



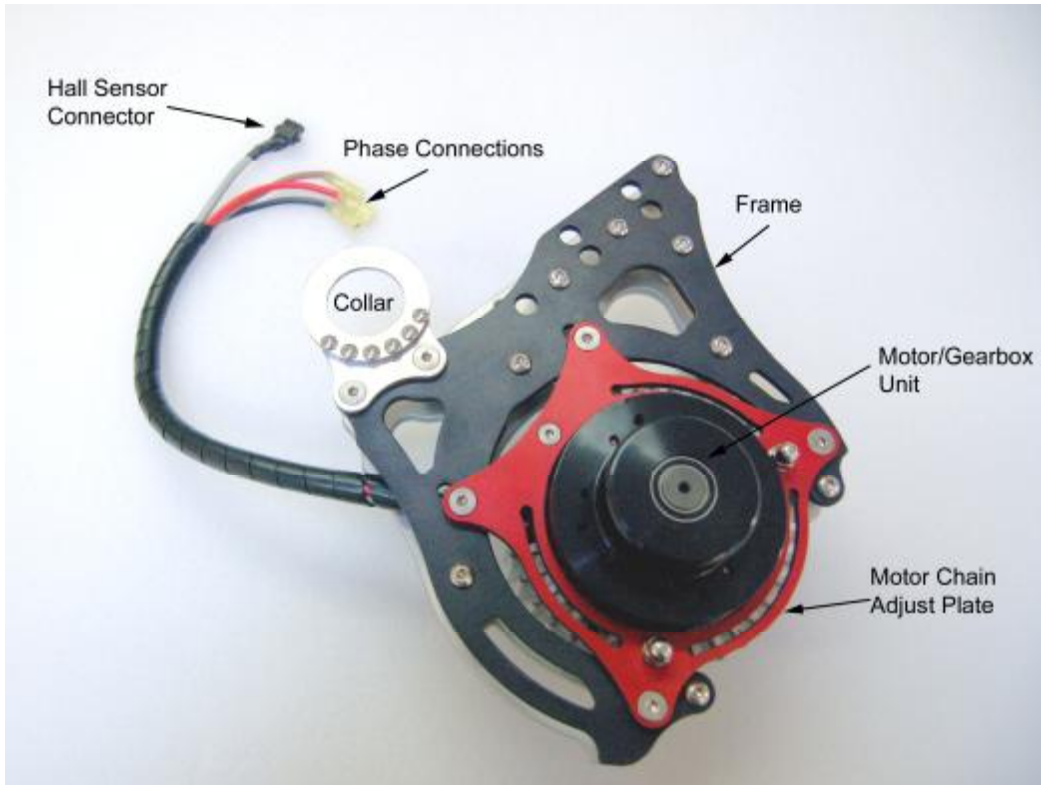
Electric Mountain Drive™

Installation and Assembly Instructions, Type 1

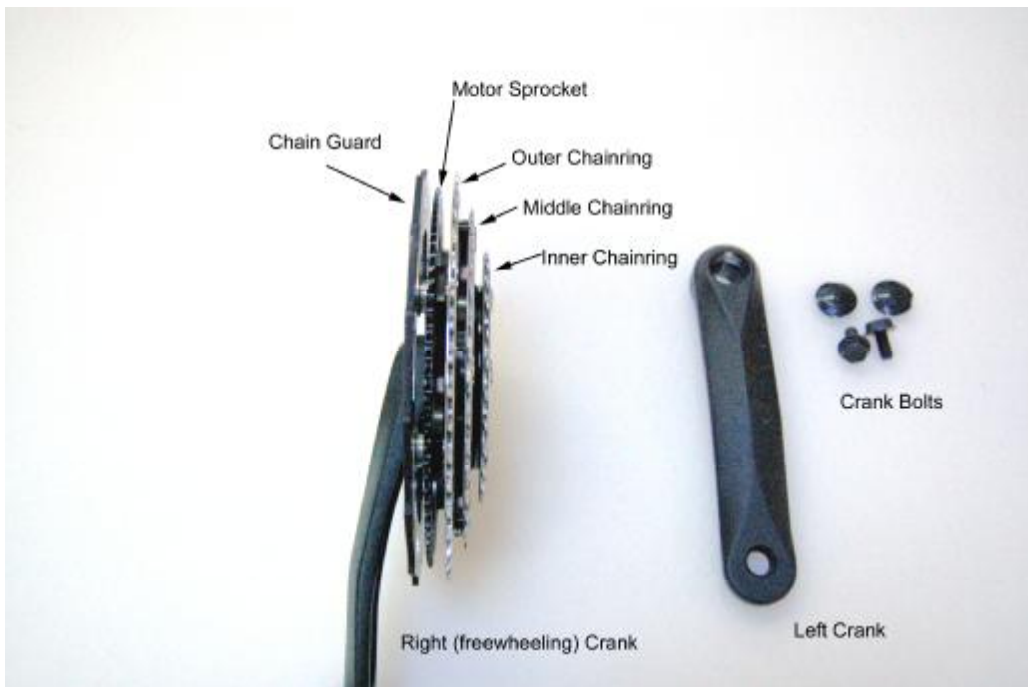
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http://www.ecospeed.com/docs/emtnd1_assy_rev2.0

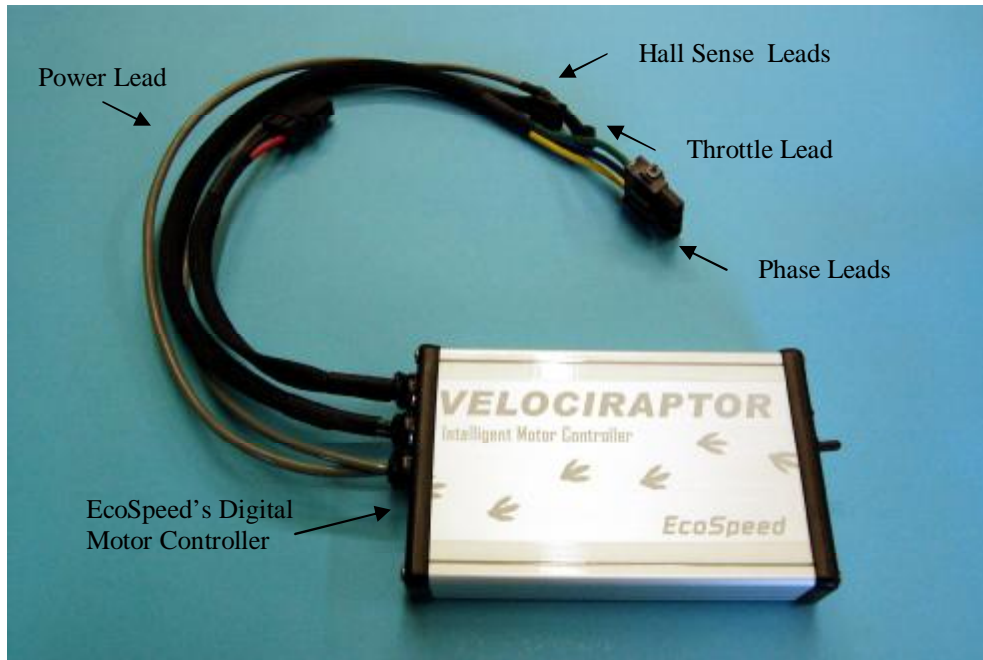
Revision 2.0
p/n 7-16-1



Drive Unit
 (connectors may differ depending on motor)



Freewheeling Crankset
 (triple shown)



EcoSpeed Motor Controller



Other Parts

Congratulations on your purchase of EcoSpeed's Electric Mountain Drive, Type 1. The Type 1 Electric Mountain Drive is the world's best multi-speed, throttle operated, electric-assist conversion and the only electric-assist designed specifically for the power needs of Mountain and Cargo bikes.

These instructions will guide you step by step through what we hope will be a simple and painless installation of your EMtnD. The mechanical skills involved are modest and, we give you hints and tips at every step that reflect what a professional mechanic knows. If at any time you have problems, call us at 1-866-EcoSpeed (866-326-7733) for friendly technical assistance or e-mail us at support@ecospeed.com.

A word on how these instructions are organized. Each step is under a major heading – **Step 1**, **Step 2**, etc. If you've installed an EMtnD before you can just read the major headings and ignore the explanatory text. Below each major heading is a list of sub-steps. The important information in each sub-step is in bold text. If you're a competent bike mechanic, you can just read the bold text and safely ignore the rest. The remaining text is there to clarify things for non-mechanics. *We've also included tips and hints in Italics.*

Before getting started check that all the pieces needed were included in your shipment:

Check the packing list included with your shipment.

You will also need the following tools:

- 1) 2.5mm, 3mm, 4mm, 5mm, and 8mm hex (or Allen) wrenches.** *(The standard "L" shaped hex wrenches sold at bike shops and hardware stores. Get long handled versions if possible.)*
- 2) 10mm box or open end wrench.**
- 3) 8mm and 10mm nut drivers or sockets. Also 14mm if your bottom bracket uses this size bolt.**
- 4) Wire clippers or scissors.**
- 5) Small screwdriver.** *(For adjusting front derailleur.)*
- 6) Needle nose pliers.**
- 7) Crank puller tool.** The Park Tool CWP-6 would be an example of this *(Standard bike repair tool. Available from almost any bike shop.)*
- 8) Bottom bracket tool.** Such as Shimano TL-UN74. *(Standard bike repair tool. Available from almost any bike shop.)*
- 9) 15mm pedal wrench.** The Park Tool PW-5 would be an example of this *(Standard bike repair tool. Available from almost any bike shop.)*
- 10) Torque wrench (optional).** A small one reading in inch-pounds.
- 10) Heat gun or pen torch.** (for shrink wrap tubing)

Once you have all the parts and tools you need, it's time to clear a nice space to work, find several of hours time, and get to it.

Step 0: Make sure that your bike is in good condition.

If you haven't had your bike tuned up by your local bike shop in a while, now would be a good time. Installing the EMtnD will place extra stress on your bike so it's important that it be in top condition.

Step 1: Find a way to secure your bike while working. (photo 1)

A bike repair stand such as bike shops use is ideal. You can also just leave the bike on it's kickstand, lean it against a wall, or rest it on a table top.

Note that the following two steps would take any competent bike shop about 5 minutes to do. So, if you would rather not hassle with them, take your bike to your local bike shop and have them remove the crankset and bottom bracket. Then start at step 4.

Step 2: Remove crankset.

Remove left and right cranks and chainrings. Leave chain hanging from front derailleur.

The cranks are held in place by bolts, sometimes concealed under caps. Remove using a socket or hex wrench. *(Trick: The bolts can be very tight. Tie one of the crank arms to your bike frame using a rope or strap. That frees both hands to turn the wrench.)*

Once the bolts are out, use your crank puller tool to pull the cranks off of the bottom bracket axle (photo 2).

Step 3: Remove bottom bracket.

The EMtnD is designed to work with frames that take standard 1.37" x 24tpi, 68mm wide bottom brackets. If yours is not, you will need to find a compatible wide bottom bracket to use with the EMtnD. The supplied one uses a 127mm square taper axle. There is quite a bit of adjustability built into the EMtnD, so a similar one should work fine.

There are different bottom bracket tools, so you will need to use the one appropriate for your bike. Photo 3 shows the tool used for Shimano cartridge bottom bracket nuts such as the one supplied with the EMtnD.



(1) Bike on Repair Stand



(2) Removing Crank with Crank Puller



(3) Removing Bottom Bracket

Note the the *right* nut is left-hand threaded, i. e. it tightens by turning left and loosens by turning to the right (clockwise). The *left* nut uses standard right hand threads (loosens counterclockwise).

Remove the left nut first. The cartridge will come out along with the right nut.

Step 4: Install the new bottom bracket and attach the EMtnD

Slip the BB cartridge and right side nut through the collar on the EMtnD. Support the weight of the EMtnD, so as not to damage the threads, and screw in the right side BB nut.

You may want to have an assistant hold the unit while you perform this step. The threads on the BB nuts are fragile aluminum, so be very careful when first engaging the threads. Remember that the right nut is left hand threaded so turn it counterclockwise to engage the threads.

(Trick: to avoid cross threading, gently press the nut into the bike frame while turning clockwise. You will feel a periodic click as the end of the thread drops into the groove in the frame threads. When you feel the click, stop turning clockwise and turn counterclockwise to engage the threads.)

Screw in the right side nut until the EMtnD collar is pressed against the bike frame but do not tighten.

Screw in the left side nut through the left hand collar, don't tighten. This involves the use of a proprietary tool made to fit our special left side cup. (5)

You use a standard pin spanner, insert its ends into the special tool, and use this to thread in the left side cup. You can then thread on the lock ring, which will not be tightened yet. When you're done the EMtnD will be hanging off of the bottom bracket by the collars as shown in Photo 6.



(4) Bottom Bracket Removed



(5) Left Side BB Nut Partly Installed



(6) Motor unit hanging from collars

Step 5: Swing the EMtnD up against the bottom of the bike frame and install adjustable clamps

Most kits will have an adjustable strap system that attaches the front of the EMtnD to the frame. The primary motor plate has cutouts to accommodate the head of the clamp, allowing it to be out of the way and streamlined.

Tighten the clamp until there is significant tension holding the motor to the down tube. As you do this, feed the emerging clamp tail into the supplied piece of shrink wrap, this will prevent any exposed edges. When clamp is tight, shrink this with a heat gun, blow-dryer, pen torch, or lighter. If using flame, be sure not to burn the bike or yourself! (7)



(7) Tighten Adjustable Clamps, Feeding Excess Into Shrink Wrap

Step 6: Finish attaching the EMtnD unit.

Make sure all clamp or quarter bracket nuts and bolts are tight.

Tighten both bottom bracket nuts.

Step 7: Install the freewheeling crankset. (photo 8+9) and bike chain.

Install the left side crank arm and the freewheeling crank and chainring assembly on the left. Tighten bolts firmly so that both arms are pressed onto the bottom bracket axle as far as they will go.

Wrap the bike's chain around one of the bike sprockets on the assembly.

It's important that the right side crank arm is firmly seated onto the BB axle for correct alignment of the motor drive chain.

It's almost impossible to get the chainring bolts tight enough by holding a crank in one hand and wrench in the other as shown in photo 16. One way to do it is to install both crank arms and tighten both bolts as tight as you can using the photo 16 method. Then, using a strong strap or length of rope, tie one crank arm to the bike frame then use both hands to tighten the bolt on the other arm.



(8) Installing Freewheeling Crankset



(9) Attach Left side arm

Step 8: Align the gearbox sprocket to the chainring motor sprocket.

Use the M6 flat washers that came with your kit to fine tune left-right location of gearbox sprocket relative to chainring motor sprocket.

Refer to photo 10. Press a thin straight edge, such as a metal ruler, against the right side of the chainring motor sprocket. Position one end of the ruler against the sprocket inside the gearbox.

Sight down the length of the ruler to check alignment of the gearbox sprocket with the chainring motor sprocket (photo 11). Both sprockets should lie flat against the side of the ruler with no bending or other obvious misalignment.

Included with the kit is a package of M6 flat washers to be used to adjust the alignment if the sprockets are not aligned after initial assembly. The washers can be used to move the motor/gearbox unit left or right in increments of one washer thickness, about 1.4mm. If the misalignment is less than about half that (0.7mm or .025") that is good enough and there's no need for the following steps.

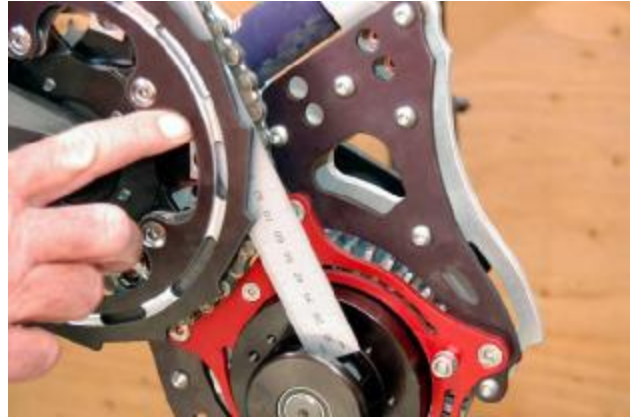
If the gearbox sprocket is too far to the left, place one or two washers under each of the 4 bolts holding the motor chain adjust plate to the frame.

Refer to photo 12. Loosen the 4 chain adjust plate bolts and nuts. Remove them one at a time and place one or two M6 flat washers between the chain adjust plate and the frame. Run the bolt through the washers and reinstall the nut and washer on the other side.

If the gearbox sprocket is too far to the right, place one or two washers under each of the 3 bolts holding the gearbox to the motor chain adjust plate

The gearbox is attached to the motor chain adjust plate with two M6 cap nuts and an M5 nut and bolt combinations. Remove the two nuts and the M5 bolt and nut. Place one or two M6 flat washers on each of the M6 studs between the gearbox body and motor chain adjust plate. Place one or two M6 washers between gearbox body and adjust plate and run the M5 bolt through the washers. Reinstall the nut and washer on the other end of the M5 bolt.

Use one washer in the above steps if the sprockets are only slightly misaligned. For larger misalignments use two. If you need more than two, the freewheeling chainring or bottom bracket may be improperly installed.



(10) Positioning Straight Edge



(11) Checking Sprocket Alignment



(12) Chain Adjust Plate Bolts

If they are correctly installed, it is OK to use as many washers or spacers as you need to get the correct alignment. You can contact EcoSpeed for extra washers or get them at your local hardware store.

Step 9: Install the motor chain.

Loosen the 4 bolts and nuts at the corners of the motor chain adjust plate. This will allow the motor/gearbox unit to move freely about 1/2 inch (12mm). Slide the motor as close to the crankset as it will go.

Thread one end of the motor chain through the gearbox opening and around the sprocket inside. Wrap the other end around the outermost sprocket on the chainring assembly and the chain tensioner, then join the ends with the included master link.

To install the chain master link, pull the ends of the chain together so that you can slip the link pins into the chain ends (photo 13). Install the master link as shown in photo sequence 14.

Step 10: Adjust motor chain tension.

Leaving the chain adjust plate bolts loose from the previous step, slide the motor/gearbox unit away from the sprocket assembly until the slack in the chain is taken up. The motor chain tensioner is there to keep constant tension, it does best without excess slack.

Rotate the sprocket through one full turn to find the position where the chain is tightest. With the sprocket in that position, move the motor/gearbox unit until all the slack is removed but the chain is not taut, as shown in Photo 15. Tighten the chain adjust plate bolts. You want the chain to be as tight as possible without binding at any point in the rotation.

Rotate the sprocket assembly one more time. If it binds noticeably in any position loosen the adjustment. Otherwise firmly tighten the chain adjust plate bolts and proceed to the next step.



(13) Pulling Chain Ends Together



**(14) Installing Master Link
(clockwise from top left)**



(15) Check for Proper Chain Tension

Step 11: Install the throttle

1) If your bike has twist shifters: Remove right side grip and shifter and install the thumb throttle between shifter and brake as shown in photo 16.

You may need to move the right brake lever to the left to make room for the throttle. The throttle slides onto your handlebar and locks in place with a set screw visible on the bottom of the throttle body.

Reinstall the twist shifter making sure there is enough clearance to allow free movement of the throttle lever.

1a) If your bike has thumb shifters: Install left Hand throttle on Accessory Mount

If you don't have the correct throttle to work with your bar and shifter setup, contact EcoSpeed for advice and/or a different throttle. (17)

Right side mounting is the usual but, left hand mounting is possible and allows you to shift and operate the throttle simultaneously, which some prefer. (18)

2) Route the throttle wire so that it doesn't impair turning the bars, won't snag on anything, and reaches the throttle connector on the motor.

3) Don't secure the throttle wire with wire ties yet. Wait until you test the system and know that everything is working then secure all the wires to the frame with the included wire ties.

Step 12: Mount the controller

The controller is an electronic device that regulates motor speed and power levels in response to a signal from the throttle. It is small and light and so may be mounted in any number of places. The important considerations are cooling — the controller should be in open air and not enclosed, and locating it so that cables from the motor and throttle will reach.

Attach the controller to your bike using the included adhesive foam and cable ties. Photo 19 shows possible mounting locations. Some involve using some extra hardware which can be provided.



(16) Right Hand Installation



(17) Accessory Mount



(18) Left Hand Installation

Step 13: Install the battery system.

- 1) See the included separate instructions for your type of battery system.



Step 14: Connect all cables

Connect the following cables:

- 1) **Throttle.** Black 4-circuit JST connector on throttle plugs into matching connector on throttle. Be careful when plugging in to avoid bending connector pins.
- 2) **3 Motor phase wires.** These can have various connector types depending on the motor and controller combination. The phase wires are the three heavy colored wires coming out of the motor. Connect them to the matching connector on the controller. If the phase wires have individual connectors, match them according to color.
- 3) **Motor Hall Sense Cable.** A gray cable coming out of the motor ending in a black JST connector with 5 or 6 circuits. Plug into the corresponding connector on the controller. Be careful when plugging in to avoid bending connector pins.
- 4) **Main Power Connection.** The heavy cable from the battery to the controller terminating in a gray 2-circuit MiniFit Sr connector.

(19) Possible Controller Mounting Locations



(20) Cables Connectors Wrapped in Op-

You may end up with a few cables coming out of the controller that are unconnected. Just tie them out of the way, they aren't used.

WARNING: Do not route the phase wires and the Hall sense cable next to each other over their entire length. Space them at least an inch (25mm) apart over most of their length. The high currents in the phase wires can interfere with the low voltage signals in the Hall cable and destroy the controller.

Step 15: Check front Derailleur Adjustment

Triple chainring version only: Test front derailleur adjustment and adjust as needed. It's especially important to adjust the derailleur so it doesn't over shift on the big ring and drop the bike chain onto the motor chain.

If you don't know how to adjust your derailleur you can ask your local bike shop to do it, or go to:

<http://www.parktool.com/repair/readhowto.asp?id=75>

on the Park Tool Company web site for an excellent how-to article on front derailleur adjustment.

Single chainring version only: If switching from a triple chainring to a powered single chainring, leave the front derailleur in place and adjust it so that the bike chain is centered in the cage.

This will provide extra protection to keep the chain from coming off the front sprocket on sharp bumps.

Step 16: Finish up and Test.

1) With the rear wheel suspended off of the ground, turn on the battery pack switch and press the throttle to test the system. Run the bike through all of the gears to make sure the derailleur is properly adjusted. Look at the motor chain and verify that it is running smoothly. Make sure that all wires are out of the way of all moving parts. Make sure axle bolts or skewers are tight

2) Once you're satisfied that everything is operating correctly, neatly tie all wires out of the way of moving parts using the included cable ties.

Proper adjustment of the gears and making sure that the rear cassette and bearings are in good shape is especially critical given the extra load the drive train will be subjected to. Also, check that the rear axle skewer or bolts are fully tightened. Axle bolts should be torqued to about 20 ft-lbs (28 Nm). Skewers should be as tight as you can comfortably make them. It is possible for the motor to pull the axle right out of the dropouts if they are loose.

3) Road test. Run through all the gears making sure they are shifting smoothly. Use full throttle in each gear to check for skipping of the drive chain. Keep speeds low at first until you're sure that everything is functioning properly and you become familiar with riding with the motor assist.

Congratulations On a Successful Installation!

