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Maineville, Ohio 45039  
(513) 677-0500

# **BavisAIR BPS Pneumatic System Installation and Service Manual**

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PN: 00710031



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## Important Safety Instructions

1. READ THESE INSTRUCTIONS.
2. KEEP THESE INSTRUCTIONS.
3. HEED ALL WARNINGS.
4. FOLLOW ALL INSTRUCTIONS.
5. DO NOT CLEAN THIS APPARATUS WITH A WATER SPRAY OR THE LIKE.
6. DO NOT BLOCK ANY VENTILATION OPENINGS. INSTALL IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
7. DO NOT INSTALL NEAR ANY HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTERS, STOVES OR OTHER APPARATUS THAT PRODUCES HEAT.
8. ONLY USE ATTACHMENTS / ACCESSORIES SPECIFIED BY THE MANUFACTURER.
9. TURN THE POWER SWITCH TO THE "OFF" POSITION WHEN THE APPARATUS IS NOT IN USE AND BEFORE SERVICING.
10. REFER ALL SERVICING TO QUALIFIED SERVICE PERSONNEL. SERVICING IS REQUIRED WHEN THE APPARATUS HAS BEEN DAMAGED IN ANY WAY, SUCH AS LIQUID HAS BEEN SPILLED OR OBJECTS FALLEN INTO THE APPARATUS, THE APPRATUS DOES NOT OPERATE NORMALLY.

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## Grounding Instructions

1. THIS MACHINE MUST BE CONNECTED TO A GROUNDED METAL, PERMANENT WIRING SYSTEM; OR AN EQUIPMENT-GROUNDING CONDUCTOR MUST BE RUN WITH THE CIRCUIT CONDUCTORS AND CONNECTED TO THE EQUIPMENT-GROUNDING TERMINAL OR LEAD ON THE CONVEYOR.
2. DANGER-CHECK WITH A QUALIFIED ELECTRICIAN OR SERVICEMAN IF THE GROUNDING INSTRUCTIONS ARE NOT COMPLETELY UNDERSTOOD, OR IF IN THE DOUBT AS TO WHETHER THE APPARATUS IS PROPERLY GROUNDED.

<b>E.F. BAVIS &amp; ASSOCIATES, INC.</b>	
MAINEVILLE, OHIO	
<b>BAVIS AIR</b>	
<b>Model: BPS</b>	
	RAINPROOF
<b>LISTED</b>	115VAC
<small>CONVEYOR SYSTEM 78P6</small>	13 AMP
<small>ALSO CLASSIFIED</small>	60 HZ
<small>BANK EQUIPMENT</small>	
<small>AS TO ELECTRICAL, FIRE, SHOCK</small>	
<small>AND CASUALTY HAZARDS ONLY.</small>	
MANUFACTURED: MO. <input type="text"/>	YR. <input type="text"/>
P/N: 23212021	

# BavisAIR Pneumatic System

## Overview

The BavisAIR system is a pneumatic tube system kit intended for the conveyance of currency and documents (rolled coin) between customers and tellers at drive-thru banking lanes. The teller unit has a powder coat finished aluminum trim. The customer unit has a stainless steel cover. The 4-1/2" PVC tubing is not supplied.

The BavisAIR system must be run in an overhead configuration. It was not designed to accommodate "Downsend" configurations. If there is a need for this type of configuration at a given site, we suggest that you consider a product from our Autoveyor™ product line. Please contact us for more details on this product line.

The BavisAIR BPS System uses a powered door at the customer end of the system. The Teller end uses a manual door. The audio wiring is run by others, either overhead or underground. For more information see the *TYPICAL SYSTEM LAYOUT* section of this manual.

The customer audio components, speaker, microphone and call button are supplied with the system.

The weight capacity of the system is rated at for no rolled coin.

This system is intrinsically safe in that the mechanical power levels at the moving parts (teller and customer door) are below 15 lbs. of force. The electrical power levels at the Teller are intrinsically safe in that they are at NEC Class II levels (24V 100 VA) or lower.

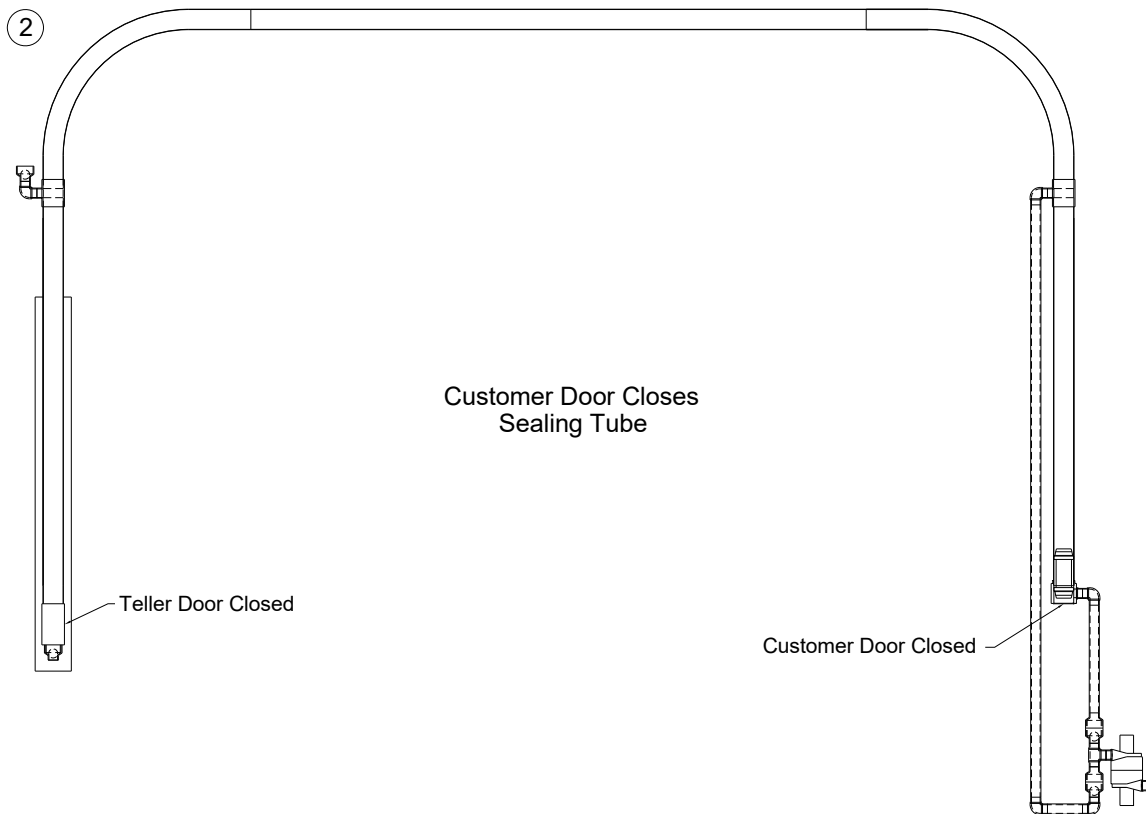
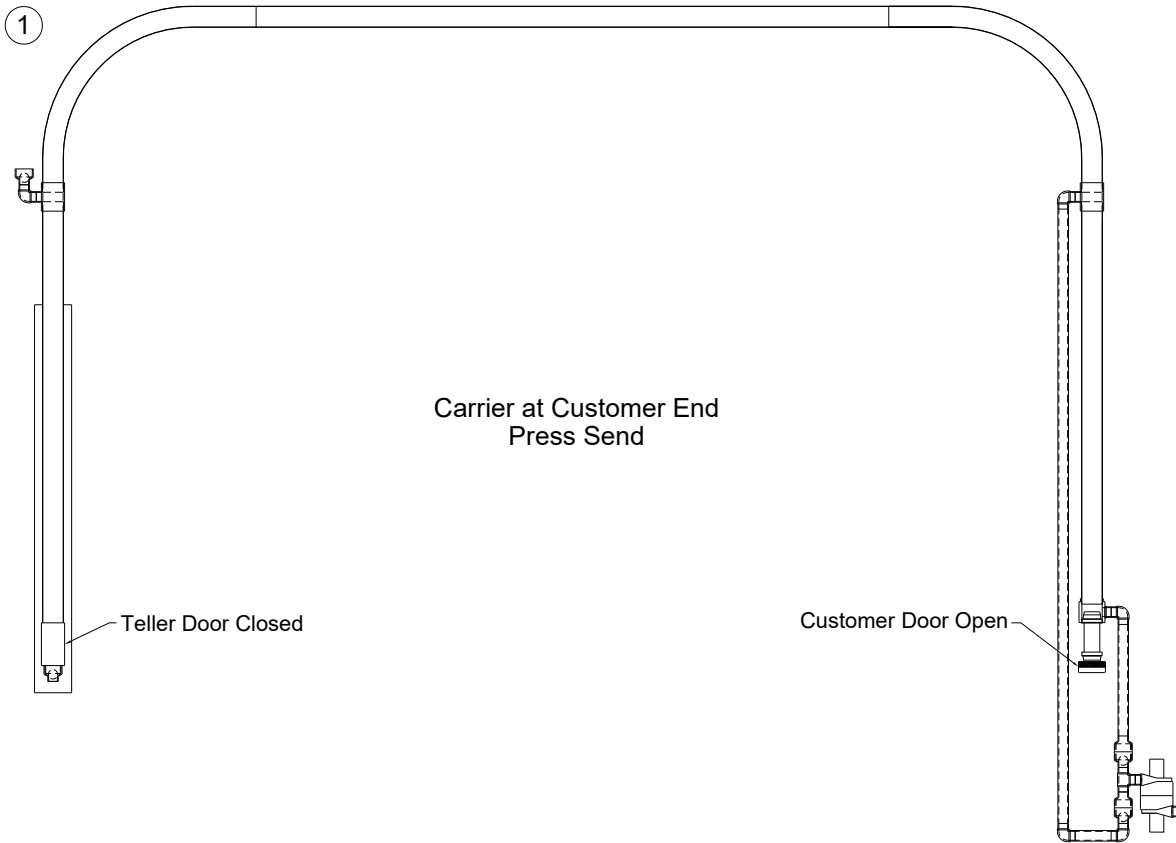
The BavisAIR System has been reviewed by a third party for safety and suitability for the given application. Please review the label applied to the machine for details concerning this review. Note that the UL approval is still pending.

Each part in the kit contains a label with the part name and number attached to it. Please read over this manual before installation to familiarize yourself with the different components and where they are used in the system.

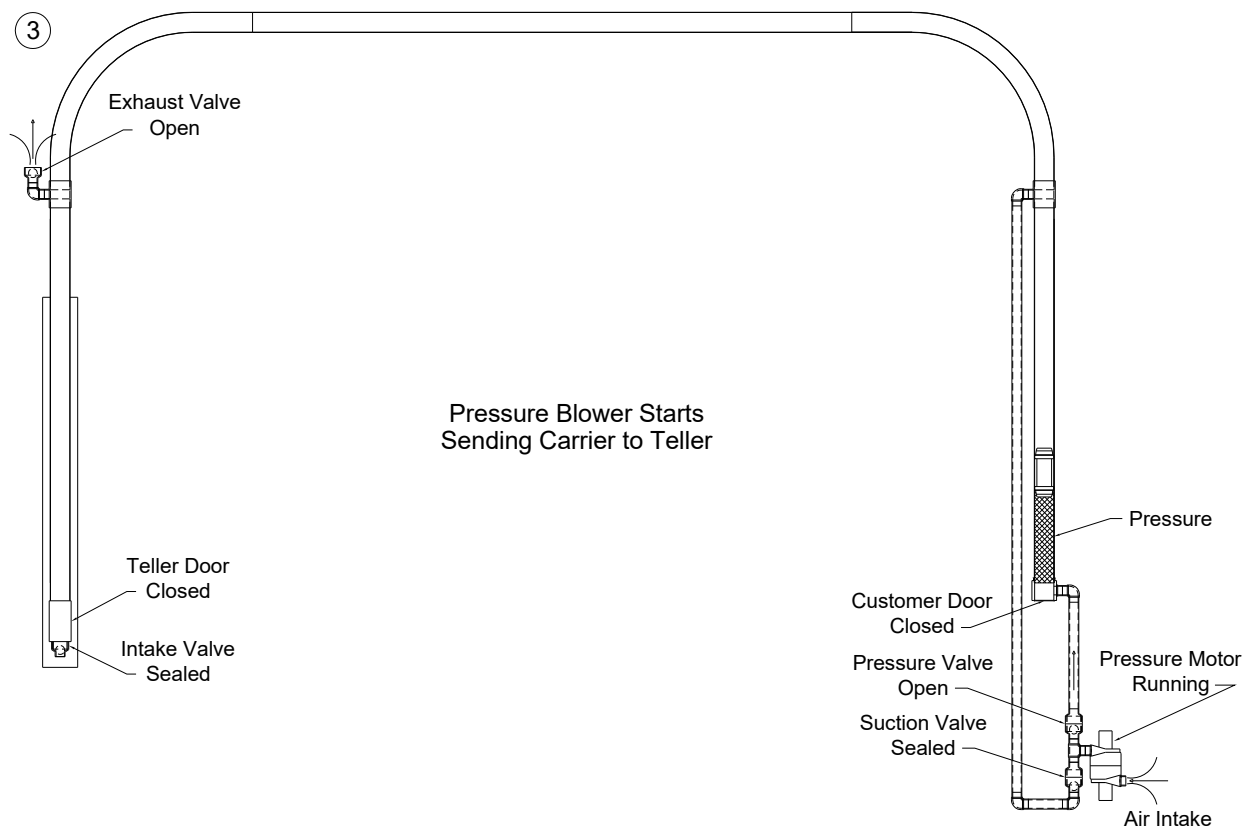
A schematic of installed BavisAIR System identifying major components by part number follows.

If there are questions about any of the following, contact the Technical Service Department at (513) 677-0500.

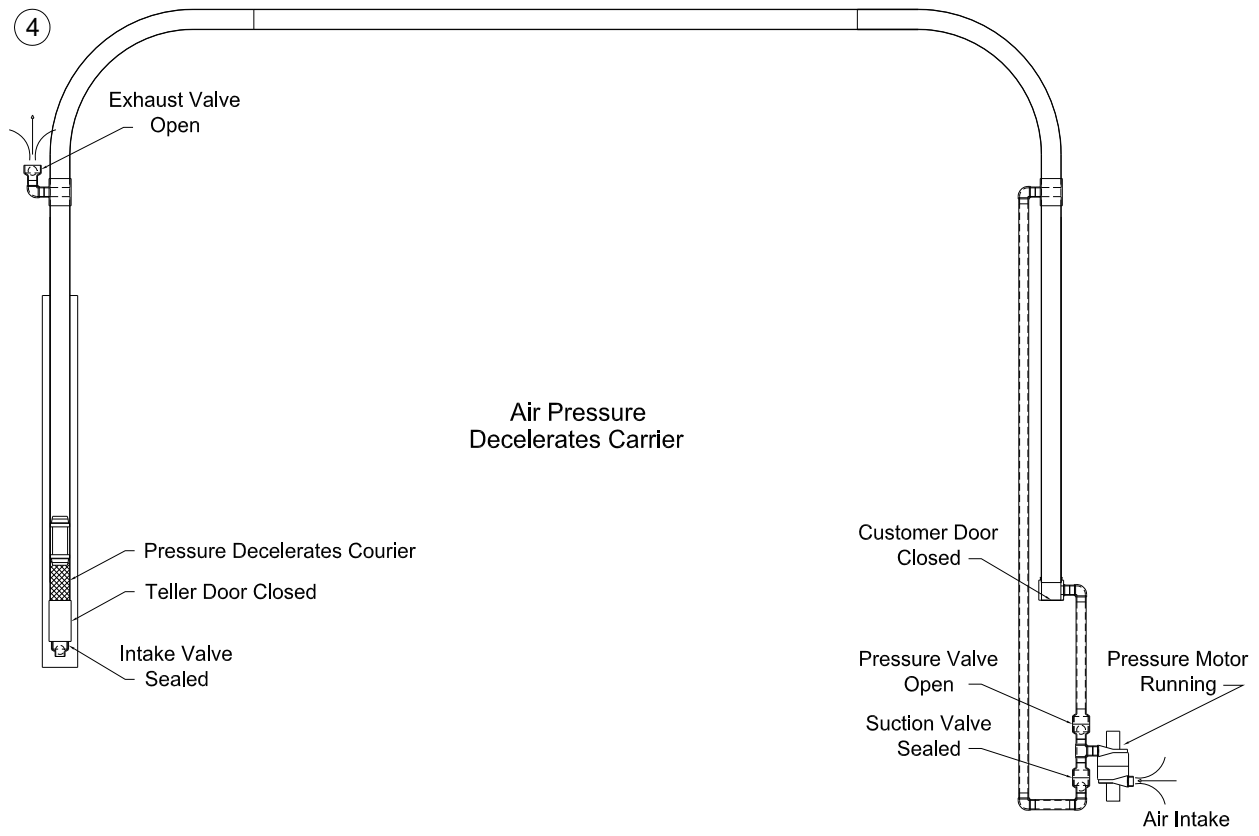
# BavisAIR Pneumatic System Operation



3

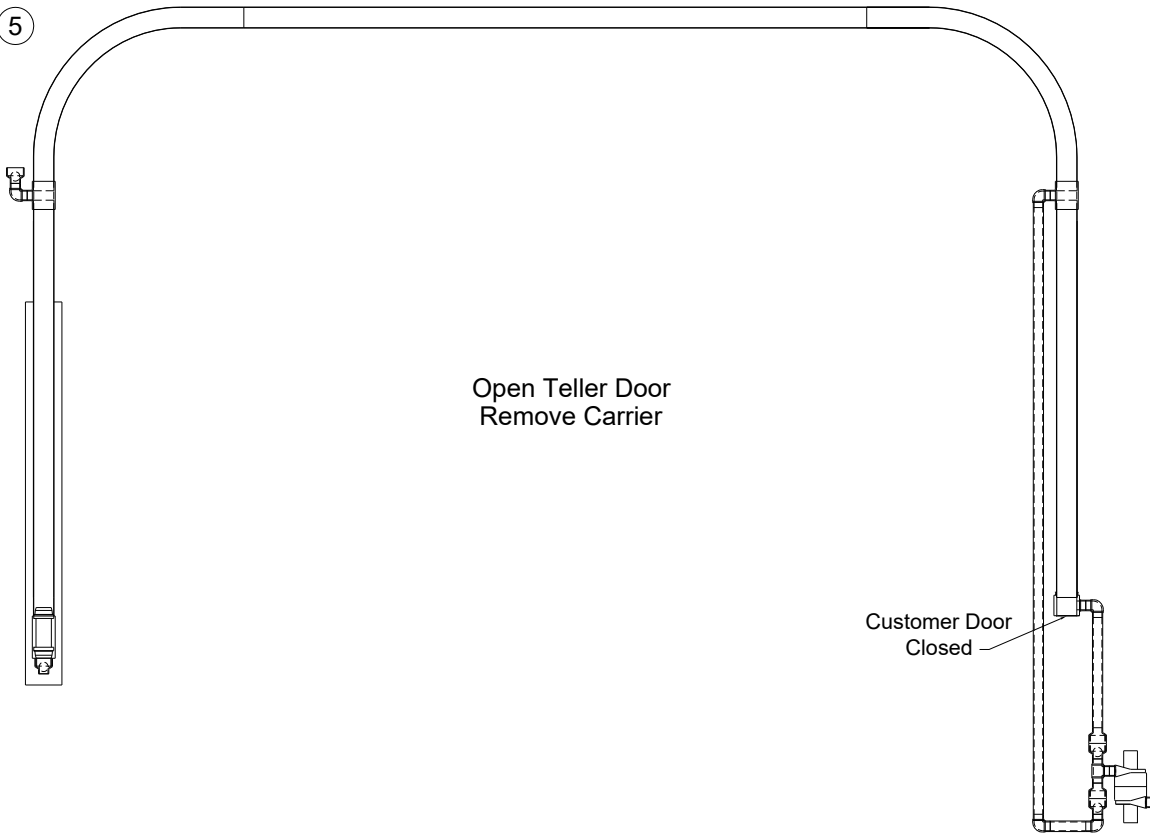


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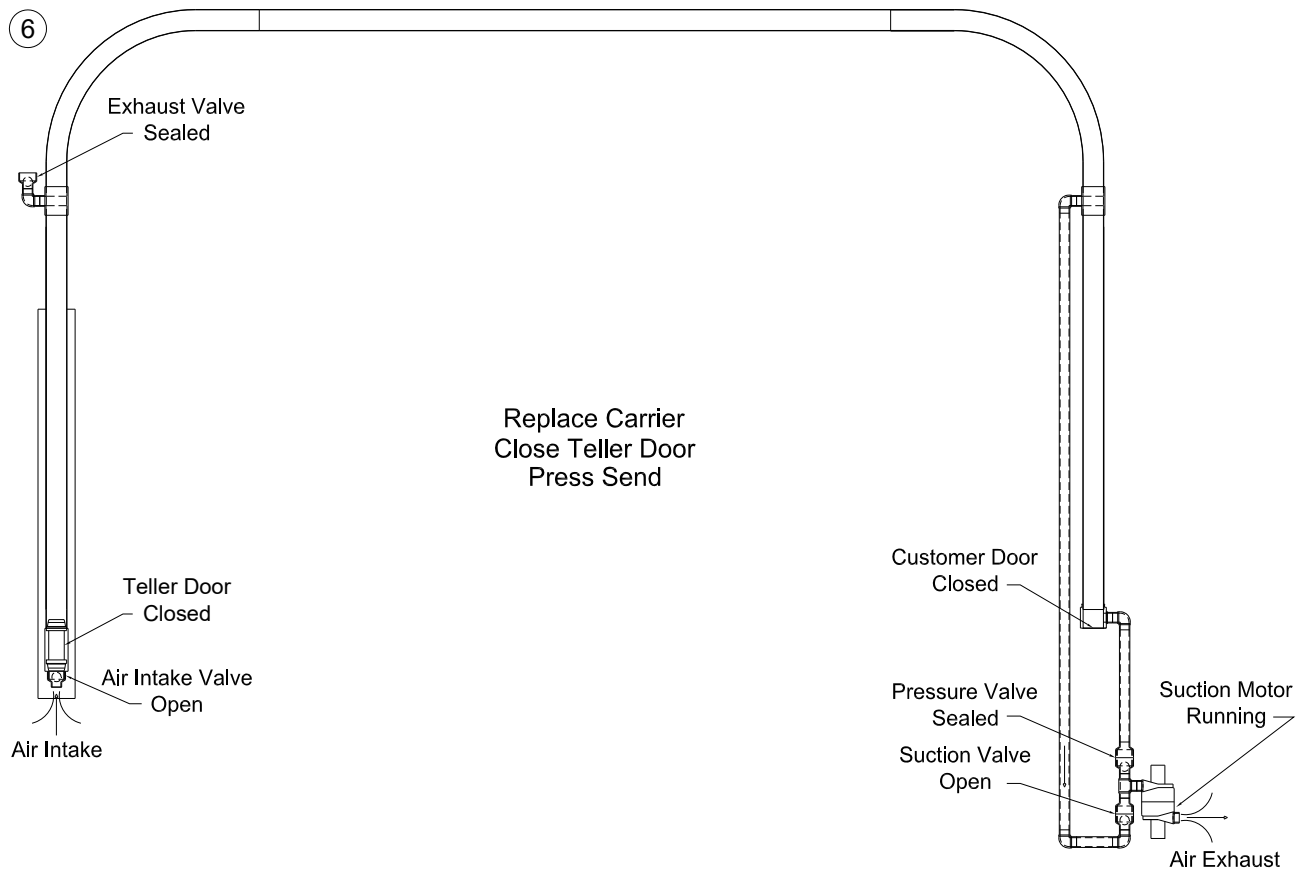




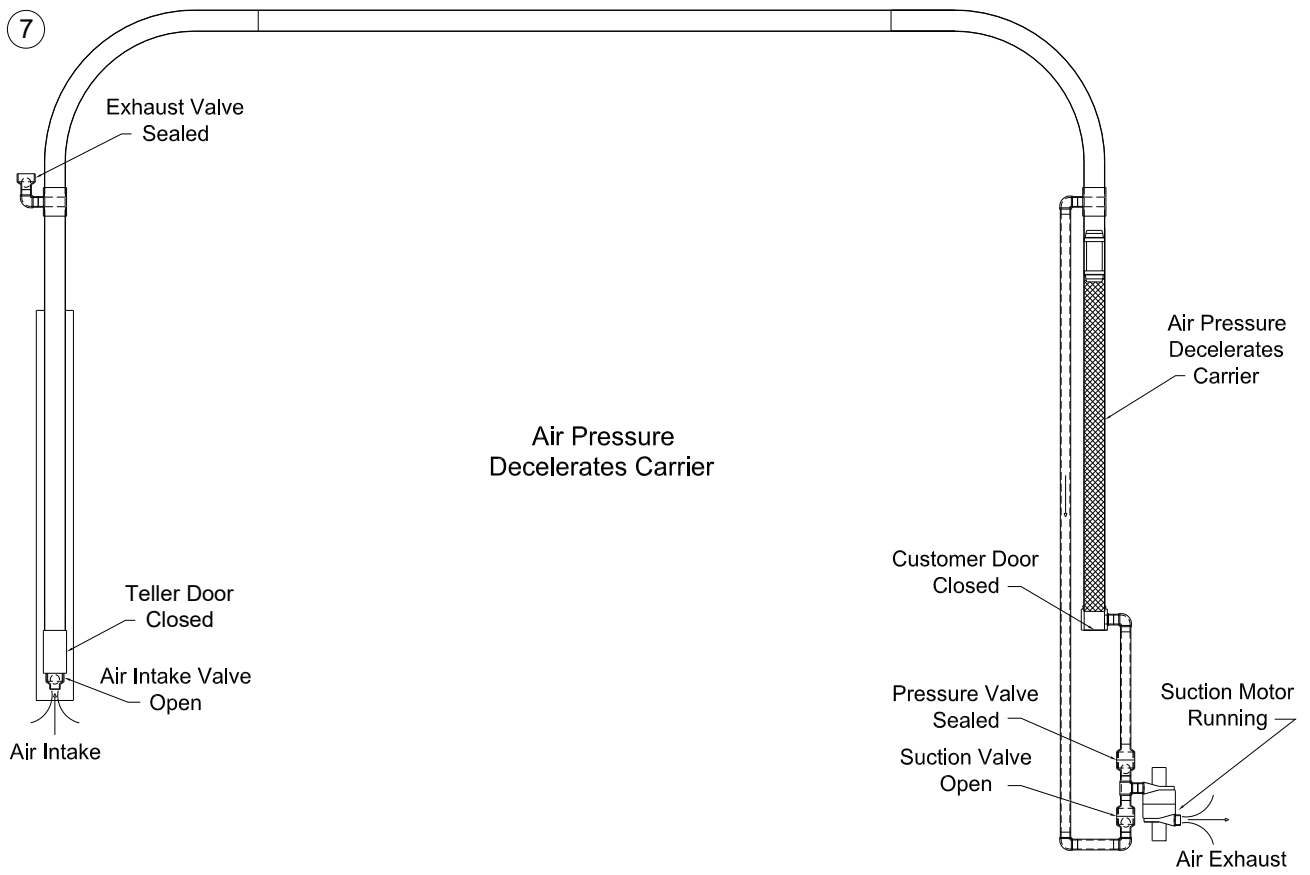
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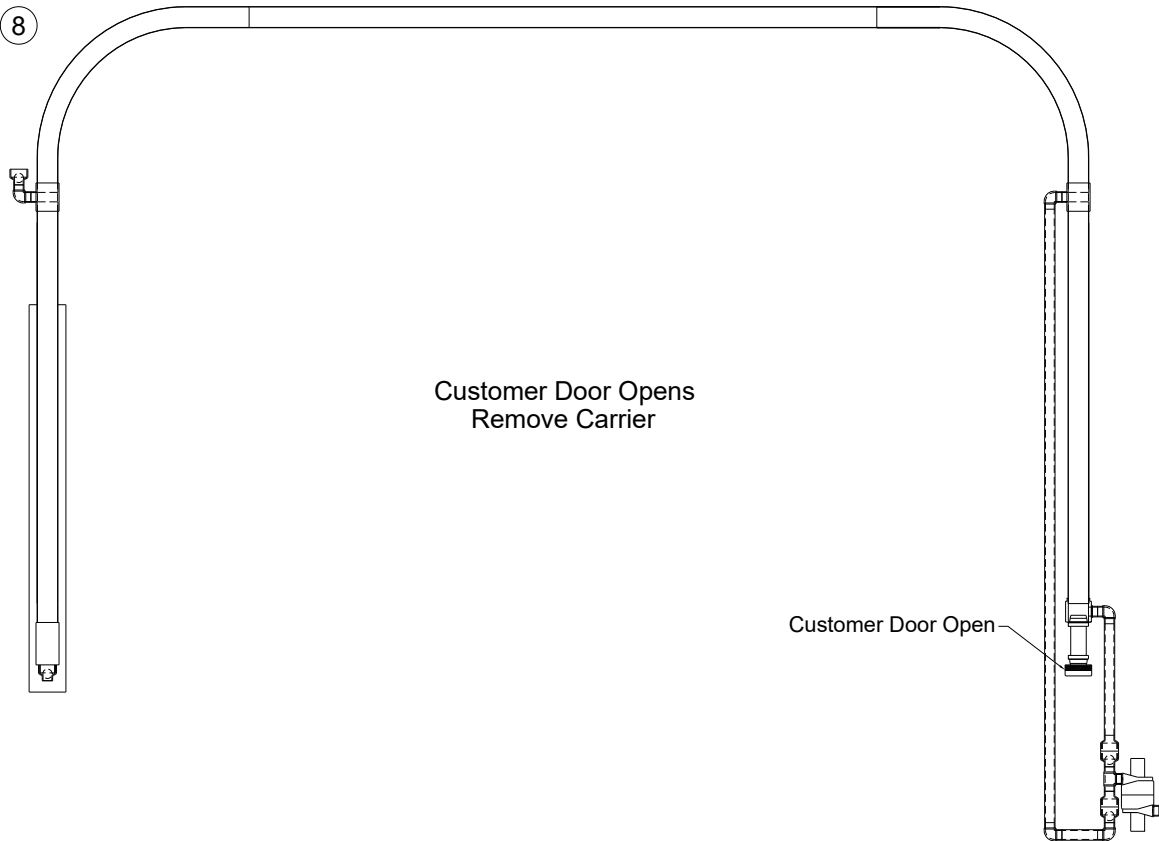
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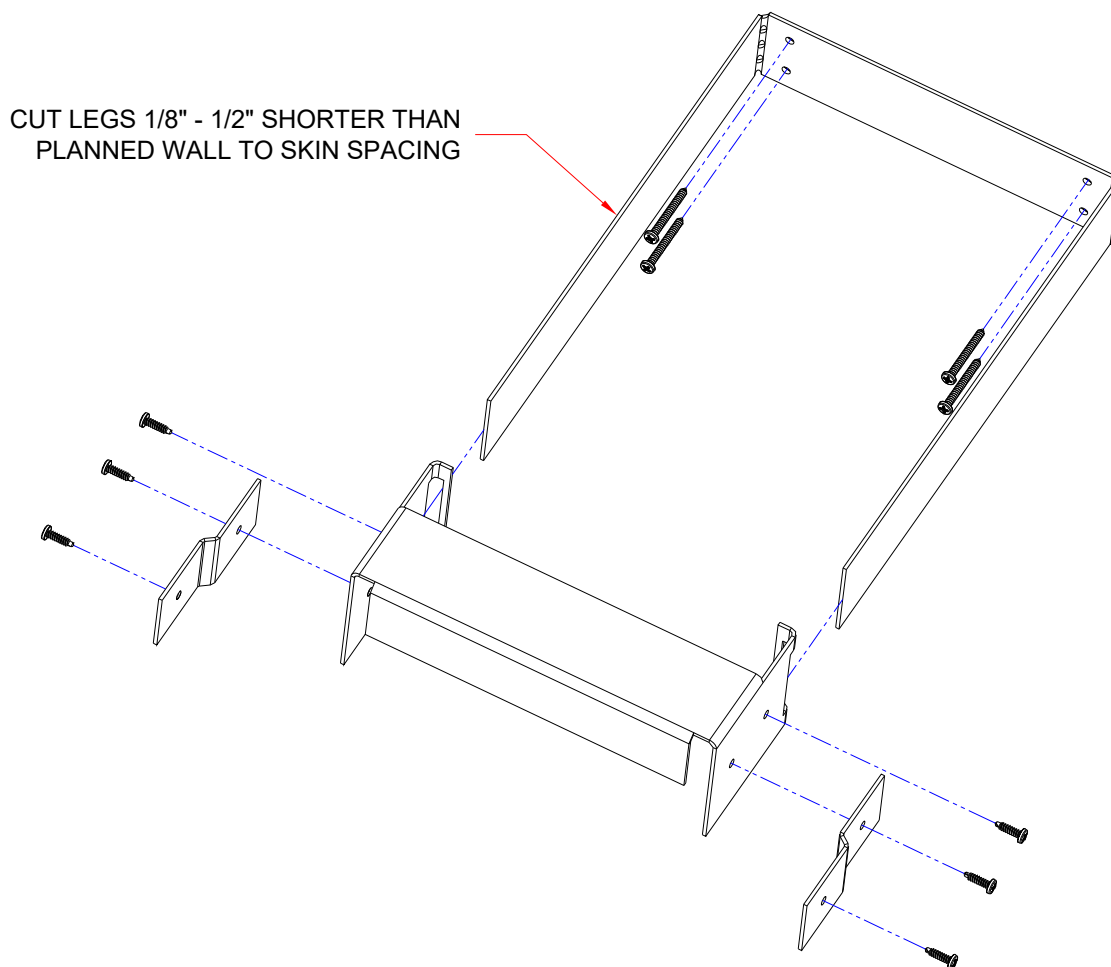


## Installation

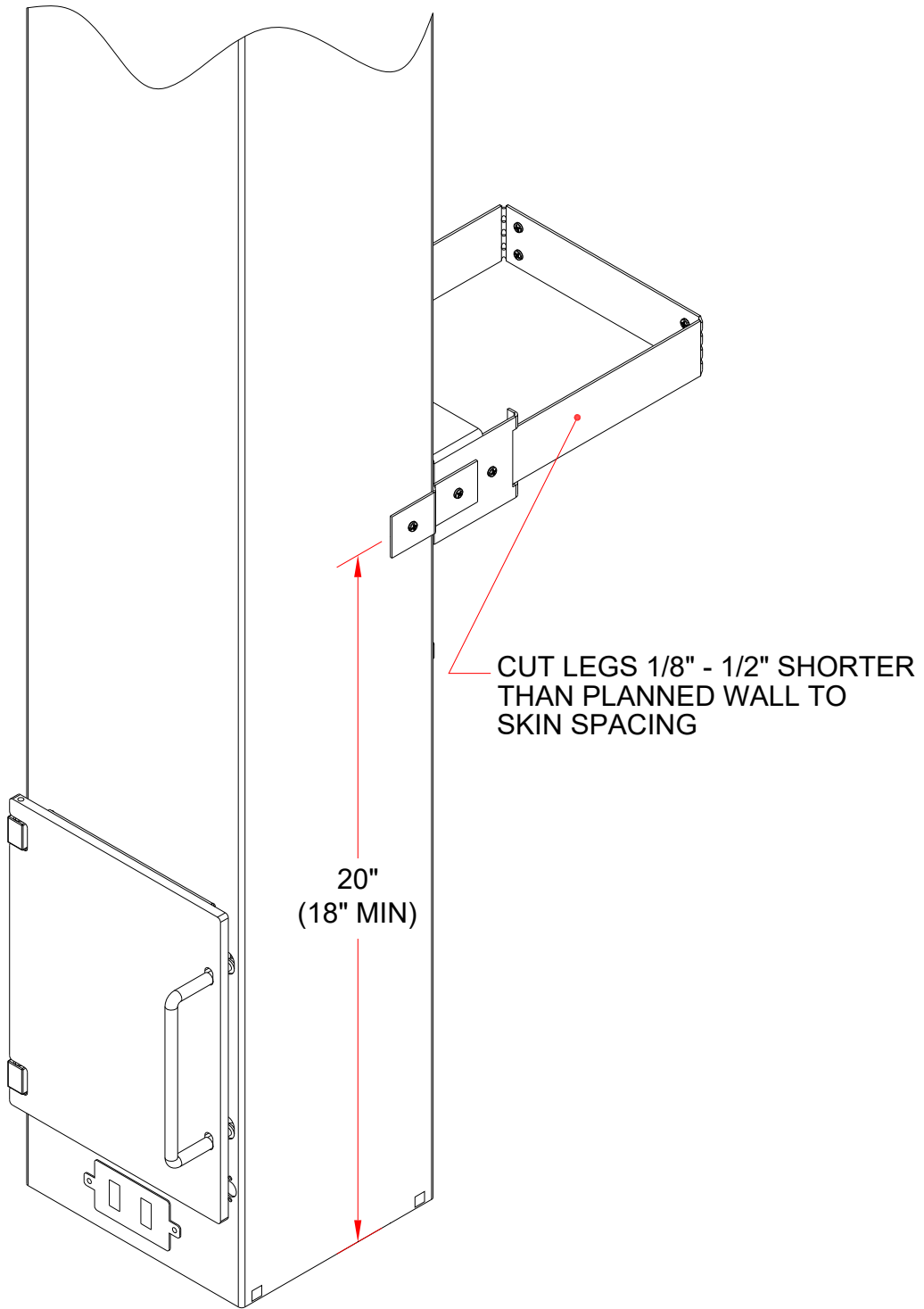
### Teller Installation:

The finish skin of the teller unit comes from the factory 70" tall. The skin can be cut shorter. To do this, remove the top cap to tube clamp, remove the top cap mounting screws and top cap, remove the skin lid, and cut the skin, skin lid and tube to length. Make sure there are no burrs on the tubing. To install the tubing in the teller unit remove the lids. The tubing is inserted through the top cap and should be fully seated into the receiver. Reinstall the top cap over the tube and secure with the hose clamp onto the tube and screws into the skin, route and connect the communication cable through the skin, then, reinstall the lids. The teller unit and tube should be installed plumb, and anchored securely from above the ceiling, then stabilized to the wall with the bracket provided. (NOTE: The Wall Standoff Bracket is meant to stabilize the Teller unit and can not support its weight.) If the Teller Verticals are to be installed side against side, install the Wall Standoff behind each vertical, but do not install the joggled skin bracket except on the outside of the outer vertical skins.

BPS Teller Wall Standoff



# Teller Standoff Installed



### **Customer Installation:**

The finish trim of the customer unit comes from the factory 48" tall. Note that the trim is designed for 6" island height. To install the tubing in the customer unit remove the top cap and the stainless front cover. The 4-1/2" clear pipe and the 1-1/2" clear pipe are inserted through the both of the molded tubing grommets and the top cap and then into the carrier receiver and PVC fitting. These tubes are secured with silicone adhesive (not supplied). Make sure there are no burrs on the tubing. The customer unit and tubes should be installed plumb. The customer unit should then be anchored securely to the island.

### **Power Connection:**

The AC Line connection is inside the *CUSTOMER UNIT* in a trade size handy box. Wiring can be run either down from the canopy and through the conduit holes in the top cap, or by under ground conduit and through the 2" hole in the base of the customer unit. The connection method should comply with all authorities having jurisdiction, (i.e. National, State or Local Electrical Codes). 1/2" pipe threaded holes are provided on a single gang box. Removing the cover will reveal three leads for termination.

*The white wire is the neutral.*

*The black wire is the hot. (Single-phase 120vac, 20amp)*

*Green is for ground.*

<p><b>WARNING:</b> To reduce the risk of shock hazard of both line voltage and static, the ground must be connected to a good earth ground.</p>
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The wiring can be enclosed in flexible metallic or nonmetallic conduit. Do not use an extension cord for permanent wiring and do not run flexible cords through or conceal in walls, ceilings and or other permanent fixtures.

Note that only blower runs at a time which allows for a single 20 amp circuit per lane.

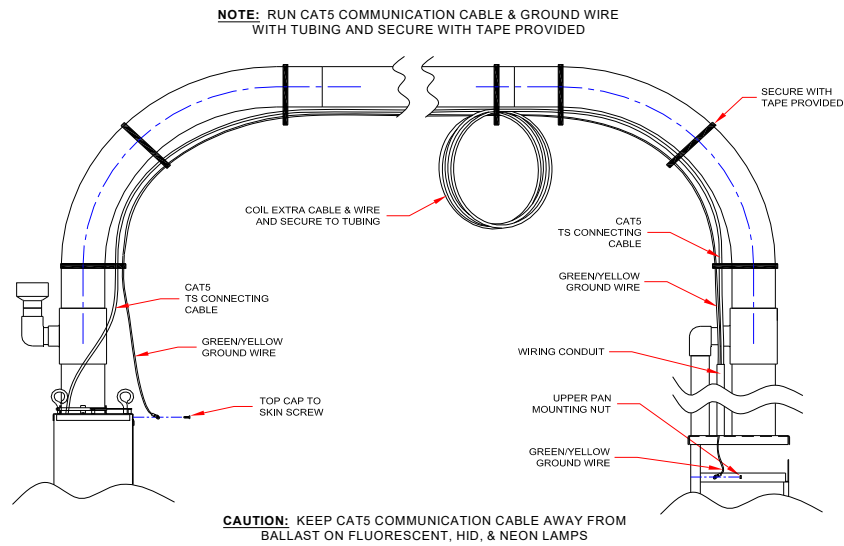
### **Connecting Cable Wiring:**

There is a CAT5 horizontal cable that connects the teller and customer units together. This cable has a connector on each end. The horizontal cable is identical on both ends and cannot be installed backwards. The connector will pass through the 3/4" hole in the customer top cap. A standard 1/2" conduit can be used to run the connecting cable wiring up into the canopy. The communications cable and anti-static grounding wire, (for lanes using PVC Tubing), should be run alongside and secured to the horizontal tubing to reduce the induction of electrical interference into the system. If the connecting cable wiring is ran underground a PVC conduit is needed. The PVC conduit is supplied by others. Plug the cable into the mating cable from the controls.

## **Anti-static Grounding Harness:**

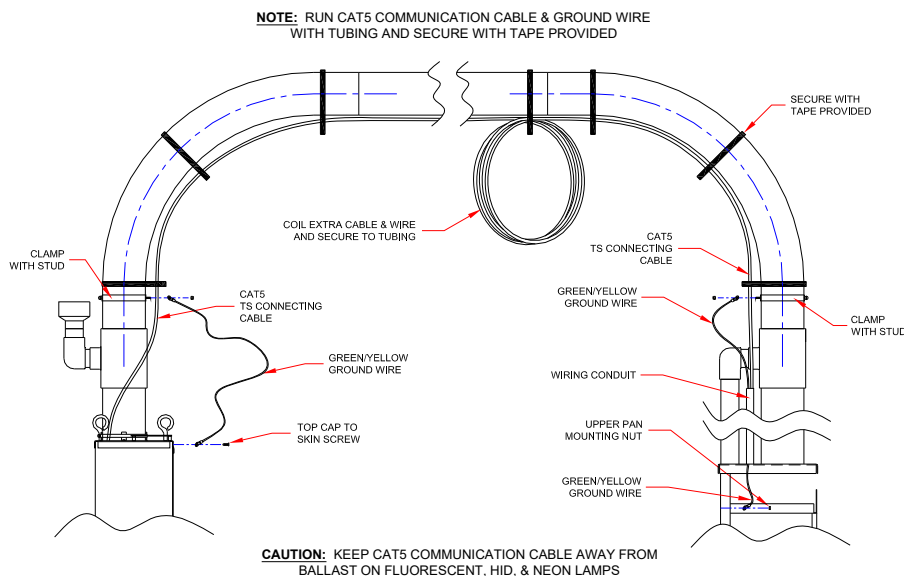
### **For PVC Tubing:**

There is a 14 Gauge Green w/Yellow stripe wire with a ring terminal at each end that needs to be attached to the Teller skin and the receiver pan at the top of the customer station. This cable provides the common ground plane between the Teller and Customer stations to reduce the possibility of static discharge interfering with the electronics. The ring terminal should be secured under one of the screws for the Vent Cover at the top of the Teller skin and under one of the nuts mounting the receiver pan of the customer station to the customer unit back.  
(See the illustration below)



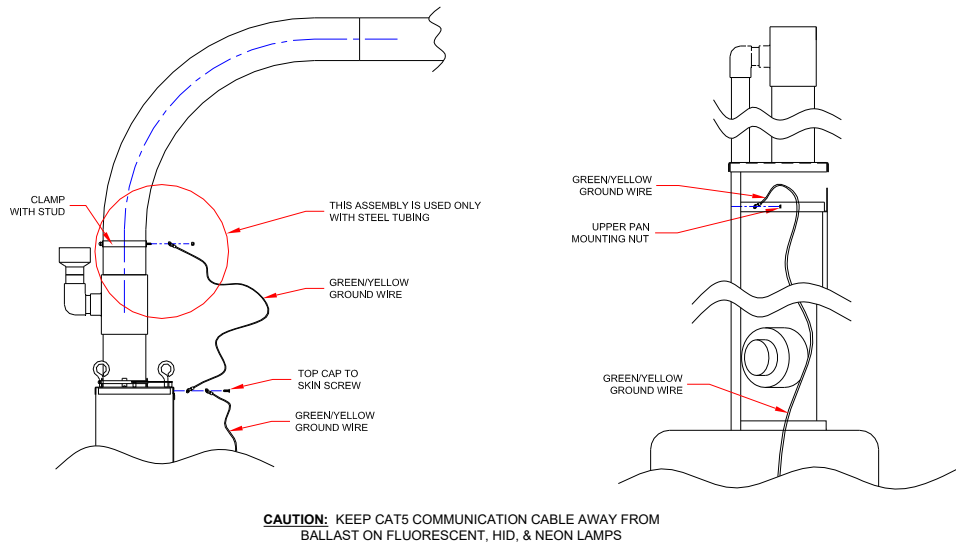
### **For Steel Tubing:**

There are 14 Gauge Green w/Yellow stripe wires with a ring terminal at each end that need to be attached to each skin, then attached to the stud of the clamp, which you need to mount on the radius tube for each vertical. These cables provide the common ground plane between the Teller and Customer stations to reduce the possibility of static discharge interfering with the electronics. (See the illustration below)



## For Underground Cable Routing

When the TS Connecting Cable is to be run underground, order the BPS Underground Grounding Kit, (P/N 23259192). It will have the long cable from the PVC Tubing kit and one of the wire and clamp assemblies from the Steel Tubing kit. The wire and clamp assembly would only be used when the BPS is installed with Steel Tubing. The ring terminal should be secured under one of the screws for the Vent Cover at the top of the Teller skin and under one of the nuts mounting the receiver pan of the customer station to the customer unit back. (See illustration below)



## Operation:

Flip the **POWER BUTTON** to the ON position. The customer door should open. Flipping the **POWER BUTTON** to the off position the customer door should close.

With the power on insert a **CARRIER** into the teller end of the system. Manually close the door. Press the **SEND BUTTON**. The blower turns on for a predetermined length of time, (Note the length of time can be adjusted by installer with the R66 & R67 pots on the control board, see pg. 12). The carrier moves to the customer end. The carrier will coast to a stop due to positive air pressure decelerating the carrier. The customer door opens. The carrier can then be removed.

**NOTE:** To send the carrier in to the teller station, (Recall move), the teller station door must be closed for the blower to run.

Insert the carrier into the customer station. Press the customer send button (Alternately the teller can press the teller recall button). The door closes. The blower turns on for a predetermined length of time. The carrier moves to the teller end. The carrier will coast to a stop due to positive air pressure decelerating the carrier. The carrier can be retrieved from the teller end by opening the door.

## Error Reporting:

This system does not have error reporting built into it.

## For Units Equipped with Divelbiss Controller Circuit Board

### Optional Teller Door Auto-send

Each lane has the ability to automatically send the carrier out to the customer when the Teller Door is closed by the Teller and the Power switch is in the ON position. To enable this feature there is attached to the control harness cable is a keyed 10 position connector with a black wire. Detach this connector and plug it onto the 10 position header on the upper left of the control board as shown below.

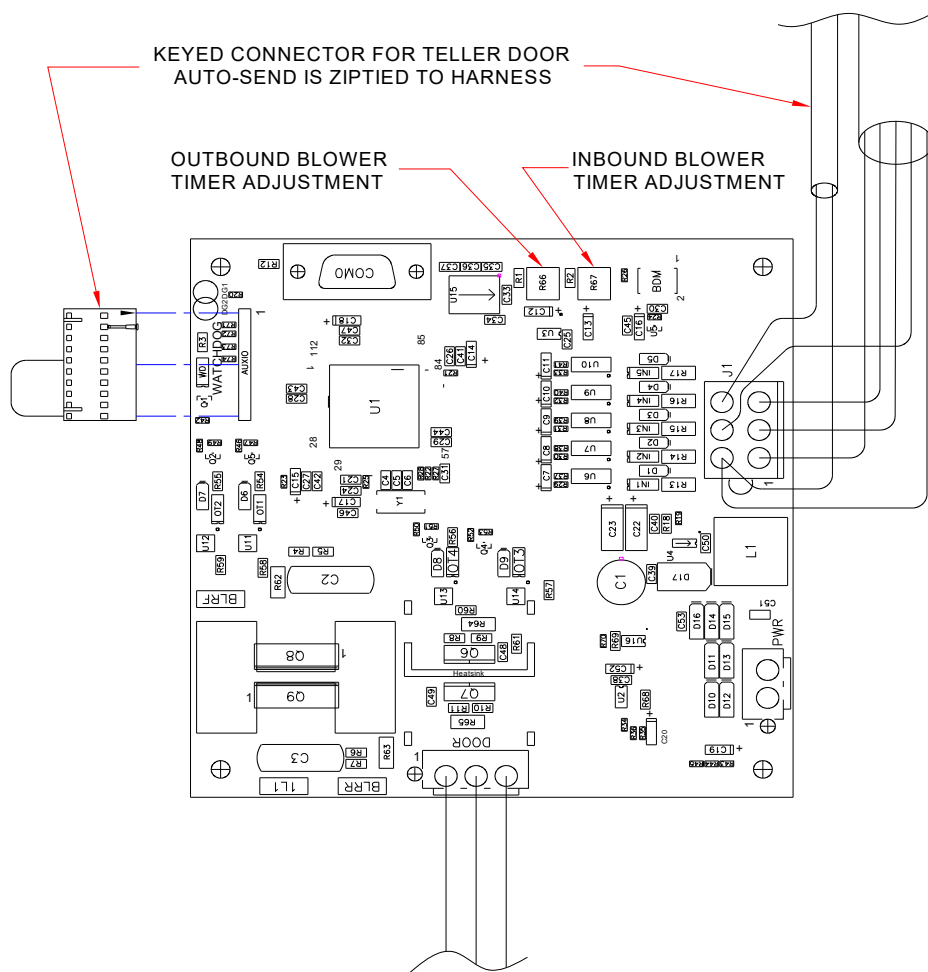
### Adjusting Blower Timer Set Points

The timer for each direction can be adjusted from 2-1/2 to 60 seconds of run time.

Open cover to access controller.

Adjust **R66** for the **Outbound** blower run timer.

Adjust **R67** for the **Inbound** blower run timer.





## Troubleshooting the BavisAIR Pneumatic System with Divelbiss Controller

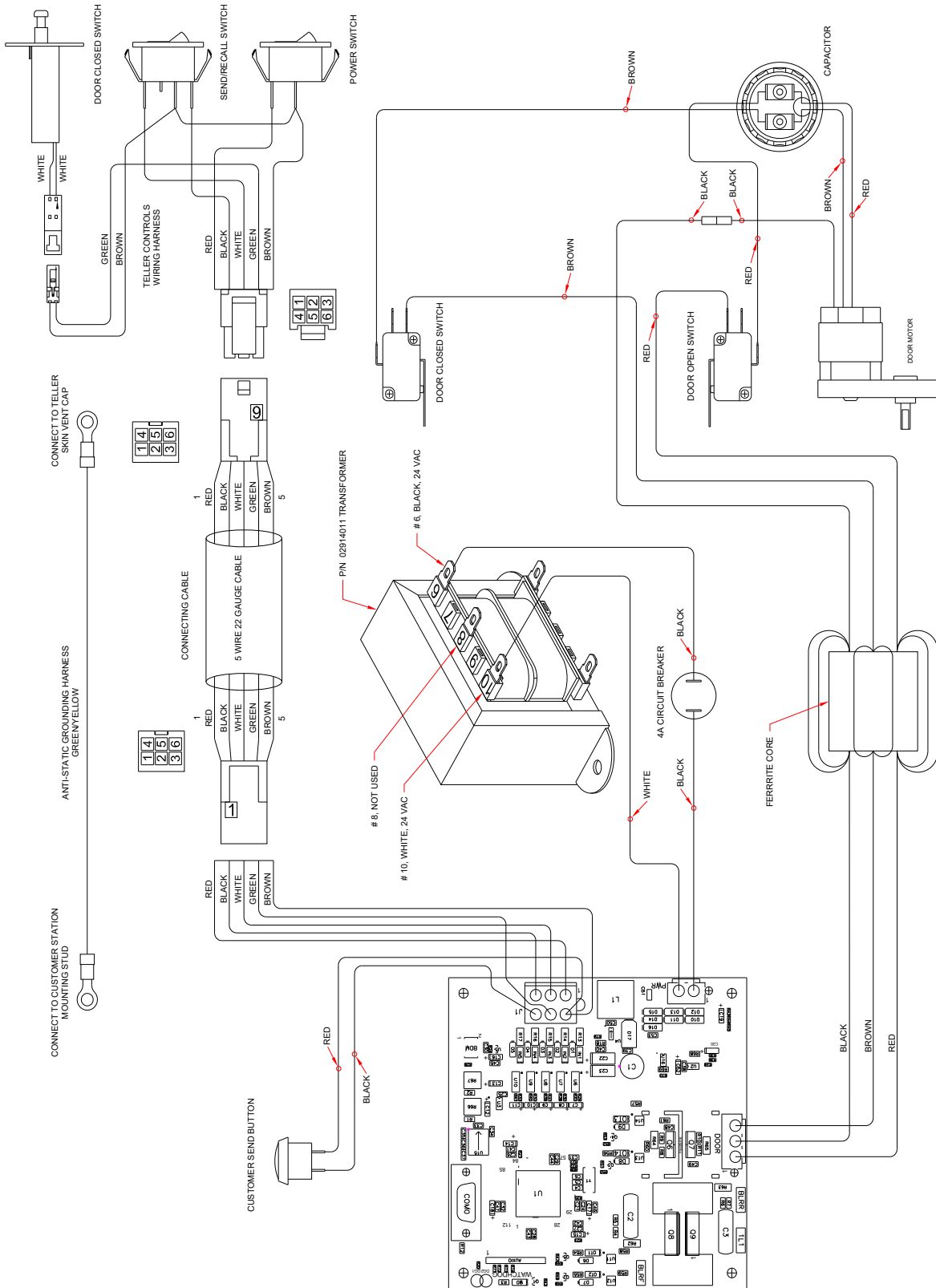
This section assumes that the machine in question has been inspected for loose, damaged or missing parts, wiring, etc.

### LED Diagnostics:

IN1	Illuminates when the power switch is toggled to the on position.
IN2	Illuminates when the teller send button is depressed.
IN3	Illuminates when the teller recall button is depressed.
IN4	Illuminates when the customer send button is depressed.
IN5	Illuminates when the teller door switch is depressed, (teller door closed).
OT1	The blower motor is running to customer.
OT2	The blower motor is running to teller.
OT3	The door motor is running in the closed direction.
OT4	The door motor is running in the open direction.
WATCHDOG	Flashing 2-1/2 times/sec. (25 times in 10sec.), CPU self diagnostics are good and program is running.

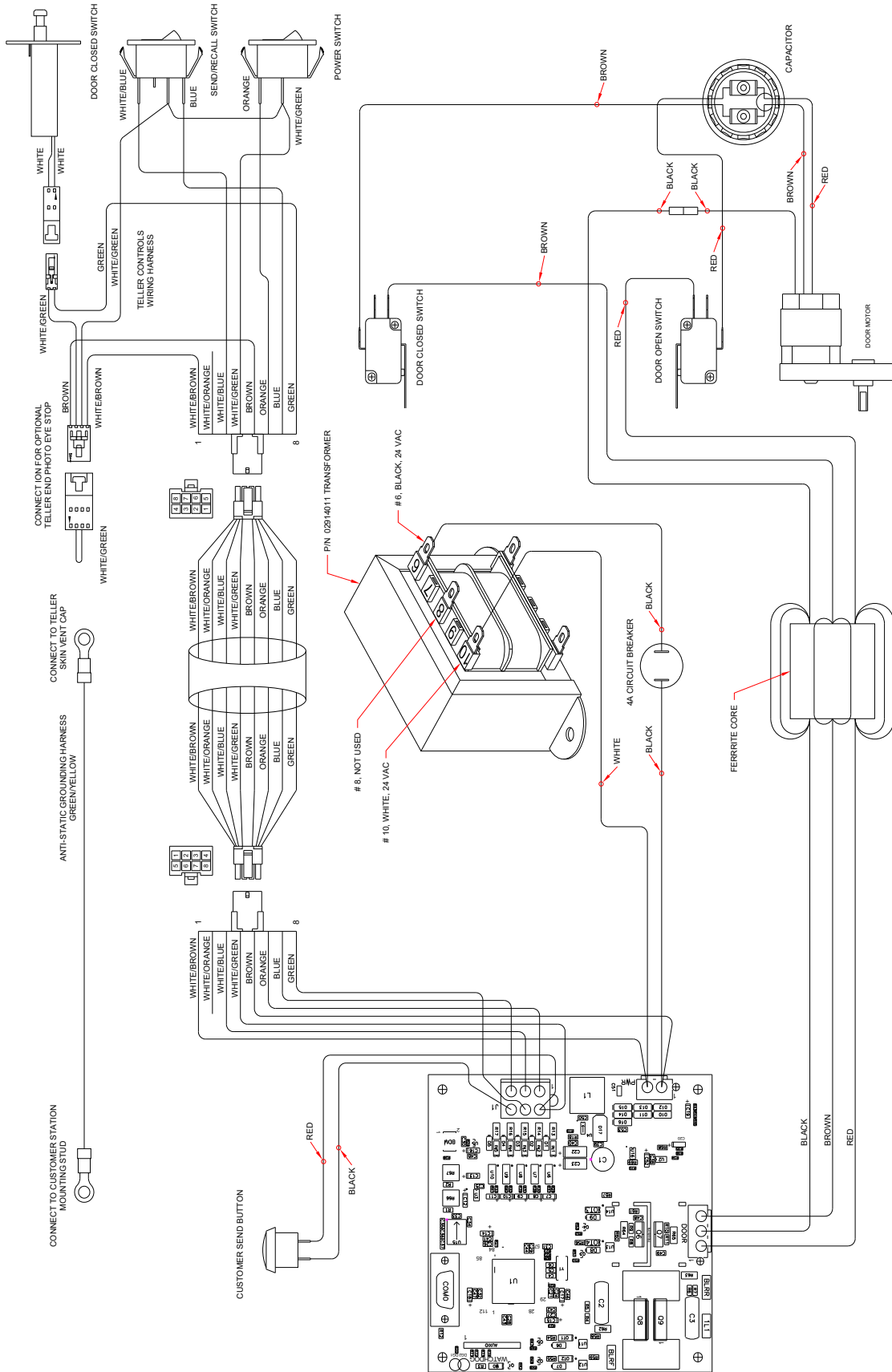
# 24 Volt Wiring Diagram Section

## For lanes with a build date before April 1, 2010

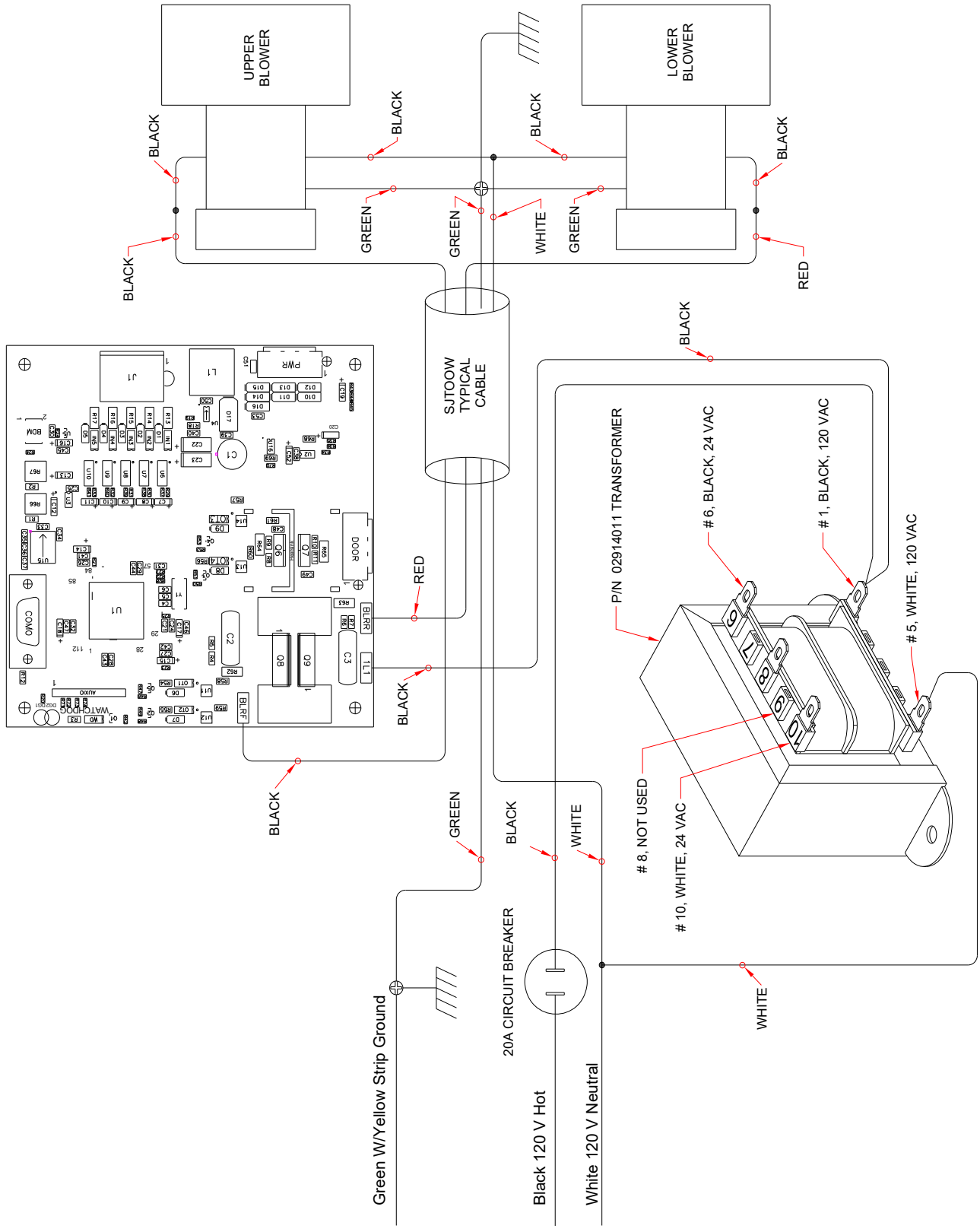


# 24 Volt Wiring Diagram Section

## For lanes with a build date after April 1, 2010



# 120 Volt Wiring Diagram Section



## **For Units Equipped with DL-05 PLC**

### **Adjusting Timer Set Points** (using PN 23214992 Programming Panel)

Open cover to access PLC.

Plug Cable into Programming Panel and then into PLC port 1 or 2.

**NOTE:** The panel can be connected and disconnected to the PLC without turning off power to the PLC.

After the Panel has powered up, the Run Timers screen will be displayed.

### **Adjusting Run Timers**

The Run Timers screen will be shown by pressing the Run Timer button below the screen or by pressing the F1 block at the bottom of the screen. These settings control how long the blower for that direction will run so that the move can be completed. The Run Timers can be adjusted from this screen by touching inside the box that is displaying the present time setting on the screen. When the display box is pressed, a numeric entry pad will appear. The present setting can be erased by pressing the box marked CL (Clear) or by pressing the BS box (Back Space) until the numbers are cleared. The new setting can then be entered by pressing the appropriate numbers on the number pad, then pressing ENT (Enter). If you need to return to the original setting and ENT has not been pressed yet, press the ESC (Escape) box. When the ENT box is pressed, the setting will be changed and the screen will again display both Run Timers. The settings for each of the Run Timers must be set to or between 5.0 seconds and 60.0 seconds or the warning that the “Entered value is above High limit” or “below Low limit” will be displayed. To clear this warning, press the screen inside the warning box.

### **Adjusting Door Timers**

To change to the Door Timers screen, either press the Door Timer button below the screen or press the F2 block at the bottom of the screen. These settings control how long power is sent to the Door motor to open or close the Door. Changing the settings is performed in the same manner as stated above. The setting limits for the Door Timers are from 2.0 seconds to 10.0 seconds.

### **Adjusting the Door / Blower Delay Timer**

To access the Door and Blower Delay Timer, press the Delay Timer button below the screen or the F3 block at the bottom of the screen. This setting is used to delay the Customer Door from

opening and also for the time delay between starting a second move so that the blowers can stop rotating. The settings are changed the same way as before with time limits from 2.0 seconds to 8.0 seconds.

### **Viewing the Cycle Counter**

To view the Cycle Counter, press the Cycle Counter button below the screen or the F4 block at the bottom of the screen. The Cycle Counter will display the total number of cycles the PLC has run up to 12 digits. Each count will consist of one send move and a recall move.

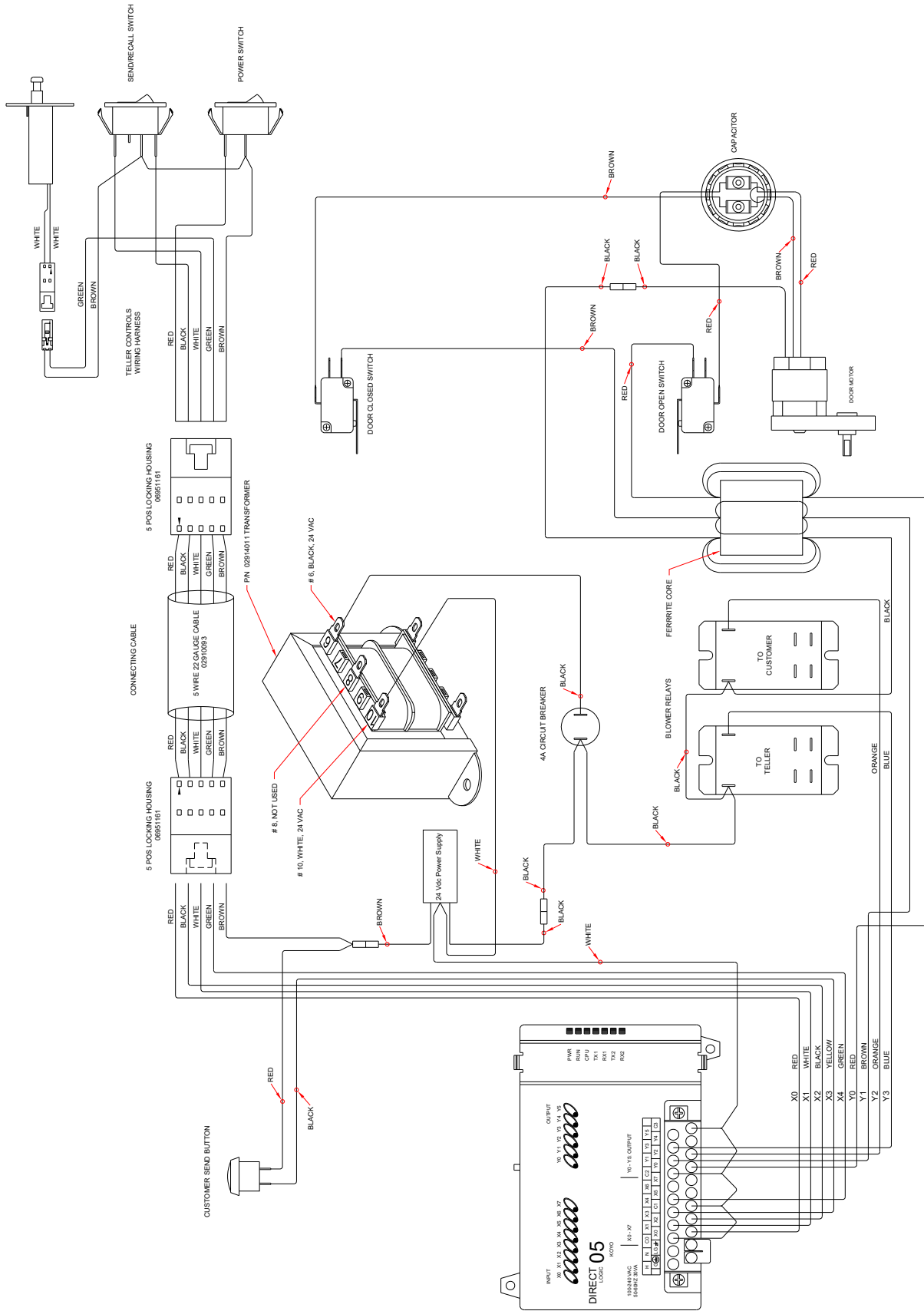
## **Troubleshooting the BavisAIR Pneumatic System with DL-05 PLC**

This section assumes that the machine in question has been inspected for loose, damaged or missing parts, wiring, etc.

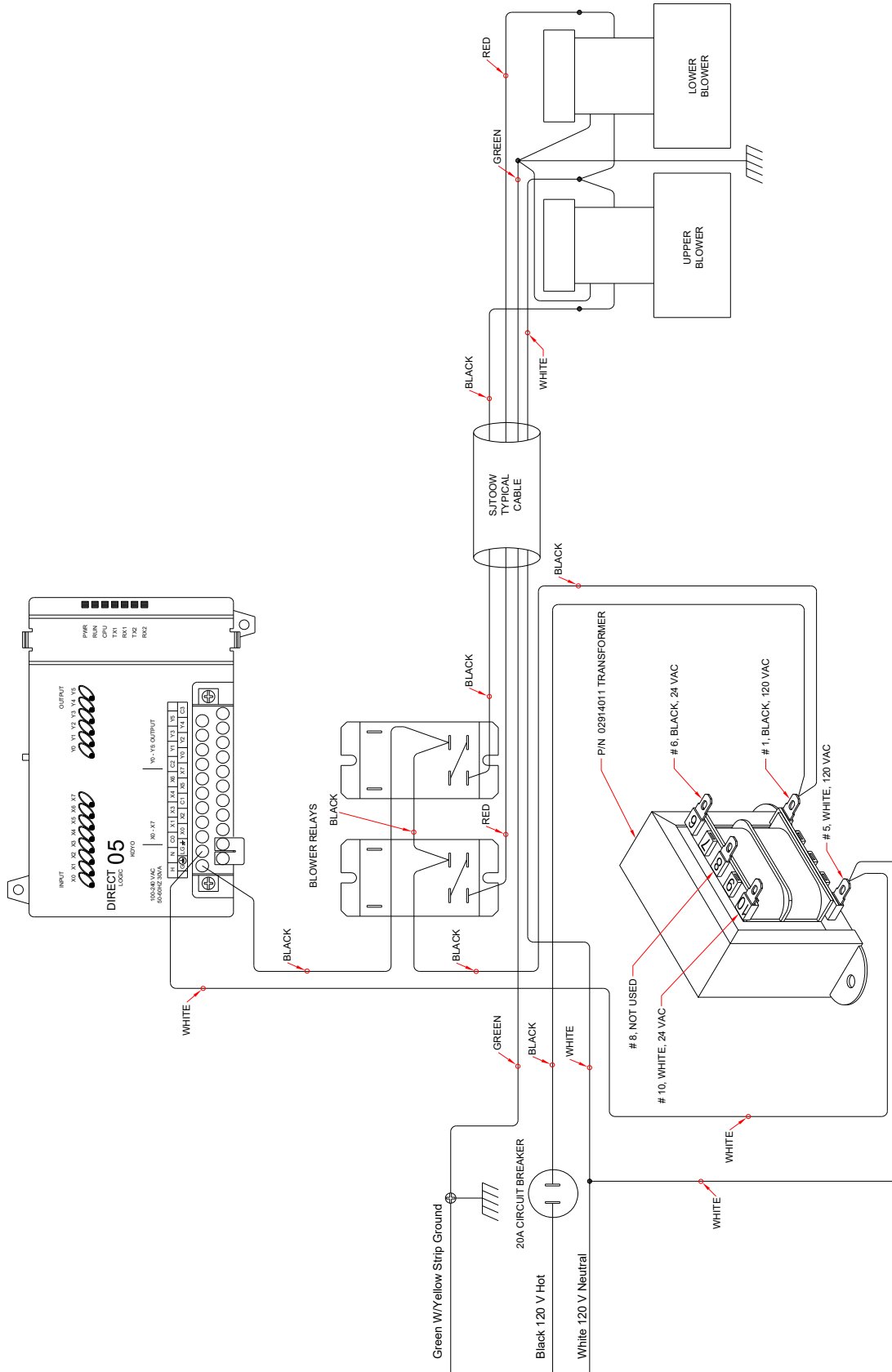
### **LED Diagnostics:**

X0	Illuminates when the power switch is toggled to the on position
X1	Illuminates when the teller send button is depressed
X2	Illuminates when the teller recall button is depressed
X3	Illuminates when the customer send button is depressed
X4	Illuminates when the teller door switch is depressed
X5 (optional)	Illuminates when the teller door switch is depressed (Closing teller door activates send mode)
Y0	The door motor is running in the open direction.
Y1	The door motor is running in the closed direction.
Y2	The blower motor is running to customer.
Y3	The blower motor is running to teller.
PWR	ON, power is good. OFF, power failure.
RUN	ON, CPU is in RUN MODE. OFF, CPU is in STOP or program MODE.
CPU	ON, CPU self diagnostics error. OFF, CPU self diagnostics good.
TX1	ON, Data is being transmitted.
RX1	ON, Data is being transmitted.
TX2	ON, Data is being transmitted.
RX2	ON, Data is being transmitted.

# 24 Volt Wiring Diagram Section

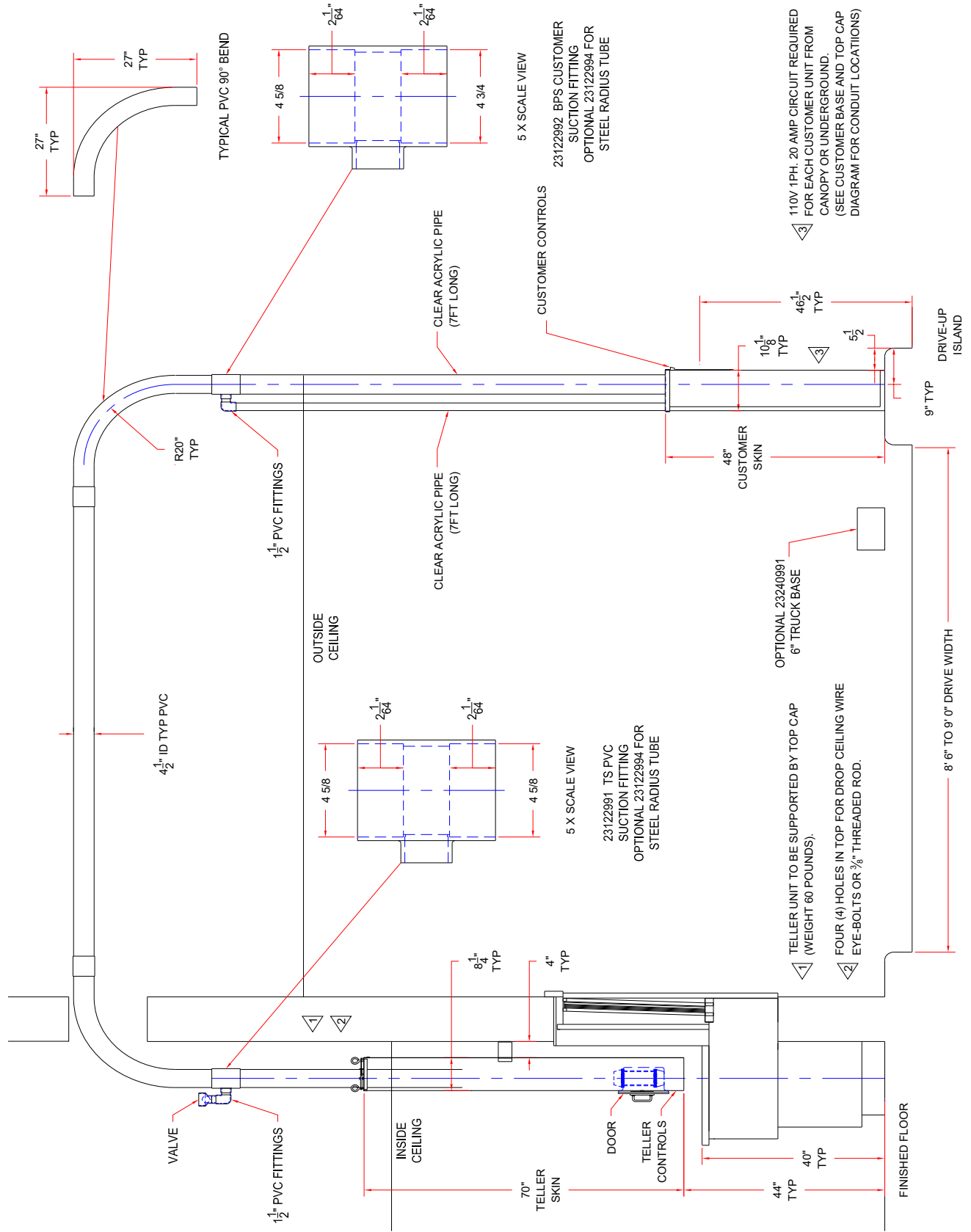


# 120 Volt Wiring Diagram Section

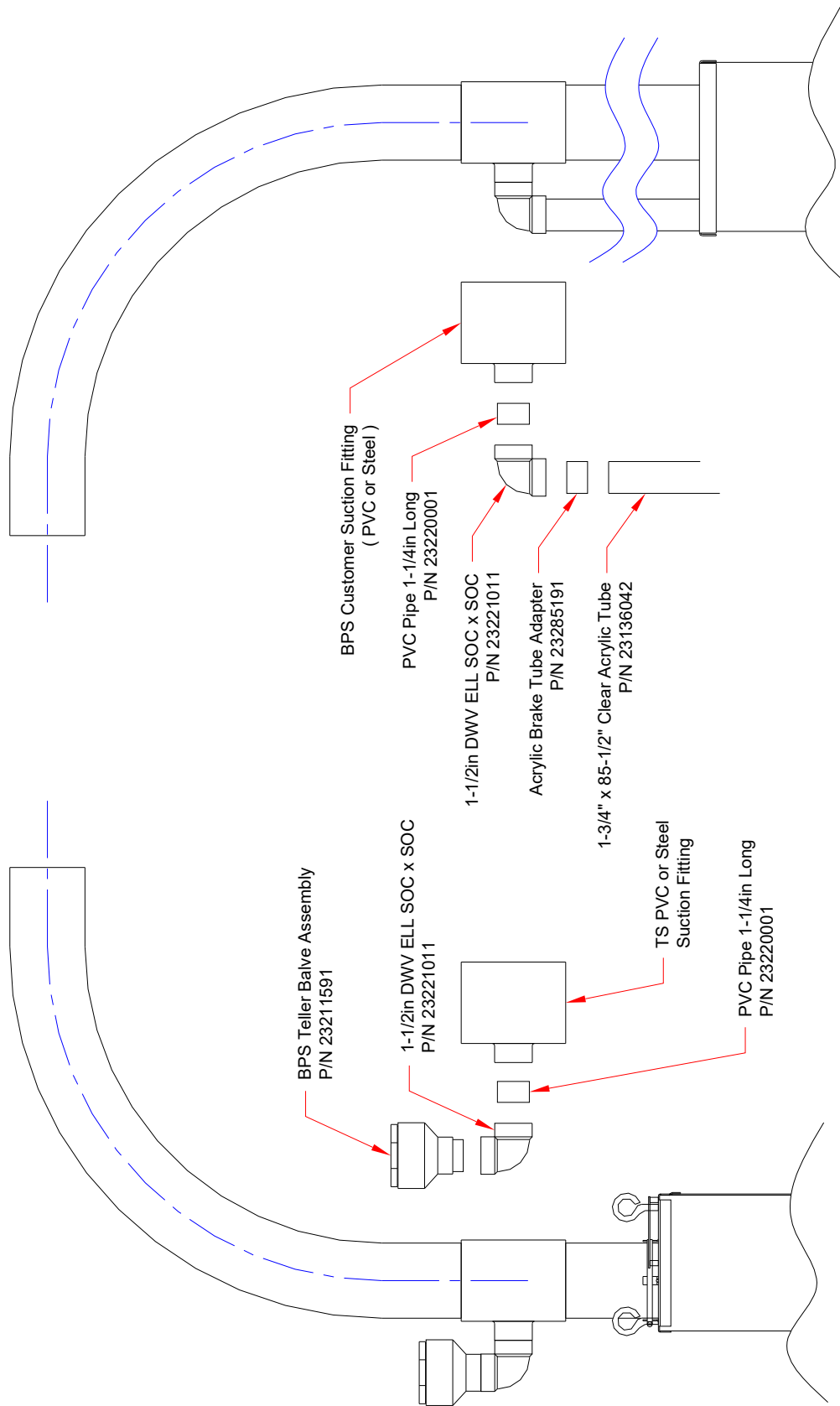




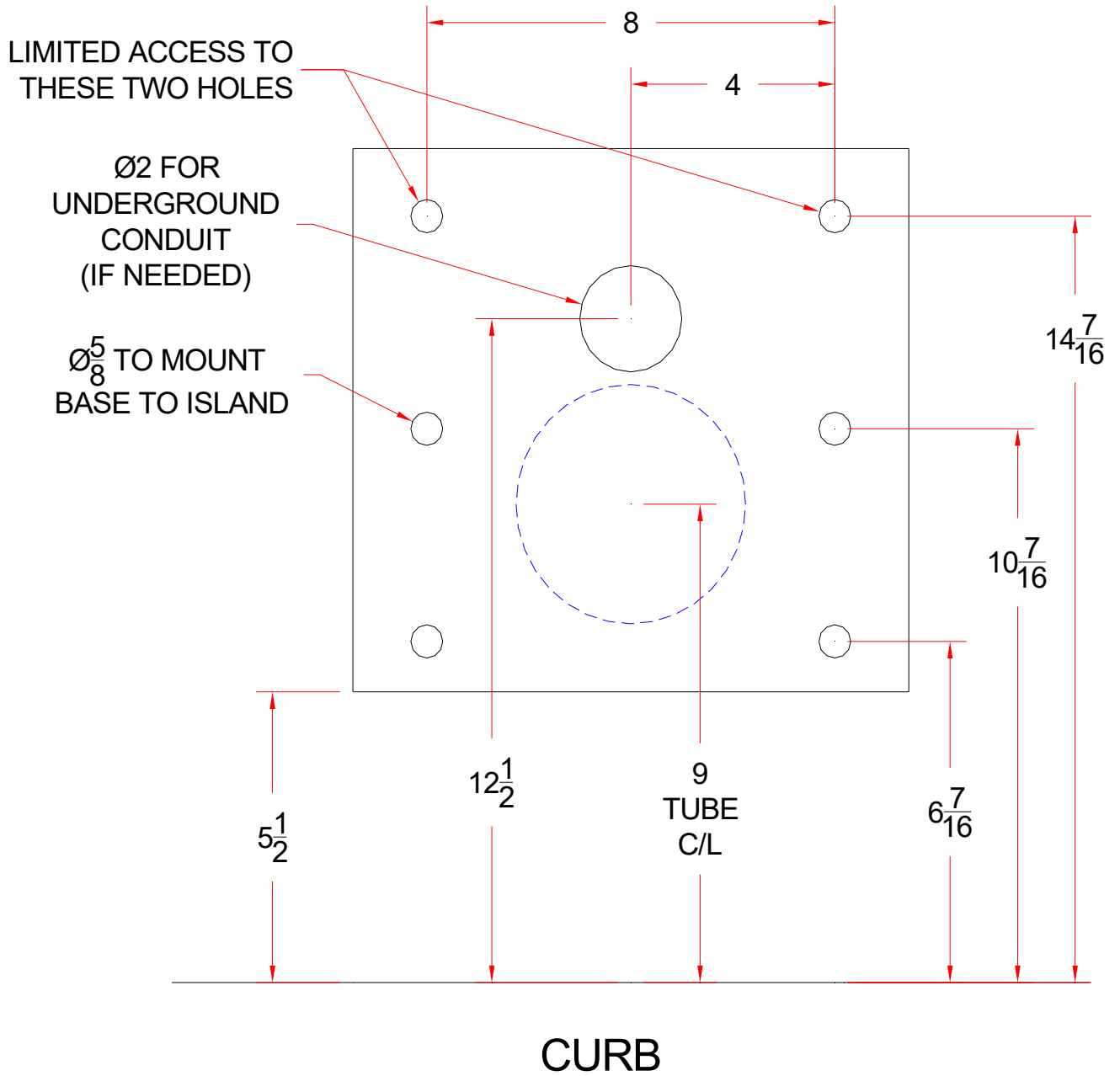
# Typical System Layout



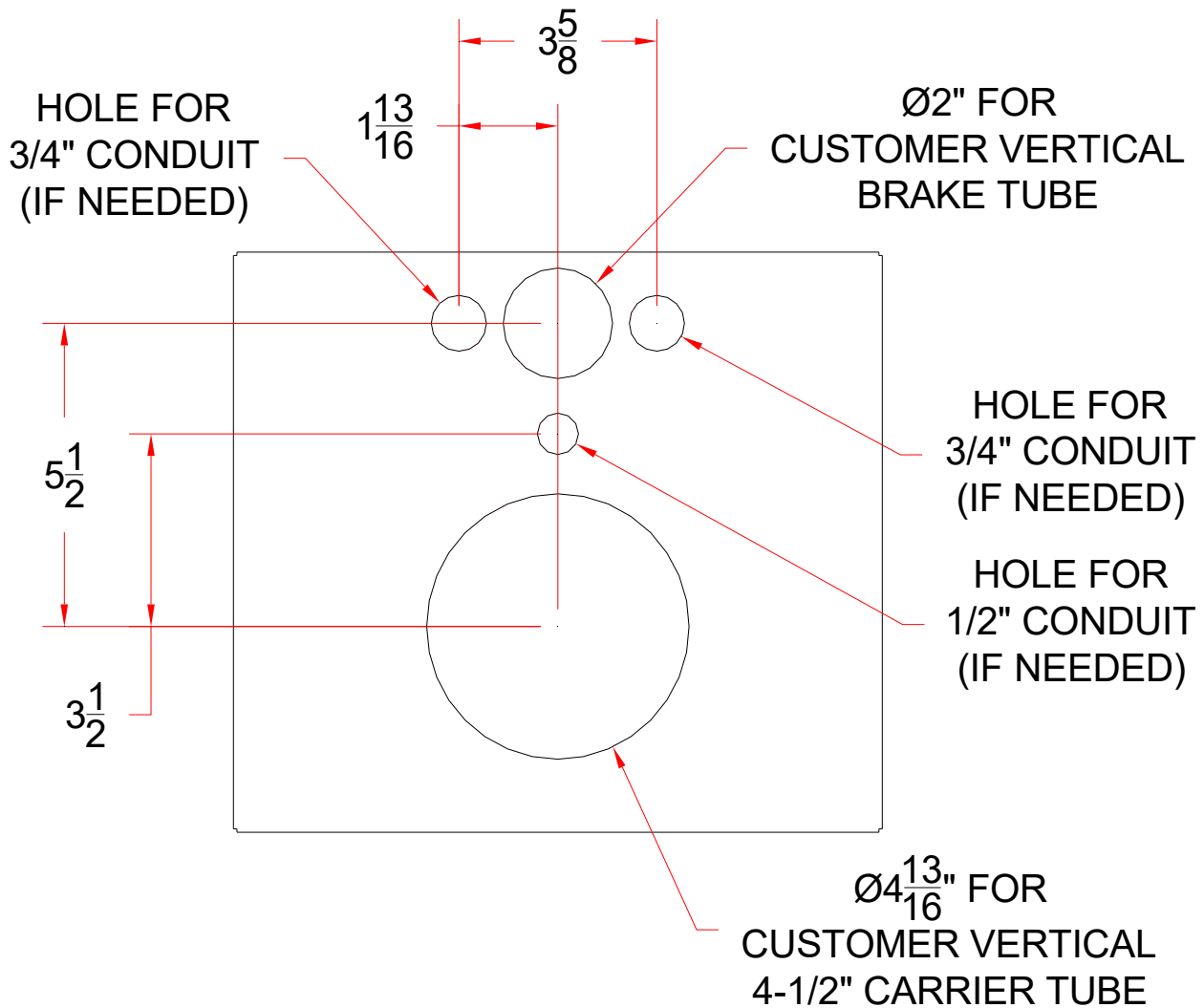
# Suction Fitting Assembly



# Customer Base to Curb Footprint



## Optional Customer Top Cap Conduit Position



# Basic Pneumatic System Final Inspection List

## Labels and Documentation:

## Initials:

1. Work Order #: \_\_\_\_\_
2. JOB #: \_\_\_\_\_
3. Software Build #: \_\_\_\_\_
4. "Hi-Pot" label inside customer unit above power junction box. \_\_\_\_\_
5. "Inspected by" labels: on teller top cap and on top of top customer pan. \_\_\_\_\_
6. Warning label on lower rear of customer station. \_\_\_\_\_
7. Manufacturer/UL label on lower rear of customer station. \_\_\_\_\_
8. Shipping manifest complete. \_\_\_\_\_

## Customer Unit:

1. Verify 6 hose clamps near blower unit are aligned and secure. \_\_\_\_\_
2. Verify all PVC junctions are both tight and aligned. \_\_\_\_\_
3. Verify door motor operation and door travel. \_\_\_\_\_
4. Verify belt tension. Belt travels ~3/4" horizontally at midpoint. \_\_\_\_\_
5. Verify door motor brake has been replaced. \_\_\_\_\_
6. Verify send button operation. \_\_\_\_\_
7. Verify PLC switch is set to "RUN" \_\_\_\_\_
8. Verify junction box cover is installed. \_\_\_\_\_
9. Verify proper audio components are installed and working. \_\_\_\_\_

## Teller Unit:

1. Check power switch for orientation and operation. \_\_\_\_\_
2. Check send/recall switch for operation and orientation. \_\_\_\_\_
3. Check operation of door close switch. \_\_\_\_\_
4. Verify handle movement is smooth. \_\_\_\_\_
5. Verify both pins fall to bottom of slot when door is slammed. \_\_\_\_\_
6. Check for leaks around magnetic gasket, especially corners. \_\_\_\_\_
7. Check PLC and Blower cover gaskets, and hardware. \_\_\_\_\_
8. Check large hose clamps at top of teller station and top of teller unit. \_\_\_\_\_
9. Verify proper audio components are installed and working, (If equipped). \_\_\_\_\_

## Basic Pneumatic System Shipping Manifest

Model PN: \_\_\_\_\_

Work Order \_\_\_\_\_

Lane \_\_\_\_\_ of \_\_\_\_\_

<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>	<u>Qty. Packed</u>
23137992	BPS Customer Unit V2	1	_____
23157992	BPS Teller Unit V2	1	_____
23084993	BPS Installation Accessories	1	_____
23115041	4-1/2" x 7' Clear Acrylic Pipe	1	_____
23136042	1-3/4" x 85-1/2" Clear Acrylic Tube	1	_____
00710031	BPS Pneumatic System Manual	1	_____

### Tubing & Suction Fitting Kit Options

<u>Description</u>	<u>Part Number</u>	<u>Checked</u>
<b><u>Kits for PVC Tubing</u></b>		
BPS PVC Tubing Kit.....	23238991.....	_____
BPS PVC Suction Fitting Kit.....	23273991.....	_____
<b><u>Kits for Steel Tubing</u></b>		
BPS Steel Tubing Kit.....	23238992.....	_____
BPS Steel Suction Fitting Kit.....	23273992.....	_____

**Tubing Kits include:** (1) 10' Straight Tube, (2) 90 Deg. Bends, (2) Connector Sleeves, & Both Suction Fittings.

**Suction Fitting Kits include:** (1) TS Suction Fitting & (1) BPS Customer Suction Fitting, (No tubing, bends or connectors).

## 23084993 – BPS Installation Accessories Pack List

Model PN: \_\_\_\_\_

Work Order \_\_\_\_\_

Lane \_\_\_\_\_ of \_\_\_\_\_

Packed By: \_\_\_\_\_ Checked By: \_\_\_\_\_

<u>Part Number</u>	<u>Description</u>	<u>Qty.</u>	<u>Qty. Packed</u>
01008512	3/8-16x4in Eyebolt Zinc	4	_____
22016011	Electrical Tape	1	_____
23051011	TS Connecting Cable	1	_____
23111011	TS Carrier	1	_____
23211591	BPS Teller Valve Assembly	1	_____
23220001	PVC Pipe 1-1/4in Long	2	_____
23221011	1-1/2in DWV ELL SOC x SOC	2	_____
23262591	BPS Teller Standoff	1	_____
23285191	Acrylic Brake Tube Adapter	2	_____
23294011	BPS Molded Brake Tube Grommet	1	_____
23295011	BPS Carrier Tube Grommet	1	_____
23309992	BPS Customer Ceiling Trim Assy.	1	_____
93062723	8-32 x 3/8 Phillips Truss Screw	4	_____
93101620	8 x 1/2 Phillips Pan TS SS	4	_____
93101629	8 Beige Skin Screws	4	_____

## Additional Parts & Options

<u>Description</u>	<u>Part Number</u>	<u>Quantity</u>
<b><u>PVC Parts</u></b>		
Straight Tubing – 10’ (always requires 23117021) .....	23115021.....	_____
Straight Tubing w/Coupling – 10’ .....	23115020.....	_____
Straight Tubing – 12’ (always requires 23117021) .....	23115022.....	_____
Straight Tubing w/Coupling – 12’ .....	23115023.....	_____
PVC Connector Sleeve .....	23117021.....	_____
90 Deg. Bend – 20” CLR.....	23116021.....	_____
90 Deg. Bend w/Coupling – 20” CLR.....	23116026.....	_____
45 Deg. Bend – 20” CLR.....	23116024.....	_____
45 Deg. Bend w/Coupling – 20” CLR.....	23116025.....	_____
30 Deg. Bend – 20” CLR.....	23116031.....	_____
30 Deg. Bend w/Coupling – 20” CLR.....	23116030.....	_____
15 Deg. Bend – 20” CLR.....	23116022.....	_____
15 Deg. Bend w/Coupling – 20” CLR.....	23116023.....	_____
<b><u>Steel Parts</u></b>		
Straight Tubing – 10’ (always requires clamp or coupling sleeve)....	23115011.....	_____
Straight Tube, Expanded – 10’ .....	23115013.....	_____
Straight Tube – 12’ 6”.....	23115012.....	_____
Straight Tube, Expanded – 12’ 6” .....	23115000.....	_____
Solid Sleeve 4-1/2” ID .....	23117011.....	_____
Coupling 4-1/2” - 3 Bolt w/Neoprene Liner.....	23117030.....	_____
Clamp Sleeve 4-1/2” .....	23117031.....	_____
Shrink Sleeve 4-1/2” OD 4.5” Long.....	23118011.....	_____
Protection Sleeve 18” long.....	23118021.....	_____
90 Deg. Bend – 20” CLR.....	23116021.....	_____
90 Deg Bend, Expanded – 20” CLR .....	23116016.....	_____
90 Deg. Bend – 24” CLR.....	23116012.....	_____
90 Deg. Bend, Expanded – 24” CLR .....	23116017.....	_____
90 Deg. Bend – 30” CLR.....	23116013.....	_____
90 Deg. Bend, Expanded – 30” CLR .....	23116018.....	_____
90 Deg. Bend – 48” CLR.....	23116014.....	_____
90 Deg. Bend, Expanded – 48” CLR .....	23116019.....	_____
90 Deg. Bend – 60” CLR.....	23116015.....	_____
90 Deg. Bend, Expanded – 60” CLR .....	23116010.....	_____
45 Deg. Bend, Expanded .....	23116027.....	_____
30 Deg. Bend, Expanded.....	23116028.....	_____
15 Deg. Bend .....	23116029.....	_____



## Additional Parts & Options, (cont.)

<u>Description</u>	<u>Part Number</u>	<u>Quantity</u>
<b><u>Carriers</u></b>		
Standard Pneumatic Carrier 4-1/2" (each).....	23111011.....	_____
<b><u>Other Parts</u></b>		
Adapter 4.5 Metal to PVC .....	23119011.....	_____
Firestop – 4 gal Bucket .....	23277011.....	_____
Firestop Caulk Tube.....	23277021.....	_____
PVC Adhesive Kit – 1/4 pt.....	23278011.....	_____
Tube Hanger 4-1/2 .....	23279011.....	_____
BPS Truck Base (raises opening 6").....	23240991.....	_____
Camera Mount Cap (Camera not included).....	23230992.....	_____
TS BavSonic Audio Kit.....	23255191.....	_____
Tube System Teller Mount Kit.....	23260991.....	_____

