ESA Stop Means Stop - MJG Technologies Ltd – Canada

Bus Safety Solutions -USA

Installation Manual - Version 5

Driver Select ON/Off and Momentary / Electric System

IC, Blue Bird, and Thomas Built Buses

Includes V3 Enclosure and V3 Circuit Board (Green)

Please note; this is NOT the Standard Extended Stop Arm where both signs are attached to our arm.

Note in Image: Old Stop Arm is not removed and New Arm Surrounds it with no contact with Old ARM. But Old Arm may have to be moved backwards in some cases. Driver will have a Momentary Pause switch to press if they do NOT want the extended arm to deploy at the next stop.

☼ ***For first ESA installation, Please Call 336-671-0838, or Toll Free 1 855 926-7233 Ext 7, or register a Service Case at https://mjgtechnologies.com/esa-support/ .***

Note: Loom may have to be routed out of old box dependent on locations to access wiring.

Read First: Quick Notes

Field observation notes: **Blue Bird Install Kits; Inside Sign Lights; Wiring; Lion Electric Installs; Read Instructions**

1. **Blue Birds Install Kit**
    a. Three types of Blue Bird – buses. The newest with lesser rub rails doesn't require a Blue Bird Install Kit. 2020 and newer
    b. Pushers with yellow ribs need a 5/8" Spacer and no rib kit. (Special Kit)
    c. Gassers need ¾" Spacer and RIB Kit (Standard BB Kit)

    Note: For Blue Bird make sure you have the proper install kits for them before beginning.

    If you have the newest Blue Bird Busses with less rub rails, you do not need the kit. Usually, 2020 model and newer.

    Illustration: Standard Blue Bird Kit Fits all Busses cut loom according to need.

2. **Inside Sign Lights do not get connected to our circuit board:** Sign stays connected to OLD Arm and uses old arm solutions.
3. **Wiring:** All wiring should be connected first before power source is connected and ignition switch turned on. Double check wiring before powering on.
4. **Lion Electric Installs**: You must have the Lion Electric Modified Lower Plate: Review Appendix A first for drilling instructions.
    a. Pre-Drill Holes in body and each install point to reduce risk of stressing fiberglass body.
    b. Must use #14 Screws on mount points.
    c. Use white stop sign wire supplied by Lion Electric manufacture for ground. See Electrical diagram in this document for Lion Electric wiring.
5. **Read Instructions:** Need to read instructions closely for first few installs. Wiring and assembly of arm to frame tend to cause most issues with installs. (Blown circuit boards, frames having pin issues down the road.)
6. **Contact Bus Safety Solutions if you have questions. 1-336-671-0838**

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
- Air hose cutter
- Roll of blue 16-gauge wire
- Roll of purple 16-gauge wire
- Roll of yellow 16-gauge wire
- Fish tape

Revised: 8-30-2019

See Appendix A: Lion Electric prep

Contents

Introduction

Welcome and thanks for installing our “Driver Select with On/Off or Momentary Options” Extended Stop Arm!

This manual cover Blue Bird, International (IC), Thomas and Lion Electric buses for electric and air models. Each section will note if the steps are for “All” or a specific model. **Skip sections that are for a model that you are not working on.** If we mention a specific version model like Air or Electric, then you can skip if you are installing the other model.

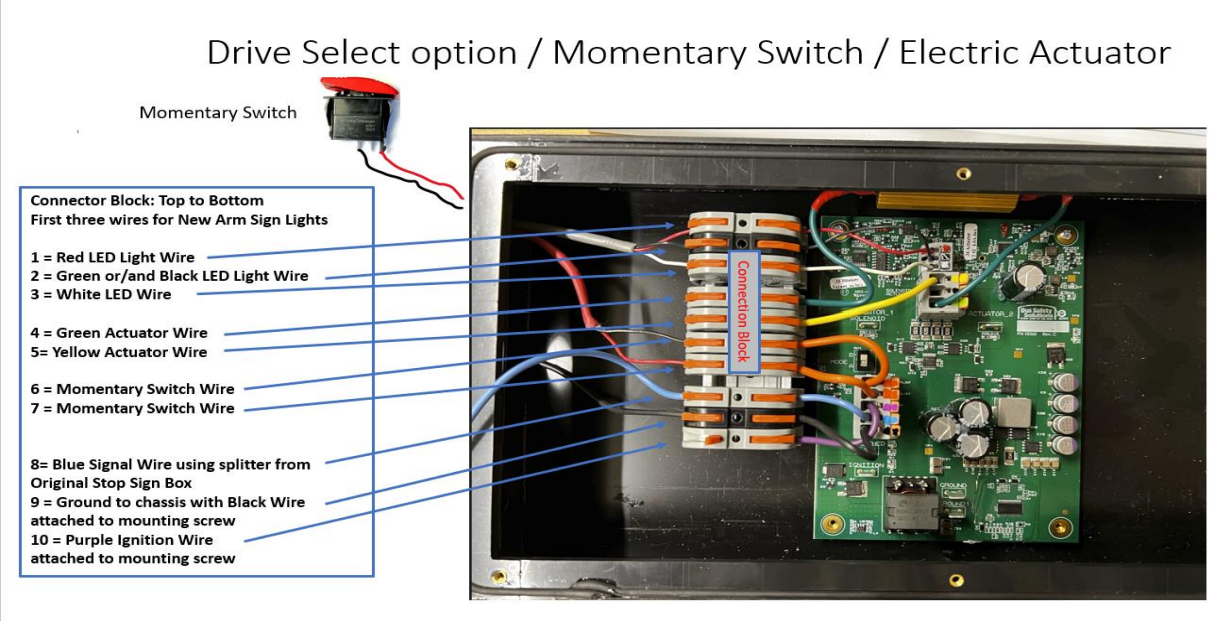
Have fun and feel free to call us if you have a question. Support Number at end of document.

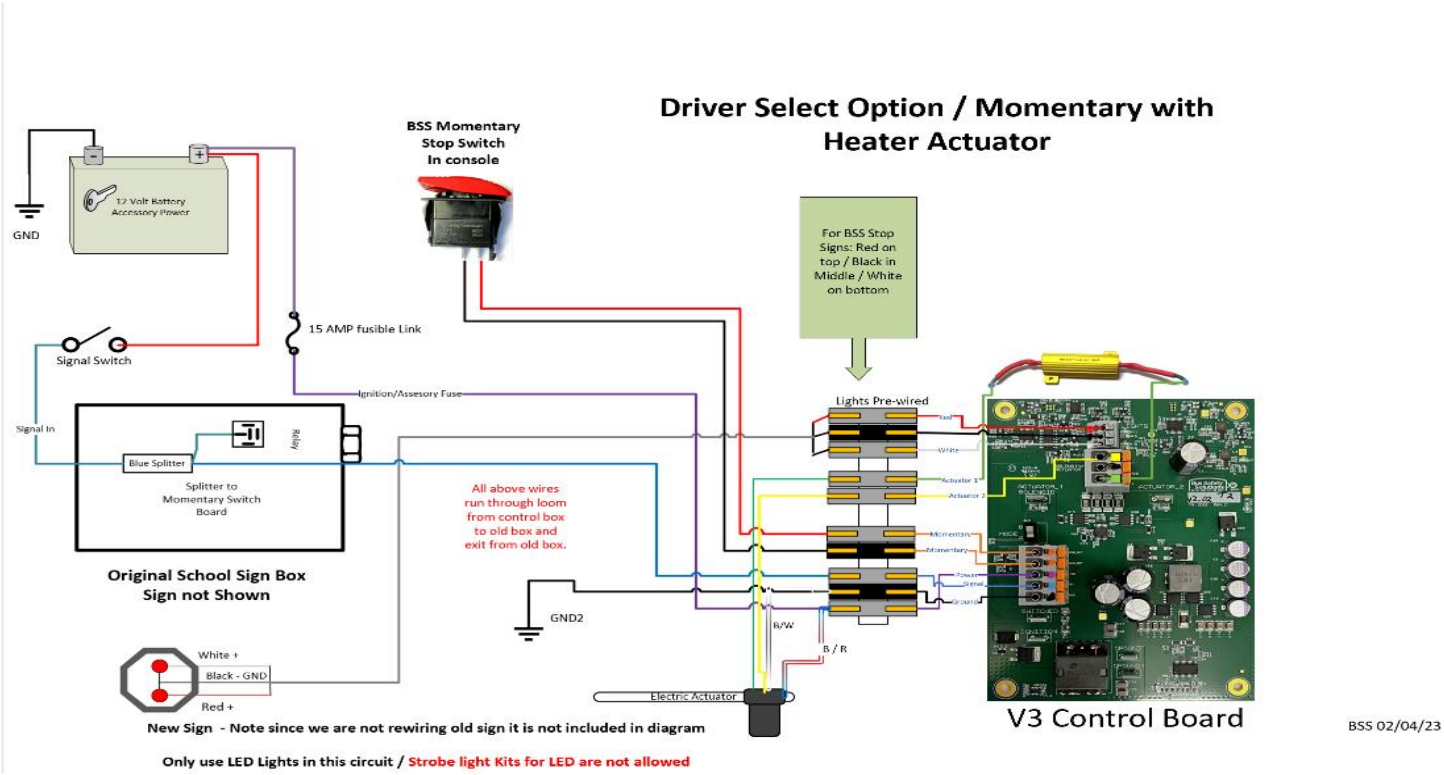
Note: for Blue Bird make sure you have the proper install kits for them before beginning.

If you have the newest Blue Bird Busses with less rub rails, you do not need the kit. Usually, 2020 model and newer.

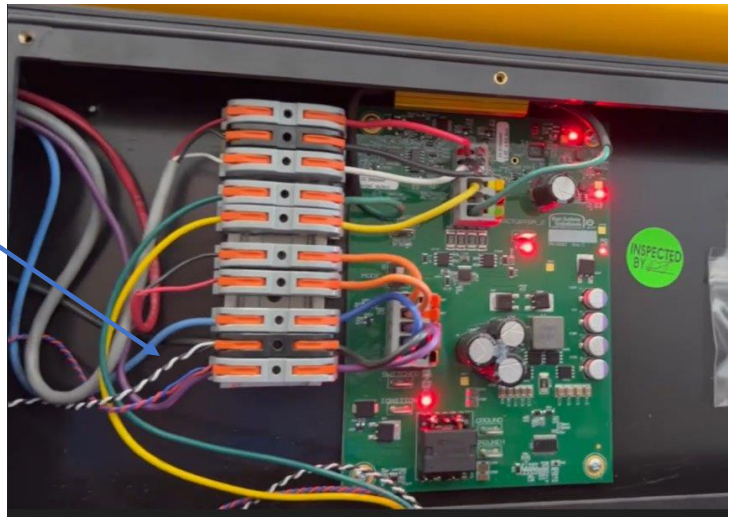
Control Box Versions

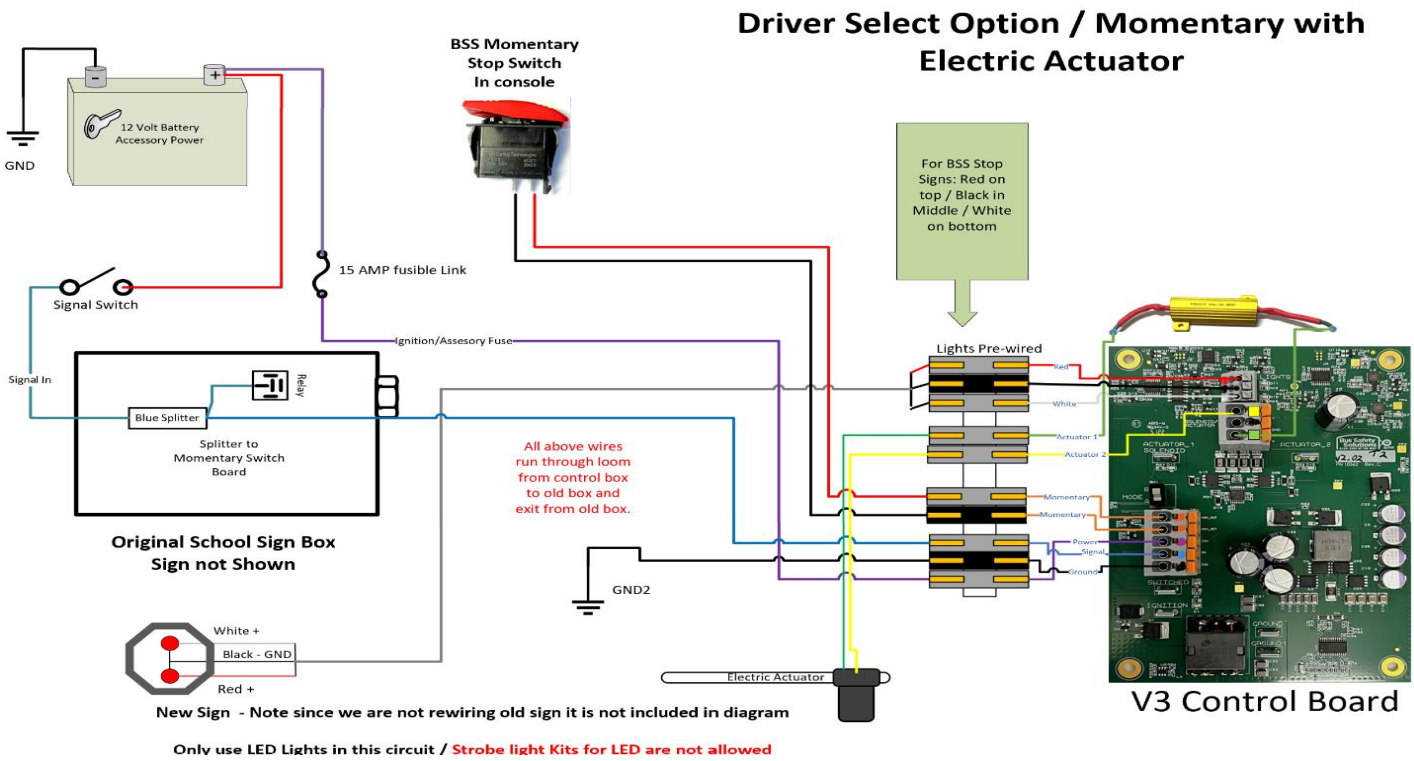
V3 Enclosure: Momentary Option





Note Twisted Heater wires in Diagram for reference.





Install Black Frame Assembly - All

- PRIOR TO INSTALL, MAKE SURE NO SCREWS WILL PENETRATE A CABLE WITHIN THE BUS!
- Install Black Frame Assembly, must be vertical, use yellow bus siding panels as guide. Pre-drill with 9/64” drill bit as needed. Frame should mount using same two front holes with current stop sign box

- In the picture below, the original stop arm and sign has not been removed and the vertical support has been installed using the original holes with the old sign frame overlapped. In some cases, a new electrical supply hole will have to be drilled 4.5” towards the rear, and fish over the supply cables. Thomas Bus may have to be a little more towards front due to inner channel with wires. See diagram for reference:

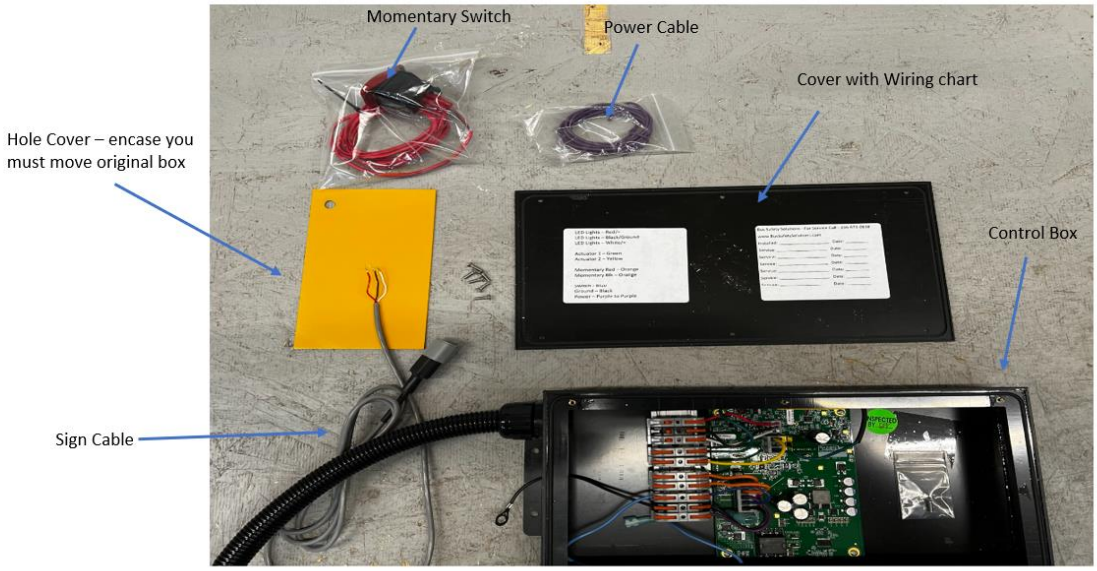
Inner frame should not be drilled or screwed into

Note: Sign will center in frame and when opened it will not conflict with the frame. These same solutions will work with all Signs including Trans spec Plastic signs and First Light Signs.

- Use ¾" x 12 self-tapping stainless-steel screws or 1-1/4" x 12 if necessary. Be sure no rivets or screws interfere with a tight fit against the side of the bus, if so remove them.
- The top left attachment on the vertical portion frame should be marked, drilled, and a self-tapping screw used to securely anchor the complete Black Frame Assembly.

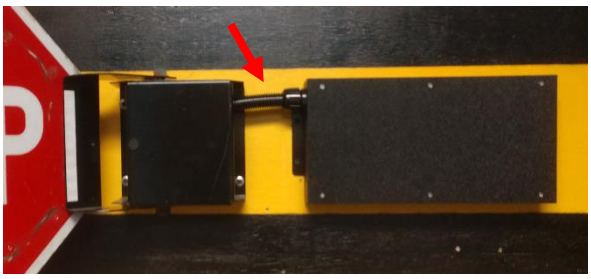
Install Control Box and Board – All

Parts:



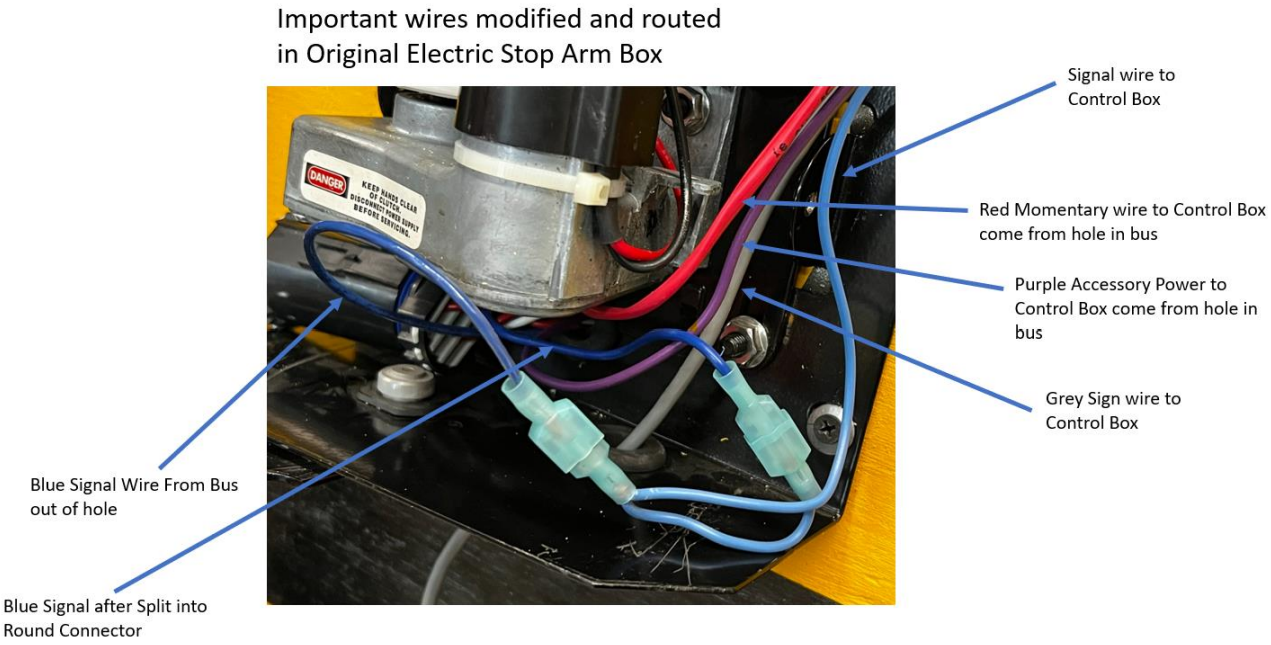
Important Notes:

New Enclosure units: You may have a newer Enclosure with all wires running thought the large Loom, This is the solution going forward. In some cases the old box may have to moved or wires also routed out the front and to the fornt of the frame for access to wiring. Use some additonal loom tubing that type of install. (as noted in very first image at top of document) We provide a plate to help cover any holes or provide cleaner access to bus and use our 90 degree elbow by drilling a 7/8" Hole in plate.



For all other installs Electric such as images below

- Drill a 7/8” hole in the rear end of the electrical arm box cover to allow for the electrical conduit.
- Install the Black Control box by inserting the flex conduit into the hole you just made. Important understanding of wiring paths: *It is possible that new power wiring must exit in front of box and use new cover plate. With new hole. Review Thomas install section for power.*



- Use 4 #12 x 1” ss screws.
- Silicone back of box for additional adhesion if you wish.
- Attach the box with 4 short 12mm self-tapping screws.
- Note On/Off Model Box Below: Momentary mounts the same.

Make Sure to secure Black wire under screw

Secure Box with all 4 screws

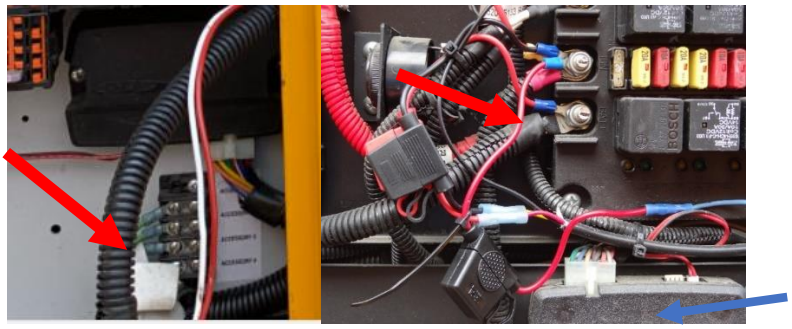
- Connect the black external wire to the lower left screw and then run the screw down.
  Note: Ground wire outside by hole
- Run the wiring harness and cables through the hole and attach the control box to the bus using 4 screws.
- If the control box covers any numbers, new decals will need to be applied.

Power source - All

Note: All power lines will run through the old box and into the loom provided into the new box.

IC Power

- The Extended Stop Arm requires a 12-Volt power source. This can be found in the electrical panel in an **IC**.
- On the **IC** equipped with an electric arm, 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.
- Preferred Solution: Connect the wire to an accessory block with a 15-amp inline fuse
- If the block is not present or functioning, connect to the solenoid and use an in-line 15-amp fuse.



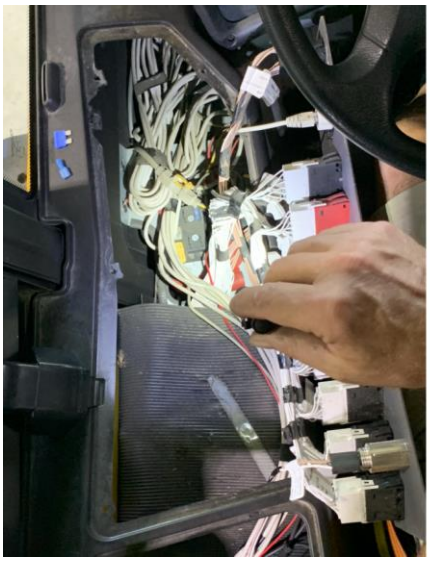
Blue Bird Power

- The Extended Stop Arm requires a 12-Volt power source. This can be found in the panel box in Bluebirds.
- On a **Bluebird**, run the power wire through the same hole that the Specialty light wires are located.
- Connect the wire to an accessory block **THAT IS CONTROLLED BY THE IGNITION SWITCH** and insert a 15-amp fuse
- If the accessory fuse block is not present or functioning, connect to the main power and use an in-line 15-amp fuse.
- Run the power wire all the way into the control box with the Bus Safety Air Solenoid. Connect the black power line to the 12-Volt source using a butt connector.

Thomas Only

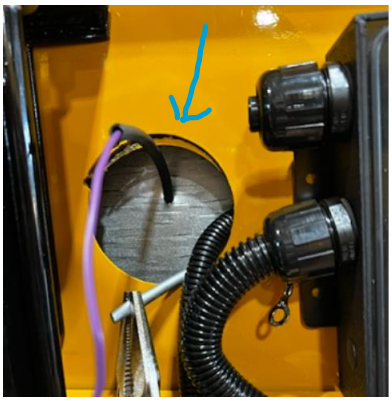
- The Extended Stop Arm requires a 12-Volt power source. This can be found underneath the left console switch panel**.**

- Open the left driver side console: Note the location and use empty space and connect purple wire direct instead of fusible link if able with female connector and 15-amp ATC fuse.

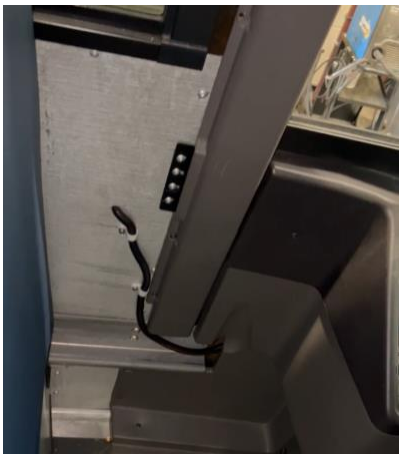



  - The Purple wire is our preferred Power (Accessory) wire with 15amp in-line fuse or with 15-amp fuse in accessory block wire is attached. Locate an accessory connection **if not able to use block.**

- Combine Power Wire with Momentary Switch cable and run through provided Loom to back of console inside and out the left bottom corner and loop up to hole drilled straight from center of outside wiring hole:
- You will drill a hole large enough for the wiring loom to come through.
- Note: Some model you may have to run through a separate hole for Thomas, use the supplied plate to manage hole.



Secure with clamps the tubing and wiring. Behind drive seat, run two wires for momentary switch.



Duplicate this option above for Momentary and On/Off options wires

Notes:

- Momentary switch red and black wires are simply sign signal wire and low amperage. They can be smaller single pair wire to simplify installation like the switch wires on the provided switch. 18–22-gauge pair in insulation.
- Connect the purple accessory wire to the accessory block and run through the bus wall
- Be sure to protect the wires from rubbing the metal hole with gromets or other tubing large enough for wires and flexible enough to bend. We use rainbird tubing. Some is included in Thomas kit.
- Inside the bus, remove the switch panel next to the driver's seat and steering wheel.
- Run the red pair through the old electrical box and into the wire loom into the new box.
- Be sure when you install the box and loom to secure the loom to the old electrical

Install Momentary Switch – All with momentary option.

- On the control panel install the switch shown below. The most ideal place for the Momentary / ON-OFF switch is usually as close to the warning light and door buttons as possible. When the switch is pushed the extended stop arm will not deploy when the reds are turned on for the one stop. If the button is not pushed for the next stop the two signs (Extended Stop Arm) will deploy.

- Place Switch in console left of Driver: If needed you may need to modify existing blank to support switch or use an adapter part for your console. Usually some are available from parts department.
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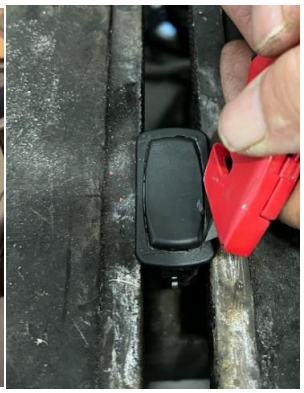
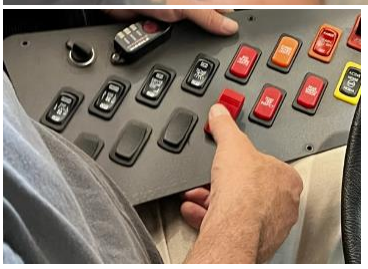
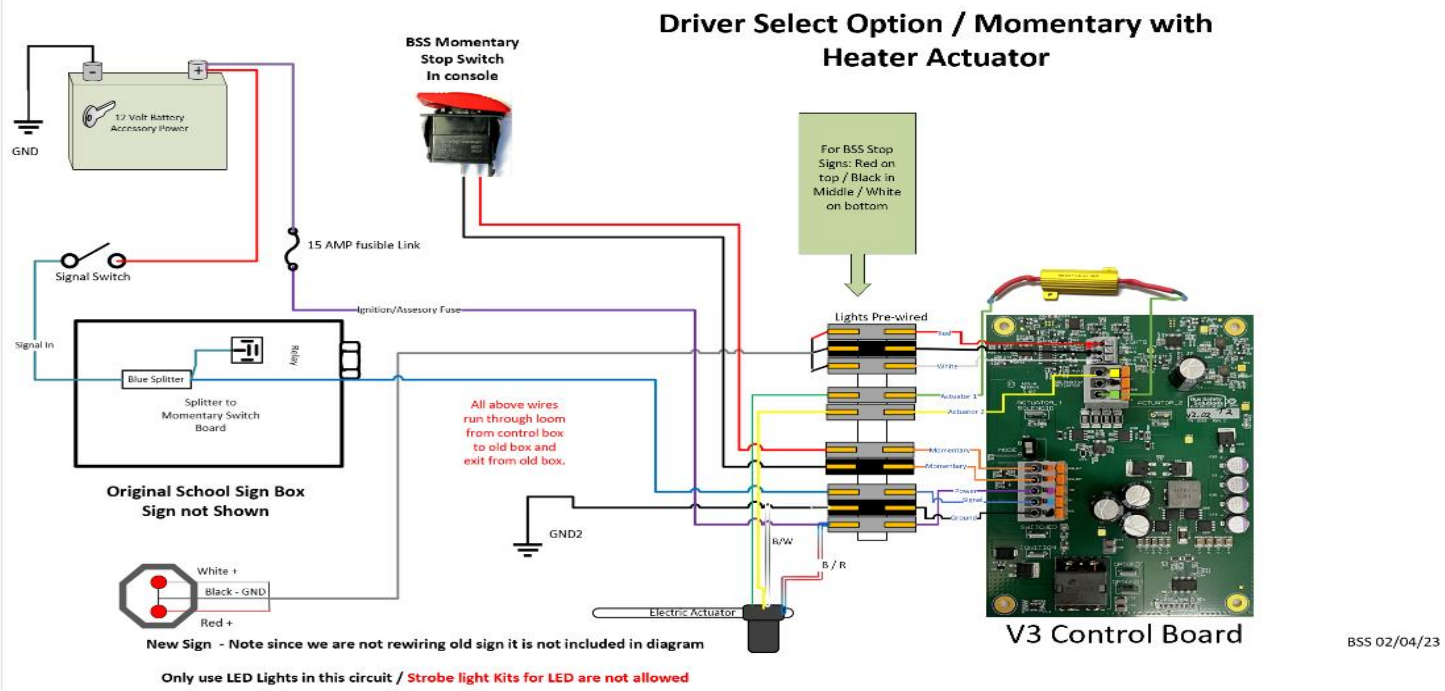


- The Momentary switch wiring and connect the RED to the SW1 6th connector from top in the control box. The black wire goes to SW2 black wire 7th connector from the top.
- They should match up to the orange wired coming from the board. See Diagram for more information.

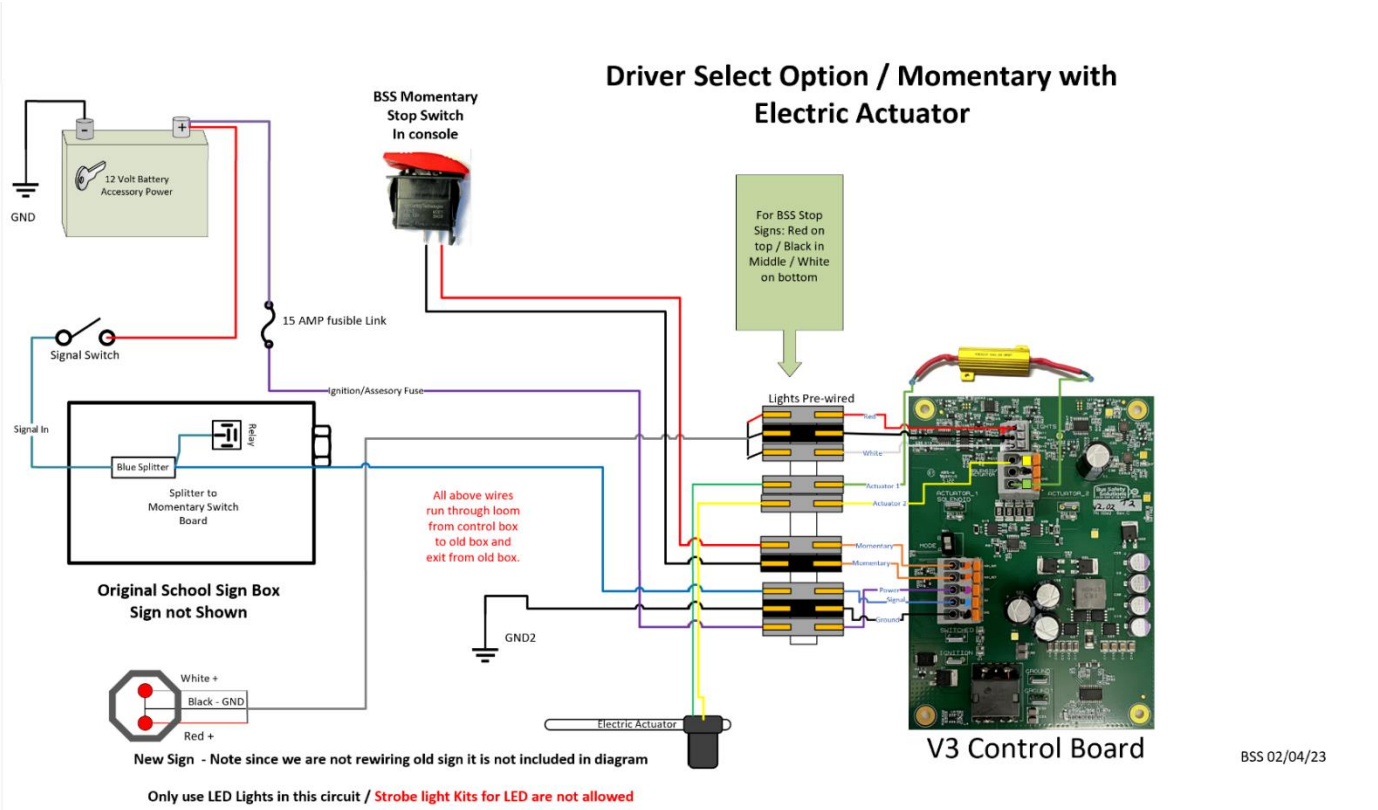


Control Box Install and Wiring: - All

- Important to understand the wiring at this point.

  Especially important: When wiring using these terminal wires, they need to be **stripped ¾" long** and with orange tab lifted insert wires all the way in and then push orange lever back down to lock in wire.

  If Electric and using Heater:
  - Reb and Blue wire got to main power on the connector block not the control board.
  - Black and White go to ground. This should be on the Connection Block ground connector with main ground wire attached also.



Run Electrical Connections - All

- Note: Wait to run grey sign wire after you install frame. We now have a metal channel for wire and can only install it after frame is in place.
- Finish running purple wire into control box
    - Make sure the wire is long enough to go through the old box and into watertight loom of control box. Run tubbing in a fair distance and run purple wire into box.
- Connect Power "Purple lead" to connection block.
- In Old Box connect provided splitter to blue signal wire and one end of the splitter will go to the stop switch wire. The other splitter connection connects to original point of connection.
- Other wire from the stop switch will run through the old box to the loom and into our box and then connect to the Switch connector See Wiring Diagram

Note: Leave the cover off the new box till testing is complete.

When done you will use supplied stainless steel screws and snug them down when closing

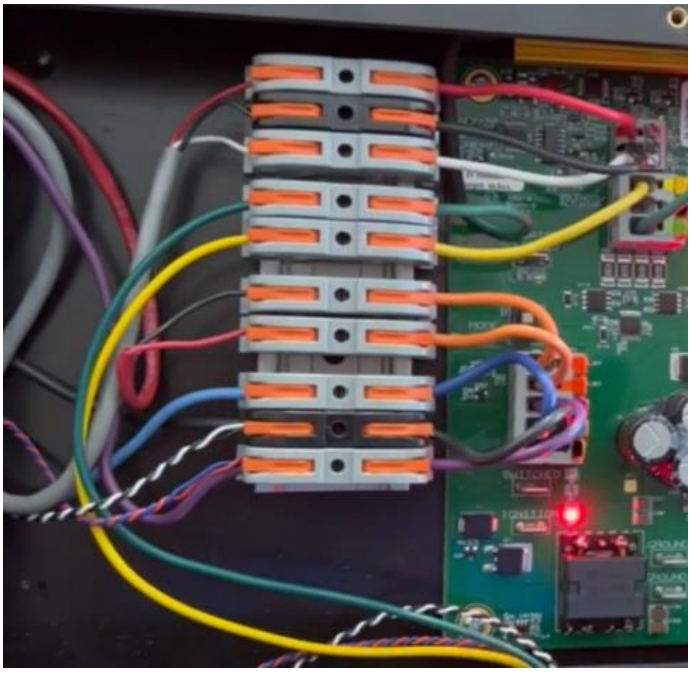
Connect Actuators – All

- Electric in two options
    - Standard - All Canadian busses should use heated as standard selection.
    - Heated for Cold Weather: 0 and below.

Note: The control box comes set up for the specific option.

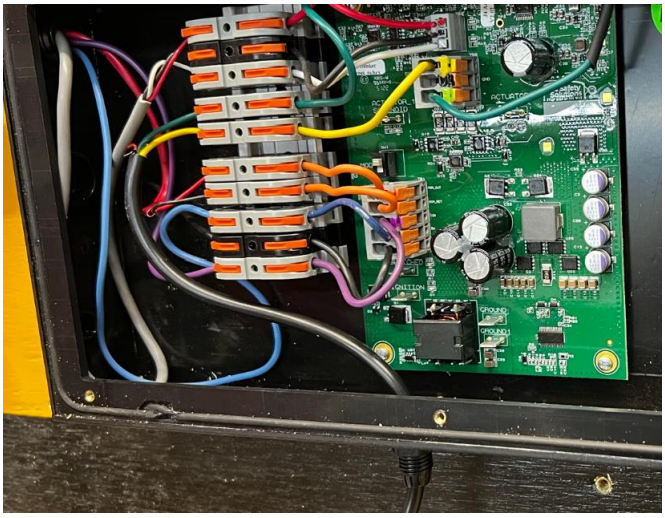
Attach Electric Actuator - All with Electric

- 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. Do not tighten bolts till complete and ready to wrap up job.
- Kit uses clevis pin and cotter key be sure to use them and set cotter pin by bending end to each side to lock it in.
- Measure the length of loom needed for a loose fit for the external wire and cut to proper length. Wire nut on enclosure will lock down on loom.
- Insert cable through bottom middle connector by loosening the gland nut and sliding in. follow wiring diagram on connecting yellow and green wires, if with heated actuator option wiring will be paired together with Red and Blue together and Black and white together. They will connect in the connection block, Red/Blue with purple wire and Black/White with Ground. Notice the twisted wires in photo below:



- Don’t forget the cotter pin when you are done. We do not lock in till we are sure of completed project.

Note Actuator wiring coming through bottom of box connection.



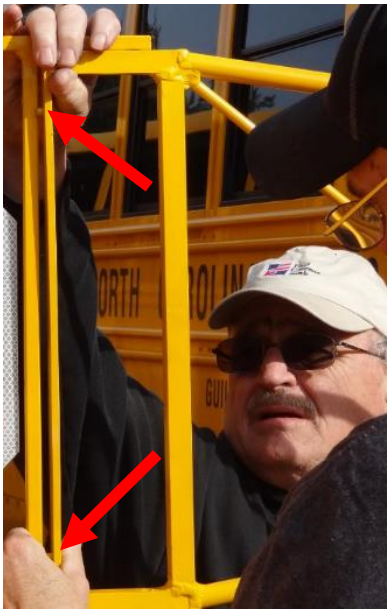
Install Frame & Sign - All

- Attach steel frame to the vertical frame using three 3/8” nylon
- Tighten with 9/16” nut driver.
- Attach Extended Stop Arm to steel frame.

Notice Old Sign and Hardware are still installed and our Frame surrounds and is not impeding operation of old arm.

Tighten the three nuts, Make sure inner sign can operate freely with out hitting yellow frame.

- Align using steel ¼” round studs, once aligned, hold with vice grip, or an additional set of hands. **Place Vise grip with protective covering directly over area so they apply pressure straight down into holes for pins.**



- 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

Be sure to run grey wire through channel and zip tie channel with included zip ties.

- 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 Bus Safety Solutions and

ESA Canada Stop Means Stop

Please Call 336-671-0838, or Toll Free 1 855 926-7233 Ext 7, or register a Service Case at https://mjgtechnologies.com/esa-support/ if you have *any problems with the installation*.

Appendix A: Lion prep for drilling:

Drill Bits:

		
Mgtgbao brand ceramic drill bit	**Carbide drill bit**	**Carbide chanfer mill**

Figure 1: Drill bit options and chanfer mill

- If the part has any residue or oil or grease, clean as per SPL40-01
- Before any drilling operation is started, visually inspect the drill bits for any damage or chipping – replace any damaged drill bits
- Select pilot hole diameter sized based on the left column of Table 1, then follow instructions in the right column – use appropriate jig when available
- Finish the hole with a chamfer mill (not needed when Mgtgbao ceramic drill bit are used) - Visually inspect the finished drilled holes for damage, chipping of the gelcoat layer.
- Randomly select 20% of the drilled holes, and confirm their size using an appropriate go/no-go gauge

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Table 1: Order of operations based on required hole size

Hole diameter size requirement	Drilling order of operations
<1/8 “	1. Drill directly with appropriately sized drill bit based on hole size requirement
1/8” – 1/4”	1. Drill 1 pilot hole - use a drill bit that is half the size of the final diameter of final hole. 2. Drill with drill bit that matches the final diameter of the required hole
1/4” – 1/2 “	1. Drill a first pilot hole – using a 1/8’’ bit 2. Drill a second pilot hole, using a bit that is half the size of the final diameter of hole. 3. Drill with drill bit that matches the final diameter of the required hole
1/2 “ – 1”	1. Drill first pilot hole – using a 1/8” drill bit 2. Drill second pilot hole, using a 1/4” drill bit. 3. Drill third pilot hole, using a bit that is half the size of the final diameter of hole. 4. Drill with drill bit that matches the final diameter of the required hole

Thank You and Enjoy Safer Transportation of your Students