Safe Operation Practices • Set-Up • Operation • Maintenance • Service • Troubleshooting • Warranty

TROY-BILT®

OPERATOR'S MANUAL

Rear Tine Tiller — 650 Series

⚠ WARNING

READ AND FOLLOW ALL SAFETY RULES AND INSTRUCTIONS IN THIS MANUAL BEFORE ATTEMPTING TO OPERATE THIS MACHINE.
FAILURE TO COMPLY WITH THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

TROY-BILT LLC, P.O. BOX 361131 CLEVELAND, OHIO 44136-0019

Printed In USA

Form No. 769-03728
(November 21, 2007)

To The Owner

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Thank You

Thank you for purchasing a Garden Tiller manufactured by Troy-Bilt LLC. It was carefully engineered to provide excellent performance when properly operated and maintained.

Please read this entire manual prior to operating the equipment. It instructs you how to safely and easily set up, operate and maintain your machine. Please be sure that you, and any other persons who will operate the machine, carefully follow the recommended safety practices at all times. Failure to do so could result in personal injury or property damage.

All information in this manual is relative to the most recent product information available at the time of printing. Review this manual frequently to familiarize yourself with the machine, its features and operation. Please be aware that this Operator's Manual may cover a range of product specifications for various models. Characteristics and features discussed and/or illustrated in this manual may not be applicable to all models. Troy-Bilt LLC reserves the right to change product specifications, designs and equipment without notice and without incurring obligation.

This product has met the rigid safety standards of the Outdoor Power Equipment Institute and an independent testing laboratory. If you have any problems or questions concerning the machine, phone a authorized Troy-Bilt service dealer or contact us directly. Troy-Bilt's Customer Support telephone numbers, website address and mailing address can be found on this page. We want to ensure your complete satisfaction at all times.

Throughout this manual, all references to *right* and *left* side of the machine are observed from the operating position

The engine manufacturer is responsible for all engine-related issues with regards to performance, power-rating, specifications, warranty and service. Please refer to the engine manufacturer's Owner's/Operator's Manual, packed separately with your machine, for more information.

Table of Contents

Record Product Information

Before setting up and operating your new equipment, please locate the model plate on the equipment and record the information in the provided area to the right. You can locate the model plate by standing at the operator's position and looking down at the rear of the tiller. This information will be necessary, should you seek technical support via our web site, Customer Support Department, or with a local authorized service dealer.

MODEL NUMBER

SERIAL NUMBER

Customer Support

Please do NOT return the machine to the retailer or dealer without first contacting our Customer Support Department.

If you have difficulty assembling this product or have any questions regarding the controls, operation, or maintenance of this machine, you can seek help from the experts. Choose from the options below:

◊ Visit us on the web at www.troybilt.com

◊ Call a Customer Support Representative at (800) 828-5500 or (330) 558-7220

◊ Write us at Troy-Bilt LLC • P.O. Box 361131 • Cleveland, OH • 44136-0019

Important Safe Operation Practices

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WARNING! This symbol points out important safety instructions which, if not followed, could endanger the personal safety and/or property of yourself and others. Read and follow all instructions in this manual before attempting to operate this machine. Failure to comply with these instructions may result in personal injury.
When you see this symbol. **HEED ITS WARNING!**

CALIFORNIA PROPOSITION 65

WARNING! Engine Exhaust, some of its constituents, and certain vehicle components contain or emit chemicals known to State of California to cause cancer and birth defects or other reproductive harm.

WARNING! Battery posts, terminals, and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. *Wash hands after handling*

DANGER! This machine was built to be operated according to the safe operation practices in this manual. As with any type of power equipment, carelessness or error on the part of the operator can result in serious injury. This machine is capable of amputating fingers, hands, toes and feet. Failure to observe the following safety instructions could result in serious injury or death.

Training

1. Read, understand, and follow all instructions on the machine and in the manual(s) before attempting to assemble and operate. Keep this manual in a safe place for future and regular reference and for ordering replacement parts.
2. Be familiar with all controls and their proper operation. Know how to stop the machine and disengage them quickly.
3. Never allow children under 14 years of age to operate this machine. Children 14 and over should read and understand the instructions and safe operation practices in this manual and on the machine and be trained and supervised by an adult.
4. Never allow adults to operate this machine without proper instruction.
5. Keep the area of operation clear of all persons, particularly small children and pets. Stop machine if anyone enters the area.

Preparation

1. Thoroughly inspect the area where the equipment is to be used. Remove all stones, sticks, wire, and other foreign objects which could be tripped over and cause personal injury.
2. Wear sturdy, rough-soled work shoes and close fitting slacks and shirt. Loose fitting clothes or jewelry can be caught in moving parts. Never operate this machine in bare feet or sandals.
3. Disengage clutch levers and shift (if provided) into neutral ("N") before starting the engine.
4. Never leave this machine unattended with the engine running.
5. Never attempt to make any adjustments while engine is running, except where specifically recommended in the operator's manual.

Safe Handling of Gasoline:

To avoid personal injury or property damage use extreme care in handling gasoline. Gasoline is extremely flammable and the vapors are explosive. Serious personal injury can occur when gasoline is spilled on yourself or your clothes which can ignite. Wash your skin and change clothes immediately.

a. Use only an approved gasoline container.
b. Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground away from your vehicle before filling.

c. When practical, remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.

d. Keep the nozzle in contact with the rim of the fuel tank or container opening at all times until fueling is complete. Do not use a nozzle lock-open device.

e. Extinguish all cigarettes, cigars, pipes and other sources of ignition.

f. Never fuel machine indoors.

g. Never remove gas cap or add fuel while the engine is hot or running. Allow engine to cool at least two minutes before refueling.

h. Never over fill fuel tank. Fill tank to no more than ½ inch below bottom of filler neck to allow space for fuel expansion.

i. Replace gasoline cap and tighten securely.

j. If gasoline is spilled, wipe it off the engine and equipment. Move unit to another area. Wait 5 minutes before starting the engine.

k. To reduce fire hazards, keep machine free of grass, leaves, or other debris build-up. Clean up oil or fuel spillage and remove any fuel soaked debris.

l. Never store the machine or fuel container inside where there is an open flame, spark or pilot light as on a water heater, space heater, furnace, clothes dryer or other gas appliances.

Operation

1. Do not put hands or feet near rotating parts. Contact with the rotating parts can amputate hands and feet.
2. Do not operate machine while under the influence of alcohol or drugs.
3. Never operate this machine without good visibility or light. Always be sure of your footing and keep a firm hold on the handles.
4. Keep bystanders away from the machine while it is in operation. Stop the machine if anyone enters the area.
5. Be careful when tilling in hard ground. The tines may catch in the ground and propel the tiller forward. If this occurs, let go of the handle bars and do not restrain the machine.
6. Exercise extreme caution when operating on or crossing gravel surfaces. Stay alert for hidden hazards or traffic. Do not carry passengers.
7. Never operate the machine at high transport speeds on hard or slippery surfaces.
8. Exercise caution to avoid slipping or falling.
9. Look down and behind and use care when in reverse or pulling machine towards you.
10. Start the engine according to the instructions found in this manual and keep feet well away from the tines at all times.
11. After striking a foreign object, stop the engine, disconnect the spark plug wire and ground against the engine. Thoroughly inspect the machine for any damage. Repair the damage before starting and operating.
12. Disengage all clutch levers (if fitted) and stop engine before you leave the operating position (behind the handles). Wait until the tines come to a complete stop before unclogging the tines, making any adjustments, or inspections.
13. Never run an engine indoors or in a poorly ventilated area. Engine exhaust contains carbon monoxide, an odorless and deadly gas.
14. Muffler and engine become hot and can cause a burn. Do not touch.
15. Use caution when tilling near fences, buildings and underground utilities. Rotating tines can cause property damage or personal injury.
16. Do not overload machine capacity by attempting to till soil too deep at too fast of a rate.
17. If the machine should start making an unusual noise or vibration, stop the engine, disconnect the spark plug wire and ground it against the engine. Inspect thoroughly for damage. Repair any damage before starting and operating.
18. Keep all shields, guards, and safety devices in place and operating properly.
19. Never pick up or carry machine while the engine is running.
20. Use only attachments and accessories approved by the manufacturer. Failure to do so can result in personal injury.
21. If situations occur which are not covered in this manual, use care and good judgement. Contact Customer Support for assistance and the name of you nearest servicing dealer..

Maintenance & Storage

1. Keep machine, attachments and accessories in safe working order.
2. Allow a machine to cool at least five minutes before storing. Never tamper with safety devices. Check their proper operation regularly.
3. Check bolts and screws for proper tightness at frequent intervals to keep the machine in safe working condition. Also, visually inspect machine for any damage.
4. Before cleaning, repairing, or inspecting, stop the engine and make certain the tines and all moving parts have stopped. Disconnect the spark plug wire and ground it against the engine to prevent unintended starting.
5. Do not change the engine governor settings or over-speed the engine. The governor controls the maximum safe operating speed of engine.
6. Maintain or replace safety and instruction labels, as necessary.
7. Follow this manual for safe loading, unloading, transporting, and storage of this machine.
8. Always refer to the operator's manual for important details if the machine is to be stored for an extended period.

9. If the fuel tank has to be drained, do this outdoors.
10. Observe proper disposal laws and regulations for gas, oil, etc. to protect the environment.

Notice Regarding Emissions

Engines which are certified to comply with California and federal EPA emission regulations for SORE (Small Off Road Equipment) are certified to operate on regular unleaded gasoline, and may include the following emission control systems: Engine Modification (EM), Oxidizing Catalyst (OC), Secondary Air Injection (SAI) and Three Way Catalyst (TWC) if so equipped.

Spark Arrestor

WARNING! This machine is equipped with an internal combustion engine and should not be used on or near any unimproved forest-covered, brushcovered or grass-covered land unless the engine's exhaust system is equipped with a spark arrester meeting applicable local or state laws (if any).

If a spark arrester is used, it should be maintained in effective working order by the operator. In the State of California the above is required by law (Section 4442 of the California Public Resources Code). Other states may have similar laws. Federal laws apply on federal lands.
A spark arrester for the muffler is available through your nearest engine authorized service dealer or contact the service department, P.O. Box 361131 Cleveland, Ohio 44136-0019.

Average Useful Life

According to the Consumer Products Safety Commission (CPSC) and the U.S. Environmental Protection Agency (EPA), this product has an *Average Useful Life* of seven (7) years, or 130 hours of operation. At the end of the *Average Useful Life*, buy a new machine or have the machine inspected annually by an authorized service dealer to ensure that all mechanical and safety systems are working properly and not worn excessively. Failure to do so can result in accidents, injuries or death.

WARNING! Your Responsibility—Restrict the use of this power machine to persons who read, understand and follow the warnings and instructions in this manual and on the machine.

SAVE THESE INSTRUCTIONS!

Assembly & Set-Up

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Contents of Carton

- One Tiller
- One Hardware Pack
- One Handlebar Support
- One Operator's Manual
- One Handlebar Assembly
- One Engine Operator's Manual

WARNING! To prevent personal injury or property damage, do not start the engine until all assembly steps are complete and you have read and understand the safety and operating instructions in this manual.

Recommended Tools for Assembly

- ½" open-end wrench
- 9⁄16" open-end wrench
- ⅜" open-end wrench
- Scissors (to trim plastic ties)
- Ruler (for belt tension check)
- Block of wood (to support tiller when removing wheels)
- Tire pressure gauge (for models with pneumatic tires)
- Clean oil funnel
- Motor oil. Refer to the Engine Operator's Manual for oil specifications and quantity required.

Contents of Hardware pack

- Hex Screw, 5⁄16-18 x 1-½"
- Hex Screw, ⅜-16 x ¾"
- Flat Washer, ⅜"
- Split Lock Washer, 5⁄16"
- Hex Nut, 5⁄16"-18
- Hex Locknut, ⅜"-16

Assembly

Unpacking Instructions

NOTE: While unpacking, do not severely bend any of the control cables.

1. The tiller weighs approximately 133 lbs. Do not attempt to remove it from the shipping platform until instructed to do so in these assembly steps.
2. Remove any packaging material from the carton. Remove any staples from the bottom of the carton and remove the carton from the shipping platform.
3. Remove all unassembled parts and the separate hardware pack from the carton. Check that you have the items listed in the Contents of Carton list (contact your local dealer or the factory if items are missing or damaged).

4.

Handle

NOTE: All references to the right or left side of the tiller are from the operators positon.

1. Loosely attach the legs of the handlebar support to the inner sides of the tiller frame using two ⅜"-16 x ¾" hex head screws, ⅜" flat washers, and ⅜"-16 hex locknuts. See Fig. 3-1.

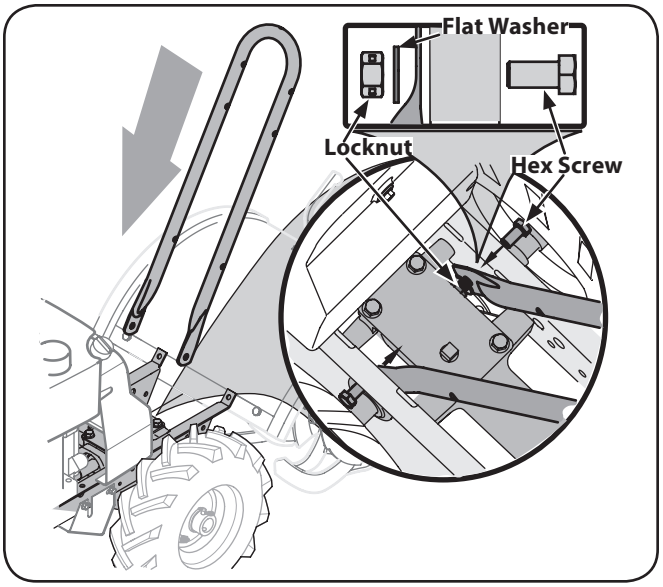


Figure 3-1

2. Using two 5⁄16″-18 x 1-½″ screws, 5⁄16″ split lock washers and 5⁄16″-18 hex nuts, loosely attach the handlebar support using the upper holes. Tighten the two screws securely. See Fig. 3-2.

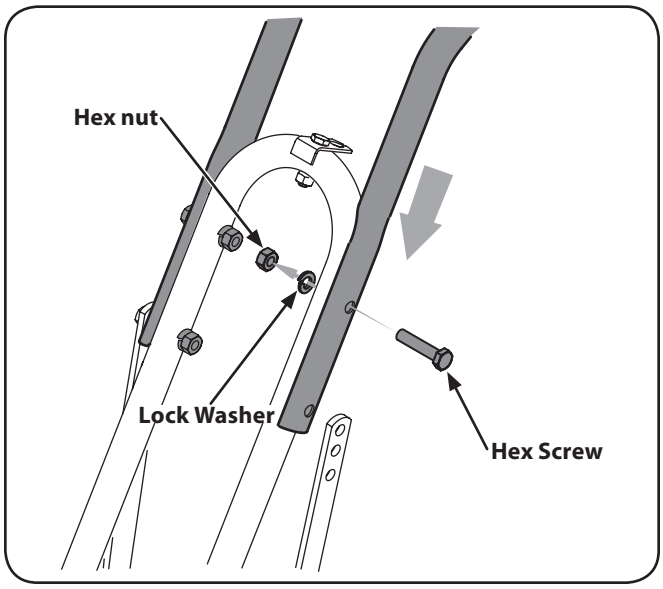


Figure 3-2

3. There are three height adjustment holes in the two handlebar support brackets. Use a setting that will position the handlebars at approximately waist level when the tines are 3-4″ into the soil. Loosely attach the support brackets to the outside of the handlebar assembly using two 5⁄16″-18 x 1-½″ screws, 5⁄16″ split lock washers and 5⁄16″-18 hex nuts. Refer to Fig. 3-2.

   NOTE: If a support bracket will not move, loosen attaching screw and nut.

   NOTE: The support brackets must be assembled to the outside of the handlebar assembly.

4. Tighten all the handlebar mounting hardware securely.

Move Tiller Off Crate

To roll the tiller off the shipping platform, put the wheels in freewheel, as follows:

1. Place a sturdy block under the transmission to raise one wheel about 1″ off the ground.

2. Remove the click pin from the wheel hub and wheel shaft. See Fig. 3-3.

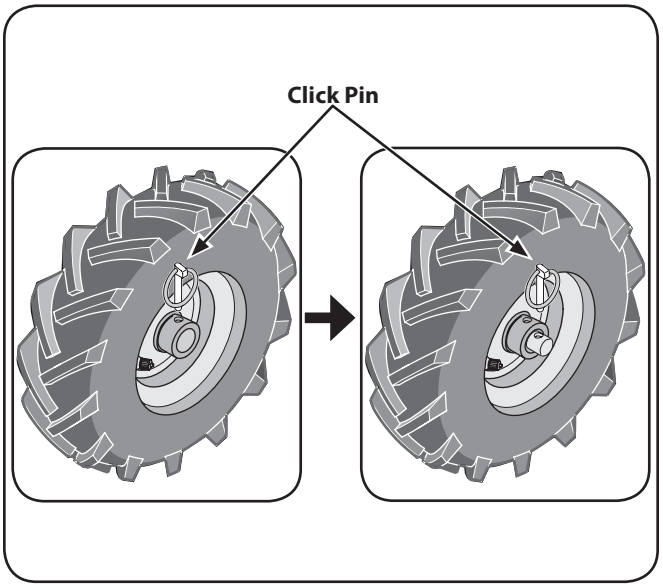


Figure 3-3

3. Slide the wheel fully inward on the wheel shaft . Reinstall the click pin through the wheel shaft only (not through the wheel hub). See Fig. 3-3. The wheel should now spin freely (freewheel) on the wheel shaft. Repeat with the other wheel.

4. Use the handlebar to roll the tiller to a flat area.

NOTE: Before starting the engine, the wheels must be placed in the WHEEL DRIVE position (pins through wheel hubs and wheel shaft).

Forward Clutch Cable

1. Carefully unwrap the forward clutch cable from its shipping position and slide the thin cable wire into the slot in the cable bracket. Push the cable connector up through the hole in the bracket until the groove in the connector snaps into place. See Fig. 3-4.

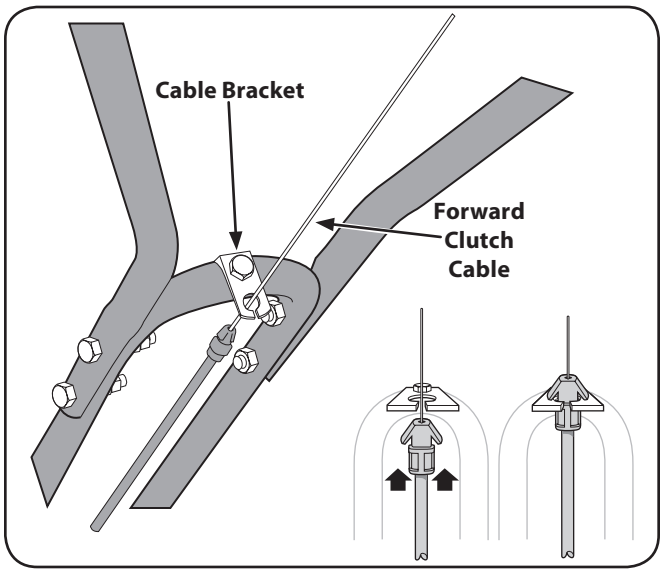


Figure 3-4

2. Thread the #10-24 hex nut halfway onto the screw which runs through the spring. See Inset Fig. 3-6.

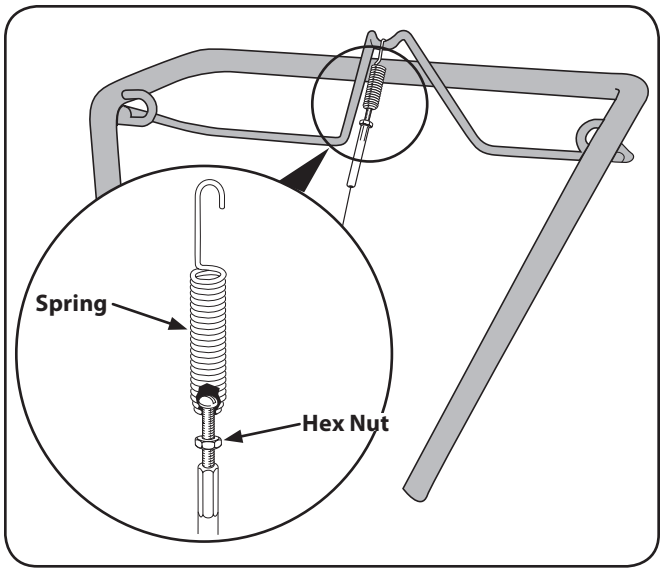


Figure 3-5

3. Thread the screw into the cable adjuster.

4. Check for the correct tension on the forward drive belt by taking two measurements of the cable spring, as follows:
   a. With the Forward Clutch Bail in an open (released) position, measure the length of the cable spring from the outermost coil to the outermost coil. See Fig. 3-6.

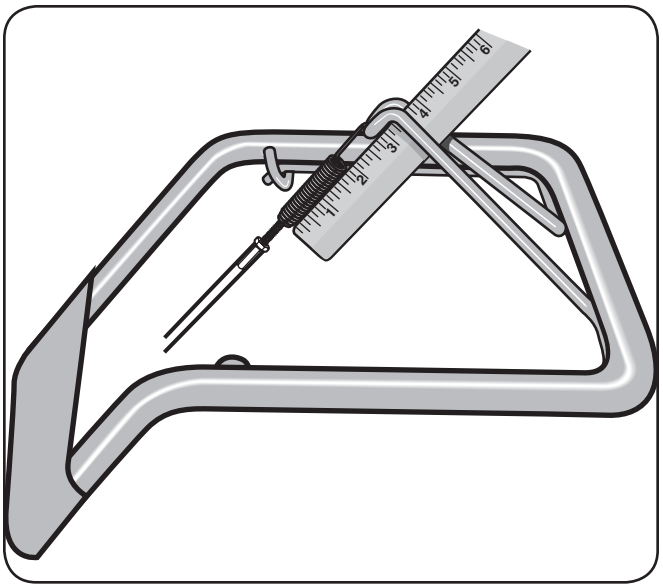


Figure 3-6

   b. Squeeze the Forward Clutch Bail against the handlebar (see Fig. 3-6) and re-measure the spring length. The belt tension is correct if this second measurement is between 1⁄16" to 3⁄16" longer than the first measurement. If so, turn the hex nut tightly against the cable adjuster while preventing the cable adjuster from turning.
   c. If the spring length is incorrect, you must adjust the cable tension as described in the Maintenance & Adjustments Section under Forward Drive Belt. Incorrect cable tension can result in belt slippage (cable tension too loose), or unintentional tine movement when the clutch bail is in Neutral (cable tension too tight).

Reverse Clutch Cable

1. Unwrap the reverse clutch cable from its shipping position and route it up to the handlebar. See Fig. 3-7. Be sure that the cable is routed beneath the Forward Clutch Bail.

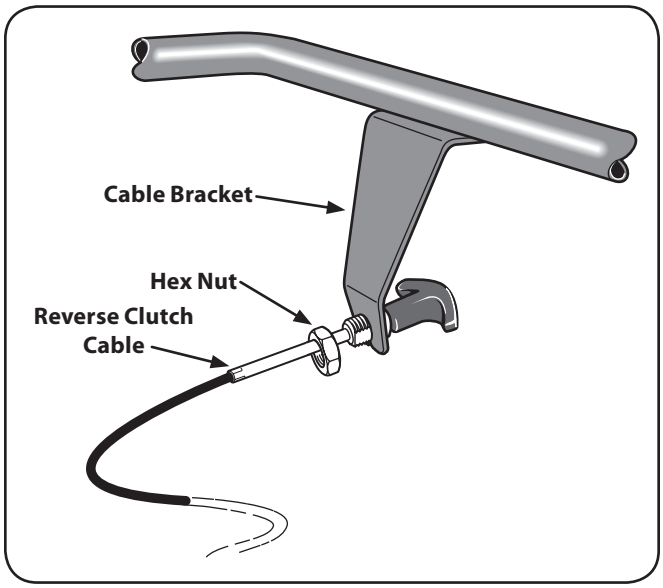


Figure 3-7

2. Insert the cable through the slot in the cable bracket and position the flat side of the threaded assembly next to the flat side of the hole. Slide the hex nut up the cable and tighten it securely.
3. Fasten the reverse clutch cable to the left side handlebar with a cable tie.
4. Test the function of the reverse clutch by pulling out and releasing the cable knob. The knob should return to its neutral position (resting against bracket). If it doesn't, contact your local dealer or Troy-Bilt LLC for technical assistance.

Set-Up

Tire Pressure

Check the air pressure with a tire guage. Deflate or inflate the tires equally to between 15 and 20 PSI.

NOTE: Be sure that both tires are inflated equally or the tiller will pull to one side.

Gas & Oil Fill Up

WARNING! Use extreme care when handling gasoline. Gasoline is extremely flammable and the vapors are explosive. Never fuel the machine indoors or while the engine is hot or running. Extinguish cigarettes, cigars, pipes and any other sources of ignition.

Service the engine with gasoline and oil as instructed in the Engine Operator's Manual packed seperately with your tiller. Read the instructions carefully.

Transmission Gear Oil

The transmission was filled with gear oil at the factory. However, you should check the gear oil level at this time to make certain it is correct.

NOTE: Do not operate the tiller if the gear oil level is low. Doing so will result in severe damage to the transmission components.

1. With the tiller on level ground, pull the Depth Regulator Lever back and then all the way up until the lowest notch in the lever is engaged. See Fig. 3-8.

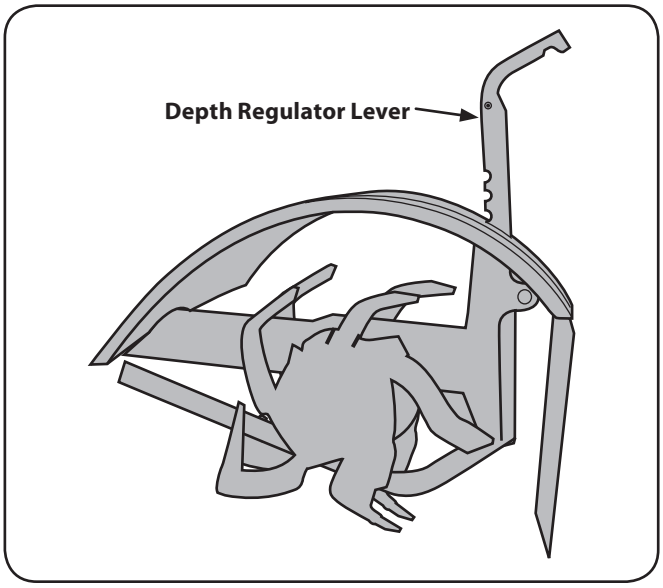


Figure 3-8

2. Remove the oil fill plug from the transmission housing cover and locate the main drive shaft situated inside the housing. See Fig. 3-9.

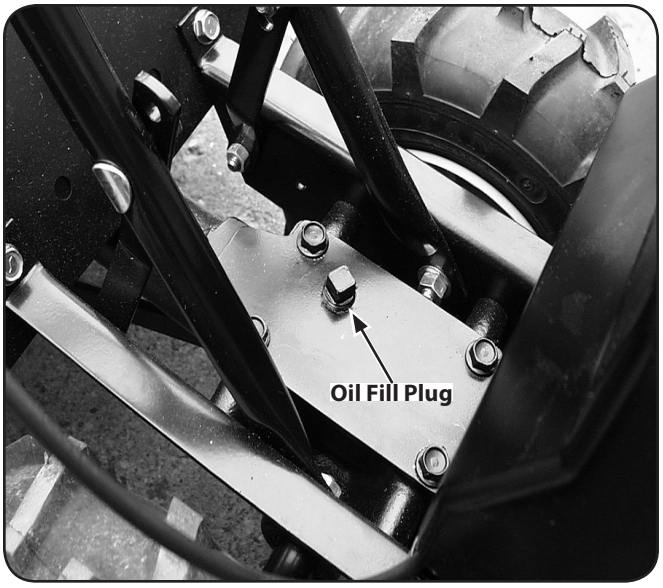


Figure 3-9

3. The gear oil level is correct if the gear oil is approximately halfway up the side of the main drive shaft.
4. If the oil level is low, add gear oil by referring to the Maintenance & Adjustments Section.

Controls and Features

4

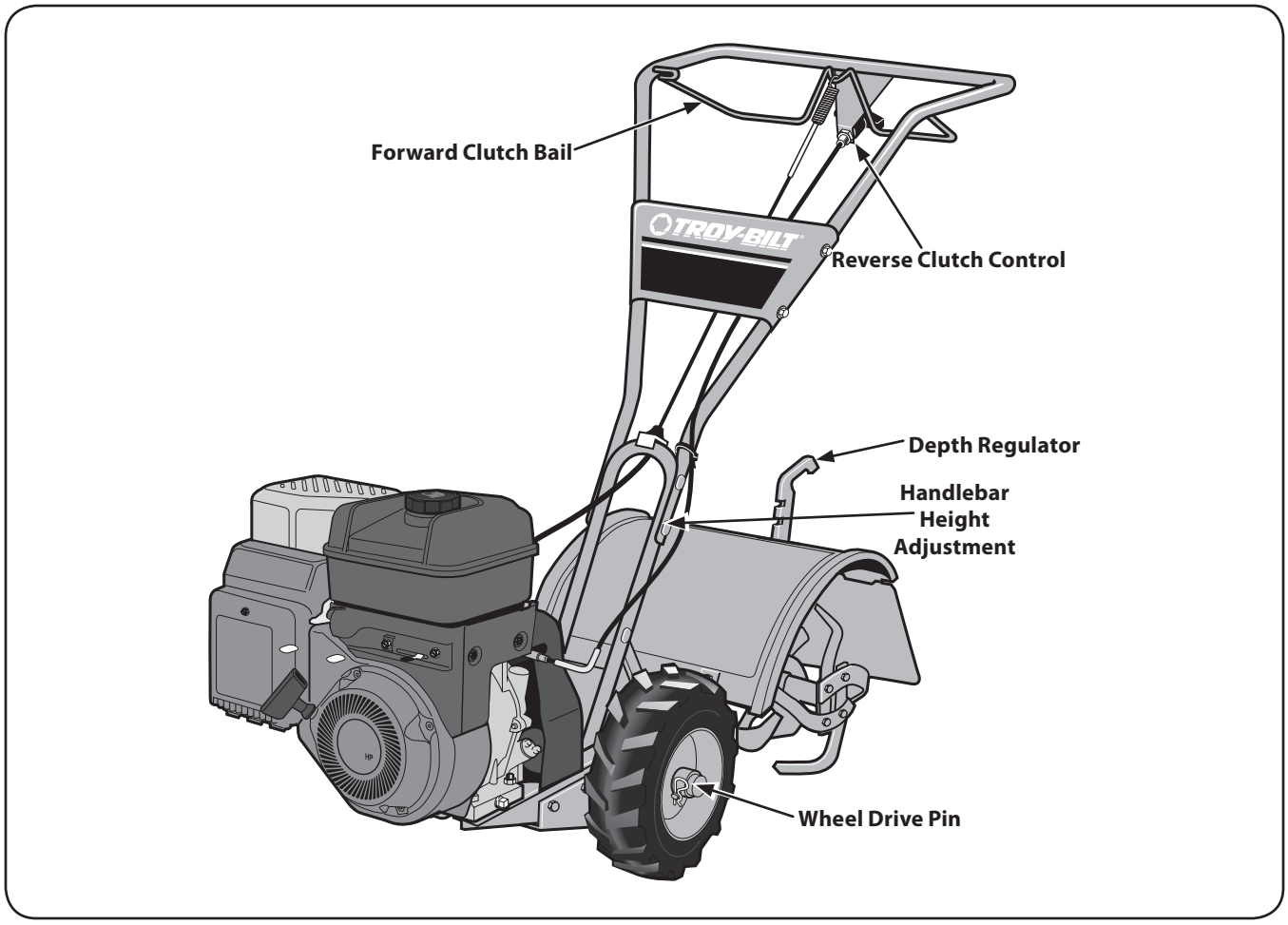


Figure 4-1

NOTE: This Operator's Manual covers various models of tillers and the machine illustrated may vary slightly from your tiller.

Engine Controls

For detailed information on all engine controls refer to the seperate Engine Operator's Manual.

Wheel Drive Pins

Each wheel is equipped with a wheel drive click pin that secures the wheel to the wheel shaft. The wheels can be positioned in either a WHEEL DRIVE or a FREEWHEEL mode.

Forward Clutch Bail

The forward clutch bail controls the engagement of the forward drive of the wheels and tines.

Reverse Clutch Control

The Reverse Clutch Control controls the engagement of reverse drive to the wheels and tines.

Depth Regulator Lever

This lever controls the tilling depth of the tines. Pull the lever back and slide it up or down to engage the notched height settings.

Handlebar Height Adjustment

The handlebar height is adjustable to three different settings. In general, adjust the handlebars so they are at waist level when the tines are 3-4" in the ground.

Gas Cap

Unthread the gas cap to add gasoline to the fuel tank.

Oil Fill

Engine oil level can be checked and oil added through the oil fill.

Operation

5

Starting the Engine

Pre-Start Checklist

With the spark plug wire disconnected from the spark plug, perform the following checks and services before each use:

1. Read the Safe Operation Practices and Features & Controls Sections in this manual. Read the separate Engine Operator's Manual provided with the tiller.
2. Put the wheels in the WHEEL DRIVE position (wheel pins must be through holes in wheel hubs and wheel shaft).

WARNING! Never allow either of the wheels to be in the FREEWHEEL position when the engine is running. Always put both wheels in the WHEEL DRIVE position before starting the engine. Failure to comply could cause loss of tiller control, property damage, or personal injury.

3. Check the tiller for loose or missing hardware. Service as required.
4. Check engine oil level. See Engine Operator's Manual.
5. Check that all safety guards and covers are in place.
6. Check air cleaner and engine cooling system. See Engine Operator's Manual.
7. Fill the fuel tank with gasoline according to the directions in the separate Engine Operator's Manual. Follow all instructions and safety rules carefully.
8. Attach the spark plug wire to the spark plug.

Starting the Engine

WARNING! To help prevent serious personal injury or damage to equipment, put both wheels in the WHEEL DRIVE position. Never have wheels in FREEWHEEL position when the engine is running. When the wheels are in FREEWHEEL, they do not hold back the tiller and the tines could propel the tiller rapidly forward or backward. Put the Forward Clutch Bail in neutral (disengaged) positions by releasing levers.

WARNING! Never run the engine indoors or in enclosed, poorly ventilated areas. Engine exhaust contains carbon monoxide, an odorless and deadly gas. Avoid the engine muffler and nearby areas. Temperatures in these areas may exceed 150° F.

1. Complete the Pre-Start Checklist on this page.
2. Put the wheels in the WHEEL DRIVE position.
3. Move the Depth Regulator Lever all the way down to the "travel" position, so that the tines clear the ground.
4. Release all the controls on the tiller.
5. On engine's with a fuel shut-off valve, turn the valve to the open position, as instructed in the separate Engine Operator's Manual.
6. Put the ignition switch and/or throttle the control lever located on the engine in the "ON", "RUN", "FAST" or "START" position, as instructed in the Engine Operator's Manual.
7. Choke or prime engine, as instructed in Engine Operator's Manual.
8. Put one hand on the fuel tank to stabilize the tiller when pulling the starter rope handle. Then use recoil starter to start the engine, as instructed in the Engine Operator's Manual. When the engine starts, gradually move choke lever (if so equipped) to "NO CHOKE", "CHOKE OFF" or "RUN" position.
9. Use the "FAST" throttle speed setting when tilling.

Stopping the Engine

1. To stop the wheels and tines, release the Forward Clutch Bail.
2. To stop the engine, put the ignition switch and/or the throttle control lever in the "OFF" or "STOP" position.

To Engage Drive & Tines

1. For forward motion of the wheels and power to the tines pull the Forward Clutch Bail up against the handlebar. Release the bail to stop the forward motion of the wheels and tines.
2. When tilling, relax and let the wheels pull the machine while the tines dig. Walk behind and a little to one side of the tiller. Use one hand, yet keep a light — but secure — grip on the handlebar (while keeping your arm loose). See Fig. 5-1. Let the tiller move at its own pace and do not push down on the handlebars to try and force the tines to dig deeper — this takes weight off the wheels and reduces traction.

Figure 5-1

WARNING! Do not push down on the handlebars to try to make the tiller till more deeply. This prevents the wheels from holding the tiller back and can allow the tines to rapidly propel the tiller forward, which could result in loss of control, property damage, or personal injury.

1. To move in reverse:
   a. Look behind and exercise caution when operating in reverse. Do not till while in reverse.
   b. Stop all forward motion. Lift the handlebar with one hand until the tines are off the ground and then pull the Reverse Clutch Control knob out. To stop reversing, let go of the Reverse Clutch Control knob
   c. If longer distances need to be covered in reverse, shut off the engine, then place the two wheels in FREEWHEEL.

Turning the Tiller

1. Practice turning the tiller in a level, open area. Be very careful to keep your feet and legs away from the tines.
2. To begin a turn, lift the handlebars until the tines are out of the ground and the engine and tines are balanced over the wheels (Fig. 5-2).

Figure 5-2

3. With the tiller balanced, push sideways on the handlebar to steer in the direction of the turn. After turning, slowly lower the tines into the soil to resume tilling. See Fig. 5-3.

Figure 5-3

Clearing the Tines

- The tines have a self-clearing action which eliminates most tangling of debris in the tines. However, occasionally dry grass, stringy stalks or tough vines may become tangled. Follow these procedures to help avoid tangling and to clean the tines, if necessary.
- To reduce tangling, set the depth regulator deep enough to get maximum "chopping" action as the tines chop the material against the ground. Also, try to till under crop residues or cover crops while they are green, moist and tender.
- While tilling, try swaying the handlebars from side to side (about 6" to 12"). This "fishtailing" action often clears the tines of debris.
- If tangling occurs, lift the tines out of the soil and run the tiller in reverse for a few feet. This reversing action should unwind a good deal of debris.

WARNING! Before clearing the tines by hand, stop the engine, allow all moving parts to stop and disconnect the spark plug wire. Remove the ignition key on electric start models. Failure to follow this warning could result in personal injury.

Tilling Tips & Techniques

Tilling Depth

WARNING! Before tilling, contact your telephone or utilities company and inquire if underground equipment or lines are used on your property. Do not till near buried electric cables, telephone lines, pipes or hoses.

- This is a CRT (counter-rotating tine) tiller. As the wheels pull forward, the tines rotate backward. This creates an "uppercut" tine action which digs deeply, uprooting soil and weeds. Don't overload the engine, but dig as deeply as possible on each pass. On later passes, the wheels may tend to spin in the soft dirt. Help them along by lifting up slightly on the handlebar (one hand, palm up, works most easily).
- Avoid the temptation to push down on the handlebars in an attempt to force the tiller to dig deeper. Doing so takes the weight off the powered wheels, causing them to lose traction. Without the wheels to hold the tiller back, the tines will attempt to propel the tiller backward, towards the operator.
- When cultivating (breaking up surface soil around plants to destroy weeds, see Fig. 4-9), adjust the tines to dig only 1" to 2" deep. Using shallow tilling depths helps prevent injury to the plants whose roots often grow close to the surface. If needed, lift up on the handlebars slightly to prevent the tines from digging too deeply. (Cultivating on a regular basis not only eliminates weeds, it also loosens and aerates the soil for better moisture absorption and faster plant growth.) Watering the garden area a few days prior to tilling will make tilling easier, as will letting the newly worked soil set for a day or two before making a final, deep tilling pass.

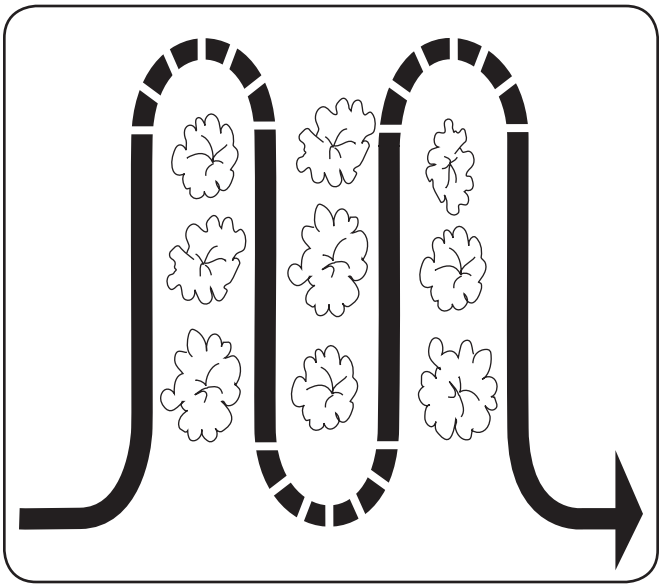


Figure 5-4

Choosing Correct Wheel & Tine Speeds

With experience, you will find the tilling depth and tilling speed combination that is best for your garden. Set the engine throttle lever at a speed to give the engine adequate power and yet allow it to operate at the slowest possible speed until you have achieved the maximum tilling depth you desire. Faster engine speeds may be desirable when making final passes through the seedbed or when cultivating. Selection of the correct engine speed, in relation to the tilling depth, will ensure a sufficient power level to do the job without causing the engine to labor.

Suggested Tilling Patterns

- When preparing a seedbed, go over the same path twice in the first row, then overlap one-half the tiller width on the rest of the passes. See Fig. 5-5.

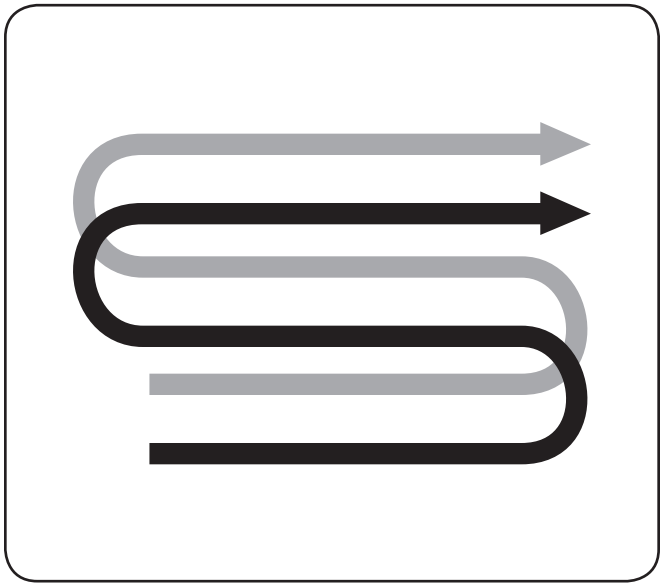


Figure 5-5

- When finished in one direction, make a second pass at a right angle, as shown in Fig. 5-6. Overlap each pass for best results (in very hard ground, it may take three or four passes to thoroughly pulverize the soil.)

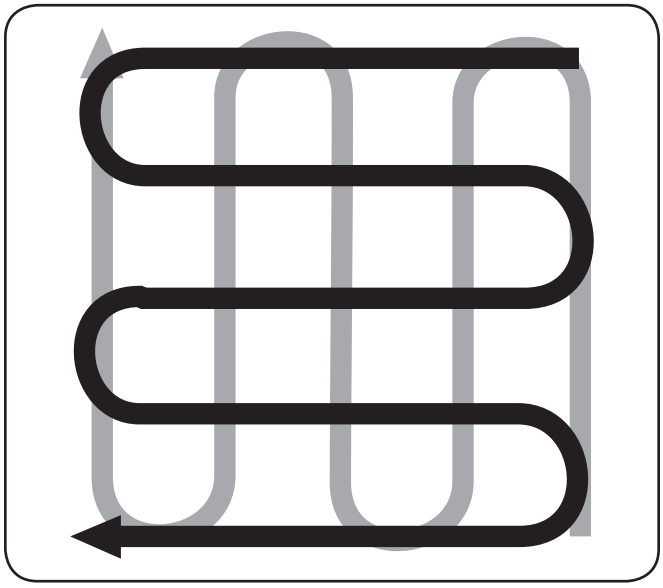


Figure 5-6

- If the garden size will not permit lengthwise and then crosswise tilling, overlap the first passes by one-half a tiller width, followed by successive passes at one-quarter width. See Fig. 5-7.

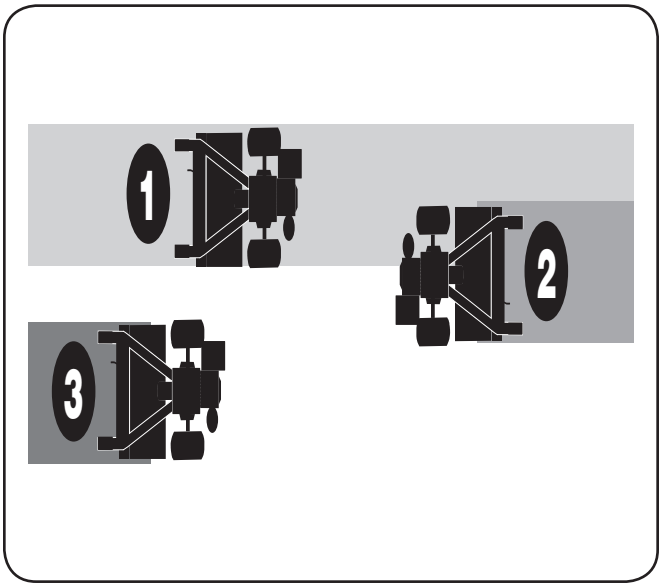


Figure 5-7

Tilling on a Slope

WARNING! Do not operate the tiller on a slope too steep for safe operation. Till slowly and be sure you have good footing. Never permit the tiller to freewheel down slopes. Failure to follow this warning could result in personal injury.

1. Till only on moderate slopes, never on steep ground where the footing is difficult.
2. We recommend tilling up and down slopes rather than terracing. Tilling vertically on a slope allows maximum planting area and also leaves room for cultivating.

   NOTE: When tilling on slopes, be sure the correct oil level is maintained in the engine (check every one-half hour of operation). The incline of the slope will cause the oil to slant away from its normal level and this can starve engine parts of the required lubrication. Keep the motor oil level at the full point at all times.

Tilling Up and Down a Slope

1. To keep soil erosion to a minimum, be sure to add enough organic matter to the soil so that it has good moisture-holding texture and try to avoid leaving footprints or wheel marks.
2. When tilling vertically, try to make the first pass uphill as the tiller digs more deeply going uphill than it does downhill. In soft soil or weeds, you may have to lift the handlebars slightly while going uphill. When going downhill, overlap the first pass by about one-half the width of the tiller.

Terrace Gardening

1. To create a terrace, start at the top of the slope and work down. Go back and forth across the first row as shown in Fig. 5-8.

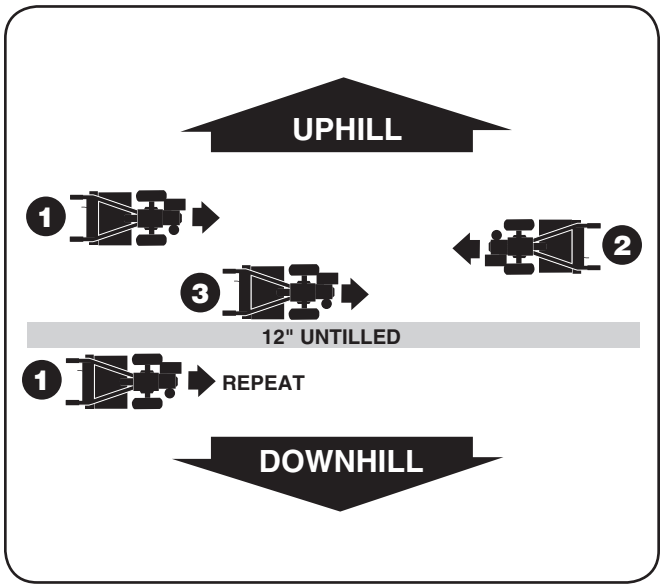


Figure 5-8

2. Each succeeding lower terrace is started by walking below the terrace you're preparing. For added stability of the tiller, always keep the uphill wheel in the soft, newly tilled soil. Do not till the last 12" or more of the downhill outside edge of each terrace. This untilled strip helps prevents the terraces from breaking apart and washing downhill. It also provides a walking path between rows.

Loading & Unloading the Tiller

WARNING! Loading and unloading the tiller into a vehicle is potentially hazardous and it is not recommend doing so unless absolutely necessary, as this could result in personal injury or property damage.

However, if you must load or unload the tiller, follow the guidelines given next.

- Before loading or unloading, stop the engine, wait for all parts to stop moving, disconnect the spark plug wire and let the engine and muffler cool.
- The tiller is too heavy and bulky to be lifted safely by one person. Two or more people should share the load.
- Use sturdy ramps and manually — with the engine shut off — roll the tiller into and out of the vehicle. Two or more people are needed to do this.
- The ramps must be strong enough to support the combined weight of the tiller and any handlers. The ramps should provide good traction to prevent slipping; they should have side rails to guide the tiller along the ramps; and they should have a locking device to secure them to the vehicle.
- The handlers should wear sturdy footwear that will help prevent slipping.
- Position the loading vehicle so that the ramp angle is as flat as possible (the less incline to the ramp, the better). Turn the vehicle's engine off and apply its parking brake.
- When going up ramps, stand in the normal operating position and push the tiller ahead of you. Have a person at each side to turn the wheels.
- When going down ramps, walk backward with the tiller following you. Keep alert for any obstacles behind you. Position a person at each wheel to control the speed of the tiller. Never go down ramps tiller-first, as the tiller could tip forward.
- Place wooden blocks on the downhill side of the wheels if you need to stop the tiller from rolling down the ramp. Also, use the blocks to temporarily keep the tiller in place on the ramps (if necessary), and to chock the wheels in place after the tiller is in the vehicle.
- After loading the tiller, prevent it from rolling by engaging the wheels in the WHEEL DRIVE position. Chock the wheels with blocks and securely tie the tiller down.

Maintenance & Adjustments

6

Maintenance Schedule

	Check After first 2 hours	Change after first 2 hours	Before each use	Every 5 Hours	Every 10 Hours	Every 30 Hours	See Engine Manual
Check Motor Oil Level			✓	✓			
Clean Engine			✓				✓
Check Drive Belt Tension	✓				✓		
Check Nuts and Bolts	✓				✓		
Change Motor Oil		✓			✓		
Lubricate Tiller					✓		
Service Engine Air Cleaner System							✓
Check Gear Oil Level in Transmission						✓	
Check Tines for Wear						✓	
Check Air Pressure in Tires						✓	
Service Spark Plug							✓

WARNING! Before inspecting, cleaning or servicing the machine, shut off the engine, wait for all moving parts to come to a complete stop, disconnect the spark plug wire and move the wire away from the spark plug. Remove the ignition key on electric start models. Failure to follow these instructions can result in serious personal injury or property damage.

Maintenance

Engine

Refer to the Engine Operator's Manual packed with your tiller for all engine maintenance.

Tire Pressure

Check the air pressure in both tires. The air pressure should be between 15-20 PSI.

Keep both tires equally inflated to help prevent machine from pulling to one side.

Hardware

Check for loose or missing hardware after every 10 operating hours and tighten or replace (as needed) before using tiller

Be sure to check the screws underneath the tiller hood that secure the transmission cover and the Depth Regulator Lever to the transmission.

Air Filter

The air cleaner filters dirt and dust out of the air before it enters the carburetor. Operating the engine with a dirty, clogged air filter can cause poor performance and damage to the engine. Never operate the engine without the air cleaner installed. Inspect and service the air cleaner more often if operating in very dusty or dirty conditions. Refer to the Engine Operator's Manual for air cleaner service intervals and instructions.

Transmission Gear Oil

Check the transmission gear oil after every 30 hours of operation or whenever you notice any oil leak. Operating the tiller when the transmission is low on oil can result in severe damage.

To Check the Transmission Gear Oil Level:

1. Check the gear oil level when the transmission is cool. Gear oil will expand in warm operating temperatures and this expansion will provide an incorrect oil level reading.
2. With the tiller on level ground, pull the Depth Regulator Lever all the way up.
3. Remove the oil fill plug from the transmission housing and look inside the oil fill hole to locate the main drive shaft situated below the hole. Refer to Fig. 6-1.

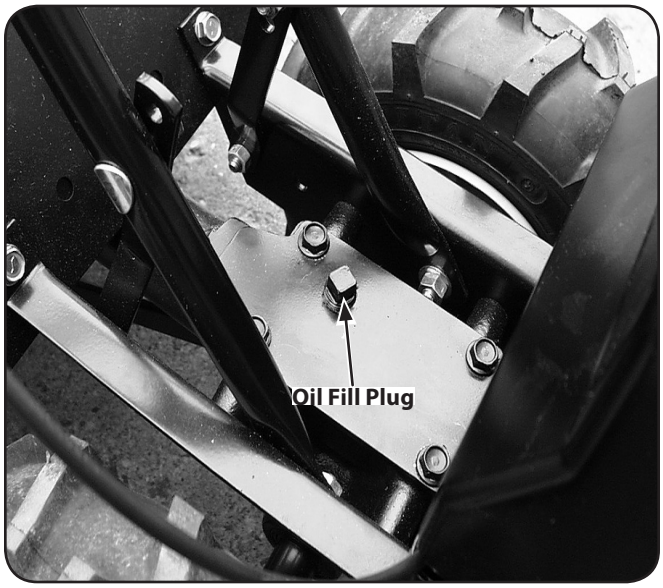


Figure 6-1

4. The gear oil level is correct if the gear oil is approximately halfway up the side of the main drive shaft.
5. If the gear oil level is low, add gear oil as described below. If the gear oil level is okay, securely replace the oil fill plug.
6. If adding only a few ounces of gear oil, use API rated GL-4 or GL-5 gear oil having a viscosity of SAE 140, SAE 85W-140 or SAE 80W-90. If refilling an empty transmission, use only GL-4 gear oil having a viscosity of SAE 85W-140 or SAE 140.
7. While checking frequently to avoid overfilling, slowly add gear oil into the oil fill hole until it reaches the halfway point on the drive shaft.
8. Securely replace the oil fill plug.

Lubrication

After every 10 operating hours, oil or grease the lubrication points shown in Fig. 6-2 and described below.

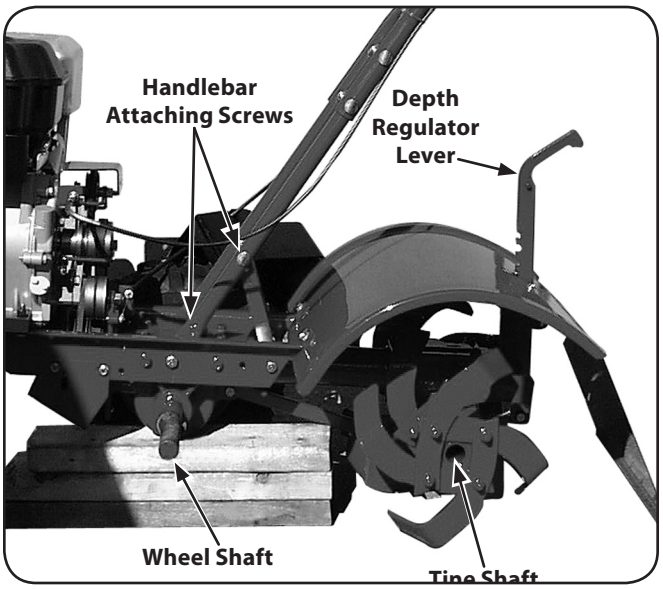


Figure 6-2

Use a clean lubricating oil (#30 weight motor oil is suitable) and a clean general purpose grease (grease containing a metal lubricant is preferred, if available).

- Remove the wheels, clean the wheel shaft and apply a thin coating of grease to the wheel shaft.
- Grease the back, front and sides of the depth regulator lever.
- Remove the tines and clean the tine shaft. Use a file or sandpaper to gently remove any rust, burrs or rough spots (especially around holes in shaft). Apply grease to the ends of shaft before installing the tines.
- Oil the threads on the handlebar height adjustment screws and the handlebar attaching screws.

Adjustments

Forward Drive Belt

It is important to maintain the correct tension on the forward drive belt. A loose belt will cause the tines and wheels to slow down — or stop completely — even though the engine is running at full speed. A belt that is too tight can result in unintentional tine movement when the clutch bail is in the Neutral (released) position.

- Check the belt tension after the first two hours of break-in operation and after every 10 operating hours.
- At the end of each tilling season, check the belt for cracks, cuts or frayed edges and replace it as soon as possible.

Check Forward Belt Tension (refer to Fig. 6-3):

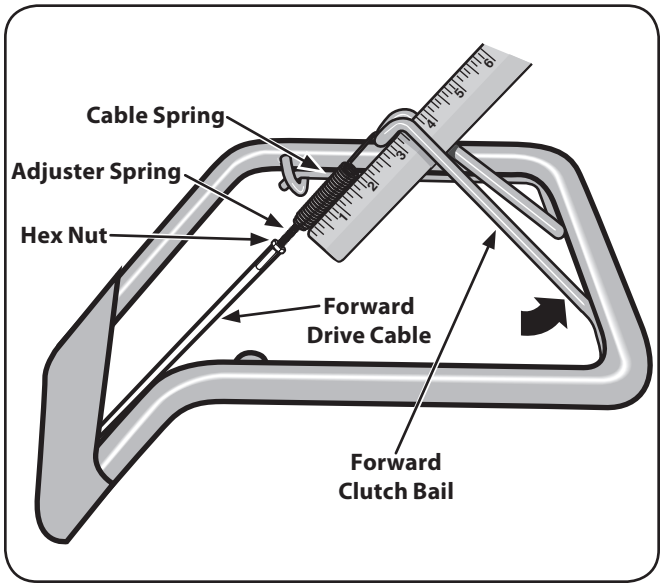


Figure 6-3

1. Stop engine, wait for all parts to stop moving and disconnect spark plug wire.
2. With the Forward Clutch Bail in an open (released) position, measure and note the overall length of the cable spring by measuring from the outermost coil to the outermost coil.
3. Squeeze the Forward Clutch Bail against the handlebar and re-measure the length of the coils. The belt tension is correct if this second measurement is between 1⁄16" -to- 3⁄16" longer than the first measurement.
4. If the spring is too short (less than 1⁄16"), the tension is too loose. If the spring is too long (more than 3⁄16"), the tension is too tight.
5. To adjust the length of the spring:
   a. Release the Forward Clutch Bail.
   b. Unthread the hex nut halfway up the adjustment screw.
   c. Unhook the top of the spring from the Forward Clutch Bail.
   d. Use pliers to prevent the adjuster from turning and turn the slotted screw located inside the spring clockwise (viewed from operator's position) to increase tension on the spring. Turn the screw counterclockwise to decrease tension. Once adjusted, reattach the spring to the Forward Clutch Bail.
   e. Repeat Steps 2 and 3 to re-measure the length of the spring. When the second measurement is between 1⁄16" -to- 3⁄16" longer than the first measurement, retighten the hex nut against the top of the adjuster.

Reverse Drive Belt

Check the belt tension after the first two hours of break-in operation and after every 10 operating hours.

To Check Reverse Belt Tension (Refer to Fig. 6-4):

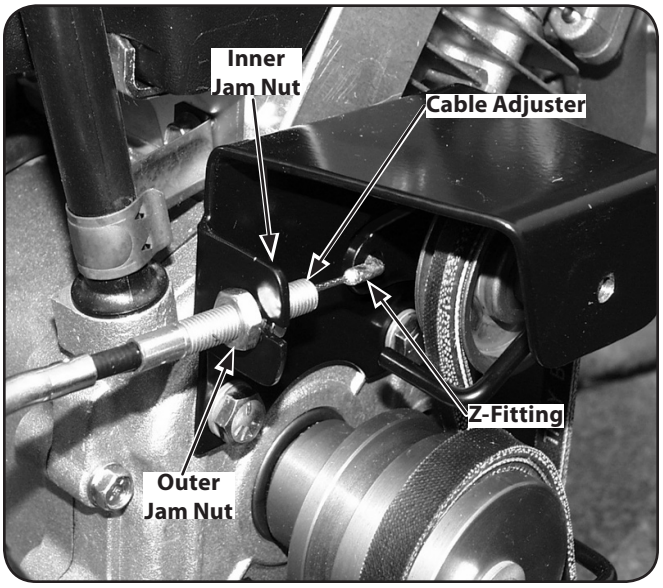


Figure 6-4

1. Stop the engine, wait for all parts to stop moving and disconnect the spark plug wire.
2. Remove the screw in the plastic belt cover and slide the belt cover — which is attached to forward clutch cable — out of the way.
3. Have an assistant pull the Reverse Clutch Control knob all the way out and hold it in that position. Measure the length of the cable wire between the end of the threaded cable adjuster and the end of the Z-fitting to which the cable wire is attached.
4. The belt tension is ideal if the cable wire length measures between 1⁄8" to 1⁄4". If it is less than 1⁄8" (and if there is no reverse action when the tiller is running), then make the following adjustments

   NOTE: If the length is more than 1⁄4", no adjustment is needed — as long as the reverse action functions properly.
5. Release the Reverse Clutch Control knob and then unthread the inner jam nut one to two turns. Pull the threaded cable adjuster to the left until the inner jam nut touches the bracket.

6. Prevent the inner jam nut from turning and tighten the outer jam nut against the bracket. Prevent the outer jam nut from turning and tighten the inner jam nut against the bracket.
7. Measure the gap by repeating Step 3. Readjust as needed by repeating Steps 5 and 6.
8. Reinstall the belt cover.

Off-Season Storage

When the tiller won't be used for an extended period, prepare it for storage as follows:

1. Clean the tiller and engine.
2. Do routine tiller lubrication and check for loose parts and hardware.
3. Protect the engine and perform recommended engine maintenance by following the storage instructions found in the Engine Operator's Manual. Be sure to protect the fuel lines, carburetor and fuel tank from gum deposits by removing fuel or by treating fuel with a fuel stabilizer (follow the engine manufacturer's recommendations).
4. Store the tiller in a clean, dry area.
5. Never store the tiller with fuel in the fuel tank in an enclosed area where gas fumes could reach an open flame or spark, or where ignition sources are present (space heaters, hot water heaters, furnaces, etc.).

Belt Replacement

If the drive belt needs to be replaced, see your local authorized dealer or refer to the Replacement Parts Section for ordering information. Use only a factory-authorized belt as an "over- the-counter" belt may not perform satisfactorily. The procedure requires average mechanical ability and commonly available tools.

Tines

The bolo tines will wear with use and should be inspected at the beginning of each tilling season and after every 30 operating hours. The tines can be replaced either individually or as a complete set. See the Replacement Parts Section for tine identification and part numbers.

Tine Inspection

With use, the tines will become shorter, narrower and pointed. Badly worn tines will result in a loss of tilling depth, and reduced effectiveness when chopping up and turning under organic matter.

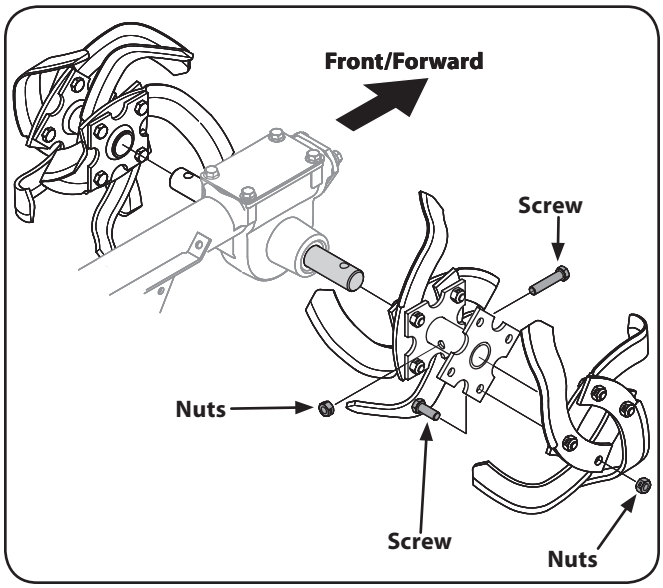


Figure 7-1

Refer to Fig. 7-1 for the following steps procedures.

Removing/Installing a Single Tine

1. With the engine shut off and the spark plug wire disconnected, remove the two screws and nuts that attach a single tine to a tine holder. If needed, use penetrating oil on the nuts.
2. When installing a single tine, be sure to position it so that its cutting edge (sharp) will enter the soil first as the tiller moves forward.

Removing/Installing a Tine Assembly:

1. A tine assembly consists of eight tines mounted on a tine holder.
2. If removing both tine assemblies, mark them "left" and "right" before removal. Remove the screw and locknut that secure the tine assembly to the tine shaft. If necessary, use a rubber mallet to tap the tine assembly outward off the shaft.
3. Before reinstalling the tine assembly, inspect the tine shaft for rust, rough spots or burrs. Lightly file or sand, as needed. Apply a thin coat of grease to the shaft.
4. Install each tine assembly so that the cutting (sharp) edge of the tines will enter the soil first when the tiller moves forward. Secure the tine assembly to the tine shaft using the screw and locknut.

Change Transmission Gear Oil

NOTE: The transmission gear oil does not need to be changed unless it has been contaminated with dirt, sand or metal particles.

1. Drain the gasoline from the fuel tank or run the engine until the fuel tank is empty. Drain the oil from the engine.
2. Remove four screws and remove the transmission cover and gasket. See Fig. 7-2.

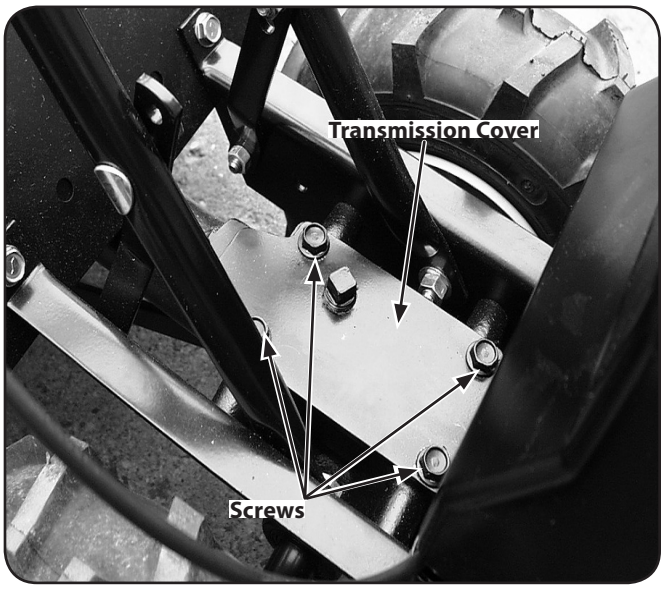


Figure 7-2

3. Remove the left-side wheel. Tilt the left-side wheel shaft into a drain pan and allow the gear oil to drain through the top of the transmission.
4. Reinstall the wheel. Install a new gasket (do not reuse the old gasket) and reinstall the transmission cover.
5. Refill the transmission using GL-4 gear oil (SAE 85W-140 or SAE 140). Refill the engine with motor oil and replenish the fuel tank with gasoline.

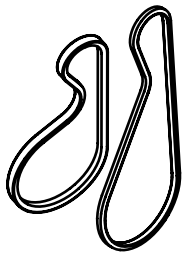
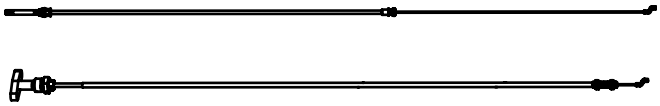
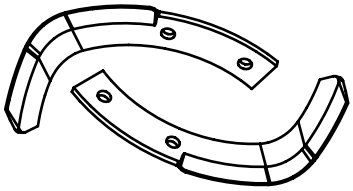
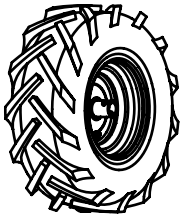
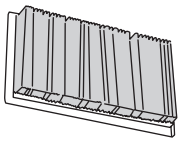
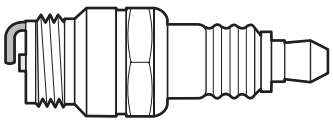
Troubleshooting

8

Problem	Cause	Remedy
Engine does not start	1. Spark plug wire disconnected. 2. Engine Throttle Control Lever incorrectly set. 3. Fuel tank empty. 4. Stale gasoline. 5. Dirty air filter. 6. Defective or incorrectly gapped spark plug. 7. Carburetor out of adjustment. 8. Misadjusted throttle control. 9. Dirt or water in fuel tank.	1. Reconnect wire. 2. Put lever in START position. 3. Add fuel. 4. Drain fuel and add fresh fuel. 5. Clean or replace filter (see Engine Manual). 6. Inspect spark plug (see Engine Manual). 7. See Engine Service Dealer. 8. See Engine Service Dealer 9. See Engine Service Dealer.
Engine runs poorly	1. Defective or incorrectly gapped spark plug. 2. Dirty air filter(s). 3. Carburetor out of adjustment. 4. Stale gasoline. 5. Dirt or water in fuel tank. 6. Engine cooling system clogged.	1. Inspect spark plug (see Engine Manual). 2. Clean or replace (see Engine Manual). 3. See Engine Service Dealer. 4. Replace with fresh gasoline. 5. See Engine Service Dealer. 6. Clean air cooling system (see Engine Manual).
Engine overheats	1. Engine cooling system clogged. 2. Carburetor out of adjustment. 3. Oil level is low.	1. Clean air cooling area (see Engine Manual). 2. See Engine Service Dealer. 3. Check oil level (see Engine Manual).
Engine does not shut off	1. Misadjusted throttle control or ignition switch.	1. See Engine Manual or Engine Service Dealer.
Wheels/Tines will not turn	1. Improper use of controls. 2. Worn, broken, or misadjusted drive belt(s). 3. Internal transmission wear or damage. 4. Bolt loose in transmission pulley.	1. Review Operation section. 2. Replace or adjust belts. 3. Contact local dealer or the factory. 4. Tighten bolt.
Tines turn, but wheels don't	1. Wheel Drive Pins not in WHEEL DRIVE. 2. Bolt loose in transmission pulley. 3. Internal transmission wear or damage.	1. Inserts Drive Pins properly. 2. Tighten bolt. 3. Contact local Dealer or the Factory.
Wheels turn, but tines Don't	1. Tine holder mounting hardware missing. 2. Bolt loose in transmission pulley. 3. Internal transmission wear or damage.	1. Replace hardware. 2. Tighten bolt. 3. Contact local Dealer or the Factory.
Poor tilling performance	1. Worn tines. 2. Improper Depth Regulator setting. 3. Incorrect throttle setting. 4. Forward Drive Belt slipping.	1. Replace Tines. 2. See "Tilling Tips & Techniques." 3. See Maintenance & Adjustments Section. 4. See Maintenance & Adjustments Section.

Replacement Parts

9

Component	Part Number and Description
	754-04091 Reverse Drive Belt 754-04090 Forward Drive Belt
	746-04208 Forward Drive Cable 746-04058 Reverse Drive Cable
	742-04116 Bolo Tine, 10" (RT) 742-04117 Bolo Tine, 10" (LT)
	634-04232 Wheels, 13 x 5 x 6
	17211-ZL8-023 Air Filter
	98079-56846 Spark Plug (BPR6ES)

Phone (800) 828-5500 to order replacement parts or a complete Parts Manual (have your full model number and serial number ready). Parts Manual downloads are also available free of charge at www.troybilt.com.

Notes

10

MANUFACTURER'S LIMITED WARRANTY FOR

TROY-BILT®

The limited warranty set forth below is given by Troy-Bilt LLC with respect to new merchandise purchased and used in the United States and/or its territories and possessions, and by MTD Products Limited with respect to new merchandise purchased and used in Canada and/or its territories and possessions (either entity respectively, "Troy-Bilt").

"Troy-Bilt" warrants this product (excluding its *Belts, Transmission and Attachments* as described below) against defects in material and workmanship for a period of two (2) years commencing on the date of original purchase and will, at its option, repair or replace, free of charge, any part found to be defective in materials or workmanship. This limited warranty shall only apply if this product has been operated and maintained in accordance with the Operator's Manual furnished with the product, and has not been subject to misuse, abuse, commercial use, neglect, accident, improper maintenance, alteration, vandalism, theft, fire, water, or damage because of other peril or natural disaster. Damage resulting from the installation or use of any part, accessory or attachment not approved by Troy-Bilt for use with the product(s) covered by this manual will void your warranty as to any resulting damage.

Belts are warranted to be free from defects in material and workmanship for a period of thirty (30) days from the date of purchase.

Transmission — Troy-Bilt warrants the transmission (including all gears, shafts and housings) against defects in material and workmanship for the life of the tiller, to the original purchaser only, commencing on the date of original purchase or lease.

Attachments — Troy-Bilt warrants attachments for this product against defects in material and workmanship for a period of one (1) year, commencing on the date of the attachment's original purchase or lease. Attachments include, but are not limited to items such as: grass collectors and mulch kits.

HOW TO OBTAIN SERVICE: Warranty service is available, WITH PROOF OF PURCHASE, through your local authorized service dealer. To locate the dealer in your area:

In the U.S.A.

Check your Yellow Pages, or contact Troy-Bilt LLC at P.O. Box 361131, Cleveland, Ohio 44136-0019, or call 1-866-840-6483, 1-330-558-7220 or log on to our Web site at www.troybilt.com.

In Canada

Contact MTD Products Limited, Kitchener, ON N2G 4J1, or call 1-800-668-1238 or log on to our Web site at www.mtdcanada.com.

This limited warranty does **not** provide coverage in the following cases:

a. The engine or component parts thereof. These items may carry a separate manufacturer's warranty. Refer to applicable manufacturer's warranty for terms and conditions.

b. Log splitter pumps, valves, and cylinders have a separate one-year warranty.

c. Routine maintenance items such as lubricants, filters, blade sharpening, tune-ups, brake adjustments, clutch adjustments, deck adjustments, and normal deterioration of the exterior finish due to use or exposure.

d. Service completed by someone other than an authorized service dealer.

e. Troy-Bilt does not extend any warranty for products sold or exported outside of the United States and/or Canada, and their respective possessions and territories, except those sold through Troy-Bilt's authorized channels of export distribution.

f. Replacement parts that are not genuine Troy-Bilt parts.

g. Transportation charges and service calls.

h. Troy-Bilt does not warrant this product for commercial use.

No implied warranty, including any implied warranty of merchantability of fitness for a particular purpose, applies after the applicable period of express written warranty above as to the parts as identified. No other express warranty, whether written or oral, except as mentioned above, given by any person or entity, including a dealer or retailer, with respect to any product, shall bind Troy-Bilt. During the period of the warranty, the exclusive remedy is repair or replacement of the product as set forth above.

The provisions as set forth in this warranty provide the sole and exclusive remedy arising from the sale. Troy-Bilt shall not be liable for incidental or consequential loss or damage including, without limitation, expenses incurred for substitute or replacement lawn care services or for rental expenses to temporarily replace a warranted product.

Some states do not allow the exclusion or limitation of incidental or consequential damages, or limitations on how long an implied warranty lasts, so the above exclusions or limitations may not apply to you.

In no event shall recovery of any kind be greater than the amount of the purchase price of the product sold. **Alteration of safety features of the product shall void this warranty.** You assume the risk and liability for loss, damage, or injury to you and your property and/or to others and their property arising out of the misuse or inability to use the product.

This limited warranty shall not extend to anyone other than the original purchaser or to the person for whom it was purchased as a gift.

HOW STATE LAW RELATES TO THIS WARRANTY: This limited warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

IMPORTANT: Owner must present Original Proof of Purchase to obtain warranty coverage.

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