

50-4



OWNER'S HANDBOOK

Your new Mantis Tiller/Cultivator has arrived, ready to help you with many of your gardening chores. It's likely that you've never seen anything quite like it before. That's because Mantis is a true innovation . . . a new and better way to till, dig, weed, cultivate and perform dozens of other jobs around your yard.

Because the Mantis is so unique, it performs differently than any machine you've used before. Once you learn how to use it correctly, we guarantee you'll love it! So, first, **PLEASE READ THIS HANDBOOK.** It contains everything you need to know to use your Mantis with ease and confidence.

If you should have any questions, please call us right away on our toll-free Owner's Hotline:

800-344-4030
(from PA,
please call 800-342-0052)

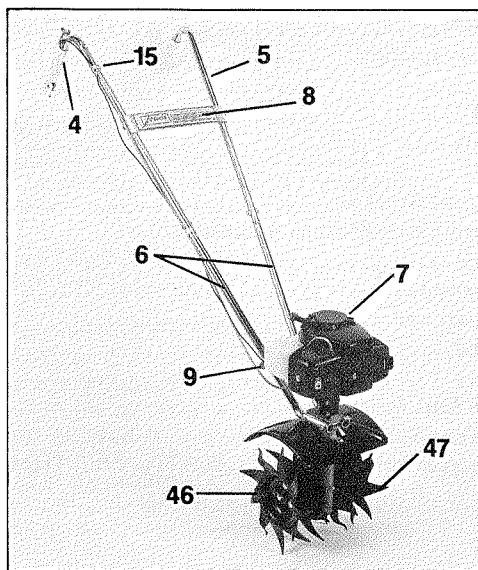
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Unpacking And Assembly

Your Mantis is almost fully assembled. All that remains to be installed are the handlebars, carrying handle and tines. This will take just a few minutes if you read the instructions first.

Start by removing all items from the carton, but *do not remove the cardboard from around the base of the tiller.*



You should have the following parts:

Qty.	Part Name	Part Number (see photos below)
1	Upper Handle With Throttle	4
1	Upper Handle Without Throttle	5
2	Lower Handles	6
1	Pair Tiller/Cultivating Tines	46/47
1	Engine Assembly Hood and Transmission	7
1	Cross Bar Handle Brace	8
1	Plastic Carrying Handle	9
1	Bag of Hardware Containing:	
	4 Bolts	11
	6 Nuts	12
	2 Bolts (3" Long)	23 & 24
	2 Pins	48
	2 Clamps	22
	1 Clip	15

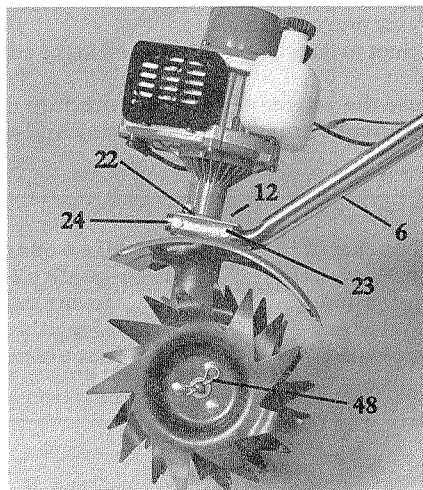
All you need to assemble your Mantis are two 7/16" wrenches (or two adjustable wrenches). We suggest that you install all nuts and bolts only finger tight until assembly is complete.

NOTICE:

Your Mantis 20 includes our new improved design engine. Since this model has just been released, many of the photos or pictures in this manual have not been updated and show the old design engine. Your Mantis 20 will look different than these.

Assembling Lower Handles

- 1) Using the protective cardboard sleeve to stabilize your Mantis, stand the Engine Assembly up. Lay the attached handle parts to the side.
- 2) Secure Lower Handles (#6) to Worm Gear Housing in the recesses provided, located below the engine under the fuel tank. Place Bolt (#23) through hole in Handle Clamp (#22), then through inside hole in short leg of Lower Handle, through back channel provided in Worm Gear Housing, through inside hole in short leg of opposite Lower Handle. Place the other Handle Clamp (#22) on this side and add Nut (#12), finger tight.
- 3) Repeat procedure with Bolt (#24) as above, using front channel of Worm Gear Housing. Note: Gas Tank should face you as you hold the handles in operation. Tighten all nuts and bolts.



Assembling Upper Handles And Plastic Carrying Handle

- 1) Lightly squeeze Lower Handles (#6) towards one another so they line up with the two smaller holes on the Carrying Handle (#9). Then slide the Mantis Carrying Handle over and down the Lower Handles to Point "A" on the diagram. Gently pull Lower Handles back to their original position "B".
- 2) Install the Upper Handle, the one with the wire and Throttle Cable, to either lower handle (whichever you prefer). Use the Bolt (#11) and Nut (#12) to secure it in position. Do the same for the other handle.
- 3) Secure the Throttle Cable and wire in position on the Lower Handle using the Clip (#15).
- 4) Install Handle Brace (#8) using wrench to tighten Bolts (#11) and Nuts (#12).



Assembling Tines

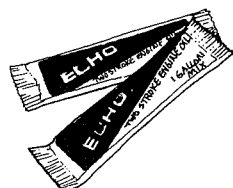
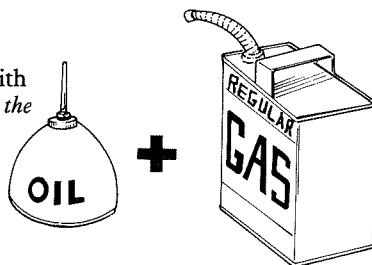
Remove cardboard from around housing and slide Tines onto drive shafts with tine points curved towards the front of your tiller. Secure the Tines to the shaft using the Pins (#48) provided.

Your tines are now installed in the tilling position. See page 12 to switch to the weeding position.

Important: Before using your Mantis, read the care and safety instructions on page 21.

AN IMPORTANT STEP! Do this *before* you start your Mantis!

Your Mantis is powered by the super-hero of the engines, our 21.2 cc, 2-cycle Echo engine. With this type of engine, *you must mix the oil with the gasoline in a separate container.*

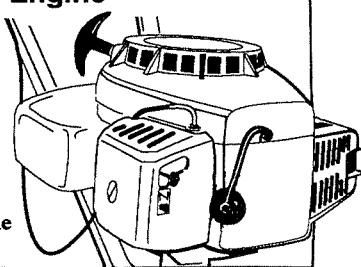


Your Mantis comes with a convenient, pre-measured packet of the special Engine Oil. Simply mix the contents with one gallon of regular gas. Shake well, fill the gas tank and go!

The NEW Mantis Engine

It's small. It's powerful. And because the oil is mixed with the gas, oil leaks are never a problem. You can lay your Mantis on its side,* or turn it upside down *without ever losing a drop of oil!*

***Note:** To avoid damage to engine parts, always lay your Mantis on the muffler side only.



You can buy additional packets of engine oil from us (just call!). Or, you can use any *high-quality*, 2-cycle chain saw oil in cans from your local hardware, auto supply or discount chain store. Mix 6 ounces of this oil to every gallon of gas.

- Use *regular leaded gasoline only*. In cases where leaded fuel is unavailable, unleaded fuel (minimum octane 87) may be substituted. Do *NOT* use gasohol.
- Remember — *never* use your Mantis without the 2-cycle oil mixed into the gasoline.
- Always mix the gasoline and oil in a clean container. Fill the fuel container halfway with fresh gasoline, add the engine oil, then add the rest of the gasoline, close the container and shake thoroughly for proper mixing.
- Do not attempt to mix the gasoline and oil in the engine fuel tank.

Failure to use the proper oil/gasoline mixture will result in rapid, permanent damage to your engine and will void the warranty.

Mix 1 packet of
our Echo Maxi-Lube
to one gallon
of regular gas
(not unleaded)

OR

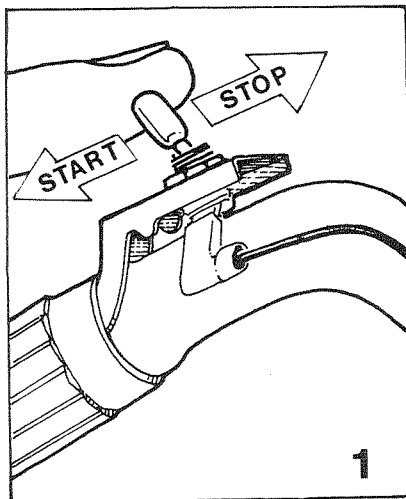
Mix 6 ounces of
high-quality 2-cycle oil
to one gallon
of regular gas
(not unleaded)

Starting Your Mantis For The First Time

Be sure that the fuel tank is filled with the correct mixture of gasoline and appropriate 2-cycle engine oil.

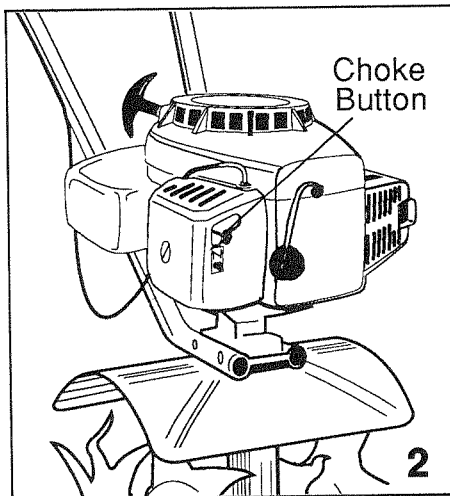
If you've ever struggled to start a lawn mower, you'll be happy to know that your Mantis has a special feature for instant, easy start-

ing: our short-pull recoil starter. We recommend that you *always* use several short, brisk pulls to start your Mantis. (You don't need to give it the forceful, long yank that's needed to start your lawn mower!) Remember: short pulls equal easy starting.



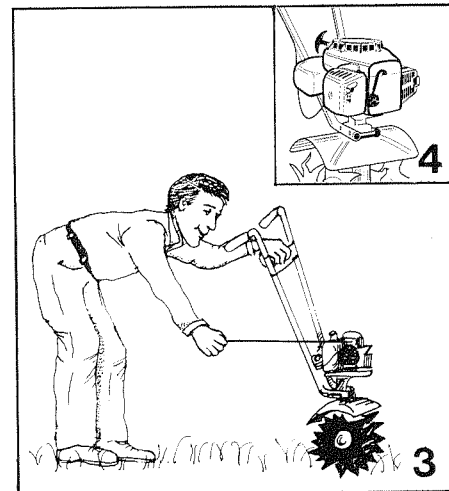
1) Place ignition switch in **START** position. This switch is located on the handle near the throttle lever.

2) Open the engine choke by **PUSHING IN** on the choke button.



3) Pull the starter cord 2 times. If engine starts, allow it to idle for a short time before beginning work. If engine does not start, proceed to steps #4 and #5.

4) Close the engine choke by **PULLING OUT** on the choke button.



5) Pull the starter cord 3 to 4 times, or until the engine begins to start (just catches then dies.) Open the engine choke again by **PUSHING IN** on the choke button. Pull the starter cord again.

If the engine does not start, repeat the steps above 1 or 2 more times. If the engine still does not start, call us.

Alternative Starting Procedure

If nothing works try this —

- 1) Turn switch on.
- 2) Place choke lever in open position (pushing in)
- 3) Pull starter rope approximately 15 quick pulls. Machine should start and run.
- 4) If not, close choke by pulling out. Pull starter 4 to 5 times. Machine should start and then stall.
- 5) If not, repeat from 2.

Starter handle should not be pulled more than 15 times with choke closed. Flooding will occur.

Troubleshooting: If Your Mantis Doesn't Start

- Be sure you have the ignition switch on *START*.
- Follow the steps for starting the engine.
- If it still doesn't start, remove the spark plug. (Please refer to page 14 first.) Check to be sure it is clean and dry. If spark plug is fouled or flooded, dry it off with a clean rag, then clean off built-up accumulations. Adjust gap if needed.
- DO NOT use starting fluids. Use of starting fluids will cause permanent engine damage and will void the warranty.

If your Mantis does not start in 10 - 15 pulls, call us on our Owner's Hotline —

800-344-4030
(In PA, 800-342-0052)

To Stop The Engine

Simply push the ignition switch on the handlebars to the *stop* position. Should this switch fail to stop the engine, you can stop it by pulling out on the choke.

A Special Safety Feature

Even with the engine started, *the tines will only turn when you squeeze the throttle lever* located on the handlebars! Release the throttle lever and the tines stop *instantly!*

About The Choke

The choke controls the amount of air that is drawn into the engine. Your Mantis will run only if the choke is open (pushed in). (See page 14 for details on adjusting these screws.)

For Maximum Engine Life:

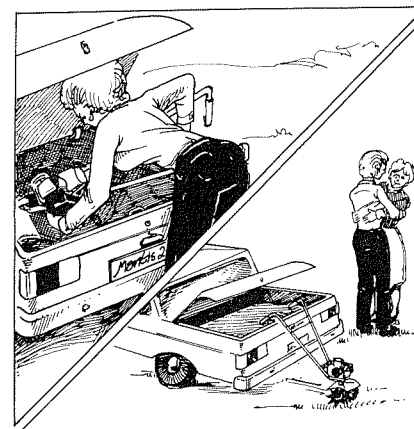
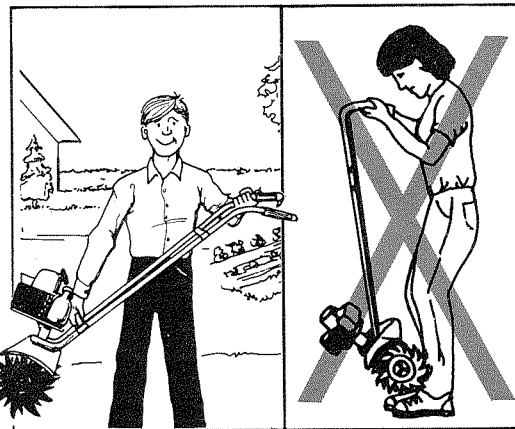
After starting the engine, let your Mantis warm up for a minute or two before using. And, before you put the Mantis away, let it run at idle to give the engine a chance to cool down.

Before using your Mantis, please read the important care and safety instructions on page 21.

Getting To Your Garden

YES!

NO!



Your Mantis can “walk” . . .

Just squeeze the throttle lever gently and let the Mantis “tip toe” across your yard on its tines. (It *won't* hurt your lawn or driveway — try it.)

Your Mantis can be carried . . .

With the engine *off*, you can carry the Mantis with its convenient carrying handle.

Safety Reminder: Do not hold or carry Mantis as in the picture at right. If tines engage, you can be badly hurt.

Your Mantis can ride . . .

For longer trips (say, to your mother-in-law's garden), just put the Mantis in the trunk of your car. It's easy to take in and out of a car without straining your back. Always empty the fuel tank before carrying Mantis in a car or truck. To avoid damage to engine parts always lay Mantis on its muffler side.

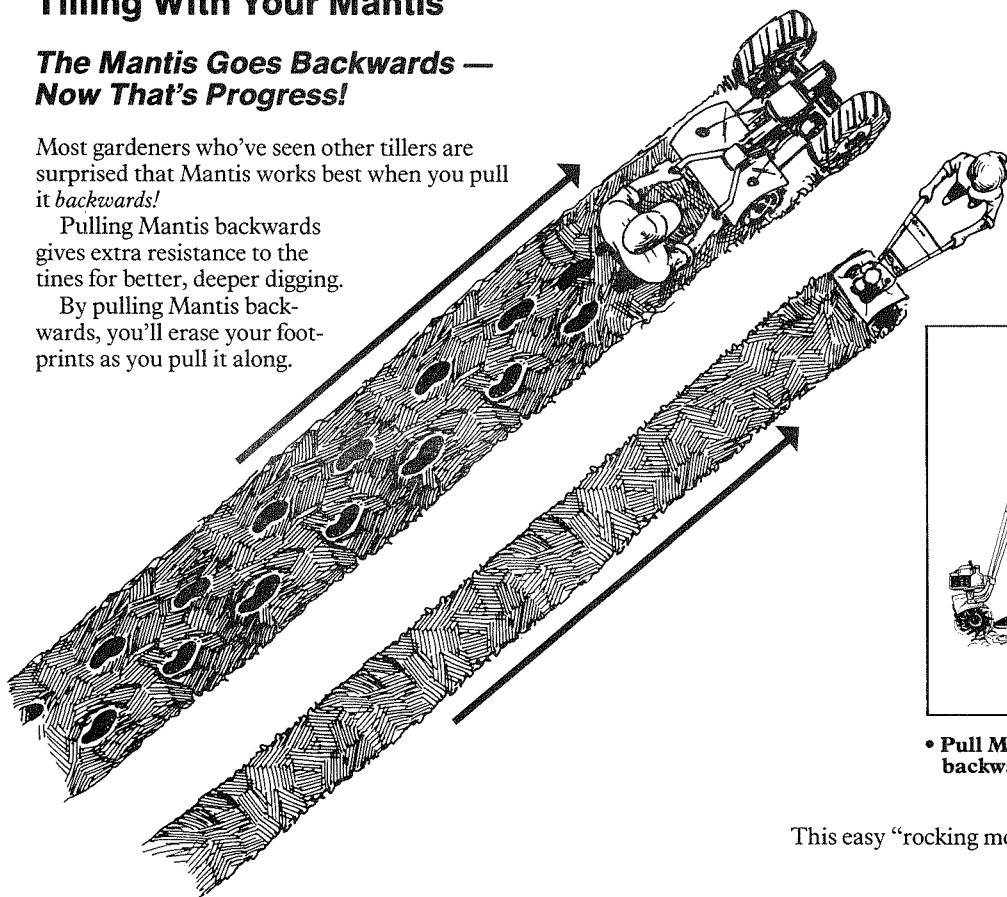
Tilling With Your Mantis

The Mantis Goes Backwards — Now That's Progress!

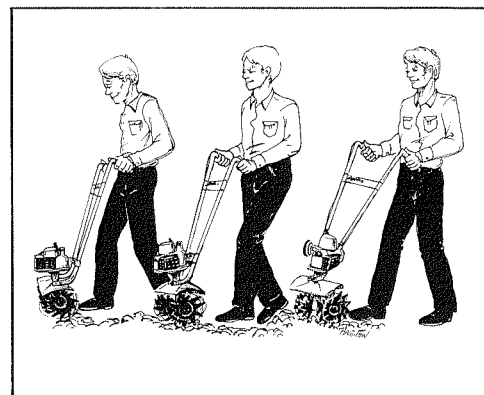
Most gardeners who've seen other tillers are surprised that Mantis works best when you pull it *backwards*!

Pulling Mantis backwards gives extra resistance to the tines for better, deeper digging.

By pulling Mantis backwards, you'll erase your foot-prints as you pull it along.



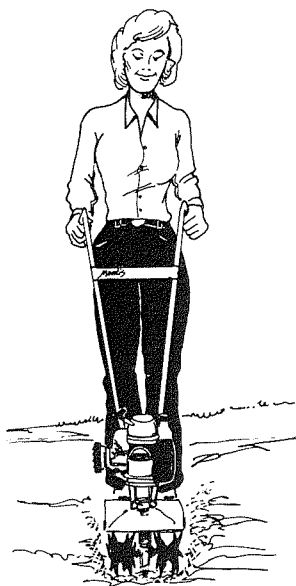
**Run the Mantis like
a vacuum cleaner.**



- Pull Mantis backwards
- Let it move forward a bit
- Pull it backwards again

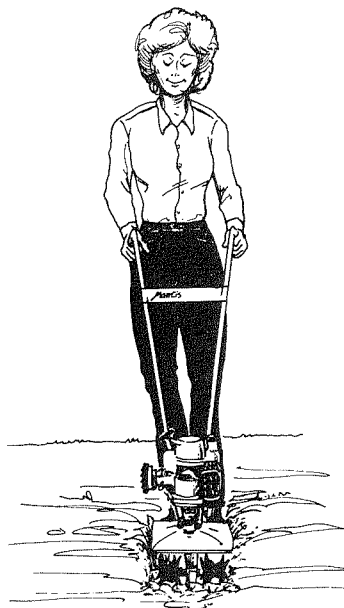
This easy "rocking motion" is the key to super-effective tilling.

Controlling The Depth Is Easy, Too!



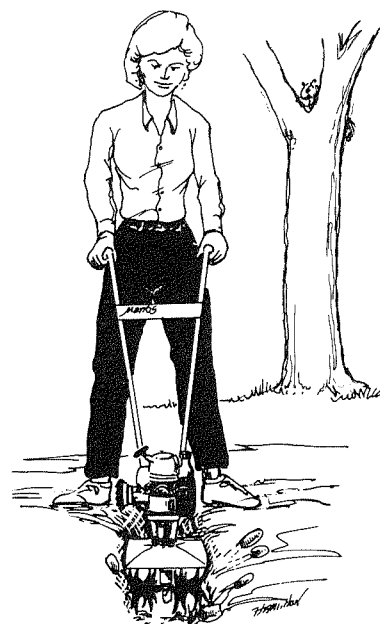
For shallow tilling

Move Mantis quickly over soil surface.
For shallow tilling or weeding, switch the
tines to the "cultivating" position.
(Please see page 12.)



For deeper tilling

Move Mantis slowly, working the same
area over with the gentle back-and-forth
rocking motion.



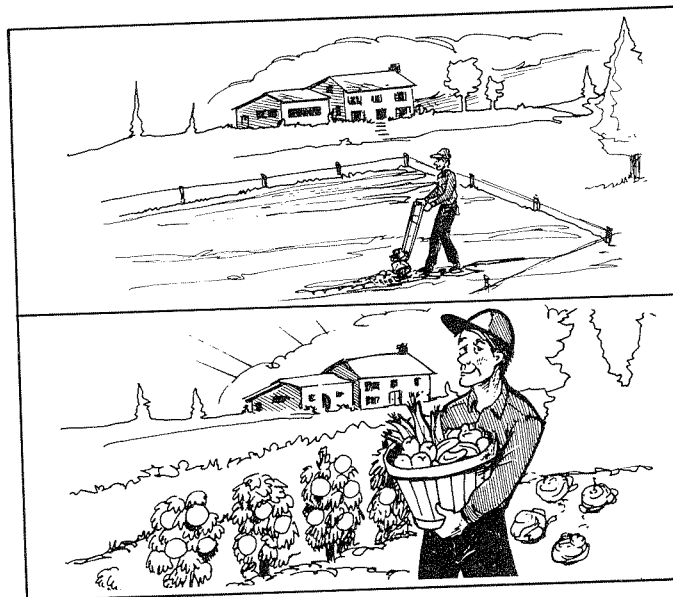
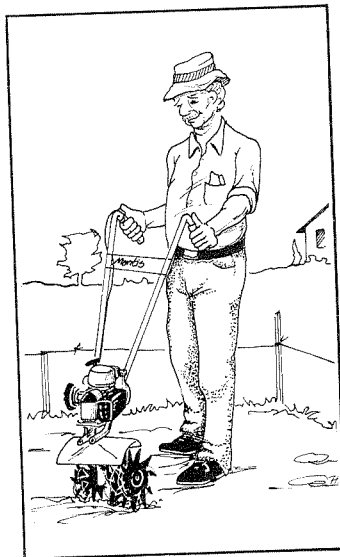
For big weeds or tough roots

Let the Mantis rock back and forth
several times over the "tough spot" until
its sharp tine teeth slice through the root
or weed.

Special Projects . . . Let Mantis Help

Starting a flower bed border

It's easy to turn a section of your lawn into a 12" - 14" wide flower bed border. Run the Mantis back and forth until sod begins to break up. Continue tilling . . . Mantis will finely chop sod clumps and thoroughly work them into the soil. No other tiller, large or small, does this job faster or more thoroughly.



Starting a family-sized vegetable garden

To turn a large plot into a garden, hire someone with a plow or large tiller to break ground for you. It's a *once-in-a-lifetime* investment that's well worth the small cost (such work costs about \$15 - \$25 an hour). Use your Mantis to break up any remaining clumps of soil or sod, and pulverize your soil into a smooth, perfect seed bed.

Then, use your Mantis for *all* of your weeding chores. (Remember, weeding is 95% of the work in home gardens.)

More Special Projects



Digging holes for shrubs, bushes, etc.

Hold Mantis in one place, letting the tines dig down into the soil. Once they've dug down about 6" - 8", lift Mantis up and simply shovel or rake out the loose dirt. Repeat until desired depth is reached.



Clearing stones and rocks out of your garden

Unlike other tillers which bury rocks, Mantis pulls them to the surface. You can then remove them from your garden.

In rocky soil, use half throttle. When Mantis hits a rock, pull back gently and the rock will be exposed. Take out rocks as you go. In time, your garden will be virtually rock free!



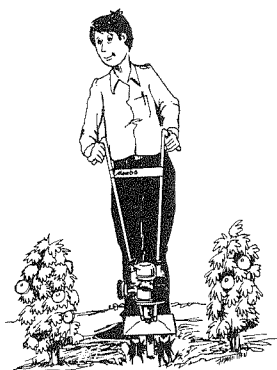
Our big, full-color PROJECT PLANNER WALL CHART has 33 other ideas on ways to use your tiller. It's included FREE with your Mantis.

A Safety Reminder: If your Mantis tines become jammed or entangled, shut off the engine immediately and remove the obstruction while the engine is off. Never attempt to remove an obstruction while the engine is running. Serious injury can result.

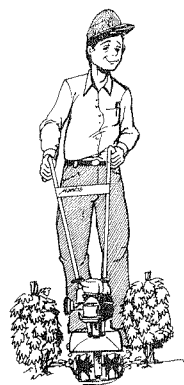
Just Guide The Mantis To Where You Need To Weed!



Between plants



In wide rows



In tight rows



Against fences



In corners



On raised beds

- Use the gentle rocking action pulling Mantis backwards slowly and letting it rock forward to knock out weeds.
 - For tough weeds, slow it down, working back and forth until the weeds are removed.
- Easy and effective!

(Remember: *any* type of tiller will tangle on tall grass, stringy vines or big weeds. Cut material up first with a knife or hand pruners. If material does tangle in tines, shut off tiller completely *first* before removing tangled material.)

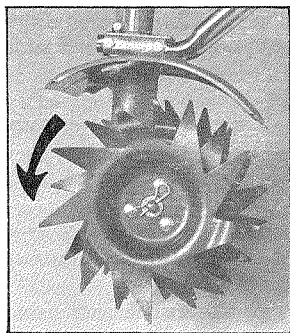
Mantis Makes Weeding A Pleasure

(Which is why gardeners love it!)

With just a quick two-minute step, you can switch your Mantis from a tiller that digs down 6" - 8" into a super weeding machine that gently cultivates only the top 2" - 3" of soil. You'll cut your weeding time in half — *and* have more time to

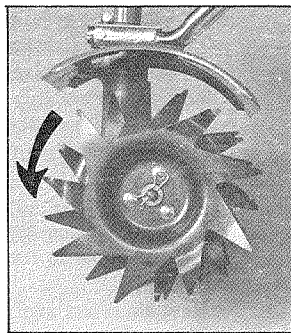
enjoy your garden! With the tines in the weeding position, the 36 sharp tine teeth will slice and chop weeds, burying them as you simply walk along (and protecting the deeper, precious root systems of your growing plants).

TILLING POSITION



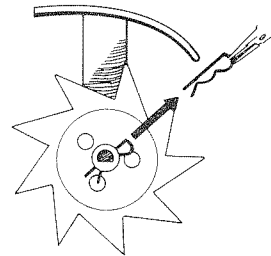
Biting Action
(Tines rotate towards back of tiller)

WEEDING POSITION

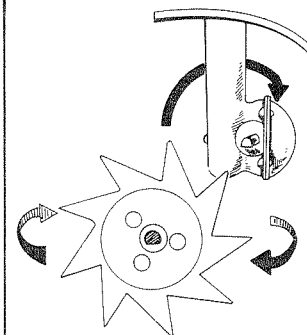


Slicing Action
(Also useful for shallow tilling)

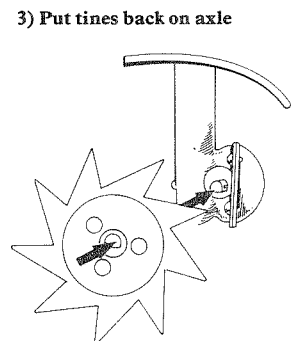
HOW TO SWITCH FROM TILLING TO WEEDING POSITION



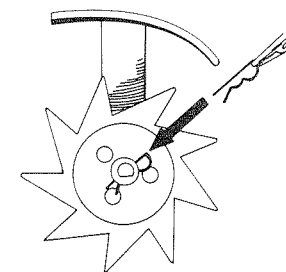
1) Pull out pins and pull tines off axle



2) Switch tines from one side of axle to the other



3) Put tines back on axle



4) Replace pins

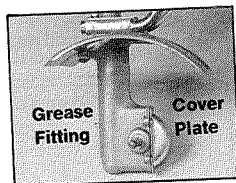
Note: The protruding end of the hub always faces toward the worm gear housing.

13 Maintenance And Storage

Maintaining the Air Filter

To be done prior to each use or when working for prolonged periods in a dusty environment.

A wet or dirty air filter can cause poor engine performance, difficult starting or decreased engine life. Be sure to check your air filter frequently. If you work in dusty soil, or want to be sure, check your air filter before each use. Under more normal conditions, check the filter once a month. Always check your air filter once a year in the spring or fall. Replace or clean as needed.



Checking The Lubricant Inside The Worm Gear Housing

The Mantis worm gear housing has been lubricated at the factory and should provide years of satisfactory service with no additional attention. Once a year, it is a good idea to inspect the lubricant level in the worm gear housing. To do this, remove the worm gear housing cover plate and clean. The GREASE LEVEL INSIDE THE WORM GEAR HOUSING SHOULD BE NEAR THE TOP OF THE HOUSING. If it isn't, top it off with lithium #0 grease or equivalent. DO NOT OVERFILL. This can create pressure which can cause seals to fail. For more convenient lubrication of the worm gear housing, a grease fitting has been positioned on the front of the worm gear housing.

How to change or clean your Mantis 20 Air Filter

Your Mantis 20 features a newly designed higher efficiency air filter that does not require an oil bath.

To Remove the air filter:

- 1) Unscrew the large screw on the side of the carburetor cover.
- 2) Take off the cover making sure to clear the choke button.
- 3) The air filter is the white pad on the inside of the carburetor cover. Remove it by carefully lifting an edge.

To Clean the air filter:

- 1) Use a mild dishwashing detergent to wash off surface debris. Do not use solvents or cleaning chemicals.
- 2) Rinse thoroughly and let stand to dry.
- 3) DO NOT install a wet air filter. Wait until it is dry, or use a replacement.

To Install the air filter:

- 1) Insert a clean dry filter into the carburetor cover and reassemble in reverse of the above removal instructions.

New air filters and other repair or maintenance parts for your Mantis 20 engine and tiller can be ordered directly from us. Write or call: Toll Free 800-344-4030 (in PA: 800-342-0052)

Storing Your Mantis

To be done each fall or before storing the Mantis for any long period of time.

Drain the gas tank and then run the engine until it stops. (Fuel stored under even the most ideal conditions may start to go stale in 30 days. Stale fuel has a high gum content which can clog the carburetor and restrict fuel flow.) Choke and re-start engine to make sure all fuel has been used from the carburetor. This prevents formation of gum deposits. Remove the spark plug and pour a few drops of clean, air-cooled 2-cycle oil through the spark plug hole into the combustion chamber. Slowly pull the starter 3 - 4 times to coat the interior of the cylinder wall. Inspect the spark plug (Autolite 2976), clean (or replace) and re-install.

If you have fuel left over at the end of the growing season, discard it rather than save it for use next spring. Clean out the air filter as shown above. Clean the entire machine of dirt, grass, etc. and wipe the tines with oil or spray with WD-40 to prevent rusting. Oil throttle cable and all moving parts that are visible (do not remove engine cover). Check grease level in transmission and refill if necessary. Order any new parts that are badly worn or broken (even though you may have been "living with" the inconvenience all summer). Put your Mantis away in a clean, *dry* place for the winter.

Adjusting The Carburetor

To be done if Mantis sputters or stalls frequently or lacks its usual power.

The carburetor has been adjusted at the factory for optimum performance. Should the carburetor require adjusting, proceed as follows:

- Low-speed needle valve (L) $1\pm \frac{1}{4}$ turn
- High-speed needle valve (H) $1\pm \frac{1}{4}$ turn

Turn the corresponding adjusting screw lightly clockwise to fully closed position and return the screw by the number of turns indicated above. The (L) and (H) markings are stamped on the carburetor body next to each screw. Do not make carb adjustments when the air filter housing is removed. (This causes the engine to run too lean.)

Spark Plugs

To be done if Mantis won't start or lacks its usual power.

Clean or replace the plug if fouled with oily black deposits. Replace the plug if the center electrode is rounded at the end or if the ground electrode is worn. Adjust the gap 0.6 - 0.7 mm (.024" - .028").

CAUTION — Do not over tighten the plug. Correct torque = 18 - 22 ft. lbs.

Use an Autolite 2976 spark plug to replace the old spark plug.

In order to avoid possible damage to the threads, do not attempt to remove the plug from a hot aluminum cylinder head.

Using Your Mantis Precision Gardening Attachments

Your Mantis was designed — right from the beginning — to accept a variety of useful, work-saving attachments. All of the attachments (except the trimmers) slide onto the tine axles and are held in place with retaining pins. Your attachments are simple to care for . . . just hose them off and when dry, spray with a light pressurized oil such as WD-40.



Important Note: For all instructions, assume that you are standing *behind* the Mantis (as you would for tilling or cultivating) to determine *left* and *right* axles.

Border Edger

Give your yard that neat, attractive, finished look! Cut clean edges for plantings along paths and sidewalks, around flower beds, shrubs and trees, and along hedge rows. Your Mantis Border Edger does the job skillfully — and effortlessly.

To Install:

For shallow edging (1" - 2" deep) — for areas with roots and other underground obstructions.

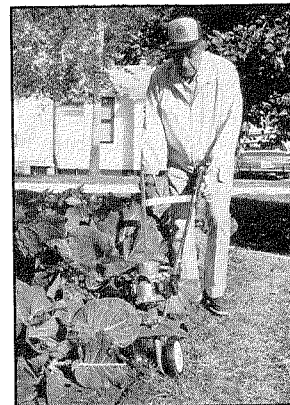
- Remove tilling/cultivating tines.
- Slide wheel onto the *right* axle.
- Slide edger blade onto the *left* axle so that the *angled face* of the blade hits

the ground when spun in a clockwise direction.

- Insert retaining pins on both the left and right axles.

For deeper edging (3" - 4" deep) — for edging around walkways and garden beds.

- Remove tilling/cultivating tines.
- Slide wheel on the *left* axle.
- Slide edger blade on the *right* axle so the *straight face* of the blade is hitting the ground when spun in a clockwise direction.
- Insert retaining pins on both the left and right axles.

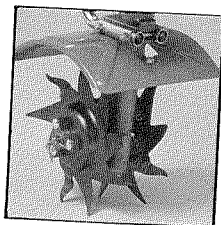


To Use:

- Position Mantis so that edger blade is along edge of garden bed and wheel is outside (on lawn, sidewalk, etc.).
- Pull tiller backwards.
- Rake away loose dirt.

Special Projects:

- Use Edger to cut sod strips. Use deep setting.
- Cut thin slits in the yard or garden for the submersion of thin electric and water lines.
- To edge *and* cultivate at the same time . . . use the edger blade on one axle, a tilling/cultivating tine on the other axle. Don't be afraid to experiment with mixing or matching the blades!



This wonderful attachment makes the best planting and hilling furrower you've ever seen. It does the work faster and easier than hand hoeing. The furrows you create will have a uniform depth, whether shallow or deep!

To Install:

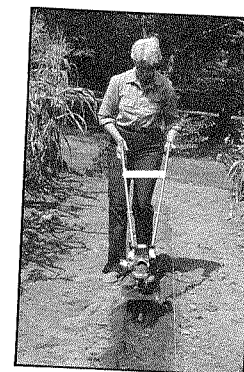
- Remove tilling/cultivating tines.
- Slide planter/furrower tines onto axle so the straight face of the blade hits the ground when spun in a clockwise direction.
- Insert retaining pins on right and left axles.

To Use:

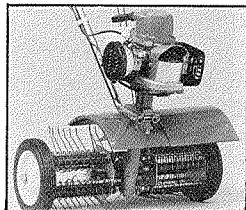
- Go over your seed beds first with normal tilling/cultivating tines.
- For *shallow trenches* (for planting beans, corn, etc.): Install planter/furrower tines and pull Mantis backwards along the row. Let machine tilt slightly to clear earth from the trench.
- For *deeper trenches* (for planting potatoes, strawberries or asparagus): With planter/furrower tines in place, let Mantis run forward and then pull it back slowly. Do this along the entire row.
- For *hilling corn or potatoes*: Using planter/furrower tines, run Mantis along the right side of the crop row you want to hill. As you move along, lean tiller at an angle *away* from the crop row. This will throw soil up onto the row.

Special Projects:

- Reverse the planter/furrower tines for *very* shallow cultivating of shallow-rooted crops. The planter/furrower tines are narrower than the usual tilling/cultivating tines and are ideal for spot weeding in extremely tight spaces.
- Use the planter/furrower tines (in normal position) to dig irrigation trenches as needed.
- Try "Invisible Composting" this fall! Dig a deep (6" - 8") trench with the Mantis in your garden and fill it with compost materials. Shredding the materials first with an electric chipper/shredder such as our Chip Mate will help speed decomposition. Cover the trench by digging a second trench beside the first one. (By leaning the Mantis *away* from the first trench, you'll throw dirt up to cover the original trench.) Come spring, the materials will be decomposed, already enriching your soil with humus and nutrients.



Lawn De-Thatcher



Thatch is a harmful, tightly-woven mat of grass roots, both living and dead (not mower clippings as commonly believed) that forms just above the soil surface. Thatch keeps water and fertilizer from getting down into the soil, shuts out air and sunlight, and provides a home for unwanted insects.

Your Mantis Lawn De-Thatcher will effortlessly do in minutes what would normally take hours of backbreaking work with an iron rake. The two gangs of forty spring-steel picks *each* cleanly de-thatch a 15"-wide swath as you walk along. One or two passes each year will totally eliminate harmful thatch build-up and develop a healthy green carpet.

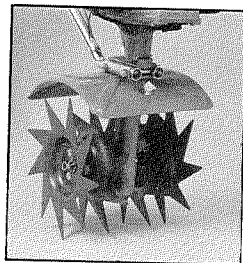
To Install:

- Remove tilling/cultivating tines.
- Slide de-thatching attachments over the tine axles. Observe right and left-hand labels. The De-Thatcher combing springs must hit the lawn like curved down fingers.
- Insert retaining pins on right and left axles.
- Slip on the hood extenders by bending them in a semi-circle so that the channels on the extenders slip over the front and back edge of the tiller hood. Push hood extenders in as far as they will go towards the center.

To Use:

- The Mantis engine will turn the De-Thatcher combing fingers (not the wheels).
- For fastest de-thatching, pull the Mantis *backwards* as you walk along. (If you prefer, you can let it run forward and pull back as if you were tilling . . . however, this is a bit slower.)
- Thatch will be combed up onto the surface of your lawn. Simply rake it away. (By the way, this material makes a terrific, weed-free mulch!)





Lawn care professionals aerate lawns to give grass roots a chance to breathe and to allow irrigation to seep below the soil's hard crust to the root zones of plants. We also recommend aerating before re-seeding or fertilizing. Your Aerator features four gangs of tempered steel "knives". The knives cut into the soil beneath your lawn to let water and nutrients penetrate easily and to encourage deep, drought-resistant root growth.

To Install:

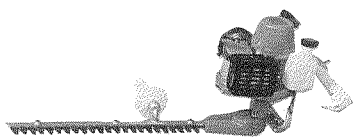
- Slide off tilling/cultivating tines.
- Mount aerator tines so the sloped edge of the tines strike the soil when rotated in a clockwise motion. (This will provide aeration to a 1" - 2" depth — recommended for your first aerating projects.)
- For deeper aeration (2½" - 3" depth), reverse the tines so the straight edge of the tines strike the soil.
- Insert retaining pins on both the left and right axles.

To Use:

- For best results, walk backwards and pull the machine as you go. This will cut four hairline slits, roughly 2½" apart and 1½" deep. (Note: If you let Mantis run forward, it will tear out dime-sized patches of lawn and soil.)
- If your lawn needs radical restoration, aerate north to south and then aerate east to west to give you a checkerboard pattern of slits.
- Leave the loose earth where it is until you've sown fresh grass seeds and fertilizer along the slits, then rake off the loose soil. You'll get fresh bands of healthy green grass which will spread over your entire lawn, giving you a rich carpet of healthy green growth.
- Please note: Aeration is a radical procedure (regardless of the method you use) and will make your lawn somewhat unsightly for about 10 days. The improved lawn vigor and color make regular aeration more than worth it. Most of the unsightly aspects of aeration can be eliminated immediately by raking off loose surface earth, followed by a good watering.
- Aerate *three* times a year (spring, mid-summer and early fall only) for best results. Aeration should always follow a thorough program of de-thatching.



19 Trimmer



What once took hours of blister-making hand work with loppers can be done in minutes with your Mantis Trimmer. Use it to prune, manicure and trim your hedges,

shrubs or small trees. Just pop the powerful Mantis engine onto the trimmer attachment (it only takes a minute or so) and you're ready to go to work.

To Install:

- Remove handle grip and trimmer from cartons.
- Screw handle grip into handle adapter located on frame bar in threaded hole provided. Handle should be sufficiently tightened to ensure that at least 3 or 4 clicks are felt on locking notches.
- Remove the engine from the Mantis Tiller as follows. Remove the air filter housing (see page 13). Loosen the locking nut that clamps the throttle cable to the engine housing. Detach the throttle cable end from the carburetor. Separate the ground wire at the connecting clips approximately 3" from the engine. (Pull on the clips, not the wire!) Loosen the hex head screw at the very bottom of the engine just above where the handles are attached to the tiller. Lift the engine straight up off the tiller. When putting the engine back on the tiller transmission, be sure it is properly seated all the way down and snug against the top of the transmission.
- Remove the two 1/4" - 20 nuts preassembled to handle and place handle on hedge trimmer. Insert the two 1/4" - 20 handle bolts into 1/4" holes and half round slot provided at rear of hedge trimmer housing. Secure the handle with the 1/4" - 20 nuts and hex head bolts provided.

- Install engine to hedge trimmer by first aligning the hex drive on the hedge trimmer with the hex socket in the engine and place motor over 1" diameter stem of hedge trimmer and secure with 5/16" hex socket wrench.
- Attach ground wire and throttle cable from trimmer handle to motor.
- Follow all engine operating instructions for the Mantis tiller (see page 21). Always use the proper gasoline and engine oil mixture.



Lubrication And Maintenance

- A few drops of oil should be placed at each adjusting screw approximately every four hours of normal operation.
- To obtain trouble-free trimming, it is necessary to remove gum that collects on the blades. A mixture of 1/2 kerosene and 1/2 machine oil will clean the blades.
- The gear housing has been permanently lubricated with a special grease which should last for the life of the trimmer. When blades are replaced, or any other time that the bottom cover plate is removed, the grease should be checked for proper amount and a new gasket should be used to ensure proper seating of cover plate.

Instructions For Safe Operation

To Use:

- Read the care and safety instructions carefully.
- Hold trimmer handle firmly and squeeze throttle to accelerate engine. Tilt trimmer so that cutting tooth is angled slightly toward the hedge or shrub and proceed to cut.
- Your trimmer is designed to cut any type of hedge or shrub; however, **THICKNESS OF CUT SHOULD NOT EXCEED 1/2" IN DIAMETER.**
- Be careful of hidden metallic objects in the hedge or shrubbery which may damage trimmer.

Trimmer Care And Safety

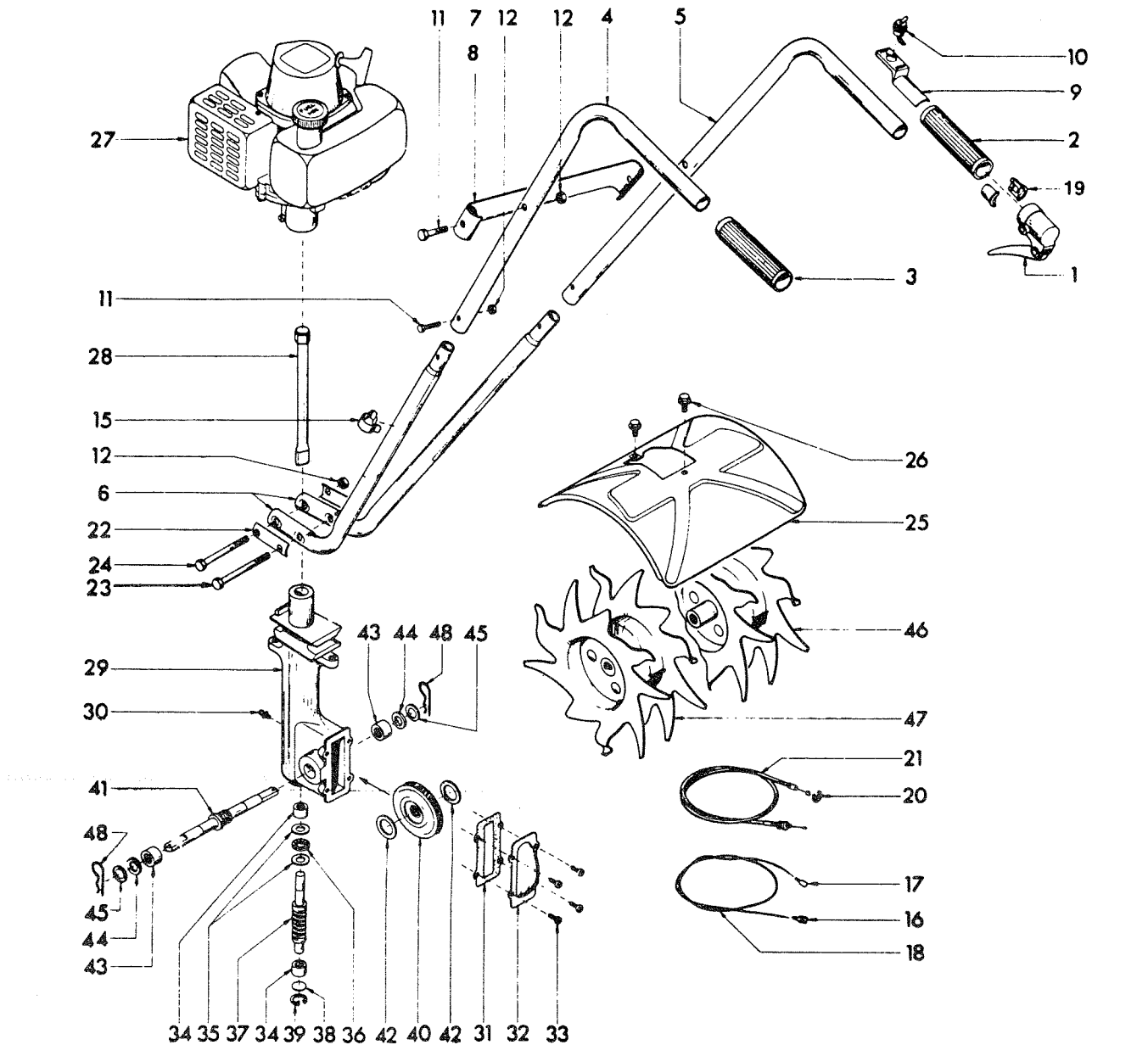
- 1) Before using trimmer, read and follow all instructions including all care and safety instructions for the Mantis Tiller (see next page).
- 2) **DANGER — CUT HAZARD — KEEP HANDS AWAY FROM BLADES** — Keep both hands on handles when power is on. Do not attempt to remove cut material nor hold material to be cut when blades are moving. Make sure trimmer switch is off (not depressed) when clearing jammed material from blades. Do not grasp the exposed cutting blades on cutting edges of trimmer.
- 3) **USE TRIMMER PROPERLY** — Use only for trimming 1/2" or less diameter branches from hedges or shrubs. Do not abuse trimmer.
- 4) **DON'T OVERREACH OR STAND ON UNSTABLE SUPPORT** — Keep good footing and balance at all times.
- 5) **STOP ENGINE WHEN TRANSPORTING** from one place to another. *Do not leave engine running* while hedge trimmer is unattended.
- 6) **MULTIPLE OPERATORS** — Keep a safe distance between two or more operators when working together simultaneously.
- 7) **MAINTAIN AND EXAMINE TRIMMER WITH CARE** — Follow maintenance instructions given in manual. Do not use the hedge trimmer if the muffler is defective or missing.
- 8) **STORE TRIMMER INDOORS** — When not in use, store trimmer indoors in a dry, sheltered area out of the reach of children.
- 9) **DO NOT ATTEMPT TO REPAIR TRIMMER** — Have repairs made by qualified dealer or repairman. See that only identical replacement parts are used.
- 10) **DO NOT USE WITHOUT HANDLE AND GUARD.**

Important: Read This Before You Use Your Mantis!

General Care and Safety Rules

- **READ AND FOLLOW** all instructions in this manual.
- **DRESS PROPERLY** — Do not wear loose clothing or jewelry. They can be caught in moving parts. Use of sturdy gloves, non-skid footwear (no sneakers or sandals) and safety glasses is recommended.
- **STAY ALERT** — Watch what you are doing and use common sense. Do not operate unit when fatigued.
- **KEEP CHILDREN AND INCAPABLE PERSONS AWAY** — Do not permit children to contact unit. Keep *children* a safe distance from work area. Never allow a person mentally ill, under influence of alcoholic drinks or drugs, or *too young in age* to operate unit.
- **DO NOT FUEL, REFUEL OR CHECK FUEL SYSTEM WHEN SMOKING OR NEAR AN OPEN FIRE** — Do not run the engine when fueling or refueling. Stop engine when transporting from one place to another. Do not leave engine running unattended.
- **DO NOT START OR RUN ENGINE INDOORS** as poisonous carbon-monoxide is emitted.
- **IF ELECTRIC SYSTEM CAUSES SPARK OUTSIDE THE CYLINDER, DO NOT USE THE ENGINE** — When checking spark plugs, keep plug a safe distance from cylinder to avoid burning of evaporated fuel from cylinder.
- **MAINTAIN AND EXAMINE ENGINE WITH CARE** — Follow maintenance instructions and do not use if parts are defective or missing from engine.
- **STORE UNIT INDOORS** — When not in use, store unit indoors in a dry, sheltered area. The engine, as well as fuel, should not be stored in a house.
- **DO NOT ATTEMPT TO REPAIR ENGINE** — Have repairs made by qualified dealer or repairman. See that only identical, quality replacement parts are used.
- **NEVER DEPRESS THROTTLE FOR FULL SPEED UNLESS TINES ARE ON THE GROUND.**
- **IF TINES SHOULD BECOME JAMMED, STOP THE ENGINE IMMEDIATELY**, free the obstruction, and — if necessary — remove tines to help free obstruction.
- **IF THE IGNITION SWITCH FAILS TO STOP THE ENGINE**, stop the engine by pulling out on the choke.

MANTIS-20 PARTS LAYOUT

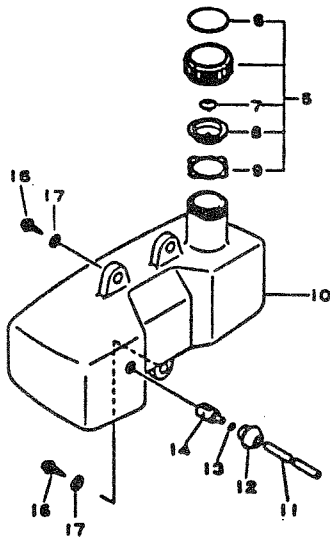


KEY NUMBER	PART NUMBER	QTY. UNIT	DESCRIPTION
1	382	1	Throttle Lever
2	383	1	Grip-Thru
3	619	1	Grip
4	461	1	Upper Handle-Left
5	462	1	Upper Handle-Right
6	463	2	Lower Handle
7	979	1	Label
8	148	1	Handle Brace
9	464	1	Switch Bracket
10	479	1	Switch
11	410	4	Cap Screw 1/4-20 x 1 Lg.
12	972	6	Lock Nut 1/4-20
15	478		Throttle Clip
16	477	1	Connector Female
17	476	1	Connector Male
18	475	1	Ground Wire
19	379	1	Cable Retainer
20	413	1	Retaining Ring
21	467	1	Throttle Cable Assy.
22	377	2	Handle Clamp
23	470	1	Long Bolt 1/4-20 x 3" Lg.
24	469	1	Short Bolt 1/4-20 x 2 3/4" Lg.
25	465	1	Fender Guard

KEY NUMBER	PART NUMBER	QTY. UNIT	DESCRIPTION
26	140	2	Bolt 1/4-20 x 1/2" Lg.
27	380	1	Engine
28	468	1	Drive Shaft
29	466	1	Worm Gear Housing
30	127	1	Grease Fitting
31	436	1	Gasket
32	437A	1	Housing Cover
33	651	4	Rd. Hd. Self Tapping Screw
34	423	2	Roller Bearing
35	425	2	Worm Bearing Race
36	424	1	Worm Thrust Bearing
37	422	1	Worm Shaft
38	426	1	Worm Disc
39	428	1	Retaining Ring
40	429	1	Worm Gear
41	431	1	Tiller Wheel Shaft
42	430	2	Worm Gear Thrust Washer
43	432	2	Worm Gear Bearing
44	434	2	Bearing Seal
45	435	2	Bearing Seal Retainer
46	438L	1	Tiller Wheel Assy. L.H.
47	438R	1	Tiller Wheel Assy. R.H.
48	418-1	2	Tiller Wheel Retaining Hair Pin

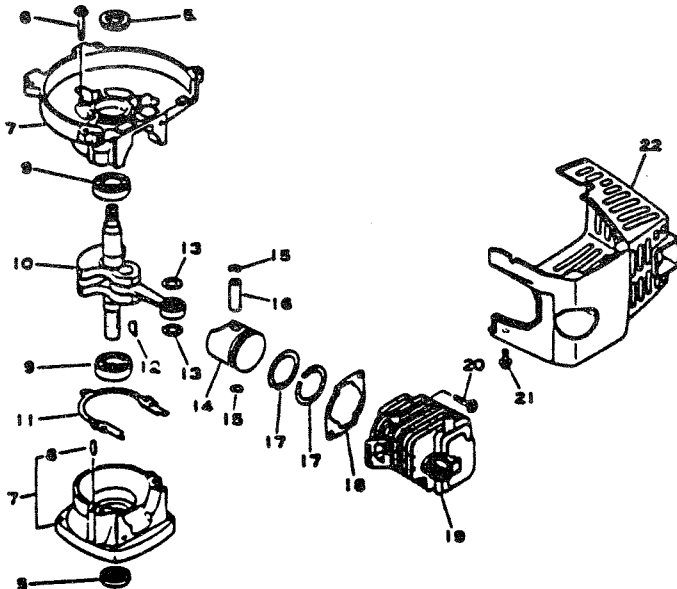
SV-4 PARTS LAYOUT

FUEL TANK ASSEMBLY



KEY NO.	PART NUMBER	QTY.	DESCRIPTION
4	5	1	CAP ASSY, FUEL (BL)
	6	1	LABEL, FUEL MIX
	7	1	VALVE, CHECK
	8	1	HOLDER, CHECK VALVE
	9	1	GASKET, F. TANK CAP
10	131 005-1152 0	1	TANK, FUEL
11	132 010-1152 0	1	PIPE, FUEL 3x5xL210
12	132 115-0492 0	1	GROMMET
13	132 013-0982 0	1	CLIP
14	131 205-0732 0	1	STRAINER, FUEL
16	900 250-0501 4	3	SCREW 5x14
17	900 603-0000 5	3	WASHER 5

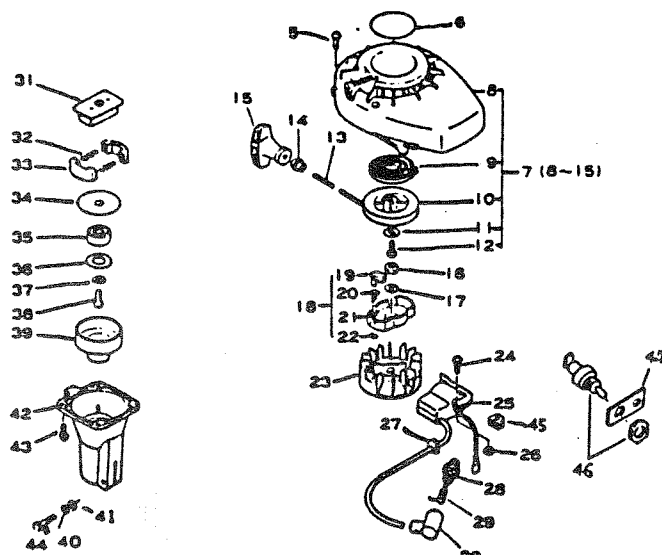
BLOCK ASSEMBLY



KEY NO.	PART NUMBER	QTY.	DESCRIPTION
1	5	2	OILSEAL
	6	3	SCREW 5MB-5x28
	7	1	CRANKCASE SET
	8	2	PIN, DOWEL
	9	2	BEARING, BALL 6201
10	100 100-1152 0	1	CRANKSHAFT ASSY
*11	N/A USE KIT	1	GASKET, CRANKCASE
12	610 325-0273 0	1	KEY, WOODRUFF
13	100 014-1152 0	2	SPACER, PISTON PIN
14	100 010-1152 0	1	PISTON
15	100 015-0463 0	2	CIRCLIP, PIST. PIN
16	100 013-1152 0	1	PIN, PISTON
17	100 011-0533 0	2	RING, PISTON
*18	N/A USE KIT	1	GASKET, CYL. BASE
19	101 011-4473 0	1	CYLINDER
20	900 238-0502 2	2	SCREW 5MB-5x2
21	900 238-0401 8	2	SCREW 4x8
22	101 506-1152 0	1	COVER, CYLINDER

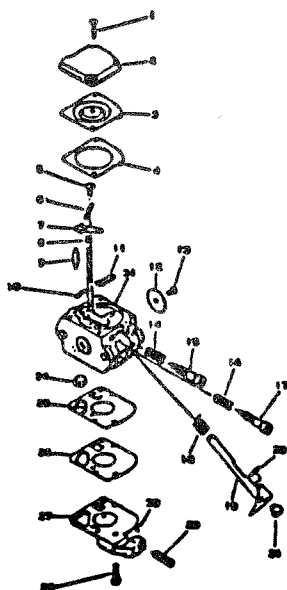
* Gasket Kit P/N 889000 42030

STARTER ASSEMBLY — PAWL CATCHER ASSEMBLY — CLUTCH ASSEMBLY



KEY NO.	PART NUMBER	QTY.	DESCRIPTION
3	5	900 242-0401 6	4 SCREW 4x15
7	177 200-1152 0	1	STARTER ASSY
8	-101 511-1152 0	1	COVER, FAN
9	-177 220-4203 0	1	SPRING, REWIND
10	-177 215-4203 0	1	DRUM, STARTER
11	-177 214-4203 0	1	WASHER
12	-177 236-1141 0	1	SCREW
13	-177 226-0553 0	1	ROPE, STARTER
14	-177 227-4203 0	1	GUIDE, ROPE
15	-177 229-1152 0	1	GRIP, STARTER
16	900 500-0000 8	1	NUT 8
17	900 500-0000 8	1	WASHER 8
18	177 202-4203 0	1	CATCHER ASSY, PAWL
19	-177 218-4203 0	1	PAWL, STARTER
20	-177 234-4203 0	1	SPRING, RETURN
21	-177 210-4203 0	1	CATCHER, PAWL
22	-900 700-0000 6	1	E-RING 6
23	150 801-4433 0	1	FLYWHEEL
24	900 238-0402 2	2	SCREW SMB-4x22
25	150 625-1152 0	1	COIL, IGNITION
26	150 117-0913 0	2	SPACER
27	152 112-0733 1	1	BUSHING
28	159 010-1233 0	1	PLUG, SPARK (CJ-8Y)
29	159 011-0343 2	1	COIL, SPARK PLUG CAP
30	159 012-0162 0	1	CAP, SPARK PLUG
31	175 016-0502 0	1	HUB, CLUTCH
32	175 018-0513 0	2	SPRING, CLUTCH
33	175 009-0513 0	2	SHOE, CLUTCH
34	175 019-0463 0	1	PLATE, CLUTCH
35	900 802-0600 0	1	BEARING, BALL 6000
36	175 044-0463 0	1	WASHER, CLUTCH
37	175 014-0463 0	1	WASHER, CLUTCH
38	900 238-0601 2	1	SCREW 6x12
39	175 010-0463 2	1	DRUM, CLUTCH
40	900 505-0000 5	1	SPRING WASHER 5
41	900 500-0000 5	1	WASHER 5
42	610 223-1152 0	1	CASE, CLUTCH (AR)
43	900 238-0401 4	2	SCREW SMB-4x14
44	900 100-0502 5	1	SCREW 5x30
45	156 114-0492 0	1	GROMMET
46	163 400 0216 0	1	SWITCH, IGNITION
47	163 810 1152 1	1	BRACKET, SWITCH (HEDGE CLIPPER ONLY)

CARBURETOR ASSEMBLY

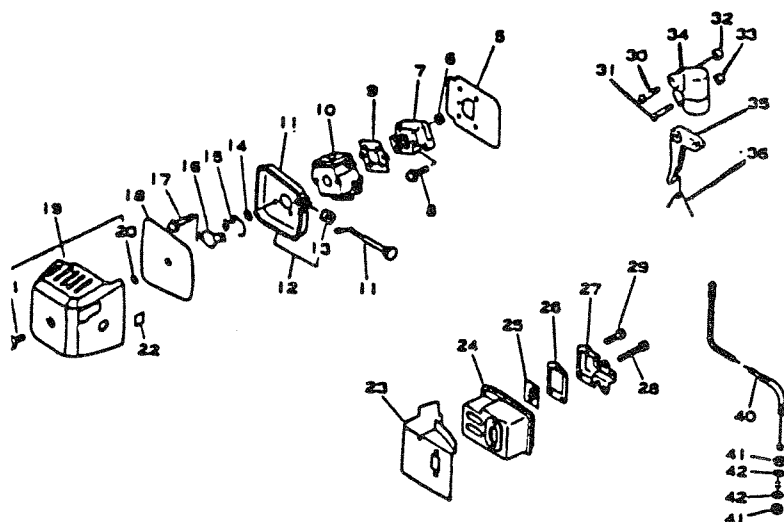


KEY NO.	PART NUMBER	QTY.	DESCRIPTION
5	125 200-1152 0	1	CARBURETOR
1	-125 344-1393 1	2	SCREW, METERING COVER
2	-125 342-1152 0	1	COVER, DIAPHRAGM
3	A.B.	0	DIAPHRAGM ASSY
4	A.B.	1	GASKET, METERING
5	-125 339-4203 0	1	SCREW
6	B	1	PIN, ARM
7	B	1	LEVER, METERING CHAM
8	B	1	SPRING, COIL
9	B	1	VALVE, NEEDLE
10	-125 327-1513 0	1	CLIP
11	B	1	PLUG, WELCH
12	-125 316-4203 0	1	WAVE, THROTTLE
13	B	1	SCREW
14	-125 319-4203 0	2	SPRING, COIL
15	-125 320-4203 0	1	NEEDLE, HIGH SPEED
17	-125 318-4203 0	1	NEEDLE, IDLE
18	-125 313-4203 0	1	SPRING, THRT, RETURN
19	-125 317-4203 0	1	SHAFT, THROTTLE
20	-125 327-1393 0	1	CLIP
21	-125 372-4203 0	1	SWIVEL
24	B	1	STRAINER
25	A.B.	1	DIAPHRAGM, FUEL PUMP
26	A.B.	1	GASKET, FUEL PUMP
27	-125 324-4203 0	1	COVER, PUMP
28	-125 310-4203 0	2	SCREW
29	-125 334-1393 0	1	SCREW, IDLE ADJUST
30	-125 378-1393 0	1	PIECE, FRICTION

A: Use 125303-42030 CARBURETOR DIAPHRAGM/GASKET KIT.

B: Use 125302-42030 CARBURETOR REPAIR KIT

AIR CLEANER ASSEMBLY — MUFFLER ASSEMBLY — THROTTLE ASSEMBLY



KEY NO.	PART NUMBER	QTY.	DESCRIPTION
2 5	130 010-4203 0	1	GASKET, INSULATOR
6	900 500-0000 5	2	NUT 5
7	130 017-4203 0	1	INSULATOR
8	900 238-0502 0	2	SCREW SMB-5x20
9	130 016-4203 0	1	GASKET, CARBURETOR
10	125 200-1152 0	1	CARBURETOR
11	178 510-0456 0	1	RCO, CHOKE
12	130 301-0456 0	1	CASE, AIR CLEANER
13	-178 310-0523 0	1	BUSHING
14	178 516-0083 0	2	SPACER
15	178 515-0456 0	1	SHUTTER, CHOKE
16	130 410-4473 0	1	BRACKET, AIR CLEANER
17	900 242-3505 7	2	SCREW 5x57
18	130 310-0456 0	1	FILTER, AIR
19	130 302-1152 0	1	COVER ASSY, AIR CL
20	-900 720-0000 4	1	O-RING (P-4)
21	-130 415-4063 0	1	SCREW
22	890 121 1233 1	1	LABEL, CHOKE
23	145 871-1152 0	1	COVER, MUFFLER
24	145 810-1152 0	1	MUFFLER
25	145 862-4063 0	1	SCREEN, MUFFLER
26	145 866-4203 0	1	GASKET, MUFFLER LTD
27	145 815-1152 0	1	HOLDER, SCREEN (A)
28	900 105-0505 5	2	BOLT, H.S. 5x55
29	900 242-0401 0	3	SCREW 4x10
30	900 220-0502 8	1	SCREW 5x28
31	900 220-0502 5	1	SCREW 5x25
32	433 020-0083 0	1	LOCKNUT 5
33	900 500-0000 5	1	NUT 5
34	178 024-0613 0	1	BRACKET, THROTTLE
35	178 010 0533 0	1	CONTROL, THROTTLE
36	178 043 0523 0	1	THROTTLE, RET. SPRING
40	178 001-1152 0	1	CULTIVATOR, THROTTLE CABLE
40	178 002 1152 0	1	HEDGE CLIPPER, THROTTLE CABLE
41	900 502-0000 5	2	NUT 6 (3N)
42	900 602-0000 6	2	WASHER 6

KEY NO.	PART NUMBER	QTY.	DESCRIPTION
	889 000-4203 0	1	GASKET KIT
1-18	N/A Use Kit	1	GASKET, CYL. BASE
1-11	N/A Use Kit	1	GASKET, CRANKCASE
* 2-5	-130 010-4203 0	1	GASKET, INSULATOR
* 2-9	-130 016-4203 0	1	GASKET, CARBURETOR
* 2-26	-145 866-4203 0	1	GASKET, MUFFLER LTD.

* Available separately or in kit.