

Installation Manual

Gru-Bee Whopper Stopper II Bike Motor Kit



Congratulations on your purchase of the best bike motor kit available

www.bicycle-engines.com

Tools and Materials needed:

Crescent wrenches, open end wrench set, and/or socket wrench set

Needle-nose pliers

Vise-Grip pliers

Allen wrenches

Screwdriver

Ruler

12" piece of piano wire or coathanger.

6" piece of 20 gauge insulated wire

Permanent marker ("Sharpie" or equivalent)

Cable Ties ("Zip" ties)

Drill with 3/32" and 15/64" (or 1/4") bits

Thread locking compound "blue Loctite" or equivalent (medium strength)

Note: thread locking compound can melt certain types of plastic, use on metal only.

Anti-sieze compound (from auto parts store) or grease



Optional:

Strap wrench

Bubble level

Grinding stone and small reinforced cut-off wheel for Drill or Dremel tool.

(See "Sprocket Installation: Coaster Brake Wheel")

Pieces of bike inner tube or thin rubber sheet

Welder *(See "Extra Wide Crank Installation")*

3/32" Wheel collar *(available at hobby shops that sell radio control planes - Great Planes part number GPMQ 4302 or equivalent)*

Note: This manual will refer to the "left" and "right" sides of the bike. This reference is made from the point of view of a rider sitting on the bike.

How to choose a bike:

The most important aspect of the "donor bike" is the frame geometry. The motor with mounting plate is about 11" tall. The mounting plate sits about 3" above the bottom bracket. Therefore, you will need at least 14" of clearance between the bottom bracket and bottom of the top tube to mount the engine inside the frame. You may have to remove the chain guard to get clearance. The motor will mount on almost any bicycle using the rear engine mount kit available from www.bicycle-engines.com. This manual will cover the standard (inside the frame) mounting only. Mounting the engine inside the frame will give the bicycle superior handling and balance characteristics over the rear mount option. This feature is what makes the Whopper Stopper much better than other types of kits. The bike chosen for this installation is the Schwinn "Jaguar" available for about \$100-\$120 from your local Target store or Target.com



This kit is set up to work with bicycles that have caliper and coaster brakes. Bicycles with a disc brake on the left side of the rear wheel will not be compatible with the chain drive system of the Whopper Stopper.

It is very important that the bike have a one-piece crank. Bicycles with cartridge type bottom brackets or three-piece cranks will be very difficult to use with the extra-wide one-piece crank included with the Whopper Stopper kit.

The rear hub must be less than 2" in diameter in order to install the sprocket mounting assembly. You can measure the hub with a dial caliper, if you are not sure. If you have an oversize hub, you may consider replacing the rear wheel with a pre-built wheel that

has a smaller hub. A new wheel will likely cost about the same as paying a bike shop to rebuild your existing wheel around a smaller hub.



The rear tire must have a width of 2.5" or less to allow for chain clearance.

Once you have the proper bike, the first step is to check the kit and ensure that you have all of the parts.



(1) Throttle Grip (2) Gas Tank (3) Bottom Bracket Parts: (Bearings, Bearing Cups, Bearing Cones, Washer, Lockwasher) (4) Extra Wide Crank (5) Chaining Sprocket (6) Small Parts Bag (7) Clutch Lever (8) Strap (9) Chain Tensioner (10) Replacement Clutch Retainer Bolt (11) Motor (12) Engine Mounting Plate (13) Sprocket Mounting Assembly (14) Size #410 Motor Drive Chain (15) Chain Guard (16) Motor Drive Sprocket (17) Muffler.

Motor Drive Sprocket: The sprocket that comes standard kit has 56 teeth. This is an excellent sprocket for use in hilly areas. Other sprockets are available from www.bicycle-engines.com, including a 44 tooth and a 48 tooth model. These will increase your top speed, but are recommended for flat terrain only.

It is possible to install the motor drive sprocket with the sprocket teeth closer to or farther away from the center of the wheel. The sprocket has two sides. One side is shaped like

the *inside* of a bowl (convex). The other side is shaped like the *outside* of a bowl (concave). It is sometimes difficult at this point in the installation to determine whether to install the sprocket with the concave side facing in or out. This is a judgment call based on how close you want the chain to the tire when the motor is installed. In the case of the Schwinn Jaguar, the sprocket was installed concave-in (facing the bike).

If your bike has caliper brakes, please skip to "Sprocket Installation: Caliper Brake Wheel"

Sprocket Installation: Coaster Brake Wheel

If you have a coaster brake wheel, you will need to check to make sure that the coaster brake arm will not scrape against the hole on the inside of the motor drive sprocket. Remove the coaster brake arm. Center the motor drive sprocket on the axle and re-install the coaster brake arm. Rotate the coaster brake arm. If the arm does not rub on the inside of the sprocket, you are ready to install the motor drive sprocket as described in "Sprocket Installation: Caliper Brake Wheel".

If the coaster brake arm rubs on the center hole of the sprocket, you will need to enlarge the hole and/or file away a portion of the coaster brake arm. To enlarge the hole: Get a 1.25" (nominal size) PVC union fitting that is approximately 2" outside diameter. Center the PVC fitting on the sprocket hole and trace around it with a Sharpie marker. You can check for center by looking inside the PVC fitting. Clamp the sprocket in a vise. Use a Dremel tool with a reinforced cut-off wheel to carefully cut to the line. Be sure to wear eye protection, as the cut-off wheels tend to fly apart quite readily. Earplugs are a good idea, too.



You can dress the edge of the hole with a grinding stone to smooth out the burrs. If the coaster brake arm still rubs on the inner hole, you can use the grinding stone to remove some material from the coaster brake arm. Don't remove too much material, as it may weaken the arm. You may have to bend the coaster brake arm slightly to make it align with the bike frame. This can be done by holding the coaster brake arm in a vice and bending it with light taps from a hammer. You can also bend the coaster brake arm with vice grips. Gentle heat from a propane torch will make the coaster brake arm easier to bend. Install the motor drive sprocket as described below in "Sprocket Installation:

Caliper Brake Wheel". Don't forget to re-attach the coaster brake arm to the bike frame after re-installing the wheel.

Sprocket Installation: Caliper Brake Wheel

If your bike has caliper brakes, the first step will be to disassemble the sprocket mounting assembly included with the kit. It would be a good idea to cover the bolts with a light coat of grease or anti-sieze. This will keep water and salt out of the threads and allow for easier removal of the sprocket mounting assembly in the future, if desired. Hold the motor drive sprocket with the concave side facing you and push the bolts through the holes. On the convex side, fit the set of three mounting plates on the bolts. Then, fit a rubber gasket on the bolts. Place the sprocket assembly on the wheel. Cut between the holes on the remaining rubber gasket. Reach inside the spokes and fit the gasket on the bolts. Add the set of two mounting plates and finally, the lockwashers and nuts.



Use a piece of piano wire or coathanger to make sure the sprocket is centered. Rotate the wire around the axle and make sure that it lines up with the bolt heads. Once the sprocket is centered, tighten the bolts in a "star" pattern. You should tighten the bolts until the gap between the rubber gaskets closes completely. Spin the wheel while looking at the edge of the sprocket. If there is little or no wobble, the sprocket is aligned with the wheel. It is important that the sprocket be installed correctly, or the chain will fall off when you try to ride the bike.

Install the rear wheel on the bike. Prop up the bike so the rear wheel is free to spin. Place a ruler on the chainstay and push it towards the sprocket until it almost touches the sprocket.



Rotate the wheel. If the sprocket is straight enough, the distance between the sprocket and end of the ruler will not vary by more than 4 mm (0.16 inches) when the wheel is rotated. If the sprocket has more wobble than this, it should be corrected. Spin the wheel slowly and stop it when the largest gap between the sprocket and end of the ruler appears. Mark an "X" on the sprocket close to the ruler. Loosen the four bolts that are closest to the "X". Slightly tighten the five bolts that are on the opposite side of the sprocket from the "X". Spin the wheel again and check to see if the problem is fixed. If not, repeat the process until you have less than 1 mm of wobble. Make a final check to see that all bolts are tight before moving on to the next step.

Extra Wide Crank Installation

The extra-wide cranks are necessary to prevent the pedals from hitting the motor when it is installed. Remove the crankset, bearings, and pedals from the bike. The left side pedal, bearing cone, and locknut are left-hand threaded. To remove the left side pedal, use a crescent wrench to turn it *clockwise*. Pedal removal can be difficult, especially on an older bike. Spray some lubricant such as WD-40 on the threads. You can tap the crescent wrench gently with a hammer to try to free the pedal. If this does not work, you may want to bring it to a bike shop. The right side pedal and bearing cone are right-hand threaded. The right-side pedal needs to be removed from the crank by turning it *counter-clockwise*.

Check the bearing cups in the lower bracket. If they are worn, you can replace them with the new bearing cups included with this kit. Bearing cup removal can be difficult without the proper tool. Check with a bike shop before attempting to remove the old bearing cups.

Slide the chainring sprocket (the one with the hex cutout center) over the extra wide crank. Apply loctite to the crank threads directly above the chainring sprocket. Screw the right side cone (the one with the three notches onto the threads and tighten. Install the right-side pedal onto the crank closest to the sprocket. Do not install the left-side pedal

yet. Check to make sure the crank bearings are clean and well greased. Place one set of bearings with the flat side facing the sprocket and slide the crankset into the bottom bracket of your bike. Spread some anti-sieze on the left side crank threads and screw the left-side cone on. Screw the locknut on finger-tight. Then, screw the washer and nut on.



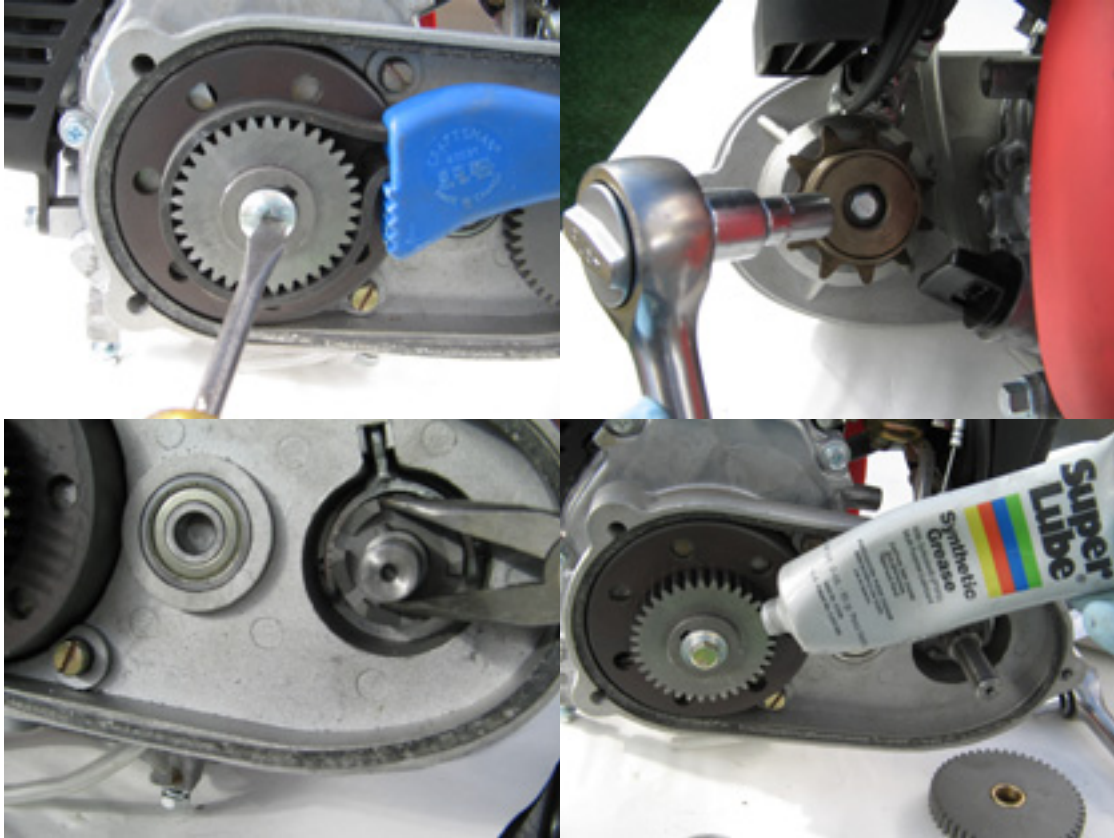
Optional Step: To guarantee that the hex hole in the sprocket will never "strip out" on the crank, you may want to tack weld the sprocket to the crank. If you don't have access to a welder, you should be able to get it welded at a muffler shop or equipment rental place. This shouldn't cost more than \$10.

Motor Preparation

Locate the bag with the replacement clutch retainer bolt. Open the gearbox cover and replace the pan head clutch bolt with the M6 - 1.00 X 20 clutch retainer bolt, washer, and lockwasher. A small amount of loctite on the bolt would be good. A strap wrench works for holding the clutch bell during bolt *removal*. Hold the pull start rope as you tighten the clutch retainer bolt for bolt *replacement*.

Optional Step: The bolt that holds the gearbox output drive sprocket has been known to come loose. This could result in damage to the sprocket or shaft. It is recommended that loctite be applied to the bolt. Remove the rear and center large spur gears. Do not lose the spacer that sits adjacent to the rear spur gear. Brace the engager gear with needle-nose pliers. Be careful not to slip and damage the driveshaft. Remove the bolt with a socket wrench. Apply a small amount of loctite to the bolt and reinstall the bolt. When reinstalling the bolt, do **not** use the needle-nose pliers as before. You can immobilize the output drive sprocket with a strap wrench while you tighten the bolt. Grip the sprocket *teeth* with the strap wrench for extra leverage.

Although this gearbox can be run without lubricants, some grease will help to prolong gear life. Apply a small amount of grease to the spur gears. Do not get grease inside the clutch, or it will slip during operation.



Remove the plastic muffler guard, muffler, and heat shield. Save the muffler guard bolts. Remove the muffler mounting studs with vise-grips. Locate the muffler bolts, washers, lockwashers, and gasket in the small parts bag. Install the exhaust pipe on the motor using the washers, lockwashers and muffler bolts,. Finger tighten the muffler bolts.

Engine Mounting

Locate the engine mounting plate. Remove the side bolts and separate the plate from the castings. Attach the engine mount castings to the bike frame using the included brackets. You can use strips of old inner tube to protect the frame from damage. If the tube size is too big for the studs, you will need to remove the studs from the castings with vise-grips and replace the studs with M6 (6 mm) bolts. You may have to cut the bolts to the right length to get them to work. A Dremel with cut-off wheel works well for this.

Make sure that the plate sits level on the castings and lines up with the side holes. Lift the plate off the castings.



Attach the motor to the plate using the included bolts. Tighten the bolts finger-tight only, for now. Place the motor and plate on the castings. Remove the master link from the motor drive chain with the needle-nose pliers. Put the master link in a bag or other container immediately, before it gets lost! Drape the chain over the rear sprocket and gearbox output sprocket. Pull the chain taut. Check the alignment of the chain from the rear of the bike. The chain should be reasonably straight. You can adjust the alignment by sliding the motor side-to-side on the motor plate. If you cannot get the chain aligned properly, you may have to remove the motor drive sprocket and change its orientation (from concave-in to concave-out, for example). Once you are satisfied with the motor alignment, tighten the motor mounting bolts. You may be able to tighten these bolts without removing the engine. Apply loctite to the side bolts and tighten. If the holes don't line up, you can clamp the motor plate to the castings with vise-grips while you install the side bolts. Be very cautious when tightening the side bolts. They will strip the threads in the castings if you overtighten them. At this time, tighten the muffler bolts.

Motor Chain Cutting

Grip both ends of the chain in one hand and hold the chain taut over both the gearbox output sprocket and rear sprocket.



You will need to estimate the proper length for the chain. The chain will need to be just loose enough to slip off the rear sprocket. You will want to be able to remove the chain

later without having to remove the rear wheel. When the chain tensioner is installed, the chain will not slip off on its own, assuming everything is aligned properly. Keep in mind that the chain will be one link longer when the master link is re-installed. Once you have decided on a chain length, mark the link to be removed. For the Schwinn Jaguar, 18.5 cm (7.3") of chain was removed. You can use a "chain breaker" tool (suitable for #41 chain) to remove the link.

If you don't have a chain breaker, you can use a blunt nail and hammer (carefully) to punch out the link pins. Do this operation on a block of wood. Drill a hole in a block of wood and place the link on the wood with the link pin over the hole. Tap one link pin until it is halfway out. Then work out the other pin from the same link. Install the master link on the chain and check to see if the tension is correct. If it is too tight, you will have to install a link using the hammer and block of wood.

Install the master link on the chain. Push the master link (with pins) into the chain from the left side of the bike. You should install it so the "C" shaped retainer clip is facing the right side of the bike. If this clip were to scrape the gearbox close to the output sprocket, it might destroy the engine.

Install the chain tensioner. On this Schwinn, the best spot was on the chainstay. Make sure that the chain tensioner wheel rides on the outside of the chain as shown in the photo. If you install the chain tensioner wheel on the inside of the chain loop, the chain will pull away from the sprocket, and slip off. The chain should move about an inch (2.5 cm) when you push it up or down from a point between the seat tube and rear wheel. It should not bind excessively when the rear wheel is turned. If it binds, check the chain tension and sprocket alignment. *Do not start the motor until you can rotate the wheel without the chain binding or slipping off. A binding chain under full load can break sprocket teeth or cause other damage!*



Gas Tank Installation

Turn the fuel tank over and dump out any debris that may be inside. Compressed air helps to remove any debris. Remove the nuts, lockwashers, washers, and brackets from the bottom of the fuel tank. Screw the fuel shut-off valve into the small threaded hole on the tank. Match the tank up to the top tube of the bike. It should be just far back enough from the headset so that the handlebars don't touch the tank when they are turned side-to-side. You can use two strips of inner tube to protect the top tube from the tank clamps. Install the tank brackets, washers, lockwashers, and nuts. Hook up the fuel tube to the tank shut-off valve. There is a brass tube on the left side of the engine, just above the carburetor. Hook the free end of the fuel tube to this fitting. Even though the fuel shut-off valve has a screen built into it, you may want to add a small inline fuel filter (available from dealers that sell lawnmower parts) to this fuel line.

If any debris gets into the carburetor, it may cause the float valve to stick open. If this happens, the fuel will run out through the overflow tube until the fuel tank is empty. To remove the debris, you will need to remove the float bowl and blow compressed air into the brass tube on the left side of the engine, just above the carburetor.

Throttle Grip and Clutch Lever Installation

Remove the right grip on the handlebars. You can do this easily by forcing compressed air under the grip and twisting the grip.



If you have a grip shifter, you may have to use an allen wrench to loosen it up. Remove the right brake lever, if you have one. Pull the right brake cable out of the housing. Remove the left grip from the handlebars. Install the clutch lever on the left handlebar. Re-install the left grip. You can also use the plain rubber grip included with this kit, if you wish.

Secure the handlebars to something with tape or a bungee cord. Slide the throttle onto the right side of the handlebars until it stops. Slide the grip out a few millimeters until it no longer scrapes the end of the handlebar when the grip is rotated. Mark the position of the throttle grip with the sharpie. Remove the screw and top plate from the throttle. Hold the throttle grip and lever as shown and mark the point where the peg touches the handlebar. You will want to extend the mark until you reach the underside of the handlebar. Pick a point on this line that is on the very bottom of the handlebar and make a small dent in the handlebar with a center punch or nail. Put on your safety glasses and drill upwards into the handlebar with a small bit (approximately 3/32"). Use a 15/64" bit to enlarge the hole. A 1/4" bit will work, too. Keep in mind that the drill bit will probably slip a few times during this process. Keep your face, hands, and other body parts away from the bit. A little grease on the bit will make drilling easier.



Screw the throttle cable on the throttle grip assembly. Pull out the throttle cable and install it in the throttle grip as shown. Install the throttle grip in the groove on the throttle grip assembly. Slide the throttle grip assembly on the right handlebar and match up the peg with the hole that you just drilled. Install the top plate on the throttle grip assembly. Put a small amount of loctite on the bolt and tighten the top plate.



Loosen the clutch cable by first loosening the nut and screw on the shift lever. The shift lever is found on the left side of the gearbox. Note the position of the spring that forces the shift lever towards the left side of the bike. Hold this spring as you remove the cable.

Put the spring in a bag or other container. Pull the clutch cable out of the cable housing and remove the metal ferrule. You will not need the ferrule.



Feed the clutch cable back into the cable housing. Back the bolt on the shift lever out halfway and apply a drop of loctite to the bolt. Feed the cable through the hole in the shift lever. Hook up the clutch cable to the clutch lever. Push the shift lever slightly towards the right side of the bike and pull the cable until it is taut. Tighten the screw on the shift lever until it is tight.



Optional Step: To ensure that the throttle cable does not slip, you can use a 3/32" Wheel collar (available at hobby shops that sell radio control planes - Great Planes part number GPMQ 4302 or equivalent). Slide the wheel collar on the clutch cable until it is right up against the shift lever.

Brake Cable Installation

If your bike has a rear coaster brake only, you may consider having a bike shop install a front drum brake for extra stopping power and back-up in case the bike chain breaks or chainring sprocket strips out.

If your bike has caliper brakes or a front drum brake, loosen the cable clamp bolts on the brake calipers or drum. Pull the brake cables out of the housing. Feed the brake cables through the holes in the throttle grip mounting assembly. The holes are drilled for standard diameter brake cable. If you have oversize brake cable, you will have to enlarge the holes slightly with a drill.



Feed the brake cables into the cable clamp bolts on the caliper brakes or front drum brake. Pull the cables taut and adjust the brakes properly. You will require more stopping distance now that the bike has an engine and is heavier. If you cannot get the brakes to work properly, take the bike to a bike shop and have them adjust the brakes. *Do not ride with weak brakes!*

Kill Switch Hook-Up

Hook up the wire from the throttle assembly to the engine as shown, using the piece of 20 gauge wire that you sourced separately from this kit. Insert your 20 gauge wire piece into the metal connector from the throttle assembly wire and crimp with pliers. Use the bolt that you removed from the muffler guard to ground the 20 gauge wire to the engine. A

ring terminal (sourced separately) makes for a more professional installation, although you can just strip the wire and wrap it around the bolt.



Throttle hook-up

Hook up the throttle cable to the throttle arm on the carburetor as shown. Ensure that the throttle arm returns to the idle position after you let go of the throttle grip. The idle position is when the throttle arm touches the black plastic idle screw.



Chain Guard

Install the chain guard as shown. The chain guard has a front strap built into it. For the rear strap, use the strap that comes with this kit. Make sure that when you are riding, you don't have any long clothing or other belongings/body parts that could get caught in the chain.



**The engine is shipped without oil.
Never run the engine without oil in the crankcase!**

Fill the gearbox with 250 milliliters of SAE 30 weight oil or equivalent. A funnel with tube attached makes filling the crankcase much easier



Fill the fuel tank with fresh premium gasoline. Old gas may cause starting problems. **Do not use gas that is mixed with 2 stroke oil!**

Rest the bottom of the bike on a stable object so that the rear wheel is not touching the ground or the object. If you accidentally start the engine with the clutch lever engaged, the bike will "take off" and possibly be damaged or cause injury. Attach the handlebars to a solid object, or have a friend hold the bike steady before trying to start the engine for the first time

You are ready to start the engine!

Check the fuel tube to make sure gas is getting to the carburetor. Looking from the rear of the engine, push the white plastic choke lever to the right. This is the "choke on" position. Pull the starter cord. You don't need to pull it out all of the way to get it to start. It should start after a few pulls.

Troubleshooting:

If the engine doesn't start after few tries, twist the throttle slightly to give it more gas, as you are pulling the starter cord. You can try starting it at half choke, or no choke if you are still having trouble. If it still won't start, you need to make sure that the kill switch wires are not short-circuiting. Unhook the 20 gauge wire from the motor and try to start

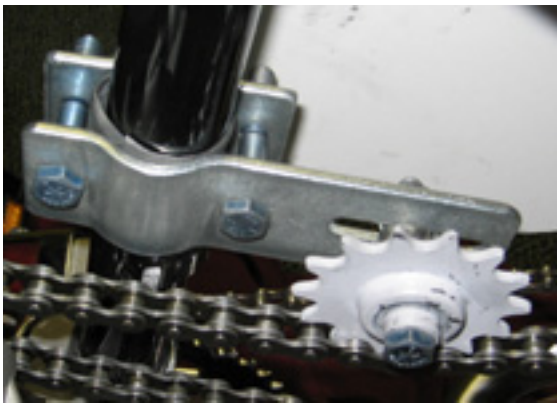
again. If it starts, the problem is in the kill switch wire. Look for damaged insulation, etc. Repair any wire damage and hook the wire back up. If the engine still doesn't work, you can get an "ignition spark tester" (about \$5) at an auto parts store to check for spark. If you don't have a spark when you pull the cord, contact www.bicycle-engines.com

Once you have the engine running, set the idle speed using the screw on the left side of the carburetor. Let the engine warm up for about two minutes and turn the choke off (choke lever to the left) The engine should run just fast enough to avoid stalling when you let go of the throttle. Don't set the idle too high, or you will stress the gearbox components when you engage the clutch lever.

Now you are ready to ride!

Always wear a helmet when riding! Select an area with flat pavement and no traffic or other hazards for your first ride. Before you start the engine, test the brakes. Start the engine and pedal the bike until you are going at least two miles an hour and engage the clutch lever. Engaging the clutch from a dead stop may stress the drive components and cause premature failure. Give it a little gas and you are good to go! Remember to let go of the clutch lever when you want to slow down or stop. If you are going down a hill, it is a good idea to "coast" by letting go of the clutch lever and allowing the engine to idle. If it feels like the engine is "over revving", you have reached the maximum speed allowed by the gearing. Coasting will allow you to travel smoothly down the hill and save wear to the engine.

Optional Modifications/Additions:



For a more durable chain tensioner, you may want to replace the plastic wheel with an "idler sprocket" (for #41 chain) from a go-kart/mini-bike supplier such as <http://neeselawnandgarden.com>. Remove the plastic wheel and install the idler sprocket using a 5/16" X 2" bolt, washers, lockwashers, and nut. You can vary the number of washers to get the side-to-side adjustment correct.

Most kickstands will eventually fail under the additional weight of the motor kit. If your bike has a hole that the kickstand mounts into, you can replace it with a center stand (Pyramid Part # 94756 - "Forged Alloy Double Kickstand"). This stand is available from www.bicycle-engines.com or any bike shop that sells Pyramid brand parts

