



## TROUBLE SHOOTING THE ESA (EXTENDED STOP ARM)

### V4.2 Electric Actuator

**For the Mechanical** Warranty items are simple, send it back, we will check out and send you a new one

**Technician:** NO CHARGE if there is a defect. – Note: Collisions and damage from collision is not covered under warranty except for first year of operation.

**Remediation of failure:** It is recommended that all shops retain some spare parts to help expedite repairs and then use the warranty program from supplier to swap out bad parts and restock you local inventory. Recommended parts:

- One complete Arm
- One Actuator
- 2 control boards
- C1, C2 cables
- 15amp fuses
- 2 SPST Relays
- Shearpins
- Light kit (4 lights, splitters, gaskets and screws)

**OVERVIEW:** The electronic control board is powered by a 15-amp fuse directly from your fuse panel or solenoid. A splitter is used to tap into the control wire for the bus's red flashing lights and this sends a signal current to the electronic control board to start operating. The electronic control board uses this signal to start the operations of the Extended Stop Arm. Current is switched to the Linear Actuator to cause it to open the Extended Stop Arm. Current is sent to the lights to both flash and strobe on the sign. Should there be an obstacle in the way of the Extended Stop Arm, it will retract automatically.

Next page contains a series of possible issues and guidance to remediate issues.

**1 light of the sign does not work:**

If only 1 light does not work, replace just one light. They are plug in, so there is no wiring to do. If the sign has not been hit, request another light under warranty.  
**Note:** if Both Top or Both bottom lights do not work most likely control board or cable issue. Or the splitter behind the lights is bad. With reds on test for strobing power in next section guidance.

**Sign lights work not working correctly:**

- **Old Model with yellow control box:** Open the box and check the control board. Disconnect the USB end and look at the board, on the top left close to USB connector the 2 lights should alternate when the red lights are on. Reconnect connector and go to next step:
  - **New Model with black control box:** Open box and disconnect the top three wires Red, Black, and White from the connection block: the 2 lights should alternate when the red lights are on. Reconnect wires.
- Continue Diagnoses:**
- For either model if the lights still do not flash, only one flashes, or one light stays on all the time you need to replace board. If no lights and Actuator light moves from Actuator 2 to Actuator 1 then the light circuit is bad. Replace board.
  - Continue: Board appears to be okay
  - If this works on the board, follow it out to the “Gray breakaway” connection. Review the pins and ensure they are not bent in connector. Using a voltmeter test for strobing 12v power on the Right and Left most outside pins. If no power on pins then wire is bad. “C1 Cable”
  - If YES (it still flashes on the board) then the problem is in the wiring within the arm. Request a new C2 cable.

**The lights on the extended sign do not turn off:**

Follow testing on the previous: **Sign lights work not working correctly** - Most likely bad board or bad signal wire coming to board leaving board activated.

**The arm will not extend:**

Open the control box and check the control board. Disconnect the Actuator Wires at the top of the board. The tabs on the board say Actuator 1 and Actuator 2.

When the red lights on bus are off, the red led light on the board should be on Actuator 2.

When the red lights on bus are turned on, the red led light on the board should be at Actuator 1.

If the LED lights on the Actuator1 does not change to Actuator 2 then Stop Arm Signal from Bus is likely bad Signal should be above 9.5 volts if it isn't you can request a SPST Relay to help boost signal if needed.

Check with a multimeter that there is 12 volts or greater between Actuator one and ground.

Check to see if unit is still under warranty if not functioning right.

**The Shear Pins broke without an accident occurring.**

Check the dates on your service records for when they were last replaced. Both shear pins need to be replaced with the monthly maintenance of the bus. Order more shear pins.

**The actuator does not work**

Test the actuator to a battery to determine whether it functions.

It is also okay to test the actuator by putting battery power + on Green wire and – on yellow wire to test then reverse to retract actuator. If this fails actuator is likely bad.

If not, most likely this has ruined the electronic board as well. This is caused by a mechanical failure or accident. Check with driver for accident, and request report accordingly. New parts can be ordered with the issue of a Purchase Order

**The arm retracted on its own:**

**When the arm hits something** it will retract on it's own to protect the integrity of the arm and bus. This will remain against the bus for 10 seconds while the red lights on the bus are flashing. Then it will attempt to come out again. If there is no obstruction, it will stay out. If there is still an obstruction it will return to the side of the bus for another 10 seconds and repeat this until there is no obstruction or driver turns off Reds.

**Small obstructions** can occur near the frame or with the cotter pin at the top that could cause the arm to retract. Extend the arm and watch for the point of contact where the retraction occurs to troubleshoot where the obstruction is occurring. If it is the frame, it can be bent or adjusted to allow the free movement of the arm.

**In high winds**, the arm might react as if it hit something and retract to the side of the bus. This should only be a rare occurrence. Similar to having your umbrella blow inside out in a surge of wind. The arm will withstand 50 mph winds with no affect once completely extended or will hold against the side of the bus while traveling at up to 75 mph..

**Cold Weather** below -17 Celcius then you may need a heated actuator to help functionality. Control board detects temperature and changes profile for cold weather.

If Arm is fully deployed it should not return unless driver has cancelled reds. Actuator locks in fully deployed position till reds are cancelled.

**The sign has been in an accident:**

Usually when this happens, you will need to replace the damaged items. Have a Purchase Order issued for the parts needed or use a credit card. Check with local dealer MJG first to see if they have parts. If not please call it in to +1-336-671-0838 and tell them you need it sent express.

**Sign does not stay tight to side of bus**

The sign frame may be shimmed to force the aluminum arm tighter to the bus. CAREFUL here as it should not press against the bumper continually. This could cause the actuator to overwork trying to get it to pull in tighter than possible. This will burn out the actuator and ruin the electronic board. This would also cause excessive noise when hitting the side of the bus. Where yellow steel frame is attached to black hinge frame place a shim behind yellow frame just to the left of the locking nuts. If arm has been hit the may occur.

**Stop sign lights hit side of ribs on bus:**

Holding the aluminum frame at point of connection with the stop sign use the other hand at the far end of the stop sign and bend it back slightly such that it does not hit. This does not have to be to the extreme, just enough to keep it from hitting the side of the bus.

**Sign or arm covers bus numbering or lettering**

Move bus decals further down the bus.

<b>A fuse "blows" in the circuit</b>	This is an indicator that an electrical fault has occurred. Most likely the actuator is drawing too much power, either from a previous accident or some physical overload. Correct the physical problem before replacing the fuse. Replacing with a larger fuse will ruin the electronic board.
<b>Arm extending slowly</b>	The electric actuator is designed to extend and retract in 5 seconds in either direction. If the actuator is extending in more time, the actuator has most likely been damaged in an accident. Listen to the actuator as it extends, if you hear grinding of gears, a replacement should be ordered.
<b>Arm is extended half-way</b>	Bus driver turned off bus before the arm was retracted fully. Turn on bus, retract arm fully.
<b>No lights working on Speciality sign</b>	Check Speciality wiring to see if it is broken or damaged Check Speciality lights to see if they are broken or damaged Check Speciality relay to see if it is broken or damaged If the bus uses a high-voltage relay, check to see if the splitter going to the relay is loose or damaged. Re-attach if necessary.
<b>Arm Extends on its own</b>	<p>This can occur if a small amount of current is sent to the stop lights for any reason. One rare situation is when the escape hatch or emergency door is not secured tightly, the vibration of the Hatch triggers the lights and extends the sign. Both of these have momentary contact switches which will start the Red lights, and therefore our electronic board to send out the Extended Stop Arm.</p> <p>Current could also be being sent by a bad switch at the control panel. A bus driver could be operating the controls incorrectly.</p> <p>To help prevent this you can install an Automotive 30amp SPST Relay on the Signal line coming to the control board to help filter out some of the noise on the signal wire.</p> <p>The relay control lead will be the signal wire coming in and then the normally open contacts will be from the control board ignition wire and the signal wire into the control board. This will supply full clean power to the signal lead on the control board.</p>



**Speciality Lights Working, but nothing on the Extended Stop Arm works**

Open the control box and look for the lights on the control board. There should be 3 red lights at the bottom of the board and one at the Actuator 2 tab on top. If these are not working, a power source is lost.

Connection between speciality signal cable and control box is bad. Check the splitter cable for integrity. Loose connections are a prime suspect.

Ground wire in the control box is not connected.

Power wire to Control Box is not connected.

Fuse to control box is blown

Solenoid connection could be bad

If the Control board will not light up with a good power source and ground, then it has burned out for some reason. If this is not due to an accident or connection error return as defective.

**Loose support screws**

If a supporting screw for the extended stop arm is missing or loose, replace with an appropriately sized screw. The system has redundancy of support; however all support screws are recommended. If needed you can use the next size stainless steel self tapping screw if hole is stripped. On some Thomas busses you may need to use a lock washer on screws due to their insulation.

**Field Modifications**

Changes to design or function void manufacture's warranty.