

SLOW START VALVE REPLACEMENT



Prepared by:

Nic Rucker
Field Service Technical Rep.
256-499-5433

Approved by: Dan Allen – Chief Engineer

Property name and Top bus number: BROWARD, 295000, 303000, 311000, 311500

Issue: After the front door is closed the front interlock is still engaged and the bus can't move.

Reason / cause: There could be multiple reasons:

1. Slow start valve does not switch to full flow mode, causing low pressure to door motor. If the pressure is low then the door won't close properly causing the proximity switch, that would release the interlock valve, to stay open.
2. Improper door adjustment.

Solution: Replace slow start valve per this work instruction. Adjust door per the NABI PDI sheet (see attached documents at pages 5-10 of this work instruction).

SLOW START VALVE REPLACEMENT



Number of buses affected:	Broward	295000	1150-1159
		303000	1160-1173
		311000	1201-1209
		311500	1200

Estimate repair hours/bus: 25 min

Necessary parts:

Clamp, hose, silicone/ss, 7/8 id	5002523	1 per bus
Legris slow start valve	617-1735-001	1 per bus

Necessary tools: Philips screw driver

SLOW START VALVE REPLACEMENT



SAFETY PRECAUTIONS MUST BE FOLLOWED ACCORDING TO ACCEPTED INDUSTRY STANDARDS AND LOCAL/PROPERTY REQUIREMENTS.

1. Dump air on side dash to release pressure

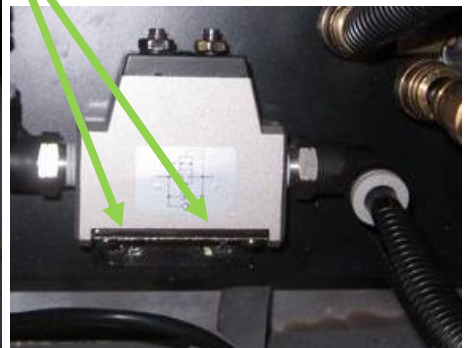


2. Open destination compartment to access the slow start valve above front door
3. Remove the two screws holding the valve in place



ORIGINAL SLOW START VALVE

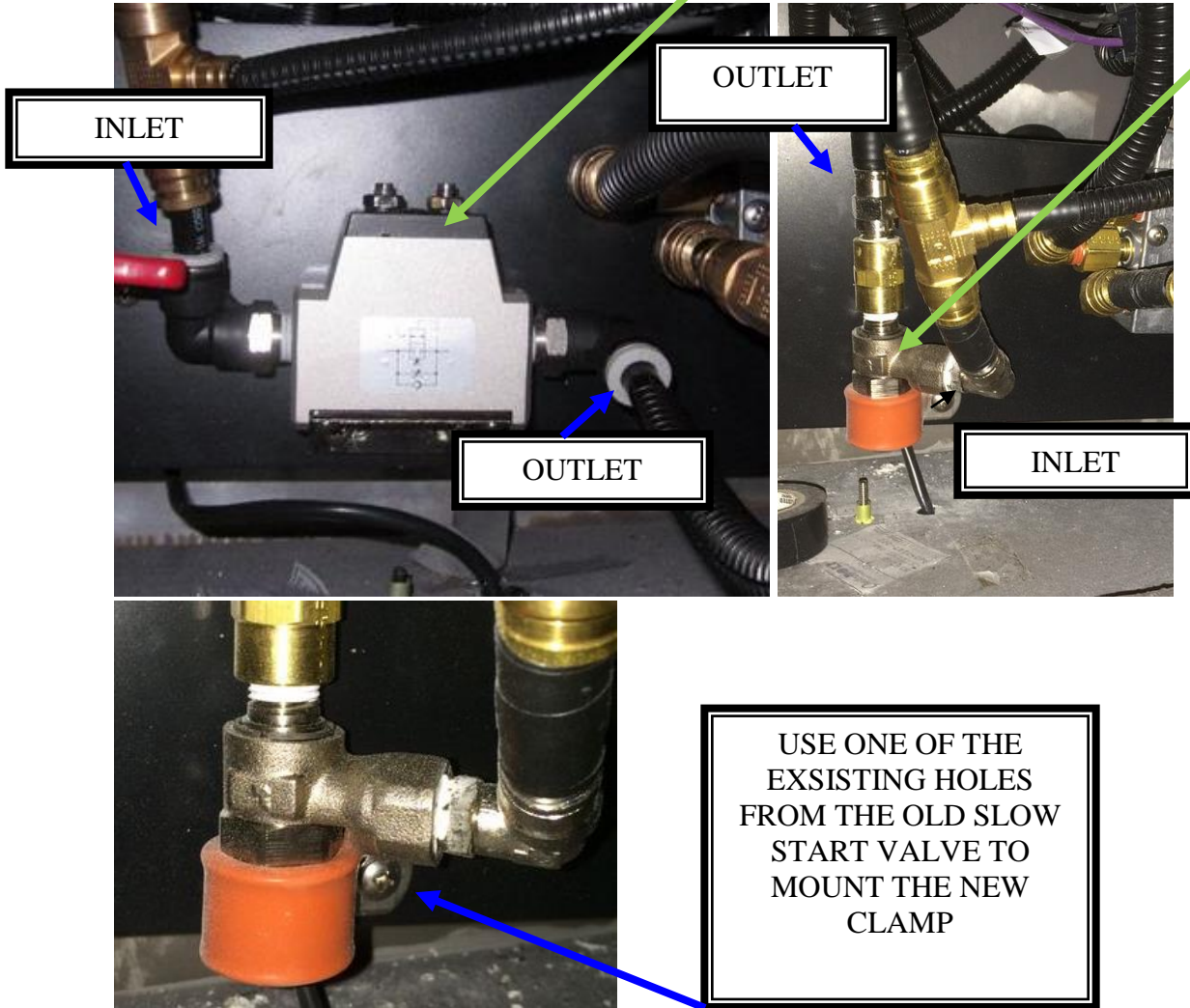
REMOVE THESE TWO SCREWS



SLOW START VALVE REPLACEMENT



4. Disconnect inlet/outlet supply airline from original slow start valve, then connect to the new valve as shown



5. Turn knob on door plate to re-apply air
6. Check for completeness of work.
7. Slow start valve operation will be checked during the BRT plug door retrofit instructions
8. Remove all tools from work area.
9. Close destination compartment door

SLOW START VALVE REPLACEMENT



NABI BRT Front Plug Door			
1			
2	Bus Number		Entrance
3	Date		Rotary Operator
4	Inspected By		Rev. 1
5			
Front Door Checklist			
6			
7	Installation and Adjustment Checks		
8	Verify that door panel is centered in portal. - Upper & Lower Door Brackets Adjustments		
9	The door panel is flush with the outside wall of the bus.		
10	The seal is in full contact with the bottom of the door opening.		
11	Verify that the door open stop bumper on the Upper Boomerang clears the lip of the portal seal in the door open position.		
12	Open the door fully and make certain that the door open stop bumper on the Upper Boomerang contacts the portal frame before the Rotary Operator Assembly cam followers contact the end of their cam slots.		
13	Rotary Operator has a minimum of 90 PSI and maximum of 130.		
14	Full closed limit switch activated when door panels fully closed and locked.		
15	Full close switch has min .030 inch over-travel.		
16	Full open limit switch activated when door panels open.		
17	Full open switch has min .030 inch over-travel.		
18	Wiring Secured Allows No Contact With Moving Parts, at Rotary Operator and above door.		
19	Wire Connections Are Secure.		
20	Make sure that all pneumatic connections are secure and free of leaks at operator and valve mounting plate above door.		
21	Verify that air tubing is routed properly and is not kinked or rubbing against sharp or rough surfaces that could cause chafing or damage at Operator, through routing hole, above door at valve mounting plate and at side dash dump valve.		
22	Verify the proper installation of the external air pilot connection for the four way solenoid valve. See Pneumatic Connection Diagram on application drawing (51004036) (Second Tab)		
23	Verify boomerang clamps are clamped over bare metal locations on the door shaft.		
24	Verify clearance between the shoulder near the top of the Shaft and Arm Assembly and the underside of the spherical bearing in the Upper Bearing Bracket - 1/8" to 1/2"		
25	Verify that the pneumatic system is properly connected.		
26	Verify that the output shaft of the Rotary Operator is rotated fully counterclockwise into the fully closed and locked position. Verify that the cam followers are in the upper most position of the axial cam slot.		
27	Torque Checks		
28	Four Fasteners 5/16" bolts attaching Rotary Operator Assembly to the vehicle structure torqued to 22 ft. lbs. Verify all 4 bolts are into the tapping plate.		
29	Door Shaft Spindle clamps torqued to 60 ft.lbs torque.		
30	Door Shaft Upper Boomerang clamp torqued to 60 ft.lbs torque.		
31	Door Shaft Lower Boomerang clamp torqued to 60 ft.lbs torque.		
32	Four 5/16" bolts in the Upper Bearing Bracket properly torqued 22 ft. lbs torque		
33	Verify Upper Spherical Bearing is horizontal and Jamb Nut torqued to 30 ft.lbs.		
34	Verify Lower Spherical Bearing is horizontal and Jamb Nut torqued to 30 ft.lbs.		
35	Upper Spherical Bearing Hex Flanged Lock Nut Torqued to 27 ft.lbs.		
36	Lower Spherical Bearing Hex Flanged Lock Nut Torqued to 27 ft.lbs.		
37	Upper Bracket to door panel bolts torqued to 25 in.lbs (2)		
38	Lower Bracket to door panel bolts torqued to 25 in.lbs (4)		
39	Guide Rod Jamb Nuts Torqued to 30 ft.lbs. (2)		
40	Guide Rod Joint Mount Nuts Torqued to 27 ft.lbs. (2)		
41	Guide Rod Bracket to Door Panel Bolts Torqued to 25 in.lbs. (4)		
42	Guide Rod Bracket to Bus Bolts Torqued to 11 ft.lbs. (2)		
43	Functional Checks		
44	Driver's Dump Function. Actuate valve & manually open door (Y/N).		
45	Emergency egress Dump Function. Actuate valve & manually open door (Y/N).		
46	Check Driver's Door Controller Functionality. Verify that Entrance / Exit doors Open / Close at proper Controller positions.		
47	Door Open Speed (5.0-6.5sec).		
48	Door Closing speed (5.0-6.5 sec).		
49	Door Opens Smoothly with proper cushioning (Y/N).		
50	Door Closes Smoothly with proper cushioning (Y/N).		
51	Ramp Interlock When Door is Not Full Open (Y/N).		
52	Ramp deploys When Door is Full Open with no contact to door or portal (Y/N).		
53	Door does not slam when starting from the full open position no air applied door controller in closed position then applying air. See "Slow Start Verification" (Third Tab)		
54	Door does not slam when starting from the full closed position no air applied door controller in closed position then applying air. See "Slow Start Verification" (Third Tab)		
55	Verify proper "Preload Adjustment" (Fourth Tab)		
56			

SLOW START VALVE REPLACEMENT



1. Restore air pressure to bus and verify that after approximately 15 seconds the slow start valve piston extends from its retracted position. Refer to figure 3. At this point the slow start valve has shifted to full pressure.

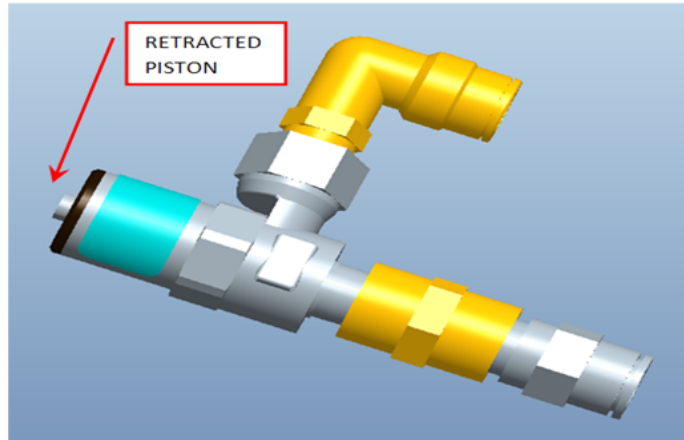


Figure 1

2. Dump the air from the door system and verify that the door stays closed.
3. Manually placed the door halfway its open position.
4. Restore the air pressure to the door system making sure that the door does not slam close. If the previous does not occur, adjust slow start valve per 51210151 (BULLETIN (TB08-03-331) SLOW START VALVE)
5. Dump the air from the system again and manually place the door in the full open position.
6. Restore air pressure to the door system verify that the door closes slowly without slamming. If the previous does not occur, adjust slow start valve per included 51210151 (BULLETIN (TB08-03-331) SLOW START VALVE)
7. If adjustment cannot be achieved, contact Vapor Bus International (VBI) customer service at 847-777-6400 for further instructions.
8. If adjustment is achieved, restore air pressure, close slow start valve compartment and slow start replacement is finished.

SLOW START VALVE REPLACEMENT



- 4.6.16 Preloading the door system, that is, elastically loading the door panel and Shaft and Arm assembly in the door closed position, is necessary to securely close and seal the doors. Preloading also prevents the door seals from pulling away from the portal seals when the vehicle travels at high speed.
- 4.6.17 Rotate the rotary operator output shaft and Shaft and Arm Assembly clockwise (clockwise for RH units / counterclockwise for LH units) so that the cam follower rollers are in the helical section of the cam slots (between points B and C in Figure 3).
- 4.6.18 Insert a .390 inch or 25/64 inch diameter pin gage between the end of the axial portion of the cam slots (Point A in Figure 3) and the cam follower roller of the Rotary Operator Assembly (see Figure 8). Rotate the Shaft and Arm Assembly counter clockwise (clockwise for LH units) so the round gage is constrained between the cam follower roller (opposite to the switching washer) and the uppermost surface of cam slot (see Figure 9). Once the round gage is in place, a gap will be present at the top and bottom of the door panel between the door and jamb seals (see Figure 10)



Figure 8 - Round Gage Installation to Rotary Operator



SLOW START VALVE REPLACEMENT



Figure 10 - Gap between Door and Jamb Seals Prior to Final Adjustment

4.6.19 Loosen the three Socket Head Screws on the Upper Boomerang Assembly and rotate the upper boomerang arm counter clockwise (clockwise for LH units) to compress the door and jamb seals against each other at the top of the door opening. Hold the Upper Boomerang Assembly to maintain proper seal compression and tighten the three Socket Head Screws of the upper boomerang to **60 ft.lbs torque** to secure the upper boomerang to the shaft.

4.6.20 Loosen the three Socket Head Screws on the Lower Boomerang Assembly and rotate the lower boomerang arm counter clockwise (clockwise for LH units) to compress the door and jamb seals against each other at the bottom of the door opening. Hold the Lower Boomerang Assembly to maintain proper seal compression and tighten the three Socket Head Screws of the lower boomerang to **60 ft.lbs torque** to secure the boomerang to the shaft.

4.6.21 Apply the **minimum air pressure expected to be encountered in operating service (90 psi)** to the Rotary Operator Assembly. Readjust the Boomerang Assemblies as required and verify the following:

- a) The Rotary Operator cam follower rollers must reach the upper end of the axial cam slots as indicated by Point A in Figure 3 to lock the rotary operator in the door closed position.

WARNING: IMPROPER ADJUSTMENT OF THE DOOR SYSTEM THAT PREVENTS THE ROTARY OPERATOR CAM FOLLOWER ROLLERS FROM REACHING THE POSITION DESCRIBED IN THIS STEP CAN RESULT IN THE DOOR PANEL BECOMING UNLOCKED WHILE THE VEHICLE IS MOVING.

- b) Verify that the door seals make uniform contact around the entire portal opening. This is verified by pushing outward on the door panel along the portal seals while checking for adequate seal compression.

4.6.22 Once proper preload adjustment has been achieved, operate the door system under power several times at minimum operating pressure and verify each time that the Rotary Operator cam followers move all the way up into the axial portion of the cam slots as indicated by Point A in Figure 3 to lock the rotary operator in the door closed position. Verify that the six Socket Head Screws on the Upper and Lower Boomerang Assemblies Clamps are tightened to **60 ft.lbs torque**.

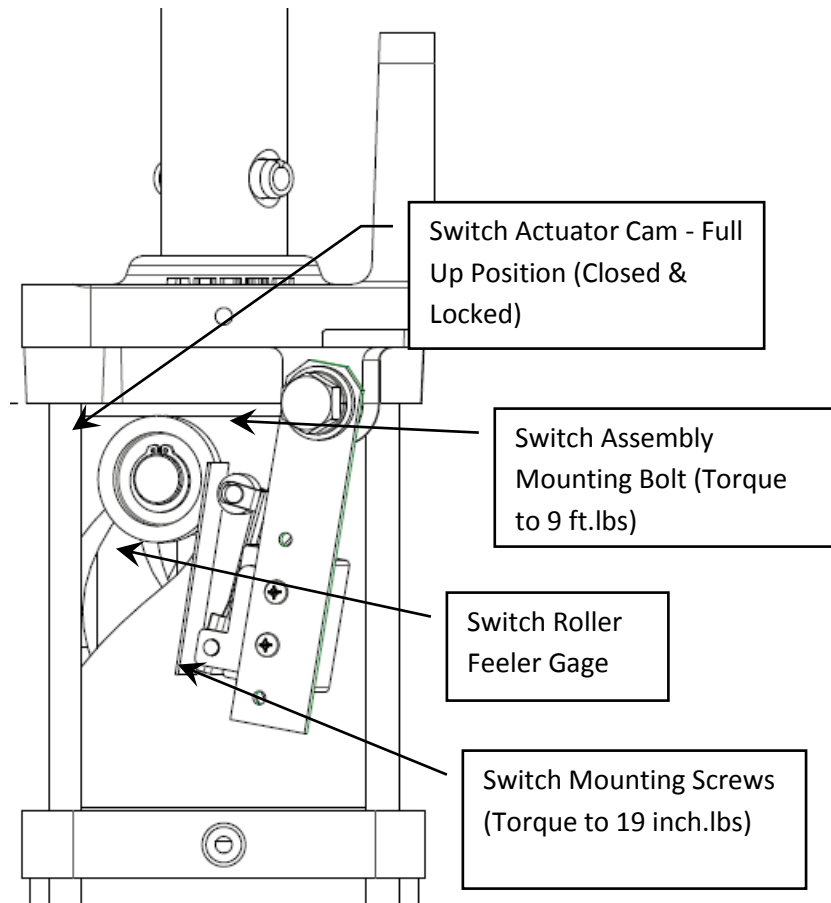


Figure 11 - Rotary Operator Closed and Locked Limit Switch

4.6.24 Tighten the switch assembly mounting bolt to **9 ft.lbs torque** to secure adjustment. Once again verify switch actuation requirements outlined in step 4.6.23 to make sure adjustment was not compromised during tightening of the switch assembly mounting fastener.

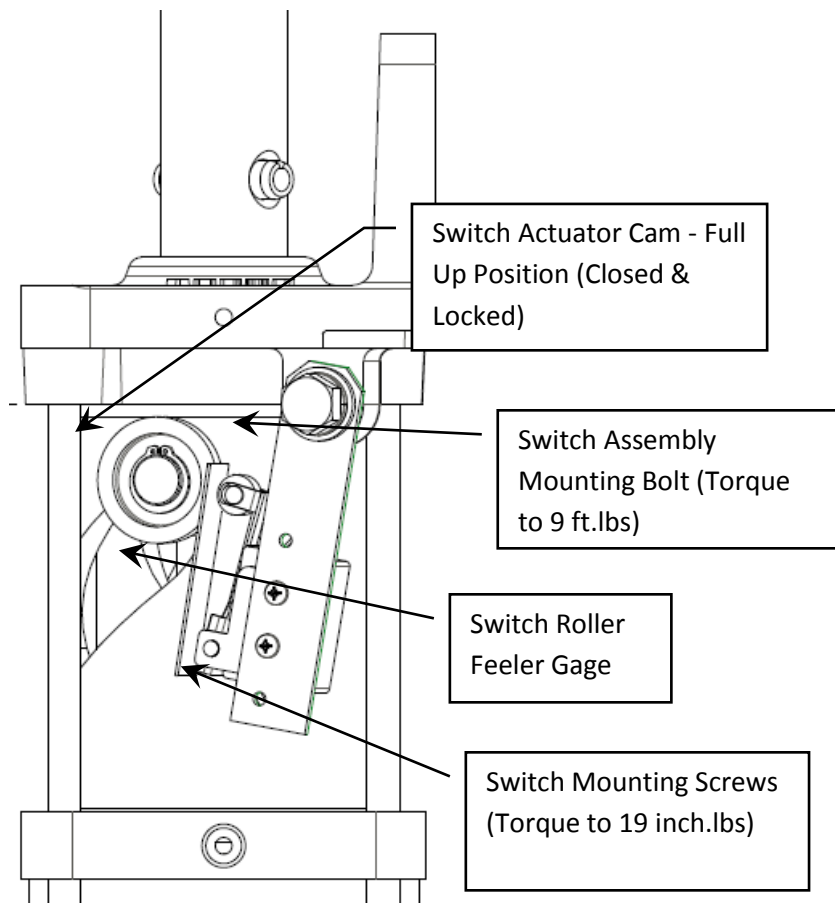


Figure 11 - Rotary Operator Closed and Locked Limit Switch

4.6.24 Tighten the switch assembly mounting bolt to **9 ft.lbs torque** to secure adjustment. Once again verify switch actuation requirements outlined in step 4.6.23 to make sure adjustment was not compromised during tightening of the switch assembly mounting fastener.