Thank you for choosing the Motor Trike Electric Reverse. We ask that you read the directions before you start and follow them very closely. Doing so will save you time and ensure that the customer’s experience with their new electric reverse is a positive one.

**It is critical that proper eye wear, ear protection, and protective clothing is worn throughout this installation.**

**Failure to secure this vehicle on a lift or stand during installation could result in injury up to and including death.**

**If you do not have the proper tools to do this installation, DO NOT ATTEMPT TO PERFORM THE INSTALLATION.**

Use the included check sheet to identify any missing parts. If there are any parts missing or if you have any questions concerning the kit, call Motor Trike at 1-800-90TRIKE (800-908-7453) Mon-Fri 8am-5pm CST. Or you can email us at INFO@MOTORTRIKE.COM

The installation process may vary for different years and/or models.

Motor Trike Inc. reserves the right to change specifications, equipment, or designs at any time without notice and without incurring obligation.

**About the Electric Reverse:**

If used within the recommendations below, the electric reverse will meet all of your expectations and then some. Before reversing, always check that the path behind the trike is clear and announce that you are reversing to anyone nearby.

**The electric reverse should not be operated longer than 15 seconds at a time.**

**The bike should be driven several miles in between reverse uses to allow the battery to fully charge. Use the motorcycle’s voltmeter as a guide.**

**Keeping the engine RPM at or above 1500 RPM will help reduce battery drain from using the reverse.**

Extended use and limited charging can and will lead to electric reverse and battery damage. Motor Trike is not responsible for damage that is caused by exceeding the recommended duration or frequency of use. If the reverse is abused the breaker(s) will flip to protect the system. They are under the seat and must be reset manually for the reverse to function again. The breakers will not limit you to the recommended maximum operation time of 15 seconds. If the breakers flip the reverse is being used above its intended use. Repeated operation of this nature will lead to failure and voiding of any warranty associated with the electric reverse. The electric reverse will not work well if the motorcycle’s battery is not in good condition or if the battery does not have a sufficient charge.
Depending on the situation, a different stage installation will be required to complete the electric reverse installation.

STAGE 1 - Adding an electric reverse to an installed trike kit. Read Sections A, B, and D.

STAGE 2 - Adding the electric reverse to an uninstalled kit. Read Section B, C, and D.

STAGE 3 - Completing a factory installed electric reverse installation. Read sections C and D.

Section E covers the optional 2nd battery and isolation harness. **Make sure you complete the install of the 2nd battery before you install the body.**

**Section A – Preparing a Trike for Installation**

1. Place the trike on a lift and secure the front tire in a tire vise. Use a ratchet strap attached to the front crash bars or motorcycle frame and then to the front of the lift to ensure the front tire stays in the vise.

2. Lift the rear of the trike and support it on jack stands. See Figure 1.

3. Remove the top left and top right side covers. These are held in place with rubber grommets and are removed by pulling them away from the centerline of the motorcycle. See Figure 2.
Figure 2: Remove the top left and top right side covers.

4. Unbolt the seat from the left and right sides of the frame and at the rear from the trike body. Pull the rear of the seat forward and up to get the rear mounting bracket clear of the tour trunk. Then slide the seat back to release it from the front seat hooks. See Figure 3.

Figure 3: Unbolt the seat from the side of the frame (right side shown, left side similar).

5. Remove the passenger floor board or foot pegs from the frame. In order to access the fastener, you must first remove the rubber plug. See Figure 4.
6. If equipped, remove the left and right fender skirts. There are 4 bolts are located under the fender as shown in Figure 5.

7. Remove the left and right wheels.

8. Unbolt the fender brackets (left and right) from the front of the trike body. See Figure 6.
9. Inside the trunk, pull back the carpet and remove the five bolts that secure the body to the frame. See Figure 7.

10. Unplug the accessory power point connector from inside the trunk and push the wire out of the trunk through the rubber grommet. See Figure 8.
11. Unplug the tail lights and indicator lights from the tail light harness. These are located under the fenders. Remove the tail light harness from the wiring clips attached to the body. See Figure 9.

12. Disconnect the two pin saddlebag latch connector under left rear corner of the trunk. Follow the latch extension cable back to the trike frame detaching anywhere it is secured to the body.

13. Unplug the two pin connector on the compressor harness from the tail light harness. This should be located through the access hole in the body. See Figure 10.
14. Unplug the connector at the audio amplifier, located at the access hole in the body. See Figure 11.

15. Ensure that all wiring harnesses are free from the body. With an assistant remove the body from the trike (with tour trunk attached) and set in a safe area.

16. Unbolt the left muffler from the rear mounting bracket. Loosen the exhaust clamp between the muffler and exhaust extension, then slide the muffler off to the rear of the trike. See Figure 12.
Section B – Installing Reverse on Trike Kit

1. Install the supplied panel nuts in the frame. See Figure 13 and Figure 14. If the kit does not have holes for the panel nuts, drill a 5/16” hole thru the frame. Use the Reverse component panel bracket as a template to locate the hole. See Figure 13 and Figure 14.

Figure 13: Install panel nuts

Figure 14: Properly installed panel nuts with threaded portion inside of tube
2. Bolt the reverse component panel to the panel nuts using the supplied \(\frac{1}{4}”\)-20 x 7/8” bolts and washers. See Figure 15.

3. Remove the relay box cover and verify that the fuse(s) are in the right location. There should be a 7.5 amp fuse in position 7 and position 9, and a 5 amp fuse in position 1. If the fuses are in the wrong location, move them to the proper locations. See Figure 16. Ensure that all of the relays are installed the same direction as shown in the figure. Reinstall the relay box cover.
4. Remove the six M8 CV bolts from the left CV joint with a 6mm Allen socket. See Figure 17.

CORRECT WITH A 7.5 AMP FUSE IN POS. 7 AND 9 AND A 5 AMP FUSE IN POS. 1
Figure 17: Remove six M8 bolts from right CV joint only

5. Remove the top bolt from the left upright. Swing the top of the upright out. Cover the exposed end of the CV joint with a clean rag or sandwich bag and wire tie to protect the CV grease from contamination. See Figure 18.
6. Insert the reverse gear into the frame on the left side of the differential. The gear can be inserted from the rear of the kit above the trunk floor framing. Let the gear rest on the frame until further instruction below. See Figure 19.

7. Insert the gear center into the frame. Place it between the differential and reverse gear. See Figure 20.
8. Position the gear and gear center as far to the left and out of the way as possible.

9. Tap the provided ¼” spring pins into the reverse motor mount until they bottom out, see Figure 21.

Figure 20: Gear Center

Figure 21: Tap spring pins into reverse motor mount
10. Slide the motor mount spring pins into the left side of the differential. Bolt the reverse motor mount to the differential. Use the ¼-20 x 1 ½” hex head bolts. Use ¼” washers under each bolt head and nut. Torque bolts to 12 ft-lbs. See Figure 22.

![Figure 22: Mount reverse motor mount](image)

11. Install the black ground strap with the supplied ¼”-20 x 1 ¼” and 5/16”-18 x 1” bolts. Use supplied washers. Secure the extra length of the ground wire to the left trunk floor brace. Make sure the ground wire will remain clear of the pulley and gear when the vehicle is in operation. See Figure 23.
12. Slide the gear center onto the pilot snout of the differential. Bolt the gear center to the differential with the supplied 3/8"-16 x 1” bolts. Use lock washers and blue Loctite 242. See Figure 24. Torque these bolts to 25-30 ft-lbs once you have the half shaft reattached. See Step 24.
13. Flip the left compressor mount bolt so that it is installed from the bottom. See Figure 25.

14. Attach the reverse gear to the gear center using the ¼” x 3/8” long shoulder bolts to locate the gear. The shoulder bolts must go through the indicated holes in the gear center. See Figure 26 and Figure 27. Look for the text that indicates the “outside” of the gear.
The outside text should face the tire and face away from the pulley. Installing the gear facing the wrong way will lead to gear damage. See Figure 28. Correctly installing the shoulder bolts is required for the electric reverse to operate properly. They must go in the position shown in Figure 26. Use a ¼” washer under the head of the bolt and a #10 washer under the nut. Tighten the shoulder bolts with a ¼” Allen wrench and 3/8” wrench.

![Figure 26: Shoulder bolt location](image)

![Figure 27: Shoulder bolt](image)
15. Install the four ⅜”-20 x 7/8” long bolts in the four remaining holes in the gear. Using 7/8” long bolts is required to ensure proper bolt clearance. Use ¼” washers under each bolt head and nut. Torque these bolts to 12 ft-lbs. See Figure 29.
16. Connect the red power lead from the reverse component panel to the electric motor. The power lead has an alternator style boot on its end. Cover the power lead connection with the alternator style boot. See Figure 30 and Figure 31.
17. Install the electric motor using the counter sunk screws and reverse motor washer. These screws require a 3mm Allen socket. Before tightening the screws rotate the motor to have a 1/8” gap between it and the differential. Torque these screws to 5 ft-lbs (or 60 in-lbs). Use blue Loctite 242 on these screws. See Figure 32, Figure 33, and Figure 34.
18. Measure the gear gap. The gap must be greater than 1/16”. See Figure 35. If it is less than 1/16”, uninstall the motor. Reinstall the motor with the supplied motor shim between the motor and the motor mount. Properly torque the countersunk fasteners and use blue Loctite 242. See Figure 35 and Figure 36. The ¼” holes on the shim are not used for anything.
19. Route and secure the power lead to protect it from any moving part such as the reverse gear. See Figure 37. Secure extra length with wire ties.

Figure 35: Measure gear gap

Figure 36: Motor shim

IF GAP IS LESS THAN 1/16”, INSTALL SHIM HERE

1/16” GAP MIN

1/4” HOLES NOT USED
20. Rotate the reverse gear by hand to check for any interference.

21. Apply a motorcycle chain lubricant all the way around the reverse motor gear and the reverse gear. See Figure 38.
22. Reinstall the top upright bolt and torque to 30 ft-lbs. See Figure 18.

23. Reinstall all six M8 CV joint bolts. Torque each bolt to 30 ft-lbs using a 6mm allen socket. See Figure 17.

24. Torque the four gear center bolts to 25-30 ft-lbs using blue Loctite 242. This will require the use of a crow’s foot with a torque wrench. See Figure 24.

Section C – Installing the Trike Kit

1. Install the trike kit per the Tomahawk Installation Instructions. Do not install exhaust, rear wheels, or body.

Section D – Making Electrical Connections and Finishing Install

Below, Figure 39 shows the reverse chassis harness and the neutral detect module.
1. Connect the reverse chassis harness to the reverse relay box (mounted to the reverse component panel). See Figure 40.

2. Connect the activation lead from the reverse chassis harness to the electric motor. See Figure 41 and Figure 42.
3. Route and secure the activation lead to protect it from any moving part such as the reverse gear. See Figure 43.
4. Connect the neutral detect module to the reverse chassis harness. Secure the module to the frame using wire ties. Orient the module so that the red LED can be seen through the access hole under the seat. See Figure 44.
5. Connect the male two pin connector, with the blue and black wires, on the reverse chassis harness to the female two pin connector on the relay harness. The female connector on the reverse harness will connect to the trunk door harness once the body is installed. See Figure 45.

![Figure 45: Accessory jumper harness connection](image)

6. Follow the appropriate step based on the year model of your motorcycle to connect the handlebar controls:

**2017 & DOWN MODELS: With the reverse activation switch activated, the horn button and start button are repurposed to operate the electric reverse.**

a. Locate the 3 VCM connectors under the seat. On the left most connector, find the yellow wire with a white stripe (pin 1). This is the starter button signal wire. Cut it about 1.5 inches from the connector. Place heat shrink on both sides of the wire and crimp the provided spade terminals onto both sides of the wire. The male terminal goes on the connector side of the wire and the female on the harness side. Apply heat to the heat shrink so that it conforms to the wire and connector. See Figure 46 for wire location.

b. Connect the yellow and green wires from the reverse harness between the two sides of the cut wire (yellow/white wire). The green wire from the reverse harness will plug into the connector side of the cut wire, and the yellow wire will plug into the harness side of the cut wire. See Figure 47 for wire splices. See Figure 51 for wire routing.
Figure 46: Starter and horn wire locations

PIN1 - STARTER BUTTON SIGNAL WIRE (YELLOW/WHITE)

PIN4 – HORN BUTTON SIGNAL WIRE (GRAY)

FORWARD

YELLOW WIRE TO HARNESS SIDE

ORANGE WIRE TO HARNESS SIDE

GREEN WIRE TO CONNECTOR SIDE

PINK WIRE TO CONNECTOR SIDE

Figure 47: Starter and horn wire splices.
c. On the right most VCM connector, locate the gray wire (pin 4). This is the horn button signal wire. Cut it about 1.5 inches from the connector. Place heat shrink on both sides of the wire and crimp the provided spade terminals onto both sides of the wire. The female terminal goes on the connector side of the cut wire and the male on the harness side of the cut wire. Apply heat to the heat shrink so that it conforms to the wire and connector. See Figure 46 for wire location.

d. Connect the orange and pink wires from the reverse harness between the two sides of the cut wire (gray wire). The pink wire from the reverse harness will plug into the connector side of the cut wire, and the orange wire will plug into the harness side of the cut wire. See Figure 47 for wire splices. See Figure 51 for wire routing.

2018 & UP MODELS: The electric reverse is operated by the addition of a button to both the left and right side handle bars.

a. Mount the handle bar switch to the left and right handle bar using the supplied switch, switch bracket, spacer and screw. Tighten the screw with the switch positioned just below the grip. See Figure 48 and Figure 49.

![Figure 48: Install the handle bar switch (right side shown, left side similar).](image)
Figure 49: Position the switch just below the handlebar grip (right side shown, left side similar).

b. Route the switch wires down the handlebars and under the fairing. Use zip ties to secure the switch wires to the brake line & clutch line.

c. On the reverse chassis harness, there is a long bundle of wires ending at two connectors that mate to the handle bar switch connectors. One connector has yellow and black wires, the other connector has orange and black wires. Route this bundle of wires under the gas tank and secure it to the frame. At the steering neck, plug the connector with the yellow and black wires into the right handle bar switch. Plug the connector with the orange and black wires into the left handle bar switch.

7. Locate the two pin gear position connector on the underside of the transmission. Disconnect the OEM connectors and install the mating connectors from the reverse harness in between. See Figure 50 for connections. See Figure 51 for wire routing.
Figure 50: Connecting to the neutral sensor

INSTALL REVERSE HARNESS CONNECTORS BETWEEN THESE OEM CONNECTORS
8. Connect the ground on the reverse harness to the frame. See Figure 52.
9. Follow the appropriate step based on the year model of your motorcycle to install the activation switch.

**2016 & DOWN MODELS: Fairing mounted activations switch.**

a. Remove the plastic plug located in the fairing just underneath the fog light switch. See Figure 53. Route the three activation switch wires (blue, brown, black) on the reverse harness along the frame, under the fuel tank, to the steering neck, into the fairing and out of the hole where the plastic plug was removed. Connect the red push button switch to the three wires. Mount the red switch in the hole where the plastic plug was removed. See Figure 55 for wire connections. Secure the wiring to the frame in several areas away from moving parts. Make sure to provide enough slack in the wire to allow for the fairing to move side to side without stretching or pinching the wires.

![Figure 53: Reverse activation switch mounting location for 2016 down models.](image)

**2017 & UP MODELS: Under gas tank mounted switch.**

a. Remove the chrome cover between the cylinders on the right side of the motorcycle. Mount the switch bracket to the 10 mm head fastener located under the cover at the circle. Keep the orientation of the bracket as shown in Figure 54. Route the three activation switch wires (blue, brown, black) on the reverse harness along the frame, under the fuel tank. Connect the red push button switch
to the three wires. Mount the red switch to the large hole in the bracket. See Figure 55 for wire connections.

Figure 54: Install the activations switch under the chrome cover.
10. Connect the power supply lead to the battery. The power supply lead has a battery terminal cover installed on its end. Cover the connection with the battery terminal cover. See Figure 56.

11. Check that the battery cables have a good connection to the battery posts. A poor connection will damage the battery and cables.
12. Double check that all hardware is properly torqued, all components have adequate clearance, and all components are properly installed.

13. Double check the reverse wiring harness and power leads. Make sure the wiring is neatly routed, properly secured, correctly connected, and clear of sharp edges, moving parts, and high temperature exhaust and engine components.

14. With the ignition key on and the engine off, put the bike in 1st gear, and test the operation of the activation switch. Turning the switch on and off should turn the switch light on and off. Check wiring if the light doesn’t turn on and off.

15. With the ignition key on and the engine off, put the bike in neutral, and turn the activation switch off. With the activation switch off, the horn and starter button should operate normally (2017 down models only). Check that they do.

16. With the ignition key on and the engine off, turn the activation switch on, and put the bike in first gear. With the bike in 1st gear the horn and starter button should operate normally (2017 down models only).

17. Install the rear tires. Leave the rear of the bike on jack stands. Secure the front tire if it is not already.

**WARNING:** DURING THE REVERSE TESTING IN THE FOLLOWING STEPS, BE SURE ALL HANDS AND CLOTHING ARE CLEAR OF MOVING PARTS. ANYTHING THAT IS CAUGHT IN THE MOVING PARTS MAY CAUSE SERIOUS BODILY INJURY.

NOTE: In the steps below, for 2018 up models, where the instructions say horn button, use the left side handlebar mounted switch. Where the instructions say start button, use the right side handle bar mounted switch.

18. Make sure the back of the bike is secure on jack stands. Check that both of the rear tires are not touching the ground and are free to rotate. Verify that all is clear of moving parts including the hubs, reverse gears, half shafts, pulley, belt, etc. With the ignition key on and the engine off, activate the reverse switch (It will light up). Put the bike in neutral. Press and hold the horn button and then press the engine start button. The reverse motor should engage the reverse gear and spin the differential and tires in reverse. Use an assistant and observe the gear for smooth operation. Be very careful around the moving parts.
19. Turn the ignition and activation switch off. Put the bike in first gear.

20. Install the exhaust. (See see Section A - Step 16 above)

21. Remove the jack stands, and set the bike down on the tires.

22. Test the reverse on the ground. Start the motorcycle. Activate the reverse switch. Put the bike in neutral. Check for a clear path behind you. Press and hold the horn button and then press the start button. The bike will back up as soon as the start button is pressed and will stop if either the horn or start button are released. Reverse is disabled by turning the activation switch off and/or putting the bike in gear.

23. Install the body if it isn’t already installed. (See Tomahawk Installation Instructions.)

24. Install the passenger floor board/foot pegs, side covers, and seat. See Section A – Preparing a Trike for Installation.

25. Clean the bike and thoroughly explain the operation of the electric reverse to the customer. Review the electric reverse section of the owner’s manual with the customer.

Section E – Adding Optional Battery Isolator Harness and 2nd Battery.

The battery isolator harness is designed to separate the electrical load from the reverse motor from the rest of the vehicles electrical system. This option adds a second battery and a small relay harness to integrate into the vehicle wiring. The harness keeps both batteries connected during normal driving conditions so they equally charge. When the reverse is activated, the 2nd battery is isolated from the existing motorcycle battery so the amp draw from the reverse motor does not impact the motorcycle ignition or create any low voltage type of trouble codes on the engines sensors. In addition, when the motorcycle starter is activated, the harness isolates the 2nd battery as well. This prevents a large amp draw from occurring in the small gauge wiring between the batteries.

1. Install the battery tray for the 2nd battery above the reverse relay box. The tray uses the trike frame mounting bolts and rests on top of the round trike frame cross member.
Remove the bolt, place the tray in position, then install the bolt through the frame and tray and tighten the nut. See Figure 57.

2. Install the 2\textsuperscript{nd} battery in the battery tray. Use the supplied hold down bracket and hardware to secure the battery in place.

3. Connect the power supply lead from the reverse motor circuit breaker onto the positive post of the 2\textsuperscript{nd} battery (you may need to remove the battery cable from the stock battery and move it to the 2\textsuperscript{nd} battery if it was previously installed). See Figure 56.

4. Connect the following wires on the isolator harness as described (See Figure 58):
   
   - Connect the red wire ring terminal with the fuse holder to the + side of the stock battery.
   - Connect the yellow wire ring terminal to the + side of the 2\textsuperscript{nd} battery.
   - Connect one black ground wire ring terminal to the motorcycle frame on a close by appropriately sized bolt.
   - Connect the other black ground wire ring terminal to the 2\textsuperscript{nd} battery negative side.
   - Connect the blue ¼” blade connectors to the reverse activations switch. You will have to reconnect the blue wire already on the activations switch to one of the two blue wire leads on the isolation harness (see Figure 55.)
• Connect one of the large ground wire to the motorcycle chassis on an appropriately sized fastener.
• Connect the other end of the large ground wire to the 2\textsuperscript{nd} battery negative side.

![Figure 58: Reverse isolation harness.]

5. Connect the 2\textsuperscript{nd} RELAY CONTROL wires based on the year model of your motorcycle.

• **2017 & Down Bikes:** Connect the ¼” blade connectors in line with the starter button signal wires previously installed. See Figure 47.
• **2018 & Up Bikes:** Connect the ¼” blade connectors in line with the Indian ECU starter relay control wires. The starter relay control wire is orange with a brown stripe. It can be found at Pin 41 of the ECM #1 connector, or it can be found on pin 35 of the motorcycle fuse box. See Figure 59.
6. Test the function of the isolation harness as follows:
   - With the activation switch off, check for continuity between the positive posts on both batteries. They should be connected.
   - With the activations switch on, check for continuity between the positive posts on both batteries. They should be disconnected.
   - With the activations switch off, check for continuity between the positive posts on both batteries. While checking for continuity have an assistant start the motorcycle. The batteries should be connected until the start button is pressed. When the start button is pressed, the batteries should disconnect.

7. Now is a good time to go back through the test procedures outline at the end of Section D above to make sure the reverse is still functioning correctly.

If you have any questions or concerns about the installation, please call Motor Trike at 1-800-90-TRIKE. Otherwise, wipe down the motorcycle, return it to your customer, and tell them to enjoy the ride!

Thank you for choosing the Tomahawk Electric Reverse for your Motor Trike Tomahawk Trike.
**REVISION LOG:**

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