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WELCOME

Congratulations on the purchase of your new TRiO front-end conversion from Tilting Motor Works! This brief manual tells you how to operate and maintain your vehicle for maximum safety and enjoyment. Tilting Motor Works may be abbreviated as TMW in this manual.

In this manual, the heading **WARNING** indicates a life-safety hazard with the potential for property damage, injury or death. The heading **CAUTION** alerts you to conditions that can damage your motorcycle.

**WARNING** YOU MUST READ AND UNDERSTAND THESE INSTRUCTIONS IN THEIR ENTIRETY TO OPERATE YOUR TRiO SAFELY. MAKE SURE YOU ARE FAMILIAR WITH ALL HANDLING CHARACTERISTICS DESCRIBED IN THESE INSTRUCTIONS BEFORE RIDING YOUR TRiO FOR THE FIRST TIME.

**WARNING** THIS PRODUCT IS FOR EXPERIENCED RIDERS ONLY. ONLY RIDERS WHO ALREADY HAVE THE BALANCE, STRENGTH, SKILLS AND CONFIDENCE TO SAFELY OPERATE A HEAVYWEIGHT TWO-WHEELED MOTORCYCLE SHOULD OPERATE THE CONVERTED VEHICLE. IT IS NOT SUITABLE FOR NOVICE RIDERS, OR FOR RIDERS WHOSE EXPERIENCE IS LIMITED TO CONVENTIONAL TRIKES, SPYDERS, SIDECAR RIGS, SCOOTERS, OR SMALLER MOTORCYCLES.

**WARNING** THE TRIO CONVERSION MAY ALTER THE HANDLING CHARACTERISTICS OF YOUR MOTORCYCLE. IT IS YOUR RESPONSIBILITY TO LEARN HOW TO USE AND MAINTAIN THE MODIFIED VEHICLE SAFELY, AND TO ENSURE THAT OTHER PEOPLE YOU ALLOW TO USE THE VEHICLE DO SO TOO. OPERATION OF THE VEHICLE BY UNPREPARED RIDERS MAY RESULT IN PROPERTY DAMAGE, INJURY OR DEATH.

**WARNING** THIS PRODUCT IS NOT DESIGNED OR TESTED TO ADDRESS THE SPECIFIC NEEDS OF PEOPLE WITH DISABILITIES. UNLIKE CONVENTIONAL TRIKES AND SPYDERS, THE TRiO CAN FALL OVER AND IS NOT SUITABLE FOR RIDERS WHO DO NOT HAVE THE FULL USE OF BOTH ARMS AND BOTH LEGS.

**WARNING** DO NOT RIDE THE TRiO WITH A PASSENGER UNTIL YOU HAVE FAMILIARIZED YOURSELF WITH THE HANDLING AS A SOLO RIDER.

**WARNING** UNLESS YOUR VEHICLE IS EQUIPPED WITH TMW’S TILTLOCK FEATURE, IT DOES NOT STAND UP BY ITSELF. YOU MUST HOLD THE BIKE UP OR USE THE KICKSTAND TO PREVENT FALLS RESULTING IN PROPERTY DAMAGE, INJURY OR DEATH.

**WARNING** YOUR TRIO IS DESIGNED FOR USE ON PAVED ROADS AND PARKING LOTS ONLY. IT IS NOT DESIGNED OR TESTED FOR USE ON DIRT SURFACES, GRAVEL SURFACES OR OFF-ROAD.
**WARNING** IF YOUR MOTORCYCLE WAS EQUIPPED WITH AN ANTI-LOCK BRAKING SYSTEM (ABS), IT MAY HAVE BEEN MODIFIED OR DISABLED AS PART OF YOUR TRiO CONVERSION. SEE THE “ABS” SECTION LATER IN THIS DOCUMENT FOR DETAILS. IF THE ABS WARNING LIGHT ON YOUR MOTORCYCLE IS LIT, ABS IS NOT AVAILABLE.

**WARNING** ON SOME MOTORCYCLES IT IS POSSIBLE TO DISABLE THE ABS WARNING LIGHT. IF YOU DO THIS, YOU SHOULD RE-ENABLE IT BEFORE SELLING YOUR TRiO OR ALLOWING OTHERS TO RIDE IT. IF YOU BOUGHT YOUR TRiO SECOND-HAND AND THE ABS WARNING LIGHT IS NOT LIT, IT DOES NOT MEAN THE ABS SYSTEM IS FUNCTIONING NORMALLY AS THE PRIOR OWNER MAY HAVE DISABLED THE LIGHT.

**WARNING** THIS VEHICLE IS NOT EQUIPPED WITH A PARKING BRAKE. IF THE TILTLOCK SYSTEM IS ENGAGED AND THE MOTORCYCLE IS NOT IN GEAR, IT CAN ROLL AWAY. ALWAYS PLACE THE MOTORCYCLE IN GEAR WHEN THE ENGINE IS STOPPED AND THE MOTORCYCLE IS UNATTENDED.

**WARNING** DO NOT ALLOW CHILDREN TO HAVE UNATTENDED ACCESS TO THE MOTORCYCLE. IF TILTLOCK IS ENGAGED AND THE CHILD SWITCHES IT OFF, THE MOTORCYCLE WILL FALL. IF TILTLOCK IS NOT ENGAGED AND THE MOTORCYCLE IS IN NEUTRAL, SWITCHING TILTLOCK ON WOULD ALLOW THE MOTORCYCLE TO ROLL AWAY.

**WARNING** WHEN POWERED ON, THE TILTLOCK SYSTEM AUTOMATICALLY ENGAGES AND DISENGAGES AT VARYING SPEEDS AS DESCRIBED IN THIS MANUAL. IT IS YOUR RESPONSIBILITY TO LEARN HOW TO SAFELY OPERATE THE VEHICLE IF SO EQUIPPED. IF YOU ARE UNCERTAIN HOW TO OPERATE THE TILTLOCK SYSTEM, YOU SHOULD LEAVE IT SWITCHED OFF.

**WARNING** IF YOUR MOTORCYCLE WAS EQUIPPED WITH AN AIRBAG, THE FORK SENSOR HAS BEEN REMOVED AND THE AIRBAG ITSELF MAY HAVE BEEN REMOVED OR DISABLED AS PART OF THE CONVERSION TO 3 WHEELS. THE AIRBAG WARNING LIGHT ON YOUR MOTORCYCLE INDICATES THAT THE AIRBAG WILL NOT FUNCTION TO SPECIFICATION.

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**Getting Started**

The TRiO comes in two versions, with and without TiltLock. Both versions lean and handle just like the original motorcycle while offering the stability and confidence of a Three-wheel stance.

Some of the benefits you can expect with your patented TRiO upgrade include the following:

- Better grip on the road for more secure cornering
- Dual perimeter rotors and two contact patches up front for better braking
- Coaxial A-arms for a plush ride with no fork dive and no bump-steer
• Improved tracking stability and resistance to crosswinds
• Improved visibility to drivers
• Improved crash protection in many collision scenarios

That all said, nothing holds up the base version except you and the kickstand; it can fall over just like a regular motorcycle!

TRiO with TiltLock offers all the same benefits—plus it keeps the bike upright at slow speeds and when stopped. You never have to put your feet down or support the weight of the bike.

If this switch is mounted on your handlebar, it means TiltLock is installed.

This manual describes how to operate and maintain both versions. Make sure you know which one you’re riding! You can tell if TiltLock is installed by the switch on the handlebar.

**NOTE:** Instructions for use of the TiltLock feature are found in Appendix A.

## Getting to Know your Trio

The TRiO conversion doesn’t change the seat height or attitude of the original bike. It does add about 100 lb. for the base version and 120 lb. with TiltLock. While the extra weight is carried down low, where you might not notice it most of the time, it can affect cornering at low speeds.

**WARNING** YOUR FACTORY-TRAINED DEALER HAS INSURED THAT THE CONVERSION KIT IS INSTALLED TO SPECIFICATION. ANY ALTERATION OR DAMAGE TO THE MOTORCYCLE FOLLOWING YOUR CONVERSION CAN CREATE UNANTICIPATED HAZARDS RESULTING IN PROPERTY DAMAGE, INJURY OR DEATH. For instance, adding “forward controls” or highway pegs that interfere with the lean of the vehicle or trap the rider’s foot can be very dangerous.
The front wheels are 36” apart on center and the overall width of the front end is 43”. While you will appreciate the maneuverability of the narrower stance compared to a regular trike or a Spyder, we don’t recommend lane splitting.

Both Harley-Davidson® and Honda® warn you not to tow a trailer with your motorcycle. You should not expect your TRiO conversion to improve the motorcycle’s handling characteristics while towing a trailer.

⚠️ **WARNING** TOWING A TRAILER IS DANGEROUS. YOUR MOTORCYCLE IS NOT DESIGNED OR APPROVED FOR USE WITH A TRAILER. TMW MAKES NO REPRESENTATION AS TO THE SUITABILITY OF THE CONVERTED VEHICLE FOR TOWING. TOWING A TRAILER CAN CAUSE YOU TO LOSE CONTROL OF THE VEHICLE RESULTING IN PROPERTY DAMAGE, INJURY OR DEATH.

Your TRiO-equipped motorcycle has a larger turning radius than the original bike. However, if you’re able to do a U-turn on a two-lane road on a two-wheeled motorcycle you should also be able to do it on the TRiO.

The overall length of the bike, and the wheelbase, may vary from the original by an inch or so. The trail is set at 5.0 inches. Because the third wheel acts as an extra gyroscope, at speed the vehicle may take slightly more effort to turn.

If the original bike had ABS, its operation may have been altered or disabled as part of the TRiO conversion or during operation of the vehicle. In that case the ABS warning light will be lit and you should not expect any ABS assistance. See the ABS section later in this manual for further information.

If the original bike had an airbag, any fork-mounted sensor has been removed as part of the TRiO conversion. The airbag warning light will be lit, and the airbag will not function to specification.

Your TRiO system does not include Tire Pressure Management System (TPMS) sensors. If the motorcycle has a TPMS system, the front sensor will be missing and a warning light may be lit.

⚠️ **CAUTION** DO NOT ADD AFTERMARKET EXTERNAL TPMS SENSORS THAT CAN CONTACT THE CALIPER AS THE WHEEL ROTATES. THE VALVE STEM WILL BREAK OFF AND THE TIRE WILL DEFLATE.

**First Ride**

Here are three important tips to keep in mind as you get on and ride for the first time.

1. **Look straight ahead!** When you set off, don’t be looking down at the new front end; you can’t get your balance that way. There’s nothing you need to monitor, nothing you need to do to get underway that’s any different than a regular motorcycle. Forget you’re on three wheels, look straight ahead and get your balance as you always do.
2. **Use that throttle**! Don’t be tentative when you’re trying it out for the first time. As with any motorcycle, you need to get under way promptly to get your balance.

When turning at low speeds, as in a parking lot, you’ll feel the extra weight. Pay close attention when making slow turns. Don’t let gravity pull you down!

3. **Watch the line**! If you’re used to riding the centerline or the white line on the shoulder, back it off a little bit. You can forget you’re on three and run a wheel over the line by mistake. If you catch a little gravel on the shoulder, just ride out of it. The other two wheels remain squarely on the pavement.

**WARNING**  YOU MUST NOT ALLOW YOUR FEET TO CONTACT EITHER FENDER. IF YOUR FOOT INTERFERES WITH THE MOVEMENT OF EITHER FRONT WHEEL, YOU MAY BE UNABLE TO STEER THE VEHICLE. YOU MUST REMOVE OR EXTEND ANY HEEL SHIFTER OR FLOORBOARD RAILING IF IT COULD TRAP THE FOOT AGAINST THE FENDER.

**WARNING**  ON CERTAIN MOTORCYCLES YOU CANNOT SEE THE FRONT WHEELS OF THE TRIO. YOU MUST REMEMBER WHERE THEY ARE TO AVOID RUNNING INTO CURBS AND OTHER OBSTRUCTIONS.

When you’re underway, you’ll find the bike leans and countersteers just like it used to. To go right, push the right handgrip and feel the bike lean to the right. To straighten up again, push the left handgrip.

**NOTE:** For a refresher course on countersteering, we recommend the book “Proficient Motorcycling” by David Hough.

### Routine Maintenance

#### Tools

Tilting Motor Works recommends you always carry a selection of everyday tools when you ride, so minor inconveniences don’t turn into major headaches. These include:

- The **hub cap wrench** included with your conversion. If you need to repair a flat tire it will come in handy.
- A selection of **allen wrenches** to fit all the allen head bolts used in the conversion. All TRIO kits use SAE standard (i.e., not metric) sizes. Honda Gold Wing conversions utilize some metric fasteners.
- A **ratchet handle** and a selection of **sockets** to fit various hex bolts used in the conversion.
- An open-end **adjustable wrench** or a selection of common open-end wrenches. These might be used to grip the nuts on the bodywork or other fasteners.
- **Pliers** to remove the cotter pin on the wheel in the event of a flat tire.
At home you’ll want to have some **anti-seize compound** on hand for use in threading the hub caps onto the wheels. You’ll also want a small tube of **threadlocker** such as blue Loctite™ #242 to secure any fasteners that might vibrate loose.

Note: Blue Loctite #242 actually comes in red containers! So does red Loctite, which is used only on fasteners that are not expected to be removed in normal use and maintenance. Make sure you have the correct type on hand.

**Fasteners**

Your motorcycle vibrates. A lot. That vibration can shake fasteners loose, and it’s up to you to check them frequently to make sure everything is tight.

Before every ride, hold the bike vertical and wiggle the handlebars back and forth. There should be no free play, and you should see the motion of the bars transmitted via the steering column and the tie rods out to the wheels.

⚠️ **WARNING** If you detect any free play, it usually indicates that a fastener has come loose somewhere in the steering linkage; you need to find it and tighten it before riding. Here are some places to look:

- Anchor bolts at each end of each tie rod, including the bolt affixing the universal joint to the steering column
- Bolts attaching the steering yoke to the steering column
- Screws affixing the steering column to the underside of the triple tree

Usually the loose fastener is easy to find if you inspect both ends of the steering column and the tie rods while a friend wiggles the handlebars. You will see that the steering column or the tie rod wiggles on one side of the loose fastener and not the other. Tighten it up firmly and you’re on your way. If the same fastener comes loose again, remove it and add blue Loctite to the threads before replacing it.

Blue Loctite is not needed on fasteners that are secured with nylon-insert locknuts.

Here are a few other places to check routinely for loose fasteners:

- All fasteners affixing the TRiO frame to the frame of the bike
- Fasteners affixing the fender bracket to the top of the spindle housing
- Screws affixing the fenders to the fender brackets
- Caliper bolts
- Jam nuts securing the rod ends to the tie rods
- Screws affixing the triple tree to the down tubes
- Bolts attaching the lower rocker plate to the main arch support
**NOTE:** Avoid over-tightening. Fasteners can be snugged down securely without using great force.

**Wheels and Tires**

Observe the wear pattern on the front tire treads to verify that your TRiO remains correctly balanced and aligned. The wear surface should be centered on the tread, wearing evenly from side to side, with no evidence of scuffing or cupping. If you detect irregular tread wear, contact your TRiO dealer for instructions. You may be asked to provide photographs to help with diagnosis.

Tires are inflated to 36 lb. of pressure and spin-balanced at installation with wheel weights. Carry a tire pressure gauge and check tire pressures frequently.

**WARNING** TIGHTEN VALVE CAPS SECURELY AFTER CHECKING TIRE PRESSURE OR ADJUSTING TIRE PRESSURE. IF A VALVE CAP COMES LOOSE, IT CAN CONTACT THE CALIPER AS THE WHEEL ROTATES AND BREAK OFF THE VALVE STEM CAUSING A SUDDEN TOTAL LOSS OF PRESSURE. THIS CAN RESULT IN LOSING CONTROL OF THE VEHICLE WITH POTENTIAL FOR PROPERTY DAMAGE, INJURY OR DEATH.

Tires should be replaced when the grooves in the tread have worn down to less than 1/16th inch, or if skidding has worn a flat patch on the tread. Tires with foreign objects penetrating the tread or sidewalls cannot be repaired and must be replaced.

**NOTE:** Step-by-step instructions for removing the wheels are found in Appendix C.

If worn, you should replace both front tires at the same time. Factory original equipment is Dunlop American Elite 130/80B17. This tire is available in blackwall and white-striped versions; there is no whitewall version.

Tires are directional, and care must be taken to mount them properly to insure correct rotation on the left and right front wheels. The wheels themselves are identical; it doesn’t matter which wheel is used on the left and which on the right as long as the rotation of the tires is correct. Look for the directional arrow on the sidewall.

You can expect the front tires to wear much more slowly than the rear tire, so don’t gauge the condition of the rear tire by looking at the fronts. Inspect the rear tire frequently for signs of excess wear.
**Alignment**

The tie rods connecting the steering shaft to the wheels never need adjusting. If a locknut comes loose, tighten it down without turning the tie rod itself. The tie rod has flats that can be gripped with an open-end wrench to hold it stationary.

Any type of wobble is cause for concern. Certain two-wheeled motorcycles are known to wobble at the rear end under certain circumstances, and the TRiO conversion does not change that behavior. For instance you may find that riding a “tar snake” with the rear wheel sets up a wobble, when riding it with the front wheel does not.

Rutted pavement can produce unexpected wobbles also. You should experiment with the tracking of the wheels relative to the ruts to find the most secure position.

Large vehicles like tractor-trailers and RVs can produce significant air turbulence at speed, sometimes leaving a wake hundreds of feet long. The buffeting you experience when following such vehicles can produce all kinds of unwanted handling characteristics, so steer clear.

**WARNING**  Persistent wobbles that can’t be attributed to specific maneuvers or road conditions may indicate that something is coming loose! Do not continue riding without checking for loose fasteners. If nothing is found, consult your dealer.

**Brakes**

Motorcycle braking systems are configured very differently from one model to the next. Features such as ABS, proportional braking, and fork dive sensors are handled in different ways when installing your TRiO, and it’s not practical to list them all here. Instead, here are a few basic rules:

- If your bike was equipped with factory ABS, it was disabled in the installation of the standard TRiO. It is retained when installing TRiO with TiltLock on certain Harley-Davidson models. If you retrofit the standard TRiO to add TiltLock on those Harley models, ABS will be reinstated. See the “ABS” section in Appendix A for more information.
- On Honda motorcycles, linked braking is disabled. This means that the front brake lever controls only the front wheels and the rear brake pedal controls only the rear wheel. You may need to adjust your braking style to apply more foot pressure to the rear brake pedal than you did before.
- The front fork is removed in all TRiO installations, as are any fork dive sensors. Since there is no fork dive on a TRiO, compensating for fork dive is no longer necessary.

The front brake lever should normally feel quite firm. However, there are situations where the braking might become quite soft. Specifically, making very tight turns at very low speed can make the front brake lever seem unresponsive. This usually occurs when wheeling a bike around a garage or when
backing out of a driveway while turning hard. One squeeze of the brake lever is all it takes to recover full function.

**WARNING**  IF THE FRONT BRAKE LEVER FEELS UNRESPONSIVE, DO NOT SIMPLY HOLD IT OR SQUEEZE HARDER. INSTEAD, RELEASE THE LEVER AND SQUEEZE IT AGAIN.

Check the brake fluid in the handlebar reservoir using the procedure recommended by the manufacturer of the motorcycle. If you detect any loss of fluid, check for leaks at all brake line fittings and at the caliper. Should you detect any leaks, contact your authorized TRiO dealer for instructions.

**Replacing brake pads**

To replace the brake pads, first remove the wheel as described in Appendix C. Then, use a ¼” allen key to remove the center pin from the caliper. The pads can then be removed easily.

Replace with aftermarket pads designated FA345HH. Your conversion uses high-performance pads from EBC, which are widely available through any motorcycle dealer. Insert the new pads and replace the center pin. Reinstall the wheel and the caliper as directed in Appendix C.

**Bearings**

Your TRiO includes several types of bearings with differing maintenance requirements.

**Wheel bearings.** Each wheel uses two Timken bearings, part #11949. The bearings and races should be inspected and regreased whenever you replace the front tires. Once the wheel has been removed, nothing retains the outside bearing and it can be removed easily. To get to the inside bearing, remove the circular oil seal with only your fingers to avoid damaging it. If the seal is damaged, replace it using a new size 8860 seal from a manufacturer such as SKF.

Clean the bearings in a solvent and allow to dry. Then pack each bearing liberally with clean, good-quality wheel bearing grease before replacing.

**Steering bearings.** Your TRiO uses one or more cylindrical needle bearings around the steering shaft or shafts (depending on your model). They should be inspected and regreased every 25,000 miles by removing the steering shaft or shafts. This operation is best left to your TMW authorized dealer.

**Rocker plate bearings.** The large aluminum rocker plate is affixed to the bottom frame tube with shoulder bolts that pass through ½” sealed needle bearings. These bearings should be inspected and regreased every 25,000 miles, and this work should be left to your TMW authorized dealer.
**Universal joint bearings.** Front and center on your TRiO kit is a universal joint that employs several sealed roller bearings. They are unlikely to need maintenance or replacement over the life of your motorcycle.

**A-arm pivot bearings.** The A-arms are affixed to the frame tubes using Teflon-lined spherical bearings that require no maintenance. Do not use lubricants such as WD-40 or oil here as they can contaminate bearing surfaces.

**Rod ends.** The A-arms are affixed to the wheels with Teflon-lined rod ends (also known as Heim joints) that require no maintenance. Do not use lubricants such as WD-40 or oil here as they can contaminate bearing surfaces. The same is true of the smaller rod ends used at the ends of the horizontal tie rods.

**NOTE:** If you detect free play in the steering and find no loose fasteners, contact your factory-trained TRiO dealer about replacing the rod ends on the tie rods. This shouldn’t occur before 30,000 miles and is best left to your TMW authorized dealer, as the front end needs to be realigned using specialized tools after replacing the rod ends.

**Shock absorbers**

Your TRiO is equipped with premium shock absorbers from Progressive Suspension. Both the pre-load and the rebound damping are adjustable. You should adjust them to fit your typical riding style and payload, taking into account also the types of roads you expect to encounter.

Damping can be used to alleviate the chattering that occurs as wheels bump up and down on rough surfaces, especially when cornering. This chattering reduces traction and should be addressed.

Heavier bikes, heavier riders and riders with passengers typically need greater pre-load and less damping.

Lighter bikes and lighter riders will want less pre-load and more damping.

TRiO kits are adjusted for middle of the range of the pre-load and middle of the range in damping when they leave the factory. To adjust the pre-loading and damping, please consult Progressive Suspension’s instructions attached as Appendix D.
Transporting your TRiO

The TRiO can be difficult to tie down and transport successfully in a trailer unless you’re prepared.

First, you’ll find that you can’t push the TRiO up against the front wall of a trailer because the bodywork contacts the wall before the wheels do. In a pinch you can put some blocks in front of the wheels, but they have a way of moving around in transit and then the bike falls over. Don’t let it happen to you!

At Tilting Motor Works we use two Condor chocks spaced 36” apart for roll-on/roll-off simplicity. If they’re bolted securely to the floor it only takes one person to load and unload a bike.

Make sure to strap the bike down securely at the rear, pulling it forward against the chocks. Run the straps to anchor rings that are bolted through the floor, not just screwed in.

If You Drop the Bike

It happens to the best of us. You might be taking a corner at low speed when a pedestrian steps off the curb, and you have no choice but to put a foot down, or maybe even drop the bike and jump clear. If the bike does go over, it will usually come to rest at about a 45 degree angle on the floorboard support and the underside of the saddlebag with no visible damage. A Honda Gold Wing will usually come to rest on the rear crash bar. TRiO with TiltLock can right itself from this position; if you don’t have TiltLock, check out Harley-Davidson’s recommendations for picking up a dropped motorcycle at https://www.youtube.com/watch?v=ndRF64N-PmQ.

For All You Stunt Riders

TRiO won’t restrict your bike’s lean angle when cornering at speed, so go ahead and scrape the floorboards if you like. The extra traction up front is your friend. You can even drift the rear end a little. But skip the low-speed hot-dogging and the traffic-cone challenge courses.

While the bike can lean over just fine in the turns, it doesn’t have full lean when the handlebars are turned hard at low speed. Do yourself and the bike a favor and learn where the limits of travel are on your own time—not when your friends are there pushing you to show what it can do.

**WARNING**  DO NOT ATTEMPT MANEUVERS REQUIRING THAT YOU TURN THE HANDLEBARS HARD WHILELEANING HARD. TYPICALLY THESE ARE LOW-SPEED PARKING-LOT OR TRICK MANEUVERS. THE BIKE WILL HIT ITS LEAN STOP, RESTRICTING THE STEERING, AND YOU WON’T BE ABLE TO ACCELERATE OR STEER OUT OF THE TURN. THE BIKE MAY FALL, RESULTING IN PROPERTY DAMAGE, INJURY OR DEATH.
More Information

Tilting Motor Works is always interested in hearing from you about any unexpected or newly discovered handling characteristics of the TRiO, and we will make every effort to answer any questions you may have as quickly as possible. Just write to info@TiltingMotorWorks.com, describe the situation as clearly as possible, and let us know how best to reach you. We may ask for additional information and/or photographs to learn more about what you’re experiencing.

For service to your TRiO, or warranty claims, write to us at info@TiltingMotorWorks.com or call us at 360-302-3008 so we can help get you back on the road.

We always welcome photos of you and your new ride on our Facebook page. Just go to Facebook.com/TiltingMotorWorks and show off your ride!

Thanks for being a customer and we’ll see you on the road.
APPENDIX A

TILTLOCK

**WARNING** YOU MUST READ AND UNDERSTAND THESE INSTRUCTIONS IN THEIR ENTIRETY TO USE TILTLOCK SAFELY. MAKE SURE YOU ARE FAMILIAR WITH ALL OF THE HANDLING CHARACTERISTICS DESCRIBED IN THESE INSTRUCTIONS BEFORE RIDING WITH TILTLOCK FOR THE FIRST TIME.

The TiltLock system is designed to hold the bike upright at slow speeds and when stopped, so you don’t have to put your feet down or support the weight of the bike.

TiltLock functions ONLY when switched on at the handlebar. When the switch is turned off, the only things supporting the bike are you and the kickstand. Without TiltLock engaged, a TRiO can fall over just like any two-wheeled motorcycle.

When switched on, TiltLock only holds the bike upright at speeds below 7 mph, when stopped, or when traveling in reverse. It does not control or affect the lean of the TRiO at speed. It is possible to experience a low-side or high-side crash at speed just as it is on a two-wheeled motorcycle.

TiltLock locks and unlocks automatically as you ride. It requires training and practice to use safely and effectively. It is your responsibility to learn how to use the system under controlled circumstances, such as in large parking lots or on empty roads, before attempting complicated maneuvers in traffic. Review and practice each of the training exercises that appear later in these instructions until you’re comfortable with the operation of the system in all conditions.

You should not allow others to ride your TRiO with TiltLock switched on unless you know they have studied these instructions and you have answered their questions. If you sell your TRiO, you should recommend that the buyer obtain training at an authorized TRiO dealer.

**WARNING** A TRiO CONVERSION, EVEN WITH TILTLOCK, DOES NOT FUNCTION LIKE A CONVENTIONAL, NON-LEANING TRIKE OR A CAN-AM SPYDER. YOU MUST HAVE THE STRENGTH, THE VISION AND THE BALANCE TO OPERATE A CONVENTIONAL HEAVYWEIGHT MOTORCYCLE AT ANY SPEED IN ORDER TO OPERATE THE TRiO.

**WARNING** IF YOU ARE UNCERTAIN HOW TO USE TILTLOCK OR HOW IT WILL RESPOND IN CERTAIN CONDITIONS, SWITCH THE SYSTEM OFF AND RIDE THE VEHICLE LIKE A REGULAR MOTORCYCLE. YOU WILL HAVE TO PUT YOUR FEET DOWN WHEN STOPPED TO SUPPORT THE WEIGHT OF THE BIKE.
BECAUSE IT LEANS, THE TRIO IS NOT SUITABLE FOR RIDERS WHO MIGHT FALL OFF IN A QUICK STOP. EVEN THOUGH THE TRIO CAN RIGHT ITSELF, THE RIDER MUST HAVE THE STRENGTH TO REMAIN ON THE BIKE.

**WARNING** DO NOT ATTEMPT TO ALTER OR OVERRIDE THE FUNCTIONALITY OF THE TILTLOCK SYSTEM AS INSTALLED BY YOUR AUTHORIZED TMW DEALER. THE SYSTEM IS CAREFULLY CALIBRATED TO ACCOUNT FOR MANY SPECIFIC RIDING CONDITIONS AND SITUATIONS. ALTERING SYSTEM BEHAVIOR MAY CAUSE YOU TO LOSE CONTROL OF THE BIKE, RESULTING IN PROPERTY DAMAGE, INJURY OR DEATH.

**System Description**

TiltLock uses a hydraulic system to hold the bike upright. The system uses sophisticated sensors to measure speed, steering angle and lean angle. They are also used to calculate acceleration and deceleration and indicate the direction of travel. All of these inputs are used to determine whether, at any given moment, the system should be LOCKED and supporting the bike or UNLOCKED and free to lean.

The LED indicator light on the handlebar switch indicates the system status as follows:

- **GREEN** means locked.
- **BLUE** means unlocked.
- **FLASHING RED** indicates a system fault. The system can still be used but redundancy is lost and the issue must be addressed.
- **SOLID RED** indicates a system fault requiring that you switch the system off and consult with your authorized dealer.

With practice you will learn to recognize when the system is locking and unlocking, and you will learn to control when it occurs. It is important to anticipate how your actions might cause the system to lock or unlock so it doesn’t happen unexpectedly.

If you started with the standard TRiO conversion and upgraded to TiltLock, you will feel a little more resistance to leaning at low speeds due to the resistance of the hydraulic cylinders. This can be disconcerting at first as you negotiate tight corners, but as you ride a little more the handling will become second nature once again. At higher speeds you are unlikely to notice any resistance.

TiltLock has two fuses located on its power cables, near the battery. One is a 5.0 amp fuse protecting the circuit board and the other is a 15 amp fuse on the power line to the hydraulic pump. If either fuse blows, do not replace it until the reason for the surge has been identified and the underlying problem has been addressed. You will not be able to use the TiltLock system until the blown fuse is replaced. The ABS equipped bikes have an additional 2amp fuse that is connected to power that is switched on by the ignition.
Turning the System On

TiltLock is independent of the ignition. It must be turned on and off separately using the handlebar switch. It will not turn off when you turn off the ignition.

Prepare to turn on TiltLock in one of these ways:

- The engine is stopped, with the bike on the kickstand and in gear (if the bike is in neutral, it can roll away). You can be sitting on the bike as it levels, but it is not recommended that a passenger be on the bike too.
- The bike is stationary and upright with you supporting it (with the engine running or not).

Turn TiltLock on by pressing the rocker switch on the left handlebar. On the handlebar switch, “—” is on and “O” is off.

At startup, the LED light will blink through several colors as TiltLock checks the sensors. If the bike was on the kickstand, you’ll hear the hydraulic pump as the bike rights itself. When TiltLock is operating correctly and locked, the light will glow steadily green.

**WARNING** IF THE LED IS NOT GREEN AT STARTUP, TURN TILTLOCK OFF AND CONTACT YOUR DEALER. You can still ride the bike without TiltLock. A red light, or no light, indicates a system fault and TiltLock must not be used until the problem is identified and resolved.

If you are not on the bike, you can now get on. Once you are on the bike, the passenger can get on. **Don’t forget to raise your kickstand once on the bike.**

**NOTE:** The bike is not rigid when locked; you will be able to rock the bike slightly to the left or right as you compress the front shocks. If you lean to one side, the system will counteract your motion.

If you turn the handlebars, you’ll find the bike leans slightly in that direction. This is to assist in making sharp right or left turns from a stop. See the TiltSteer™ section below for more detail.

Turning the System Off

As a general rule, you should turn off TiltLock whenever you turn off the ignition. There’s no problem leaving the bike standing there on TiltLock if you’re getting gas or getting off the bike for a few minutes. But you shouldn’t leave it for hours or overnight or it will drain the battery.

**WARNING** IF THE BATTERY FAILS OR IS DISCONNECTED WHILE TILTLOCK IS ON, THE SYSTEM WILL UNLOCK AND THE BIKE WILL FALL OVER WITH POTENTIAL FOR PROPERTY DAMAGE, INJURY OR DEATH.
**WARNING** DO NOT USE TILTLOCK TO SUPPORT THE BIKE WHEN PERFORMING MAINTENANCE OR REPAIRS. IN THE EVENT OF BATTERY FAILURE OR SYSTEM FAILURE, THE BIKE COULD FALL ON YOU CAUSING PROPERTY DAMAGE, INJURY OR DEATH.

To turn off the system, first come to a stop, turn off the engine and make sure the bike is in gear so it can’t roll away. If desired, you can turn the handlebars to the left to make the bike lean slightly to the left. Then do one of the following:

- Get off and put the kickstand down. Pull the left hand grip toward you as you turn off the TiltLock switch, easing the bike onto the kickstand.
- Stand up, straddling the bike, and put down the kickstand. Turn off the TiltLock switch while easing the bike to the left, and the bike will settle onto the kickstand beneath you. Get off the bike.

**Operating Characteristics**

Detailed training exercises can be found in Appendix B, explaining how to start, stop and maneuver with TiltLock. You must review and practice these exercises until you are proficient. Until then, here’s a quick summary of how the system behaves:

- The system is **ALWAYS LOCKED** below 1 mph, when stopped, or when moving backwards.
- The system is **ALWAYS UNLOCKED** when moving forward at speeds above 7 mph.

Between 1 mph and 7 mph, the system may be locked or unlocked depending what you’re doing:

- You can move around a parking lot at very low speed (less than 7 mph) and the system will remain locked as long as you don’t hit the throttle and accelerate quickly.
- If you accelerate hard anywhere in the 1 mph to 7 mph range, it will unlock instantaneously.
- It will lock anytime you’re decelerating below 7 mph.

What does that mean?

When you set off for the first time, look straight ahead and don’t set off tentatively. If you throttle as you normally do on two wheels, you’ll quickly accelerate through the 1 mph threshold and TiltLock will release just about the same time you’d normally put your feet up. If you’re going straight you probably won’t feel or hear it. The green light will turn blue, indicating that the system is unlocked and operating normally. You still have to get your balance just as you did on two wheels.

As you slow to a stop at a traffic light or a stop sign, you will see the blue light turn green—right around the time you might normally put your feet down. You no longer have to put your feet down; instead, leave them where they are and the bike will support itself. The system is designed to bring the bike vertical to the horizon even if the road surface is sloping to the left or the right.
Until you get the hang of it you might not trust TiltLock to hold you up at a stop. It’s okay if you put your feet down for a while, but it’s not necessary and pretty soon you’ll get used to leaving them on the pegs or the floorboards. You do have to keep your balance as you slow down to 7 mph. But once you see the green light go on you can relax, knowing that the system will hold you up.

With your motorcycle in first gear and the clutch all the way out you are almost certain to be traveling more than 7 mph. So as a general rule of thumb: if the clutch is out, you’re unlocked.

**TiltSteer**

The TiltSteer feature makes it easier to complete a sharp turn from a standing start. When stopped at an intersection, turn the handlebars to the right or left until the bike leans slightly in the direction the handlebars are turned. Turn the handlebars a little further and it will lean more, up to about three degrees off vertical. While it may be unfamiliar as a motorcycling technique, you’ll find that by accelerating briskly from this position you can get around the corner with a tighter turning radius.

TiltSteer is only operational when stopped or when traveling up to 1 mph. It does not function when moving in reverse, and it does not function when traveling at speeds greater than 1 mph.

⚠️ **WARNING** YOU MUST LEARN AND PRACTICE THIS MANEUVER UNDER CONTROLLED CIRCUMSTANCES BEFORE ATTEMPTING IT IN CROSS-TRAFFIC. IF YOU GO TOO SLOWLY YOU WILL NOT ACHIEVE THE TURNING RADIUS NEEDED TO STAY IN YOUR LANE WHILE MAKING A RIGHT TURN, OR YOU WILL DROP THE BIKE.

Make sure you’re in first gear, and that you have a good grip on the throttle. Don’t lose your nerve or lose momentum part way through the turn, because you’ll be leaning in and not traveling very fast as you set off; if you let off the throttle while traveling faster than 7 mph, the bike will drop just like a two-wheeler. Instead, accelerate smoothly out of the turn and straighten up as you normally would.

Observe a two-wheeled motorcycle negotiating a hard right turn from a standing stop and you’ll see the rider leaning into the turn at low speed. TiltSteer operates similarly. Remember that with the TRiO you’re carrying an extra 120 lb., so you have to be prepared to balance the bike accordingly.
In general, you’re always well advised to set up for a sharp turn by swinging wide as you come to a stop and getting the bike pointed in the direction of the turn.

If the intersection is on a hill, remember that TiltSteer is cancelled when moving in reverse. You could roll up to a stop sign with the intention of making a hard right turn, and turn the handlebars to the right to pre-lean the bike. If you then roll back a few inches, the bike will straighten up. Don’t try to make the turn just then; instead, wait a second or two after the bike stops rolling backward and TiltSteer will take over again. If you’ve rolled back too far, straighten out and move back up to the line before turning the bars and pre-lean again.

Moving in Reverse

If you’re moving backwards, TiltLock will stay locked regardless of speed or acceleration. It will continue leveling if the surface is sloped to either side. This makes it easy to back downhill out of a driveway, for instance. TiltSteer does not function when moving in reverse.

Moving the Bike While Not Riding

You might find TiltLock useful in moving your bike around the garage or out of a parking space. Just switch it on and you can push the bike any way you like. As long as you’re going backwards, it won’t unlock at any speed. But if you’re going forwards, take care not to push the bike downhill or it could accelerate and unlock while you’re pushing it.

U-Turns

When going into a U-turn from a stop, turn the handlebars fully to the left or right. With the handlebars turned in this way, TiltLock bypasses the acceleration function and stays locked until 7 mph. TiltSteer automatically leans the bike slightly into the direction of the U-turn (i.e. slightly to the left on a left U-turn). TiltLock will release as you accelerate out of the U-turn, either because you straighten out or because you start moving faster than 7 mph. Try this maneuver at varying speeds in an empty parking lot to understand what happens as TiltLock releases at various points in the arc of the U-turn. With practice you will find a speed and a turning radius and an acceleration pattern that works well for you.

When decelerating into a U-turn, be aware that TiltLock will begin locking and leveling as you slow down through 7 mph. The ideal point to lock is when you’re just entering the turn and have started to lean slightly.
As you turn the handlebars, TiltLock will maintain the lean while you complete the U-turn and release as above when you accelerate out of the turn.

Parking

When learning how to use TiltLock, come to a full stop in front of the parking space you want. Then turn the handlebars full left or full right and slowly pull in. Once you are more familiar with TiltLock you can pull directly into the parking spot without stopping. If you’re leaning as the bike decelerates through 7 mph, TiltLock will lock and begin leveling as you slow to a stop. However, you may find yourself leaned over at a full stop and will have to hang on while the bike rights itself. Do not pull into a parking lot stall quickly with the bike leaned over in this way until you understand how the system will behave.

Potholes and Bumpy Surfaces

You may find yourself in a campground, or on a street that’s in poor repair, with a lot of potholes or surface irregularities. Here are two strategies for dealing with the situation:

1. Go EXTREMELY slowly, potentially as slow as 1 or 2 mph. The hydraulic system is well equipped to level the bike as you go along, but it won’t be able to keep up if you’re moving too fast. A deep pothole, if you go through it too quickly, can produce strong side-to-side thrust that makes it difficult to hang onto the bike. Just take it easy and you’ll be fine.
2. Accelerate to greater than 7 mph so TiltLock is disengaged and ride through the area without hesitation. The front suspension of the TRiO handles these situations well, and if you can stand up off the seat a little bit you won’t get jolted by the rear wheel. Just go straight and let the suspension do the job. This is a good approach on washboard surfaces or other mildly bumpy surfaces where traveling greater than 7 mph isn’t too difficult.

Slippery Surfaces

⚠️ WARNING EVEN WITH TILTLOCK, YOUR TRIO-EQUIPPED MOTORCYCLE IS NOT SUITABLE FOR USE ON ICY OR SNOWY SURFACES.

⚠️ WARNING WHEN SKIDDING WITH THE FRONT WHEELS LOCKED UP, SUCH AS ON SNOWY OR ICY SURFACES, TILTLOCK WILL ENGAGE AND BRING THE BIKE VERTICAL. MAKE SURE YOU UNDERSTAND THIS BEHAVIOR BEFORE YOU ENCOUNTER THE SITUATION.
If the front wheels lock up and skid on a slippery surface, the speed sensors will indicate a speed of zero and TiltLock will begin to lock and level. Depending on circumstances, this can be a very positive or a very negative thing.

On the plus side, TiltLock can help you stay upright while skidding where a two-wheeled motorcycle would immediately fall.

On the negative side, you may spin to some degree while sliding and regain traction as you exit the slippery area. This can cause a high-side accident.

Your choice is whether to keep the brakes locked up, thus keeping TiltLock engaged, or to release the brakes and let the wheels roll so that TiltLock stays disengaged. This is similar to deciding whether sliding or rolling will produce a better outcome in an automobile. We can’t advise you here on exactly how to handle every possible situation but encourage you to think through how skidding affects TiltLock before you need to decide.

**Stop and Go Traffic**

TiltLock can be a big convenience in stop and go traffic—whether it’s on the freeway at rush hour, cruising the main street at a motorcycle rally, or just approaching a four-way stop in a long line of cars. You won’t have to put your feet up and down all the time.

As a general strategy, leave as much room as you can between you and the car in front of you. That will allow you to accelerate and decelerate smoothly, and you will know when to expect TiltLock to engage and disengage. You may choose to putter along at 5 mph and leave TiltLock locked up, or you may cruise along at 8 or 9 mph using your own balance.

You may encounter situations where you’re constantly accelerating and decelerating at slow speed. This means TiltLock will be coming on and off frequently. As you gain familiarity with the system, using it should become second nature.

**Sudden Stops**

Sudden straight-line stops pose little difficulty with TiltLock. But if you’re leaning hard and suddenly have to come to a stop, hang on tight! Let’s say you’re accelerating through a hard right turn at a light when a pedestrian steps off the curb into your path. On a two-wheeled motorcycle, you might have no choice but to hit the brakes and throw your foot out. With TiltLock, you’ll be locked and leveling as soon as your speed drops below 7 mph. If you’re able to hang on, the bike will right itself with you on it. You don’t have to put your feet down. You can make a slow-speed turn to get straightened out and then be on your way.
It can happen that with all your body weight leaned in at slow speed, you’ll lift the outside wheel in a sudden stop. You can probably recover and let the wheel come back down. If it doesn’t, you’ll have to get off the bike. By tipping it up until all three wheels are on the ground you can let TiltLock take over to straighten it up.

In the unlikely event the bike winds up all the way over on its side, the system will shut off automatically. Turn the switch off, tip the bike up onto three wheels, and switch the system back on again and the bike will right itself.

**Turning the System On or Off While Riding**

It is not recommended, but you can turn TiltLock on and off while riding once you have become familiar with its operation and know what to expect.

> **WARNING** IF ABS HAS BEEN RETAINED ON YOUR BIKE WITH THE TRiO INSTALLATION, SWITCHING OFF TILTLOCK MAY SWITCH OFF YOUR BIKE’S ABS SYSTEM.

If you’re traveling more than 7 mph when you turn it on, the initial system check will proceed normally but the LED will glow steadily blue instead of green until you slow to 7 mph or less.

If you switch the system off while locked (i.e., below 7 mph), it will immediately unlock so you will need to have your balance and be prepared to put your feet down when you stop.

> **WARNING** ONCE YOU’RE USED TO TILTLOCK YOU MIGHT SWITCH IT OFF AND FORGET. IF YOU FORGET TO PUT YOUR FEET DOWN WHEN YOU STOP, THE BIKE WILL FALL OVER.

**Anti-lock Braking System (ABS)**

Your motorcycle may or may not have an Anti-lock Braking System, or ABS. ABS is designed to pump the brakes faster than you can to prevent skidding in rapid stops or on slippery surfaces.

ABS has been available on select Harley-Davidson models since 2008. You can identify a two-wheel bike with ABS by the speed sensor, which is a black plastic spacer on the left of the front axle. It has a cable leading back up to the bike. Sometimes the presence of ABS can be confirmed by the VIN also.

Motorcycle ABS systems vary. If your bike has ABS, it is handled in one of several ways depending which version of the TRiO you have. Here are the basics:

- ABS is always disabled in a standard TRiO installation with no TiltLock
- On most Harleys and Indians, ABS is retained in a TRiO installation with TiltLock
• If you retrofit the standard TRiO installation to add TiltLock, ABS functionality is reinstated on most Harleys and Indians.
• On Honda Gold Wings with ABS, the ABS is not retained in a TRiO installation with TiltLock.

The ABS warning light on your motorcycle indicates whether the system is operational. Normally, the ABS lamp begins flashing when the vehicle is turned on. The flashing lamp indicates that the system is in self-diagnosis mode. It continues to flash until motorcycle speed exceeds 3 mph.

On Harley-Davidson and Indian motorcycles with ABS, ABS functionality is maintained whether the Tiltlock is turned on or not. The ABS should be properly functioning and the ABS light will go out as usual as you get under way.

If you operate the motorcycle with TiltLock switched off, the ABS warning light will go on and stay on, and ABS functionality will be disabled until the next time you start the vehicle.

Where ABS functionality is present, it retains two sensor inputs—one for the rear tire and one for the front. The front sensor is used on the right front wheel (in countries that drive on the right), as it is more likely to get off-pavement and skid.

When ABS activates, it modulates braking pressure on both front calipers, not just the wheel generating the sensor input.

Every Harley-Davidson motorcycle equipped with ABS is delivered with a short video, available at bit.ly/HarleyABS, which is helpful in understanding the system’s operating characteristics and limitations. We strongly encourage you to take the few minutes to review this video.

**Error Conditions**

If the LED on the handlebar switch is solid red or flashes red, it indicates a system fault. The system can still be used but redundancy may be lost and the issue must be addressed.

**WARNING**  DO NOT RIDE WITH TILTLOCK SWITCHED ON IF THE SOLID RED LED IS ILLUMINATED.

If the LED on the handlebar glows solid red, it indicates a system fault requiring that you switch the system off and consult with your authorized dealer. If this occurs while you are operating the bike, immediately pull over, stop the bike and turn off TiltLock. Be aware that under these circumstances TiltLock will not be functioning correctly so you should be prepared to put your feet down as you come to a stop. You can continue to ride the bike normally but TiltLock will not function. Contact the dealer who installed TiltLock for further instructions.

If you come to a stop with the handlebars straight and find that TiltLock is holding you at an angle instead of vertical, it indicates that the circuit board housing or the steering sensor has come loose or changed position.
due to vibration or impact. The red LED may not be lit. You will need to put your feet down immediately, turn off TiltLock, and consult your dealer for further instructions.

If you come to a stop and hear the TiltLock motor pumping but the bike is not leveling promptly, it can indicate a failing hydraulic pump. In this case the LED should be red. You will need to put your feet down immediately, turn off TiltLock, and consult your dealer for further instructions.

**Errors will be considered:**
1) Fault 1 (system will unlock if locked and there will be no leveling. LED will show solid red)
2) Fault 2 (system will stay unlocked if unlocked showing a fast alternating blinking red and blinking blue LED. If locked, it will stay locked and show a fast alternating blinking red and blinking green LED but there will be no leveling)
3) Fault 3 (system will be unaffected by error condition and show a slow alternating blinking red and blinking blue or green LED depending if the system is locked or unlocked)

**Maintenance**

Your TiltLock system requires no routine maintenance. Do check for leakage from hydraulic cylinders, hoses, hose fittings and the pump periodically.

Check the hydraulic fluid level annually. To check the fluid, remove the snorkel/filter fitting from the side of the fluid reservoir below the pump. Add more fluid until it trickles down the side. Clean off excess fluid and replace the fitting. For replacement fluid, use only LikeWater suspension fluid from Redline (www.redlineoil.com).
Thoroughly read and understand the TiltLock Operation Instructions prior to the beginning of your training program.

A large (at least 100’ x 250’) empty parking lot, without poles or other obstacles, is a good place to practice TiltLock maneuvers.

TMW uses Safety Cones 9 in. with base from Walmart (570945423) which sells for around $20 for a pack of 12. We usually set up the course with 24 cones with each cone spaced about 7 paces from the next cone.

Starting and stopping straight

The first skill to learn is to start straight and stop straight. You will just be doing large ovals in the parking lot for this skill. The oval should be marked out with cones. Start from a standstill in the middle of the oval’s straightaway. Turn TiltLock on. After the startup sequence, the handlebar LED should be solid green; if not, see the Operating Instructions. Place your feet on the floorboards or foot pegs; you will be vertical to the horizon. Accelerate from the stop as normal and you will see the green LED turn blue as the system unlocks. Complete one full lap, slow down and come to a stop where you started. As you decelerate through 7 mph, TiltLock lock will lock and the green LED will turn on again. If you are not vertical to the horizon and leaned over as you come to a stop, the bike will lock and level you. Do this five to ten times until you are comfortable.

You no longer have to put your feet down when you come to a stop. If you are a long time motorcyclist, putting your feet down at a stop is a habit and it may take some time to get comfortable with the fact that you no longer have to put your feet down.
Getting a feel for the acceleration function

In the same oval course you set up in the beginning to come to a stop on one of the straightaways, try starting very slowly by feathering the clutch. TiltLock will remain locked as you slowly move forward. The green LED will stay lit indicating TiltLock is locked. Accelerate and you will see the green LED immediately go out. Try this as many times as you need to get a feel for how soft you need to be on the clutch (and how slowly you have to accelerate) for TiltLock to stay locked. You may find this skill easier to practice while riding the rear brake. This is a helpful skill for moving slowly around parking lots or moving along in stop and go traffic. If your speed exceeds 7mph the TiltLock system will unlock.

Now use the cones on the oval course to do some S-turns at very slow speeds.
Figure 8’s

Set up cones into two large circles as shown. First start doing non-stop figure 8’s until you are comfortable. Then try stopping and starting in the middle of the figure 8. You will be stopping and then doing a right turn and then stopping and doing a left turn.

Starting and making a left turn

Set up the cones to represent an intersection.

To make a left turn, start by lining the bike up to the right side of your lane as illustrated. Accelerate straight and then make a 90-degree left turn about 25 feet from you. If you accelerate promptly, TiltLock will release at 1 mph and you’ll be leaning freely within a matter of a foot.

Try it several times until you are comfortable.

For tight left turns, line up the bike to the right of the lane and turn the handlebars slightly to the left. You will feel the bike pre-lean to the left. Don’t fight it, lean with it. If you accelerate decisively, the pre-lean will set you up for a quick turn.

You can also make a turn by accelerating SLOWLY into the intersection and remaining locked up until the bike is pointed in the right direction. This is fine but not advised for intersections with fast-moving cross-traffic.
Starting and making a right turn

Start by lining the bike up to the left side of your lane. Accelerate straight and then make a 90 degree right turn between two cones about 25 feet from you. If you accelerate promptly, TiltLock will release at 1 mph and you’ll be leaning freely within a matter of a foot.

Do that several times until you are comfortable.

For really tight right turns, after lining up the bike to the left of the lane try turning the handlebars slightly to the right and you will feel the bike pre-lean you to the right. Don’t fight it, lean with it. If you accelerate decisively, the pre-lean will set you up for a quick turn.

Try the quick stop drill as laid out in the left turn section but this time making a stop mid right turn.

You can also make a right turn by accelerating SLOWLY into the turn while remaining locked until the bike is has completed the 90 degree turn. With the front wheels pointed in the direction you want to go, accelerate smoothly and the lock will release.

U-turns:

The acceleration function of TiltLock is disabled when your handlebars are turned fully to the left or the right. This means that TiltLock will remain locked no matter how hard you accelerate until you reach 7 mph.

CAUTION: We strongly recommend that you do not exceed 7 mph with your handlebars in the full locked left or right position. If you do, TiltLock will release and the bike will handle just like a regular bike performing a tight maneuver.

With the handlebars in the full locked position TiltLock will lean the bike over in the direction you have the handlebars turned. This helps the rider to make the turn.
The first exercise for learning to do a U-turn with TiltLock locked is to do a 180 degree turn to the left. Start with the bike stopped, TiltLock system locked and facing forward. Turn the handlebars full lock to the left. The bike will pre-lean slightly to the left. Slowly release the clutch but not all the way. You will exceed the 7 mph locked limit if you fully release the clutch. Do a 180 degree turn until you are facing the complete opposite direction from where you started and come to a complete stop. Turn the handlebars until they are facing straight forward. You should be stopped, locked and level. Repeat until you are comfortable.

Do the same U-turn exercise as listed above but to the right.

Next try linking u-turns to the right and to the left. Make a full 180 degree u-turn to the right and come to a stop. Then do a u-turn to the left. Repeat.
APPENDIX C

WHEEL REMOVAL
1. Remove each fender as a unit, leaving the mounting bracket attached to the fender. The bracket attaches to the top of the hub with 2 allen-head screws. You’ll need a 3/16” or 1/4” allen key or low-profile socket, working from the outside of the wheel.

2. Use the provided wrench to remove the hub cap.

3. Using a scissors jack positioned toward the front of the bike’s frame, lift the bike until the front wheels come off the ground. Make sure the work surface is clear of debris.
4. Tie the bike down securely to insure it can’t fall over.

5. Your caliper bolts may or may not employ locknuts. If they do, remove the locknuts using a 9/16” wrench. A flex-head wrench with a ratcheting box end is ideal for reaching these locknuts.

6. Using a 9/16” socket and working from the inside of the wheel, remove the 2 bolts holding each caliper to the spindle housing. Once unbolted, the caliper may slide down the rotor but it will remain trapped until the wheel is removed.
7. Remove and discard the cotter pin holding the wheel nut on.

8. Using a 1.25” socket, remove the wheel nut and the washer beneath it. Place the nut and washer in a clean plastic bag or other container to protect from debris.

9. Slide the wheel off the axle, taking care that the outside bearing doesn’t fall out accidentally. Remove the bearing and keep it clean too.
10. Leave the caliper on the rotor until the wheel has cleared the spindle shaft. Then remove the caliper and rest it on the A-arm so it doesn’t hang. It will remain connected to the bike by the brake line.

Don’t squeeze the front brake lever once a caliper has been removed.

11. Bring the wheel and bearing to any motorcycle shop for use in mounting and spin-balancing a new tire.

12. If removing and replacing two wheels at the same time, note that the tires are directional. Mount the wheels so the arrows on the tire match the forward rotation of the wheel.

13. Replace the caliper bolts. If your caliper bolts don’t employ locknuts, apply a threadlocker such as blue LocTite™ to the threads to keep them from vibrating loose. Tighten the bolts down securely.
14. If your caliper bolts do use locknuts, first screw the bolts through the hub and caliper. Tighten until the red rubber O-ring under the head of the bolt just begins to compress against the collar protruding from the hub. Then, hold the bolt stationary while tightening down the locknut from the outside. Tighten the locknut securely. No threadlocker is needed.

15. When replacing the wheel, place the caliper over the rotor and replace the outside wheel bearing before sliding the wheel onto the axle.

16. Replace the washer and tighten the locknut firmly, until drag on the wheel prevents it from spinning freely. Then unscrew it up to 1/6 turn until you can place a fresh cotter pin through the hole in the spindle.

17. Always use a fresh 7/64” x 1.5” stainless steel cotter pin. Bend one leg of the cotter pin across the end of the spindle.
18. Cut off the other leg, **making sure the cotter pin can’t contact the inside of the hub cap once the hub cap is replaced.**

19. Replace the hub cap, tightening until the red rubber O-ring compresses against the face of the wheel. Snug it down gently with the wrench provided.
20. Replace the fenders. Use a threadlocker on the screws so they don’t vibrate loose.

21. Make sure the kickstand is down before lowering the bike and releasing the tiedowns. Lean the bike to the left as it comes off the jack so it settles to the left, onto the kickstand, rather than falling over to the right.
APPENDIX D

ADJUSTING THE SHOCK ABSORBERS
TOOLS NEEDED:
Floor Jack, Tape Measure, Torque Wrench. For specifics, please refer to your shop manual.

NOTE:
PLEASE read and refer to our warnings, cautions, and warranty on the last page before proceeding to install your new shocks on your bike.

INSTALLATION:

1. First, place a quality jack or sufficient blocks under your motorcycle to securely lift the rear wheel slightly off the ground.

2. Next, using the correct shop manual for your bike, remove the old shocks and note the location of any mounting hardware. If additional accessories are installed on your motorcycle, please refer to their mounting instructions for removal to gain access to your shocks.

3. Before installing your new Progressive shocks you need to check the tire to fender clearance, making sure that the tire does not come in contact with the fender. If the rear fender or tire has been changed to anything other than stock, a travel limiter may be required. On some models with side bags or luggage, the bag or luggage mounts may need to be modified to eliminate any interference. Install the shock assemblies onto the motorcycle with the included hardware, noting any special instructions in the hardware kit. Tighten bolts / nuts to their proper torque and then check the clearances of the shock to the frame, shock to chain or belt, shock to chain or belt guard, shock to brake caliper and/or linkage, and brake rotor.
4. Reinstall any accessories removed in accord with their mounting instructions. Make sure accessories do not interfere with the shocks throughout their full travel. If any accessories bolt to the shock mounting points, a careful inspection must be made to insure that they do not bind the shocks in any way. Your shocks will come pre-installed with either bushings or bearings; refer to your hardware pack supplement during installation.

5. Set your ride sag. The proper spring preload setting will permit the rear suspension to sag, or compress, approximately 1/3 of the wheel travel from full extension. To check sag, take a measurement from the center of the rear axle, straight up to a vertical point on the rear fender or frame with the shocks fully extended. Then, take a second measurement using the same points with the rider(s) on the bike. The difference between the two measurements is the ride sag. Use the rightmost column in the table below to find the target ride sag based on your application. If the bike is sagging too much, increase the preload.

### PRELOAD ADJUSTMENT:

6. Spring preload adjustments are made by turning the adjuster (this can be done by hand or using a spanner wrench). Turn this adjuster clockwise to increase spring preload and counterclockwise to decrease spring preload. Set the preload equally on both shocks using these measurements as your guide. See table and figure below.

![Diagram of shock with installed spring length](image)

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**NOTE:** The adjuster is a threaded device, so if you rotate the adjuster beyond the recommended minimum setting you run the risk of the spring losing contact at full extension which can lead to excessive noise and/or component failure. Similarly if the adjuster is rotated to a setting beyond the recommended maximum you run the risk of the spring coils binding at full compression which can lead to a harsh ride and/or component failure.

6911 Marlin Circle, La Palma, CA 90623
Tech Line: 714.523.8700 | Toll Free: 877.690.7411
3083-006, 490 Instr, Rev. A
REBOUND ADJUSTMENT:

7. Your 490 shocks also have an external rebound damping adjustment which can be adjusted using a flathead screwdriver. The rebound adjuster will have 12 turns of adjustment and is preset from the factory at our recommended setting of 6 turns from closed (Closed is turning the adjuster clockwise until it is snug). Adjustments can be made based on riding style and road conditions. Turn the adjuster clockwise to increase rebound damping or turn the adjuster counterclockwise to decrease rebound damping.

**Increase Rebound:** More rebound may be desired if the back of the bike feels like it is kicking up too much during braking or after a bump is hit. More rebound may also be desired if the bike feels like it is moving around excessively and not settling down after hitting a bump.

**Decrease Rebound:** Less rebound may be desired if the back of the bike is too firm and not very compliant with the road. This may be noticeable after a series of bumps very close to each other or after a large bump is encountered. Less rebound may also be desired if the ride feels too harsh or choppy.

We recommend making rebound adjustments 2 turns at a time until a desired rebound setting is found. The adjuster can then be finely tuned in 1 turn increments if needed.

8. Test ride: If excessive bottoming occurs, you need to increase your spring pre-load setting as described above.

9. Lastly, ride and enjoy...Safety!

For a visual interpretation of this install, check out our video-guide on our youtube channel at https://www.youtube.com/user/ProgressiveVideos
WARNING
This means there is the possibility of injury to yourself or others. Raising or lowering the rear of your motorcycle will affect the steering and initial ground clearance. If the motorcycle is lower to the ground, care should be taken to avoid bottoming, especially over bumps or in turns. Raising the rear of a motorcycle can change the steering head angle. Always use extreme caution when riding after a change is made and take time to get accustomed to any handling change. The motorcycle must be securely blocked to prevent it from tipping over when the shocks are removed. Failure to do so can cause serious damage and/or injury. The use of lowering blocks on Progressive Suspension shocks is not recommended. Use of a lowering kit may void the warranty or damage the shock/motorcycle. Progressive Suspension shocks are designed to work on the OEM (Original Equipment) frame and swingarm. Use of these shocks on a frame or swingarm other than OEM may produce an unsatisfactory ride and void the warranty. Make sure that proper bushings/sleeves are installed in the shocks. Improper bushings/sleeves can cause unsatisfactory and/or unsafe operation.

CAUTION
Make sure to adjust your spring preload with both ends of the shock mounted to the motorcycle or otherwise secured as to not allow rotation of the ends while making the pre-load adjustment. Not doing so may cause internal damage to the shock which could result in shock malfunction and injury. Be sure not to remove the travel limiters (if any) and the jounce bumper. If removed, some components could come into contact during the ride (tire/fender, swing arm/frame, etc), resulting in very unstable behavior which could lead to serious damage and/or injury. Do not attempt to disassemble the shock yourself. Our shocks contain highly pressurized gas, attempting to open them could lead to injury. Progressive Suspension’s shocks are designed to last the lifetime of the motorcycle. If for any reason you need to disassemble the shock, please call our customer support line at: 1.877.690.7411.

WARRANTY
Progressive Suspension warrants to the original purchaser of this Part to be free of manufacturing defects in materials and workmanship with a lifetime warranty. In the event warranty service is required, you must call Progressive Suspension immediately with a description of the problem. If it is deemed necessary for Progressive Suspension to make an evaluation to determine whether the part is defective, a return authorization number will be given by Progressive Suspension. The parts must be packaged properly so as to not cause further damage and returned prepaid to Progressive Suspension with a copy of the original invoice of purchase and a detailed letter outlining the nature of the problem. If after the evaluation by Progressive Suspension the part was found to be defective it will be repaired or replaced at no cost to you. If we replace it, we may replace it with a reconditioned one of the same design. Progressive Suspension shall not be held liable for any consequential or incidental damages resulting from the failure of a Progressive Suspension part. Progressive Suspension shall have no obligation if a part becomes defective as a result of improper installation or abuse.
APPENDIX E

LIMITED WARRANTY

Tilting Motor Works, Inc. ("TMW") warrants that an authorized TMW dealer will repair or replace, without charge, any parts found under normal use to be defective in factory materials or workmanship. Such repair and replacement will be owner’s sole remedy under this warranty and the following terms and conditions apply:

Duration
1) The duration of this limited warranty is thirty-six months starting from the date of initial retail purchase and conversion by an authorized TMW dealer.
2) Any unexpired portion of this limited warranty will be transferred to subsequent owners, upon the resale of the original converted motorcycle with the TMW kit installed during the warranty period.

Owner’s Obligations
1) Register your initial or subsequent purchase with TMW within 30 days of the transaction.
2) To obtain warranty service, return the original motorcycle with the TMW kit installed at your expense, within the warranty period, to a TMW authorized dealer. Warranty service will be provided during normal business hours as soon as possible depending on the dealer’s workload and parts availability.

Exclusions
This warranty does not cover any motorcycle:
1) Which has not been operated or maintained as specified in the TMW Owner’s Manual.
2) Which has been abused, misused, improperly stored, used “off the highway”, or used for racing or competition of any kind.

Other Limitations
This warranty does not cover:
1) Parts and labor for normal maintenance as recommended in the TMW Owner’s Manual.
2) Parts and labor for normal wear and tear item such as tires, brake pads and bearings.

Notice and Registration
You may contact TMW at:

Tilting Motor Works, Inc.
1824 Bickford Ave., Suite C
Snohomish, WA 98290
(360) 302-3008
info@tiltingmotorworks.com
www.tiltingmotorworks.com