

# Bus Safety Solutions



## Installation Manual

Extended Stop Arm v. 4.0

Pneumatic System – With ON-OFF Switch

**International**



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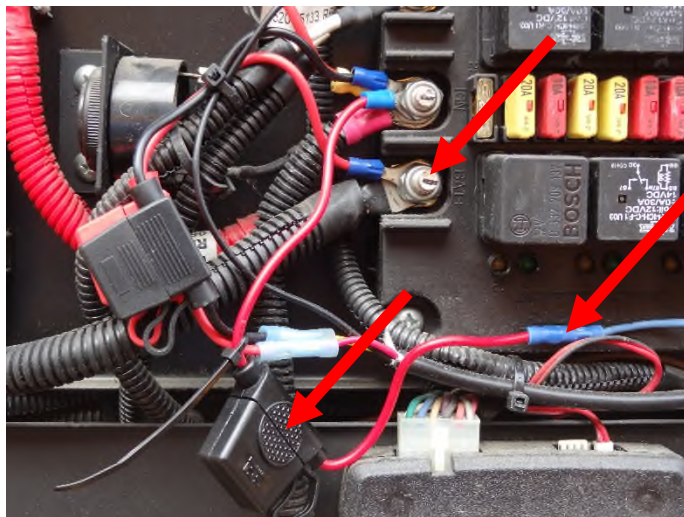
## Tools and Supplies Needed

- 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
- ¼" Steel Bit
- 5/16" Steel Bit
- 5/8" Steel bit
- 9/16" drill 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

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### Run Electrical Power Connection

- The Extended Stop Arm requires a 12-Volt power source.
- On an **International**, run the power wire through the same hole that the Specialty light wires are located. This will typically require using a stiff wire to help fish the power wire through the siding and behind the rib of the bus.
- Connect the wire to an accessory block and insert a 15-amp fuse
- If the block is not present or functioning, connect to the solenoid and use an in-line 15-amp fuse.



### Connect Air Hose

- Locate the air supply line—the green hose—located on most **IC Buses** in the electrical panel.
- From outside, run the new air hose through the half-inch loom to the aluminum box.
- Cut the green air line and install an air “tee,” and connect the new air line to that.
- Make sure to connect directly to the air supply and NOT behind one of the air solenoids that control the original stop arm, front crossing gate, or air door. The Extended Stop Arm needs *constant* pressure to operate properly.



## Run Electrical Connections and Install Parking Board

- The Extended Stop Arm requires a 12-Volt power source. This can be found in the electrical panel of an **IC Bus**.
- Run one 8-ft length each of blue, red, and yellow 16-gauge wire (hereafter referred to as “exterior wires”) into the bus compartment. Two wires will have to run through one hole and one wire through another; the third hole will be used for the air hose.
- Inside the bus, connect the blue exterior wire to the 15 Amp Fuse link.
- Locate the forward accessory fuse block in the panel. Run another short length of blue wire from the “IGN. Fuse” position on the board to a free tab on the accessory block, and insert a 15-amp fuse.
- If the accessory block is already in use, not present, or not functioning, find another power source and include an in-line 15-amp fuse.
- Find a solid ground and connect the green “Ground” wire.

## Install ON-OFF Switch

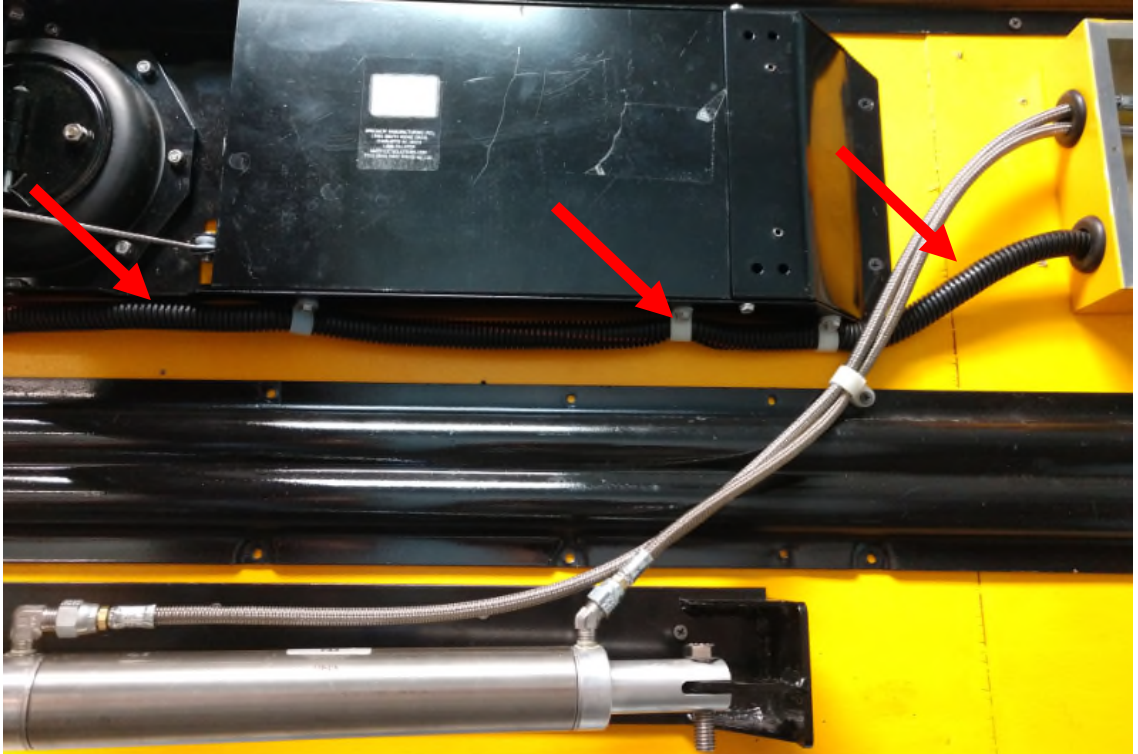
- On the control panel install the switch shown below. The most ideal place for the ON-OFF switch is usually as close to the warning light and door buttons as possible. When the switch is pushed to ON the light will be on showing that the Extended Stop Arm will now go out with the short arm when the red lights are turned on.



- Take the ON-OFF switch wiring and connect one RED to the red wire going to the Switched terminal on the new control board. The other RED wire goes to the splitter for the OEM stop arm light control. The green wire is ground and may be connected to the easiest place to do that. The BLUE wire needs to be connected to a source of 12 volt power. This only gives power to the LED light in the switch itself, this does not power the control board or the Extended Stop Arm in any way.

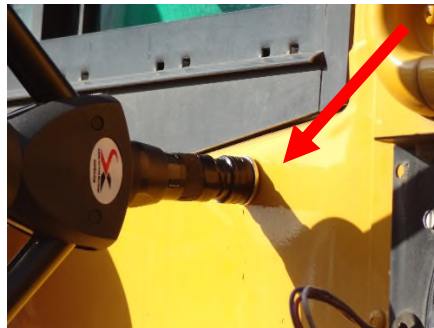
### Run External Air and Wiring

- Install air hose and electrical hose inside half inch loom and run it under the Specialty box, attach with clips, and run into the electrical panel.



## Install Hinge Frame

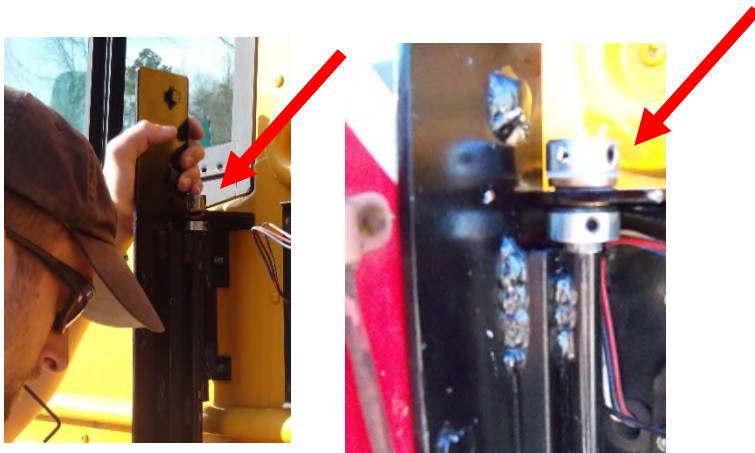
- PRIOR TO INSTALL, MAKE SURE NO SCREWS WILL PENETRATE A CABLE WITHIN THE BUS! There is a wire harness running vertical behind the driver's seat near where the vertical support bar is secured. Open the panel and pull the harness out enough to prevent damage.
- Install Vertical Support Bar, must be vertical, use yellow bus siding panels as guide. Pre-drill with 9/64" drill bit.
- The top attachment should be marked, drilled, 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. With some bus models the Vertical Support Bar can be attached at the same point as 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 1/2" 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 blinkers 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  $\frac{1}{4}$ " hole in Lower Support to attach to Vertical Support Bar and install  $\frac{1}{4}$ " x  $\frac{3}{4}$ " 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.



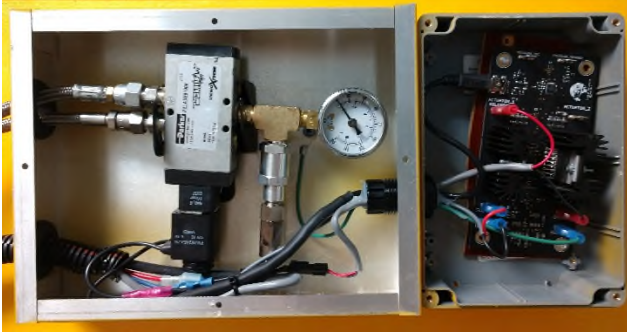
#### **Install Air Solenoid, Cylinder, and Box Assembly**

- Take a  $\frac{7}{16}$ " bolt and nut and *loosely* fit the back cylinder piece on the mount on the right side of the horizontal support. Don't tighten yet.
- With the cylinder parallel to the bus (facing forward), line the box assembly up so that the solenoid sits as evenly as possible on the bracket, the boxes are both clear of any obstruction,



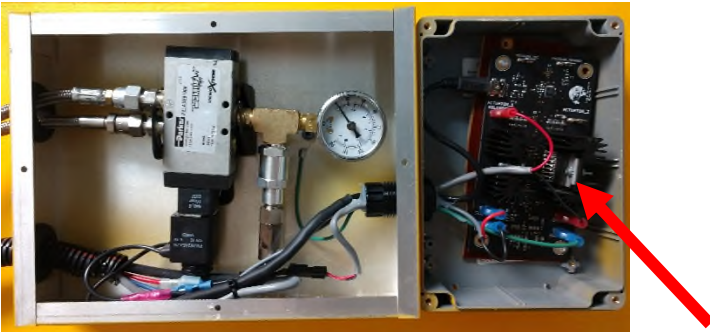
and the wiring/air line coming from the hole in the rib will reach the bottom hole of the aluminum box.

- Using #12 self-tap screws, secure the boxes in place. Keep in mind another screw will be used after mounting to secure the ground wire, so two screws should be enough to mount the aluminum side. Use another two in the tabs on the plastic box.



### Install Control Board

- Connect the Mini-USB connector for the lights to the board, 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 Green Ground wire connects to the GROUND terminal
  - The thin red solenoid wire attaches to SOLENOID terminal.
  - The thin black solenoid wire attaches to GROUND1 terminal.
  - The **thick red** wire attaches to the SWITCHED terminal
  - The **thick black** wire attaches to the IGNITION terminal



### Run Electrical and Air Connections

- Attach the green ground using a self-tapping screw in the aluminum box into the bus siding.
- Run both wires and air hose from the hole in the rib through the bottom hole in the box.
- Connect the solenoid to the board using the plastic quick-connects.
- 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.
- Connect the air hose to the elbow on solenoid assembly.
- Open the Specialty box and find the wiring to the Specialty 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 Parking 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 Specialty stop arm.

### Install Frame & Sign

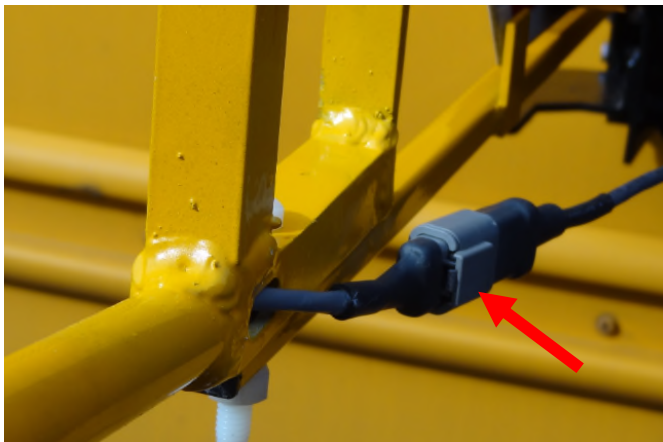
- Attach steel frame to the vertical frame using three 3/8" nylon insert nuts found on hinge plate.
- Tighten with 9/16" nut driver.
- Attach Extended Stop Arm to steel frame.
- Align using steel 1/4" round studs, once aligned, hold with vice grip, or an additional set of hands.



- 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 Specialty box front plate using original screws. Ensure yellow switch wire is secure.
- Cover exposed wiring and air hose from aluminum box to bus rib using 9/16" wire loom.
- Zip-tie loose wiring in aluminum box.
- Place lid on aluminum box using *short* #12 sheet metal screws.
- Place cover (bolts included) on plastic control box.

- Secure cylinder nose piece to hinge using 7/16" clevis pin and 1/8" x 3/4" cotter key.
- Adjust cylinder tail piece 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.