supply ● : Replace □ : Adjust (clean) ■ : Oil & grease

Check & service items			Daily	Every 50	Every 100	Every 250	Every 500	Every 1000 hrs
General	Check falling off, breakage of parts		◇					
	Check loosened bolts & nuts, retighten		◇					
	Check engine condition		◇					
	Clean		□					
Lube oil	*Swing gear case oil	Check, resupply				◇/○		
		Replace			●1st time			●
	Travel reduction gear oil	Check, resupply				◇/○		
		Replace			●1st time			●
	*Transmission oil	Check, resupply	◇/○					
		Replace			●1st time			●
	*Differential gear oil	Check, resupply			◇/○			
		Replace			●1st time			●
Hydraulic system	Hydraulic oil	Check, resupply	◇/○					
		Replace						●
	Clean suction filter					□1st time		□
	Replace return filter					● 1st time	●	
	Check for abnormality of hydraulic pump		◇					
Grease	Check grease-up positions, grease		■					
	Greasing the swing gears and the swing bearings			■				
	Greasing the track gauge change cylinder and the link fulcrum			■				
Undercarriage	Check, adjust track tension		◇/□					
	*Check air pressure, wear, flaw in tyres		◇					
Steering equipment	*Check performance, play of steering lever		◇					
	Check performance, play of travel lever		◇					
	*Check performance of speed change lever		◇					
	*Check performance of forward/reverse pedal		◇					
	*Check performance, play of steering wheel		◇					
	*Brake pedal	Stroke	◇					
		Performance	◇					
	*Parking brake	Stroke	◇					
		Performance	◇					
	Check performance of accel. lever		◇					
Electric equipment	Check front & work lights, horn		◇					
	Check hourmeter function		◇					
	Check function of change, oil and pilot lamps		◇					
	Check wire breakage, short-circuits, loosened terminals retighten		◇					
	Check, resupply battery fluid		◇/○					
	Check specific gravity of electrolyte						□As required	
	Check function of OK monitor		◇					

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25-6. Maintenance every 200 service hours

Also perform the maintenance every 50 and 100 service hours.

25-6-1. Replacing the engine oil and the engine oil filter

⚠ WARNING

- **Do not replace the oil immediately after the engine stops to prevent bodily injury, because all the components are hot.**
- **Do not allow hot oil or components to contact your skin.**
- **Replace the oil and the filter element after the oil and the components have cooled sufficiently.**

■ Things to prepare

- Replacement new oil : 3.2 Qts. (3.0 L)
- Container for waste oil : Capacity of 3.2 Qts. (3.0 L) or more
- Filter wrench for engine oil filter cartridge

1) Swing the upperstructure so that the drain plug (P) on the bottom of the engine is positioned in the middle of the right and left crawlers.

2) Remove the cover under the machine body and place the container for waste oil under the drain plug (P).

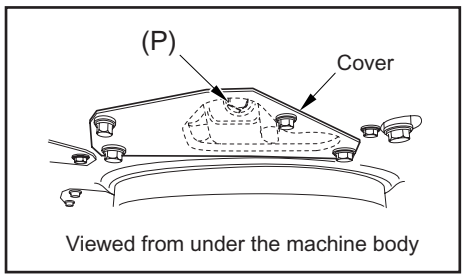
3) Slowly remove the drain plug (P) so that the oil should not splash on you, and drain the waste oil.

4) Check the waste oil, and contact your dealer if any metallic particles or foreign objects are mixed in it.

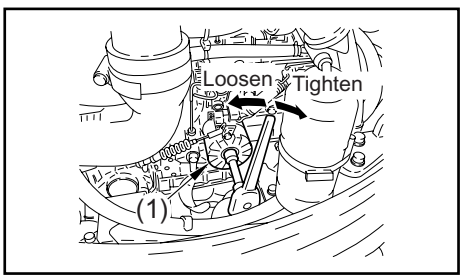
5) Reinstall the drain plug (P).

6) Turn the oil filter cartridge (1) counterclockwise with the filter wrench to remove it.
After removing the oil filter, wait 10 to 15 minutes before replacing it.

7) Wipe the dirt and oil from the filter mount and apply engine oil (or apply grease lightly) to the seal surface of a new oil filter cartridge.



Viewed from under the machine body



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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)	
	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)	
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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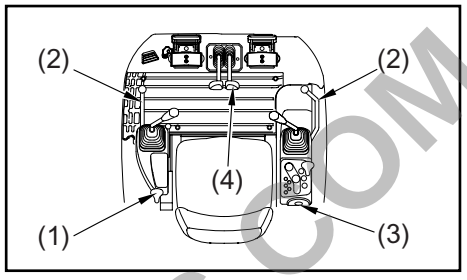
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13-4. Traveling

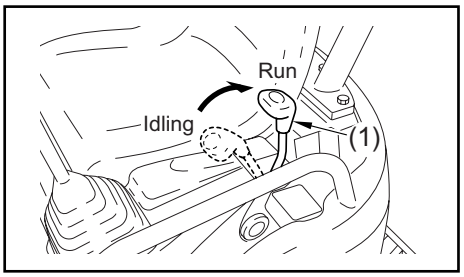
13-4-1. Traveling forward

⚠ WARNING

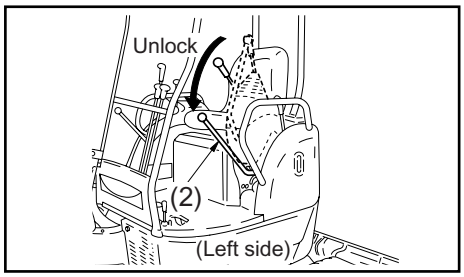
- **Always check the position of the blade before operating the travel levers.**
  When the blade is in the rear, the travel levers operate in reverse of normal operation.
- **A signal person should be in attendance to give signals at sites which are dangerous or not clearly in view of the operator.**
- **Clear all people from the working area.**
- **Sound the horn before beginning travel, to alert the people near the machine.**
- **Clear obstacles from the path of the machine.**
- **Do not operate the travel levers rapidly while the engine is running at high speed. Otherwise, the machine may move unexpectedly, causing a serious accident.**



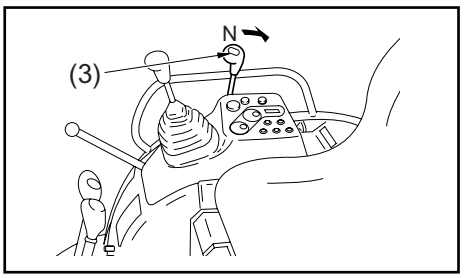
1) Pull the accelerator lever (1) back to the "RUN" position to increase the engine speed.



2) Unlock the lock levers (2), and retract the implement to raise it 16 to 20 in. (40 to 50 cm) above the ground.



3) Pull back the blade lever (3) to raise the blade.



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