$ 4.50

TROY-BILT®

Owner's Manual

7HP PONY® REAR-TINE TILLER

- **Safety**
- **Assembly**
- **Controls**
- **Operation**
- **Maintenance**
- **Parts List**

Models

12211 – Recoil Start
12212 – Electric Start

(Recoil Start Model shown)

GARDEN WAY INCORPORATED

Dear Owner:

You now own one of the finest standard-rotating-tine tillers available. Your new PONY® Model tiller allows you to till and cultivate your garden with ease, and accomplish dozens of other property management projects as well. Your tiller is famous for its ruggedness, performance and high-quality engineering. We know you'll enjoy using it.

Please carefully read this Manual. It tells you how to safely and easily assemble, operate and maintain your machine. *Be sure that you and any other operators carefully follow the recommended safety practices at all times. Failure to do so could result in personal injury or property damage.*

Of course, if you should ever have any problems or questions, please contact your local authorized service dealer or call the factory (see back cover of this Manual).

We want to be sure that you are completely satisfied at all times.

NOTE: Be sure to fill out and return the Warranty Registration Card that was supplied with this Manual.

See Back Cover for Customer Service information

Safety Alert Symbol

This is a safety alert symbol. It is used in this manual and on the unit to alert you to potential hazards. When you see this symbol, read and obey the message that follows it. Failure to obey safety messages could result in personal injury or property damage.

This machine meets voluntary safety standard B71.8 – 1996, which is sponsored by the Outdoor Power Equipment Institute, Inc., and is published by the American National Standards Institute.

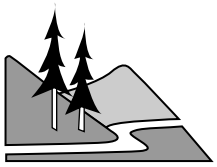
⚠ WARNING

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects or other reproductive harm.

Table of Contents

Section 1 Safety

SPARK ARRESTER WARNING TO RESIDENTS OF CALIFORNIA AND SEVERAL OTHER STATES



Under California law, and under the laws of several other states, you are not permitted to operate an internal combustion engine using hydrocarbon fuels on any forest, brush, hay, grain, or grass covered land; or land covered by any flammable agricultural crop without an engine spark arrester in continuous effective working order.

The engine on the unit is an internal combustion engine which burns gasoline, a hydrocarbon fuel, and must be equipped with a spark arrester muffler in continuous effective working order. The spark arrester must be attached to the engine exhaust system in such a manner that flames or heat from the system will not ignite flammable material. Failure of the owner/operator of the unit to comply with this regulation is a misdemeanor under California law (and other states) and may also be a violation of other state and/or federal regulations, laws, ordinances or codes. Contact your local fire marshal or forest service for specific information about which regulations apply in your area.

Training

1. Carefully read this Owner's Manual, the separate Engine Owner's Manual, and any other literature you may receive. Be thoroughly familiar with the controls and the proper use of the tiller and its engine. Know how to stop the unit and disengage the controls quickly.

2. Never allow children to operate the tiller. Never allow adults to operate the tiller without proper instruction.

3. Keep the area of operation clear of all persons, particularly children and pets.

4. Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people, their property and themselves.

Preparation

1. Thoroughly inspect the area where the tiller is to be used and remove all foreign objects.

2. Be sure all controls are released and the Wheel Gear Lever is in ENGAGE before starting the engine.

3. Do not operate the tiller without wearing adequate outer garments. Avoid loose garments or jewelry that could get caught in moving parts.

4. Do not operate the tiller when barefoot or wearing sandals, sneakers, or light footwear. Wear protective footwear that will improve footing on slippery surfaces.

5. Do not till near underground electric cables, telephone lines, pipes or hoses. If in doubt, contact your telephone or utility company.

6. Warning: Handle fuel with care; it is highly flammable and its vapors are explosive. Take the following precautions:

- **a**. Store fuel in containers specifically designed for this purpose.
- **b**. The gas cap shall never be removed or fuel added while the engine is running. Allow the engine to cool for several minutes before adding fuel.
- **c**. Keep matches, cigarettes, cigars, pipes, open flames, and sparks away from the fuel tank and fuel container.
- **d**. Fill fuel tank outdoors with extreme care. Never fill fuel tank indoors. Use a funnel or spout to prevent spillage.
- **e**. Replace all fuel tank and container caps securely.
- **f.** If fuel is spilled, do not attempt to start the engine, but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have dissipated.

7. Never make adjustments when engine is running (unless recommended by manufacturer).

Operation

1. Do not put hands or feet near or under rotating parts.

2. Exercise extreme caution when on or crossing gravel drives, walks, or roads. Stay alert for hidden hazards or traffic. Do not carry passengers.

3. After striking a foreign object, stop the engine (and remove the ignition key on electric start models), disconnect the spark plug wire and prevent it from touching the spark plug, carefully inspect the tiller for any damage, and repair the damage before restarting and operating the tiller.

4. Exercise caution to avoid slipping or falling.

5. If the unit should start to vibrate abnormally, stop the engine (and remove the ignition key on electric start models). Disconnect the spark plug wire and prevent it from touching the spark plug, and check immediately for the cause. Vibration is generally a warning of trouble.

6. Stop the engine (and remove the ignition key on electric start models), disconnect the spark plug wire and prevent it from touching the spark plug whenever you leave the operating position, before unclogging the tines, or when making any repairs, adjustments or inspections.

7. Take all possible precautions when leaving the machine unattended. Stop the engine. Remove ignition key on electric start models. Disconnect spark plug wire and move it away from the spark plug. Move Wheel Gear Lever to ENGAGE.

8. Before cleaning, repairing, or inspecting, stop the engine, remove the ignition key on electric start models, and make certain all moving parts have stopped. Disconnect the spark plug wire and prevent it from touching the spark plug to prevent accidental starting. On electric start models, always remove the cable from the negative side (–) of the battery.

9. Always keep the tiller tine hood flap down, unless using the hiller/furrower attachment.

10. Never use the tiller unless proper guards, plates, or other safety protective devices are in place.

11. Do not run engine in an enclosed area. Engine exhaust contains carbon monoxide gas, a deadly poison that is odorless, colorless, and tasteless.

12. Keep children and pets away.

13. Never operate the tiller under engine power if the Wheel Gear Lever is in DISENGAGE (FREEWHEEL). In this position, the wheels will not hold the tiller back and the revolving tines could propel the tiller rapidly, possibly causing loss of control. Always move the Wheel Gear Lever to ENGAGE before starting the engine or engaging the tines/wheels with the Forward Clutch or the Reverse Clutch.

14. Be aware that the tiller may unexpectedly bounce upward or jump forward if the tines should strike extremely hard packed soil, frozen ground, or buried obstacles like large stones, roots, or stumps. If in doubt about the tilling conditions, always use the following operating precautions to assist you in maintaining control of the tiller:

a. **Walk behind and to one side of the tiller, using one hand on the handlebars. Relax your arm, but use a secure hand grip.**
b. **Use shallower depth regulator settings, working gradually deeper with each pass.**
c. **Use slower engine speeds.**
d. **Clear the tilling area of all large stones, roots and other debris.**
e. **Avoid using downward pressure on handlebars. If need be, use slight upward pressure to keep the tines from digging too deeply.**
f. **Before contacting hard packed soil at the end of a row, reduce engine speed and lift handlebars to raise tines out of the soil.**
g. **In an emergency, stop tines and wheels by releasing whichever Clutch Lever is engaged. Do not attempt to restrain the tiller.**

15. Do not overload the tiller's capacity by attempting to till too deeply at too fast a rate.

16. Never operate the tiller at high transport speeds on hard or slippery surfaces. Look behind and use care when backing up.

17. Do not operate the tiller on a slope that is too steep for safety. When on slopes, slow down and make sure you have good footing. Never permit the tiller to freewheel down slopes.

18. Never allow bystanders near the unit.

19. Only use attachments and accessories that are approved by the tiller manufacturer.

20. Use tiller attachments and accessories when recommended.

21. Never operate the tiller without good visibility or light.

22. Never operate the tiller if you are tired, or under the influence of alcohol, drugs or medication.

23. Operators shall not tamper with the engine-governor settings on the machine; the governor controls the maximum safe operating speed to protect the engine and all moving parts from damage caused by overspeed. Authorized service shall be sought if a problem exists.

24. Do not touch engine parts which may be hot from operation. Let parts cool down sufficiently.

25. The battery on electric start model tillers contains sulfuric acid. Avoid contact with skin, eyes, or clothing. Keep out of the reach of children.

Antidote–**External Contact:** Flush immediately with lots of water.

Antidote–**Internal:** Drink large quantities of water or milk. Follow with milk of magnesia, beaten eggs or vegetable oil. Call a doctor **immediately.**

Antidote–**Eye Contact:** Flush with water for 15 minutes. **Get prompt medical attention.**

26. Batteries produce explosive gases. Keep sparks, flame, and smoking materials away. Ventilate when charging batteries or when using a battery in an enclosed space. ALWAYS wear safety goggles when working near batteries.

27. Please remember: You can always stop the tines and wheels by releasing the Forward Clutch Lever or the Reverse Clutch Control (whichever control you have engaged) or by moving the Throttle Control Lever to STOP on recoil start models or by turning the ignition key to OFF on electric start models.

28. To load or unload the tiller, see the instructions in Section 4 of this Manual.

29. Use extreme caution when reversing or pulling the machine towards you.

30. Start the engine carefully according to instructions and with feet well away from the tines.

31. Never pick up or carry a machine while the engine is running.

Maintenance and Storage

1. Keep the tiller, attachments and accessories in safe working condition.

2. Check all nuts, bolts, and screws at frequent intervals for proper tightness to be sure the equipment is in safe working condition.

3. Never store the tiller with fuel in the fuel tank inside a building where ignition sources are present such as hot water and space heaters, furnaces, clothes dryers, stoves, electric motors, etc. Allow engine to cool before storing in any enclosure.

4. To reduce the chances of a fire hazard, keep the engine free of grass, leaves, or excessive grease.

5. Store gasoline in a cool, well-ventilated area, safely away from any spark- or flame-producing equipment. Store gasoline in an approved container, safely away from the reach of children.

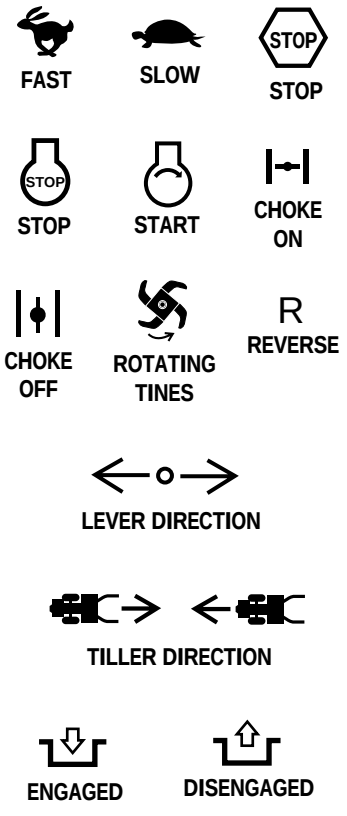
6. Refer to the Maintenance section of this Manual and in the separate Engine Owner's Manual for instructions if the tiller is to be stored for an extended period.

7. Never perform maintenance while the engine is running or the spark plug wire is connected, except when specifically instructed to do so.

8. If the fuel tank has to be drained, do this outdoors.

Operating Symbols

Various symbols (shown here, with word descriptions) may be used on the tiller and engine.



Decals

For your safety and the safety of others, various safety message decals are on your unit (see Figure below). Keep the decals clean and legible at all times. Contact your local service dealer or the factory for replacements if any decals are damaged or missing.

Refer to the Parts List pages for decal locations and part numbers.

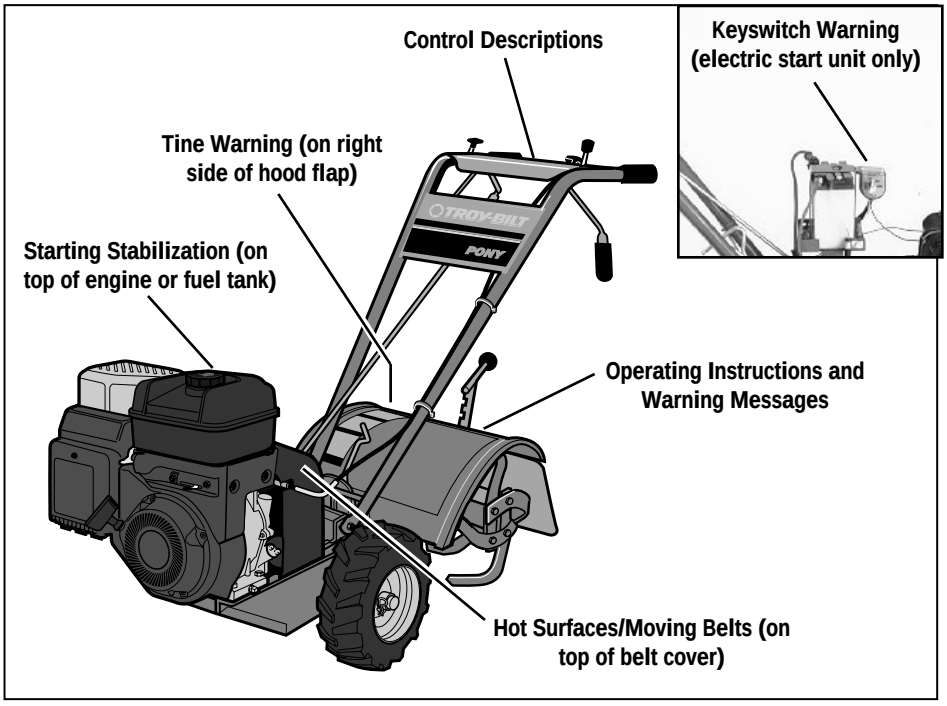


Figure 1: Location of Safety and Operating Decals

⚠ WARNING

TO AVOID SERIOUS INJURY:

- **READ THE OWNER'S MANUAL.**
- **KNOW LOCATIONS AND FUNCTIONS OF ALL CONTROLS.**
- **KEEP ALL SAFETY DEVICES AND SHIELDS IN PLACE AND WORKING.**
- **NEVER ALLOW CHILDREN OR UNINSTRUCTED ADULTS TO OPERATE TILLER.**
- **SHUT OFF ENGINE AND DISCONNECT SPARK PLUG WIRE BEFORE MANUALLY UNCLOGGING TINES OR MAKING REPAIRS.**
- **KEEP BYSTANDERS AWAY FROM MACHINE.**
- **KEEP AWAY FROM ROTATING PARTS.**
- **USE EXTREME CAUTION WHEN REVERSING OR PULLING THE MACHINE TOWARDS YOU.**

Section 2 Assembly

⚠ 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.

Introduction

Carefully follow these assembly steps to correctly prepare your tiller for use. It is recommended that you read this Section in its entirety before beginning assembly.

Inspect unit

Inspect the unit and carton for damage immediately after delivery. Contact the carrier (trucking company) if you find or suspect damage. Inform them of the damage and request instructions for filing a claim. To protect your rights, put your claim in writing and mail a copy to the carrier within 15 days after the unit has been delivered. Contact us at the factory if you need assistance in this matter.

STEP 1: Unpacking Instructions

1. Remove any cardboard inserts and packaging material from the carton. Remove any staples from the bottom of the carton and remove the carton.

2. Remove the handlebars from the carton. To avoid damaging parts, do not uncoil any cables until instructed to do so.

3. A bag with loose hardware is inside the literature envelope. Check the contents against the following list and Figure 2-1. Contact your local dealer or the factory if any items are missing or damaged.

NOTE: For electric start units, a second hardware bag is located near the battery. The parts in that bag are described later in this Section.

4. The tiller is heavy and you should not attempt to remove it from the shipping platform until instructed to do so in these "Assembly" steps.

Hardware Bag Parts List

Fig. Ref.	Qty.	Description
1	1	Height Adjustment Handle
2	1	Keyed Washer
3	3	Hairpin Cotter (one spare)
4	2	3/8-16 x 1" Hex Hd. Screw
5	2	3/8" Flat Washer
6	2	3/8"-16 Nylock Lock Nut
7	1	Throttle Lever Knob
8	1	Wheel Gear Lever Knob
9	4	#10-32 x 1/2" Round Hd. Screw
10	4	#10 Lockwasher
11	4	#10-32 Nut
12	4	Plastic Tie Strap
13	1	Cotter Pin (not used on unit)

Tools/Materials Needed for Assembly

(1) 3/8" open-end wrench*

(1) 7/16" open-end wrench* (electric start unit only)

(2) 9/16" open-end wrench*

(1) 7/8" open-end wrench or 8" long adjustable wrench

(1) Scissors (to trim plastic ties)

(1) Ruler

(1) Small board (to tap plastic knobs on levers)

(1) Tire pressure gauge

(1) Clean oil funnel

(1) Clean, high-quality motor oil. Refer to the separate Engine Owner's Manual for motor oil specifications and quantity required.

* Adjustable wrenches may be used.

IMPORTANT: Motor oil must be added to the engine crankcase before the engine is started. Follow the instructions in this "Assembly" Section and in the separate Engine Owner's Manual.

NOTE: LEFT and RIGHT sides of the tiller are as viewed from the operator's position behind the handlebars.

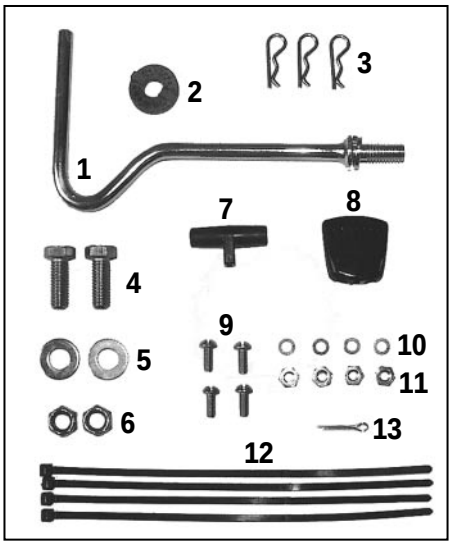


Figure 2-1: Loose hardware (see parts list).

STEP 2: Attach Handlebars

1. On electric start units, remove one screw and lockwasher from the curved height adjustment bracket (A, Figure 2-2), loosen the second screw, and swing the bracket to one side.

2. Place the handlebar cross-brace (B, Figure 2-3) in front of the curved height adjustment bracket (C) and position the handlebar ends on the outside of the two mounting tabs on the transmission cover.

3. Loosely attach the handlebars to the mounting tabs with two 3/8-16 x 1" screws (heads of screws go to inside of tabs), 3/8" flat washers and 3/8"-16 Nylock lock nuts (see D, Figure 2-3).

4. On electric start units, reattach the height adjustment bracket (A, Figure 2-2). Tighten both screws securely.

5. Move the handlebars up or down to align the hole in the cross-brace with one of the four slots in the curved height adjustment bracket. Place the keyed washer (E, Figure 2-4) on the height adjustment handle (F) with the raised keys (edges) on the washer facing down.

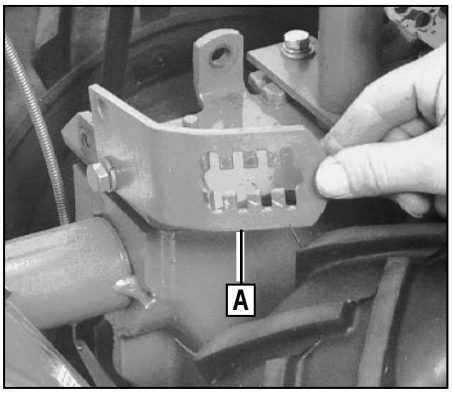


Figure 2-2: Move height bracket aside.

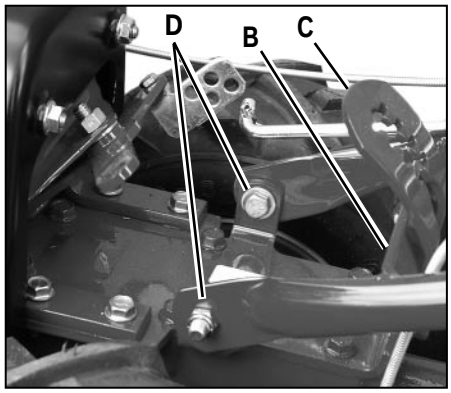


Figure 2-3: Attach handlebars.

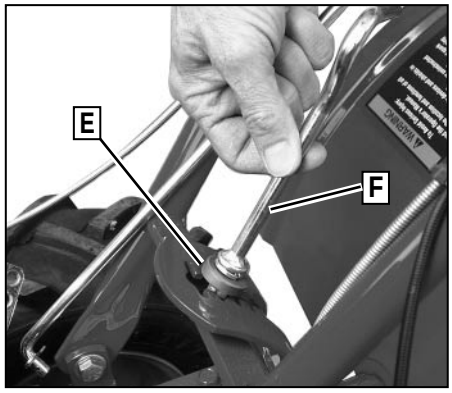


Figure 2-4: Install height adjustment handle.

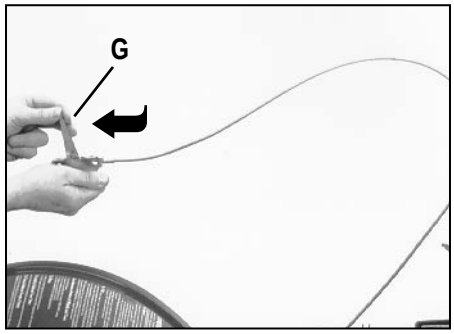


Figure 2-5: Carefully unwrap Wheel Gear Lever and move lever to DISENGAGE.

6. Screw the height adjustment handle (F) into the hole in the handlebar cross-brace, making sure that the raised keys on the washer fit into the slot on the height adjustment bracket. Tighten the height adjustment handle securely. Next, securely tighten the two screws in the ends of the handlebars (D, Figure 2-3).

7. To remove the tiller from its shipping platform, first carefully unwrap the wheel gear cable (G, Figure 2-5) from around the chassis. Next, move the Wheel Gear Lever to the DISENGAGE position (this allows the wheels to rotate). Use the handlebars to roll the tiller off the platform.

IMPORTANT: Use the DISENGAGE position only when the engine is not running. Before starting the engine, the Wheel Gear Lever must be placed in the ENGAGE position (see Section 3 for details).

STEP 3: Attach Reverse Clutch Control

1. Carefully unwrap the Reverse Clutch Control cable (H, Figure 2-6) from its shipping position and route it up along the inside edge of the left side handlebar. A knob and large hex nut (I) is installed on the cable.

2. Insert the cable into the slot in the control panel and fit the threaded assembly into the hole in the slot (see Figure 2-6). Be sure that the flat side of the threaded assembly is aligned with the flat side of the hole. Slide the hex nut (I) up the cable and tighten it securely.

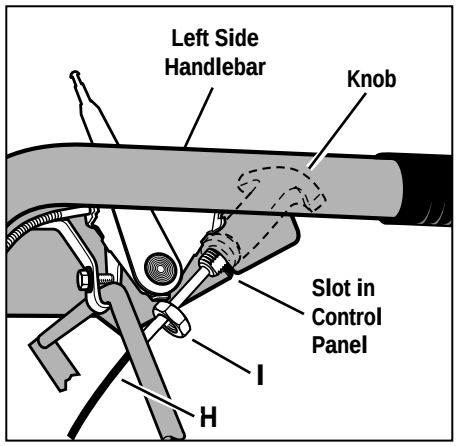


Figure 2-6: Attach Reverse Clutch Control to slotted hole in handlebar panel.

3. Test the function of the reverse clutch cable by pulling the knob out and releasing it. The knob should return to its neutral position against the tapered bushing when it is released. If it doesn't, contact your local dealer or the factory for technical assistance.

STEP 4: Attach Forward Clutch Rod

1. The upper end of the Forward Clutch rod is connected to the two Forward Clutch levers (paddles) that hang below the handlebar grips. Turn the lower end of the rod (J, Figure 2-7) so that the angled end points inward toward the outer face of the clutch swivel plate (K).

2. Insert a hairpin cotter down through the innermost hole in the rod (Figure 2-7).

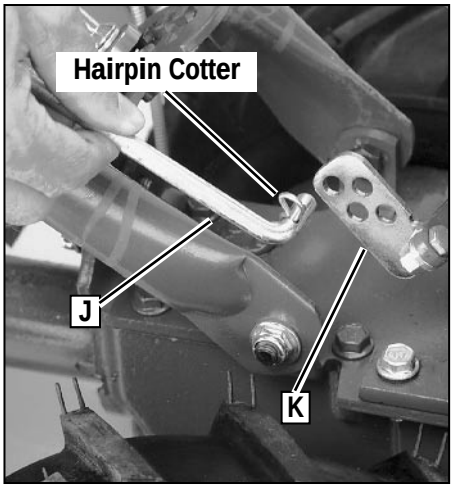


Figure 2-7: Install Forward Clutch rod.

3. There are four holes in the clutch swivel plate and four slots in the curved height adjustment bracket (see numbered holes and slots in Figure 2-8). For correct operation of the Forward Clutch rod, the numbered hole used for the Forward Clutch rod must match with the numbered slot in the height adjustment bracket. For example, if the Forward Clutch rod is installed in hole #1 of the clutch swivel plate, then the handlebar height adjustment handle must be installed in slot #1 of the height adjustment bracket.

IMPORTANT: If the handlebar height is changed, the hole position of the Forward Clutch rod must be changed accordingly. Changing the handlebar height changes the tension on the Forward Clutch rod – this tension must be adjusted by relocating the rod in the appropriate hole in the clutch swivel plate.

4. Select the proper hole in the clutch swivel plate and insert the Forward Clutch rod with the tip facing inward (see Figure 2-8). *Secure the rod by inserting a second hairpin cotter through the hole near the tip of the rod.*

5. Check for correct tension on the Forward Clutch rod as follows:

(a) Two interconnected Forward Clutch paddles hang beneath the handlebar grips. Lift and hold the right-side paddle against the handlebar grip.

(b) While squeezing the paddle, measure the gap between the E-ring and the lower end of the clutch rod bracket (see Figure 2-9). The gap should be 3/16"-to-5/16". NOTE: A stack of five pennies is approximately 5/16" thick.

(c) If the gap is incorrect:

(1) First check that the Forward Clutch rod is in the correct hole in the clutch swivel plate. If not, reposition the rod and repeat Step 5b.

(2) If the Forward Clutch rod is in the correct hole and the gap is incorrect, you will need to adjust the length of the Forward Clutch rod. To do this, first release the Forward Clutch paddle and then disconnect the rod from the clutch swivel plate.

If the gap is more than 5/16", rotate the rod counterclockwise (as viewed from the front of tiller) to decrease the gap. Reinstall the rod in the correct clutch swivel plate hole, secure it with the hairpin cotter, and repeat Steps 5a and 5b.

If the gap is less than 3/16", rotate the rod clockwise (as viewed from the front of tiller) to increase the gap. Reinstall the rod in the correct clutch swivel plate hole, secure it with the hairpin cotter, and repeat Steps 5a and 5b.

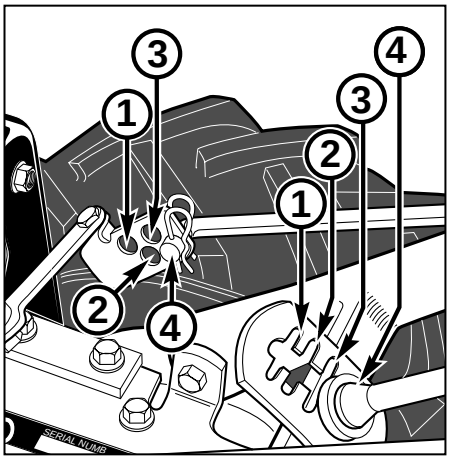


Figure 2-8: Numbered settings for handlebar height slots and clutch swivel plate holes.

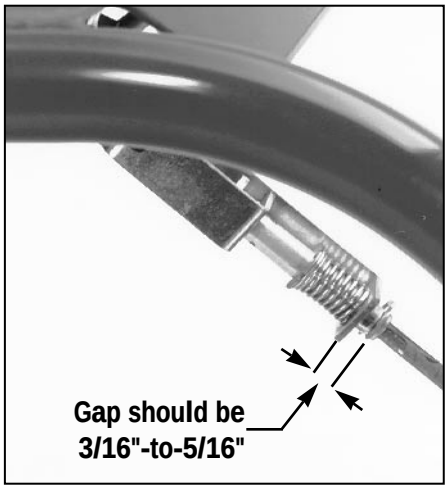


Figure 2-9: While squeezing Forward Clutch paddle, measure gap between end of bracket and E-ring.

STEP 5: Check Gear Oil Level in Transmission

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

IMPORTANT: 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 (L, Figure 2-10) back and then slide it to the second notch from the top. NOTE: If the lever does not move, lift the tine hood flap and look for a plastic tie securing the lever in place. Cut and remove the tie.

2. Remove the oil level check plug (M, Figure 2-11) on the left-side of the transmission. (Due to dried paint on the plug threads, it may require some force to remove the plug the first time.) The gear oil level is correct if oil starts to flow out of the hole as the plug is removed. If so, securely reinstall the plug.

3. If oil does not flow from the check hole, add oil as follows:

NOTE: Do not use automatic transmission fluid or motor oil in the transmission.

(a) Clean area around oil fill hole (N, Figure 2-12) and unscrew oil fill plug.

(b) 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.

(c) Using a clean funnel, slowly add gear oil until it flows from the oil level check hole (M, Figure 2-11). Securely reinstall the oil level check plug (M).

(d) Reinstall and hand-tighten the oil fill plug (N).

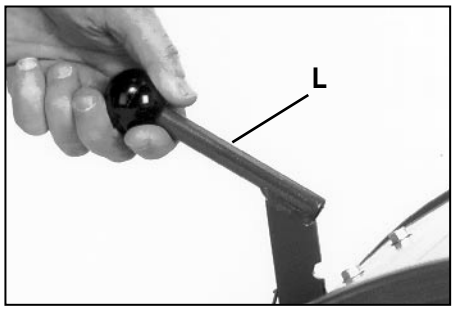


Figure 2-10: Put lever in second notch.

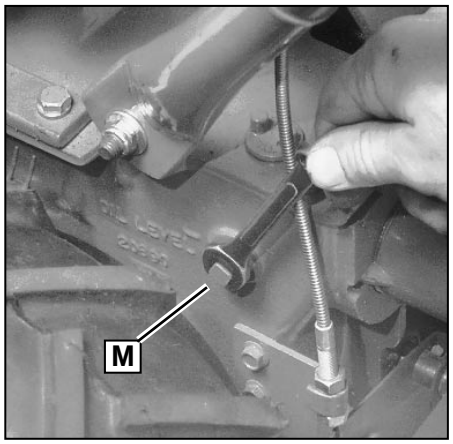


Figure 2-11: Gear oil level check plug.

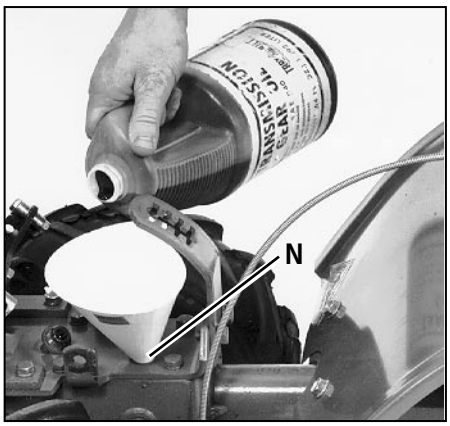


Figure 2-12: Adding gear oil.

STEP 6: Add Motor Oil to Engine

The tiller is shipped *without* oil in the engine.

IMPORTANT: Do not start the engine without first adding motor oil. Severe engine damage will result if the engine is run without oil.

1. Refer to the separate Engine Owner's Manual for motor oil specifications and capacities.

2. With the unit on level ground, move the Depth Regulator Lever (L, Figure 2-10) up or down until the engine is level.

3. Add motor oil as described in the Engine Owner's Manual.

4. Move the Depth Regulator Lever all the way down until the highest notch is engaged. This places the tines in the "travel" position.

STEP 7: Attach Engine Throttle Lever

1. Carefully unwrap the engine throttle cable assembly from around the engine and route it up the right-side handlebar.

2. Insert the Throttle Lever (O, Figure 2-13) up through the slot in the control panel that is labeled "ENGINE THROTTLE."

3. Insert two #10-32 x 1/2" round head screws down through the "+" marks on the control panel decal and securely attach the throttle lever mounting bracket using two #10 lockwashers and #10-32 nuts.

4. Using a board, tap the "T" shaped knob securely onto the lever (see Figure 2-13).

5. Move the lever fully forward and backward. On recoil start models, it should move freely from the "FAST" to the "STOP" settings. On electric start models, it should move freely from the "FAST" to the "SLOW" settings. (Note that there is a detent setting which will catch the lever before it reaches the "STOP" [recoil start model] or "SLOW" [electric start model] settings.)

If the lever is difficult to move away from the "STOP" (recoil start model) or "SLOW" (electric start model) settings, loosen both bracket screws, move the lever assembly slightly to the left, and retighten both screws. Recheck the lever movement and readjust as needed.

6. Secure the throttle cable to the right-side handlebar with two plastic ties (R, Figure 2-14) located about two feet apart. The serrated side of the tie should be on the inside of the loop. Snip off any excess tie length with scissors.

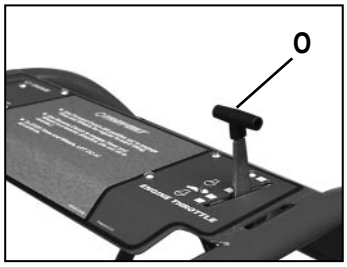


Figure 2-13: Attach engine throttle lever.

STEP 8: Attach Wheel Gear Lever

1. Carefully unwrap the wheel gear cable from around the transmission and route the cable up the left-side handlebar.

2. Insert the Wheel Gear Lever (P, Figure 2-15) up through the slot in the control panel that is labeled "WHEEL GEAR."

3. Insert two #10-32 x 1/2" round head screws down through the "+" marks on the control panel decal and securely attach the wheel gear mounting bracket using two #10 lockwashers and #10-32 nuts.

4. Using a board, tap the Wheel Gear Lever knob securely onto the lever (see Figure 2-15).

5. Secure the wheel gear cable and the reverse clutch cable to the left-side handlebar with two plastic ties (S, Figure 2-14) located about two feet apart. Snip off any excess tie length with scissors.

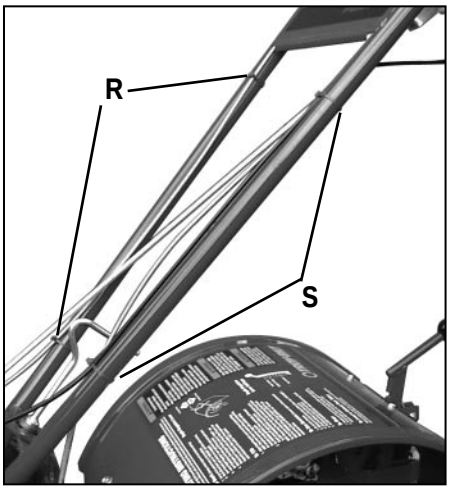


Figure 2-14: Attach throttle cable with cable ties (R). Attach wheel gear cable and reverse clutch cable with cable ties (S).

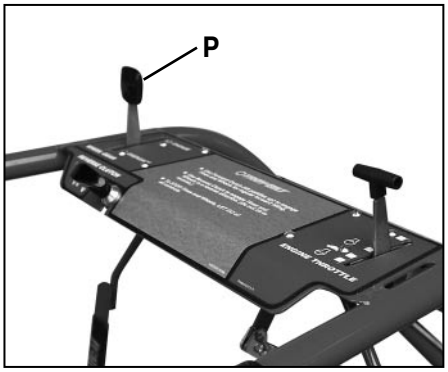


Figure 2-15: Attach Wheel Gear Lever.

STEP 9: Check Air Pressure in Tires

Use a tire pressure gauge to check the air pressure in both tires. Deflate or inflate both tires equally to 15-to-20 PSI (pounds per square inch). Be sure that both tires are inflated equally or the unit will pull to one side.

STEP 10: Check Hardware for Tightness

Inspect the hardware on the unit and tighten any loose screws, bolts and nuts.

IMPORTANT:

- This completes the assembly steps for the standard (recoil) start tiller. Be sure to read the rest of this Manual, and the separate Engine Owner's Manual, before you operate your tiller.
- If you have an electric start model, continue with the following electric start assembly steps.

Electric Start Assembly Steps

The following steps explain how to prepare and install the battery. FOR YOUR SAFETY, CAREFULLY FOLLOW ALL STEPS AND OBSERVE ALL ACCOMPANYING SAFETY MESSAGES. Before beginning, check that you have received the following items (see Figure 2-16):

1. Battery (installed on tiller)
2. Clear plastic vent tube
3. Two hex screws and hex nuts

⚠ WARNING

Remove metal jewelry before working near the battery or near the electrical system.

Failure to comply may cause a short circuit, resulting in electrical burns, electrical shock, or an explosion of battery gases.

STEP 1: Battery Activation and Charging

The battery is shipped dry. It must be filled with battery electrolyte (battery grade sulfuric acid) and fully charged before it can be used.

Adding electrolyte and charging the battery can be dangerous. The electrolyte contains acid that can burn or blind you. Battery charging produces potentially explosive gases.

It is strongly recommended that you have the battery serviced by a trained professional (your authorized tiller dealer, a reliable service station, a battery store, etc.). Do not attempt to activate and charge the battery unless you are fully experienced in battery activation and charging procedures.

To ensure that the battery is properly activated and charged, you should review the activating and charging instructions with your battery technician.

⚠ DANGER

Battery electrolyte is a sulfuric acid solution that is poisonous and causes severe burns.

- **Avoid spills or contact with skin, eyes, clothing.**
- **To prevent accidents, wear protective clothes, rubber gloves and shield eyes with safety goggles when working on or near the battery.**
- **Neutralize acid spills with a baking soda and water solution. Neutralize electrolyte container with same solution. Then rinse with clear water.**

ANTIDOTE: External – Flush with water. Eyes – Flush with water for 15 minutes and get immediate medical attention.

ANTIDOTE: Internal – Drink a large quantity of water or milk. Follow with milk of magnesia, beaten eggs, or vegetable oil. Call physician immediately.

A. To Activate the Battery:

1. Remove the battery from the tiller by removing the screws, lockwashers and nuts from the battery hold-down clamp.

2. Place battery on a level surface, safely away from any spark- or flame-producing sources such as stoves, heaters, electrical switches, pilot lights, dryers, etc.

3. Remove and discard the short sealing tube (if so equipped) that covers the vent fitting located on the negative (-) side of the top of the battery.

4. Remove the six filler caps from the top of the battery. Leave the caps off while activating and charging the battery.

5. Put on protective clothing, rubber gloves and eye protection. For best results, the temperature of the battery and electrolyte should be between 60° F to 80° F. Carefully fill each of the six cells with electrolyte (battery grade sulfuric acid with a specific gravity of 1.265) up to the UPPER LEVEL line printed on the battery. Do not add water or any other liquid during this initial activation.

6. Allow battery to stand for 30 minutes and then recheck the electrolyte level in each cell. Add more electrolyte solution if needed. Do not overfill the battery as this could result in flooding from the cells during charging.

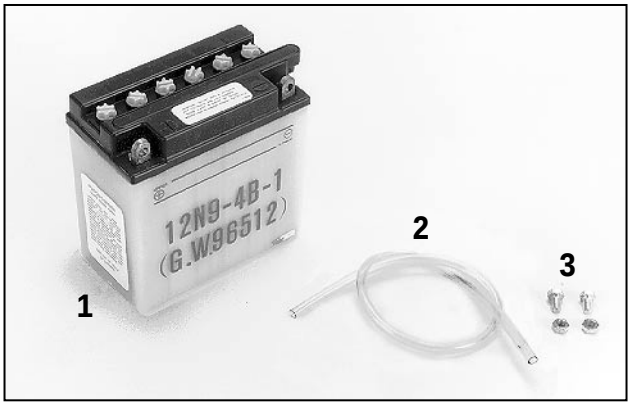


Figure 2-16

⚠ DANGER

Batteries produce explosive gases!

- **Keep sparks, flame and cigarettes away.**
- **Ventilate area when charging or using battery in an enclosed space.**
- **Make sure venting path of battery is always open once battery is filled with acid.**
- **Follow safety rules and instructions supplied by manufacturers of battery and charger unit.**
- **During charging, do not leave battery unattended. Charging time need not be continuous.**
- **When checking the battery for gassing, always wear safety goggles and use a flashlight to look down into the cells.**

B. To Charge the Battery:

To obtain maximum battery life, charge the battery using the following method until all cells are gassing freely. A battery is gassing freely when the surface of the electrolyte is covered with tiny bubbles.

Be sure to follow all instructions provided by the manufacturer of the battery charging unit that is being used to charge the battery.

1. Charge the battery approximately three to five hours at a rate of 1-to-2 amperes. Turn the battery charger off and disconnect the charger cables from the battery terminals.

2. Check the electrolyte level in each cell. If the electrolyte level has fallen, refill the battery with distilled water until the level reaches the UPPER LEVEL line.

3. Securely replace all six filler caps. Use a baking soda and water solution to rinse of any electrolyte that may have spilled. Then dry the battery.

⚠ DANGER

- **Do not touch positive (+) battery terminal and any surrounding metal with tools, jewelry or other metal objects. Failure to comply could cause a short circuit that could cause electrical burns or an explosion of battery gases.**
- **Incorrect installation of the battery can result in electrical system damage. Follow installation instructions carefully to avoid damage.**

STEP 2: Install Battery

1. Reinstall the battery on the battery mounting base with the two cable mounting posts facing to the rear of the tiller. Be sure that the positive (+) post is on the left-side of the tiller and the negative (-) post is on the right-side (as viewed from rear of tiller). See Figure 2-17.

2. Reinstall the battery hold-down bracket over the battery with the ignition switch (T, Figure 2-17) toward the front of the unit. Attach the bracket to the mounting base using the two 1/4-20 x 1-1/4" carriage screws (insert screws up from beneath mounting base), 1/4" lockwashers and 1/4"-20 nuts removed previously. Tighten the nuts securely, but not so much as to bend the tabs on the hold-down bracket.

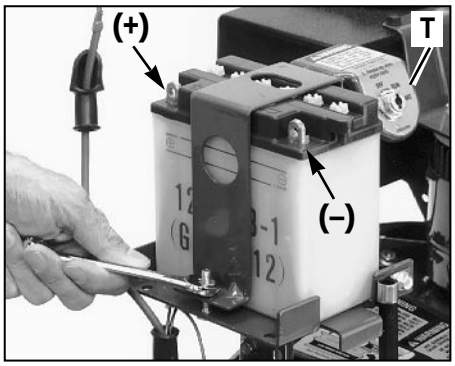


Figure 2-17: Attach hold-down clamp.

STEP 3: Attach Battery Cables and Vent Tube

1. Locate the positive battery cable, which is connected to the starter solenoid on the left-side of the battery post (a rubber boot covers the connection). A second rubber boot is loosely installed on the cable. Using the small screw and nut from the hardware bag, connect the loose end of the cable to the positive (+) post on the battery. See Figure 2-18.

2. Slide the rubber boot over the positive (+) battery post.

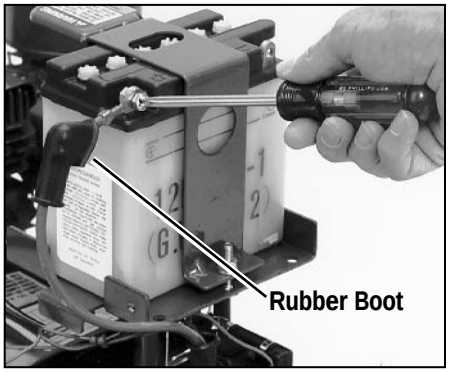


Figure 2-18: Attach positive (+) battery cable. Cover connection with rubber boot.

3. The negative battery cable is connected to the upper mounting screw that attaches the starter solenoid to the back of the battery post. This is the ground for the negative cable. Using the second screw and nut, attach the loose end of the cable to the negative (-) battery post. See Figure 2-19.

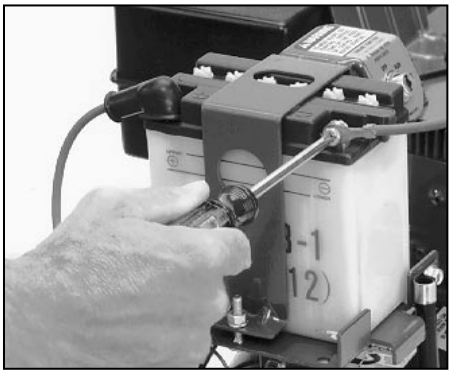


Figure 2-19: Attach negative (-) battery cable.

4. Check the tightness of the upper mounting screw that secures the negative cable and starter solenoid to the battery post. See Figure 2-20. Scrape away any paint between the cable and the screw as the paint can prevent a good electrical ground.

5. Install one end of the clear plastic vent tube over the vent fitting (U, Figure 2-21) on the battery. Insert the other end down into the vent tube shield (V).

⚠ WARNING

Improper venting can cause a battery to explode, resulting in severe personal injury or property damage.

Be sure that the vent tube does not become kinked, folded or pinched along its entire length.

STEP 4: Connect Wiring Harness

Attach the wiring harness receptacle to the prongs on the back of the ignition switch (see Figure 2-22).

IMPORTANT: This completes the assembly steps for the electric start tiller. Be sure to read the rest of this Manual, and the separate Engine Owner's Manual, before you operate your tiller.

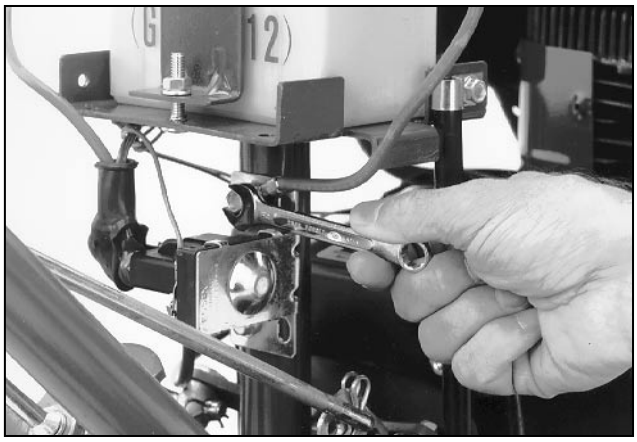


Figure 2-20: Check tightness of upper mounting screw.

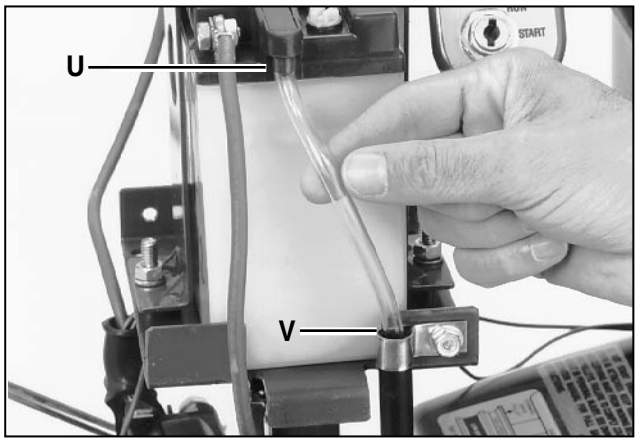


Figure 2-21: Install vent tube.

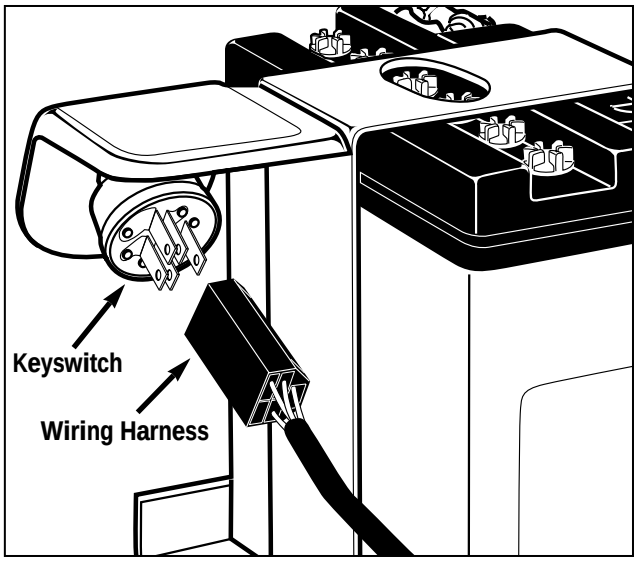


Figure 2-22: Attach wiring harness to keyswitch.

Section 3 Features and Controls

⚠ WARNING

Before operating your machine, carefully read and understand all safety, controls and operating instructions in this Manual, the separate Engine Owner's Manual, and on the decals on the machine.

Failure to follow these instructions can result in serious personal injury.

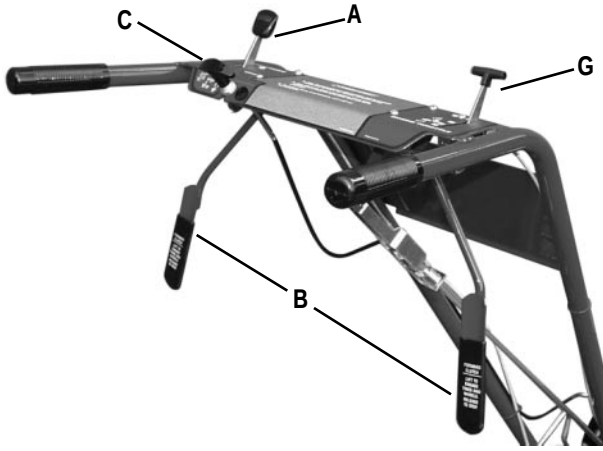


Figure 3-1: Controls located on handlebar.

INTRODUCTION

This Section describes the location and function of the controls on your tiller. Refer to the following section "Operation" for detailed operating instructions.

Practice using these controls, with the engine shut off, until you understand the operation of the controls and feel confident with each of them.

IMPORTANT: Refer to the separate engine manufacturer's Engine Owner's Manual for information about the controls on the engine.

Wheel Gear Lever

This lever (A, Figure 3-1) has two positions: ENGAGE and DISENGAGE.

In the ENGAGE position, the wheels will start turning when either the Forward Clutch or the Reverse Clutch is engaged (the tines will also start turning when either clutch is engaged).

The DISENGAGE position places the wheels in the freewheeling mode to allow the unit to be moved without the engine running. Use the DISENGAGE position only when the engine is not running. See "DANGER" statement that follows.

To shift to ENGAGE, gently (do not force) move the lever forward while also rolling the tiller a few inches forward or backward. Moving the tiller helps to align the shift mechanism with the transmission wheel drive gears.

To shift to DISENGAGE (freewheel), move the lever rearward, without rolling the tiller. The wheels will roll freely when the lever is properly set in the DISENGAGE position.

⚠ DANGER

Never place the Wheel Gear Lever in DISENGAGE (Freewheel) when the engine is running.

Having the Wheel Gear Lever in DISENGAGE and then engaging the tines/wheels with either the Forward Clutch or the Reverse Clutch could allow the tines to propel the tiller rapidly forward or backward.

Failure to follow this instruction could result in personal injury or property damage.

Forward Clutch

The two interconnected levers (B, Figure 3-1) control the engagement of forward drive to the wheels and tines.

To Operate the Forward Clutch:

1. Before engaging the Forward Clutch, put the Wheel Gear Lever in the ENGAGE position (see "WARNING" below).

2. Lift and hold one or both of the levers against the handlebar grips to engage the wheels and tines.

3. Release BOTH levers to disengage (stop) the wheels and tines. All forward motion will stop (the engine will continue to run).

⚠ WARNING

Never engage the wheels and tines with the Forward Clutch or the Reverse Clutch unless the Wheel Gear Lever is in ENGAGE.

Engaging the Forward Clutch or the Reverse Clutch when the wheels are not engaged could allow the tines to rapidly propel the tiller forward or backward.

Failure to follow this warning could result in personal injury or property damage.

Section 3: Features and Controls

Reverse Clutch

The Reverse Clutch (C, Figure 3-1) controls the engagement of reverse drive to the wheels and tines. **The reversing feature is used for maneuvering the tiller only – never engage the tines in the ground while going in the reverse direction.**

⚠ WARNING

- **Use extreme caution when reversing or pulling the machine towards you. Look behind to avoid obstacles.**
- **Never attempt to till in reverse.**

Failure to follow this warning could result in personal injury or property damage.

To Operate the Reverse Clutch:

1. Put the Wheel Gear Lever in the ENGAGE position (see the "WARNING" statement on previous page).

2. Stop all tiller motion by releasing the Forward Clutch levers.

3. Lift up the handlebars until the tines clear the ground, look behind you to avoid any obstacles, and then pull the Reverse Clutch control knob out. The tines and wheels will rotate in a reverse direction.

4. Release the Reverse Clutch control knob to disengage (stop) the wheels and tines. All reverse motion will stop (the engine will continue to run).

Depth Regulator

This lever (D, Figure 3-2) controls the tilling depth of the tines. Pull the lever straight back and slide it up or down to engage the notched height settings.

The highest notch (lever all the way down) raises the tines approximately 1-1/2 inches off the ground. This "travel" position allows the tiller to be moved without the tines digging into the ground.

Moving the lever up increases the tilling depth. The lowest notch allows a tilling depth of approximately six to eight inches, depending on soil conditions.

For best results, always begin tilling at a very shallow depth setting and gradually increase the tilling depth. Complete details on using the Depth Regulator are found in the "Operation" Section of this manual.

⚠ WARNING

- **Do not attempt to till too deeply too quickly. Gradually work down to deeper tilling depths.**
- **Place the Depth Regulator Lever in the "travel" position before starting the engine. This position prevents the tines from touching the ground until you are ready to begin tilling.**

Failure to follow this warning could result in personal injury or property damage.

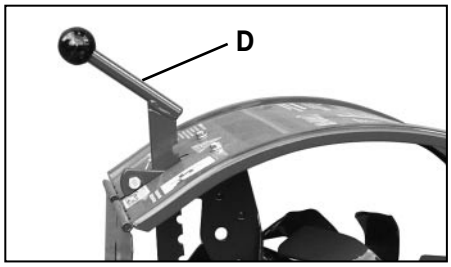


Figure 3-2: Depth Regulator Lever.

Handlebar Height Adjustment

The handlebar height is adjustable to four different settings. Set the handlebar height to a comfortable setting, but keep in mind that the handlebars will be lower when the tines are engaged in the soil.

⚠ WARNING

Whenever the handlebar height is changed, the Forward Clutch shift mechanism must be readjusted.

When adjusting or checking the Forward Clutch mechanism, shut engine off, disconnect spark plug wire and prevent it from touching the spark plug.

Failure to follow this warning could allow the Forward Clutch mechanism to operate improperly which could result in personal injury or property damage.

To Adjust the Handlebar Height:

1. Stop the engine, wait for all parts to stop moving and then disconnect the spark plug wire. Remove the ignition key on electric start models.

2. Loosen the two screws at the lower ends of the handlebar.

3. Loosen the height adjustment handle (E, Figure 3-3) and pull the keyed washer (F) free of the slots in the curved height adjustment bracket.

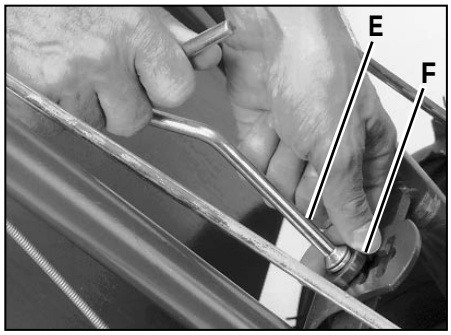


Figure 3-3: Height Adjusting Handle (E).

4. Move the handlebars to the new slot setting and insert the raised keys on the keyed washer into the slot. Tighten the height adjustment handle securely.

5. Retighten the two screws at the ends of the handlebar.

6. Adjust the tension on the Forward Clutch rod shift mechanism, as follows:

(a) Remove the inner hair pin cotter from the end of the Forward Clutch rod.

(b) There are four holes in the clutch swivel plate and four slots in the height adjustment bracket (see numbered holes and slots in Figure 3-4). For correct operation of the Forward Clutch mechanism, the numbered hole used for the Forward Clutch rod must match the numbered slot in the height adjustment bracket. Example: If handlebar is in slot #4, put Forward Clutch rod in hole #4 of clutch swivel plate.

(c) Select the correct hole in the clutch swivel plate and insert the Forward Clutch rod (tip faces inward). Secure the rod with the hairpin cotter.

(d) Check for correct tension on the Forward Clutch rod as described in item 5 of "Step 4: Attach Forward Clutch Rod" on page 8.

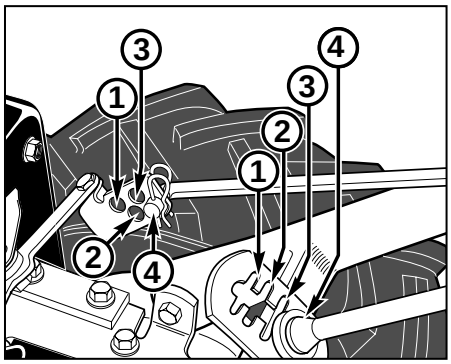


Figure 3-4: Handlebar height slots and clutch swivel plate holes.

ENGINE CONTROLS

Refer to the engine manufacturer's Engine Owner's Manual (included in the tiller literature package) to identify the controls on your engine. The following two controls are located on the tiller.

Engine Throttle Lever

The Throttle Lever (G, Figure 3-5) is used to regulate the engine speed. On the recoil start model only, it is also used to stop the engine (on the electric start model, the electric start keyswitch is used to stop the engine). The throttle settings are shown below.

IMPORTANT: See "Starting and Stopping the Engine" in the "Operation" Section for detailed engine starting and stopping instructions.

FAST - Use for most tilling and cultivating projects.

START - Use when starting engine.

SLOW - Use when idling engine or when slower tilling and cultivating speeds are needed.

STOP (on recoil start model only) - Stops the engine.

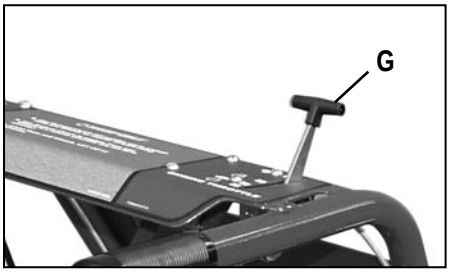


Figure 3-5: Engine Throttle Lever.

Electric Start Keyswitch (electric start model)

The ignition keyswitch on the electric start model (H, Figure 3-6) is used to start and stop the engine. The keyswitch settings are described below.

IMPORTANT: See "Starting and Stopping the Engine" in the "Operation" Section for detailed engine starting and stopping instructions.

OFF - Stops engine.

RUN - After starting, key returns to run position.

START - Starts engine. Release key when engine starts (avoid cranking engine for longer than 15 seconds at a time).

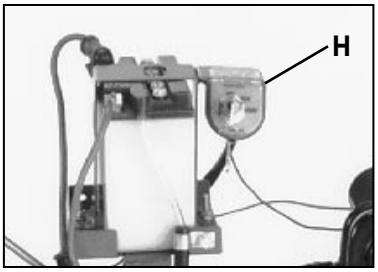


Figure 3-6: Electric start keyswitch.

Section 4 Operation

⚠ WARNING

Before operating your machine, carefully read and understand all safety (Section 1), controls (Section 3) and operating instructions (Section 4) in this Manual, in the separate Engine Owner's Manual, and on the decals on the machine.

Failure to follow these instructions can result in serious personal injury.

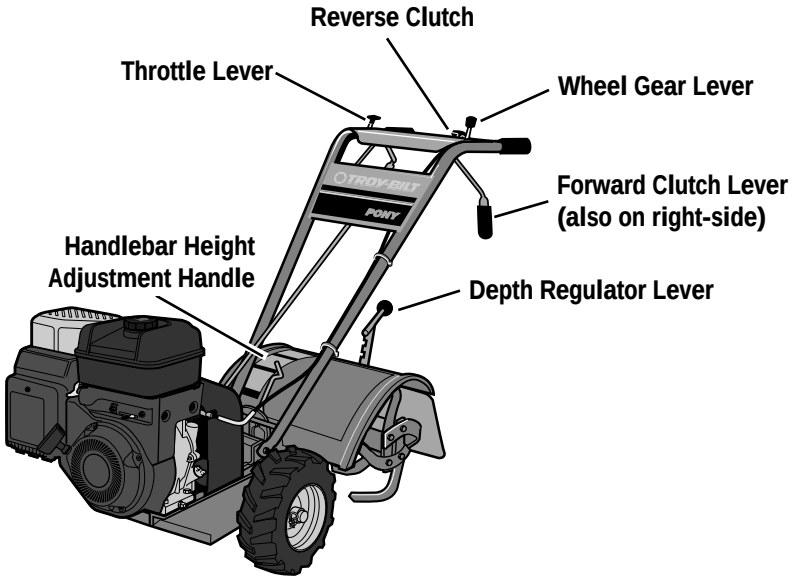


Figure 4-1: Location of main tiller controls.

INTRODUCTION

Read this Section of the manual thoroughly before you start the engine. Then, take the time to familiarize yourself with the basic operation of the tiller before using it in the garden.

Find an open, level area and practice using the tiller controls without the tines engaging the soil (put tines in "travel" setting). Only after you've become completely familiar with the tiller should you begin using it in the garden.

BREAK-IN OPERATION

Perform the following maintenance during the first hours of new operation (see "Maintenance" in this manual and in the Engine Owner's Manual).

1. Change engine oil after first two (2) hours of new engine operation.

2. Check for loose or missing hardware on unit. Tighten or replace as needed.

3. Check transmission gear oil level after first two (2) hours of operation.

4. Check tension on forward drive belt after first two (2) hours of operation.

STARTING AND STOPPING THE ENGINE

Pre-Start Checklist:

Make the following checks and perform the following services before starting the engine.

1. Read the "Safety" and "Controls" Sections in this Manual. Read the separate Engine Owner's Manual provided by the engine manufacturer.

2. Check unit for loose or missing hardware. Service as required.

3. Check engine oil level. See Engine Owner's Manual.

4. Check that all safety guards and covers are in place.

5. Check air cleaner and engine cooling system. See Engine Owner's Manual.

6. Attach spark plug wire to spark plug.

⚠ DANGER

GASOLINE IS HIGHLY FLAMMABLE AND ITS VAPORS ARE EXPLOSIVE.
Follow gasoline safety rules in this manual (see Section 1) and in the separate Engine Owner's Manual.

Failure to follow gasoline safety instructions can result in serious personal injury and property damage.

7. Fill the fuel tank with gasoline according to the directions in the separate Engine Owner's Manual. Follow all instructions and safety rules carefully.

⚠ CAUTION

To help prevent serious personal injury or damage to equipment:

- **Before starting engine, put Wheel Gear Lever in ENGAGE position.**
- **Before starting engine, put Forward Clutch Levers and Reverse Clutch Control in neutral (disengaged) positions by releasing controls.**
- **Never run engine indoors or in enclosed, poorly ventilated areas. Engine exhaust contains carbon monoxide, an odorless and deadly gas.**
- **Avoid engine muffler and nearby areas. Temperatures in these areas may exceed 150°F.**

Starting the Engine

The following steps describe how to start and stop the engine. **Do not attempt to engage the tines or wheels until you have read all of the operating instructions in this Section. Also review the safety rules in Section 1: "Safety" and the tiller and engine controls information in Section 3: "Features and Controls."**

1. Complete the "Pre-Start Checklist" on the previous page.

2. Put the Wheel Gear Lever (Figure 4-1) in the ENGAGE position.

3. Put the Depth Regulator Lever in the "travel" position (lever all the way down) so that the tines are clear of the ground.

4. Release all controls on the tiller.

5. Put the Engine Throttle Lever (Figure 4-1) in the "START" setting.

6. On engines equipped with a fuel valve, turn valve to open position as instructed in the separate engine manual.

7. Choke or prime engine as instructed in the separate Engine Owner's Manual.

8. For recoil (non-electric) starting models:

(a) Place one hand on fuel tank to stabilize unit when you pull the starter handle.

(b) Use the recoil starter rope to start the engine as instructed in the separate Engine Owner's Manual. When the engine starts, gradually move the choke lever (on engines so equipped) to the "NO CHOKE", "CHOKE OFF" or "RUN" position.

(c) Put the engine throttle lever in the "FAST" setting.

9. For electric starting models:

(a) Turn the engine ignition key to the "START" setting and allow the starter motor to crank the engine for several seconds. Avoid cranking the engine longer than 15 seconds at a time as doing so could damage the starter motor. NOTE: Refer to the Engine Owner's Manual for detailed starting instructions.

(b) When the engine starts, release the key and it will return to the "RUN" setting.

(c) Gradually move choke lever (on engines so equipped) to "NO CHOKE", "CHOKE OFF" or "RUN" position.

(d) Put the engine throttle lever in the "FAST" setting.

To Start the Electric Start Engine With the Recoil Starter Rope

If necessary, the electric start engine can be started with the recoil starter rope by following the steps below:

1. If the battery is not "dead" or damaged, leave it connected to the tiller so it will be recharged during engine operation. Make sure the battery cells are filled to the UPPER LEVEL line with electrolyte.

2. If the battery is "dead" or damaged, remove it (refer to "Battery Removal and Installation" in Section 5) and have it tested. Before starting engine, cover the terminal on the loose end of the positive (+) cable with the insulated boot and secure it in place with electrical tape to prevent electrical sparks.

3. Put the ignition key in the "RUN" position and then follow Steps 1-8 of "Starting the Engine."

Stopping the Engine

1. To stop the wheels and tines, release the Forward Clutch levers or the Reverse Clutch control (whichever control is engaged).

2. To stop the engine on the recoil start model, move the Engine Throttle Lever to the "STOP" position.

3. To stop the engine on an electric start model, move the ignition key to "OFF".

IMPORTANT: After stopping an electric start engine, remove the ignition key from the switch to reduce the possibility of unauthorized starting of the engine.

Figure 4-2: Use one hand to guide tiller when moving forward.

OPERATING THE TILLER

The following pages provide guidelines to using your tiller effectively and safely in various gardening applications. Be sure to read "Tilling Tips & Techniques" in this Section before you actually put the tines into the soil.

This is a traditional "standard rotating tine" tiller with forward rotating tines. It operates completely differently from CRT (Counter Rotating Tines) tillers or from low-cost front tine tillers.

1. Follow the "Pre-Start Checklist" on the previous page. Be sure that the Wheel Gear Lever is in the ENGAGE position.

2. Put the Depth Regulator Lever in the "travel" position (lever all the way down) so that the tines are clear of the ground. Use this position when practicing with your tiller or when moving to or from the garden. When you are ready to begin tilling, you must move the Depth Regulator Lever to the desired depth setting (see "Tilling Tips & Techniques").

3. Start the engine and allow it to warm up. When warm, put throttle control in fast speed setting.

⚠ WARNING

Keep away from rotating tines. Rotating tines will cause injury.

4. For *forward* motion of the wheels and tines:

(a) Pull one or both of the Forward Clutch lever "paddles" up and hold them against the handlebars. To stop forward motion of the wheels and tines, release the "paddles."

(b) As the tiller moves forward, relax and let the wheels pull the unit along while the tines dig. Walk behind and a little to one side of the tiller. Use a light but secure grip with one hand on the handlebars, but keep your arm loose. See Figure 4-2. Let the tiller move ahead at its own pace and do not push down on the handlebars to try and force the tiller to dig deeper – this takes weight off the wheels, reduces traction, and causes the tines to try and propel the tiller.

⚠ 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.

5. For reverse motion of the wheels and tines:

(a) Look behind and exercise caution when operating in reverse. **Do not till while in reverse.**

(b) Stop all forward motion before reversing. Lift the handlebars with one hand until the tines are off the ground and then pull the Reverse Clutch control knob out to engage reverse motion (see Figure 4-3). To stop reverse motion, let go of the Reverse Clutch control knob.

Figure 4-3: Raise tines off ground and look behind when moving in reverse.

6. To Turn the Tiller Around:

(a) Practice turning the tiller in a level, open area. Be very careful to keep your feet and legs away from the tines.

(b) To make a turn, reduce the engine speed and then lift the handlebars until the engine and tines are balanced over the wheels (Figure 4-4).

(c) With the tiller balanced, push sideways on the handlebar to move the tiller in the direction of the turn (Figure 4-5). After completing the turn, slowly lower the tines into the soil and increase the engine speed.

Stopping the Tiller and Engine

1. To stop the wheels and tines, release the Forward Clutch "paddles" or the Reverse Clutch control (whichever is engaged).

2. To stop the recoil start engine, move the Engine Throttle Lever to "STOP" . On electric start models, turn the ignition keyswitch to "OFF" to stop the engine.

⚠ WARNING

Before tilling, contact your telephone or utilities company and inquire if underground equipment or lines are used in your area. Their representative will be glad to answer your questions and tell you if any of their equipment or lines are buried underground on your property.

Turning the Tiller Around

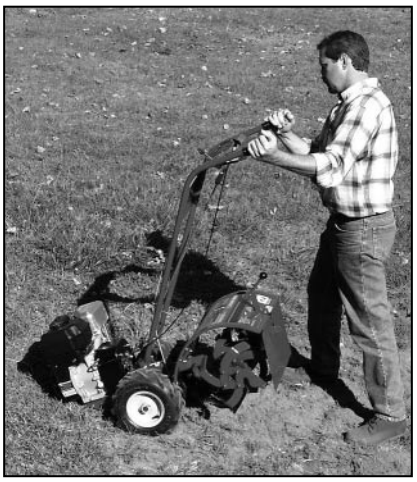


Figure 4-4: To begin turn, reduce engine speed and lift handlebars until engine and tines are balanced over wheels.

Figure 4-5: With tiller balanced over wheels (and tines out of the ground), push handlebars sideways to turn tiller.

Tilling Tips & Techniques

Let the tiller do the work

- While tilling, relax and let the wheels pull the tiller along while the tines do the digging. Walk on the side that is not yet finished (to avoid making footprints in the freshly tilled soil) and lightly, but securely grip the handlebar with just one hand.
- Avoid pushing 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 helping to hold the tiller back, the tines will attempt to propel the tiller – often causing the tiller to skip rapidly across the ground. (Sometimes, slight downward pressure on the handlebars will help get through a particularly tough section of sod or unbroken ground, but in most cases this won't be necessary at all.)

Tilling depths

- Avoid trying to dig too deeply too quickly, especially when busting sod or when tilling soil that hasn't been tilled for some time. Use shallow depth regulator settings (only an inch or two deep) for the first passes through the garden area. With each succeeding pass, adjust the depth regulator to dig another inch or two deeper. (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.)
- When cultivating (breaking up the surface soil around plants to help destroy weeds), use very shallow depth settings to prevent injury to 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.)

Avoid tilling soggy, wet soil

Tilling wet soil often results in large, hard clumps of soil that can interfere with planting. If time permits, wait a day or two after heavy rains to allow the soil to dry before tilling. Test soil by squeezing it into a ball. If it compresses too easily, it is too wet to till.

Avoid making footprints

When possible, walk on the untilled side of the unit to avoid making footprints in the freshly tilled soil. Footprints cause soil compaction that can hamper root penetration and contribute to soil erosion. They can also "plant" unwanted weed seeds back into the freshly tilled ground.

Choosing correct wheel and tine speeds

With experience, you will find the "just right" 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...at least 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 Figure 4-6). When finished in one direction, make a second pass at a right angle as shown in Figure 4-7. Overlap each pass for best results (in very hard ground it may take three or four passes to thoroughly pulverize the soil).
- If the garden size will not permit lengthwise and then crosswise tilling, then overlap the first passes by one-half a tiller width, followed by successive passes at one-quarter width (see Figure 4-8).
- With planning, you can allow enough room between rows to cultivate (see Figure 4-9). Leave room for the hood width, plus enough extra room for future plant growth.

Figure 4-6

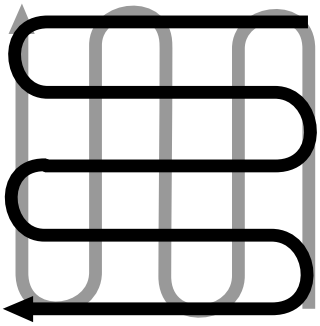


Figure 4-7

Figure 4-8

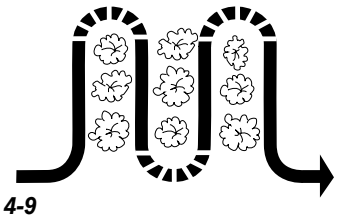


Figure 4-9

Tilling Tips & Techniques

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 power composting, 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.
- If reversing the tiller doesn't clear the debris, it may be necessary to remove the debris by hand (a pocket knife will help you to cut away the material).

⚠ 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 on slopes

If you must garden on a moderate slope, please follow two very important guidelines:

1. Till only on moderate slopes, never on steep ground where footing is difficult (review safety rules in the "Safety" Section of this Manual).
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.

IMPORTANT: 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 required lubrication. Keep the engine oil level at the full point at all times!

A. Tilling up and down slopes:

- 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.
- 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.

B. Terrace Gardening:

- When a slope is too steep or too short for vertical tilling, it may be necessary to till across the slope and create terraced rows. Terraces are rows that are cut into the side of a slope, creating a narrow, but flat area on which to plant.
- On a long slope, you can make several terraces, one below the other.
- Terraces should be only 2-to-3 feet wide. Digging too far into the side of the slope will expose poor subsoil that is unproductive for plants.
- 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 Figure 4-10.
- 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.

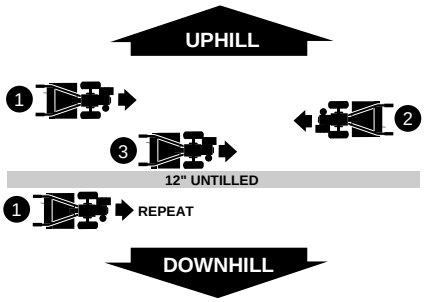


Figure 4-10

C. Tilling across slopes without using terraces:

- If vertical or terracing gardening aren't practical for you, then you can till laterally across a slope. We don't really recommend this method as it can create unsure footing and invites soil erosion.
- As in terrace gardening, start at the top of the slope and overlap the first pass by half the width of the tiller. For added stability of the tiller, always keep the uphill wheel in the soft, newly tilled soil.

POWER COMPOSTING

Power composting simply means tilling under and burying in the soil all manner of organic matter such as crop residues, leaves, grass clippings and cover crops. This material will decompose during the non-growing season and add important natural nutrients to the soil.

⚠ WARNING

When power composting, do not keep the Depth Regulator Lever at a deep setting if the tiller jumps or bucks.

If jumping or bucking occurs, move the Depth Regulator Lever down to one of the shallower settings and then slowly increase the tilling depth on later passes.

Failure to follow this warning could result in personal injury.

The first place to begin is with crop residues such as leftover vines, stalks, stems and roots. Power compost these crop residues as soon as they finish bearing. The sooner this is done, the better, as tender green matter is easier to till under. Use the deepest depth regulator setting possible without causing the engine to labor or the tiller to jump ahead.

Standing cornstalks of reasonable height can be power composted. Pushing over (but not uprooting) cornstalks will often make it easier for your tiller to chop up the stalks. Keep the tines clear of excessive tangling by "fishtailing" or frequently using reverse. Make several passes, then return a few days later to finish off any remaining stubble.

After tilling under crop residues, add more organic matter such as leaves, grass clippings and even kitchen scraps. When tilled into the soil, this organic matter will decompose and add even more important nutrients to the soil.

After power composting, you may want to plant a "green manure" cover crop to protect the soil during the off-season. You simply grow a crop of clover, alfalfa, buckwheat, peas, beans, rye grass, grain, or kale and then till it into the soil prior to the planting season.

LOADING AND UNLOADING THE TILLER

⚠ WARNING

Loading and unloading the tiller into a vehicle is potentially hazardous and we don't 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. Remove the ignition key on electric start models.
- The tiller is too heavy (over 170 lbs., depending on model) and bulky to lift safely by one person. Two or more people should share the load.
- Use sturdy ramps and manually (engine shut off) roll the tiller into and out of the vehicle. Two or more people are needed to do this.
- 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 to 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.
- Use wooden blocks to place 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.
- When the tiller is in the vehicle, prevent it from rolling by engaging the wheels in the wheel drive position (put Wheel Gear Lever in ENGAGE). Chock the wheels with blocks and securely tie the tiller down.

Section 5 Maintenance

REQUIRED MAINTENANCE SCHEDULE				
PROCEDURE	**Before Each Use**	**Every 10 Hours**	**Every 30 Hours**	**As Noted**
Check engine oil level	•			And every 5 operating hours
Clean engine	•			▲
Check drive belt tension		•		†
Check nuts and bolts		•		†
Change engine oil		•		*
Lubricate tiller		•		
Service foam pre-cleaner air filter (if so equipped)				▲
Service paper air filter (if so equipped)				▲
Check gear oil level in transmission			•	†
Check tines for wear			•	
Check air pressure in tires			•	
Service spark plug				▲

* *Change more frequently in dusty or dirty conditions. Change after first 2 hours of break-in operation.*

† *Check after first 2 hours of break-in operation.*

▲ *See Engine Owner's Manual for service recommendations.*

⚠ WARNING

Before inspecting, cleaning or servicing the machine, shut off engine, wait for all moving parts to come to a complete stop, disconnect spark plug wire and move wire away from spark plug. Remove ignition key on electric start models.

Failure to follow these instructions can result in serious personal injury or property damage.

TILLER LUBRICATION

Proper lubrication of the tiller is an essential part of your maintenance program. After every 10 operating hours, oil or grease the lubrication points shown in Figure 5-1 as described below.

Use a good quality lubricating oil (#30 weight engine oil is suitable) and a good quality general purpose grease (grease that has a metal lubricant is preferred, if available).

- Remove wheels, clean wheel shaft (A, Figure 5-1) and apply thin coating of grease to shaft.
- Grease back, front and sides of depth regulator lever (B, Figure 5-1).
- Remove tines, clean tine shafts (C, Figure 5-1) and inspect for rust, rough spots or burrs (especially around holes). File or sand smooth and coat ends of shaft with grease.
- Oil the threads on the handlebar height adjustment handle (D, Figure 5-1).
- Oil the outer casings of the engine throttle cable and the wheel gear cable (E, Figure 5-1). Allow oil to soak in and then wipe off any excess.
- Oil the threads on the handlebar attaching screws (F, Figure 5-1).

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

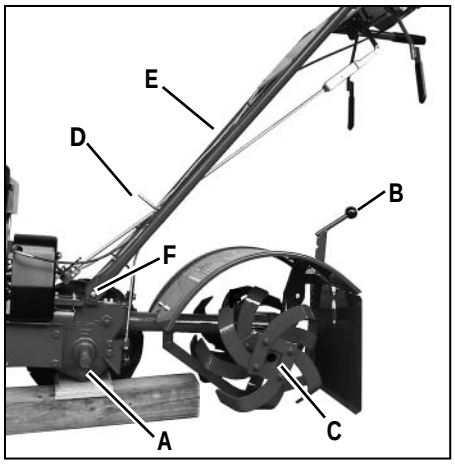


Figure 5-1

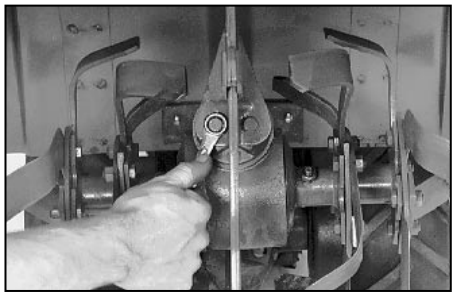


Figure 5-2

CHECK HARDWARE

At least every 10 operating hours, check the unit for loose or missing hardware (screws, bolts, nuts, hairpin cotters, etc.). Loose or missing hardware can lead to equipment failure, poor performance or oil leaks.

Be sure to check the three end cap mounting screws located at the rear of the transmission (Figure 5-2). Lift the tine flap to service those screws.

CHECK TIRE PRESSURE

Check the air pressure in both tires. Deflate or inflate both tires evenly to 15-to-20 PSI (pounds per square inch). Be sure that both tires have the same air pressure or the unit will tend to pull to one side.

CHECK FOR OIL LEAKS

Before each use, check your tiller for signs of an oil leak – usually a dirty, oily accumulation either on the unit or on the floor where it has been parked.

A little seepage around a cover or oil seal is usually not a cause for alarm. However, if the oil drips overnight then immediate attention is needed as ignoring a leak can result in severe transmission damage.

If a cover is leaking, try tightening any loose screws or bolts. If the fasteners are tight, a new gasket or oil seal may be required. If the leak is from around a shaft and oil seal, the oil seal probably needs to be replaced. See your authorized dealer or contact the factory for service or advice.

IMPORTANT: Never operate the tiller if the transmission is low on oil. Check the oil level after every 30 hours of operation and whenever there is any oil leakage.

TRANSMISSION GEAR OIL SERVICE

Check the transmission gear oil level 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.

A. To Check 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. To check the gear oil level (and to add oil, if necessary), refer to "STEP 5: Check Gear Oil Level in Transmission" in Section 2 of this manual.

B. To Drain and Refill the Transmission:

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

1. Prop up the left side of the unit so that it will be securely supported when the left side wheel is removed. Remove the left side wheel by removing the wheel mounting hardware.

2. Unscrew the plastic gear oil fill plug from the top of the transmission.

3. Place a clean pan below the transmission drain plug (see Figure 5-3) and remove the drain plug. The oil will start flowing out of the drain hole (it may flow slowly, especially in cold temperatures).

4. Remove the transmission gear oil level check plug that is located a few inches above the left side wheel shaft.

5. When the oil stops flowing, tilt the transmission forward to drain oil from the rear of the transmission.

6. After draining the oil, clean the threads of the drain plug, apply a non-hardening removable gasket sealant to the threads, and securely reinstall the drain plug.

7. Using a clean funnel, slowly add SAE 140 or SAE 85W-140 weight gear oil (with an API rating of GL-4 only) to the transmission. The transmission holds approximately 3-1/4 pints (52-54 ounces). Tilt the tiller slightly backwards to make sure the gear oil reaches the rear (tine) end of the transmission. Stop adding
gear oil when it begins to flow from the oil level check hole on the side of the transmission.

8. Securely reinstall the oil level check plug.

9. Securely reinstall the gear oil fill plug on top of the transmission.

10. Reinstall the wheel and remove the prop.

Section 5: Maintenance

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

Figure 5-3: Remove drain plug to drain transmission gear oil (also remove oil fill plug and oil level check plug).

ENGINE OIL SERVICE

Check the engine oil level before starting the engine each day and check it after each 5 hours of continuous operation. Running the engine when it is low on oil will quickly ruin the engine.

It is recommended that you change the motor oil after every 10 hours of operation and even sooner when operating in extremely dirty or dusty conditions. Refer to the separate Engine Owner's Manual for detailed service instructions.

A. To Check the Engine Oil Level:

1. Move the tiller to a level area and shut off the engine.

2. Level the engine by moving the Depth Regulator Lever up or down as needed.

3. Clean the area around the oil dipstick or oil fill tube to prevent dirt from falling into the crankcase.

4. On engines with an oil fill tube, remove the filler cap, add oil (if required) until it reaches the top of the tube and reinstall the filler cap.

5. On engines with a dipstick, remove it, wipe it clean, and reinstall it finger-tight. Remove the dipstick and check the reading. Add oil (if required) to bring the level to the FULL mark. Do not overfill.

B. To Change the Engine Oil:

Change the engine oil as instructed in the separate Engine Owner's Manual.

AIR CLEANER SERVICE

The engine 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.

Service the air cleaner as instructed in the separate Engine Owner's Manual.

SPARK PLUG SERVICE

Inspect and clean or replace the spark plug after every 100 operating hours or annually. Clean the plug and set the gap as described in the separate Engine Owner's Manual.

In some areas, local law requires using resistor spark plugs to suppress ignition signals. If the engine was originally equipped with a resistor spark plug, use the same type for replacement.

SPARK ARRESTER SCREEN SERVICE

If the engine muffler is equipped with a spark arrester screen, remove and clean it according to the time intervals and instructions in the separate Engine Owner's Manual.

ENGINE CLEANING

The engine must be kept clean to assure smooth operation and to prevent damage from overheating. Refer to the separate Engine Owner's Manual for specific repair and cleaning instructions. All inspections and services must be done with the engine shut off and cool to the touch.

CARBURETOR/GOVERNOR CONTROL ADJUSTMENTS

The carburetor was adjusted at the factory for best operating speed. Refer to the separate Engine Owner's Manual for any adjustment information or see your authorized engine service dealer.

The governor controls the maximum safe operating speed and protects the engine and all moving parts from damage caused by overspeeding. Do not tamper with the engine governor settings. Seek authorized service if a problem exists.

⚠ WARNING

Operators shall not tamper with the engine governor settings on the machine; the governor controls the maximum safe operating speed to protect the engine and all moving parts from damage caused by overspeed. Authorized service shall be sought if a problem exists.

THROTTLE CONTROL ADJUSTMENT

If the engine does not respond to various throttle lever settings, refer to the separate Engine Owner's Manual for service information or contact your local authorized engine service dealer.

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

WHEEL GEAR CABLE ADJUSTMENT

When the Wheel Gear Lever is in DISENGAGE, the wheels will roll freely (freewheel). The wheels should not roll freely when the lever is in ENGAGE. If the wheels roll freely when the Wheel Gear Lever is in ENGAGE, the wheel gear cable needs to be adjusted as described below.

1. With the engine shut off and the spark plug wire disconnected, put the Wheel Gear Lever in ENGAGE.

2. Loosen the top adjustment nut (A, Figure 5-4) on the wheel gear cable bracket that is located on the left side rear of the transmission.

3. Push the wheel gear cable (B) down and roll the tiller slightly forward or backward until the eccentric lever (C) engages (locks) the wheels. Hold the cable in that position and tighten the top (A) and bottom (D) adjustment nuts.

4. Move the Wheel Gear Lever to ENGAGE and DISENGAGE several times to check the adjustment. The wheels should not roll when the lever is in ENGAGE, but they should roll when the lever is in DISENGAGE. Readjust the cable as required.

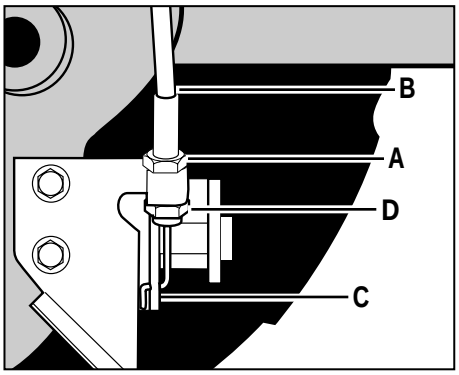


Figure 5-4: Wheel gear cable assembly.

OFF SEASON STORAGE

When the tiller won't be used for extended periods, 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 engine storage instructions found in the separate Engine Owner's Manual. NOTE: 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 engine manufacturer's recommendations).

4. On electric start units, follow "Battery Storage" instructions in this Section.

5. Store unit in a clean, dry area.

6. 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.).

BOLO TINES

The tines will wear with use and should be inspected at the beginning of each tilling season and after every 30 operating hours. Tines can be replaced individually or as a complete set. Never inspect or service the tines unless the engine is stopped, the spark plug wire is disconnected, and the ignition key is removed on electric start models.

A. Tine Inspection:

With use, the tines will become shorter, narrower and pointed (Figure 5-5). Badly worn tines will result in a loss of tilling depth and reduced effectiveness when chopping up and turning under organic matter. Use Figure 5-5 as a guide to when the tines should be replaced.

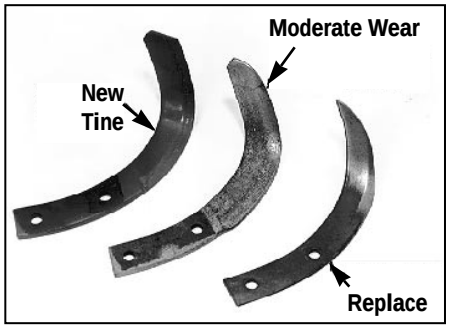


Figure 5-5: Checking tines for wear.

B. Removing a Single Tine:

1. Remove the two screws and nuts that attach a single tine to the tine holder (Figure 5-6). If needed, use penetrating oil to help free the nuts.

2. When installing a single tine, be sure to position it so that its *cutting edge will enter the soil first as the tiller moves forward*.

C. Removing a Tine Assembly:

1. If removing both tine assemblies, mark them "left" and "right" before removal. Doing so will help ensure that the assemblies are reinstalled on the correct sides of the tiller.

2. Remove the screw and locknut that secure the tine assembly to the tine shaft (Photo 5-7). Pull the tine assembly off the shaft (if necessary, use a rubber mallet to tap the tine assembly outward).

3. Before reinstalling the tine assembly, inspect the tine shaft for rust, rough spots or burrs and file or sand as needed. Apply a thin coat of grease to the shaft.

4. Install each tine assembly so that *the cutting 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 previously removed. Tighten securely.

Section 5: Maintenance

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

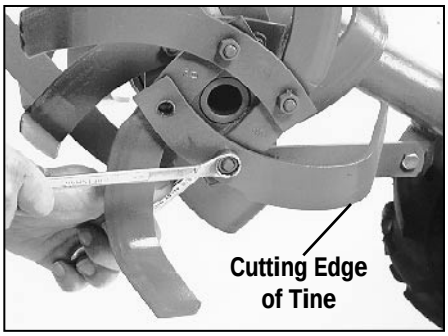


Figure 5-6: Removing single tine.

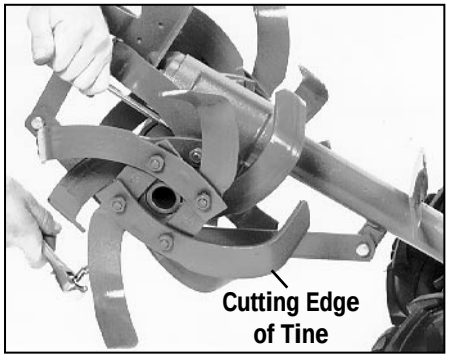


Figure 5-7: Removing a tine assembly.

CHECKING AND ADJUSTING TENSION ON THE DRIVE BELTS

Maintaining correct belt tension is important to good tilling performance and long belt life. A loose belt will slip on the engine and transmission pulleys and cause the tines and wheels to slow down – or stop – even though the engine is running at full speed. A loose belt will also result in premature belt wear.

While checking belt tension, also check for cracks, cuts or frayed edges. A belt that is in poor condition should be replaced.

The tension on a new forward drive belt (I, Figure 5-11) should be checked after the first two (2) hours of operation. Thereafter, check the tension after every ten (10) hours of operation.

The reverse drive belt (J, Figure 5-11), because it is used more sparingly, will probably not require an initial tension adjustment until a significant number of operating hours has passed. A tension adjustment is required only if there is no reverse action when the Reverse Clutch Control knob is pulled out.

To Check and Adjust Tension on the Forward Drive Belt

⚠ WARNING

Follow the belt adjustment instructions carefully. An incorrect adjustment could result in the Forward Clutch mechanism engaging too soon. This could cause loss of tiller control and result in personal injury or property damage.

1. The check for correct belt tension is the same as that described in item 5 of "Step 4: Attach Forward Clutch Rod" on page 8. Before performing this check, shut off the engine, disconnect the spark plug wire, remove the ignition key on electric start models, and allow the engine and muffler to cool down. If, after following the adjustment procedures you cannot get the correct gap on the forward clutch rod adjustment bracket, you will need to make a secondary adjustment as described next.

2. Disconnect the Forward Clutch Rod (A, Figure 5-8) from the swivel plate (B) by removing the innermost hairpin cotter (C).

3. Unthread the Forward Clutch Rod (in a counterclockwise direction as viewed from the front of the unit) until one or two threads on the rod extend above the rectangular nut (D, Figure 5-9) on the forward clutch bracket.

4. Remove the plastic belt cover (E, Figure 5-8).

5. On the **left** side of the unit (as viewed from operator's position) remove the hairpin cotter from the clevis pin (F, Figure 5-10) that connects the forward idler arm (G) to the forward adjustable link (H). Push inward on the forward idler arm (G) and remove the clevis pin (F).

6. There are two holes in the forward adjustable link (H, Figure 5-10). Push inward on the forward idler arm (G) and install the clevis pin (F) through the **inner** hole in the forward adjustable link (H) and out through the single hole in the forward idler arm (G). Secure the clevis pin with the hairpin cotter. NOTE: While pushing inward on the forward idler arm, be sure that the forward drive belt is moved off to the right side of the tiller. This creates more room to install the clevis pin when the forward idler arm is pushed inward.

IMPORTANT: With the clevis pin installed in the inner hole of the forward adjustable link, the number of additional belt tension adjustments that can be made is limited. If, with future tension adjustments, you find that you cannot screw the forward clutch rod any farther into the rectangular nut on the forward clutch bracket, it means that the forward drive belt must be replaced. Before doing so, the clevis pin must be returned to the OUTSIDE hole in the forward adjustable link.

7. Reinstall the belt cover and secure it with the two nuts.

8. Readjust the forward drive belt tension by following the "Handlebar Height Adjustment" instructions in Section 3.

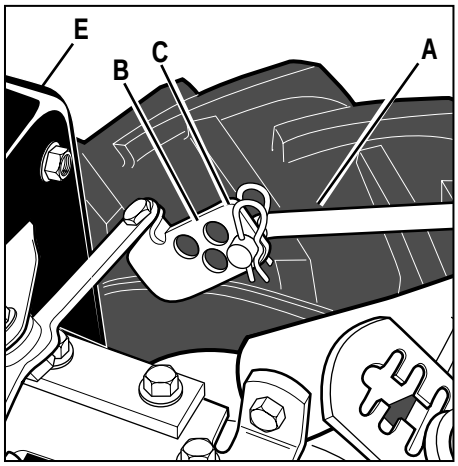


Figure 5-8: Disconnect Forward Clutch Rod and move forward drive belt out of groove in engine forward drive pulley

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

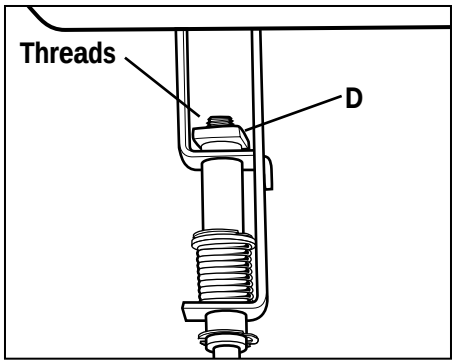


Figure 5-9: One or two threads on Forward Clutch Rod should show above nut.

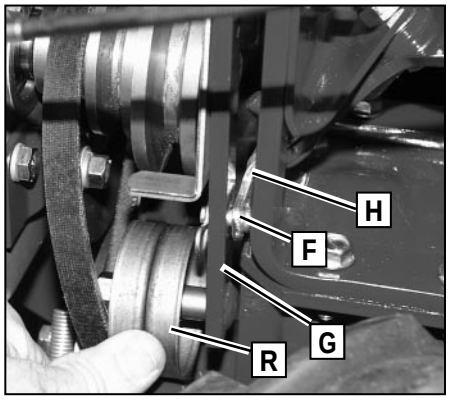


Figure 5-10: Remove clevis pin from outer hole in forward adjustable link and move to inner hole in link.

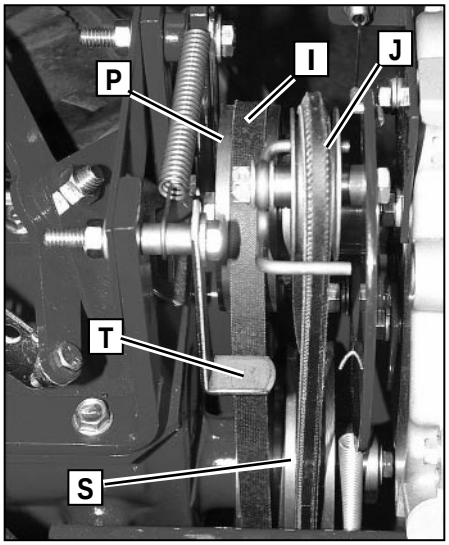


Figure 5-11: View of belts and pulleys. Only the upper half of the transmission pulley (S) is shown.

To Check and Adjust Tension on the Reverse Drive Belt

1. Remove the belt cover (E, Figure 5-8) after first shutting off the engine, disconnecting the spark plug wire, removing the ignition key on electric start models, and allowing the engine and muffler to cool down.

2. 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 (K, Figure 5-12) and the end of the Z-fitting (L) to which the cable wire is attached.

3. The belt tension is correct if the cable wire length measures between 1/8" to 1/4". If the length 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.

4. Release the Reverse Clutch control knob. Unthread the inner jam nut (M, Figure 5-13) one to two turns and pull the threaded cable adjuster (K) to the left until the inner jam nut rests against the bracket.

5. Prevent the inner jam nut (M) from turning and tighten the outer jam (N) against the bracket. Prevent the outer jam nut (N) from turning and tighten the inner jam nut (M) against the bracket.

6. Measure the gap by repeating Step 2. Readjust as needed by repeating Steps 4 and 5.

7. Reinstall the belt cover and secure it with the two nuts.

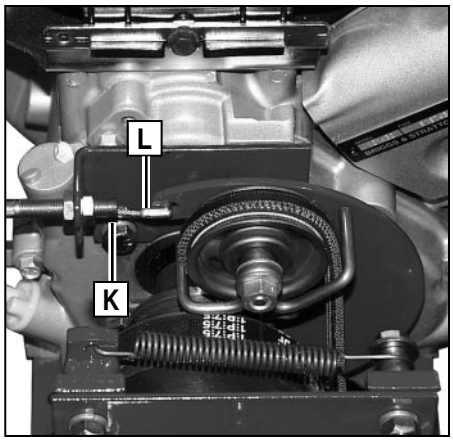


Figure 5-12: Measure length of cable.

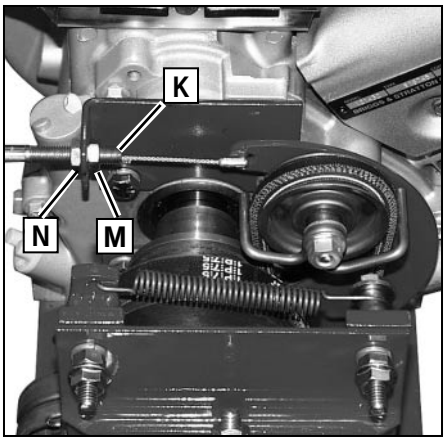


Figure 5-13: Adjust jam nuts.

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

FORWARD DRIVE BELT REMOVAL AND INSTALLATION

The forward drive belt (I, Figure 5-11) is driven by the engine drive pulley (P). When the Forward Clutch is engaged, it puts tension on the forward idler pulley (R) which tightens the belt between the engine drive pulley and the transmission drive pulley (large pulley located below the engine drive pulley). The transmission drive pulley then turns the main drive shaft inside the transmission.

A. Removing the Forward Drive Belt

1. Stop the engine, allow it to cool and disconnect the spark plug wire before working near the belts. Also remove the ignition key on electric start models.

2. First remove the reverse drive belt (J, Figure 5-11) by following the "Removing the Reverse Drive Belt" instructions in this Section.

3. Using needle-nose pliers, carefully unhook the forward idler return spring (A, Figure 5-14) from the reverse idler bracket assembly.

4. Remove the forward idler bracket assembly (B, Figure 5-15) by removing the nut and lockwasher from the screw (C). You may need to push the screw part way through the bracket while removing the assembly. Do not remove the flat washer and bushing from the screw. NOTE: Before removing the assembly, lift the forward adjustable link (M, Figure 5-15) off the link adjusting pin.

5. Move the forward drive belt (D, Figure 5-16) completely off the engine drive pulley (E) by moving it to the rear (away from engine) of the pulley. If necessary, work the belt off the pulley with your left hand while pulling the engine recoil starter rope with your right hand.

6. Push the belt downward and then remove it by slipping it over the front of the transmission pulley (F, Figure 5-16). NOTE: If the belt will not pass between the right side of the transmission pulley and the tiller frame, try loosening the two right side frame mounting screws (G, Figure 5-17) two or three full turns. This should create the needed clearance between the frame and the pulley.

B. Installing the Forward Drive Belt

1. The reverse drive belt must be removed before installing the forward drive belt.

2. From the front of the tiller, insert the belt in between the bottom of the engine drive pulley and the top of the transmission pulley (see Figure 5-16). Put the bottom half of the belt into the rearmost groove in the transmission pulley (I, Figure 5-18). Now put the top half of the belt into the rearmost groove of the engine drive pulley (H).

3. If the two right side frame screws (G, Figure 5-17) were loosened to remove the belt, then retighten both screws securely.

4. Reinstall the forward idler bracket assembly (B, Figure 5-15) as follows:

a). Place the slot in the forward adjustable link (K, Figure 5-19) over the link adjusting pin (L).

b). Reinstall the forward idler bracket assembly using the screw (C, Figure 5-15), lockwasher and nut removed previously. Be sure that the bushing and flat washer are on the screw before inserting it through the bracket arms. Tighten the screw securely. NOTE: Check that the belt is positioned to the inside of the forward idler pulley (see R, Figure 5-11) and both belt guides (T).

5. Reattach the forward idler return spring (A, Figure 5-14) to the bushing/screw assembly on the reverse idler bracket assembly.

6. Install the reverse drive belt (see "B. Installing the Reverse Drive Belt").

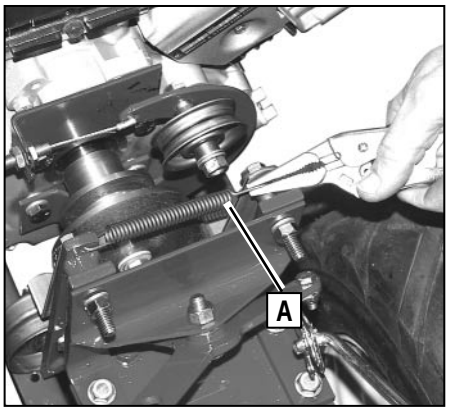


Figure 5-14: Unhook forward idler return spring.

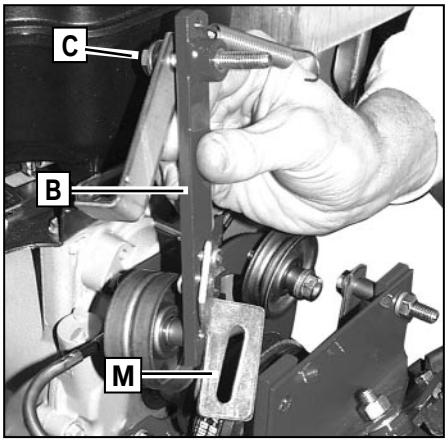


Figure 5-15: Remove forward idler bracket assembly.

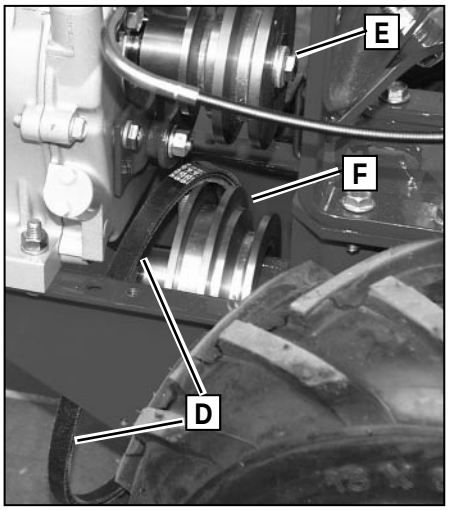


Figure 5-16: Remove forward drive belt.

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

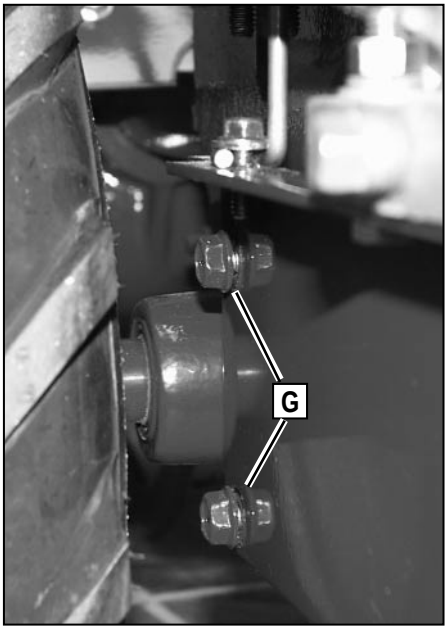


Figure 5-17: Loosen screws in right side frame to create clearance between transmission pulley and frame.

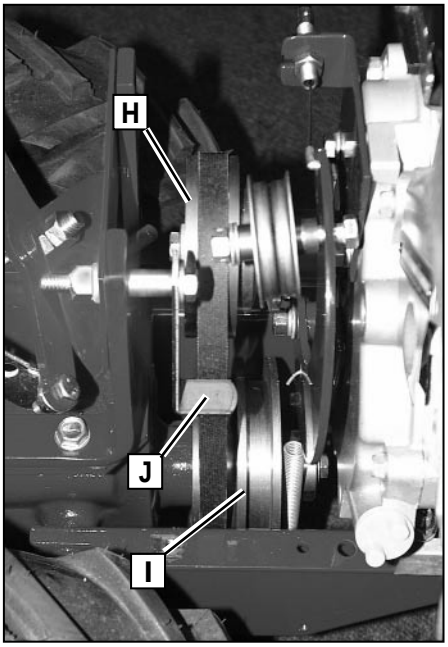


Figure 5-18: Install forward belt on transmission (lower) pulley and then on engine (upper) pulley.

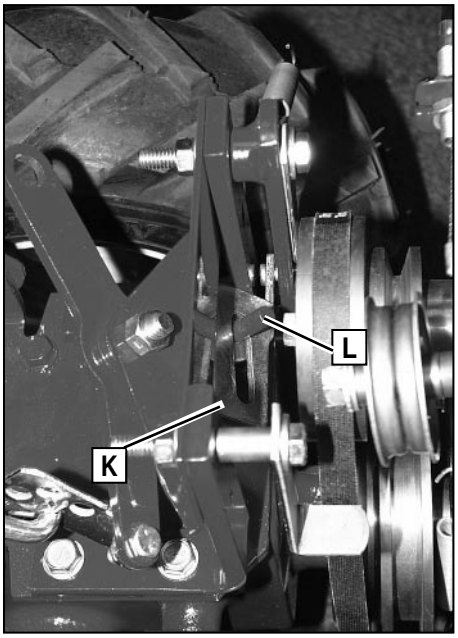


Figure 5-19: Place link over adjusting pin.

REVERSE DRIVE BELT REMOVAL AND INSTALLATION

NOTE: The forward drive belt must be installed before installing the reverse drive belt.

The reverse drive belt (J, Figure 5-11) is driven by the engine drive pulley (P, Figure 5-11). When the Reverse Clutch Control is engaged, it puts tension on the reverse drive pulley which tightens the belt between the engine drive pulley and the transmission drive pulley (large pulley located below the engine drive pulley). The transmission drive pulley then turns the main drive shaft inside the transmission.

A. Removing the Reverse Drive Belt

1. Stop the engine, allow it to cool and disconnect the spark plug wire before working near the belts. Also remove the ignition key on electric start models.

2. Remove the plastic belt cover (E, Figure 5-8) by removing the two flange locknuts.

3. Remove the front transmission cover (A, Figure 5-20) by removing the four self-tapping screws.

4. Using needle-nose pliers, reach inside the left side frame and carefully unhook the reverse idler spring (B, Figure 5-20) from the hole in the frame.

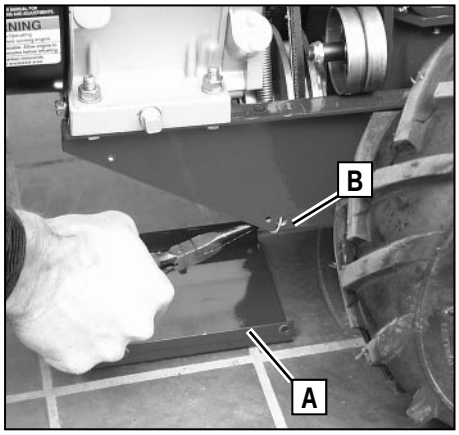


Figure 5-20: Remove transmission cover and unhook reverse idler spring.

5. Remove the wire belt guide (C, Figure 5-21) by removing the locknut and flat washer from the pulley mounting screw. Do not remove the screw or the pulley. Loosely reinstall the locknut and flat washer on the screw for safe-keeping.

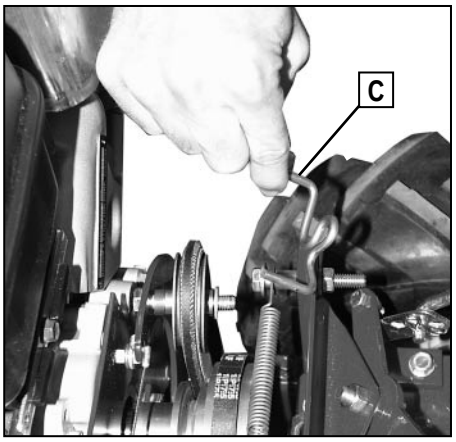


Figure 5-21: Remove wire belt guide.

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

6. Disconnect the reverse cable wire from the Z-fitting to (Q, Figure 5-23).

7. Remove the reverse belt (D, Figure 5-22) from the reverse pulley (H) and the transmission (lower) pulley (I) by pulling it out through the front of the transmission housing.

B. Installing the Reverse Drive Belt

IMPORTANT: The reverse belt has a 'V" shape. When installing the belt, make sure that the widest (flat) side of the belt will ride against the reverse pulley (F, Figure 5-23) and transmission pulley (E). If needed, the belt can be twisted "inside out" so that the "V" shaped side is on the outside and the widest side is on the inside.

1. Install the forward drive belt (see "B. Installing the Forward Drive Belt" in this Section) before installing the reverse belt.

2. Insert the belt up through the front of the transmission housing (see Figure 5-22) and loop the bottom half of the belt around the front groove (groove closest to engine) of the transmission pulley (E, Figure 5-23). Move the reverse idler spring (which was detached previously) out of the way and then loop the top half of the belt around the reverse pulley (F).

3. Reconnect the reverse cable wire to the Z-fitting (Q, Figure 5-23).

4. Reinstall the wire belt guide (G, Figure 5-23) using the flat washer and locknut removed previously. Position the wire belt guide as shown in Figures 5-23 and 5-12) before tightening the nut securely.

5. Using needle-nose pliers, carefully reinstall the reverse idler spring (B, Figure 5-20) into the hole in the left side frame.

6. Reattach the front transmission cover (A, Figure 5-20) with the the four self-tapping screws.

7. Check for correct tension on the belt(s) by referring to "Checking and Adjusting Tension On the Drive Belts" in this section.

8. Reinstall the plastic belt cover and secure it with the two flange locknuts.

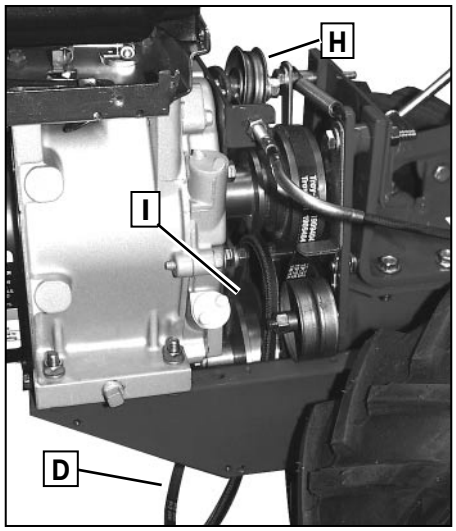


Figure 5-22: Remove reverse belt.

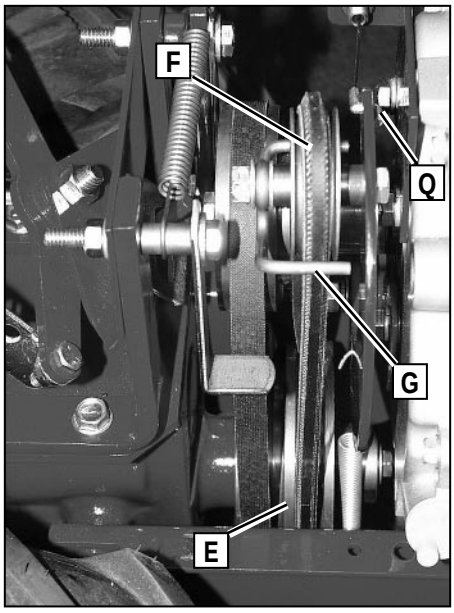


Figure 5-23: Install reverse belt and wire belt guide.

BATTERY MAINTENANCE

⚠ DANGER

Use extreme caution when working on or near batteries. To help prevent personal injury or property damage:

- **Follow the battery safety rules in Sections 1 and 2 of this Manual. Failure to follow all safety rules may result in personal injury or property damage from such causes as an explosion of battery gases, acid burns or electrical burns.**
- **Electrolyte is a sulfuric acid solution. Avoid spillage and contact with skin, eyes and clothing. Wear protective clothing, rubber gloves and shield eyes with safety goggles when working near the battery.**
- **Batteries generate explosive gases. Keep sparks and flames away from the battery at all times. Ventilate the area when charging or using the battery in an enclosed area.**

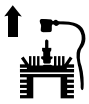
Battery Care in Service

1. Once a month or every 10 operating hours, whichever occurs first, check the electrolyte level. If the electrolyte level is not at the UPPER LEVEL line marked on the battery case, add distilled or demineralized water. NEVER USE BATTERY ACID TO REFILL THE BATTERY. Replace the battery caps securely and wipe the battery top. Run the engine outdoors for about 20 minutes at 3/4 throttle speed to recharge and recirculate the electrolyte solution. For safety, do not leave the tiller unattended while the engine is running.

2. Keep the battery clean. Any acid deposits should be neutralized with a baking soda and water solution (remove battery from unit and tighten the battery caps to prevent any solution from entering the cells). Clean any remaining solution off the battery.

Clean the posts and terminals with a wire brush, sandpaper or steel wool. After

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



cleaning, coat the terminals with a thin coat of petroleum jelly or silicone grease to protect against corrosion.

3. Periodically check the electrical system for loose or dirty connections.

4. Periodically check that the battery clamp is tight. However, do not overtighten the clamp as doing so could damage the battery case.

5. Periodically check that the vent tube on the side of the battery is not crimped or pinched anywhere along its length.

Battery Storage

The electric start system has a recharging circuit that will maintain the battery's state of charge during the tilling season. When storing the tiller for extended periods, it is recommended that the battery be fully charged before placing it in storage. (Before reinstalling the battery after storage, give it a thorough recharge.)

Battery Removal and Installation

When removing and installing the battery, disconnect and connect the cables in this order to avoid sparking:

1. To remove the battery, first disconnect the negative (-) cable from the grounding screw on the back of the battery bracket post. Bend the cable away from any metal parts.

2. Disconnect the negative (-) cable from the negative (-) battery post.

3. Disconnect the positive (+) cable from the positive (+) battery post and bend it away from any metal parts. Cover the cable terminal with its rubber boot.

4. Remove the battery clamp.

5. To install the battery, reverse the above steps. Be sure that the battery posts face to the rear of the tiller and that the positive (+) post is on the left side as you face forward from the handlebars.

6. Insert the vent tube into the vent tube shield. Make sure the vent tube is not crimped, pinched or folded anywhere along its length.

TILLER SPECIFICATIONS

TILLER HEIGHT (with Depth Regulator Lever in highest setting):

Without Handlebars	24-3/4"
Handlebars in lowest setting	39-1/2"
Handlebars in highest setting	49-1/2"

TILLER LENGTH

Without Handlebars	46"
Handlebars in lowest setting	63"

TILLER WIDTH

Hood Width	16-5/8"
Tilling Width	16"
Wheel Width	18-3/4"
Handlebar Width	20-1/4"

TILLER WEIGHT

Approximate Weight (without oil or gas):

Recoil Start Model	172 lbs.
Electric Start Model	178 lbs.

TRANSMISSION GEAR OIL SPECIFICATIONS

For small top-offs: Use SAE 140, SAE 85W-140, or SAE 80W-90 gear oil with an API rating of either GL-4 or GL-5.

For Full Replacement: Use SAE 140 or SAE 85W-140 gear oil with API rating of GL-4 (do not use GL-5).

TILLER ATTACHMENTS

The attachments listed below are available for your tiller. The information is the most current at the time this manual was printed. Contact your authorized dealer or the factory for current information.

BUMPER

The tubular steel bumper surrounds the engine to protect the air cleaner, starter assembly and fuel tank from damage.

HILLER/FURROWER

The furrower blade attaches to the back of the depth regulator assembly and is used to create rows, trenches and ditches up to 8" deep, depending on soil conditions. The two hiller wings attach to the sides of the furrower blade and are used to make hilled rows and raised bed gardens.

ROW MARKER

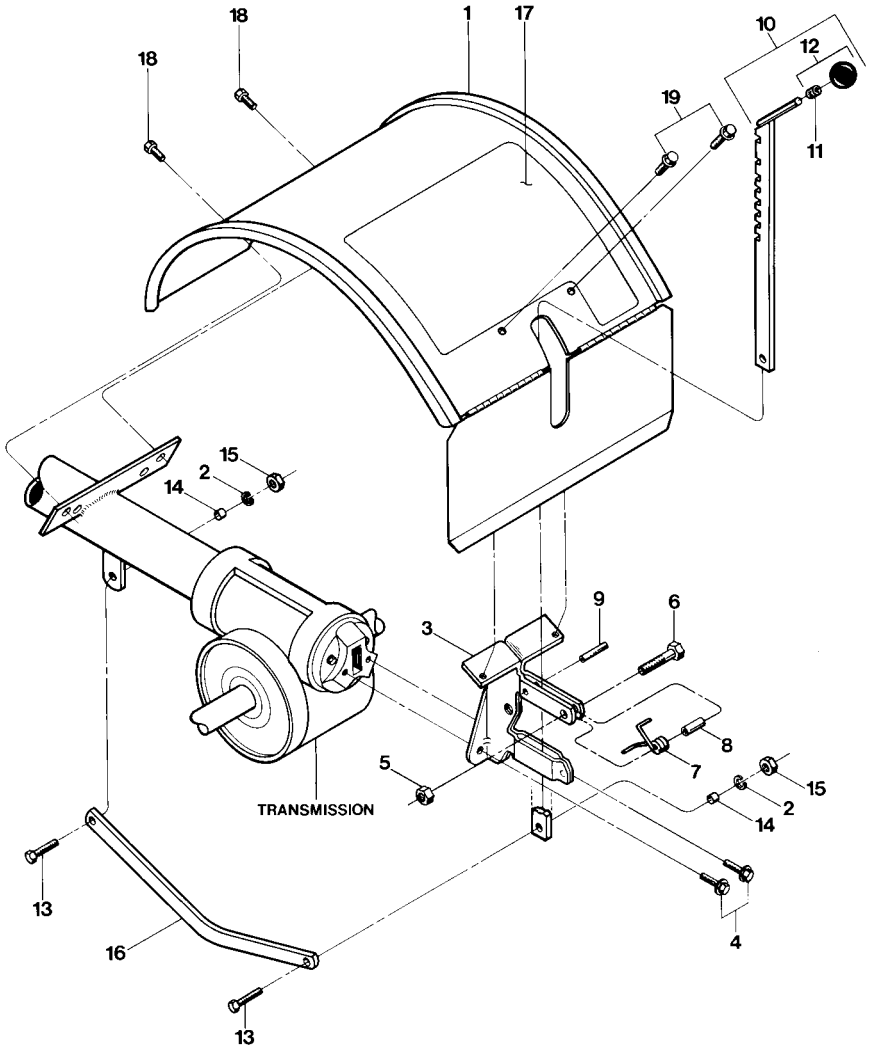
The row marker attaches to the hiller/furrower attachment and is used to scratch lines in the seedbed for laying out furrows, trenches, raised beds, etc. (eliminates the need for stakes, string and measuring tape). The row marker is adjustable in length from 28" to 49-3/4", allowing you to vary the width of the marked rows as required.

TROUBLESHOOTING

Before performing any corrections, refer to the appropriate information in this Manual, or in the Engine Owner's Manual, for the correct safety precautions and operating or maintenance procedures. Contact your local authorized Engine Service Dealer for engine service. Contact your local authorized equipment dealer or the factory for all other service problems.

PROBLEM	POSSIBLE CAUSE	CORRECTION
Engine does not start.	1. Spark plug wire disconnected. 2. Engine Throttle Control Lever incorrectly set. 3. Fuel tank empty. 4. Choke control (if so equipped) in incorrect position. 5. Stale gasoline. 6. Dirty air filter(s). 7. Defective or incorrectly gapped spark plug. 8. Carburetor out of adjustment. 9. Misadjusted throttle control. 10. Dirt or water in fuel tank.	1. Reconnect wire. 2. Put lever in START position. 3. Add fuel. 4. See Engine Owner's Manual. 5. Drain fuel and add fresh fuel. 6. Clean or replace filter(s). 7. Inspect spark plug. 8. See Engine Service Dealer. 9. See Engine Service Dealer 10. See Engine Service Dealer.
Keyswitch does not start engine (electric start model only)	1. Electrical connections loose or disconnected. 2. Battery discharged. 3. Broken wire in wiring system. 4. Malfunctioning starter motor. 5. Corroded battery terminals. 6. Poor contact on ground wire terminals.	1. Tighten or reconnect wiring. 2. Charge battery (see "Battery Maintenance," Section 5). 3. Replace broken wiring. 4. See Engine Service Dealer. 5. Clean terminals (see "Battery Maintenance," Section 5). 6. Scrape paint off terminals.
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 Owner's Manual). 2. Clean or replace (see Engine Owner's Manual). 3. See Engine Service Dealer. 4. Replace with fresh gasoline. 5. See Engine Service Dealer. 6. Clean air cooling system (see Engine Owner's 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 Owner's Manual). 2. See Engine Service Dealer. 3. Check oil level (see Engine Owner's Manual).
Engine does not shut off.	1. Misadjusted throttle control cable (recoil start model). 2. Keyswitch wire harness malfunction (electric start model.)	1. See Engine Owner's Manual or Engine Service Dealer. 2. See Engine Service Dealer.
Wheels and Tines will not turn.	1. Improper use of controls. 2. Forward Drive: Misadjusted forward clutch rod. 3. Reverse Drive: Broken or misadjusted belt. 4. Worn, broken, or misadjusted drive belt(s). 5. Internal transmission wear or damage. 6. Bolt and key loose in transmission pulley.	1. Review Sections 3 and 4. 2. See "Handlebar Height Adjustment," Section 3. 3. Replace belt or adjust belt tension (Section 5). 4. See "Checking Drive Belt Tension," Section 5. 5. Contact local dealer or the factory. 6. Tighten bolt; check that key is in place.
Tines turn, but wheels don't.	1. Wheel mounting hardware missing. 2. Bolt and key loose in transmission pulley. 3. Internal transmission wear or damage. 4. Misadjusted wheel gear cable. 5. Wheel Gear Lever not fully engaged.	1. Replace hardware. 2. Tighten bolt; check that key is in place. 3. Contact local Dealer or the Factory. 4. See "Wheel Gear Cable Adjustment," Section 5. 5. Engage lever (see Section 3).
Wheels Turn, but Tines Don't.	1. Tine holder mounting hardware missing. 2. Internal transmission wear or damage.	1. Replace hardware. 2. Contact local Dealer or the Factory.
Poor tilling performance.	1. Worn tines. 2. Improper Depth Regulator setting. 3. Incorrect throttle setting. 4. Belt(s) slipping.	1. See "Bolo Tines" (Section 5). 2. See "Tilling Tips & Techniques," Section 4. 3. See Section 4. 4. See "Checking Drive Belt Tension," Section 5.
Battery (if so equipped) does not charge during engine operation.	1. Broken wiring in engine recharging circuit. 2. Malfunctioning engine recharging system. 3. Discharged or dead battery.	1. Contact Engine Service Dealer. 2. Contact Engine Service Dealer. 3. See "Battery Maintenance," Section 5.

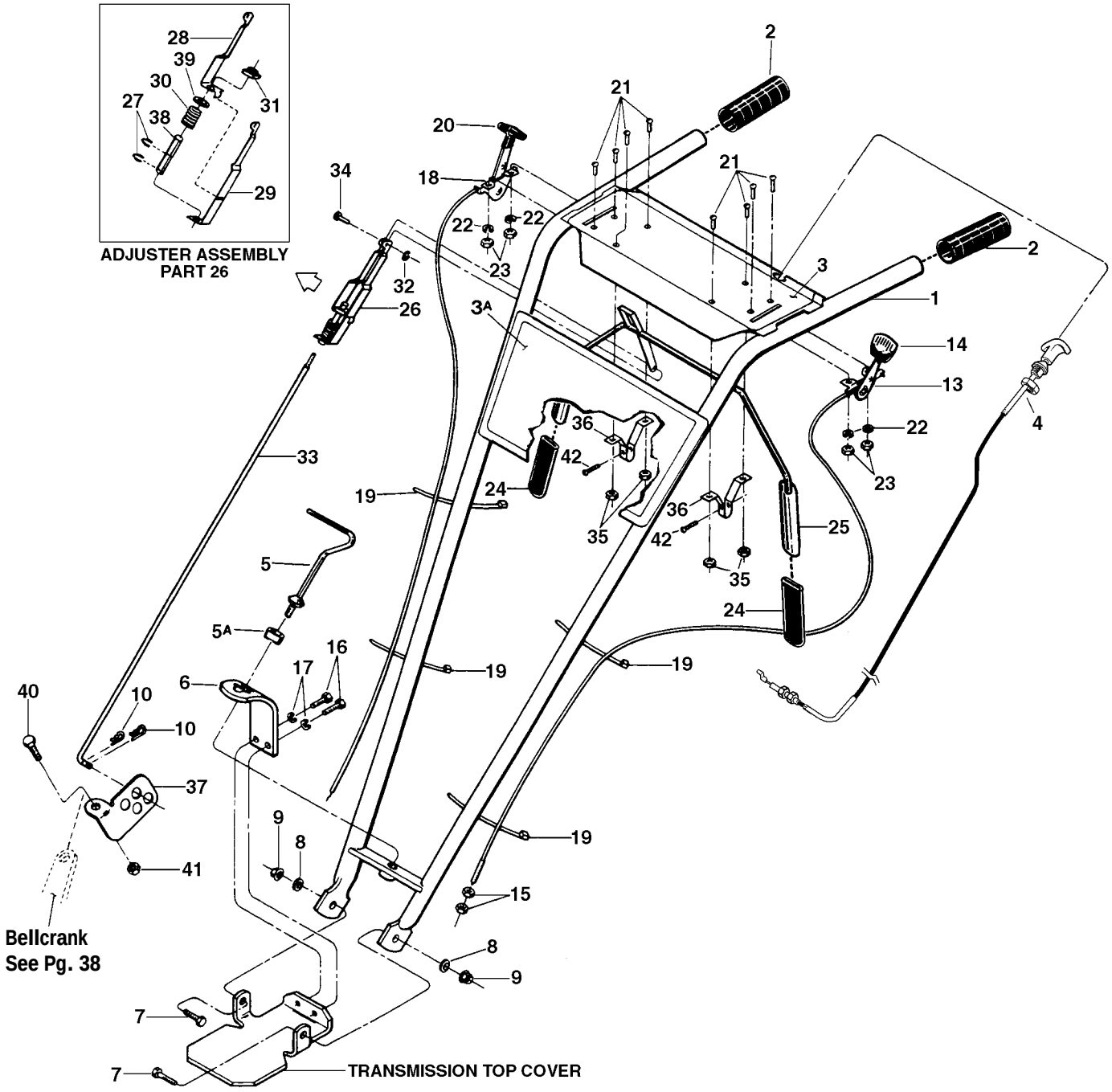
HOOD, BRACKET and DEPTH REGULATOR



REF. No.	PART No.	DESCRIPTION	QTY.
1	1917605	Tine Hood (Incl. hood flap and Ref.17)	1
2	1100243	Lockwasher, 3/8	2
3	2527	Bracket–hood & depth regulator (Incl. Ref. No. 9)	1
4	90038	Hex Flange Screw, 5/16-18 x 5/8*	2
5	9811	Hex Locknut, 1/4-20	1
6	1100069	Hex Hd. Screw, 1/4-20 x 1*	1
7	9384	Spring	1
8	9438	Spacer	1
9	9308	Roll Pin (spiral), 1/4 x 1	1
10	1117A	Depth Adjustment Bar Assembly (Incl. Refs. 11 and 12)	1
11	9120	Retaining Ring (tolerance ring)	1
12	9119	Knob, Depth Regulator (Incl. Ref. 11)	1
13	1100043	Hex Hd. Screw, 3/8-16 x 1-1/4*	2
14	1113-1	Bushing, Drag Bar	2
15	1186231	Hex Nut, 3/8-16	2
16	20775	Drag Bar	1
17	1917536	Decal, operating instructions	1
18	9553	Hex Hd. Screw, self-tapping, 5/16-18 x 1/2*	2
19	9552	Hex Flange Screw, self-tapping, 1/4-20 x 1/2*	2

* Specify GRADE 5 if ordering part locally.

HANDLEBAR ASSEMBLY and CONTROL LEVERS



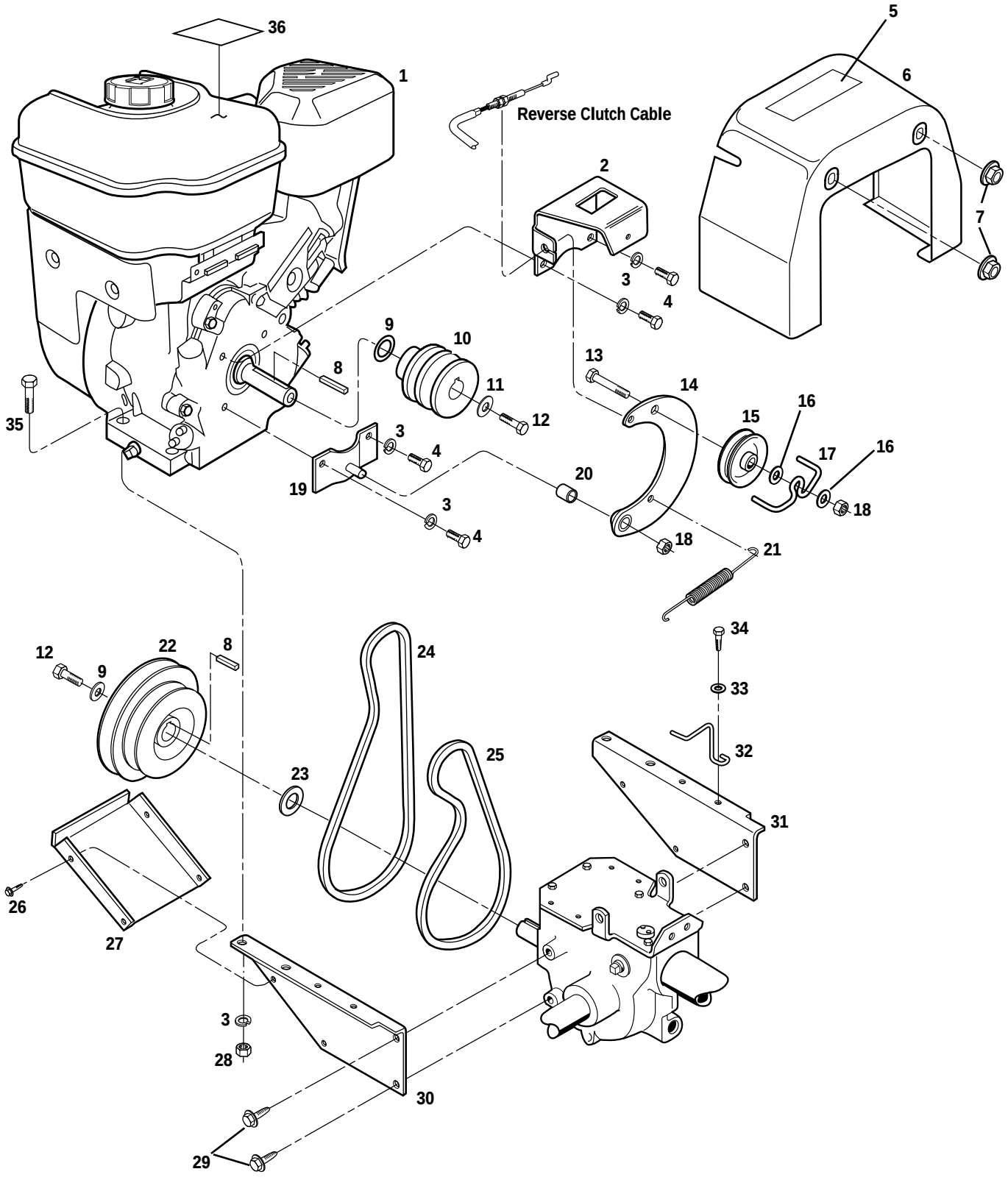
HANDLEBAR ASSEMBLY and CONTROL LEVERS

REF. No.	PART No.	DESCRIPTION	QTY.
1	1917606	Handlebars (Incl. Refs. 2, 3 & 3A) **(A)**	1
	1917607	Handlebars (Incl. Refs. 2, 3 & 3A) **(B)**	1
2	9126	Grip	2
3	1917537	Decal, Control Panel **(A)**	1
	1917571	Decal, Control Panel **(B)**	1
3A	20924	Decal, Model Name/Logo	1
4	1916784	Reverse Clutch Control Cable	1
5	20703	Height Adjustment Handle	1
5A	9955	Washer, Keyed	1
6	1900475001	Bracket, Handlebar Height Adjustment	1
7	1100046	Hex Hd. Screw, 3/8-16 x 1*	2
8	9904	Washer, Plain (flat) 3/8, S.A.E.	2
9	9837	Hex Locknut, 3/8-16	2
10	9338	Hair Pin Cotter	2
13	9442	Wheel Gear Control and Cable Assy. (Incl. Refs. 14, 15, 19, 21, 22 & 23)	1
14	9057	Knob, Wheel Gear Control Lever	1
15	1186211	Hex Nut, 5/16-24	2
16	1100068	Hex Hd. Screw, 3/8-16 x 3/4*	2
17	1100243	Lockwasher, 3/8	2
18	1916900	Engine Throttle Control and Cable	2
19	1735531	Cable Ties, Plastic	4
20	9212	Knob, Throttle Control Lever	1
21	1114748	Round Hd. Screw, #10-32 x 1/2	8
22	1100240	Lockwasher, #10	4
23	1186208	Hex Nut, #10-32	4
24	9390	Grip	2
25	20863	Bail, Forward Clutch Control (Incl. two Ref. 24)	1
26	20862	Adjuster Assy. (Incl. Refs. 27, 28, 29, 30, 38 and 39)	1
27	9532	Klip Ring	2
28	20808	Adjuster, Right Side	1
29	20809	Adjuster, Left Side	1
30	9059	Spring, Adjuster	1
31	9522	Rectangular Nut	1
32	9386	Klip Ring	1
33	20831	Rod, Forward Clutch	1
34	97083	Clevis Pin	1
35	9853	Sems Nut	4
36	20806	Bracket, Bail Support	2
37	20888	Swivel	1
38	9432	Bushing	1
39	9973	Washer	1
40	1100805	Hex Hd. Screw, 1/4-20 x 3/4*	1
41	9811	Nut, 1/4-20	1
42	9552	Hex Flange Screw, self-tapping, 1/4-20 x 1/2*	2

* Specify GRADE 5 if ordering part locally.

(A) For Model 12211 (Recoil Start Engine)
(B) For Model 12212 (Electric Start Engine)

ENGINE, SUPPORT BRACKETS, PULLEYS, BELTS, BELT COVER



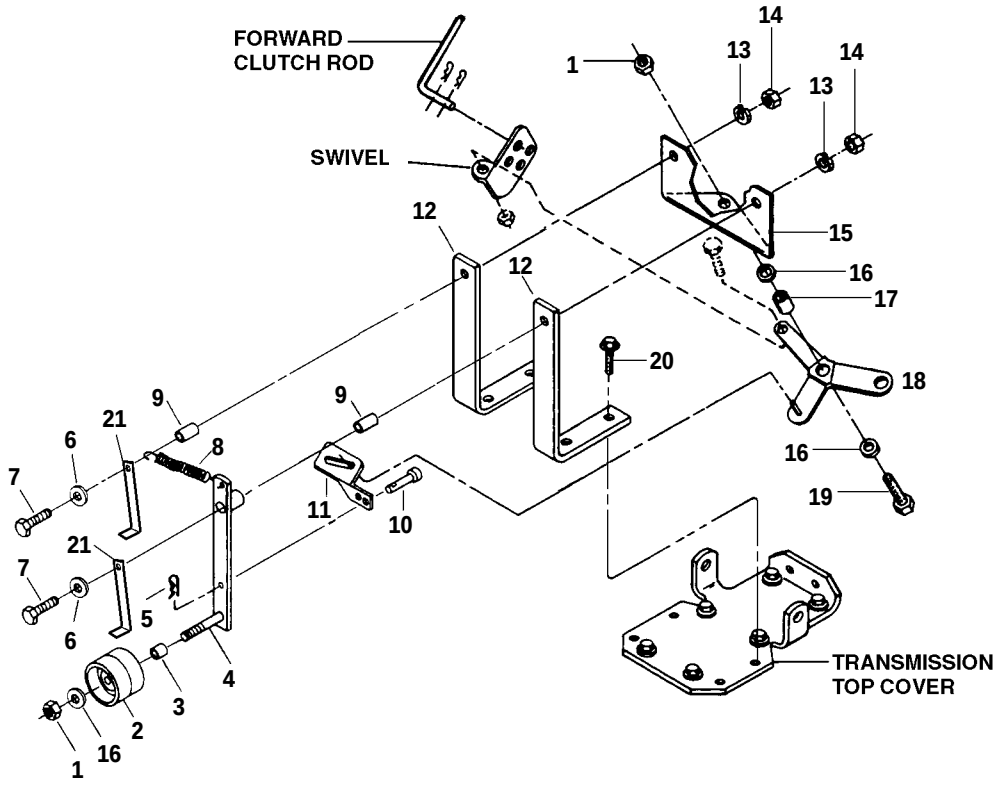
ENGINE, SUPPORT BRACKETS, PULLEYS, BELTS, BELT COVER

REF. No.	PART No.	DESCRIPTION	QTY.
1	**	Engine – 7HP, standard recoil start	1
	**	Engine – 7HP, electric start	1
2	1917326001	Bracket, Clutch Cable	1
3	1100242	Lockwasher–5/16	8
4	1111696	Hex Hd. Screw, 5/16-24 x 1/2	4
5	1904557	Decal, Hot Surfaces/Belt Warning	1
6	1917139	Cover (Incl. Ref. 5)	1
7	1186391	Flange Lock Nut, 5/16-18	2
8	1108841	Key, 3/16 x 1-1/2	2
9	1138-1	Shim	1
10	1916520	Pulley, Engine Drive	1
11	9944	Belleville Washer	2
12	9572	Hex Hd. Screw, 5/16–24 x 1-1/8	2
13	1111606	Hex Hd. Screw, 5/16–18 x 2	1
14	1916578001	Reverse Idler Arm	1
15	1916535	Pulley, Reverse Idler	1
16	1107382	Flat Washer, 5/16	2
17	1916725	Belt Guide	1
18	1110107	Locknut, 5/16–18	1
19	1916559001	Bracket, Reverse Idler	1
20	1916536	Bushing	1
21	1916728	Spring, Reverse Return	1
22	1916522	Transmission Pulley	1
23	1440	Support Washer	1
24	1916753	Reverse Drive Belt	1
25	1909404	Forward Drive Belt	1
26	1900396	Hex Hd. Screw, #10-32 x 1/2, self-tapping	4
27	1916189001	Guard, Belts/Pulleys	1
28	1186230	Hex Nut, 5/16–18	4
29	1186329	Hex Flange Screw, 5/16-18 x 3/4*	4
30	1916797001	Engine Support Bracket, left side	1
31	1916796001	Engine Support Bracket, right side	1
32	1916736	Belt Guide	1
33	1107381	Flat Washer, 1/4	1
34	9573	Hex Hd. Screw, self-tapping, 1/4-20 x 3/4*	1
35	1100799	Hex Hd. Screw, 5/16–18 x 1-1/2	4
36	1915810	Decal, Stabilization	1

* Specify GRADE 5 if ordering part locally.

** See your local authorized engine service dealer for engine parts or service. Refer to engine nameplate for engine type and code information.

FORWARD IDLER ASSEMBLY

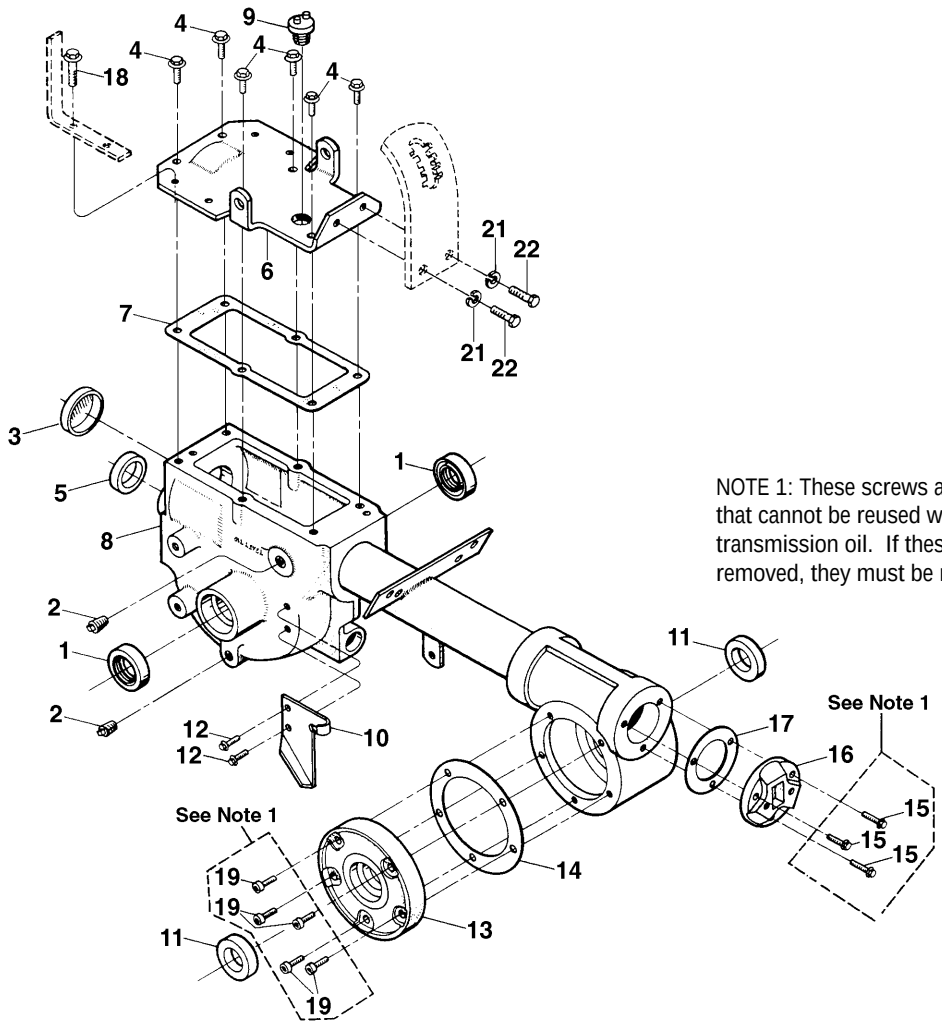


REF. No.	PART No.	DESCRIPTION	QTY.
1	1110108	Hex Locknut, 3/8-16	2
2	9090	Idler Pulley, Forward	1
3	20532	Spacer	1
4	1916192001	Left Idler Arm, forward tiller direction	1
5	9338	Hairpin Cotter	1
6	20545	Plain Washer, 5/16	1
7	1111607	Hex Hd. Screw, 5/16-18 x 2-1/4*	2
8	1916727	Spring	1
9	9479	Pivot Bushing	2
10	9340	Pin	1
11	20517-01	Forward Link	1

REF. No.	PART No.	DESCRIPTION	QTY.
12	1916194001	Mounting Bar	2
13	1100242	Lockwasher, 5/16	2
14	1186230	Hex Nut, 5/16-18	2
15	1916195001	Shifting Base	1
16	20553	Spacer (Bushing)	3
17	20532	Bushing (Bellcrank)	1
18	1916196001	Bellcrank	1
19	1100043	Hex Hd. Screw, 3/8-16 x 1-1/4*	1
20	1186331	Hex Flange Screw, 5/16-18 x 1	1
21	1917149001	Belt Guide, Forward Belt	2

* Specify GRADE 5 if ordering part locally.

TRANSMISSION HOUSING, COVERS, SEALS, GASKETS, PLUGS



NOTE 1: These screws are a special sealing screw that cannot be reused without risking the loss of transmission oil. If these screws are loosened or removed, they must be replaced with new screws.

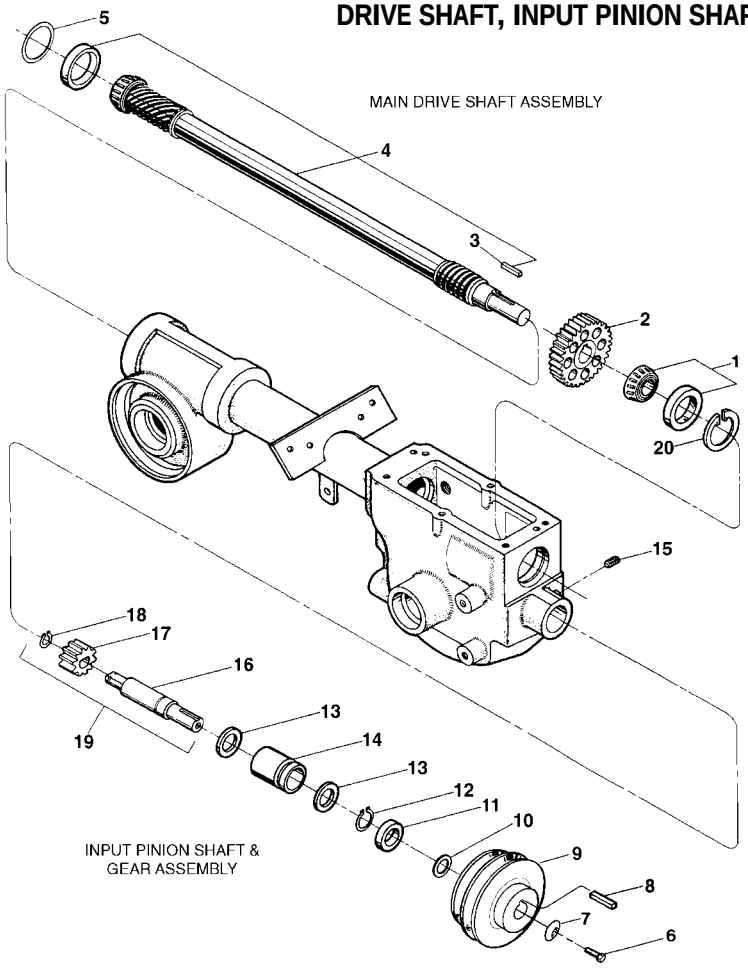
REF. No.	PART No.	DESCRIPTION	QTY.
1	9621	Oil Seal (Double Lip), Wheel Shaft	2
2	9726	Pipe Plug, 1/4,	2
3	97076	Seal, Transmission Bore	1
4	1186329	Hex Flange Screw, 5/16-18 x 3/4*	6
5	85030	Oil Seal, Input Pinion Shaft	1
6	11513	Transmission Cover (Incl. four Ref. 18 and two ea. Refs. 21 & 22)	1
7	20694	Gasket, Transmission Top Cover	1
8	1916197001	Transmission Case Assy. (Incl. Tube and Rear Housing)	1
9	9467	Plug	1
10	1916198001	Mounting Plate, Wheel Drive Cable	1
11	97073	Oil Seal, Tiller Shaft	2
12	90038	Hex Flange Screw, 5/16-18 x 5/8*	2
13	1916273001	Tiller Housing Cover, left side	1

REF. No.	PART No.	DESCRIPTION	QTY.
14	1129-1	Gasket, Tiller Housing Cover, .010" (fits all covers)	A/R
15	1915089	Screw Kit: Incl. three 1/4-20 x 7/8 Self-Sealing Screws	A/R
16	1115	Rear Bearing Cap	1
17	1124-2	Gasket, Rear Bearing Cap, .010" Thick	A/R
18	1186331	Hex Flange Screw, 5/16-18 x 1*	4
19	1915087	Screw Kit: Incl. five 1/4-20 x 5/8 Self-Sealing Screws	A/R
21	1100243	Lockwasher, 3/8	2
22	1100068	Hex Hd. Screw, 3/8-16 x 3/4*	2

* Specify GRADE 5 if ordering part locally.

A/R – As Required

DRIVE SHAFT, INPUT PINION SHAFT and GEAR ASSEMBLIES



REF. No.	PART No.	DESCRIPTION	QTY.
		MAIN DRIVE SHAFT	
1	1714	Bearing, Tapered Roller with Race	1
2	20718	Spur Gear	1
3	9301	Key, 3/16 sq. x 1	1
4	11603	Main Drive Shaft (Drive shaft is one-piece with integral, single-lead, work-hardened front worm, and integral, six-lead, work-hardened rear worm. Also includes pressed-on #1714 bearing and #9301 key).	1
5	1224-1	Shim, Rear Bearing Cap, .010" thick (see Note below)	A/R
5	1224-2	Shim, same as above, but .030" thick (see Note).....	A/R
5	1224-3	Shim, same as above, but .005" thick (see Note).....	A/R
...	1325C	Shim Set (Incl. two #1224-1; two 1224-2 and one #1224-3)	A/R

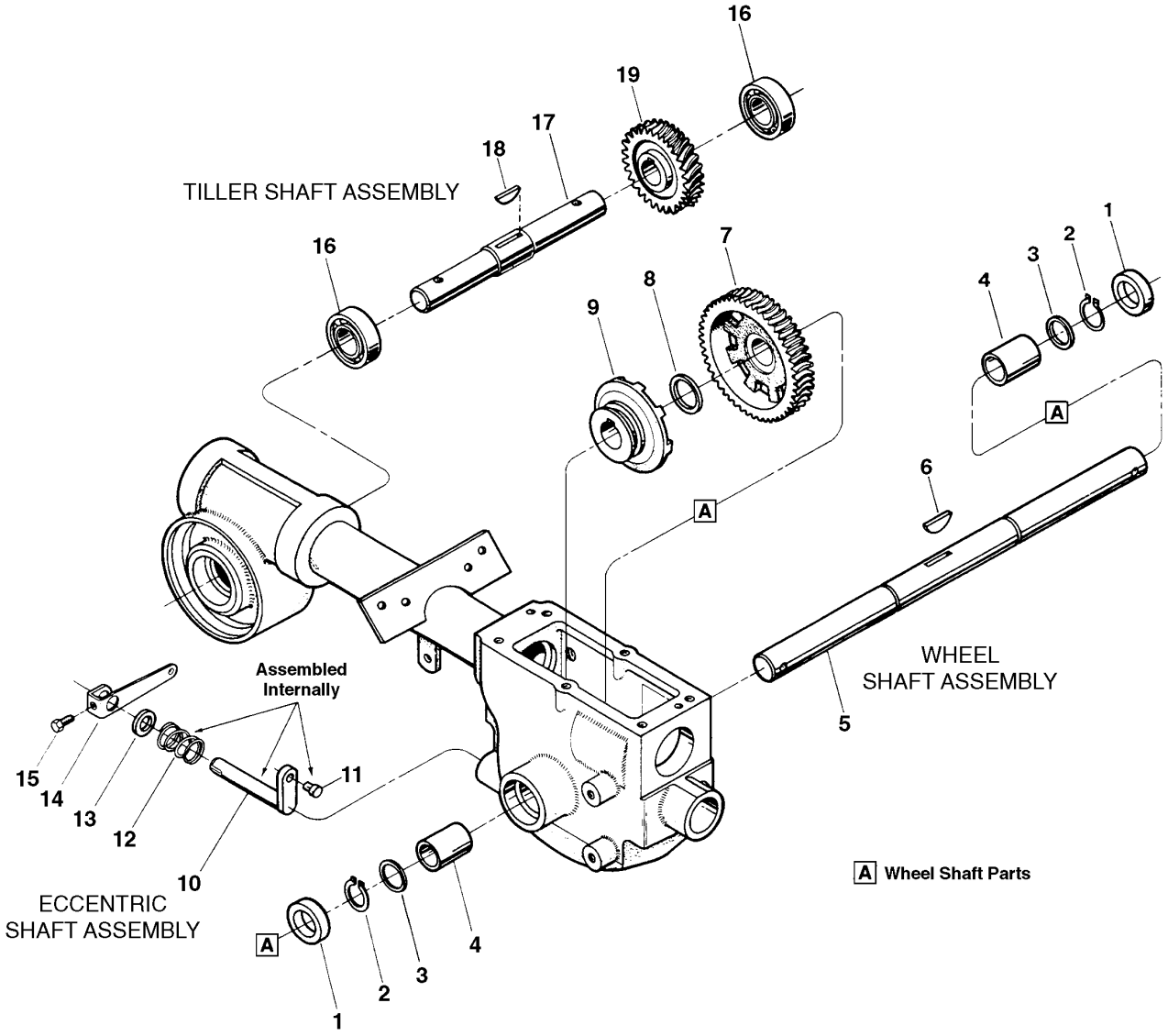
REF. No.	PART No.	DESCRIPTION	QTY.
		INPUT PINION SHAFT & GEAR ASSEMBLY	
6	9572	Hex Hd. Screw, 5/16-24 x 1-1/8*	1
7	9944	Washer, Disc Spring (concave surface faces pulley).....	1
8	1108841	Key, 3/16 sq. x 1-1/2	1
9	20880	Transmission Drive Pulley.....	1
10	1440	Support Washer	1
11	85030	Oil Seal, Input Pinion Shaft.....	1
12	9500	Retaining Ring (external)	1
13	9953	Thrust Washer.....	2
14	9428	Bushing	1
15	9677	Set Screw, 5/16-18 x 3/8*.....	1
16	20791	Input Pinion (steel shaft).....	1
17	20792	Input Pinion Gear	1
18	9093	Retaining Ring (external) I.....	1
19	20799	Pinion Assy. (Incl. one each Refs. 16, 17 and 18	A/R
20	9517	Retaining Ring (internal)	1

NOTE: Shim between drive shaft rear bearing and rear bearing cap to achieve 5-to-10 thousandths of an inch (.005-.010) end play on drive shaft.

A/R - As Required

* Specify GRADE 5 if ordering part locally.

WHEEL SHAFT, ECCENTRIC SHAFT and TILLER SHAFT ASSEMBLIES

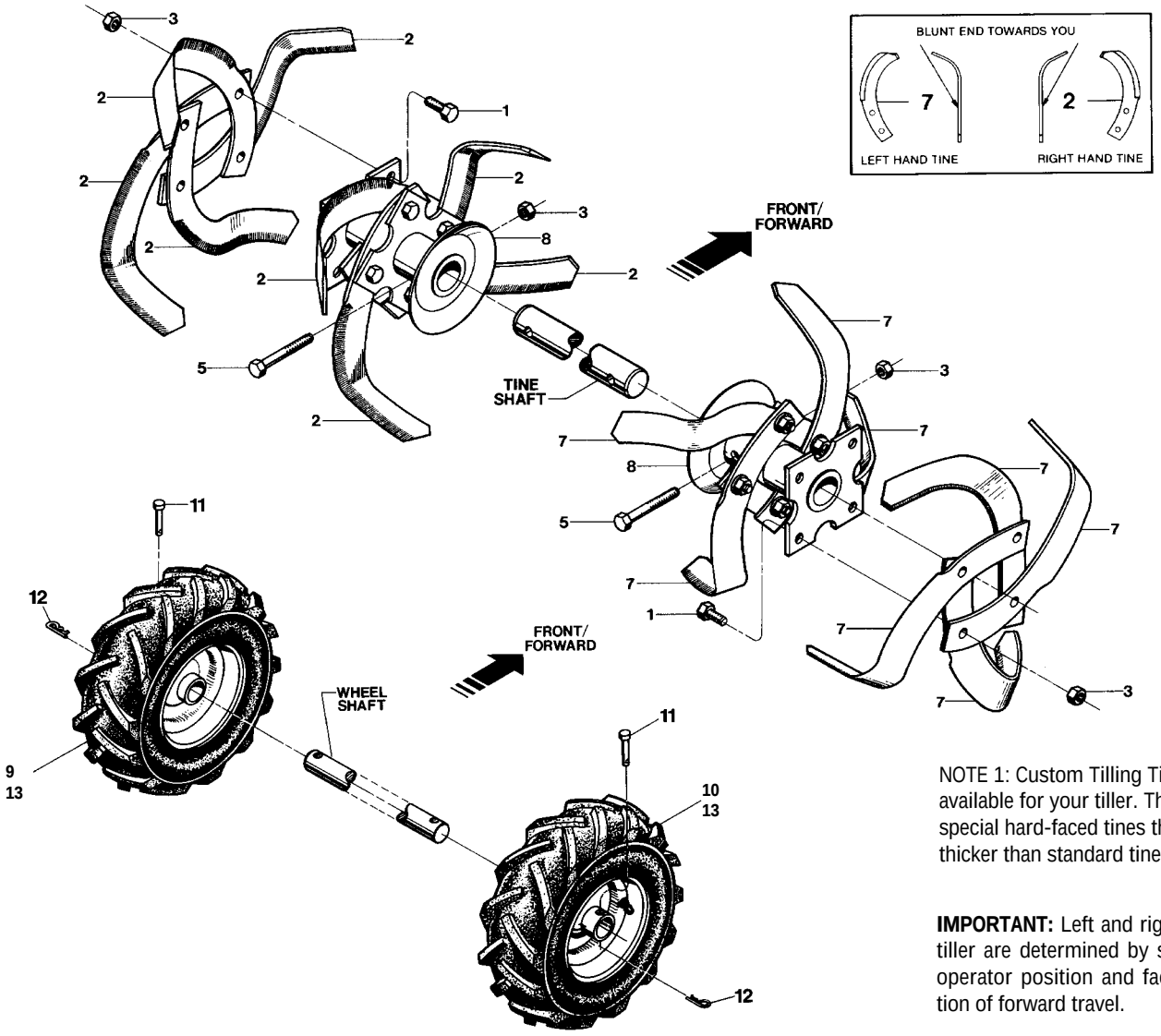


REF. No.	PART No.	DESCRIPTION	QTY.
1	9621	Oil Seal	2
2	9511	Retaining Ring (heavy-duty, external)	2
3	1166-1	Shim, 1-1/64 I.D., .062" thick	A/R
---	1166-2	Shim, as above, but .030" thick	A/R
---	1166-3	Shim, as above, but .015" thick	A/R
---	1166-4	Shim, as above, but .010" thick	A/R
4	1086	Bushing	2
5	2494	Wheel Shaft (Incl. Ref. 6)	1
6	9373	Hi-Pro Key, 1/4 x 1-5/16	1
7	20914	Wheel Drive Worm Gear (cast-iron)	1
8	9935	Shim (between key and gear), 1.016 I.D. x 1.468 O.D. x .062 Thick	1
9	20712	Wheel Drive Clutch (cast-iron)	1
10	20879	Eccentric Shaft	1
11	1442	Pin, Eccentric Shaft	1
12	9055	Spring	1
13	9622	Oil Seal	1
14	20757	Eccentric Shaft Lever	1
15	1100804	Hex Hd. Screw, 1/4-20 x 1/2*	1
16	97074	Ball Bearing	2
17	20896	Tiller Shaft (Incl. Ref. 18)	1
18	1104	Woodruff Key, 1/4 x 1-1/4	1
19	20913	Tiller Drive Worm Gear (bronze)	1

* Specify GRADE 5 if ordering part locally.

A/R - As Required

BOLO TINES, WHEELS



NOTE 1: Custom Tilling Tines are available for your tiller. These are special hard-faced tines that are thicker than standard tines.

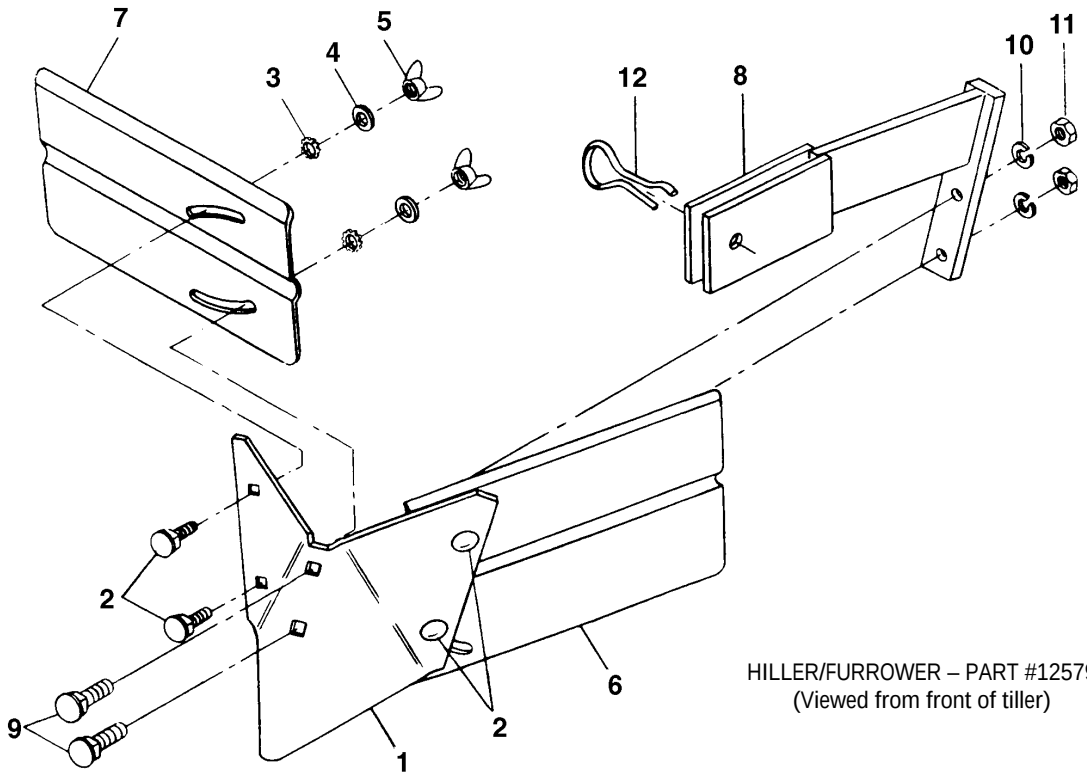
IMPORTANT: Left and right sides of tiller are determined by standing in operator position and facing direction of forward travel.

REF. No.	PART No.	DESCRIPTION	QTY.
1	1100043	Hex Hd. Screw, 3/8-16 x 1-1/4*.....	16
2	1270-2A	Bolo Tine-single. Right hand tine used on left side of tiller. (Incl. two ea. Refs. 1 and 3)	8
3	1733398	Hex Locknut, 3/8-16	18
5	1982612	Hex Hd. Screw, 3/8-16 x 2, Grade 8....	2
7	1270-1A	Bolo Tine-single. Left hand tine used on right side of tiller. (Incl. two ea. Refs. 1 and 3)	8
8	1902154010	Tine Holder. For left and right sides	2
--	1901118	Bolo Tine Replacement Set (Incl. eight ea. right hand and left hand tines, and sixteen ea. Refs. 1 and 3)	1
--	2475-1	Custom Tilling Bolo Tine, Left hand tine (see Note 1 above)	8
--	2475-2	Custom Tilling Bolo Tine, Right hand tine (see Note 1 above)	8
--	10802	Custom Tilling Bolo Tine Replacement Set (Incl. eight ea. right hand and left hand custom tines, and sixteen each of Refs. 1 and 3)	1
9	2706-01	Wheel and Tire Assy., left side, 4.10 x 6 tire on 6" wheel **(A)(B)**	1
10	2706-02	Wheel & Tire Assy., right side, 4.10 x 6 tire on 6" wheel **(A)(B)**	1
11	9380	Clevis Pin, .312 x 1-3/4	2
12	9338	Hitch Pin	2
13	1917487	Wheel and Tire Assembly **(C)(D)**.....	2

* Specify GRADE 5 if ordering part locally.

(A) For Model 12211 – S/N 122111100101-122111199999
(B) For Model 12212 – S/N 122121100101-122121199999
(C) For Model 12211 – S/N 122111200101-122111299999
(D) For Model 12212 – S/N 122121200101-122121299999

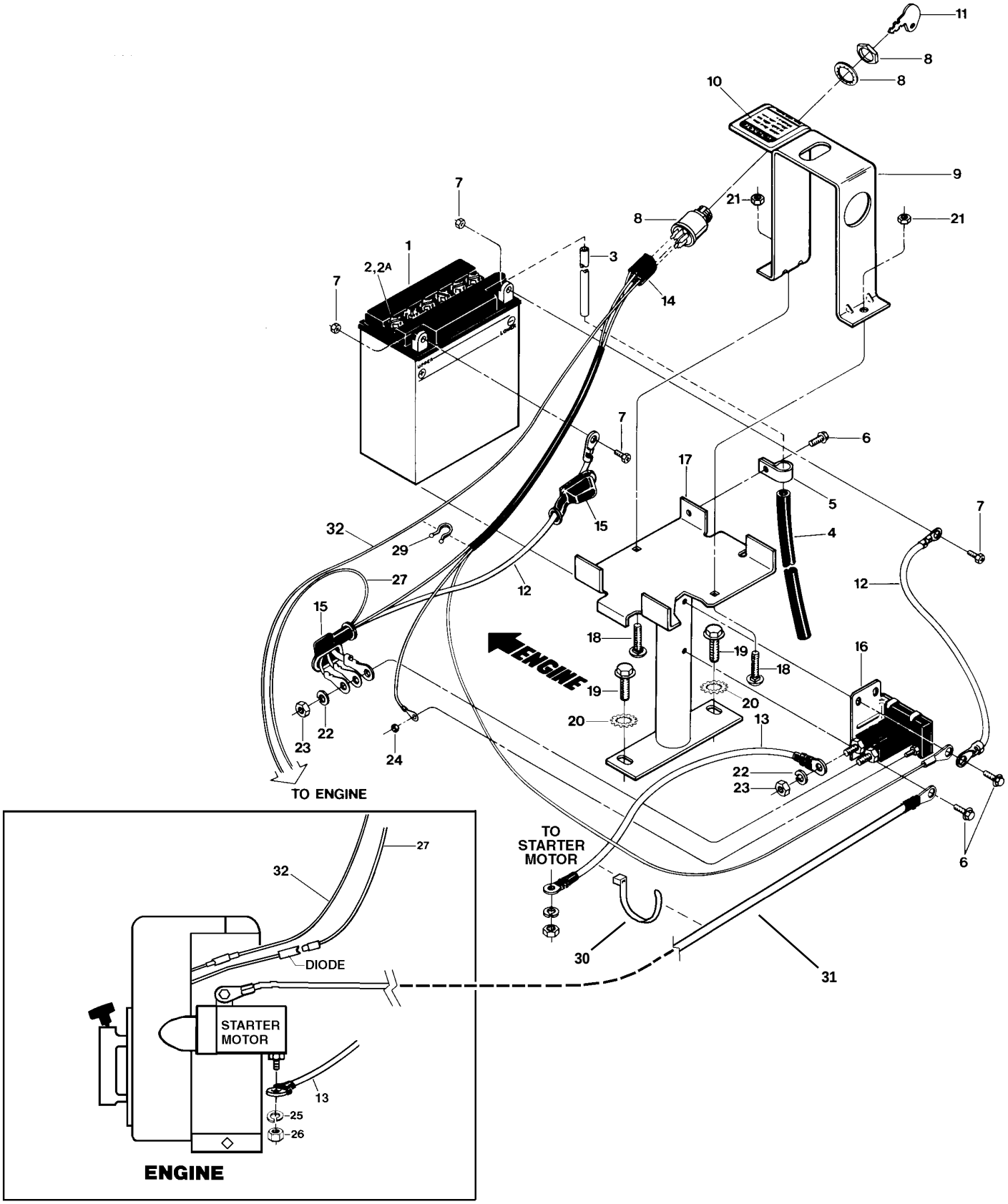
HILLER/FURROWER ATTACHMENT



HILLER/FURROWER – PART #12579
(Viewed from front of tiller)

REF. No.	PART No.	DESCRIPTION	QTY.
1	1900771001	Furrower Blade	1
2	1186098	Carriage Bolt, 5/16-18 x 3/4	4
3	1177548	Star Washer, External Tooth, 5/16	4
4	9902	Plain Washer, 5/16 S.A.E.	4
5	9824	Wing Nut, 5/16-18	4
6	1900773001	Hiller Wing, left	1
7	1900774001	Hiller Wing, right	1
8	1900772001	Blade Mounting Bracket	1
9	9725	Carriage Bolt, 3/8-16 x 1-1/2	2
10	1100243	Lockwasher, 3/8, plated	2
11	1186231	Hex Nut, 3/8-16, plated	2
12	9318	Clinch Pin	1
--	12579	Complete Hiller/Furrower Attachment (Incl. blade, bracket, hiller wings and mounting hardware)	1

ELECTRIC START ASSEMBLY



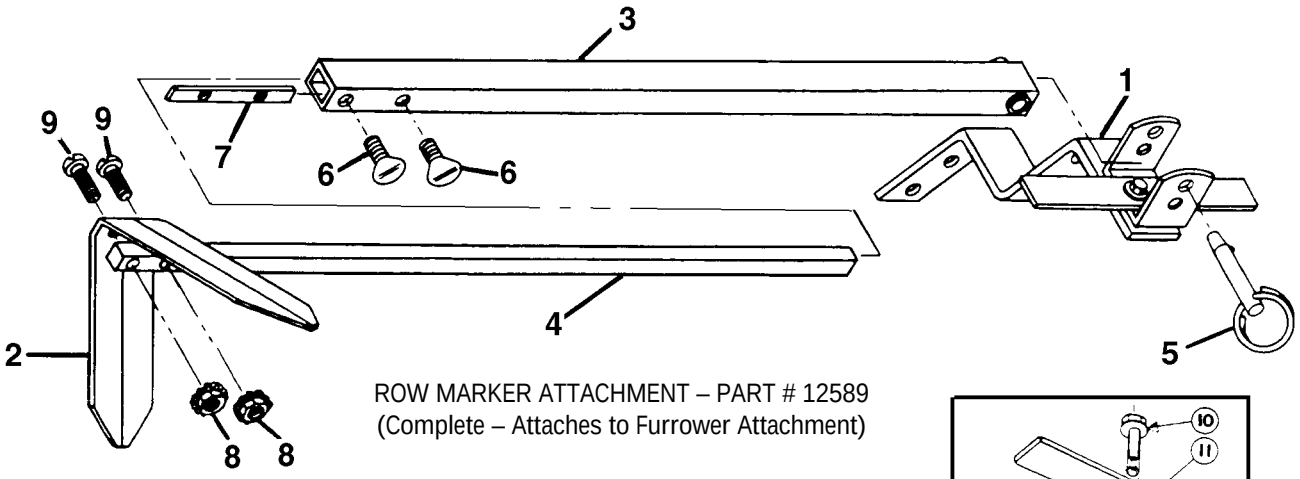
ELECTRIC START ASSEMBLY

REF. No.	PART No.	DESCRIPTION	QTY.
1	96512	Battery, 12 Volt, 9 Amp (Incl. Ref. 7)	1
2	9462	Battery Cap (yellow)	A/R
2A	9248	Battery Cap (white)	A/R
3	9009	Vent Tube	1
4	1475	Shield, Vent Tube (hard plastic)	1
5	9224	Clamp	1
6	9552	Hex Flange Screw, Self-Threading, 1/4-20 x 1/2*	3
7	11361	Battery Hardware Kit – Includes two M6 x 11mm Bolts and two M6 Nuts (metric sizes)	1
8	1908112	Ignition Switch (Incl. two ignition keys [Ref. 11], one lockwasher and one nut (lockwasher and nut not available separately)	1
9	1904570	Battery Hold-Down Clamp/Switch Mounting Plate Assy. (Incl. Ref.10)	1
10	1904548	Decal, Ignition Switch	1
11	96520	Ignition Key (pair)	1
12	96509	Battery Cable	2
13	96510	Cable (solenoid to starter motor)	1
14	1908118	Wire Harness Assy. (available as complete assembly only). Incl. wire assy. w/connector to large solenoid stud (red wire); wire assy. w/connector to small solenoid stud (red wire); wire assy. w/connector to solenoid grounding screw (red wire); wire assy w/connector to engine ground shut-off (green wire); plastic protector tube; wire terminal	1
15	97020	Boot, Insulating	2
16	96514	Solenoid (Incl. nuts and washers for cables and wires)	1
17	20837	Battery Bracket	1
18	1186023	Round Hd. Screw, Square Neck, 1/4-20 x 1-1/4	2
19	1186331	Hex Flange Screw, 5/16-18 x 1*	2
20	1177548	Lockwasher, External Tooth	2
21	1186389	Hex Locknut, 1/4-20	2
22	1100242	Lockwasher, 5/16	2
23	1186211	Hex Nut, 5/16-24	2
24	9853	Hex Locknut, #10-32	1
25	--	Lockwasher, #10 (not available from factory)	1
26	--	Hex Nut, #10-24 (not available from factory)	1
27	1901894	Recharge Wire Assembly	1
28	9218	Clip (holds recharging line)	1
29	9265	Plastic Wire Tie	1
30	9202	Plastic Wire Tie	1
31	1901202	Cable (ground wire to starter motor bracket)	1
32	1917262	Ground Wire Assy. (shut off)	1

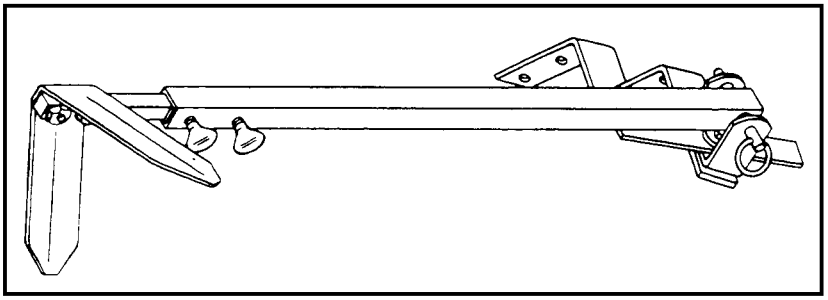
* Specify GRADE 5 if ordering part locally.

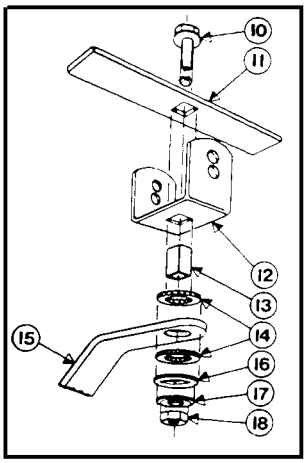
A/R - As Required

ROW MARKER ATTACHMENT



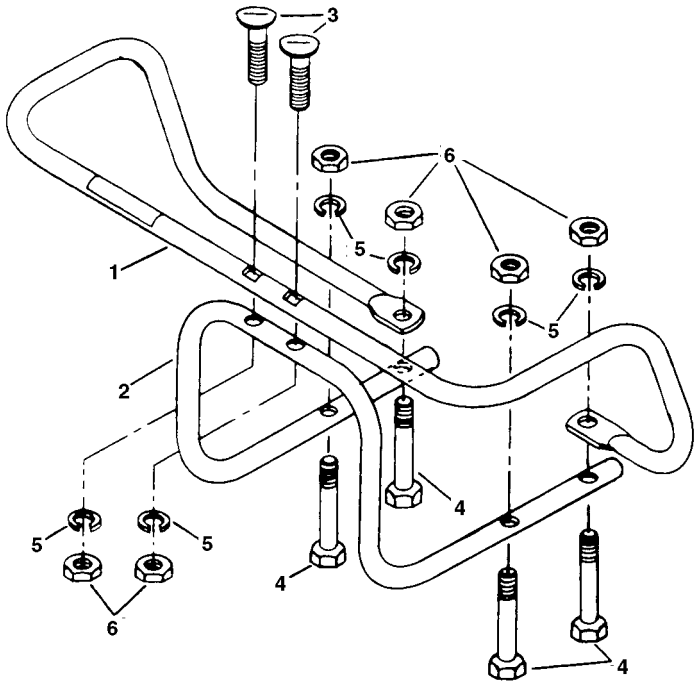
ROW MARKER ATTACHMENT – PART # 12589
(Complete – Attaches to Furrower Attachment)





MAIN SUPPORT/YOKE ASSEMBLY
PART # 1904522001

BUMPER ATTACHMENT



BUMPER ATTACHMENT – PART #12593 (Viewed from front of tiller.)

ROW MARKER ATTACHMENT & BUMPER ATTACHMENT

REF. No.	PART No.	DESCRIPTION	QTY.
		Row Marker Attachment – Part #12589	
1	1904522001	Complete Main Support & Yoke Assy. (Incl. Refs. 10, 11, 12, 13, 14, 15, 16, 17 & 18)	1
2	1594	Marker Blade	1
3	1904524001	Marker Arm	1
4	1904523001	Marker Extension Arm (Incl. stop pin)	1
5	9347	Hitch Pin (Incl. in #1837 Hardware Package)	1
6	9786	Thumbscrew, 1/4-20 x 1/2 (not avail. separately – see #1837 Hardware Package)	2
7	1596	Nut Bar (Incl. in #1837 Hardware Package)	1
8	9828	Hex Nut, #10-24 w/attached start washers (not avail. separately – see #1837 Hardware Package)	2
9	1100135	Round Hd. Screw, #10-24 x 1 (not avail. separately – see #1837 Hardware Package)	2
---	1837	Hardware Package. Includes: one Hitch Pin (Ref. 5), two Thumbscrews (Ref. 6), one Nut Bar (Ref. 7), two Hex Nuts (Ref. 8) & two Screws (Ref. 9)	1
---	12582	Row Marker Attachment & Pony Hiller/Furrower Attachment – Complete. Includes: #12579 Pony Hiller/Furrower and #12589 Row Marker	1
---	12589	Row Marker Attachment – Complete. Attaches to #12579 Furrower Attachment. Includes #1904522001 Main Support & Yoke Assy.	1

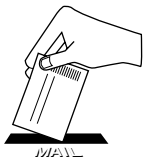
REF. No.	PART No.	DESCRIPTION	QTY.
		Row Marker Main Support & Yoke Assy – Part #1904522001	
10	1186349	Hex Flange Screw, 3/8-16 x 1-1/2*	1
11	1593	Stop Bar	1
12	1592	Yoke	1
13	1591	Tube Key (square)	1
14	1590	Friction Washer	2
15	1588	Main Support	1
16	1589	Washer (square hole)	1
17	9925	Disc Spring Washer	1
18	1186231	Hex Nut, 3/8-16	1
		Bumper Attachment – Part #12593	
19	1904757001	Bumper, Top Section	1
20	1904758001	Bumper, Bottom Section	1
21	1731025	Curved Hd. Screw, 5/16-18 x 2 (special); also see #1915811 Hardware Kit	2
22	1111608	Hex Hd. Screw, 5/16-18 x 2-1/2*, (not avail. separately – order #1915811 Hardware Kit)	4
23	1100242	Lockwasher, 5/16, (not avail. separately – order #1915811 Hardware Kit)	6
24	1186230	Hex Nut, 5/16-18 (not avail. separately – order #1915811 Hardware Kit)	6
---	1915811	Hardware Kit. Includes: two Ref. 21; four Ref. 22; six Ref. 23 and six Ref. 24	1

Note: Common hardware listed above as “not available separately” can be easily found at most good, local hardware stores.

* Specify GRADE 5 if ordering part locally.

CUSTOMER SERVICE INFORMATION

Owner Registration Card



Please fill out and mail the enclosed owner registration card. The purpose of this card is to register each unit at the factory so that we can provide you with warranty benefits and informational bulletins.

Warranty Service

The warranty statement is included in the unit's literature package.

Model/Serial Numbers

A Model/Serial Numbers decal is located on top of the transmission. For ready reference, record these numbers in the spaces below.

Model Number: _____

Serial Number: _____

Authorized Dealer Information

If you purchased your unit from an authorized dealer, record the dealer's address and phone number below for ready reference:

Dealer Name: _____

Address: _____

Phone: _____

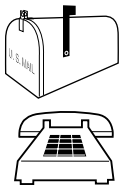
IMPORTANT:

Left and right sides of the unit are determined by standing behind the unit, in the operator's position, and facing in the direction of forward travel.

NOTICE:

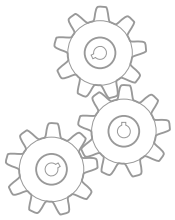
We reserve the right to change specifications, add improvements or discontinue the manufacture of any of our equipment without notice or obligation to purchasers of our equipment.

Customer Service and Technical Service



If you have questions or problems with the unit, contact your local dealer or the factory. (When calling or writing, provide the Model/Serial Numbers of the unit.)

Replacement Parts

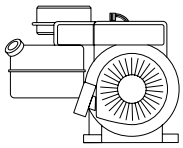


Factory specified replacement parts are available from your authorized dealer or directly from the factory. When ordering parts, be sure to provide the following:

- Model/Serial Numbers of the unit.
- Part number of the part needed.
- Part Description.
- Quantity needed.

NOTE: All replacement parts must conform to our rigid quality specifications. Although some replacement parts we provide may vary slightly in shape, color or texture from the original parts, any variations will not affect the fit or performance of these parts on your unit.

Engine Service and Repair



For engine service or repair, contact your nearest authorized engine dealer (look in the Yellow Pages under "Engines–Gasoline"). The engine is warranted by the engine manufacturer. Any unauthorized work performed on the engine during the warranty period may void this warranty. For complete details on the engine warranty, refer to the engine owner manual.

⚠ WARNING

We urge using only genuine replacement parts, which meet all the latest requirements. Replacement parts manufactured by others could present safety hazards, even though they may fit on the unit.

For customer assistance, contact your nearest authorized dealer or:

GARDEN WAY INCORPORATED • 1 Garden Way • Troy, New York 12180

Customer Service: 1-800-437-8686 • Technical Service: 1-800-520-5520 • Parts Service: 1-800-648-6776

• FAX: (518) 391-7332 • WEBSITE: www.troybilt.com

Outside the United States and Canada:

Customer Service: (518) 391-7007 • Technical Service: (518) 391-7008 • Parts Service: (518) 391-7006 • FAX (518) 391-7332

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