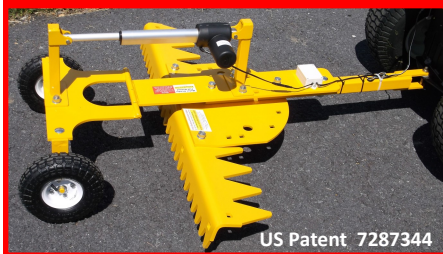
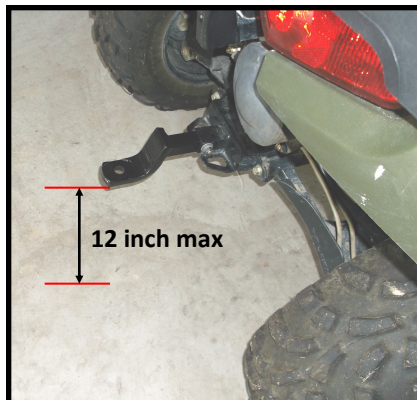


## Ratchet Rake Motor Grader



US Patent 7287344

The Motor Grader is essentially our Pull Behind Ratchet Rake that was released in 2013 combined with a new remote raising and lowering feature. The implement is intended to be pulled behind ATVs and lawn tractors weighing up to 1000 lbs. To eliminate routine battery charging (and accelerated battery failure due to continuous vibration), the unit is powered by the 12 volt battery of the tow vehicle. Universal SAE battery connectors are included to enable the Motor Grader to hitch up and plug-in to the tow vehicle (Similar to a cargo trailer's running lights plugging in to the back of a pick-up truck). For reference, the Motor Graders components are labeled at the top of top of page 3.



12 inch max

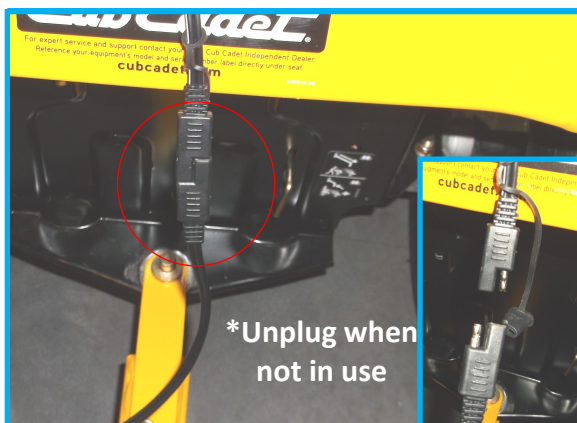
### Hitching Up:

- Requires a drop pin receptacle no more than 12 inches high. On ATVs with a hitch receiver, use a hitch ball mount (without the ball).
- The tongue tube is connected to the receptacle using the clevis pin. The washer is positioned under the tongue to reduce wear.



Clevis pin  
Washer

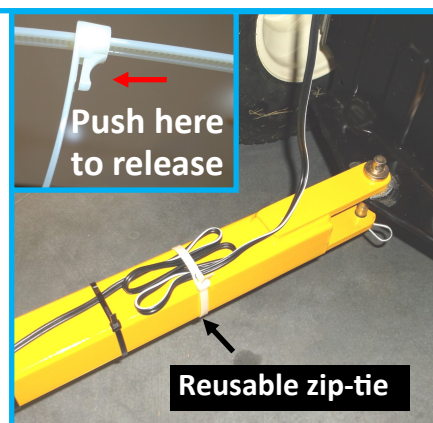
Included



\*Unplug when not in use

### Powering Up:

- The motor grader is plugged into the tow vehicle when in use and unplugged when not in use.
- Note: The control box can slowly discharge the battery if the engine of the tow vehicle is not running.
- A reusable zip tie is included to secure excess wire to the tongue tube.



Push here to release

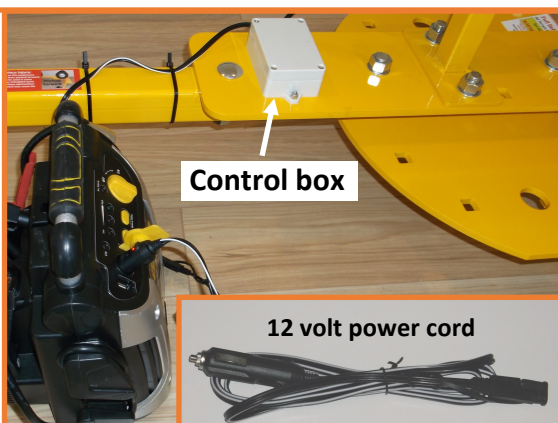
Reusable zip-tie



Red power indicator light illuminates when electrical current is present.

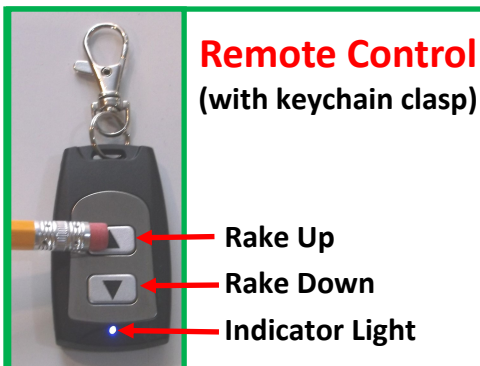
### 12 Volt Power Cord

A six foot long power cord is also included and will plug in to standard 12 volt sockets. Also, a portable automobile battery jumper fastened securely to the tow vehicle can provide sufficient power.



Control box

12 volt power cord



Remote Control  
(with keychain clasp)

Rake Up  
Rake Down  
Indicator Light

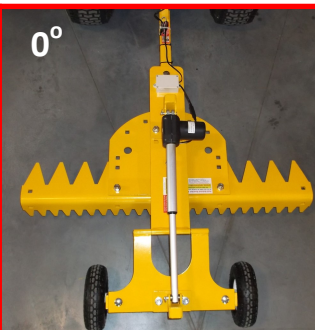


Replacement  
Battery # 2016

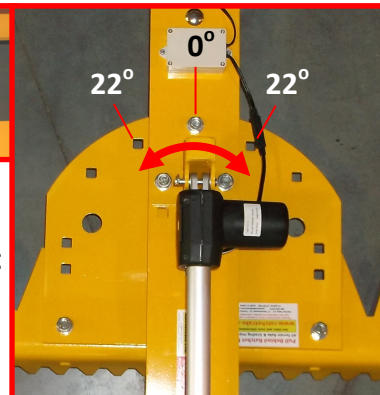
Each remote control produces a unique signal which is received by a compatible control box. A free matching replacement remote is also included. Both of the remotes are shipped with the batteries installed. An indicator light illuminates when the up or down button is pressed. To eliminate complicated remote control signal recalibrations, the control box and remotes will be replaced in matching sets.



## Angle Adjustments



To adjust rake angle, remove bolt #2 and loosen bolt #3. Turn rake to desired setting. Reinsert and tighten bolt #2 then tighten bolt #3. Note: A 45° angle setting is not possible due to inadequate wheel clearance.



## Extra Height for Long Tines

The long tines are 2 1/2" longer than the short tines. Repositioning the actuator mount rearward to the **R** set of square holes will increase the long tines fully raised ground clearance by over 2 inches.



## Yearly Maintenance:

Lubricate swing arm with thin oil (motor oil is fine).

## Fuse Replacement:

automotive - small style.



\*Grader draws about 3 amps

## One Year Warranty

All parts (except the free replacement remote control) are fully covered by a 1 year warranty and 30 day satisfaction guarantee.

**Trouble shooting** – Actuator doesn't respond to remote control...

- #1** Check the indicator light on the remote. If it does not illuminate when an arrow is pressed, replace batteries.
- #2** Power up the control box using the 12 volt plug (6 feet long). The 12 volt plug has a red indicator light that will illuminate when power is supplied. If the actuator then operates properly using the 12 volt cord, check the tow vehicles battery connection wire for damage or a blown fuse and also the battery terminals for corrosion.
- #3** With the 12 volt plug powered up (red power indicator light illuminating) and connected to the control box, pressing either of the arrows on the remote control should produce a clicking sound inside the control box. If there is no clicking sound, then the control box is not working.
- #4** If the control box produces a clicking sound and the actuator doesn't respond, the actuator is likely not working. To confirm the actuator is faulty, bypass the control box. With the 12 volt cord powered up (red power indicator light illuminating), plug it directly in to the actuator, the actuators ram should fully extend.

**Warning:** Failure to follow the safety precautions below can lead to serious injury, death, & damage to equipment.

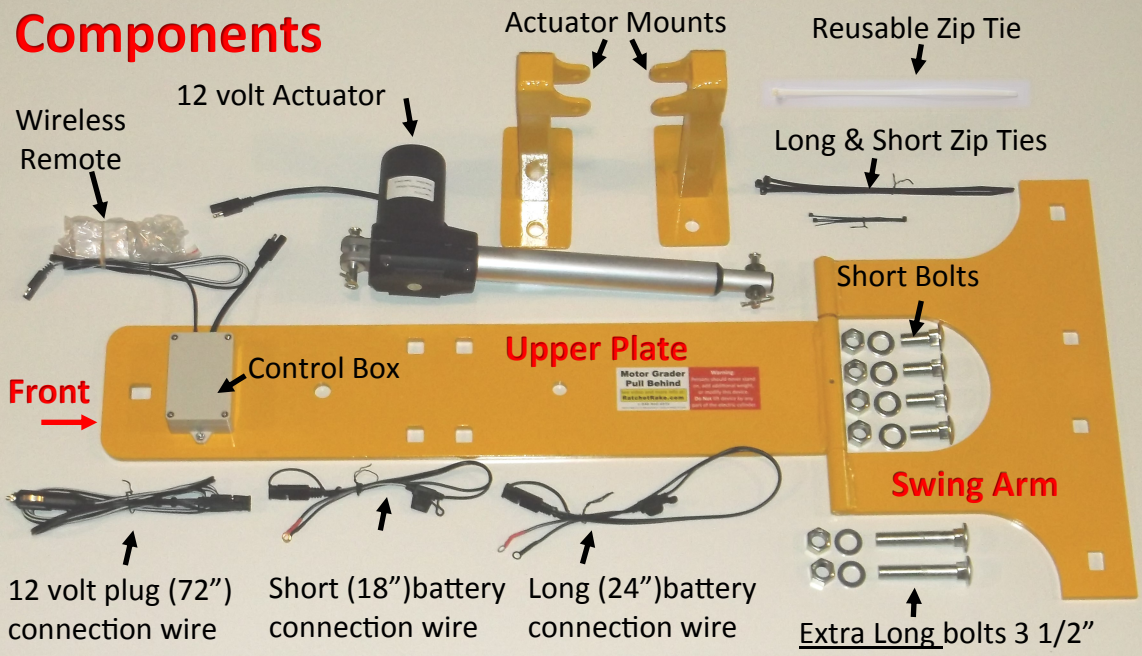
- Persons should never stand on or ride the Motor Grader at any time.
- Persons should never add additional weight or modify the Motor Grader in any way.
- Persons should never lift the Motor Grader by any part of the electric actuator.
- The Motor Grader should be assembled as instructed by the Assembly Direction sheet.
- The Motor Grader should not be cleaned with a power washer or submerged in water (a garden hose is fine).
- When backing up the tow vehicle, the Motor Graders rake tines must always be elevated.
- The maximum tow vehicle weight is 1000 pounds and should not exceed 5 mph when using the Motor Grader.
- Do not back up the motor graders rear swing arm/wheel assembly into trees or other objects.

- Additional tow vehicles: Universal SAE trickle charge battery harnesses are readily available and can be installed on additional tow vehicles to provide power to the Motor Grader. (The battery connections are all the same as the diagram on pg.4)
- The 12 volt actuator and control box are water resistant but we recommend indoor storage.

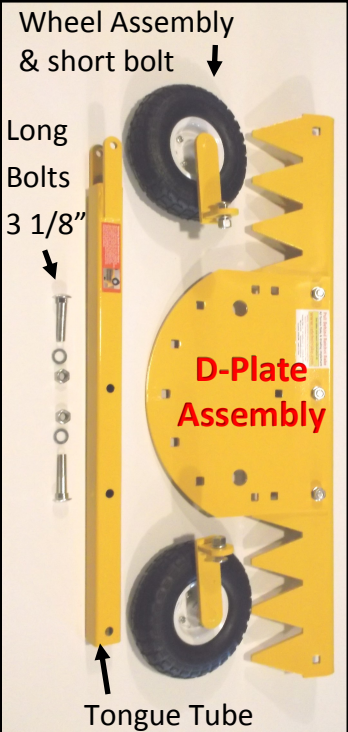


# Ratchet Rake Motor Grader Assembly Directions: pages 3 & 4

## Components

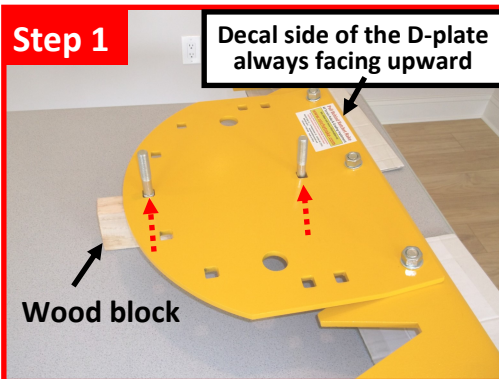


## Pull Behind Rake (partially disassembled)



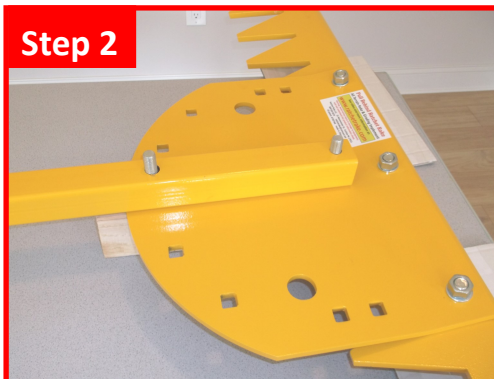
- Due to the heavy weight of some of the components, 2 persons may be required for assembly.
- The motor grader should be assembled on a flat surface preferably the floor of a garage or shed.
- Tools required: **1.** 15/16", or 24 mm, or large adjustable wrench **2.** 3/8" wrench to disassemble the packaging. **3.** Other tools will be required to install the connection wires on to your battery's terminals.

### Step 1



Place a support block under the curved edge of the D-plate. Insert the two extra long bolts up through the square holes in the D-plate.

### Step 2



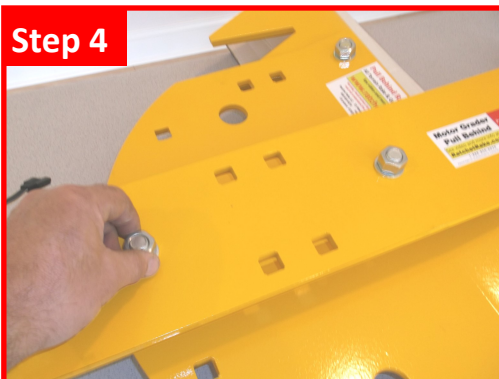
Position the tongue tube over the two extra long bolts as pictured.

### Step 3



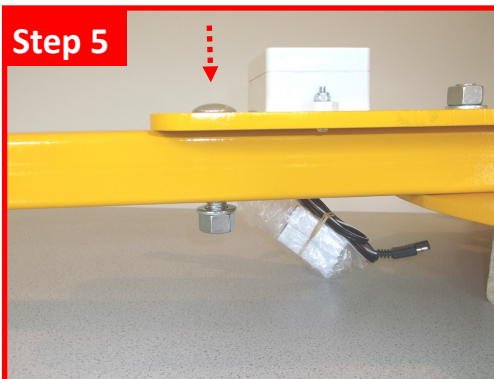
Position the upper plate over the two extra long bolts as pictured.

### Step 4



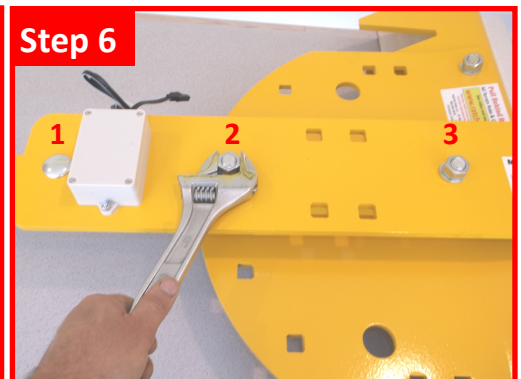
Place washers over the threads of the two extra long bolts. Hand tighten the nuts.

### Step 5



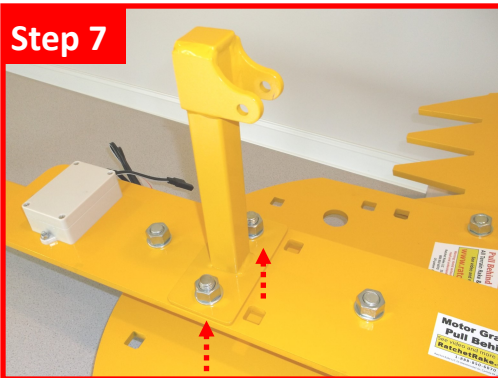
Inset a long bolt down through the rectangular hole in the front of the upper plate as pictured. Add washer and nut.

### Step 6



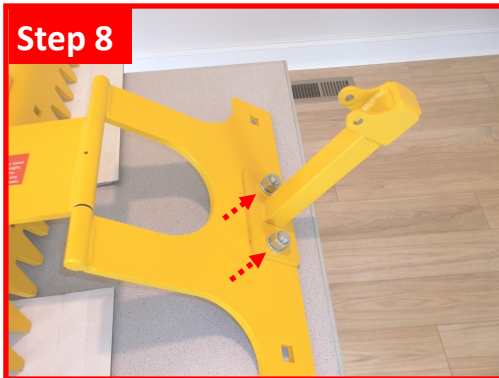
Finish tightening the three bolts with a 15/16 inch, or 24mm wrench, or large adjustable wrench.





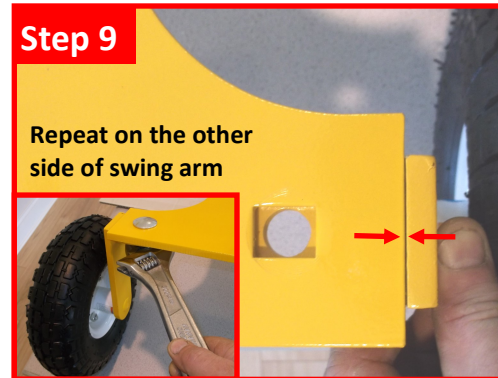
**Step 7**

Secure the front actuator mount by inserting two short bolts up through the front set of square holes of the top plate as pictured. Add washers & tighten nuts with wrench.



**Step 8**

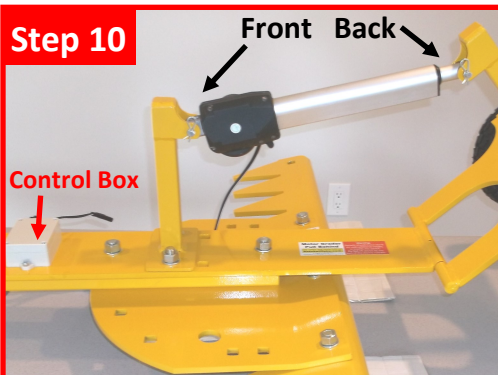
Secure the rear actuator mount by inserting two short bolts up through the square holes of the swing arm as pictured. Add washers & tighten nuts with wrench.



**Step 9**

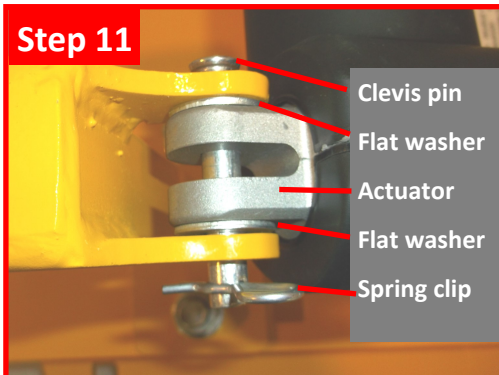
Repeat on the other side of swing arm

Positioning the top of the wheel assembly against one side of the swing arm. Insert its short bolt down through the rectangular hole. Add washers & tighten the nuts.



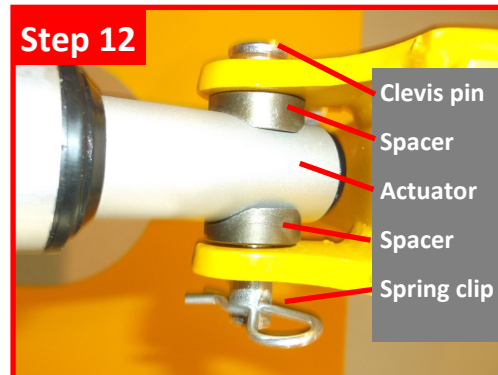
**Step 10**

Install the 12 volt actuator with its power cord orientated toward to the control box as pictured.



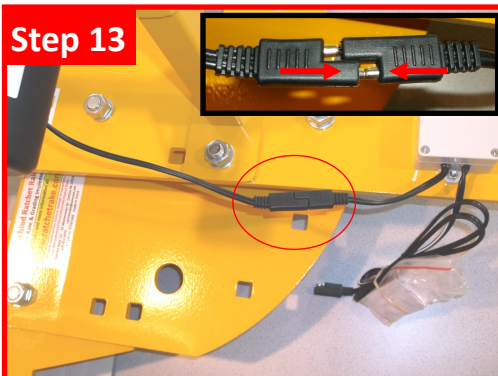
**Step 11**

The front "power cord" end of the 12 volt actuator is connected to the actuator mount as pictured.



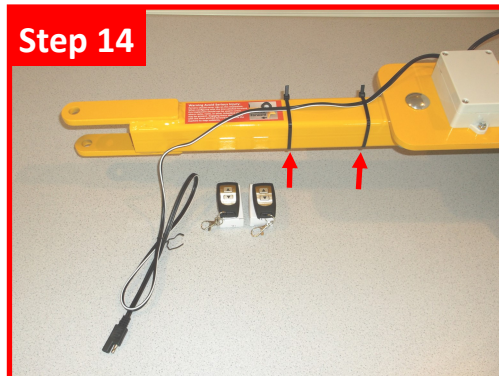
**Step 12**

The back end of the 12 volt actuator is connected to the actuator mount as pictured.



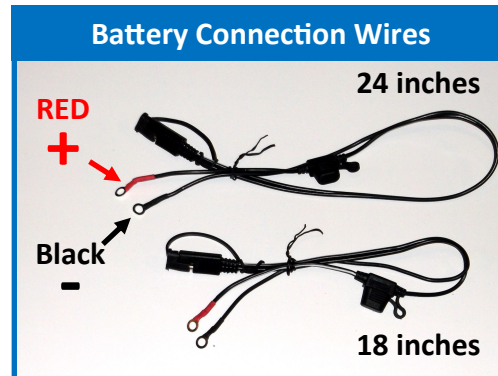
**Step 13**

Connect the power wire from the 12 volt actuator to short wire from control box.



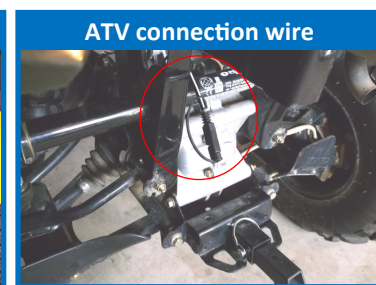
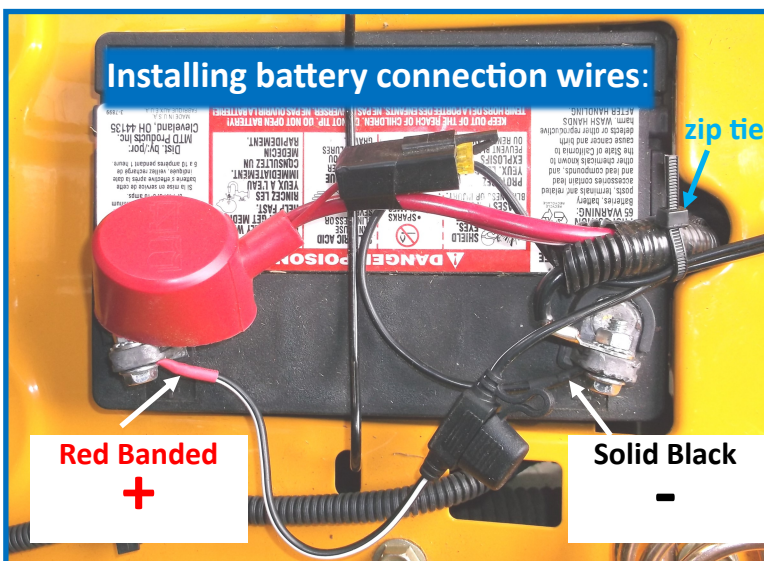
**Step 14**

Secure the long wire from control box to the tongue tube with long zip ties.



**Battery Connection Wires**

24": recommended for most ATVs  
18": recommended for most lawn tractors



**Red Banded wire (with white stripe) must be connected to the Positive (+) terminal of the battery.**  
**The Solid Black wire must be connected to the Negative (-) terminal of the battery.**

**Caution: Reversing the connection wires on the battery terminal will permanently damage the control box!**

Route the plug end of the connection wires rearward toward the center of the machine. Secure the wire with the short zip ties.