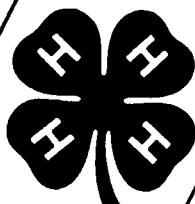
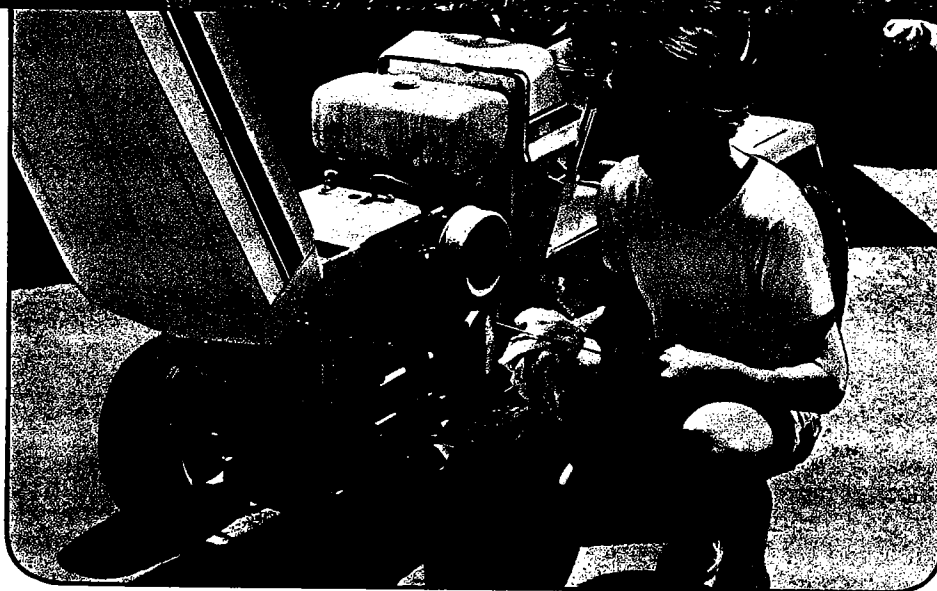
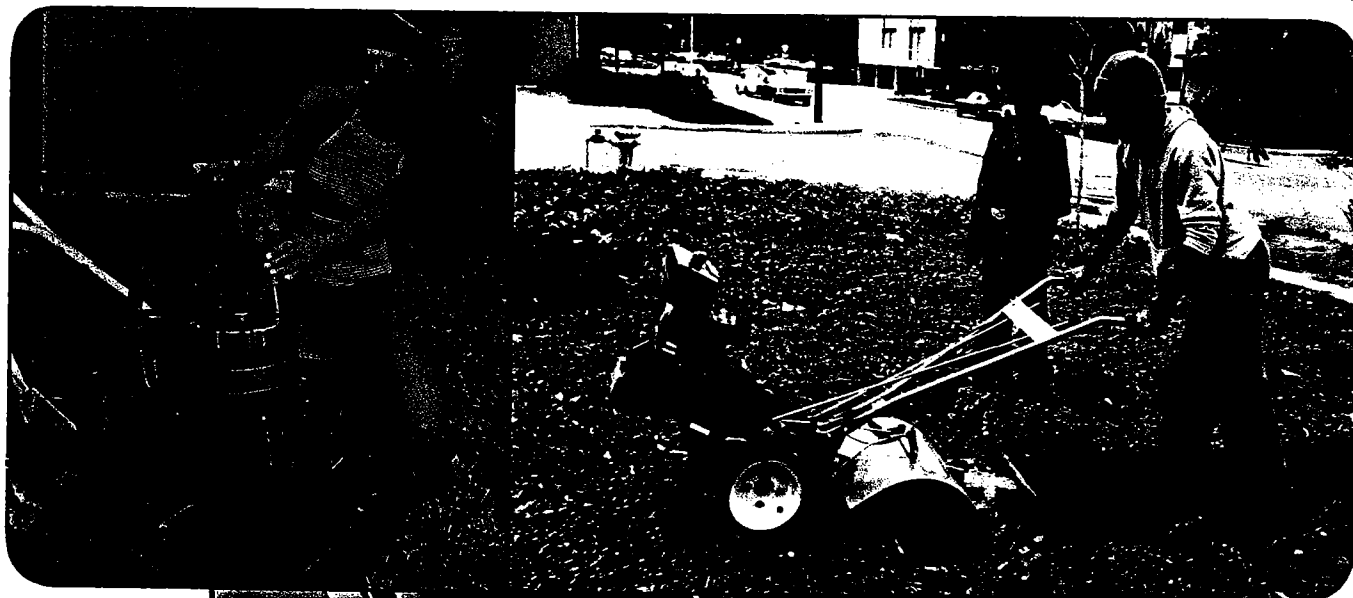


# 4-H Small Engines Program

# **LAWN and GARDEN POWER EQUIPMENT**



## Members' Manual

NAME \_\_\_\_\_

CLUB \_\_\_\_\_

BIRTHDATE \_\_\_\_\_

YEARS IN PROJECT \_\_\_\_\_

YEARS IN 4-H \_\_\_\_\_



# 4-H LAWN AND GARDEN EQUIPMENT IDENTIFICATION SHEET

NAME \_\_\_\_\_ AGE \_\_\_\_\_

ADDRESS \_\_\_\_\_

ENGINE MANUFACTURER \_\_\_\_\_

EQUIPMENT MANUFACTURER \_\_\_\_\_

MODEL NUMBER \_\_\_\_\_ SERIAL NO. \_\_\_\_\_

HORSEPOWER \_\_\_\_\_ ENGINE APPLICATION \_\_\_\_\_

## TABLE OF CONTENTS

	Page
INTRODUCTION TO LAWN AND GARDEN EQUIPMENT .....	3
SAFETY INSTRUCTIONS FOR LAWN MOWERS .....	5
OPERATING INSTRUCTIONS FOR THE LAWN MOWER .....	7
SAFETY INSTRUCTIONS FOR THE ROTARY TILLER .....	11
OPERATING INSTRUCTIONS FOR THE ROTARY TILLER .....	13
TRANSMITTING POWER .....	15
MAINTAINING YOUR LAWN AND GARDEN EQUIPMENT .....	22
MISCELLANEOUS LAWN AND GARDEN EQUIPMENT .....	29
RECORD KEEPING .....	31

## ACKNOWLEDGEMENT

This educational material has been prepared for 4-H use by the National 4-H Petroleum Power Development Committee, composed of representatives of the Cooperative Extension Service of the U. S. Department of Agriculture and State Land Grant Universities in cooperation with the National 4-H Council. Edward O. Eaton, Agricultural Engineering Department, Cornell University, served as principal author. Special thanks are extended to Amoco Foundation, Inc. for financial and technical assistance. This material is published by the National 4-H Council, 7100 Connecticut Avenue, Washington D.C. 20015.

The author wishes to extend special thanks to the Toro Company and Professor Joseph Campbell for technical information and illustrations.

Programs and educational materials of National 4-H Council; SEA-Extension, United States Department of Agriculture; and all Cooperative Extension Services of the State Land-Grant Universities are available to all persons regardless of race, color, sex, age, religion, national origin or handicap. All are equal opportunity employers.





## 4-H Small Engines Program.

# LAWN AND GARDEN POWER EQUIPMENT



### *Introduction*

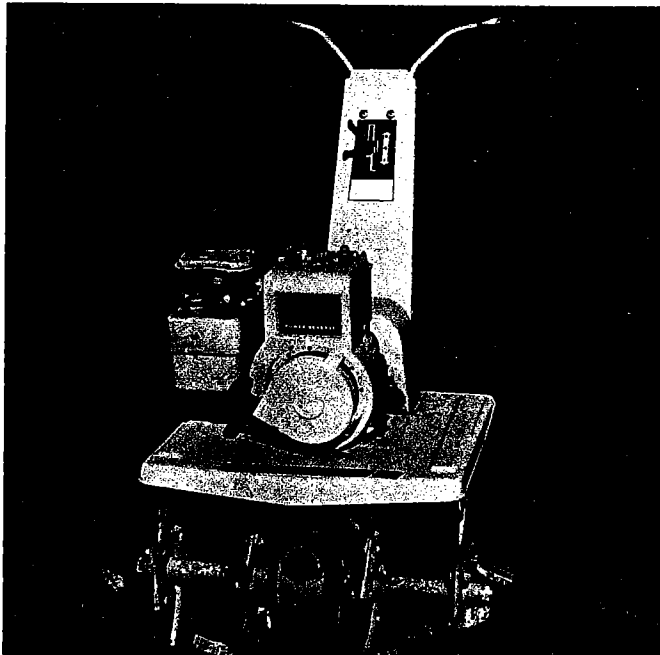
A high percentage of the small engines in use today in the United States are probably applied to some piece of lawn or garden equipment and are being operated by over 27 million families. Lawn equipment is the most popular, although garden equipment is also common. Rotary tillers and garden tractors are used by thousands of families. Some small electric devices such as grass shears and hedge trimmers also need attention if they are to be cared for properly and used safely. Major emphasis in this manual will be placed on the lawn mower, rotary tiller and garden tractor.

### *Rotary Tiller*

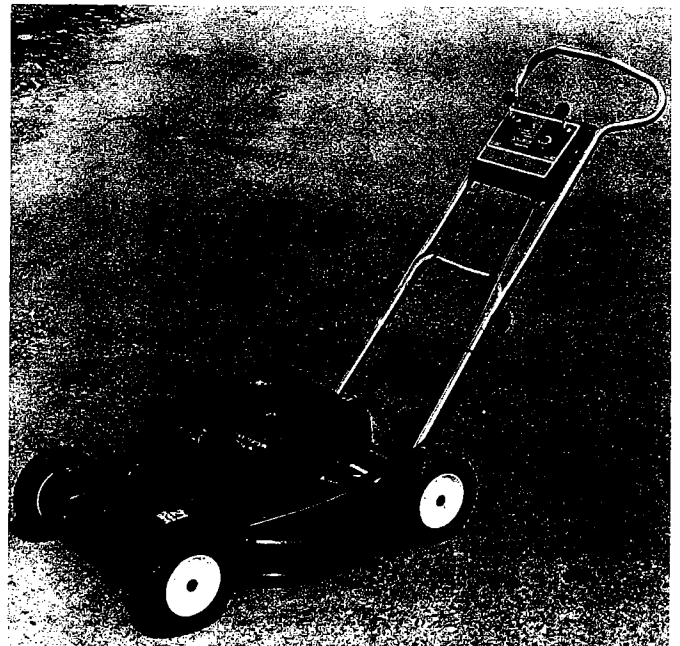
The rotary tiller is a machine designed for seed bed preparation, cultivating, furrowing, composting and mulching. It is engineered to perform many useful labor-saving tasks in the garden. Two common sizes are three and five horsepower.

### *Rotary Lawn Mower*

The rotary lawn mower is the most common type in use today for home lawns. Walking mowers are either push-type or self-propelled, usually having a cutting blade of 18 to 21 inches in diameter and powered by a three and one-half horsepower engine.



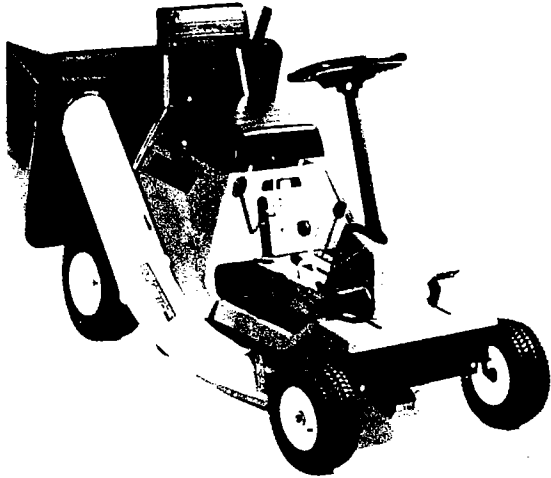
**Rotary Tiller**



**Walking-Type Rotary Mower**

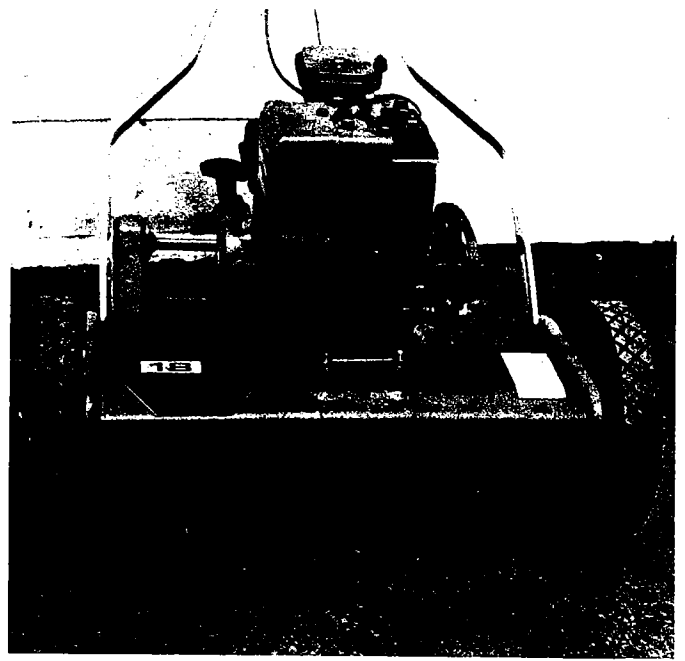


Riding rotary mowers are desirable for large lawns, having cutting widths from 25 to 32 inches, and are powered by 5 to 10 horsepower engines. A small walking rotary mower is usually needed for trimming work.



Riding Rotary Mower

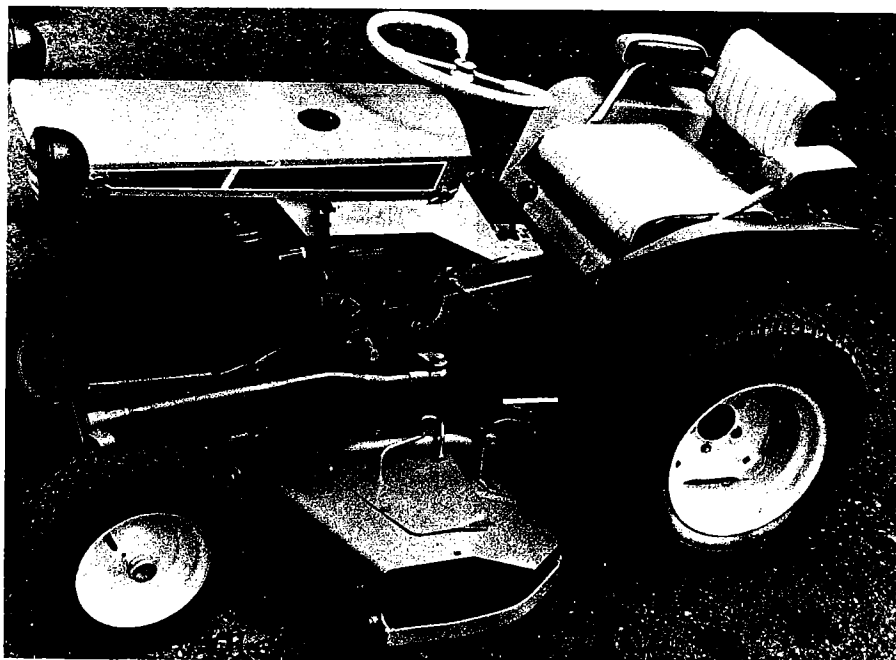
The reel-type mower, either push or self-propelled, is designed for use on *smooth* lawns. Its cut varies from 16 to 25 inches. It is powered by a two to five horsepower engine, depending upon design and width of cut. Prices of reel mowers are usually higher than rotary mowers.



Self-Propelled Reel Mower

A garden tractor is a versatile machine. Mounted with a variety of tools, such tractor can be used around the home grounds to plow gardens, mow lawns, spray plants, cultivate, dig holes and remove snow.

More than a quarter million tractors with engine ratings between eight and 16 horsepower are manufactured in the United States each year.



Garden Tractor





# SAFETY INSTRUCTIONS FOR LAWN MOWERS

## Preparation For Safe Mowing

(1) Read the owner's manual and be sure you know how to stop the engine quickly. All controls are important so be familiar with their operation. Before you operate alone, have a check-out by a qualified operator.

(2) Inspect the lawn before each mowing to be sure any stones, sticks, bones, toys or any other debris have been removed. This is especially important if children frequently play on the grass. The alert operator will keep his eyes open for any unremoved items and will stop and pick them up during the mowing operation. Keep a clean lawn.



(3) Inspect your mower before using it. Tighten any loose nuts, bolts and screws and be sure the blade of

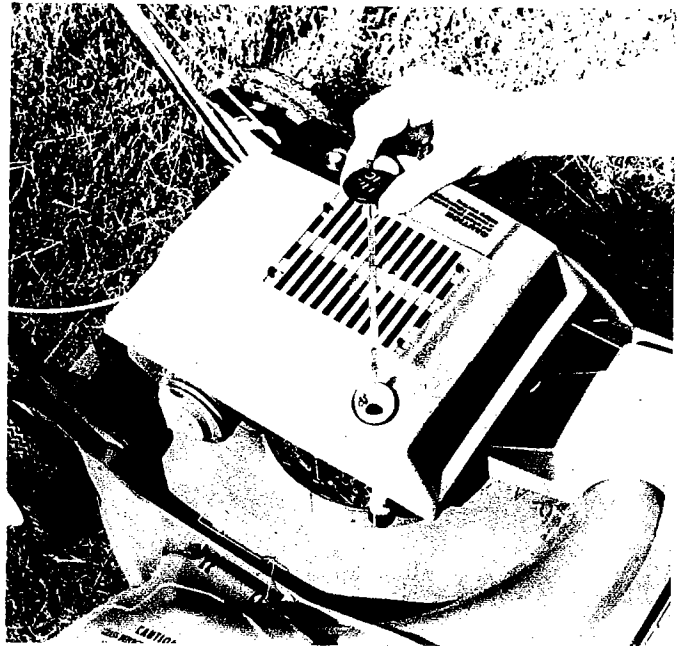


the rotary mower is tight. Keep all shields and safety devices in place. *Before* inspecting the mower, be sure to disconnect the spark plug wire.

(4) Wear long pants or slacks and good sound shoes while using the mower. Do not operate the mower while wearing sandals, shorts or in bare feet.

(5) Keep everyone a safe distance away from the area of operation — especially children and pets.

(6) Service the engine before starting it. Check the oil and fill to the required level if oil is needed. If you have a full day of operation, be sure to check the oil at least twice, once before starting and again at midday.



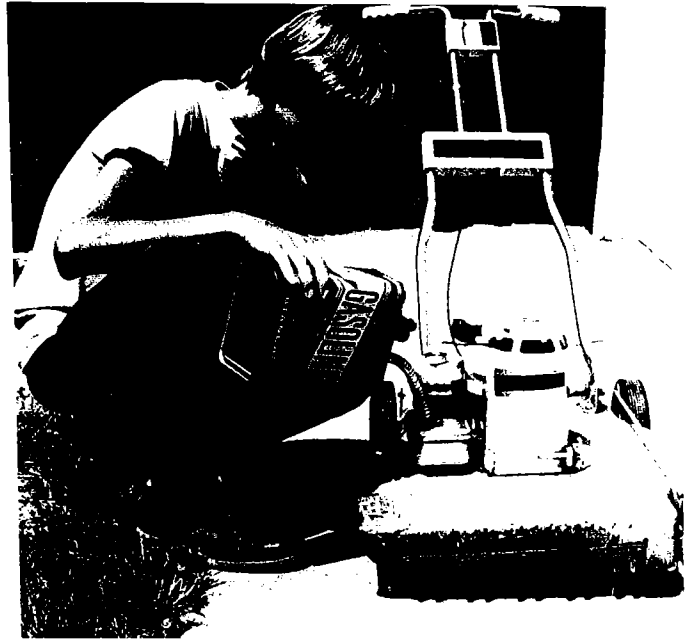
(7) Handle gasoline with extreme caution. Fill the tank before starting and avoid spilling any gasoline. Gasoline should be stored in approved containers such as a safety can, *never in a glass jug or an unapproved plastic container*. Fill the fuel tank outdoors and remember gasoline readily vaporizes and it is the vapors that are dangerous. It can be dangerous to fill the tank when the engine is hot so take a break when it is time to refuel.

(8) Adjust the height of cut, if necessary, to fit the conditions under which you will be mowing. It may be necessary to mow the same area twice if grass is tall. Be sure the engine is stopped when making height-of-cut adjustments.



(9) Disengage clutches and shift into neutral before starting engine. Make these safety checks each time before operating any power mower.

(10) Do not operate the mower if someone comes into the area unexpectedly. Be sure to caution anyone who is working with you. If you have to stop to visit with someone, shut off the engine of the mower.





# OPERATING INSTRUCTIONS FOR THE LAWN MOWER

Many of the safety instructions which apply to lawn mowing are applicable to all types of mowers. Beginners should periodically review the safety rules and then follow them prior to mowing and during the mowing operation. There are other instructions in addition to the safety rules.

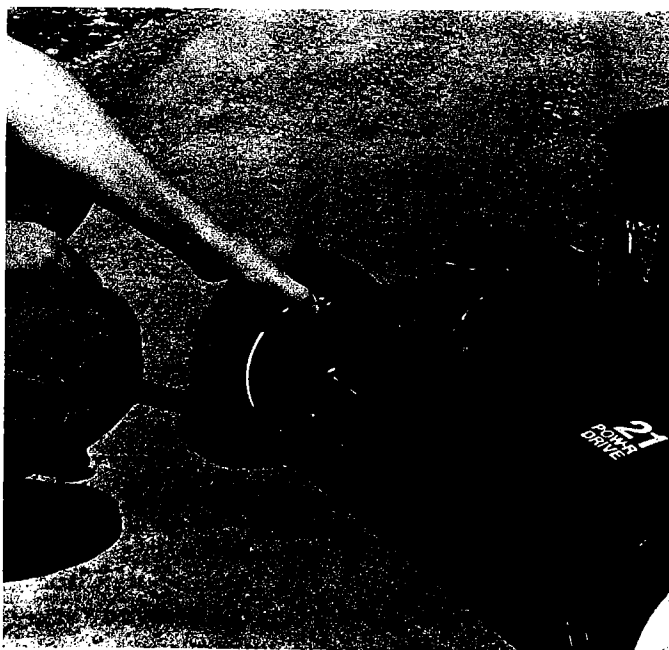
Before mowing be sure the engine is properly serviced and checked out. Use of a daily maintenance check sheet is a good practice.

To keep a good lawn, proper mowing is necessary. Cutting close weakens the grass, and causes shallow, weak roots and weed infested turf. One and one half to two inches is the ideal height for most varieties of bluegrass. Common Kentucky bluegrass and the older lawn varieties, normally do best when cut at two inches. Some of the new varieties perform well at lower cutting heights. It is frequency, not height of cut, which usually determines the attractiveness of a lawn.

## *Adjusting Height of Cut*

The method of changing height-of-cut varies with the design of the mower. Follow the manufacturer's directions if you are not sure how to make the adjustment.

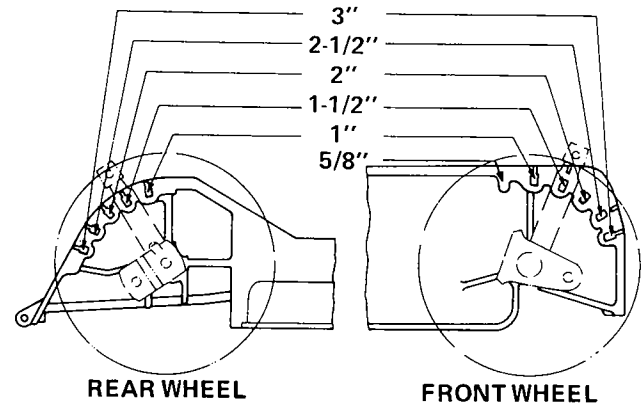
(1) Move traction control into disengage position and shut engine off before adjusting height-of-cut.



(2) Place thumb against inside of pivot arm knob and fingers against outside of wheel.

(3) Pull pivot arm out until its locating stud disengages notch in side of mower housing; then move pivot arm to desired setting and release locating stud into notch in mower housing.

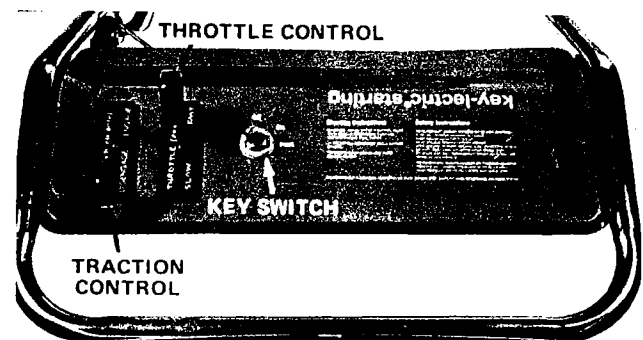
(4) Adjust all wheels to same height-of-cut.



## *Starting and Stopping Instructions*

A high percentage of lawn mowers have manual start systems which require hand cranking. In any case, be sure to follow the manufacturer's instructions for start-up. Start-up procedures for small engines is covered in the 4-H Small Engines Program Manual. If start-up difficulties are encountered refer to the "Trouble Shooting Section" in that manual.

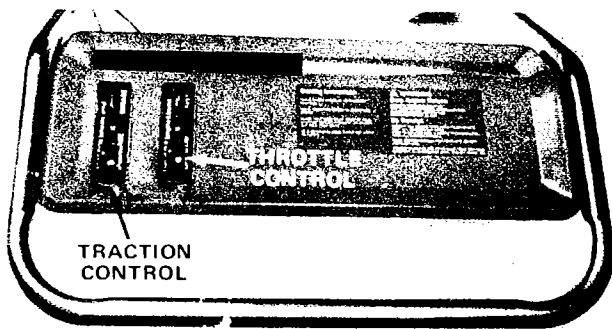
(1) If the lawn mower is a self-propelled model be sure to put the traction drive control in the disengage position. On riding lawn mowers you should also disengage the blade if this is possible.



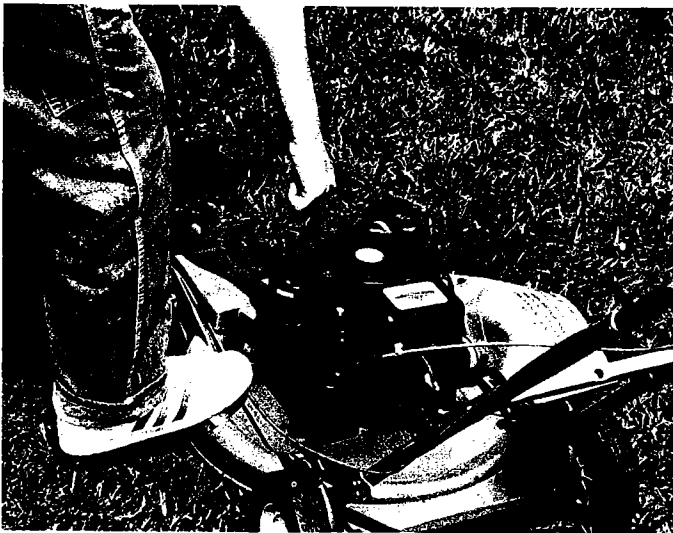


(2) Be sure spark wire is securely on the plug and ignition key in the on position. On most models the on-off switch is part of the throttle control.

(3) Move the throttle control to the “start” position. This accomplishes a number of things — the throttle is opened, the choke is closed and the grounding switch is opened and should permit the spark plug to fire when the engine is cranked. If there is a separate manual control for the choke be sure to close it. A cold engine requires a closed choke at starting time.



(4) If necessary, move the mower to level ground and in an area where the grass is short. A mower is hard to start in high grass. Put one foot firmly on the mower housing and keep the other foot from beneath the housing.



Pull the starting rope vigorously to start the engine. Two or three pulls may be necessary. If the engine does not start in three pulls it is best to follow a trouble

shooting procedure. A well tuned engine should start by the third pull on the starting rope.

(5) After the engine starts, move the throttle control to the desired speed setting.

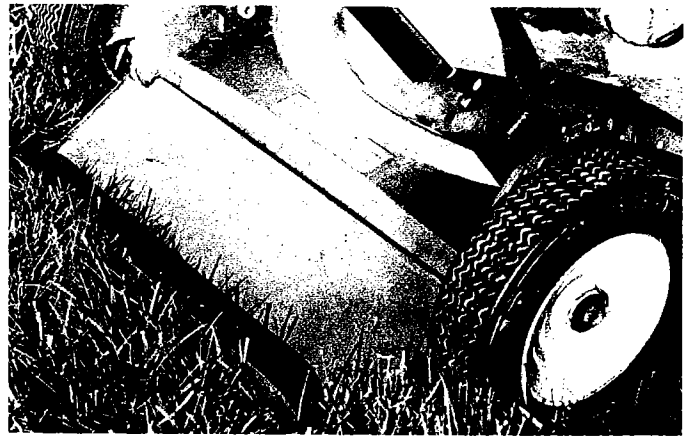
(6) To stop engine, move the traction drive control (self-propelled models) to the disengage position. When the throttle control is at the off position, the spark plug should be grounded and no spark will occur between its electrodes.

(7) Pull the spark wire off the plug to prevent the possibility of accidental starting when the mower is unattended or not used.

#### *Mowing Instruction*

Mowing practices vary. They depend upon the shape, objects to mow around and rough, uncertain areas in the lawn. Some general rules can be applied to almost any lawn.

(1) Be sure all guards provided by the manufacturer are in place. For example, the rear safety shield is an excellent addition on recent models.



(2) Always cut the grass when it is dry.

(3) Always walk behind the mower and be sure, with self-propelled units, that you are in control.

(4) Cut long grass with height-of-cut at highest setting. Then cut grass again using a lower setting.





(5) A mowing pattern is important in that it is best to discharge the mowed grass on the mowed portion of the lawn. This practice makes it easier on the engine and a more efficient operation and maybe faster. The mowing pattern is not as critical when a bagging attachment is used to collect the clippings.



(10) When using a walking rotary mower, cut across a slope, not up and down. To keep the carburetor on the up-hill side of the engine, you may need to mow in only one direction. Use caution when mowing on uneven terrain and maintain good footing.

(6) Changing the direction of mowing every other time a lawn is mowed is recommended. This may be contradictory to rule five, but is better for the lawn. It may require some raking.

(7) If the discharge chute on the mower becomes plugged with grass, the engine should be shut off before cleaning. Also disconnect the spark plug wire before starting the cleaning operation.

(8) If a solid object is hit by the blade or if mower vibrates abnormally, shut engine off immediately and wait for all moving parts to stop. Remove key from switch if mower has key start. Disconnect high tension wire from spark plug and keep wire away from plug to prevent possibility of accidental starting. Check mower for possible damage, bent blade, an obstruction, or lost part (s). Make all repairs before using the mower.

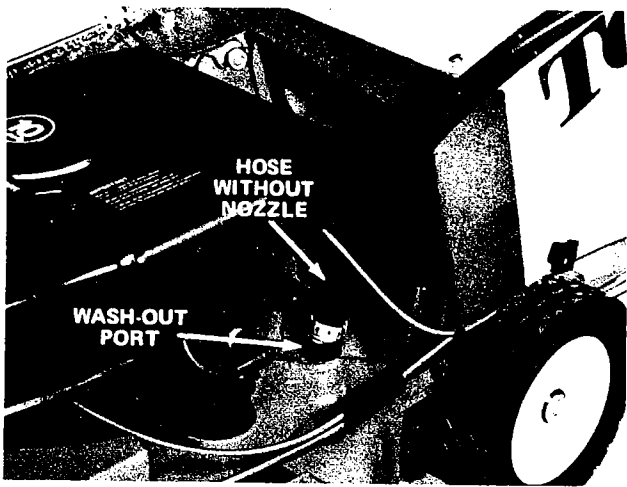
(9) If a gravel driveway, road, or side walk must be crossed, shut engine off so loose sand and rocks are not thrown.



(11) Cut grass during the daytime or when there is adequate artificial light. Do not cut wet grass; it is best to cut grass when it is dry.

(12) After the mower is used, the underside of the housing should be cleaned. If the unit has a wash-out port it is easy to do by connecting a garden hose and apply moderate water pressure. Start the engine and allow it and the water to run for about two minutes.





(13) Some lawn clean-up may be necessary after the mowing operation. A lawn will look more attractive if the clippings are removed. This is especially true if the lawn is not mowed frequently enough.

*Extra Rules For Riding Mowers*

(1) Become familiar with all controls and know how to use them. You may need to know how to stop the engine quickly. Never allow children to operate the riding mower.

(2) Never carry a passenger.

(3) Start the engine when parking brake is set, the blade is de-energized and the transmission is in neutral. If possible move the height of cut control to the highest cutting level.



(4) When using the riding mower, stay alert for holes in the terrain and other hidden hazards. To prevent tipping or loss of control, do not drive close to a ditch or creek.

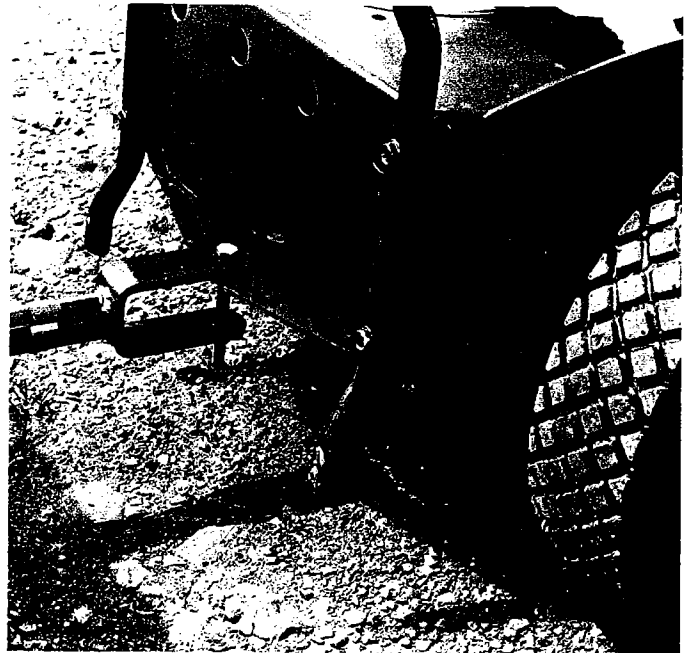
(5) Cut steep grass slopes up and down; never across the face. When going uphill or downhill do not stop or start suddenly.

To prevent tipping or loss of control, reduce speed on slopes and when making sharp turns. Extreme caution must be used when changing direction on slopes. If a steep hill must be cut, back the rider up the hill and drive forward down the hill.

(6) Watch out for traffic when crossing roads or near roads and always yield the right-of-way.

(7) When driving from one area to another, crossing a gravel driveway, road or sidewalk, move blade control into **DISENGAGE** and raise mower housing to its highest level. This will prevent loose sand, rocks and other debris from being thrown by the whirling blade.

(8) Always use the drawbar hitch point at the rear of the chassis for hauling a small trailer. Limit loads to those that can be controlled safely. Be careful when backing and turning.



(9) Before leaving the operator's position or leaving the mower unattended, shift transmission into neutral, set parking brake, move blade control into **DISENGAGE**, turn ignition key to **OFF**, and remove key from switch.



