CMVTC
Commercial Mobile Video Technologies of Canada

MJG Technologies Ltd – Canada

Bus Safe T CROSS

Bus Safety Solutions - USA

BUS SAFETY SOLUTIONS

Thomas Built Buses Installation Manual

Extended Stop Arm v. 4.3

ELECTRIC Actuator System – With ON/OFF Momentary Switch

Thomas BUILT BUSES

Revised: 7-21-2021

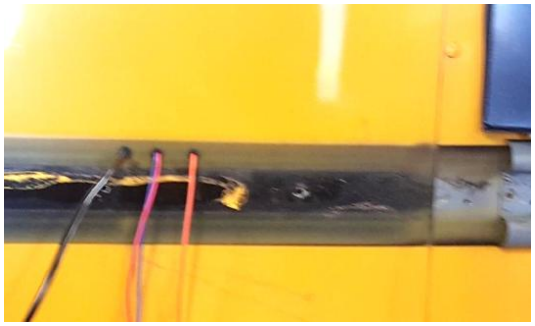
Contents:

Tools and Supplies Needed

- Safety Glasses
- Work Cart
- Magnetic dish
- Tape measure
- Small Level
- Impact Driver
- Drill Motor
- Assorted nut drivers
- #2 Philips Bit, #3 Philips Bit
- Assorted drill bit set
- 7/8” Conduit Hole bit
- 9/64” steel bit
- 3/16” steel bit
- ¼” steel bit
- 9/32” steel bit
- 5/16” steel bit
- 5/8” steel bit
- 9/16” steel bit
- Hammer
- Vice Grip – Small & Large
- Utility Knife
- Needle Nose Pliers
- Cold Chisel
- #2 Philips head screwdriver
- #3 Phillips head screwdriver
- Flathead screwdriver
- 2 - ½” Wrenches
- 2 – 5/8” Wrenches
- 2 – 7/16” Wrenches
- 1/8” Allen Wrench
- Socket Set
- 1/2” NPT Steel Pipe (7/8” diameter) 8” Long
- Electrical Wire Crimping Tool
- Electrical Wire Stripping Tool
- Electrical Multi-Meter
- Clear Exterior Silicone
- School Bus Yellow Exterior Silicone
- Nutsert (nut insert/rivet nut) tool
- Air hose cutter
- Roll of blue 16-gauge wire
- Roll of red 16-gauge wire
- Roll of yellow 16-gauge wire
- Fish tape

Run Electrical Connections

- The Extended Stop Arm requires a 12-Volt power source. This can be found underneath the switch panel**.**
- Remove the horizontal rib underneath the driver window. Carefully drill three 5/16" holes into the wiring compartment under the switch panel. Insert grommets in the holes. Run one 8-ft length each of blue, red, and yellow 16-gauge wire (hereafter referred to as "exterior wires") into the bus compartment.

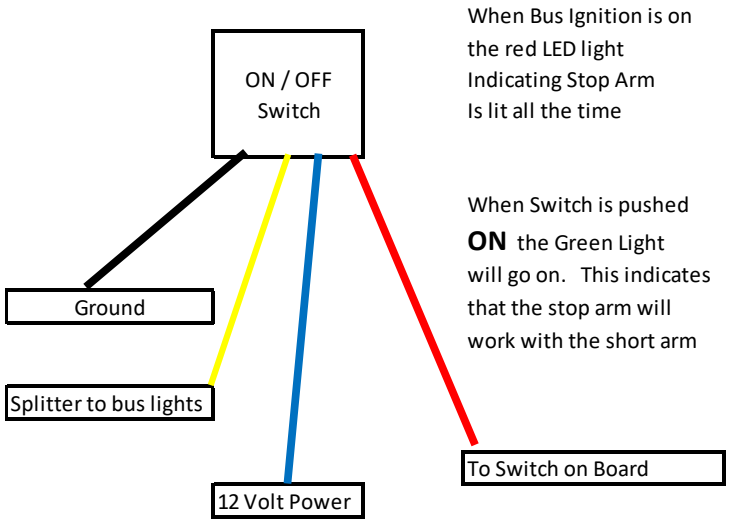


- Do not cut the exterior wiring or replace rib until the hinge frame and control box are mounted.
- Inside the bus, remove the switch panel next to the driver's seat and steering wheel.
- Locate the accessory ignition fuse block. Attach a female end to the blue exterior wire and plug it into a tab on the block, and insert a 15-amp fuse. If there is no accessory block or it's not functioning, use an in-line fuse to connect to a terminal on the back of the plastic fuse panel (found underneath the red flaps marked "BATTERY").

Install ON/OFF Switch

- Locate an empty switch slot and pop out the plastic cover.
- Review the following diagram:

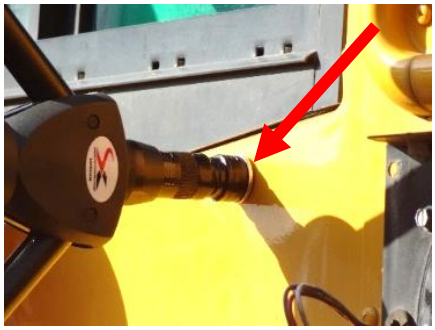
Extended Stop Arm Control Switch



- Using a butt connector, connect the yellow exterior wire to the yellow wire on the switch.
- Connect the red exterior wire to the red wire on the switch.
- Find a solid ground for the black ground wire.
- Connect the blue wire from the switch to a 12V power source.
- Seat the switch in the panel and replace the panel.

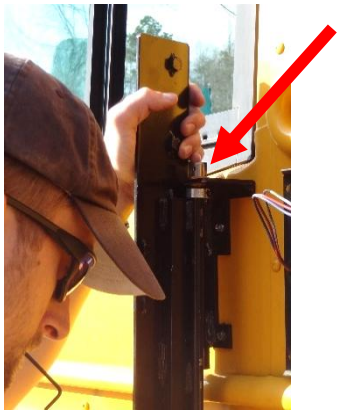
Install Hinge Frame

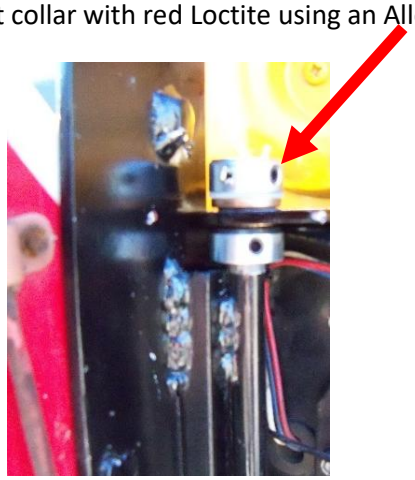
- PRIOR TO INSTALL, MAKE SURE NO SCREWS WILL PENETRATE A CABLE WITHIN THE BUS! Depending on vertical support placement, there will probably be a wire harness running vertical behind the driver's seat near where the vertical support bar is secured. Open the panel and pull the harness out enough to prevent damage, replacing after vertical support is in place.
- **NOTE*:* The vertical support must sit as close as possible to the existing stop arm to ensure the steel frame will fit over it when it closes. This may require removing a large steel rivet that sits just to the left of the existing stop arm.
- Install Vertical Support Bar—must be vertical—using yellow bus siding panels as guide. Pre-drill with 9/64" drill bit.
- The top attachment should be marked, drilled with a 9/32" bit, and a Nutsert used to securely anchor the vertical bracket. Carefully follow Nutsert tool instructions.



- Use 1" x #12 self-tapping stainless-steel screws or 1-1/4" x #12 if necessary. Position the vertical support as close as possible to the Specialty box. Be sure no rivets or screws interfere with a tight fit against the side of the bus, if so remove them.
- Once the vertical support bar is attached with insert nut bolt and self-tap screws, attach the hinge plate.
- Remove the top collar and nylon washer.
- Push the hinge pin through the top bearing, add nylon washer and shaft collar with pre-drilled hole.

- Insert 1/8” x 1 ½” cotter key and tighten shaft collar with red Loctite using an Allen wrench.

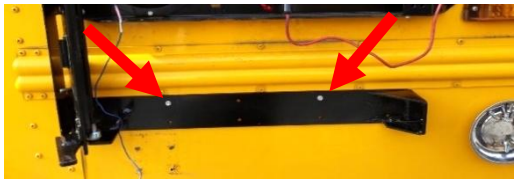




Connect the Lower Support Bar

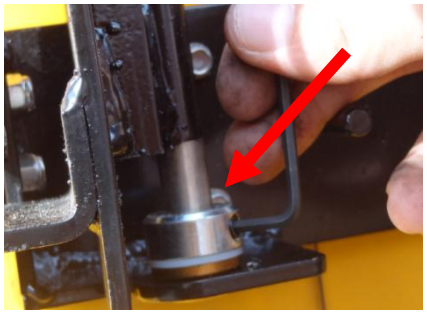
- Remove any rivets or screws that may be behind the bar.
- You may have to move any lights or cameras that may be mounted in the way of the bar.

- Install lower support bar with a shaft collar and nylon washer. The nylon washer should sit beneath the shaft collar and above the brass bushing. Press up slightly to make lower shaft collar hold some of the support before tightening. The bottom of the hinge shaft must be flush with the bottom of the brass bushing.
- Install 2 of the 1” x 12 self-tapping screws in the middle area of the lower support, and then test hinge to make sure it is swinging freely. Lower support **must** be parallel to bus ribs and tight to Vertical Support Bar at left side, forming a 90-degree angle.

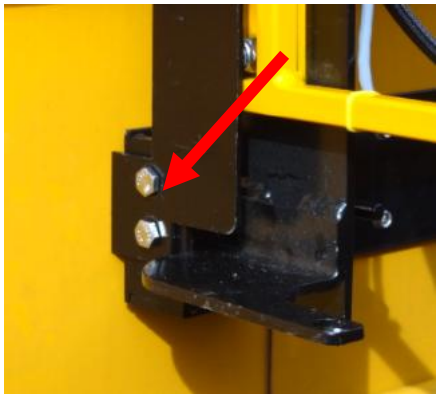


- Attach the bar to the bus using #12 x 1” self-tap screws.

- Tighten the bottom shaft collar with Allen wrench



- The Vertical Support Bar has 2 pre-drilled holes at the bottom left corner. Using one of these holes as a guide, drill a ¼” hole in Lower Support to attach to Vertical Support Bar and install ¼” x ¾” bolt and nut with nylon insert lock nuts. Make sure that the vertical piece does not protrude beyond the lower brace or it will interfere with the operation of the arm.

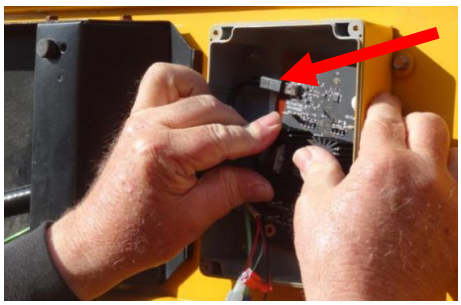


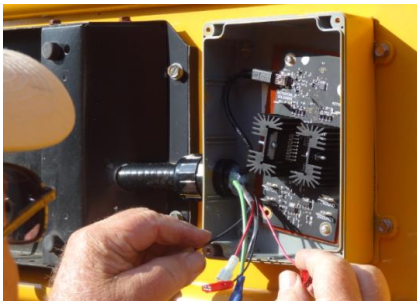
Install Control Box and Board

- Position the box snug to the lower horizontal rib and away from any obstruction of either stop arm.

- Attach the plastic control box to the bus using four screws.
- If the control box covers any numbers, new decals will need to be applied.

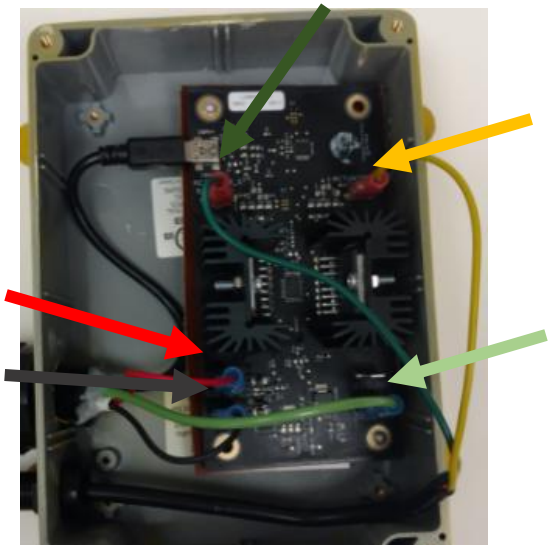
- Before placing the board in the box, connect the Mini-USB connector for the lights, then attach the control board to the box using the double-sided tape pre-applied to the back of the electronic board. The board will typically be positioned in the box at an angle.





Connect the remaining wiring.

- The *thick* GREEN ground wire connects to the GROUND terminal
- The RED wire attaches to the SWITCHED terminal
- The BLACK wire attaches to the IGNITION terminal



- When attaching the two wires from the actuator, the GREEN wire goes to ACTUATOR_1
- The YELLOW wire goes to ACTUATOR_2

Run External Wiring and Replace Side Rib

- Cut a length of wire mold almost long enough to reach the next section of bus rib, run all three wires through it, and affix it to the side of the bus.

- Place a piece of ¼" flexible tubing (resembles air line) over the yellow wire and run it up inside the stop arm box.

- Drill a 9/16" hole in the top of the bus rib close to the end of the conduit from the plastic box.

- Using fish tape, feed the red and blue wires through the hole and clear the slack. Replace the side rib.

Attach Electric Actuator

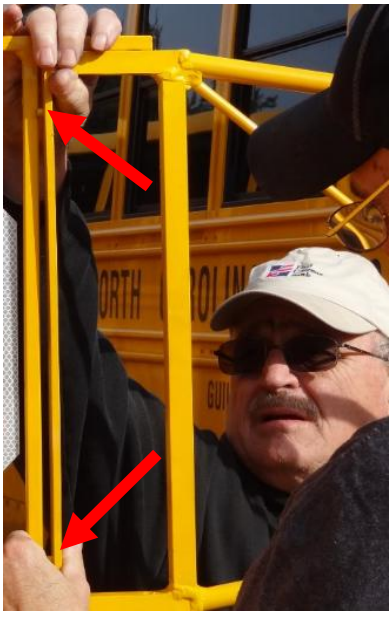
- Mount tail piece of electric actuator to the right-side mount on the horizontal support bar, using a nylon washer and 7/16" bolt and nut. The washer should rest between the top tab of the tail piece and the top side of the mount.

Run Electrical Connections

- Attach the green ground securely using a self-tapping screw to the bus siding.
- Connect the blue power wire to the black wire with the butt connector.
- Place a male end on the red wire and connect it to the red wire with the female connector.
- Feed as much wiring as possible back inside the bus rib, so there is little to no slack between the hole and the conduit.
- Open the stop arm box and find the wiring to the existing stop sign lights. The source can often vary with different brands, types, and models of stop arms, but usually it is as simple as attaching a splitter to the blue wire—where the red wire from the stop sign connects—and tying in the yellow ON/OFF switch wire there. If in doubt, turn the red lights on and off and use an electrical multimeter to determine the source.
- Secure the yellow switch wire, if necessary, to ensure it will not be damaged by or interfere with the motion of the stop arm.
- Run the actuator cable through the small watertight connector in the control box, pull as much slack through as possible, and tighten the watertight nut.
- Attach female ends to the green and yellow wires and connect them as indicated.

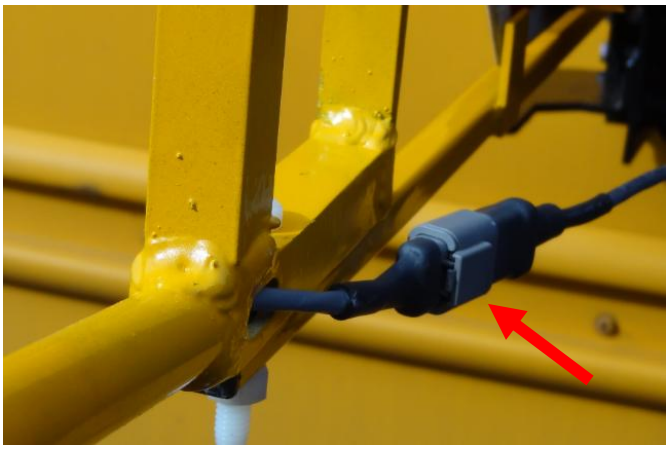
Install Frame & Sign

- Attach steel frame to the vertical frame using three 3/8” nylon insert nuts found on hinge plate.
- Tighten with 9/16” nut driver.
- Attach Extended Stop Arm to steel frame.
- Align using steel ¼” round studs, once aligned, hold with vice grip, or an additional set of hands.



- Secure using two 5/16” nylon bolts and 2 nylon nuts.

- Tighten nylon nuts to snug with a wrench. Do not overtighten.
- Connect electrical harness to extended stop arm using harsh environment ATM connector



- Attach electrical harness to bottom of steel frame using 3 yellow zip ties.

Install Bumper

- Position rubber bumper vertically at the point of the bar connecting sign to frame.

- Attach with 2 self-tap screws, one on either side of bumper.

- Adjust sign by bending it slightly away from bus to ensure lights do not hit the bus when closing.

Button Up

- Close up stop arm box using original screws. Ensure yellow switch wire is secure.
- Cover exposed wiring from plastic box conduit to bus rib using wire loom.
- Place cover (bolts included) on plastic control box.
- Secure actuator nose piece to hinge using 7/16” clevis pin and 1/8” x ¾” cotter key.
- Adjust actuator nose piece/cylinder to ensure reasonably tight fit against bumper, then tighten 7/16” bolt and nut.
- Run through installation checklist to ensure that all items are complete.
- Ensure that bus driver is aware and trained on using their new Extended Stop Arm.

From your Friends at CMVTC MJG Technologies Canada

and Bus Safety Solutions USA

Please Call Bus Safety Solutions, the Manufacturer at 1 336-671-0838

if you have any issues with the installation.

Thank You and Safe Driving