

# ***Power Dog***™

## **Owner's Manual**

PD209SR PD209HR PD213HE  
PD209SE PD209HE

Commercial/Industrial Products



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# SAFETY RULES



## Safe Operation Practices for Walk-Behind *Power Dog*™ Tillers



### TRAINING

- Read the Manual carefully. Be thoroughly familiar with the controls and the proper use of the equipment. Know how to stop the unit and disengage the controls quickly
- Never allow children to operate the equipment. Never allow adults to operate the equipment without proper instruction.
- Keep the area of operation clear of all persons, particularly small children, and pets.

### PREPARATION

- Thoroughly inspect the area where the equipment is to be used and remove all foreign objects.
- Disengage all controls before starting the engine (motor).
- Do not operate the equipment without wearing adequate outer garments. Wear footwear that will improve footing on slippery surfaces.
- Handle fuel with care; it is highly flammable.
- Never add fuel to a running engine or hot engine.
- Fill fuel tank outdoors with extreme care. Never fill fuel tank indoors.
- Replace gasoline cap securely and clean up spilled fuel before restarting.
- Never attempt to make any adjustments while the engine (motor) is running (except where specifically recommended by manufacturer).

### OPERATION

- Do not put hands or feet near or under rotating parts.
- Exercise extreme caution when operating on or crossing gravel drives, walks, or roads. Stay alert for hidden hazards or traffic. Do not carry passengers.
- After striking a foreign object, stop the engine (motor), remove the wire from the spark plug, thoroughly inspect the tiller for any damage, and repair the damage before restarting and operating the tiller.
- Exercise caution to avoid slipping or falling.
- If the unit should start to vibrate abnormally, stop the engine (motor) and check immediately for the cause. Vibration is generally a warning of trouble.
- Stop the engine (motor) when leaving the operating position.
- Take all possible precautions when leaving the machine unattended. Disengage the tines, and stop the engine.
- Before cleaning, repairing, or inspecting, shut off the engine and make certain all moving parts have stopped. Disconnect the spark plug wire, and keep the wire away from the plug to prevent accidental starting.
- Do not run the engine indoors; exhaust fumes are dangerous.

- Never operate the tiller without proper guards, plates, or other safety protective devices in place.
- Keep children and pets away.
- Do not overload the machine capacity by attempting to till too deep at too fast a rate.
- Never operate the machine at high speeds on slippery surfaces. Look behind and use care when backing.
- Never allow bystanders near the unit.
- Use only attachments and accessories approved by the manufacturer of the tiller.
- Never operate the tiller without good visibility or light.
- Be careful when tilling in hard ground. The tines may catch in the ground and propel the tiller forward. If this occurs, let go of the handlebars and do not restrain the machine.

### MAINTENANCE AND STORAGE

- Keep machine in safe working condition.
- Check shear pins, engine mounting bolts, and other bolts at frequent intervals for proper tightness to be sure the equipment is in safe working condition.
- Never store the machine with fuel in the fuel tank inside a building where ignition sources are present, such as hot water and space heaters, clothes dryers, and the like. Allow the engine to cool before storing in any enclosure.
- Always refer to the operator's guide instructions for important details if the tiller is to be stored for an extended period.

### - IMPORTANT -

CAUTIONS, IMPORTANTS, AND NOTES ARE A MEANS OF ATTRACTING ATTENTION TO IMPORTANT OR CRITICAL INFORMATION IN THIS MANUAL.

**IMPORTANT:** USED TO ALERT YOU THAT THERE IS A POSSIBILITY OF DAMAGING THIS EQUIPMENT.

**NOTE:** Gives essential information that will aid you to better understand, incorporate, or execute a particular set of instruction.



Look for this symbol to point out important safety precautions. It means CAUTION!! BECOME ALERT!! YOUR SAFETY IS INVOLVED.



**CAUTION:** Always disconnect spark plug wire and place wire where it cannot contact spark plug in order to prevent accidental starting when setting up, transporting, adjusting or making repairs.

### ⚠ WARNING ⚠

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

## PRODUCT SPECIFICATIONS

Gasoline Capacity:	4 Quarts (2.8L) Unleaded Regular
Oil (API-SG-SL): (Capacity: 20 oz/0.6L)	SAE 30 (Above 40 ° F/4 C SAE 5W-30 (Below 40 F/4 C)
Spark Plug: (Gap: .030"/0.76mm)	Champion RC12YC

**CONGRATULATIONS** on your purchase of a new tiller. It has been designed, engineered and manufactured to give you the best possible dependability and performance.

Should you experience any problems you cannot easily remedy, please contact your nearest authorized service center. We have competent, well-trained technicians and the proper tools to service or repair this unit.

Please read and retain this manual. The instructions will enable you to assemble and maintain your tiller properly. Always observe the "SAFETY RULES".

## CUSTOMER RESPONSIBILITIES

- Read and observe the safety rules.
- Follow a regular schedule in maintaining, caring for and using your tiller.
- Follow instructions under "Maintenance" and "Storage" sections of this Owner's Manual.

**WARNING:** This unit is equipped with an internal combustion engine and should not be used on or near any unimproved forest-covered, brush-covered or grass covered land unless the engine's exhaust system is equipped with a spark arrester meeting applicable local laws (if any). If a spark arrester is used, it should be maintained in effective working order by the operator.

In the state of California, a spark arrester is required by law (Section 4442 of the California Public Resources Code). Other states may have similar laws. Federal laws apply on federal lands. See your authorized service center/DEPARTMENT for spark arrester.

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# OPERATION

## KNOW YOUR TILLER

### READ THIS OWNER'S MANUAL AND SAFETY RULES BEFORE OPERATING YOUR TILLER.

Compare the illustrations with your tiller to familiarize yourself with the location of various controls and adjustments. Save this manual for future reference.

These symbols may appear on your Tiller or in literature supplied with the product. Learn and understand their meaning.

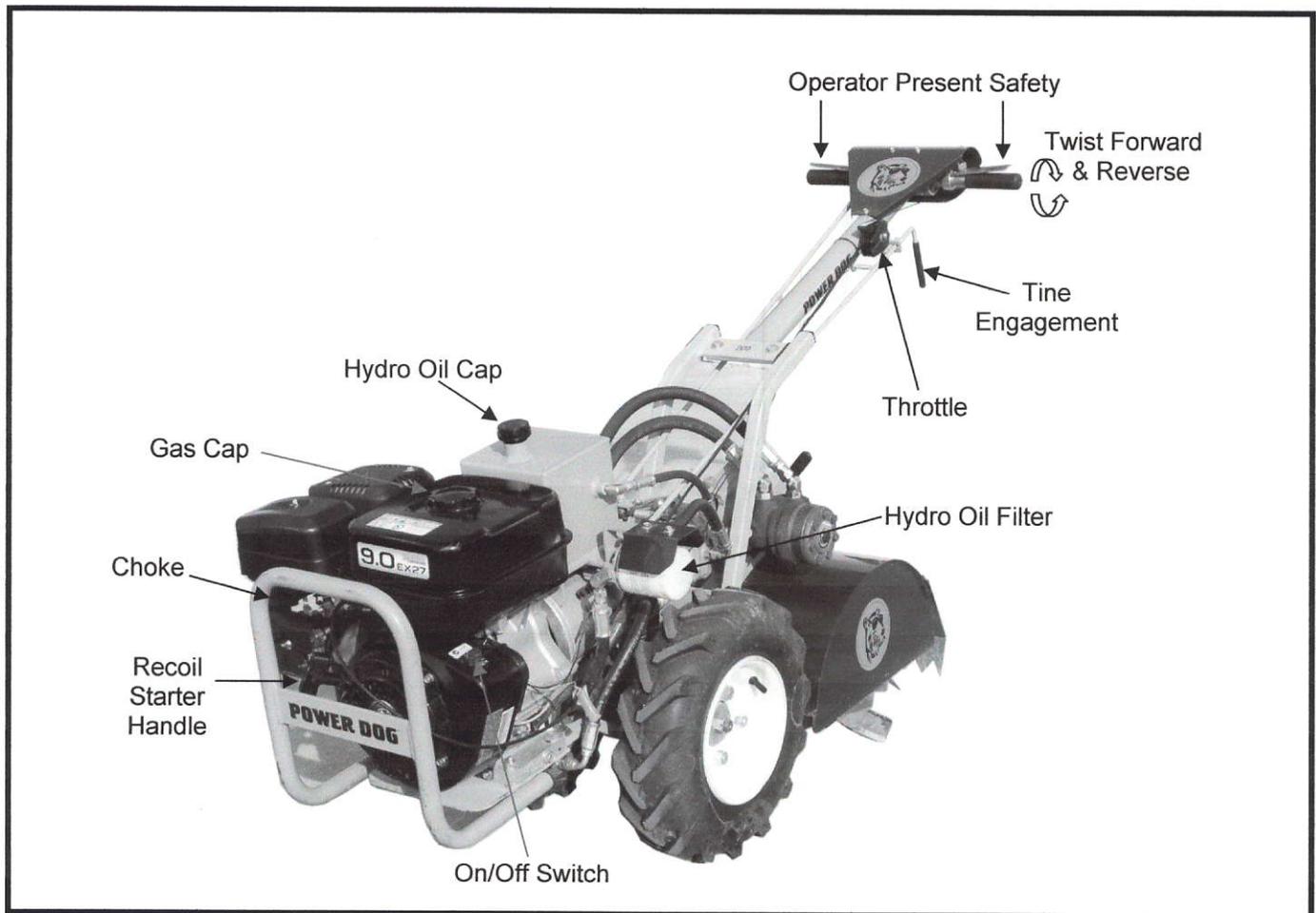
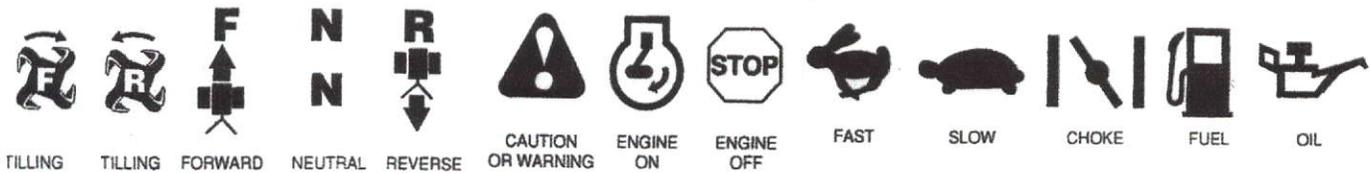


FIG. 8

**CHOKE CONTROL** - Used when starting a cold engine.  
**DEPTH BAR** - Controls depth at which tiller will dig.  
**TILLER CONTROL ROD** - Used to engage tines.  
**TINE FLAP** - Levels tilled soil

**RECOIL STARTER HANDLE** - Used to start the engine.  
Variable speed with the twist of your wrist, forward and reverse.

# OPERATION



The operation of any tiller can result in foreign objects thrown into the eyes, which can result in severe eye damage. Always wear safety glasses or eye shields before starting your tiller and while tilling. We recommend a wide vision safety mask for over spectacles or standard safety glasses.

## HOW TO USE YOUR TILLER

Know how to operate all controls before adding fuel and oil or attempting to start engine.

## STOPPING (See Fig. 9)

### TINES AND DRIVE

- Turn handlebar back to center position for neutral.
- Move tine control rod to your left and bring to center position to stop movement on tines.

### ENGINE

- Never use choke to stop engine.
- Turn engine switch (OFF).

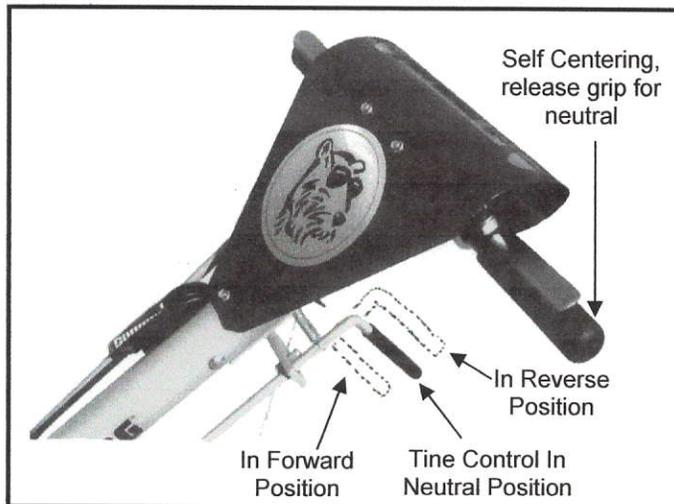


FIG. 9

## TINE OPERATION

- Tine movement is achieved by pulling tine control rod back for counter rotating till position or push forward for forward rotation tilling.

### FORWARD -WHEELS ONLY

- Release tine rod, twist handle bar forward.

### REVERSE -WHEELS ONLY

- DO NOT STAND DIRECTLY BEHIND TILLER.
- Move the tine control rod to the left and bring to center position.
- Move throttle control to "SLOW" position.
- Twist handle bar backwards.

## DEPTH BAR STAKE (See Fig. 12)

- Can be raised or lowered to allow you more versatile tilling and cultivating, or to more easily transport your tiller.

## TILLING (See Fig. 12)

- Loosen depth bar tightener, pull the depth bar up for increased tilling depth. Move drag stake to desired position and retighten tightener handle to lock into position.
- Place tine control rod in desired position. Slowly lower tines into the ground. Twist handle bar forward to desired speed.
- Move throttle control to "FAST" position for deep tilling. To cultivate, throttle control can be set at any desired speed, depending on how fast or slow you wish to cultivate.

**IMPORTANT: ALWAYS DISENGAGE TINE CONTROL ROD WHEN NOT TILLING.**

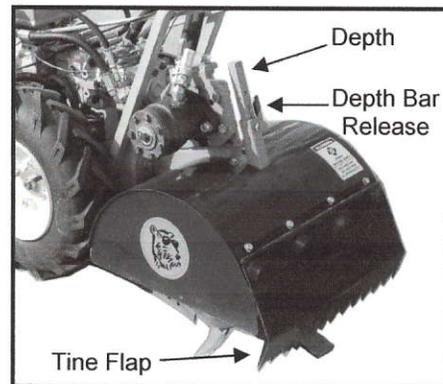


FIG. 12

## TURNING

- Disengage the tine control rod.
- Move throttle control to "SLOW" position.
- Lift handle to raise tines out of ground.
- Swing the handle in the opposite direction you wish to turn, being careful to keep feet and legs away from tines. Slowly twist handlebar to desired direction.
- When you have completed your turn-around, with handle up and tines out of ground, again engage tines in desired direction. Slowly lower handle to start tilling. Slowly twist handlebar forward to desired speed.

## CULTIVATING

- Use the forward rotating tine drive when cultivating, tilling soft ground or tilling pre-tilled soil.
- Loosen depth bar tightener and move depth bar to desired height. Tighten tightener to lock. Lower drag stake.
- Move tine control rod in forward rotating till position.
- Move throttle control "FAST" position for deep tilling. To cultivate, throttle control can be set at any desired speed, depending on how fast or slow you wish to cultivate.
- **Always lower the depth bar when using the forward rotating tine drive.**

# OPERATION

## TO TRANSPORT



**CAUTION:** Before lifting or transporting, allow tiller engine and muffler to cool. Disconnect spark plug wire. Drain gasoline from fuel tank.

## AROUND THE YARD

- Move the tine control rod to center position (neutral).
- Loosen depth bar tightener and move depth bar down. This will keep tine from damaging the yard or from getting damaged.
- Slowly twist handlebar to desired direction and speed.
- Move throttle control to desired speed.

## AROUND TOWN

- Disconnect spark plug wire.
- Drain fuel tank.
- Transport in upright position to prevent oil leakage.

## BEFORE STARTING ENGINE

**IMPORTANT:** BE VERY CAREFUL NOT TO ALLOW DIRT TO ENTER THE ENGINE WHEN CHECKING OR ADDING OIL OR FUEL. USE CLEAN OIL AND FUEL AND STORE IN APPROVED, CLEAN, COVERED CONTAINERS. USE CLEAN FILL FUNNELS.

## CHECK ENGINE OIL LEVEL (See Fig. 13)

- The engine in your unit has been shipped, from the factory, already filled with SAE 30 summer weight oil.
- With engine level, clean area around oil filler plug and remove plug.
- Engine oil should be to point of overflowing when engine is level. For approximate capacity see "PRODUCT SPECIFICATIONS" on page 2 of this manual. All oil must meet A.P.I. Service Classification SG-SL.
- Reinstall engine oil cap and tighten.
- For cold weather operation you should change oil for easier starting (See oil viscosity chart in the Maintenance section of this manual).
- To change engine oil, see the Maintenance section in this manual.

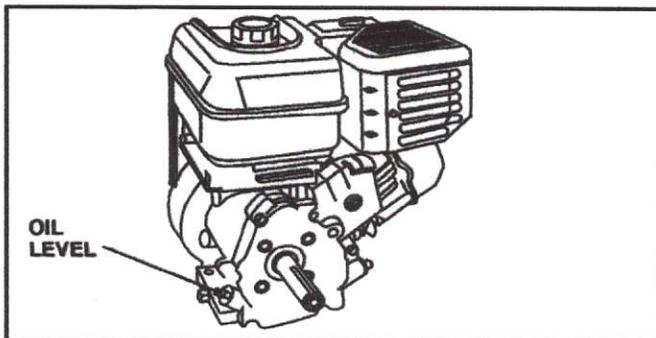


FIG. 13

## ADD GASOLINE

- Fill fuel tank to bottom of filler neck. Do not overfill. Use fresh, clean, regular unleaded gasoline with a minimum of 87 octane. (Use of leaded gasoline will increase carbon and lead oxide deposits and reduce valve life). Do not mix oil with gasoline. Purchase fuel in quantities that can be used within 30 days to assure fuel freshness.



**CAUTION:** Fill to within 1/2 inch of top of fuel tank to prevent spills and to allow for fuel expansion. If gasoline is accidentally spilled, move machine away from area of spill. Avoid creating any source of ignition until gasoline vapors have disappeared.

**Wipe off any spilled oil or fuel. Do not store, spill or use gasoline near an open flame.**

**IMPORTANT:** WHEN OPERATING IN TEMPERATURES BELOW 32 °F (0 °C), USE FRESH, CLEAN WINTER GRADE GASOLINE TO HELP INSURE GOOD COLD WEATHER STARTING.

**CAUTION:** Alcohol blended fuels (called gasohol or using ethanol or methanol) can attract moisture which leads to separation and formation of acids during storage. Acidic gas can damage the fuel system of an engine while in storage. To avoid engine problems, the fuel system should be emptied before storage of 30 days or longer. Drain the gas tank, start the engine and let it run until the fuel lines and carburetor are empty. Use fresh fuel next season. See Storage Instructions for additional information. Never use engine or carburetor cleaner products in the fuel tank or permanent damage may occur.

## TO START ENGINE (See Fig. 14)



**CAUTION:** Keep tine control rod in "DISENGAGED" position when starting engine.

When starting engine for the first time or if engine has run out of fuel, it will take extra pulls of the recoil starter to move fuel from the tank to the engine.

- Make sure spark plug wire is properly connected.
- Place throttle control in "FAST" position.
- Turn fuel shut-off valve 1/4 turn to open position.
- Move choke control to choke position.
- Grasp recoil starter handle with one hand and place foot on bottom part of front bumper. Pull rope out slowly until engine reaches start of compression cycle (rope will pull slightly harder at this point).
- Pull recoil starter handle quickly. Do not let starter handle snap back against starter.

# OPERATION

- If engine fires but does not start, move choke control to half choke position. Pull recoil starter handle until engine starts.
- When engine starts, slowly move choke control to "RUN" position as engine warms up.

**NOTE:** A warm engine requires less choking to start.

- Move throttle control to desired running position.
- Allow engine to warm up for a few minutes before engaging tines.

**NOTE:** If at a high altitude (3000 feet) or in cold temperatures (below 32 °F), the carburetor fuel mixture may need to be adjusted for best engine performance. See "TO ADJUST CARBURETOR" in the Service and Adjustments section of this manual.

**NOTE:** If engine does not start, see troubleshooting points.

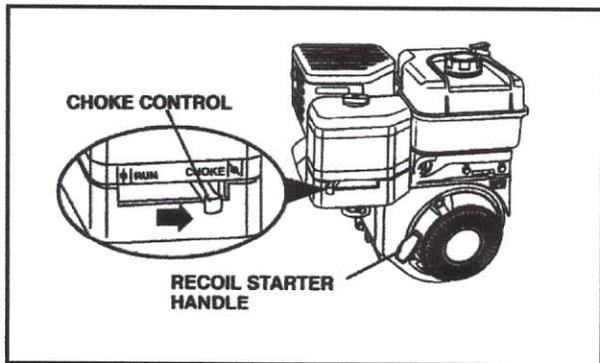


FIG. 14

tilling; however, extremely wet soil will "ball-up" or clump during tilling. Wait until the soil is less wet in order to achieve the best results. When tilling in the fall, remove vines and long grass to prevent them from wrapping around the tine shaft and slowing your tilling operation.

- Do not lean on handle. This takes weight off the wheels and reduces traction. To get through a really tough section of sod or hard ground, apply downward pressure on handle or raise the depth bar.

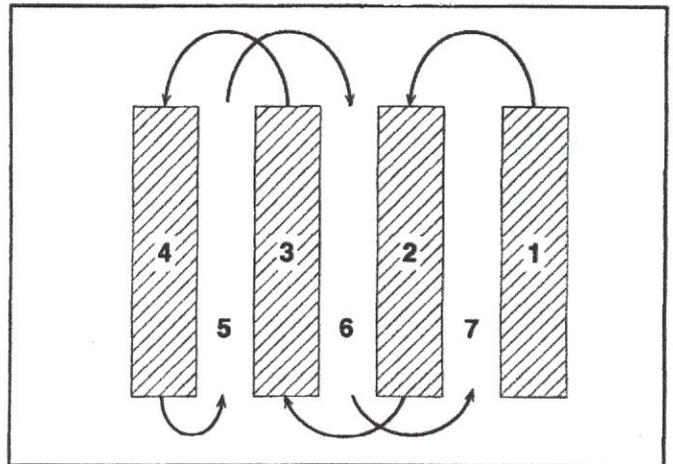


FIG. 15

## TILLING HINTS (See Fig. 15)



**CAUTION:** Until you are accustomed to handling your tiller, start actual field use with throttle in slow position (mid-way between "FAST" and "IDLE").

- Tilling is digging into, turning over, and breaking up packed soil before planting. Loose, unpacked soil helps root growth. Best tilling depth is 4" to 6" (10-15 cm). A tiller will also clear the soil of unwanted vegetation. The decomposition of this vegetable matter enriches the soil. Depending on the climate (rainfall and wind), it may be advisable to till the soil at the end of the growing season to further condition the soil.
- You will find tilling much easier if you leave a row untilled between passes. Then go back between tilled rows. (See Fig. 15) There are two reasons for doing this. First, wide turns are much easier to negotiate than about-faces. Second, the tiller won't be pulling itself, and you, toward the row next to it.
- Soil conditions are important for proper tilling. Tines will not readily penetrate dry, hard soil which may contribute to excessive bounce and difficult handling of your tiller. Hard soil should be moistened before

## CULTIVATING

Cultivating is destroying the weeds between rows to prevent them from robbing nourishment and moisture from the plants. At the same time, breaking up the upper layer of soil crust will help retain moisture in the soil. Best digging depth is 1" to 3" (2.5 - 7.5 cm).

- Cultivate up and down the rows at a speed which will allow tines to uproot weeds and leave the ground in rough condition, promoting no further growth of weeds and grass (See Fig. 16).
- Do not lean on handle, this takes weight off the wheels, reduces traction, and may cause the tiller to skip over the ground.
- **Always lower the depth bar when using the forward rotating tine drive.**

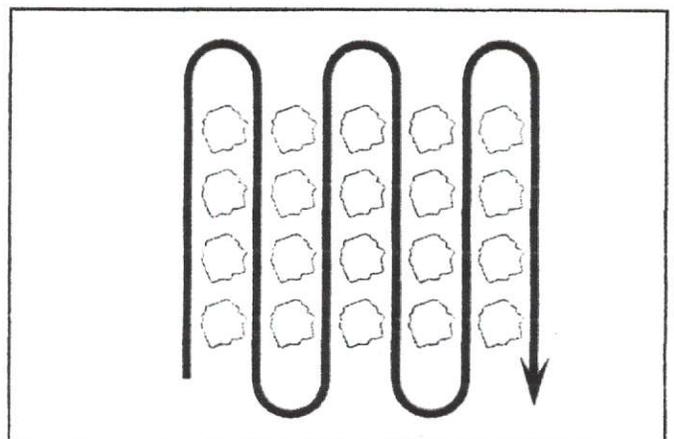


FIG. 16

# MAINTENANCE

<b>MAINTENANCE SCHEDULE</b>  FILL IN DATES AS YOU COMPLETE REGULAR SERVICE		BEFORE EACH USE	EVERY 5 HOURS	EVERY 25 HOURS	EVERY 50 HOURS	EVERY SEASON	SERVICE DATES												
Check Engine Oil Level	X	X																	
Change Engine Oil				X <sub>1,2</sub>															
Check Hydro Oil Level	X																		
Inspect Spark Arrester/Muffler				X															
Inspect Air Screen	X																		
Clean or Replace Air Cleaner Cartridge				X <sub>2</sub>															
Clean Engine Cylinder Fins				X															
Replace Spark Plug				X															
Change Hydro Oil					X														
Check Tine Chain Tension			X																
Check Tine Chain Oil				X															
Change Tine Chain Oil					X														
Change Hydro Oil Filter			X																

1 - Change more often when operating under a heavy load or in high ambient temperatures.  
 2 - Service more often when operating in dirty or dusty condition.

## GENERAL RECOMMENATIONS

The warranty on this tiller does not cover items that have been subjected to operator abuse or negligence. To receive full value from the warranty, the operator must maintain tiller as instructed in this manual.

Some adjustments will need to be made periodically to properly maintain your tiller.

All adjustments in the Service and Adjustments section of this manual should be checked at least once each season.

- Once a year you should replace the spark plug, clean or replace air filter, and check tines for wear. A new spark plug and clean air filter assure proper air-fuel mixture and help your engine run better and last longer.

## BEFORE EACH USE

- Check engine oil level.
- Check tine operation.
- Check for loose fasteners.

# MAINTENANCE



Disconnect spark plug wire before performing any maintenance (except carburetor adjustment) to prevent accidental starting of engine.  
Prevent fires! Keep the engine free of grass, leaves, spilled oil, or fuel. Remove fuel from tank before tipping unit for maintenance. Clean muffler area of all grass, dirt, and debris.  
Do not touch hot muffler or cylinder fins as contact may cause burns.

## ENGINE

### LUBRICATION

Use only high quality detergent oil rated with API service classification SG-SL. Select the oil's SAE viscosity grade according to your expected temperature.

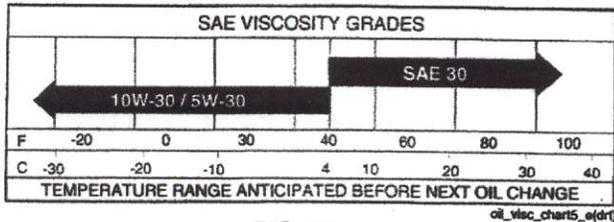


FIG. 19

**NOTE:** Although multi-viscosity oils (5W-30, 10W-30, etc.) improve starting in cold weather, these multi-viscosity oils will result in increased oil consumption when used above 40 ° F (4 ° C). Check your engine oil level more frequently to avoid possible engine damage from running low on oil.

Change the oil after every 25 hours of operation or at least once a year if the tiller is not used for 25 hours in one year.

Check the crankcase oil level before starting the engine and after each five (5) hours of continuous use. Add SAE 30 motor oil or equivalent. Tighten oil filler plug securely each time you check the oil level.

### TO CHANGE ENGINE OIL (See Figs. 19 and 20)

- Be sure tiller is on level surface.
- Oil will drain more freely when warm.
- Use a funnel to prevent oil spill on tiller, and catch oil in a suitable container.
- Remove drain plug.
- For easier removal of plug use 7/16 12 Pt. socket with extension.
- After oil has drained completely, replace oil drain plug and tighten securely.
- Remove oil filler plug. Be careful not to allow dirt to enter the engine.
- Refill engine with oil. See "CHECK ENGINE OIL LEVEL" in the Operation section of this manual.

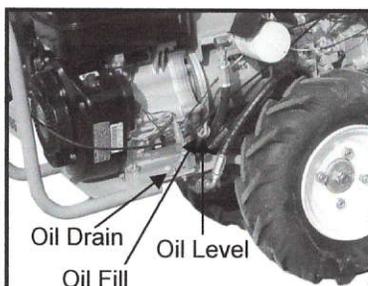


FIG. 20

### AIR FILTER (See Fig. 21)

Your engine will not run properly using a dirty air filter. Clean the foam pre-cleaner after every 25 hours of operation or every season. Service paper cartridge every 100 hours of operation or every season, whichever occurs first.

Service air cleaner more often under dusty conditions.

- Remove cover screw and cover

### TO SERVICE PRE-CLEANER

- Remove foam pre-cleaner from air cleaner cover.
- Wash it in liquid detergent and water.
- Squeeze it dry in a clean cloth.
- If very dirty or damaged, replace pre-cleaner.
- Reinstall pre-cleaner into air cleaner cover.
- Reinstall cover and secure screw.

### TO SERVICE CARTRIDGE

- Carefully remove cartridge to prevent debris from entering carburetor. Clean base carefully to prevent debris from entering carburetor.
- Clean cartridge by tapping gently on flat surface. If very dirty or damaged, replace cartridge.
- Reinstall cartridge, cover with pre-cleaner and secure with screw.

**IMPORTANT:** PETROLEUM SOLVENTS, SUCH AS KEROSENE, ARE NOT TO BE USED TO CLEAN THE CARTRIDGE. THEY MAY CAUSE DETERIORATION OF THE CARTRIDGE. DO NOT OIL CARTRIDGE. DO NOT USE PRESSURIZED AIR TO CLEAN OR DRY CARTRIDGE.

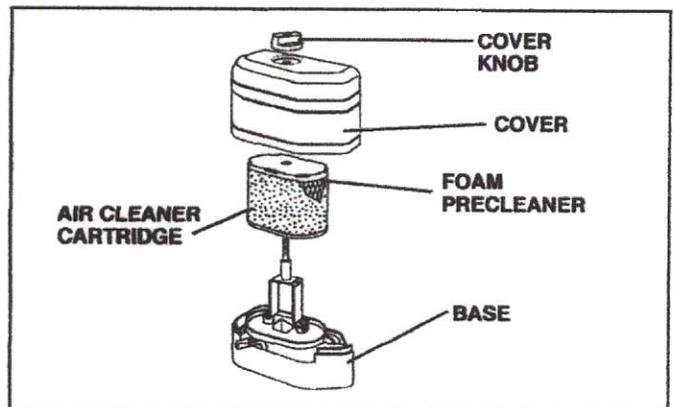


FIG. 21

# MAINTENANCE

## COOLING SYSTEM (See Fig. 22)

Your engine is air cooled. For proper engine performance and long life, keep your engine clean.

- Clean air screen frequently using a stiff-bristled brush.
- Remove blower housing and clean as necessary.
- Keep cylinder fins free of dirt and chaff.

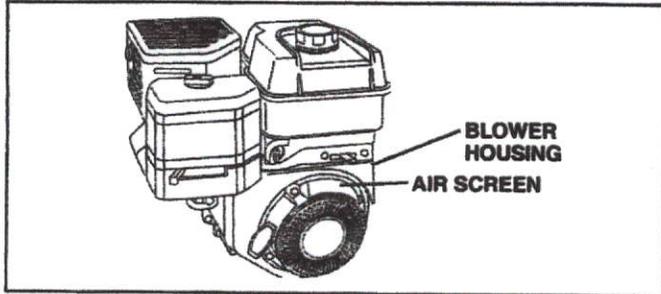


FIG. 22

## MUFFLER

Do not operate tiller without muffler. Do not tamper with exhaust system. Damaged mufflers or spark arresters could create a fire hazard. Inspect periodically and replace if necessary. If your engine is equipped with a spark arrester screen assembly, remove every 50 hours for cleaning and inspection. Replace if damaged.

## SPARK PLUG

Replace spark plugs at the beginning of each tilling season or after every 50 hours of use, whichever comes first. Spark plug type and gap setting is shown in "PRODUCT SPECIFICATIONS" on page 3 of this manual.

## CLEANING

Do not clean your tiller when the engine, pump, and motors are hot. We do not recommend using pressurized water (garden hose, etc.) to clean your unit unless the gasket area around the pump and the engine muffler, air filter and carburetor are covered to keep water out. Water in engine will shorten the useful life of your tiller.

- Clean engine, wheels, finish, etc., of all foreign matter.
- Keep finished surfaces and wheels free of all gasoline, oil, etc.
- Protect painted surfaces with automotive type wax.

# SERVICE AND ADJUSTMENTS



**CAUTION:** Disconnect spark plug wire from spark plug and place wire where it cannot come into contact with plug.

## TILLER

### TO ADJUST HANDLE HEIGHT (See Fig. 23)

Select handle height best suited for your tilling conditions. Handle height will be different when tiller digs into soil.

- Handle height is changed by different setting on rear tiller assembly.
- Lower holes on main frame will raise handle height.
- Unbolt rear tiller assembly (4-bolts) and move to desired setting.
- Make sure all bolts are tight before operating.

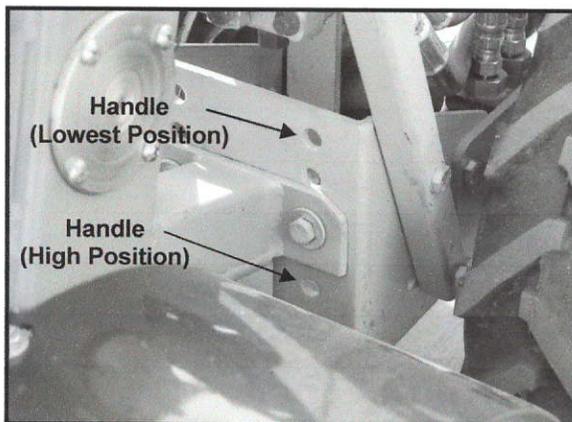


FIG. 23

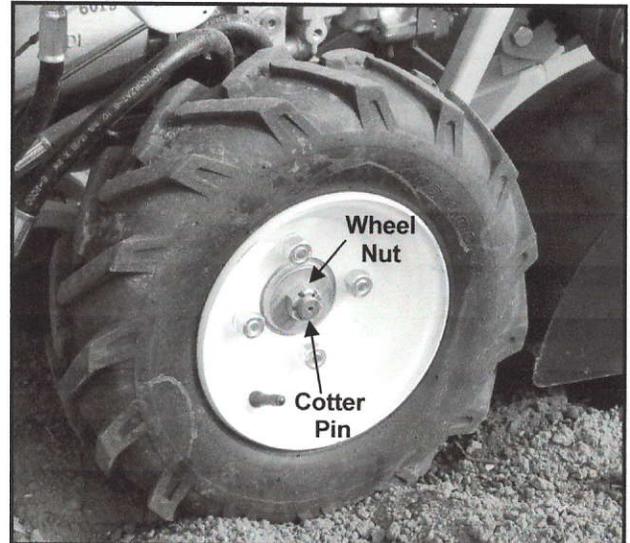


FIG. 24

## TIRE CARE



**CAUTION:** When mounting tires, unless beads are seated, over-inflation can cause an explosion.

- Maintain 39 pounds of tire pressure. If tire pressures are not equal, tiller will pull to one side.
- Keep tires free of gasoline or oil which can damage rubber.

### TO REMOVE WHEEL (See Fig. 24)

- Place blocks under wheel motor to keep tiller from tipping.
- Remove cotter pin and wheel nut.
- Remove wheel and tire.
- Repair tire and reassemble.

# SERVICE AND ADJUSTMENTS

## TINE REPLACEMENT (See Figs. 27, 28 and 29)



**CAUTION:** Tines are sharp. Wear gloves or other protection when handling tines.

A badly worn tine causes your tiller to work harder and dig more shallow. Most important, worn tines cannot chop and shred organic matter as effectively nor bury it as deeply as good tines. A tine this worn needs to be replaced.

- To maintain the superb tilling performance of this machine, the tines should be checked for sharpness, wear, and bending, particularly the tines which are next to the transmission. If the gap between the tines exceeds 3 1/2 inches, they should be replaced or straightened as necessary.

- For tines that are slightly worn, the bolted tine and hub assemblies can be switched between sides to continue tilling in the same tilling mode if tilling in a different mode is desired then the bolted tine and hub assemblies should be switched back to their original side so that the tine edge with the least wear will be used.

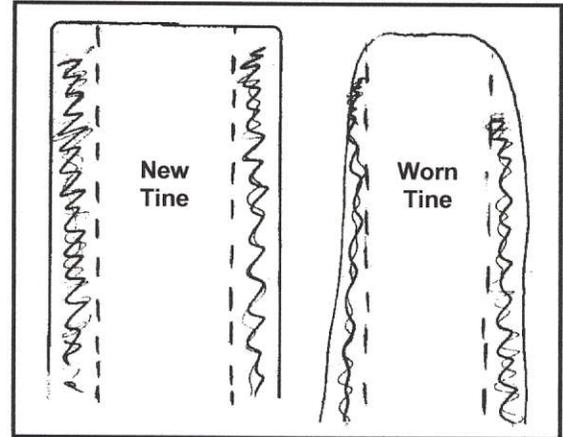


FIG. 27

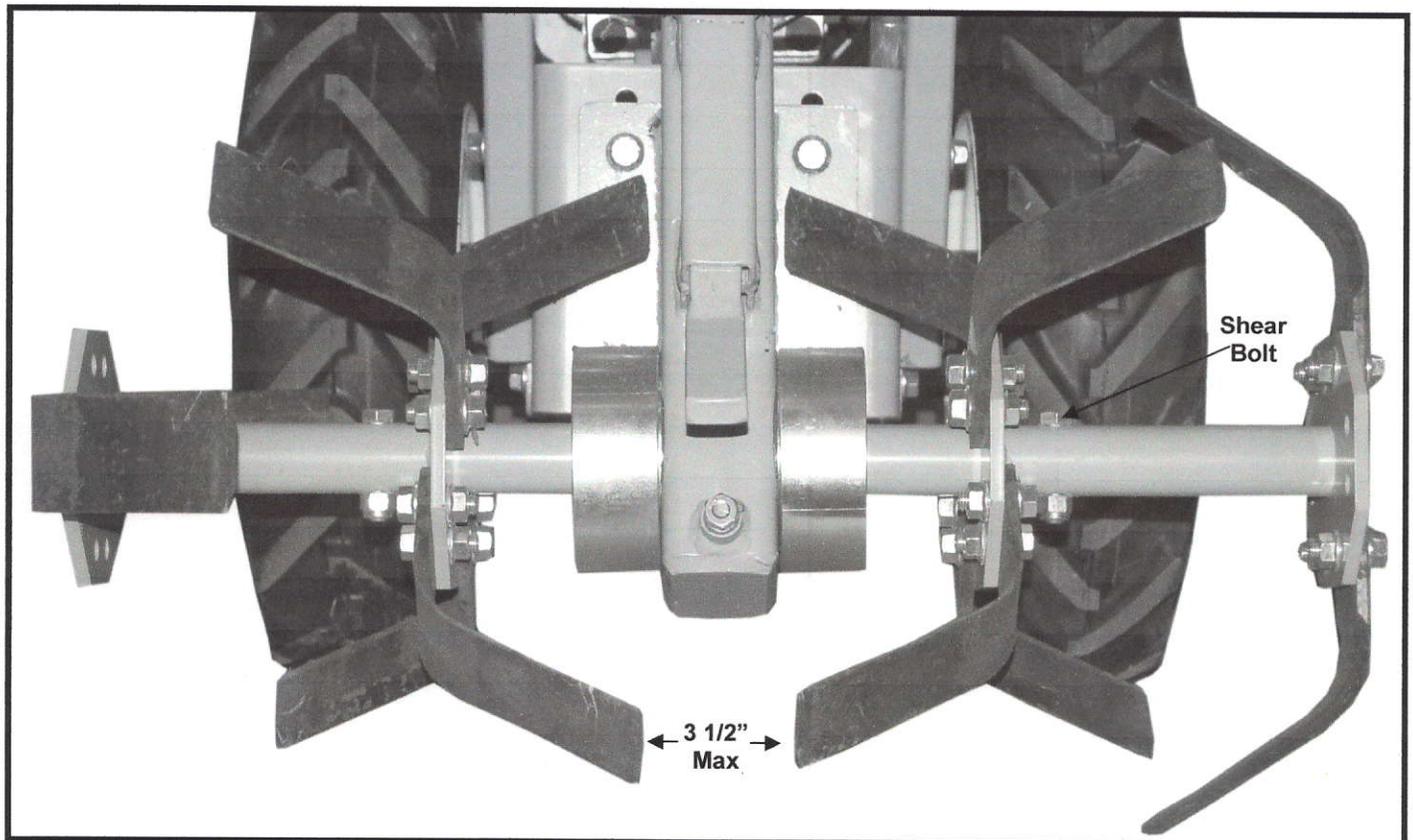


FIG. 29

# SERVICE AND ADJUSTMENTS

## ENGINE

### TO ADJUST THROTTLE CONTROL CABLE (See Fig. 30)

The throttle control has been preset at the factory and adjustment should not be necessary. If adjustment is necessary, proceed as follows:

- With engine not running, move remote throttle control lever to "FAST" position.
- If throttle lever on engine touches high speed stop, no further adjustment is necessary. If throttle lever does not touch high speed stop, continue with adjustment procedure.
- Loosen cable clamp screw.
- Move throttle lever up until it touches high speed stop, and hold in this position.
- Tighten cable clamp screw securely.

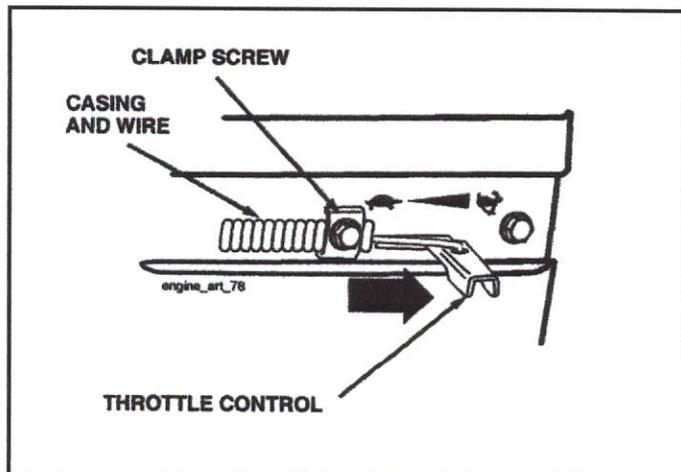


FIG. 30

## TO ADJUST CARBURETOR

The carburetor has been preset at the factory and adjustment should not be necessary. However, engine performance can be affected by differences in fuel, temperature, altitude or load. If the carburetor does need adjustment, contact your nearest authorized service center/department.

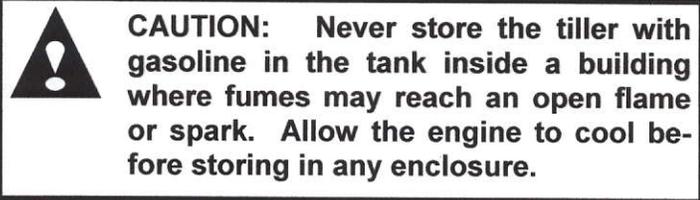
**IMPORTANT:** NEVER TAMPER WITH THE ENGINE GOVERNOR, WHICH IS FACTORY SET FOR PROPER ENGINE SPEED. OVERSPEEDING THE ENGINE ABOVE THE FACTORY HIGH SPEED SETTING CAN BE DANGEROUS. IF YOU THINK THE ENGINE GOVERNED HIGH SPEED NEEDS ADJUSTING, CONTACT YOUR NEAREST AUTHORIZED SERVICE CENTER/DEPARTMENT, WHICH HAS THE PROPER EQUIPMENT AND EXPERIENCE TO MAKE ANY NECESSARY ADJUSTMENTS.

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# STORAGE

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Immediately prepare your tiller for storage at the end of the season or if the unit will not be used for 30 days or more.



## TILLER

- Clean entire tiller (See “CLEANING” in the Maintenance section of this manual).
- Be sure that all nuts, bolts and screws are securely fastened. Inspect moving parts for damage, breakage and wear. Replace if necessary.
- Touch up all rusted or chipped paint surfaces; sand lightly before painting.

## ENGINE

### FUEL SYSTEM

**IMPORTANT:** IT IS IMPORTANT TO PREVENT GUM DEPOSITS FROM FORMING IN ESSENTIAL FUEL SYSTEM PARTS SUCH AS THE CARBURETOR, FUEL FILTER, FUEL HOSE, OR TANK DURING STORAGE. ALSO, EXPERIENCE INDICATES THAT ALCOHOL BLENDED FUELS (CALLED GASOHOL OR USING ETHANOL OR METHANOL) CAN ATTRACT MOISTURE WHICH LEADS TO SEPARATION AND FORMATION OF ACIDS DURING STORAGE. ACIDIC GAS CAN DAMAGE THE FUEL SYSTEM OF AN ENGINE WHILE IN STORAGE.

- Empty the fuel tank by starting the engine and let it run until the fuel lines and carburetor are empty.
- Never use engine or carburetor cleaner products in the fuel tank or permanent.
- Use fresh fuel next season.

**NOTE:** Fuel stabilizer is an acceptable alternative in minimizing and formation of fuel gum deposits during storage. Add stabilizer to gasoline in fuel tank or storage container. Always follow the mix ratio found on stabilizer container. Run engine at least 10 minutes after adding stabilizer to allow the stabilizer to reach the carburetor. Do not empty the gas tank and carburetor if using fuel stabilizer.

### ENGINE OIL

Drain oil (with engine warm) and replace with clean oil. (See “ENGINE” in the Maintenance section of this manual).

### CYLINDERS

- Remove spark plug.
- Pour 1 ounce (29 ml) of oil through spark plug hole into cylinder.
- Pull starter handle slowly several times to distribute oil.
- Replace with new spark plug.

### OTHER

- Do not store gasoline from one season to another.
- Replace your gasoline can if your can starts to rust. Rust and/or dirt in your gasoline will cause problems.
- If possible, store your unit indoors and cover it to give protection from dust and dirt.
- Cover your unit with a suitable protective cover that does not retain moisture. Do not use plastic. Plastic cannot breathe which allows condensation to form and will cause your unit to rust.

**IMPORTANT:** NEVER COVER TILLER WHILE ENGINE AND EXHAUST AREAS ARE STILL WARM.

# TROUBLESHOOTING POINTS

PROBLEM	CAUSE	CORRECTION
Will not start	<ol style="list-style-type: none"> <li>1. Out of fuel.</li> <li>2. Engine not "CHOKED" properly.</li> <li>3. Engine flooded.</li> <li>4. Dirty air cleaner.</li> <li>5. Water in fuel.</li> <li>6. Clogged fuel tank.</li> <li>7. Loose spark plug wire.</li> <li>8. Bad spark plug or improper gap.</li> <li>9. Carburetor out of adjustment.</li> <li>10. Tine control rod engaged.</li> <li>11. Wheel drive is engaged.</li> </ol>	<ol style="list-style-type: none"> <li>1. Fill fuel tank.</li> <li>2. See "TO START ENGINE" in Operation section.</li> <li>3. Wait several minutes before attempting to start.</li> <li>4. Clean or replace air cleaner cartridge.</li> <li>5. Empty fuel tank and carburetor, and refill tank with fresh gasoline.</li> <li>6. Remove fuel tank and clean.</li> <li>7. Make sure spark plug wire is sealed properly on plug.</li> <li>8. Replace spark plug or adjust gap.</li> <li>9. Make necessary adjustments.</li> <li>10. Disengage.</li> <li>11. Return handle bar to neutral.</li> </ol>
Hard to start	<ol style="list-style-type: none"> <li>1. Throttle control not set properly.</li> <li>2. Dirty air cleaner.</li> <li>3. Bad spark plug or improper gap.</li> <li>4. Stale or dirty fuel.</li> <li>5. Loose spark plug wire.</li> <li>6. Carburetor out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Place throttle control in "FAST" position.</li> <li>2. Clean or replace air cleaner cartridge.</li> <li>3. Replace spark plug or adjust gap.</li> <li>4. Empty fuel tank and refill tank with fresh, clean gasoline.</li> <li>5. Make sure spark plug wire is seated properly on plug.</li> <li>6. Make necessary adjustments.</li> </ol>
Loss of power	<ol style="list-style-type: none"> <li>1. Engine is overloaded.</li> <li>2. Dirty air cleaner.</li> <li>3. Low oil level/dirty oil.</li> <li>4. Faulty spark plug.</li> <li>5. Oil in fuel.</li> <li>6. Stale or dirty fuel.</li> <li>7. Water in fuel.</li> <li>8. Clogged fuel tank.</li> <li>9. Spark plug wire loose.</li> <li>10. Dirty engine air screen.</li> <li>11. Dirty/clogged muffler.</li> <li>12. Carburetor out of adjustment.</li> <li>13. Poor compression.</li> <li>14. Clogged oil filter.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set depth stake for shallower tilling.</li> <li>2. Clean or replace air cleaner cartridge.</li> <li>3. Check oil level/change oil.</li> <li>4. Clean and regap or change spark plug.</li> <li>5. Empty and clean fuel tank and refill, and clean carburetor.</li> <li>6. Empty fuel tank and refill fuel tank with fresh gasoline.</li> <li>7. Empty fuel tank and carburetor, and refill tank with fresh gasoline.</li> <li>8. Remove fuel tank and clean.</li> <li>9. Connect and tighten spark plug wire.</li> <li>10. Clean engine air screen.</li> <li>11. Clean/replace muffler.</li> <li>12. Make necessary adjustments.</li> <li>13. Contact an authorized service center department.</li> <li>14. Replace oil filter.</li> </ol>
Engine overheats	<ol style="list-style-type: none"> <li>1. Low oil level/dirty oil.</li> <li>2. Dirty engine air screen</li> <li>3. Dirty engine.</li> <li>4. Partially plugged muffler.</li> <li>5. Improper carburetor adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check oil level/change oil.</li> <li>2. Clean engine air screen.</li> <li>3. Clean cylinder fins, air screen, and muffler area.</li> <li>4. Remove and clean muffler.</li> <li>5. Adjust carburetor to richer position.</li> </ol>
Excessive bounce/ difficult handling	<ol style="list-style-type: none"> <li>1. Ground too dry and hard.</li> </ol>	<ol style="list-style-type: none"> <li>1. Moisten ground or wait for more favorable soil conditions.</li> </ol>
Soil balls up or clumps	<ol style="list-style-type: none"> <li>1. Ground too wet.</li> </ol>	<ol style="list-style-type: none"> <li>1. Wait for more favorable soil conditions.</li> </ol>
Engine runs but tiller won't move	<ol style="list-style-type: none"> <li>1. Hydro oil level too low.</li> <li>2. Clogged oil filter.</li> <li>3. Love-joy couple disconnected.</li> <li>4. Control rod disconnected.</li> <li>5. Pumps/motors not primed.</li> </ol>	<ol style="list-style-type: none"> <li>1. Add hydro oil.</li> <li>2. Replace oil filter.</li> <li>3. Reconnect coupler.</li> <li>4. Reconnect control rod.</li> <li>5. Allow time for oil to circulate.</li> </ol>
Engine runs but labors when tilling	<ol style="list-style-type: none"> <li>1. Tilling too deep.</li> <li>2. Throttle control not properly adjusted.</li> <li>3. Carburetor out of adjustment.</li> </ol>	<ol style="list-style-type: none"> <li>1. Set depth bar for shallower tilling.</li> <li>2. Check throttle control setting.</li> <li>3. Make necessary adjustments.</li> </ol>
Tines will not rotate	<ol style="list-style-type: none"> <li>1. Shear pin(s) broken.</li> <li>2. Chain/sprocket broken.</li> </ol>	<ol style="list-style-type: none"> <li>1. Replace shear pin(s).</li> <li>2. Remove cover plate and check chain tension.</li> </ol>
Tines skip over ground	<ol style="list-style-type: none"> <li>1. Depth bar not lowered in forward rotating till mode.</li> <li>2. Improper tilling mode.</li> </ol>	<ol style="list-style-type: none"> <li>1. Lower depth bar.</li> <li>2. Forward rotating tine drive should only be used for soft ground or for soil that has already been tilled.</li> </ol>