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2-Stroke Bicycle Engine Kit User Manual For ZTMoto Phantom 85 Bicycle Engines



Quick Installation Videos



Complete Bicycle Engine Kit Installation Instructions



SCAN ME



Top End - Cylinder & Head - Assembly Instructions



For additional support, discussion or to share pictures, stories and ideas please visit the Motorized Bicycle Photo Gallery page on Facebook: <https://www.facebook.com/groups/motorizedbicycle>

Assembly & Operating Instructions

Please take the time to read these instructions.

Doing this may save you time, money and a heap of frustration.

Take note of **CAUTION, NOTE & WARNING** labels. These labels refer to important information. Most problems and warranty claims are a direct result of either not reading these notes or, not understanding them, so it is a good idea to read them more than once. Refer to them often as you work through your project.

Congratulations! On your choice of a **ZTMOTO** motor. When installed correctly, you will enjoy many hours of fun.

Most of the questions we receive are related to information supplied in these notes. Save yourself time and money (not to mention frustration!) by reading these instructions thoroughly. Many hours have been spent in preparing this information and it has recently been revised to cover the latest changes in both motor and bike design. Yes, this message is almost the same as the sub-heading above. This is because it is **IMPORTANT!** Thank you for taking the time to read this far, it gets better as you go along.

Skills: Some mechanical ability is required to properly install your motor. The job may take a few hours, a few days or even weeks. Skill levels, the tools available, the type of bike, and the time available dictate how long the job will take. Do the job right, and the motor will give you hours of reliable service. Enjoy!

WARNING! Do not carry out any modifications of this motor for the purpose of increasing power, before installing and running/breaking it in first. Make sure the motor works correctly, then think about any changes you may want to make. Doing this will also give you an idea of just what sort of improvement you may want to make (i.e. more RPMs, more acceleration, easier starting etc.), also it will indicate if the gearing needs changing. This is what professional engine builders do, it is called "seasoning" the motor. **NOTE:** Any unauthorized modification of the motor voids the Warranty.

The Motorized Bicycle Photo Gallery page on Facebook: <https://www.facebook.com/groups/motorizedbicycle> is an excellent resource where you can tap into the vast knowledge of the motorized bike community. Get quick feedback and learn from the experience of fellow riders.

GUARANTEE: ZTMOTO guarantees this product against defects of materials and workmanship for a period of 6 months from the date of purchase provided that the product is used in accordance with ZTMOTO's instructions, including the use of the correct fuels and oils. ZTMOTO will, by its own option, make good, by replacement with the same or similar product, or provide credit for any product manufactured or supplied by it, which proves to be defective, within the limits set out above, provided always that no repairs, alterations, or modifications to the product have been undertaken or attempted, other than by the company or its authorized agents.

Should the purchaser wish to make a claim under this guarantee, the product should be returned in accordance with the return policy found here: <https://www.bicycle-engines.com/returns/>

Installation Instructions



Features

- Pearl coating exterior finish helps protect against corrosion
- Angled LD Z8C spark plug
- Stainless steel allen head bolts
- Better balanced crank
- Upgraded bearings / 60% thicker crank case around bearings
- Stuffed crank case
- Large intake port (40mm bolt hold width)
- Oversized round exhaust port - 29mm diameter, 60mm stud spacing
- 40mm crank stroke (more powerful, efficient, and reliable)
- Double window piston
- Long rod (89mm)
- Larger 8mm x 1.25 engine mount studs
- Approximate engine dimensions: 9" x 9" x 5"

What's in the box?



Items in the Kit

- 85cc 2-stroke engine (1 pc cylinder & head)
- Performance CDI
- Reed valve air intake
- High performance Speed carb
- Black tear drop gas tank (2L) w/ new fuel cap, fuel valve, fuel filter, and fuel line
- 415 Heavy Duty chain with chain guard
- Ball bearing chain tensioner
- Ultra-quiet muffler (Stainless steel with sound insulation cotton inside)
- Throttle assembly w/ gooseneck style throttle cable
- Twist throttle & cable w/ grip & kill switch
- New quick release clutch handle
- Large front mount for bikes with large down tubes
- Available with 36, 44, 48 tooth rear sprocket
- Spark plug socket & gear removal tool

To supply a kit of components and detailed instructions for every installation of a **ZTMOTO** motor is virtually impossible due to the wide variety and types of bikes available. However, **ZTMOTO** is committed to helping you maximize the reliability, safety, and performance of your motorized bicycle and these notes are supplied as a set of guidelines to help you through the installation process. For specific information on a particular aspect of your installation, or if you need a special part to get the job done, contact us and we will do our best to assist.

Installation Instructions

Choosing Your Bike

The easiest installation is performed on a men's bike with a "V" frame and 26 inch or 700C wheels, and round frame tube diameter from 1-1.25 inches, but other sizes will work with some additional effort. Cruisers are also popular with most models being suitable. However, spacers are usually necessary to support the rear engine mount assembly and some machining of the front mount and the rear drive sprocket may be required. Bikes like the "Everest" shown below require extensive modifying of the motor to achieve a sound, safe and reliable installation. A large diameter front 'Down Tube', 28" wheels with 38 or more spokes and a small or odd shaped "V" section of the frame can make installation of the motor a real challenge.

The motor can be mounted to other bikes, but it is best to stick with these types. A front mount adapter is available from **ZTMOTO** to assist in fitting the motor to an oval or larger diameter tube, while various other fittings and processes are available to help you get the motor correctly installed. If time and care is taken with the initial installation and regular maintenance is carried out, you should have many hours of fun and thousands of miles of trouble free operation.



An ideal bike for conversion



A Cruiser with ZTMOTO motor installed



The over-sized "Down Tube" & large number of Spokes makes this "Everest" install a challenge



The installation is a bit of a squeeze but doable with a few extra fittings

Will the Motor fit? The only way to really know this is to sit the motor in position in the frame (place rubber or cloth on the frame to prevent marking it) and check the following. The Carburetor must clear the frame and have an angle of no greater than 10 to the horizontal. The rear mount must fit the Seat Stay and be at right angles to it. The front mount may need to be modified to match up with the front Down Tube. When the Exhaust is fitted, it must clear the front Down Tube and the LH pedal. The Chain must have clearance between the Rear Sprocket and the motor.

Installation Instructions

Getting Started

Since you are reading this section you have obviously opened the box! Did the box arrive in reasonable condition? If not, see if any of the contents are damaged or broken, and if so, contact **ZTMOTO** immediately. Fortunately, this is very rare. Is everything OK? Good, check the contents using the images on page 3 as a guide. If you ordered any extra items, make sure they are there and motor is the model you ordered.

NOTE: Before doing anything else, read these notes thoroughly and get yourself familiar with the various items in the kit and what they are for. Also look at how the components interact with each other and where they could fit on the bike. Thinking things through and planning how things may fit will make the job much easier down the track.

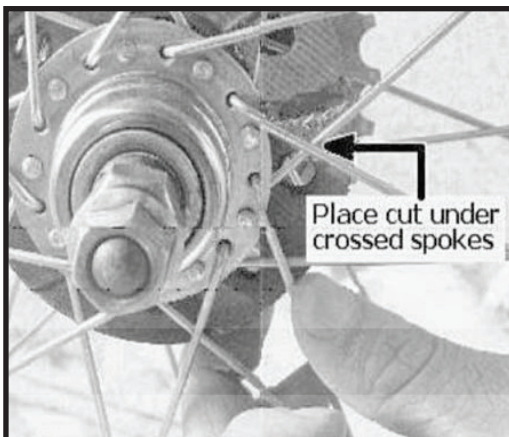
Installing the Rear Sprocket

Installing the Rear Sprocket is the first task required because the alignment between the Rear Sprocket and the Motor is key to where the motor needs to sit in the frame and whether or not the Rear Wheel needs to be offset. Before fitting the Rear Sprocket, make sure the Spokes are in good condition and are tight, and that the Wheel runs true. The extra weight of the motor on the bike and the power produced, puts extra stress on the wheel so it needs to be in top condition. The motor weighs roughly the same as the bike, so you are effectively doubling the total mass! Your local Bike Shop can true the Wheel for you or there are some good 'HowTo' articles available on the Web. Also, is the rear tire up to the task?

1. Find the two Rear Sprocket rubber mounting pieces. Cut one of them between the drilled holes, as shown in the image to the right.
2. Place the cut mouting piece inside the spokes.
3. Place the other mounting piece on the outside of the spokes.
4. Place the metal support segments against the rubber mounting piece inside the wheel and the sprocket on the outside, with the teeth offset inwards. That is, the step on the teeth is towards the wheel spokes. Overlap the split of the inner mounting piece with one of the plates (see images below).

NOTE: Some bikes with large tyres may need to be Sprocket reversed.

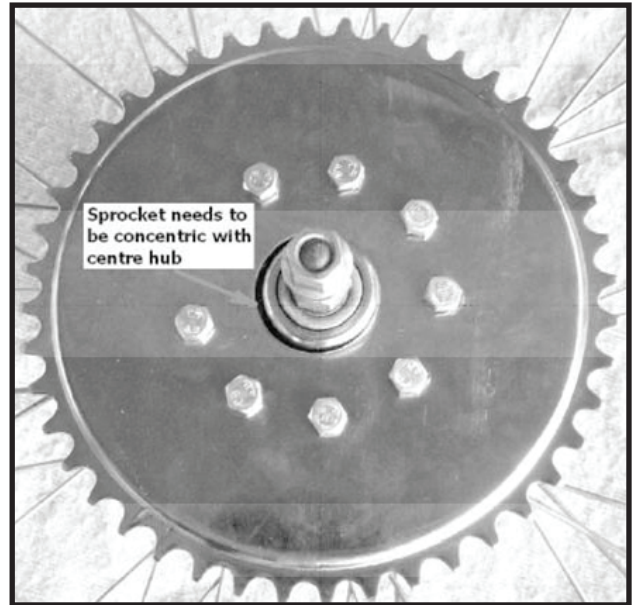
5. Push the nine bolts through the sprocket, outer rubber piece, the inner rubber piece and finally the support pieces.



Installation Instructions

Installing the Rear Sprocket

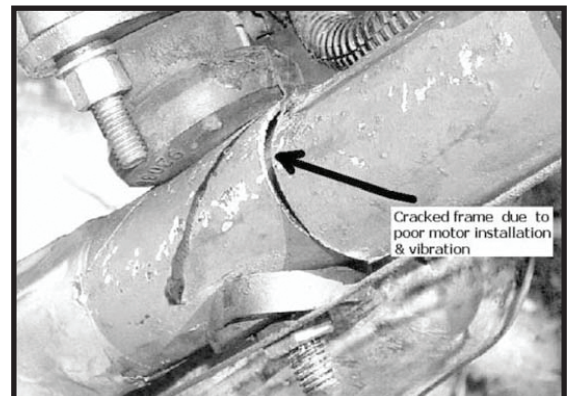
6. Place washers and nuts on the bolts and tighten them so the assembly is loosely held together with light pressure on the spokes. All nuts need to have the same amount of thread protruding.
7. Align sprocket and center hub so the gap is even all round. If necessary, use a block of wood and a hammer against the teeth to tap the sprocket into position. (Image right shows misaligned sprocket).
8. Tighten the nuts and bolts 2 full turns in a criss-cross or star pattern and check the hub alignment again. Adjust if necessary. Tighten the nuts and bolts another full turn moving in a star fashion across the sprocket.
9. Repeat this process twice more, checking the alignment as you go. The nuts should now be tight enough to hold the sprocket firmly against the spokes but have some flexing in the drive direction.
10. Spin the wheel and check that the sprocket runs true. Run out of more than 1.5mm may cause the chain to bind and even jam or jump off the sprocket. Correct any side-to-side wobble by tightening the nuts where the sprocket is further from the spokes to pull the sprocket back into alignment, and slacken the nuts on the opposite side a fraction, if necessary. If there is a gap between the two rubbers, tighten all the nuts evenly, until the rubbers are just touching.
NOTE: Do not over tighten the nuts, the rubber pieces give some degree of shock absorption, so if over-tight this will not happen. If there is still some run-out, use a large shifting spanner to bend the section of sprocket giving trouble. You do not need to use much force to do this.
11. Place the wheel in the bike frame and install it as indicated in the bicycle instruction manual. At this time leave the axle retaining nuts finger tight, they will be tightened later when the drive chain alignment is set. Check the wheel and sprocket run true and adjust if necessary. Make any further adjustments as necessary.



Installing the Motor

Vibration can be a concern with all single cylinder bicycle engines, so you may choose to use rubber pads (about 1/8 of inch thickness) between the mounts, the clamps, and the frame.

The tube failure in the image right was due to poor installation technique. Note the bolt through the frame. This practice is illegal in some countries. It weakens the frame and is potentially dangerous for the rider. The reason it is illegal is that any bicycle, fitted with a motor (gas or electric) may not be modified in any way. This means no drilling, cutting, bending, grinding or welding. This is why the motor and fuel tank mounts are designed as they are.



Installation Instructions

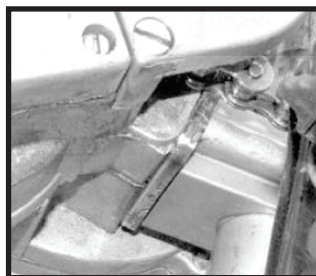
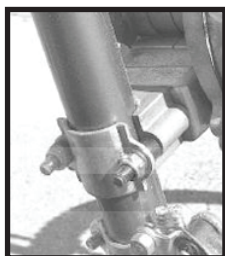
Installing the Motor

If the motor is not mounted securely, you will have constant problems with the motor twisting in the frame, broken engine mounts and studs, together with chain tension and alignment problems. Taking extra care with the mounting process will save hours of work, frustration, money, and possibly even injury.

1. Hold the motor up to the frame to make sure it will fit. Put the carburetor assembly temporarily in place to check for clearance of the air filter and the throttle cable. Also remember to check the drive chain alignment and do a trial fit of the exhaust pipe. It needs to clear the 'down tube' and not be struck by the left hand pedal.

Note: It is rare that the motor will go straight into the frame. The following guidelines will help you avoid the usual pitfalls when installing the motor.

- The carburetor needs to be horizontal or tilted up or down to a maximum of 10° (see image to the right).
- It is best to mount the motor as far forward as possible. If the front tube is larger in diameter than 1.125 inches a "Large Tube" Mounting Kit for tube diameters up to 2 inches is available from ZTMOTO (image below).



Standard Rear Mount

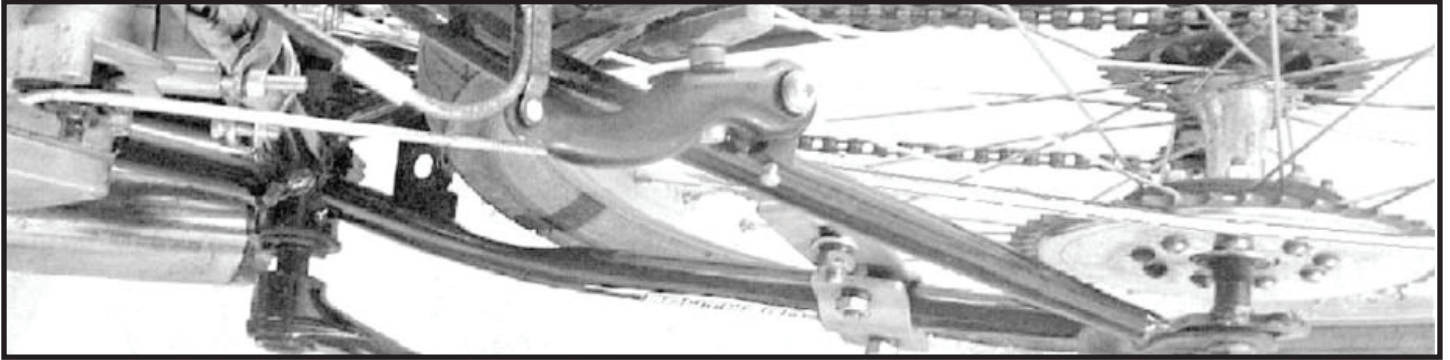


- Mount the motor high enough in the frame to clear any controls or brackets on the Seat Stay (see image above right and center).
- Rework the mounts so they are a good fit in the frame. Adding rubber pads (about 1/8 of an inch thick) helps reduce engine vibration and helps the mounts to grip the frame. Spacers and longer mounting studs are available from ZTMOTO. **NOTE:** The Rear Engine mount must always be at right angles to the Seat Stay.
- Do as little re-working of the front mount as is possible, better to re-arrange the rear mount to suit the frame. See images on this page for ideas. If you need further help, please contact support.

Installation Instructions

Installing the Motor

- Make sure the chain will clear the bike frame and run straight between the two sprockets. Moving the motor mounting position up or down and leaning it a small amount to one side may solve this problem.



- Remove the three screws retaining the Sprocket Cover (be careful not to lose the small bar and ball sitting in the center of the sprocket shaft) and using a piece of cord to check where the chain will sit, which will give you an idea of how much clearance you have.

The front mount image (right) shows a large (38mm) down tube and an effective way of creating a good quality front mount.

The original studs have been removed, the mounting pad has been re-worked to fit the frame, new holes have been drilled at an angle to clear the tube, a new thread tapped, and studs refitted. **CAUTION:** Do not use bolts screwed into the mounting-stud holes. In short time they will strip the thread. Use studs and nuts only, for this task.

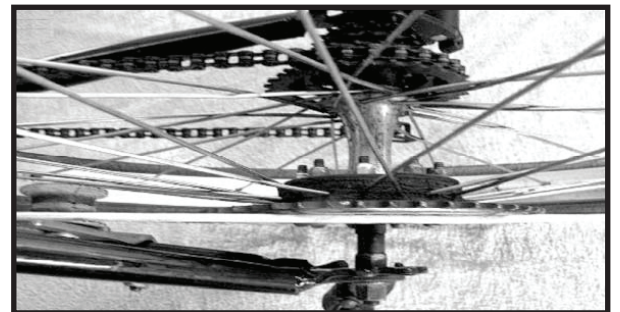
The clamp is a modified 30mm plumbing saddle available from hardware stores. The key here is that the large tubes are very thin and are easily crushed by over-tightening the nuts.

- After making the necessary modifications and adjustments, mount the engine into the frame. The mass of the motor and the vibration created when it is running can cause havoc. Snug fitting mounts and clamps, together with firmly secured (but not over-tight) nuts, are essential. Check the nuts frequently for security after the first few runs and any time there appears to be a change in engine vibration.



Installing the Chain & Tensioner

Using the cord again, you can now align the front and rear sprockets. Place the cord along the teeth of the front sprocket and along the side of the rear sprocket. Change the angle of the wheel to get the cord to run parallel to the rear sprocket. See image to the right and at the top of this page. Tighten the rear wheel retaining nuts. They need to be really tight because vibration and torque loads of the motor may cause the wheel to slip.



Installation Instructions

Installing the Chain

First the length of the chain needs to be checked. Locate and remove the Master Link of the chain. A pair of long nosed pliers will release and re-install the clip (see fig.3). With the sprocket cover removed, feed one end of the chain up from under the sprocket and use the Spark Plug spanner to turn the sprocket clockwise as you feed in the chain (see fig. 2).

Bring the chain just to the rear of the seat stay and pass the other section of chain over the rear sprocket to join up with the front section. For most installations the chain is about 5 to 7 links too long and will need to be shortened. Some bikes need a short section added. The rivet can be removed using a hammer and punch or by using a "chain breaker" which is a special tool made for the job. If you need help with this, please contact your ZTMOTO distributor.

When deciding where to 'break' the chain, make sure you remove the link that will allow the joining link to re-assemble the chain and always go to the link that will end up with a slightly loose chain. An over tight chain simply will not work. When the chain length is correct, install the chain.

WARNING: An over-tight chain is more likely to drop off the sprockets than a correctly aligned loose chain.

Installing the Chain Tensioner

The last image on the previous page shows the 'Idler Pulley' parallel to the cord but the Mounting Bracket on the lower frame section is angled, so the bracket has been twisted. To achieve this you may need to twist the top section of the Mounting Bracket. **NOTE:** Different bikes have different frame angles (some with none at all) but you need to have the Idler Pulley running square to the chain. A vice and a large shifting spanner will do the job.

Use a couple of strips of rubber (old bike tubes work well) glued to the clamp area to prevent damage to the frame and to give the clamp extra grip. Fit the tensioner about 6 inches in front of the rear axle. It is best to fit it nearer to the rear sprocket rather than close to the motor (see fig. 1). The clamp nuts and bolts need to be tight but be careful not to crush the frame. Some bikes have very little strength in this area so take care. An indication you are crushing the tube is when the torque on the nuts does not increase as you continue to tighten them.

Once the tensioner assembly is installed, adjust the pulley to obtain about 1/2 inch - 3/4 inch of 'droop' at the center point of the top section of chain. Wheel the bike around to check for the tightest point of the chain, this is the point where you need between 10 - 20mm of droop. **NOTE:** You may find the chain does not run over the front sprocket smoothly. At this time, do not worry about this, once the motor has been running for a few minutes this condition should disappear. Also fig. 3 shows the use of pliers to remove and fit the clip on the joining link. Make sure the "nose" (the rounded part) of the clip faces the direction of rotation of the chain, if not it may come off.

You can now re-install the Sprocket Cover. **NOTE:** Make sure the Lever points to the rear.

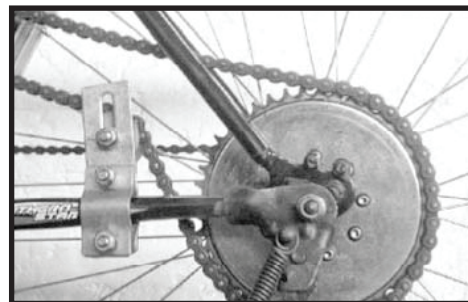


fig. 1

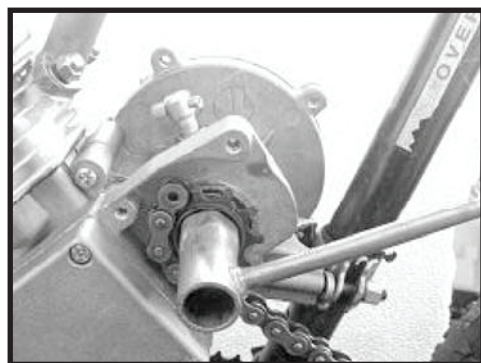


fig. 2

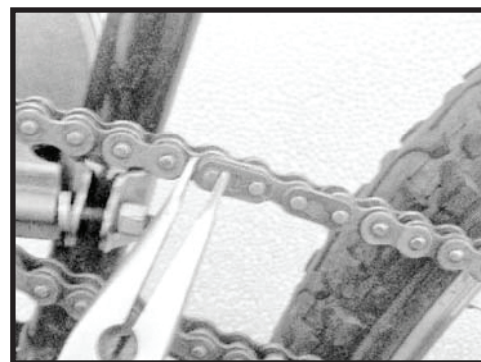
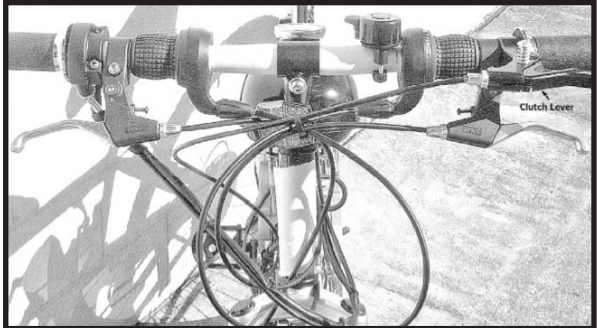


fig. 3

Installation Instructions

Installing the Controls

1. Remove the hand grips from the Handle Bar. If you have access to compressed air, this can be used to blow air under the grips to help remove them. If you cannot get them off you will have to cut them off with a sharp knife.
 2. If you have shifter controls, loosen the clamps and slide them inboard as far as possible. Do the same with the brake levers.
 3. Place the Clutch Control Lever on the left hand side of the bar horizontal to the ground (see image on right).
- 
4. Angle the Brake Lever to about 45 and tighten clamps on both levers.
 5. Sit on the bike and see if you can comfortably grab the brake lever by putting your hand between the clutch lever and the handlebars. Now put your hand over the clutch lever and operate both levers. You need to be able to pull on the brake while you operate the clutch with the first two fingers. Adjust the levers so you can do this.
 6. Take the clamp top-half off the Throttle Control assembly and slide the assembly onto the bar. If it stops before it touches the brake lever clamp, you will need to be sure to slide the control back a little, to give the twist grip some clearance at the end of the handlebars to ensure it does not bind after installation. The top clamp has a small, 5mm diameter spigot that is intended to locate the throttle assembly so the clamp will not turn when you twist the throttle. A 5-5.5mm hole needs to be drilled in the handlebars at about a 45 angle at the top front of the bar. This is where you need to measure how far from the end of the bar the hole has to be to ensure the end clearance needed for the grip to rotate freely is available.
 7. Install the cable assembly into the clamp body and attach the cable to the twist grip.
NOTE: leave about 3mm of thread when screwing the 'elbow' into the grip so the lock nut can be fitted.
 8. Fit the assembly to the handlebars, install the screws but leave them loose. It takes a little fiddling to get the inner cable in the correct position along with the grip and the clamp arrangement. There is a 'stop' inside the clamp assembly that the grip rests against when in the "idle" position. By rotating the grip you will feel this position and, once you have this located you will find the throttle will turn freely. When the clamp halves are in the correct position (with the spigot engaged in the drilled hole) they will match up evenly. Until you get this right, do not tighten the screws! Do not force anything, with some care this assembly will come together and the throttle twist grip will rotate freely.
 9. Now that the throttle assembly is installed you need to fit the grip on the LH side and tighten all the clamp screws.
NOTE: Sometimes the Handlebars are a little short. A simple fix is to cut a length of dowel (a broom handle is ideal) and reduce a 1 inch section so it can be driven into the handle bar, then cut the dowel to the length.

Installing the Clutch Cable

The Clutch Cable installation is simple but there are a number of details that are often missed that causes a heavy lever action and, eventually, failure of the cable. The image next page shows the cable arrangement and small spring position. The image top of page 12 shows an example of how to keep the cable as straight and as short as possible.

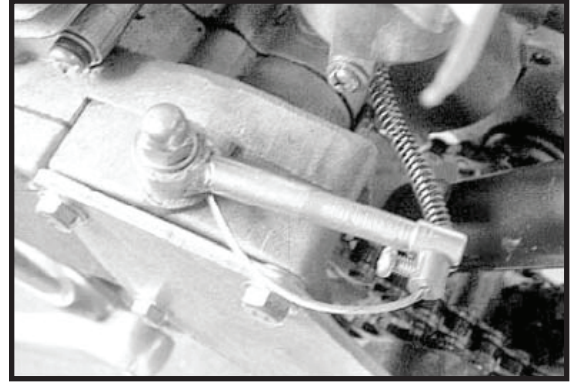
To install the cable, you need to find a path that is as short as possible to the Mounting Post on the motor. The image of the controls at the top of this page shows the clutch cable with a gentle curve from the lever to the side of the frame. This is to allow for the turning of the handlebars. Make sure all cables are long enough to handle a full turn of the bar in either direction.

Installation Instructions

Installing the Clutch Cable

Once you have decided how long the clutch cable needs to be, remove the inner cable and cut the outer cable to length. Do not cut the inner cable until you have completed the cable installation.

The outer cable has the large spring fitted near the Mounting Post on the motor. The outer cable and the fitting on the post must be in alignment. Do not worry about the angle of the inner wire as it runs to the Actuation Lever, this does not cause any excessive friction or wear as is often supposed. Re-fit the Inner Cable and attach the lug at the Control Handle end. Thread the inner cable through the Mounting-Post Ferrule (small threaded tube) and fit the small spring over the cable wire. Thread the cable through the Clutch Actuation Lever and fit the Cable Lock, there should be about 2mm of free-play at the actuation lever, which equates to about 10mm at the control lever. When the installation is completed, clutch lever action should be firm but manageable.



At this stage it is a good idea to ride the bike around to get a feel of the overall operation. Check the Clutch Control lever releases and engages the clutch, and the Locking Button on the lever assembly holds the lever in the released position. Check the brakes and gears work and you can pedal the bike around without difficulty. **NOTE:** At this stage the chain may click and jump around. Check the alignment and tension of the Idler Pulley and if all appears OK, do not worry about the "roughness" at this time. It is probably caused by the chain and the small sprocket not matching well and, once you have ridden the bike for a few minutes, with the motor running, this will disappear.

Installing the Fuel Tank Assembly

Gluing rubber strips (old bicycle tubes work well) on the tank near the mounting studs and on the curved section of the clamps will help the tank grip the bike frame and stop it sliding around. See the "What's in the Box" images on page 3 to find the parts you need. Install the tank close the Steering Head of the bike (with a gap from the front section of about 30mm). **WARNING:** Make sure the clamps are not in a position where they will clamp the cables to the frame. If the cables run along the top of the frame, use an extra pair of clamps (available from **ZTMOTO** or make up a couple yourself) and 4 spacers (oversized nuts will work). This will give the cables clearance to operate normally when the tank is fitted. The nuts should be firm but just tight enough to stop the tank moving. Over tightening the nuts can pull the studs from the tank, causing fuel leaks.

Installing the Carburetor and Throttle Cable

Remove the Retaining cap from the Carburetor and remove the Slide Assembly (see images next page). Loosen the Clamp Screw on the carb and install it on the Inlet Manifold. You may need to remove the Air Filter to do this. **CAUTION:** Do not disassemble the Air-filter Housing, if you reassemble it incorrectly it will not fit correctly on the carb. Ensure the carb is "fully home" on the Manifold and sitting at a near vertical position. Tighten the Clamp Screw just tight enough to stop the carb from twisting on the Manifold. **WARNING:** Over-tightening the screw can fracture the carb mount. Use the image of the controls on page 10 and the overview image (fig. 4 next page) to get an idea of the best layout for the Throttle Cable. It is important that there are no tight curves and a minimal use of "tethering" (cable ties). Either can cause binding and this could cause the throttle to jam in the "open" position. Loop the cable around the front of the handlebars and pass it through the gap between the tank mounting studs and the frame of the bike, (see fig. 4 next page).

Installation Instructions

Installing the Carburetor and Throttle Cable

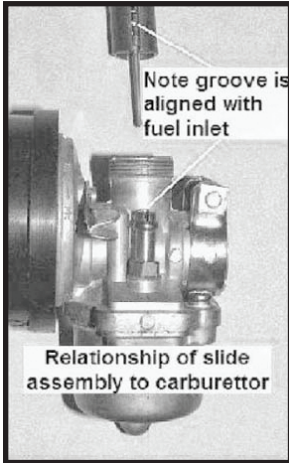


fig. 4

The images above and to the right show how the Cable and Slide fit into the carburetor. Install the cable and check the Throttle operates freely. The image fig 4 above shows a typical installation.

WARNING: The motor is designed to run correctly with the Air Filter provided. Removal, or any modification of the filter assembly voids warranty and may cause the motor to run rough and/or produce less power. If your installation will not allow you to fit the carburetor correctly, there is a special Angled Inlet Manifold available from **ZTMOTO**, to solve this problem.

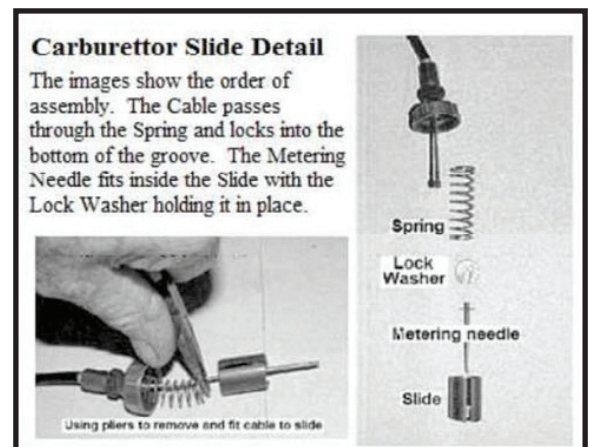
NOTE: The Idle Speed Screw is mounted on the right hand side of the carburetor body and is used to set idle speed.

Turn it clockwise to increase speed. Idle speed should be between 2000-3000 RPM. This is a slow speed at which the motor will run constantly without stalling.

Installing the Exhaust

Install the Exhaust and tighten the nuts finger tight. Swing the lower section of the pipe to the right hand side of the motor and tighten the nuts. Check the Engine Pipe is not touching the Down Tube of the bike, you need a minimum of 5mm clearance. Turn the Pedals to check the left hand pedal also clears the pipe. The following methods may fix either or both of these problems.

- Drill out the Mounting holes to 9mm. You can then swing the pipe further to the right and slide it on the mount to the left. This small change is often enough to solve both problems.
- Angle the motor a few millimeters to the left and re-tighten the mounts.
- Make a wedged shaped spacer (use the gasket as a template) from a piece of aluminum and fit it with the thicker section on the right hand side. You will need another gasket. **ZTMOTO** can also supply both of these items.



Installation Instructions

Installing the Ignition

There are two key areas for the correct installation of the Ignition System:

1. The CDI and the HT Lead and Spark Plug NOTE: Plug Gap is 0.6 - 0.7mm (.024" - .28")
2. The 'Low Tension' wiring and the Switch Leads

Installing the CDI (see image on right)

Vibration and heat are the enemies of ignition systems so the CDI may be installed with some rubber mounting material and be placed where it is unaffected by engine and exhaust heat. fig 4. on the previous page gives you another view of a proper installation. Use the clamp arrangement supplied to mount the module or you can use a cable tie (both methods are shown). If you use a cable tie, sometimes the holes in the mount are undersized so the same drill used for the throttle locating hole can be used to ease out the holes. Before installing the CDI, check the switch leads will reach the connectors on the CDI and the HT lead will reach the Spark Plug.



Installing the Low Tension and Switch Leads

The Handlebar Controls image (page 10) shows the Switch Leads are cable tied to the throttle cable as far as the Steering Head and then follow the Clutch Cable down to the motor. Cable ties and Spiral Wrap (purchased from automotive spare parts stores) are used to protect leads and hold them in place. **WARNING:** Do not use "electrical Tape" or attempt to "waterproof" the Ignition System. All this will do is trap water in places where it will eventually cause failure. The spiral wrap allows air to circulate around the system and any moisture will soon dry out. Riding in the rain is OK. It is very rare for an Ignition System to fail when it gets wet. The Blue and Black leads from the motor plug into the corresponding colored leads on the CDI. The switch leads plug into the remaining two sockets, either way round. If there is a White lead from the motor cut it about an inch off the end and tuck it down inside the insulating sleeve on the motor. This lead is no longer required.

NOTE: There are two types of Spark Plug Caps. One is a soft rubber type with a spring coil inside that fits the brass cap on the plug. Make sure the cap is screwed on firmly. The other type is a hard plastic cap and the threaded brass cap needs to be removed and discarded. If this is not done it will cause poor ignition performance.

ALSO NOTE: Ignition failure is very rare (most faults are fuel related), however when an ignition fault does occur, it is almost always due to a wiring fault, not a component failure. Contrary to popular belief, in two stroke motors, Spark Plugs almost never fail.

Installing the Chain Guard

This is actually very easy to do. It is not a legal requirement but it is a good idea if you want to stay clean! Locate the pieces shown in "1" in the 'Plastic Bag Contents' image. The plate's short screw lock nut holds the rear of the guard to the 'Back Stay' and the nut and lock washer hold the Guard on the motor, which fits on the long screw that holds the rear of the Clutch Actuation Cover onto the motor assembly. Offer the guard up to the screw on the motor and hook the notch over it. Loosely fit the washers and nut. Take the strap and bend it around the "Back Stay" to form a letter "P" with the holes together at the "leg" of the letter. Refer to fig. 4 on page 12 to see how to arrange the guard. Position it so the hole in the guard lines up with the holes in the "P" clamp. Mark where the Back Stay fowls the guard and cut out this section so you can clear the frame. You may need to do a little trimming at the other end also. Once the trimming is done, fit the Guard and bend and flex it so it clears the frame and chain.

Installation Instructions

User's Notes

These notes cover operation and maintenance of the bicycle and motor

Fuel: The preferred fuel is "E10" (Unleaded+ Ethanol, usually 91 Octane) or ULP (94 Octane). For break in the fuel to oil ratio is 20:1 (6.4 ounces of oil per gallon of fuel), also recommended if working the motor hard or operating in hot temperatures. Break in period is approximately 310 miles. After break in, 25:1 is the ratio.

Valvoline "Two Stroke Racing Oil" is highly recommended. Use Valvoline "Two Stroke Oil" as an alternative which is readily available at most auto part & big box stores. DO NOT USE 4 STROKE OIL. This will void your warranty.

Fuel Tap: Always turn the fuel tap "off" when the motor is stopped.

Starting the Motor

1. Check fuel level and top up if necessary.
2. Turn on fuel valve and depress the 'tickler' for 3-10 seconds (the longer time in cold weather).
3. Set the choke to the 'half closed' position (lever down is the 'Off position).
4. With clutch engaged (lever released), rock bike rearwards until resistance is felt.
5. Disengage clutch (pull in lever and engage the lock button).
6. Pedal the bike up to a speed of about 5-10 mph (jogging pace), with the throttle about half open and release the clutch lever by pulling on it and then letting it go. Continue pedaling.
7. The motor will begin to tum and fire occasionally. Use the throttle to vary road speed and move the choke lever to a position that keeps the motor running evenly.
8. As the motor warms up less choke will be required and after about 30 seconds the motor should run properly without any choke (lever down).

If the motor won't start

The most likely cause is 'flooding' (too much fuel in the motor). To correct this, turn the fuel "Off" set the choke to the "Off" position (lever down) and with the throttle fully open (don't be heavy handed, you can damage the throttle handle), pedal the bike, with the clutch engaged, for a few hundred feet. If flooding is the problem, the motor should start to "fire" and gradually begin to run. As it picks up speed and runs smoothly, tum on the fuel.

Breaking in: Correct breaking in procedure is essential for good performance, fuel consumption, and long life of the motor, however, the procedure is simple to follow.

To "break in" the motor, start the motor as per instructions above, and ride the bike at a slow but comfortable speed where the motor runs smoothly. Warm the motor up by opening the throttle in bursts of 5 to 10 seconds (full throttle is OK later). Between the bursts of power, allow the motor to slow down to cool it, do this for about 20 seconds then repeat the throttle bursts. Keep oil and fuel moving through the motor by just 'cracking' the throttle a fraction every few seconds. This helps the cooling process and reduces the risk of damaging the motor. Repeat the 'power on, power off procedure for 5 minutes, gradually increasing speed as the motor runs smoother and develops more power. Check the temperature of the motor by touching the fins briefly with your fingers. If it is too hot to touch, stop the motor and let it cool down. This technique helps generate heat (essential for 'seasoning' the motor) and moves oil through the motor, helping various components (such as, rings, bearings, and seals) to "settle in".

Repeat the above procedure after allowing the motor to completely cool down (about 30 minutes) and then repeat the process. You should find the motor runs smoother with more power and more responsive to throttle changes. You can now use longer bursts of full throttle, but still check for over-heating.

Note: A gradual loss of power may indicate the motor is over-heating. Apply a small amount of choke and use low throttle settings. Ideally it is best to stop the motor and allow it to cool down. When re-started, the motor should perform normally with good power.

Installation Instructions

User's Notes

New two stroke motors don't like to run at a constant speed or constant load. So to complete the break in process, simply ride the bike as you would normally would except vary your speed and load by opening the throttle and then closing it every few seconds or so. Using this technique throughout the life of the motor will greatly extend its life.

Torquing down the Cylinder Head

After running the motor for ten minutes or so, the Base and Head Gaskets compress and so the Head Retaining Nuts may become a little loose. It's good practice to "re-torque" the nuts but it must be done with a 10" or similar Torque Wrench. A typical Automotive wrench is not accurate enough and many studs have stripped from motors as a result of using this type of tool. If you do not have access to the correct tool, then do not touch the nuts! Most motors run fine for years without ever having the Head Nuts being re-torqued.

If you have the correct tool, the torque setting is: 1.4Nm (12 ft/lbs) for M8 nuts and 1.1Nm (10 ft/lbs) for M6 nuts. Tighten evenly using a star pattern. **WARNING:** There is no Warranty for stripped Head Nuts or Cranks Studs.

Before Beginning A Ride

1. Check you have your helmet and any other safety equipment you use.
2. Check brakes, clutch, throttle, gear shift levers, bell and motor controls for correct adjustment and operation.
3. Check the bike generally for loose pedals, fittings or fasteners, damaged wheels and spokes. Check motor, exhaust and carburetor are secure. Check for signs of gas leaks, wet oil is a sure sign something is wrong.
4. Check seat and handlebar position.
5. Check lights and reflectors if riding at night.
6. Check tire pressures (low pressure can cause punctures or blowouts).
7. Check fuel level (do you have enough for the round trip)?
8. Check motor drive chain is not binding and tension is correct (about 1/2 inch of droop).

Note: If any item is incorrect - FIX IT!! Breaking down 20 miles from home can be a real pain!

WARNING: Do not leave the bike unattended with motor running. Do not idle the motor for more than 60 seconds, it may overheat.

Stopping the Motor

There are four methods for stopping the motor.

1. With the clutch disengaged, press and hold the yellow button near the twist grip, until the motor stops (preferred method).
2. Turn the fuel tap to the "off" position and allow the motor to run out of fuel. This may take some time.
3. "Panic stop" - with the clutch still engaged, apply both front and rear brakes hard until bike stops.
4. With the clutch disengaged and the motor idling, apply the rear brake and slowly release the clutch.

General Maintenance

Gearbox & Clutch: When new, the gearbox and clutch may make weird clattering and whining noises. This is normal and the noise should subside after the first 5 or 6 tanks of fuel. Add grease to the gearbox after about 10 minutes of running and check every 6 months. Add more grease if gears appear shiny or dry. Apply grease where the gears mesh.

Initial fill: Use six pumps of General Purpose Grease from a Hand Pump Grease Gun.

Tire Pressures: Due to the extra weight of the motor etc. it is important to pay special attention to tire pressures. Set to a minimum of 45 psi. If there is a maximum pressure rating on the tire, pump the tire up to this pressure. Low pressures can cause a puncture, broken spokes or buckled wheels. The heavier the rider, the higher the pressures should be.

Fuel & Oil Leaks: Regularly check for fuel and oil leaks. Motor vibration can cause some movement of seals, leading to weeping of fluids. Fluid leaks are an early indicator of an impending failure. Usually tightening nuts and fittings will cure this. Oil may drip out of the end of the exhaust pipe while the bike is in storage. Best to place a rag under the exhaust outlet to catch the drops. Once properly run in, this condition usually disappears. **NOTE:** Any oil leaking from a two stroke motor indicates a gas leak as well.