APQUIP™
COMPANY, LLC

# 2013
# SERVICE MANUAL

**FOR RED BEAM SENSOR VERSIONS**
**WITH DIGITAL CONTROLS**
**AND PRESSURE TANK**

# ADHESIVE
# APPLICATOR SYSTEM

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# ADHESIVE
# APPLICATOR SYSTEM

The following Assembly Drawings are to be used in conjunction with this Manual.

| Included | Drawing Number | Description |
|---|---|---|
| q | 121 | BRACKET ASSEMBLY |
| q | 197 | APPLICATOR HEAD, EDGE GLUE |
| q | 221 | BRACKET ASSEMBLY |
| q | 268 | ADHESIVE VALVE ASSEMBLY |
| q | 268-Rebuild | ADHESIVE VALVE REBUILD INSTRUCTIONS |
| q | 375 | BRACKET ASSEMBLY |
| q | 552 | SOLENOID VALVE ASSEMBLY, LARGE |
| q | 582 | PRESSURE TANK ASSEMBLY |
| q | 582-07 | FLUSH TANK ASSEMBLY |
| q | 587 | ADHESIVE ACCUMULATOR |
| q | 600 | ADHESIVE FILTER ASSEMBLY |
| q | 600B | ADHESIVE FILTER ASSEMBLY, LARGE |
| q | 621 | ADHESIVE REGULATOR ASSEMBLY |
| q | 816 | FINGERJOINT SYSTEM DIAGRAM / NOTES |
| q | 817 | EDGE GLUE SYSTEM DIAGRAM / NOTES |
| q | 820 | SOLENOID VALVE ASSEMBLY |
| q | 821 | CONTROL PANEL ASSEMBLY |
| q | 821-32 | CONTROL PANEL WIRING DIAGRAM |
| q | 821-36 | 821 CONTROL PANEL ELEC SCHEM 120VAC |
| q | 821-37 | 821 CONTROL PANEL ELEC SCHEM 220VAC |
| q | 917 | APPLICATOR HEAD, FINGERJOINT |
| | Additional Drawings | |
| q | ___ | _____ |
| q | ___ | _____ |
| q | ___ | _____ |

# Contents


ELECTRICAL INSTALLATION ..... 1
CONTROL ENCLOSURE FEATURES ..... 2
SYSTEM COMPONENT IDENTIFICATION ..... 5
SIX CONTROL STAGES DURING APPLICATION ..... 6
ADHESIVE APPLICATOR HEAD ..... 8
APPLICATOR HEAD ALIGNMENT ..... 9
APPLICATOR HEAD CLEAN UP ..... 10
SENSOR MOUNTING ..... 11
SENSING COMPONENTS CHECK ..... 12
DYNAMIC ADJUSTMENT ..... 13
SQUEEZE OUT ..... 15
ADJUSTMENT TROUBLESHOOTING ..... 16
- Applicator valve opens late. ..... 16
- Applicator valve closes early. ..... 16
- Adhesive on upper surface and none on lower surfaces. ..... 18
- Adhesive on lower surface and none on upper surfaces. ..... 18
- Glue Buildup On Applicator Head ..... 18

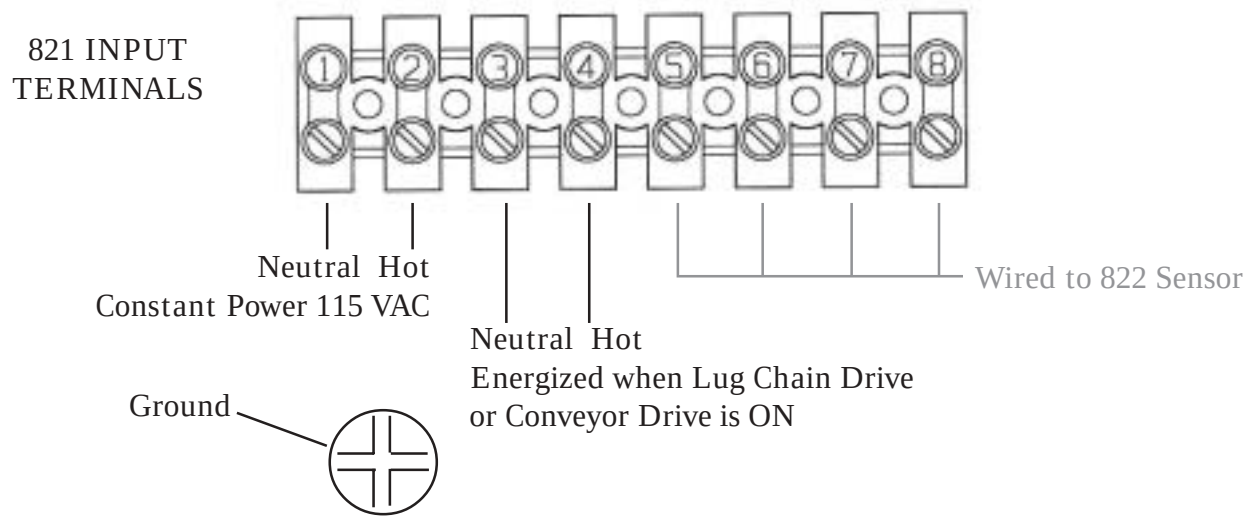
AIR CONTROLS ..... 19
TROUBLESHOOTING ..... 20
- Troubleshooting Fluid Supply ..... 20
- Troubleshooting Applicator Valve Assembly ..... 21
- Internal Electrical Component Identification ..... 22
- Troubleshooting Electrical Controls ..... 23
- Troubleshooting Sensing Electronics ..... 24
- Troubleshooting Sensor Function ..... 26
- Troubleshooting Sensor Output Signals ..... 27
- Troubleshooting Timer Output Signal ..... 28
- Troubleshooting Test, Chain, and Solid State Relays ..... 29

APPLICATOR VALVE ASSEMBLY ..... 30
OPTIONAL VALVE PARTS ..... 31
ADHESIVE FILTER ..... 32
PRESSURE TANKS ..... 33
SPECIAL ADHESIVES ..... 33

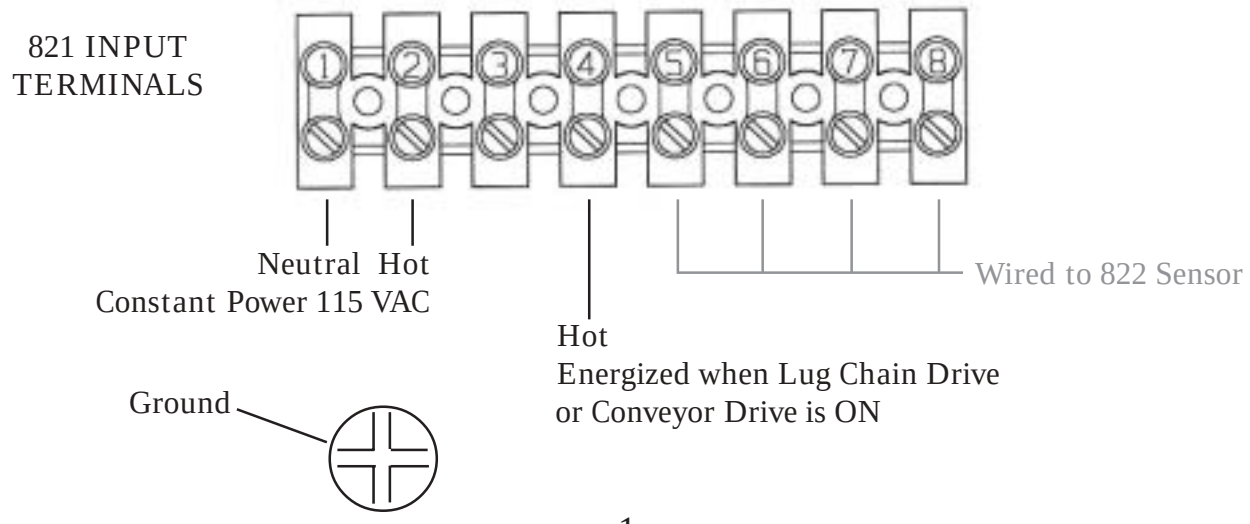
# ELECTRICAL INSTALLATION

Two voltages must be supplied to the APQUIP Control Enclosure:
1) A constant 115 VAC to power the system and, 2) a 115 VAC signal when the Lug Chain Drive or Conveyor Drive is powered. These connections can be wired in two ways; either configuration is acceptable.

A) One neutral and one hot line to the Constant Power input terminals (1 & 2 respectively), and one neutral and one hot line to the Lug Chain Drive "ON" input terminals (3 & 4 respectively). Connect the ground wire to the inner panel mount screw just below the input terminals.



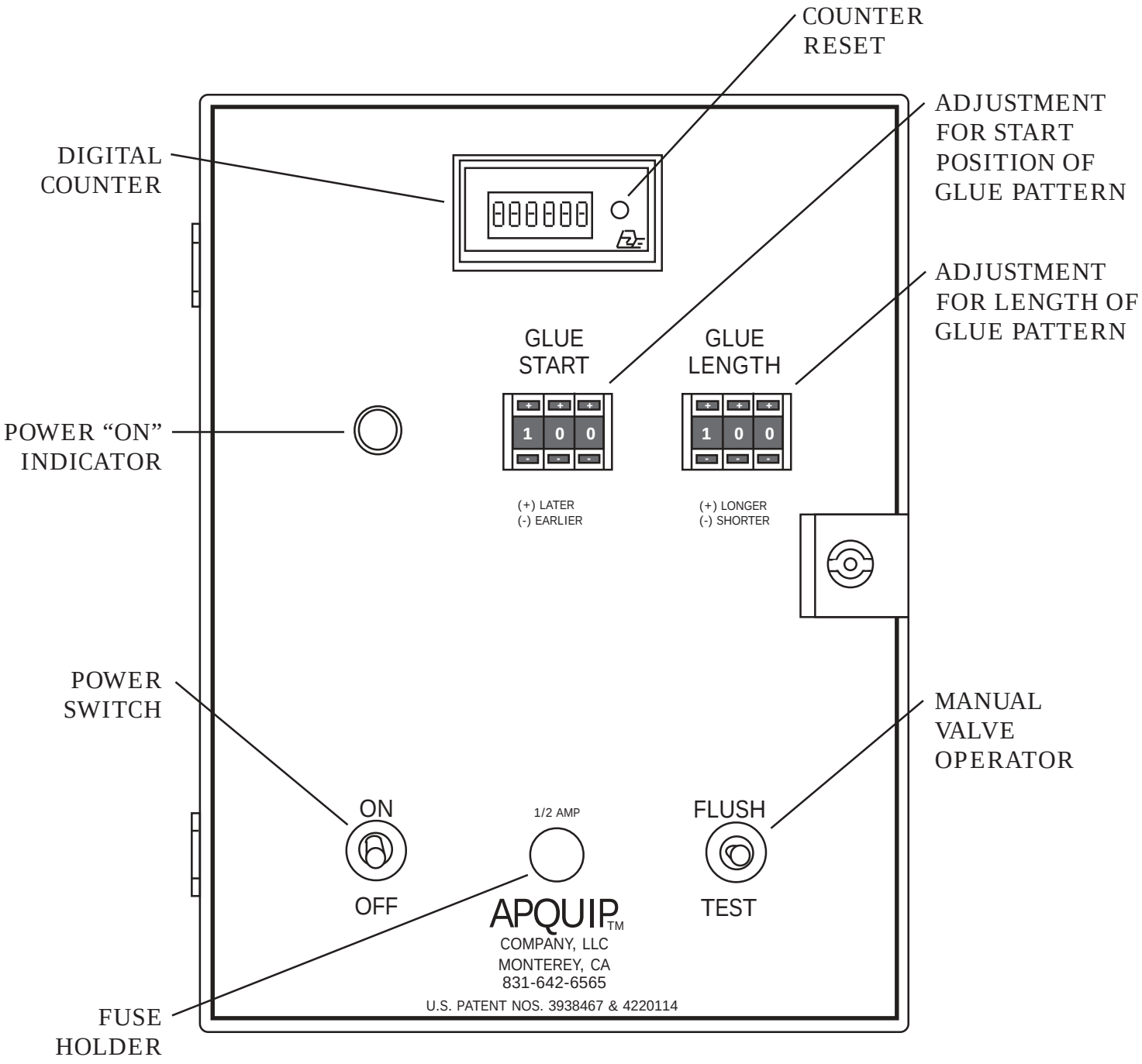

B) One neutral and one hot line to the Constant Power input terminals (1 & 2 respectively), and a single hot lead from the Lug Chain Drive or Conveyor Drive "ON" to input terminal 4. The 821 Harness already makes the connection from Input Terminal 1 to 3 joining the AC neutral lines. Connect the ground wire to the inner panel mount screw just below the input terminals.



# CONTROL ENCLOSURE FEATURES

The Apquip Control Enclosure operates a precise adhesive applicator system. To perform correct installation and to maintain this system at optimum performance, the operator must have a basic understanding of how this applicator system works.

Let's start by examining the controls:



# CONTROL ENCLOSURE FEATURES

• **Power Switch (On / Off Switch)**

Supplies power to the Control Enclosure electronics when in the ON position.

De-energizes the Control Enclosure when in the OFF position.

**NOTE:** Line voltage (115 VAC) is still present inside the enclosure even with the Power Switch in the OFF position.

• **Power "ON" Indicator Lamp**

Is lighted when the Power Switch is in the ON position and the Door Safety Switch is closed.

• **Fuseholder**

Contains a fast-blow 1/2 amp fuse AGC-1 or equivalent.

• **Manual Valve Operator (Flush / Test Switch)**

The Flush / Test Switch is a three position switch. The center position is the normal operating position. The switch is moved to Flush or Test position during setup or testing of the Apquip System.

Push the switch upward to FLUSH. This action overrides the Apquip System's automatic sensing circuit and directly operates the Air Electric Solenoid. The Air Electric Solenoid Valve shifts the air in the control lines to open the Applicator Valve. This will either dispense adhesive or, when the Applicator Valve is connected for flushing, will flush water through the adhesive lines.

Push the switch downward to TEST. This action allows testing the wood detection circuit without the requirement of having the Lug Chain or Conveyor moving or having the signal present. By holding the switch in TEST position, and moving an object through the sensor beam (within range), the entire electronic circuit and adhesive dispensing system can be tested.

• **Digital Counter**

Increments with each Air Electric Solenoid operation, providing a count of Adhesive Valve operations and, therefore, joints glued.

• **Counter Reset**

Resets the digital counter to zero.

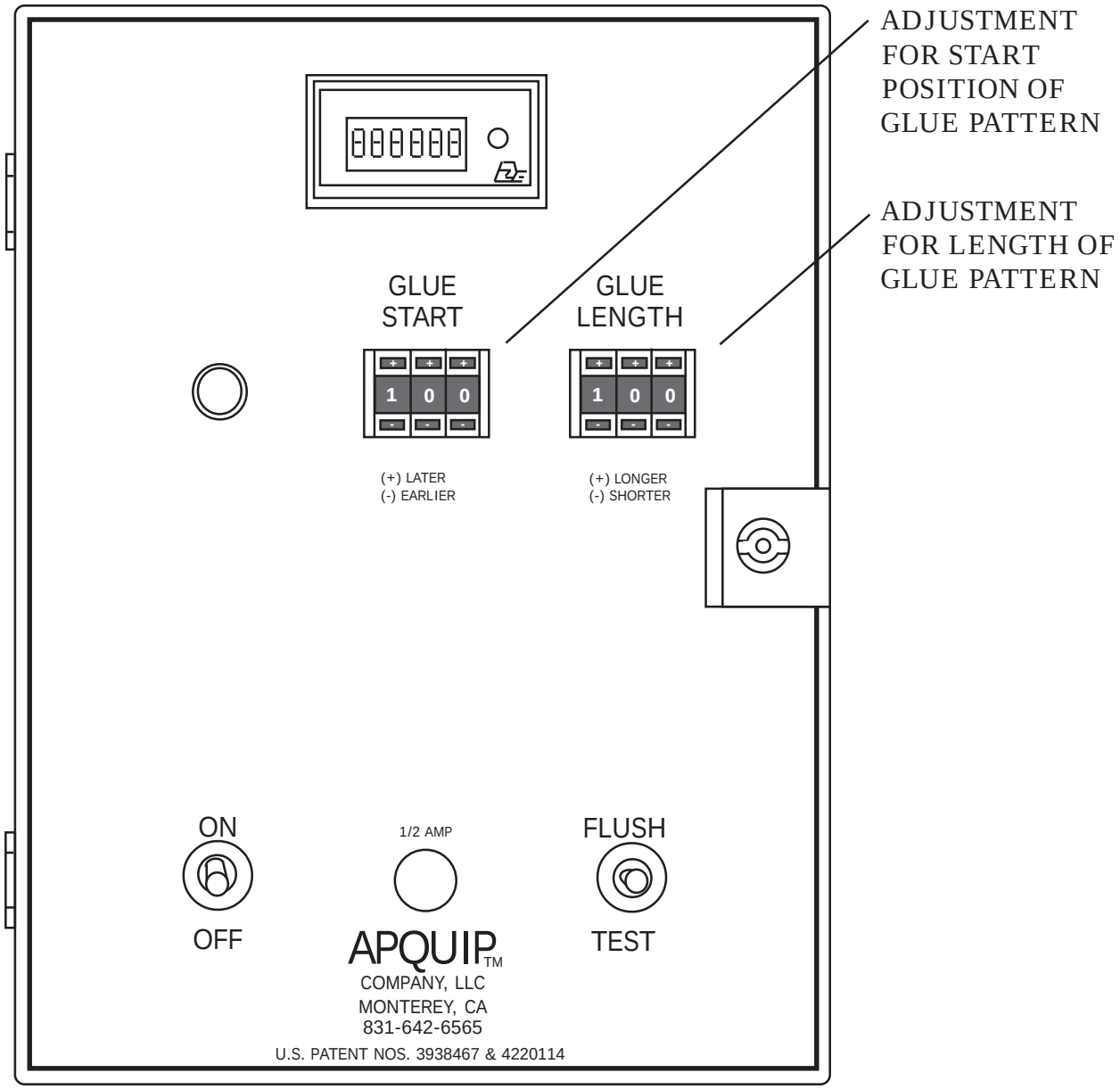
# CONTROL ENCLOSURE FEATURES

• **GLUE START Adjustment**

The setting determines when the applicator valve opens to begin applying adhesive to a joint or edge. 000 is the earliest (least amount of delay), and 999 is the latest (most amount of delay) for activation of the adhesive pattern.

• **GLUE LENGTH Adjustment**

The setting determines when the applicator valve closes after applying adhesive to a joint or edge. 000 is the shortest length, and 999 is the longest length adhesive Pattern.



# SYSTEM COMPONENT IDENTIFICATION

1) Control Enclosure

2) Coalescer Filter/Regulator Assembly

3) Optical Sensor

4) Applicator Head

5) Adhesive Applicator Valve Assembly

6) Bracket, X - Y Adjustment, Adhesive Valve Mount

7) "ON" Air Control Line

8) "OFF" Air Control Line

9) Pressurized Adhesive Hose

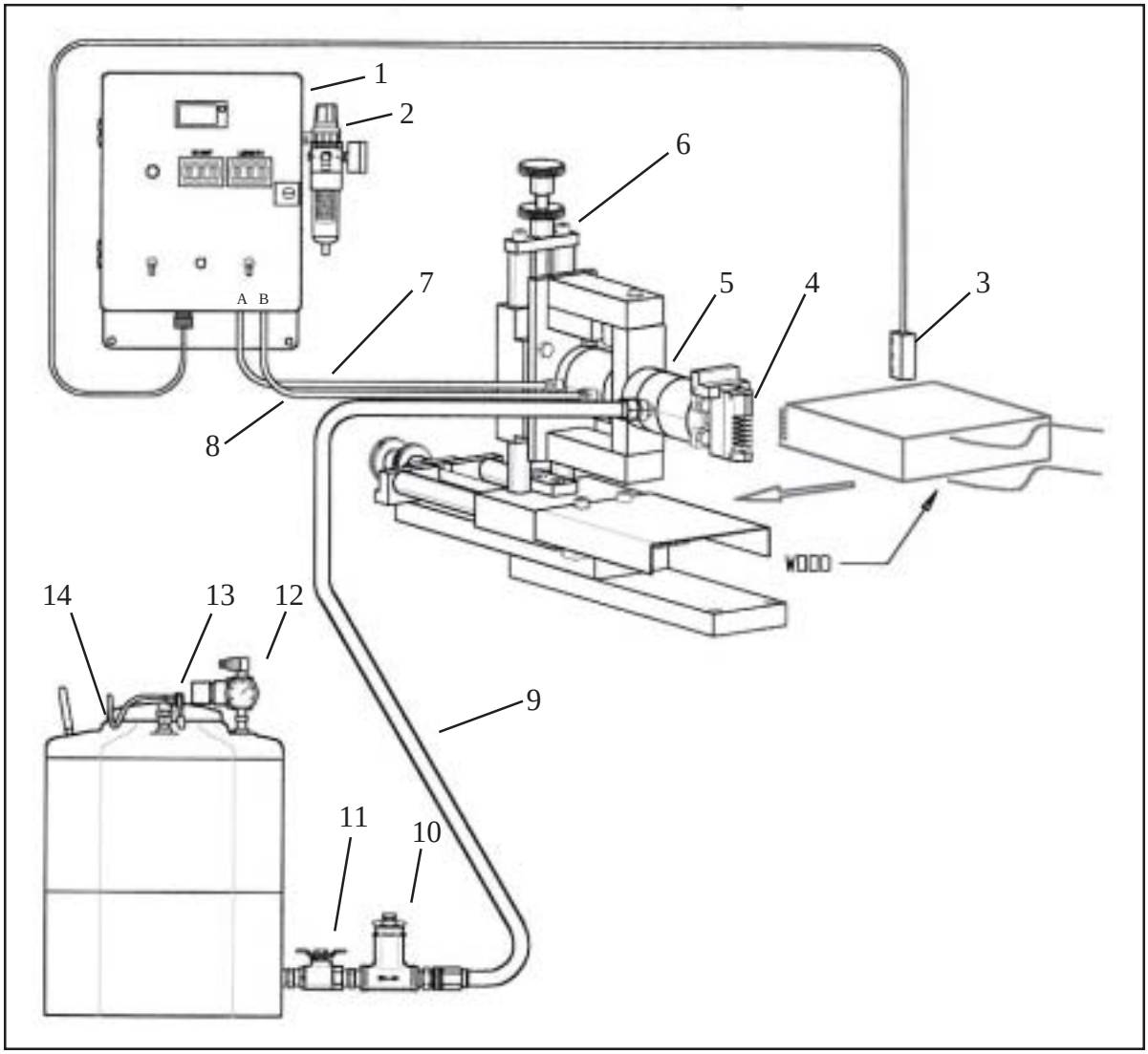
10) Adhesive Filter

11) Manual Shut off Valve

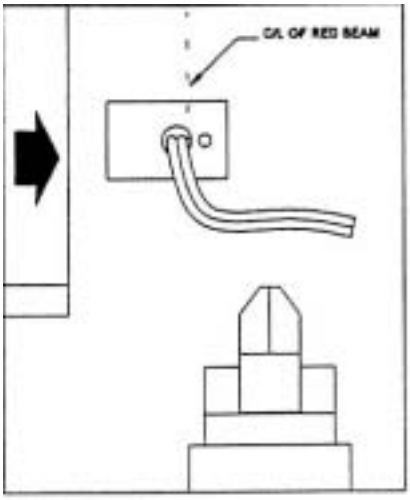
12) Regulator / Gauge, Tank Pressure

13) Relief, Tank Pressure

14) Pressure Tank Assembly



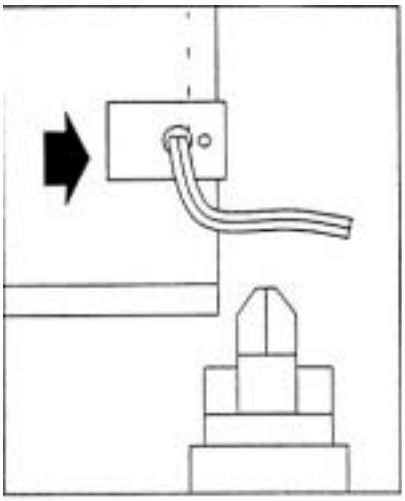
# SIX CONTROL STAGES DURING APPLICATION




**STAGE ONE**

A piece of wood moving on the lug chain away from the cutter head approaches the sensor.

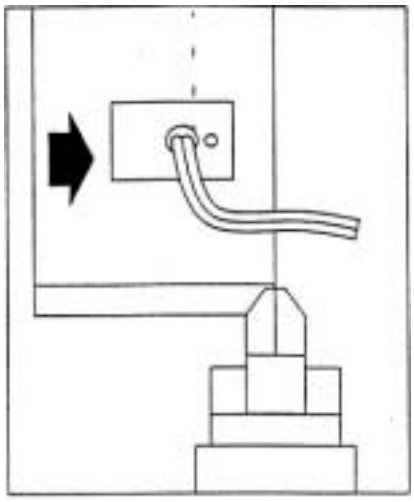
822 Sensor: Unobstructed
LED lighted
268 Valve: Closed



**STAGE TWO**

The moving piece of wood now passes the sensor and the red beam. The applicator valve is still closed. The time delay circuit begins timing out the interval set with the START adjustment.

822 Sensor: Blocked
LED off
268 Valve: Closed
START Timer: Running



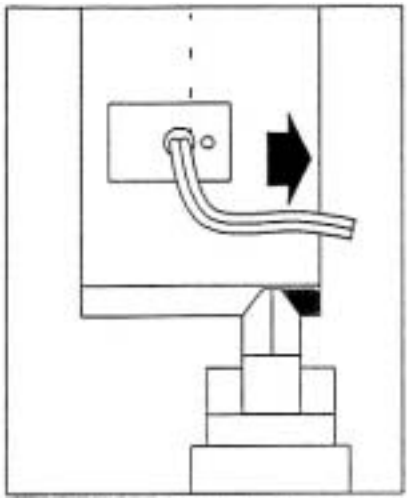
**STAGE THREE**

The START time delay circuit completes its timing cycle and the Air Electric Solenoid is activated.* The Applicator Valve opens and the adhesive passes to the finger ports of the Applicator Head. The wood finger joint has just moved into the Applicator Head and the pressurized adhesive is forced through the finger ports to the wood surfaces. The START adjustment synchronizes this entire operation, so that the Applicator Valve opens at the desired START position on the wood, not earlier and not later.

822 Sensor: Blocked
LED off
268 Valve: Open
START Timer: Complete

* The Air Electric Solenoid Valve shifts causing the air in the "ON" control line to pressurize and open the Applicator Valve. When the Air Electric Solenoid is deenergized, the Air Electric Solenoid Valve shifts causing the air in the "OFF" control line to pressurize and close the Applicator Valve. When either the "ON" or "OFF" air control line is pressurized, the other air control line is exhausted.

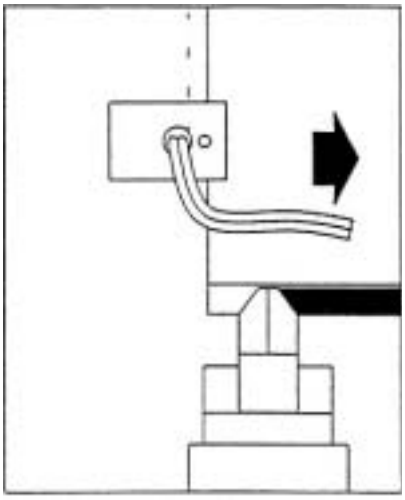
# SIX CONTROL STAGES DURING APPLICATION



**STAGE FOUR**

The Applicator Valve is open and the Applicator Head spreads adhesive evenly onto the wood surfaces. Any width joint or length of wood can be run through the Applicator Head without readjustment of the START and LENGTH controls.

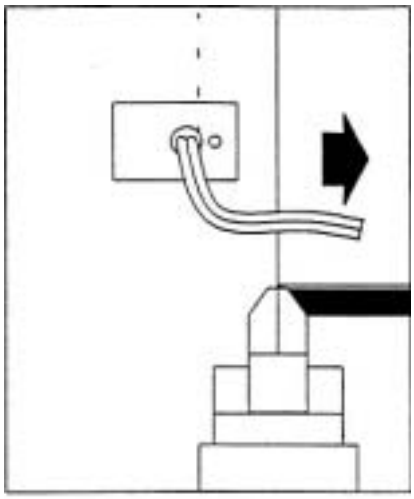
822 Sensor: Blocked
LED off
268 Valve: Open
START Timer: Complete



**STAGE FIVE**

The entire width/length of wood has now passed the optical sensor. The optical beam and the time delay circuit begins timing out the second interval. ** The LENGTH adjustment determines this delay period.

822 Sensor: Unblocked
LED lighted
268 Valve: Open
START Timer: Complete
LENGTH Timer: Running



**STAGE SIX**

The LENGTH time delay circuit completes its timing cycle and the Air Electric Solenoid is deenergized.* The Applicator Valve closes and the adhesive flow through the Applicator Head is shut off. The LENGTH adjustment synchronizes the closure of the Applicator Valve to shut off the adhesive flow as the trailing edge of the wood passes the Applicator Head.

The result, an even film of adhesive is applied to a wood finger joint with no dry spots and no drips.***

822 Sensor: Unblocked
LED lighted
268 Valve: Closed
START Timer: Complete
LENGTH Timer: Complete

** The LENGTH setting or time interval is not necessarily of the same length as that of the START. The two adjustments, START and LENGTH, operate independently of one another.

*** Refer to the Manual Section on ADHESIVE PATTERN ADJUSTMENT for a more detailed explanation of system operation and "fine tuning."

# ADHESIVE APPLICATOR HEAD

The only component in the Apquip System which requires particular alignment attention is the Applicator Head. The Applicator Head must be clean and correctly aligned in order for the adhesive to be properly applied.

## APPLICATOR HEAD ALIGNMENT

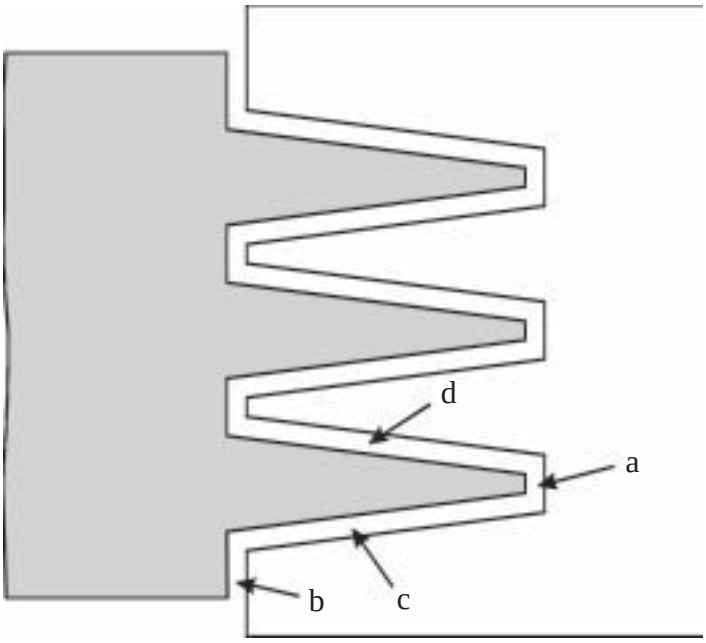
Visual alignment of the Applicator Head has proved the most reliable alignment method. Alignment should be performed with a wood joint stopped directly in front of the head. A white card or a flashlight placed behind the joint may make it easier to check the head clearance in poorly lit environments.

At no point should the Applicator Head touch the wood during an adhesive application. The Applicator Head should not move, not even slightly, as the wood passes through the Applicator Head Fingers. Mechanical wear caused by misalignment will reduce the usable life of the head.

The Applicator Head need not be realigned each time the cutter heads are changed, provided the dimensions of the wood joint remain the same. However, a check of the Applicator Head alignment with each cutter head change will also provide a quick verification of correct cutter head alignment.

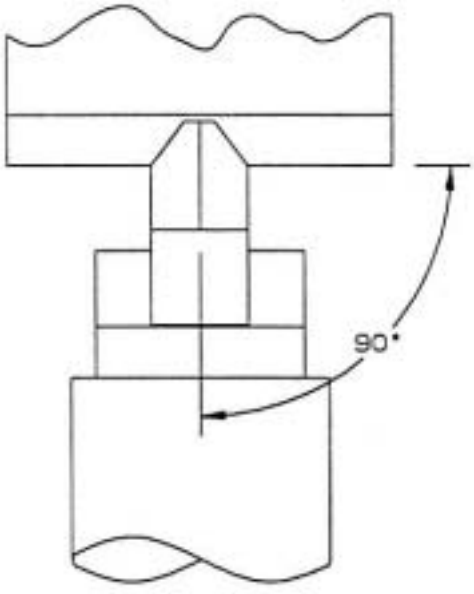
For edge glue or face glue applications, the applicator head should be 1/16” from the wood surface at an approximate 45° angle.

# APPLICATOR HEAD ALIGNMENT




Correct alignment of Applicator Head to wood joint is shown at the left. Carefully note that all of the clearances between wood and metal are equal. In particular check to see that on each finger the clearance at point (a) is equal to the clearance at point (b). Similarly, the clearance at point (c) should equal the clearance at point (d). These are the critical check points. (Fig. A.)

Figure A.




If you have difficulties getting equal clearances (a), (b), (c), and (d) above, verify that the Applicator Head is at 90° with respect to the wood joint. (Fig B.)

If you still have difficulties check to see that the dimensions of the wood joint are correct.

Figure B.

# APPLICATOR HEAD CLEAN UP

At the end of each day the Applicator Head must be thoroughly flushed out with water. The Apquip Flush Adaptor, (Part #010,) is designed for just this purpose. The Flush Adaptor connects to a common hose bib for easy flushing of the Applicator Head.

The Applicator Head can be taken apart should foreign matter get through the fluid filter and clog the Applicator Head. For those plants which use two component adhesives with a limited pot life, the head can be taken apart and cleaned should the adhesive be allowed to set up inside the head.

Apquip Applicator Heads are machined from stainless steel and although resistant to wear, they can be damaged by sharp tools. Use only a soft brush to clean the head if taken apart. A toothbrush or fine brass brush works well. Never use a screwdriver or pick to clean the finger ports in the Applicator Head.

Use of silicone grease during reassembly on all screw threads and head mating surfaces will make maintenance much easier.

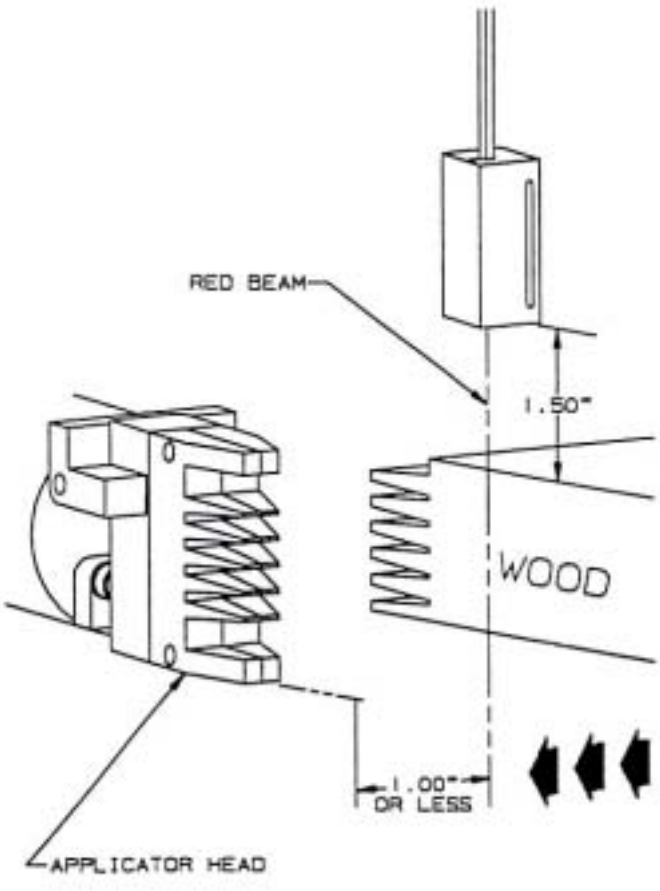
Whenever the applicator head is removed from the valve, use the Apquip Valve Plug (Part #011-01) to seal the valve. This will prevent glue drying inside the valve.

# SENSOR MOUNTING

The sensor, for finger jointer applications, should be installed on the hold down section on the side opposite the cutter head. The aluminum body which houses the sensor should be installed as follows:

1) It is preferable to place the sensor on the side of the hold-down section that is away from the cutter head. This offers more protection from contact by the cutter head whenever it is removed.

2) The beam centerline should be 1" or less UPSTREAM of the centerline of the applicator head. The bottom edge of the sensor housing should be 1-1/2" above the wood surface. This distance should be measured when the hold-down section is adjusted for a given thickness of wood.




3) The 1-1/2" edge of the block should be parallel to wood travel. The beam diameter is small enough so that it can be mounted with the beam located between the edge of the hold-down flex strip and the edge of the lug.

4) If you are having difficulties with reflection from the lugs, try angling the sensor beam upstream slightly.

5) If you run blocks with significant wane, you may want to angle the sensor upstream so you are actually targeting the block halfway down the side of the block. This will eliminate the sensor not picking up the front section of the board that has the top corner of the leading edge missing.

6) **Edge Gluing:** Because the edge glue lines often run at much higher speeds, it may be necessary to mount the sensor anywhere from 1" to 15" upstream of the Applicator Head.

# SENSING COMPONENTS CHECK

Before proceeding to adjustment, a quick check of the sensing electronics will verify that the system is set up correctly. The following check is made without the Lug Chain or Conveyor moving. The Air Lines from the Air Electric Solenoid may be connected to the Adhesive Valve but you should not pressurize the Adhesive Tank until this test is complete.

1) POWER SWITCH

The Main Switch is on the face of the Control Enclosure Door. Locate the switch labelled "ON / OFF" and move the toggle to the ON position. The Power ON Indicator will light to indicate the Control Enclosure has been powered up.

Locate the Sensor in its mounting and check the back end of the aluminum Sensor block. The Sensor LED will be lighted when power is applied to the enclosure.

Place an object (or your hand) in front of the Sensor between 0 and 1.5" away from the "eye" opening. The LED will extinguish when the object blocks the Sensor, and relight when the object is moved away.

2) MANUAL VALVE SWITCH

The Manual Valve Switch is on the face of the Control Enclosure Door, locate the switch labelled "FLUSH / TEST" Switch. This switch has 3 positions: up FLUSH, down TEST, and the center position for automatic running.

Move the Manual Valve Switch toggle to the FLUSH position. You will hear the Air Electric Solenoid activate when the toggle is moved up, and deactivate when the toggle is moved back to center position.

Move the Manual Valve Switch toggle to the TEST position. In the TEST position, the Manual Valve Switch will activate a relay inside the Enclosure. You may or may not hear the relay activation.

Place an object (or your hand) in front of the Sensor between 0 and 1.5" away from the "eye" opening. The LED will extinguish, the Air Electric Solenoid will activate, and the Adhesive Valve will shift to OPEN when the object blocks the Sensor. The LED will relight, the Air Electric Solenoid will deactivate, and the Adhesive Valve will shift to CLOSE when the object is moved away.

## DYNAMIC ADJUSTMENT

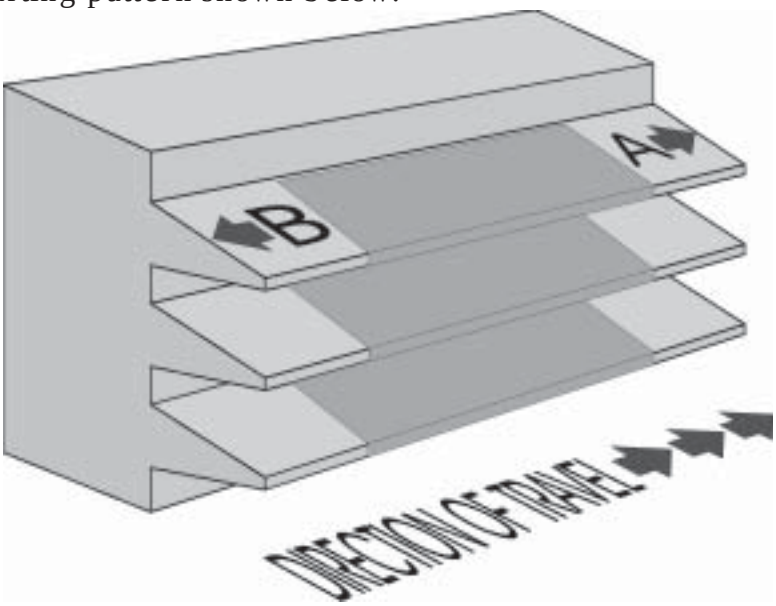
The Apquip system employs a high speed optical Sensor and solid state timers to insure a reliable, consistent adhesive pattern. Once the Applicator Head has been aligned and the sensing components checked, adhesive pattern dynamic adjustments (with the jointer running) can be made:

1) Bleed any trapped air out of the adhesive supply line using the FLUSH Switch. This switch overrides the sensing circuit and directly opens the applicator valve.

2) Set the GLUE START digital potentiometer to 100; this value is dependent on the horizontal distance between the Applicator Head and the Sensor, and the speed of the Chain or Conveyor. The greater the distance, the greater the setting. This setting is temporary.

   Set the GLUE LENGTH potentiometer to 100. As above, this setting is dependent on the distance between the Applicator Head and the Sensor, and the speed of the Chain or Conveyor. This setting is also temporary.

Start the Lug Chain Drive. The above control adjustment settings will produce something like the starting pattern shown below:




This illustration shows a right hand application. A left hand application would show the direction of travel reversed as well as directions “A” and “B.” The “A” direction points downstream with the travel (toward the leading edge and assembly section) and the “B” direction points upstream against the travel (toward the trailing edge and feeder station). All subsequent application adjustment illustrations will show right hand application examples only.

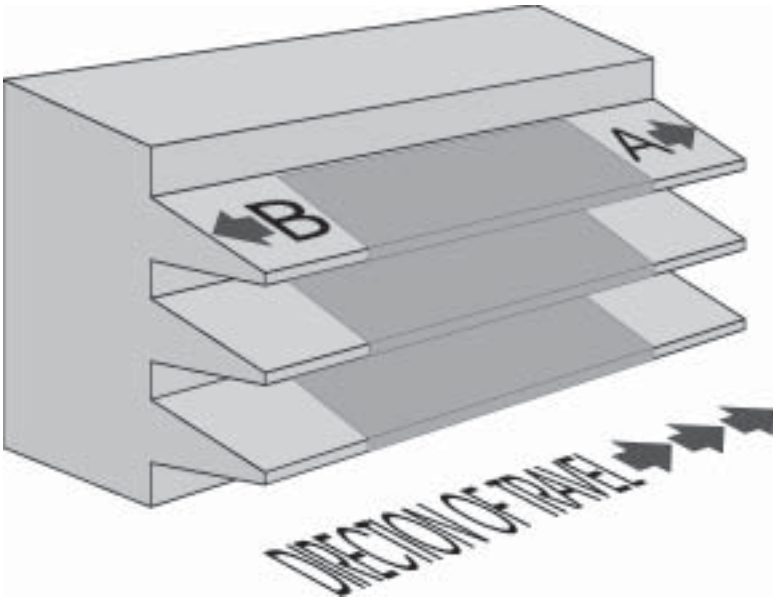
# DYNAMIC ADJUSTMENT

These adjustments must be made with the jointer running.

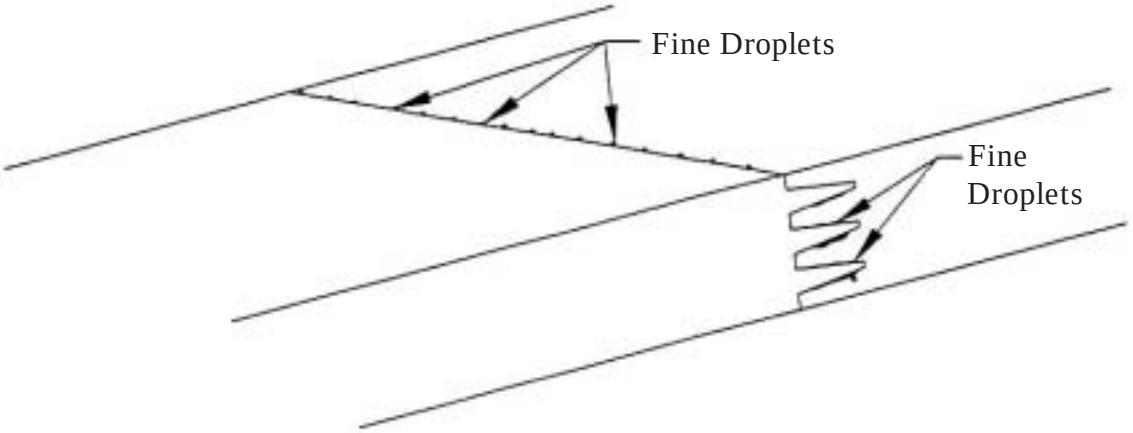
GLUE START:
If the leading edge (A), or start, of the glue pattern is too far away from the edge of the block as shown below, then decrease the value of the GLUE START setting. This will reduce the size of the gap from the edge of the block to the start of the glue pattern. Continue adjusting the setting until the glue pattern is 1/8" from the block's leading edge.

GLUE LENGTH:
Examine the length of the Adhesive Pattern. If the trailing edge of the glue pattern is too far from the back edge (B) of the block (length is not long enough), then increase the value of the GLUE LENGTH setting. This will cause the glue pattern length to extend farther to the trailing edge of the block. Continue adjusting the setting until the glue pattern is 1/8" from the block's trailing edge.

NOTE: A small gap, or "spared" area, 1/16" - 1/8" should be left on both ends of the adhesive pattern to allow for a little squeeze forward/rearward of the adhesive during assembly. Refer to the Manual Section on SQUEEZE OUT for more adjustment modifications for Squeeze Out.



## SQUEEZE OUT



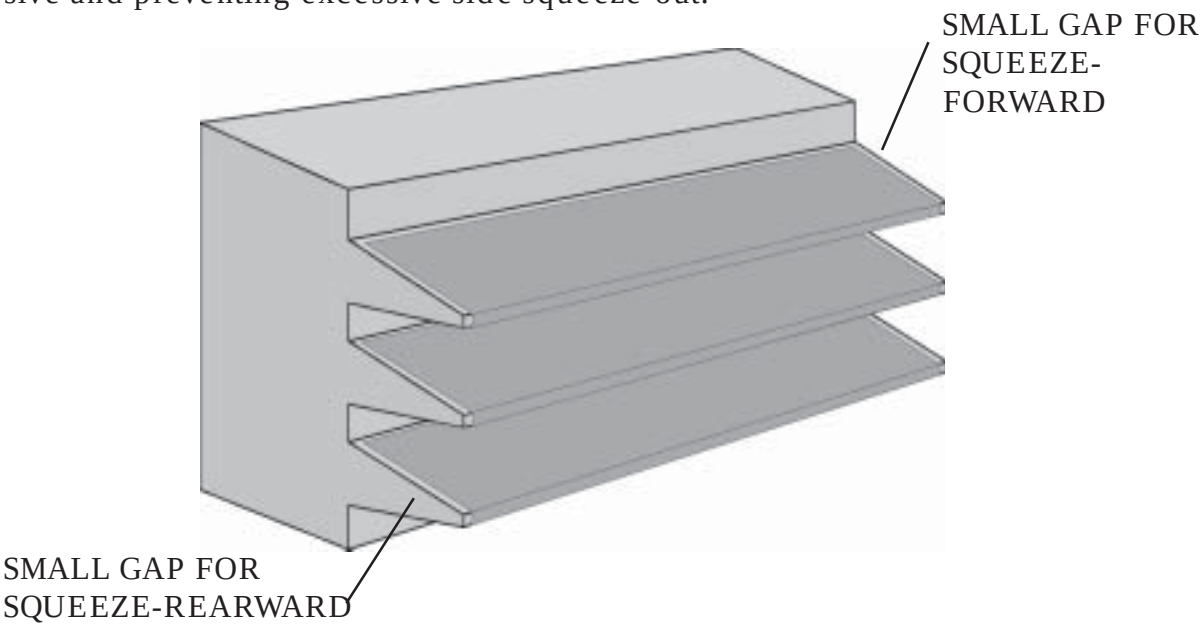

To double check your adhesive pattern settings, examine an assembled wood joint farther down the line. A very thin bead of adhesive or fine droplets squeezed out on tip of the joint indicate a sufficient quantity of adhesive applied to the joint (i.e. correct adhesive pressure).

Squeeze-out on the edge surface of the joint should be minimal.

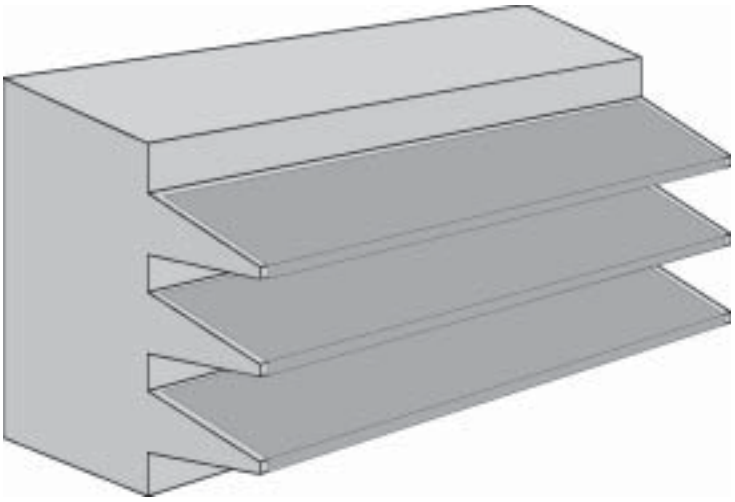
To remove the leading edge squeeze-out, increase the value of the GLUE START adjustment.

To remove the trailing edge squeeze-out, decrease the value of the GLUE LENGTH adjustment.

When these controls are correctly set, the adhesive pattern will be slightly less than the width of the joint, thereby allowing for a little squeeze forward/rearward of adhesive and preventing excessive side squeeze-out.

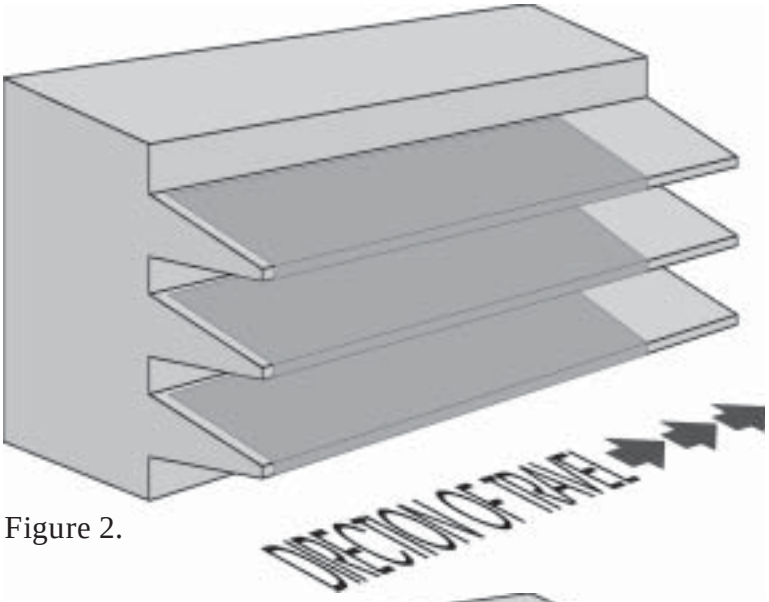


# ADJUSTMENT TROUBLESHOOTING



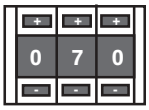
1) Even film of adhesive on upper and lower face of wood fingers. No drips. No dry areas.

Figure 1. Correct Adhesive Application



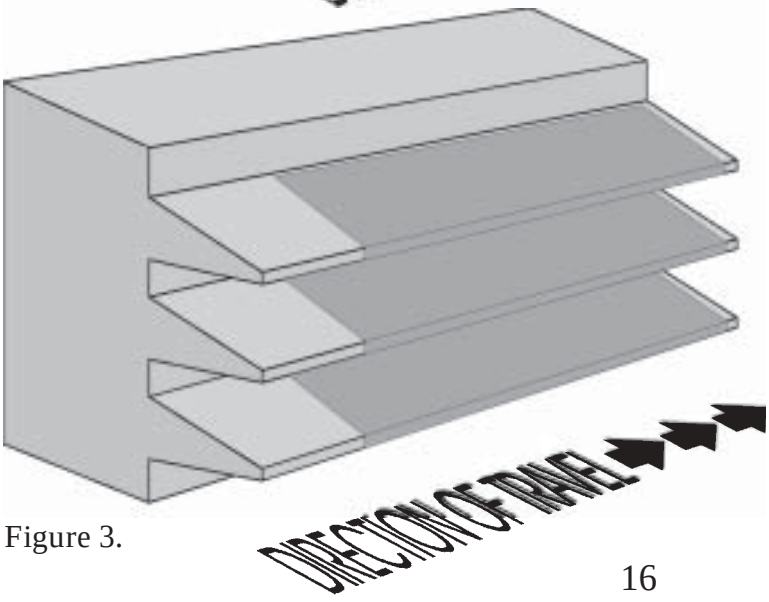

2) APPLICATOR VALVE OPENS LATE.
Decrease the value of the GLUE START adjustment to open Applicator Valve earlier and bring the adhesive closer to the leading edge of the block.

GLUE START



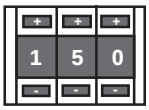

(+) LATER
(-) EARLIER

Figure 2.




3) APPLICATOR VALVE CLOSES EARLY.
Increase the value of the GLUE LENGTH adjustment to close Applicator Valve later and extend the adhesive pattern toward the trailing edge of the block.

GLUE LENGTH




(+) LONGER
(-) SHORTER

Figure 3.

# ADJUSTMENT TROUBLESHOOTING

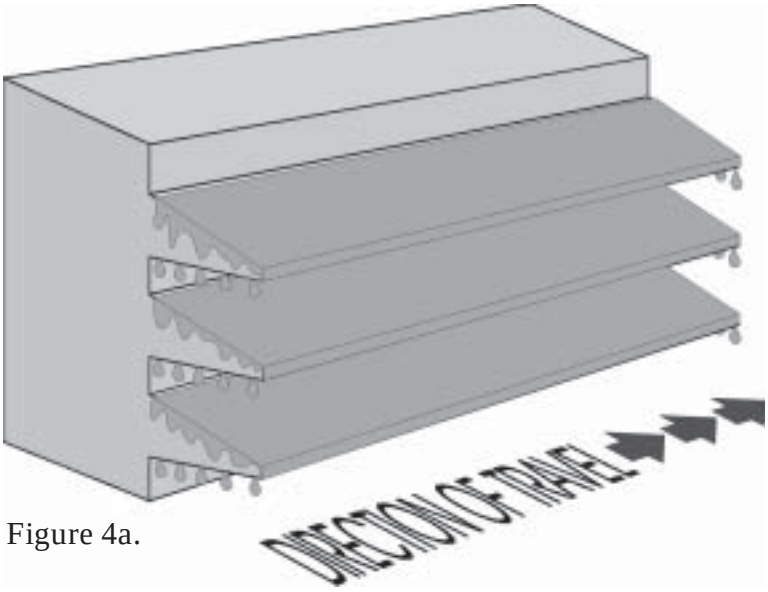



Figure 4a.

4a) Applicator Valve either:
1) Opens too early; or
2) Closes too late; or
3) Opens early AND closes late.

In all three cases there is adhesive on the Applicator Fingers before the wood reaches the Head.

IF 4a IS THE CASE, THEN:

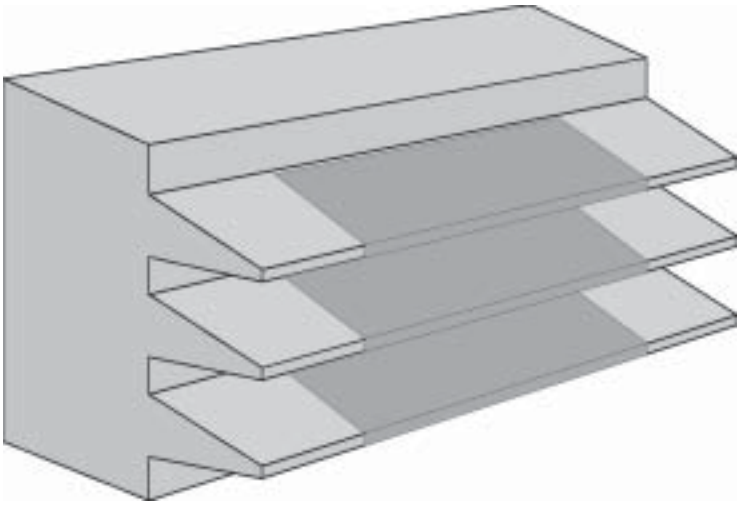


Figure 4b.

4b) Increase the value of GLUE START and decrease the value of GLUE LENGTH to re-center the adhesive pattern so there are "spared" areas as shown in Figure 4b.

Then decrease the value of GLUE START to advance the adhesive up to the leading edge of the block.

Now increase the value of GLUE LENGTH to extend the adhesive pattern to the trailing edge of the block.

# ADJUSTMENT TROUBLESHOOTING

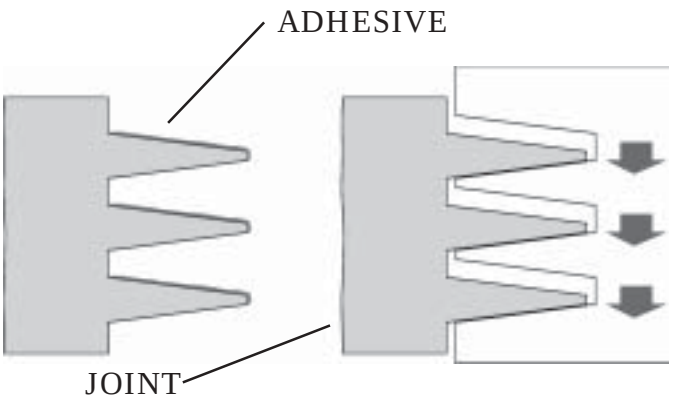



Figure 5.

5) ADHESIVE ON UPPER SURFACE AND NONE ON LOWER SURFACES.

Applicator head is incorrectly aligned vertically to the wood finger joint. The Applicator Assembly must be repositioned slightly lower to give equal clearance above and below steel Applicator Fingers.

The 375 Bracket Assembly has a vertical adjustor to position the Applicator Head. In this example, turn the vertical adjustor knob to move the Applicator Head downward.

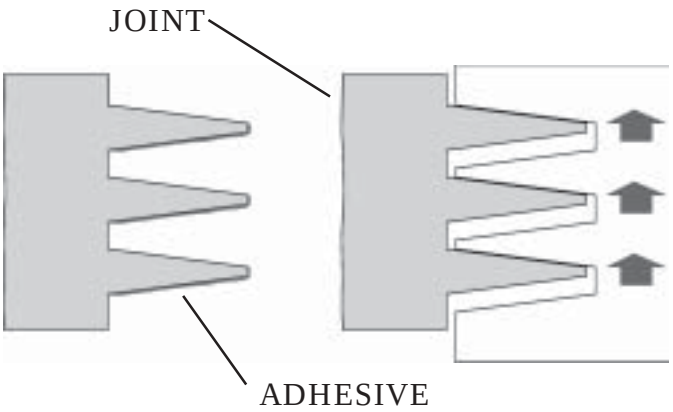



Figure 6.

6) ADHESIVE ON LOWER SURFACE AND NONE ON UPPER SURFACES.

The Applicator Head is incorrectly aligned vertically to the wood finger joint. The Applicator Assembly must be repositioned slightly higher to give equal clearance above and below steel Applicator Fingers. Turn the Vertical Adjustor Knob to move the Applicator Head upward.

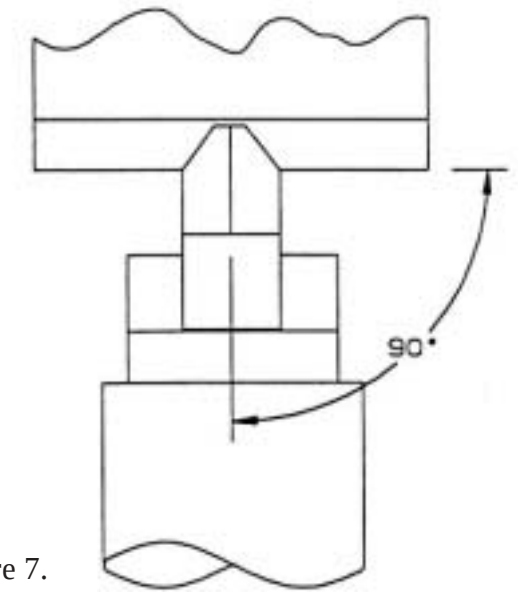



Figure 7.

7) GLUE BUILDUP ON APPLICATOR HEAD

If glue appears on the side surfaces of the Applicator Head check to see that the Applicator Head is at 90° with respect to the wood joint.

# AIR CONTROLS

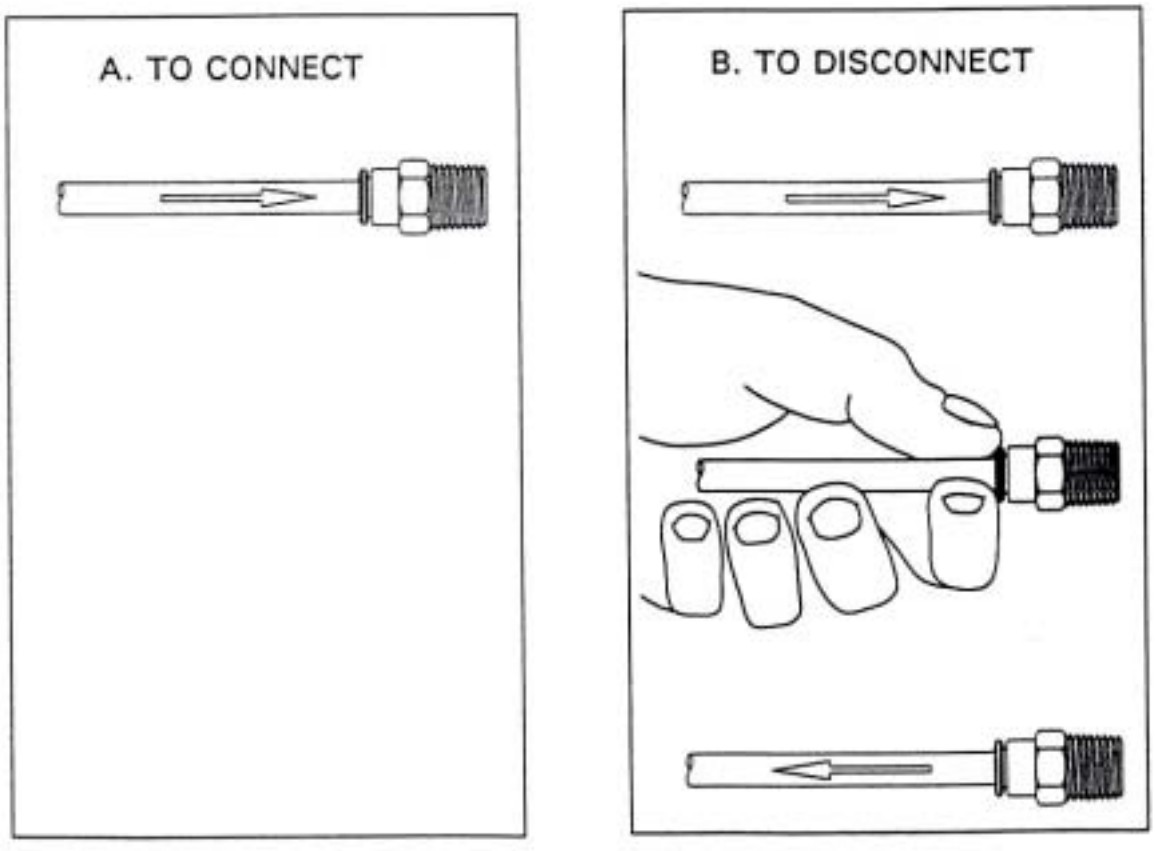
Pressurized air lines are normally used at just two points in the Apquip System:

1) Air supply to pressurize the tank.
2) Air supply to the Control Enclosure to operate the applicator valve.

This system requires a maximum of 60 PSIG of clean, dry air. Moisture and compressor blowby will affect the performance of the system's spool/sleeve assembly. The Apquip system includes Coalescer / Filter to remove normal levels of impurities.

**Do not lubricate the air supply.**

All control lines are 1/4" plastic tubing. The air fittings are the quick release type. To attach an air line, push the plastic tubing firmly into the fitting (See A). To remove the air line, depressurize the line, push the tubing firmly into the fitting, then using your fingers, push the locking ring in on the fitting. While holding the lock ring in, pull the tubing out. (See B)




Replace the Coalescer Filter Element whenever it is no longer white in color. Continued use of a contaminated Element will permit impurities to cause inconsistent operation of the Air Electric Valve. A combination of cold air in the mill and oil in the air supply can also cause intermittent or sluggish Air Electric Valve operation.

# TROUBLESHOOTING

If your Adhesive Applicator System does not function, then proceed with trouble-shooting to isolate the problem to one of three subsystems; fluid supply, applicator valve assembly, or electrical controls.

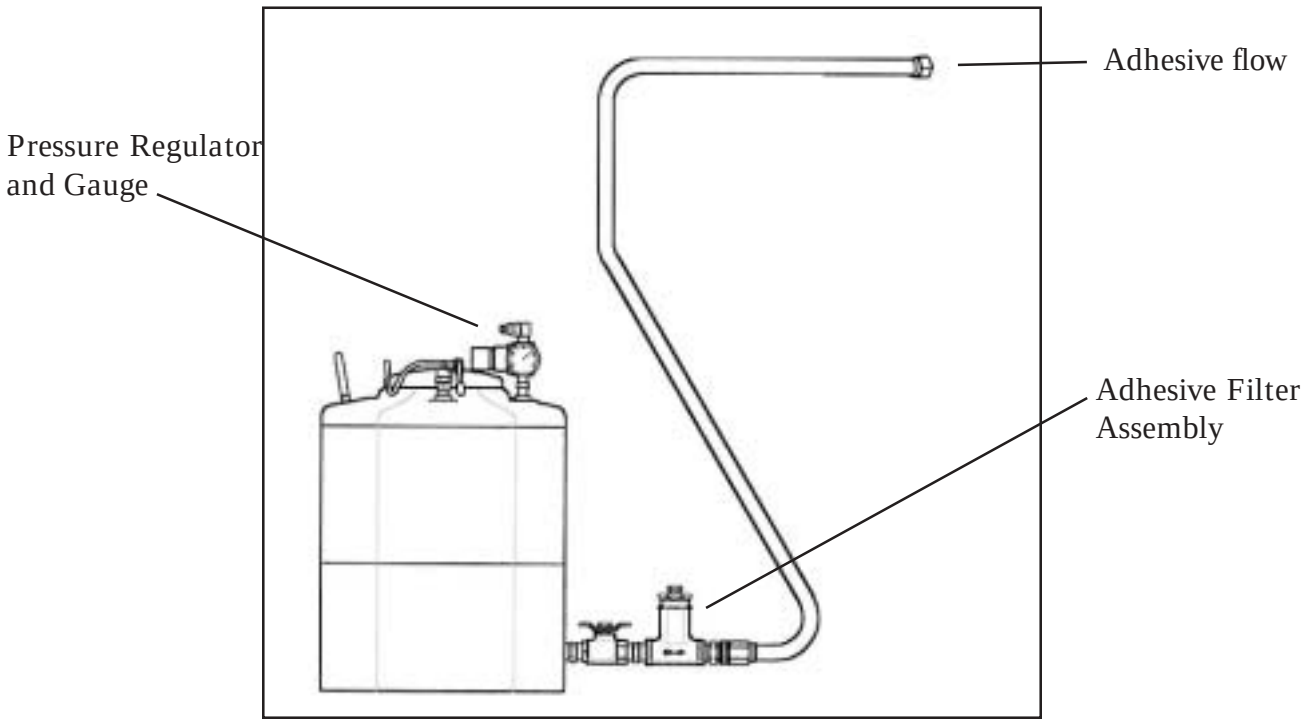
## TROUBLESHOOTING FLUID SUPPLY

Shut off the air supply to the pressure tank. Disconnect the pressurized adhesive supply hose at the applicator valve assembly. This hose may be under pressure, so loosen the fitting slowly. Place the end of the hose over a small container.

Turn the air pressure regulator at the top of the tank slowly CLOCKWISE until:
A) The gage indicates 20 PSI and there is no flow from the hose, or
B) adhesive flows from the hose.

If the gauge indicates 20 PSI and there is no flow, then turn the tank air supply off and depressurize the tank. Turn the valve at the bottom of the tank off and then check the condition of the filter inside the brass T-body. A plugged filter will prevent adhesive flow. Remove the filter and clean with water and a small brush. If the filter can not be cleaned, replace it with a new one. Refer to drawing 600 which lists the three available filter elements.

If there is adhesive flow, then refer to Manual Section TROUBLESHOOTING APPLICATOR VALVE ASSEMBLY.



## TROUBLESHOOTING APPLICATOR VALVE ASSEMBLY

Shut off the air supply to the Control Enclosure and Pressure Tank. Disconnect the two 1/4" air control lines to the Adhesive Valve (see Manual Section on **Air Controls** for instructions on disconnecting air lines from quick-release fittings). Hold the ends of the control lines in your hand.

Reapply air to the Control Enclosure. Air should exhaust from the "OFF" B line. Move the FLUSH / TEST Switch up to the FLUSH position. Air should now exhaust from the "ON" A line to the valve.

If air still exhausts from the "OFF" line when the FLUSH / TEST Switch is moved to FLUSH, then proceed with Manual Section TROUBLESHOOTING ELECTRICAL CONTROLS.

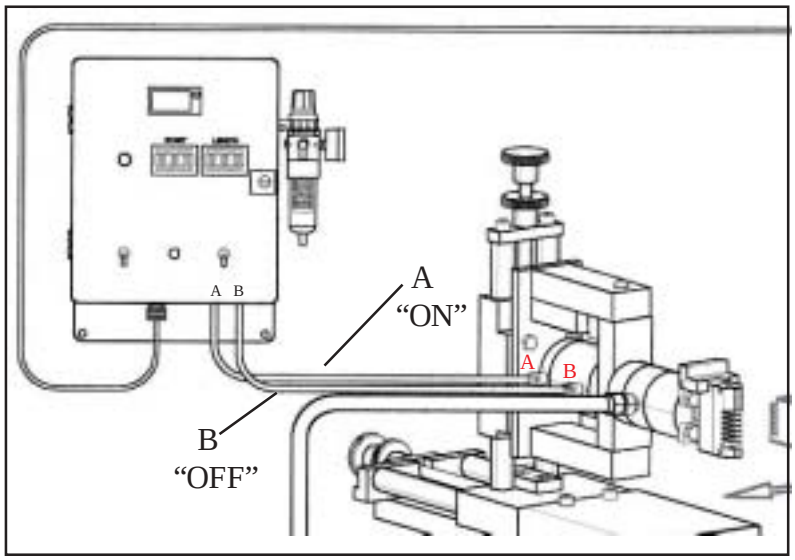
Reconnect the air lines to the Adhesive Valve. Reapply air to the Control Enclosure and Pressure Tank.

Now move the FLUSH / TEST Switch upward to the "FLUSH" position. The Applicator Valve should now open and adhesive should flow from the finger ports of the Applicator Head.

If no adhesive appears at the Applicator Head then the APPLICATOR VALVE must be taken apart and serviced.

Start the lug chain drive and run a few wood joints. The Applicator Valve should open each time a wood joint passes through the sensor's beam.

If the Applicator Valve doesn't open as the wood joints pass, then proceed with Manual Section TROUBLESHOOTING ELECTRICAL CONTROLS.



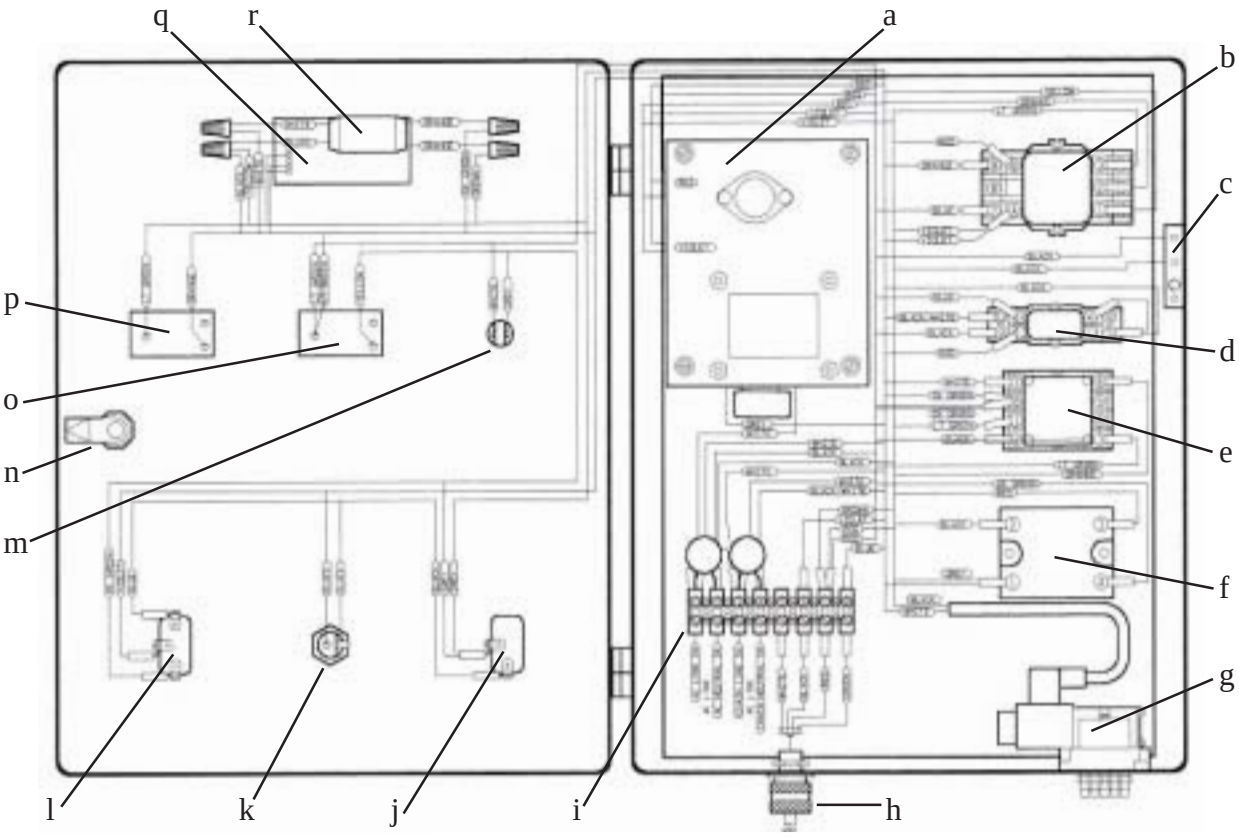
## INTERNAL ELECTRICAL COMPONENT IDENTIFICATION

THE SMALL RED INDICATOR VISIBLE IN THE SENSOR HOUSING (NEAR THE CABLE) GLOWS WHEN THE CONTROL ENCLOSURE IS ENERGIZED; IT GOES OUT WHEN THE SENSOR DETECTS AN OBJECT UP TO 1-1/2" FROM THE EDGE OF THE ALUMINUM SENSOR HOUSING.

Examine the Electrical Diagram Drawing 821-36 or 821-37. See Drawing 821 Control Panel Assembly and locate the electrical components inside the Control Enclosure:

a) Power Supply
b) Time Delay Module
c) Door Safety Switch
d) Test Relay
e) Chain Relay
f) Solid State Relay
g) Air Electric Solenoid Valve
h) Sensor and Cable
i) Input / Output Terminal Strip
j) On / Off Switch
k) Fuseholder and Fuse
l) Flush / Test Switch
m) Power "ON" Lamp
n) Door Latch
o) GLUE START Digital Potentiometer
p) GLUE LENGTH Digital Potentiometer
q) Digital Cycle Counter
r) Converter (for Counter)

PROCEED WITH CAUTION, SOME TESTS ARE PERFORMED WITH THE CONTROL ENCLOSURE ENERGIZED. SOME COMPONENTS WILL BE AT LINE VOLTAGE.



## TROUBLESHOOTING ELECTRICAL CONTROLS

PLACE POWER TO OFF / OPEN ENCLOSURE DOOR

CHECK SUPPLY VOLTAGE:
Using a voltmeter, check the AC voltage between terminals (1) and (2) on the Input / Output Terminal Strip. The voltage should be 115 VAC. A reading of 0 VAC indicates your plant supply is not providing power to the Control Enclosure.

PLACE DOOR SAFETY SWITCH TO OVERRIDE / POWER SWITCH TO ON:
With 115 VAC at terminals (1) and (2), pull the Door Safety Switch plunger to the override. (Pull the plunger button with insulated pliers or pull the #6 screw attached to the plunger outward about 1/4".) The override position closes the Door Safety Switch and allows the Enclosure to operate with the Door open. Move the ON / OFF Switch to ON.

OBSERVE POWER LAMP / NO LAMP, CHECK INPUT AGAIN, THEN FUSE:
The Power "ON" Lamp (front of Enclosure Door) will light. If not, recheck the voltage between terminals (1) and (2) on the Input / Output Terminal Strip. The voltage should be 115 VAC. If the voltage is 0 VAC then replace the 1/2 amp Fuse located in the Fuseholder.

FLUSH / TEST SWITCH TO FLUSH:
Move the FLUSH / TEST Switch to FLUSH. The Air Electric Solenoid will activate with a click sound. If no sound, check the solenoid by pressing the button at the end of the black solenoid housing to feel the solenoid activate when the Switch is moved to FLUSH. If the core doesn't move, then check voltage between Input / Output Terminal (3) and Solid State Relay (2). Voltage will be 115 VAC when the FLUSH / TEST Switch is at FLUSH. If 115 VAC is present, then replace the solenoid coil.

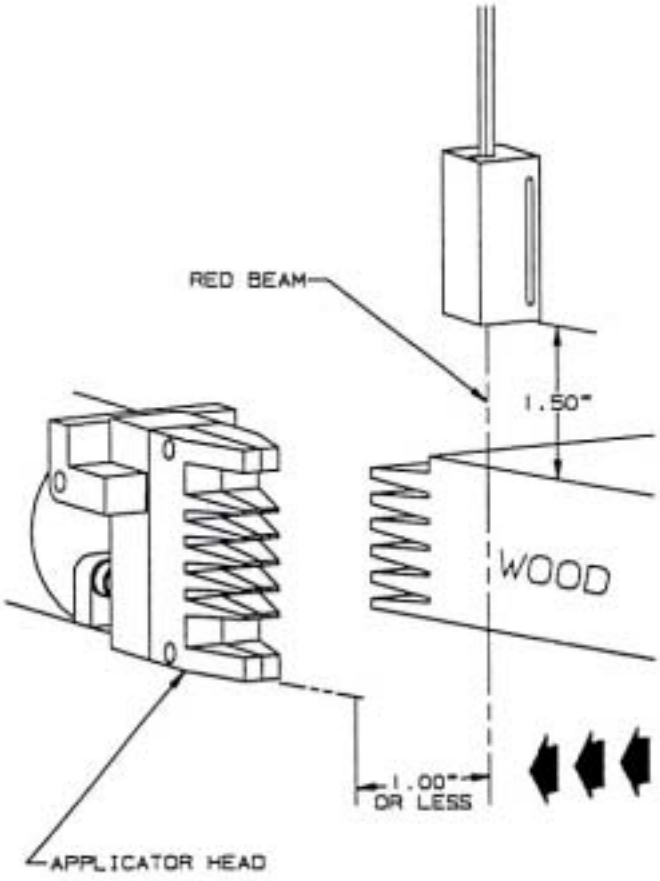
CHECK AIR ELECTRIC SOLENOID VALVE:
If the Air Electric Solenoid activates but the Air Electric Valve does not shift, the valve (located in the valve body) is sticking and must be serviced or replaced.

FLUSH / TEST SWITCH TO TEST:
If the Air Electric Solenoid operates as specified, then move and hold the FLUSH / TEST Switch in TEST. The Switch activates the K1 Test Relay which activates the K2 Chain Relay. With the Chain Relay active, the system will activate the Air Electric Solenoid and Valve when the 822 Sensor is blocked with wood. The timing set up by the GLUE START and GLUE LENGTH Settings will affect the System response.

If the voltage checks out, then proceed with TROUBLESHOOTING SENSING ELECTRONICS.

**TROUBLESHOOTING SENSING ELECTRONICS**

Before proceeding to troubleshooting, check to see that the sensing electronic components are set up correctly.

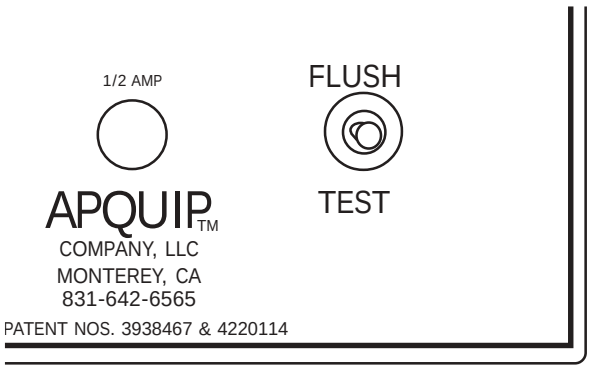



1) SENSOR POSITION

The visible red beam, (or the center of the eye of the Sensor), should be 1" or less from the centerline of the Applicator Head.

The lower edge of the Sensor's Aluminum Housing should be positioned 1-1/2" above the upper surface of the wood being detected.

NOTE: If the wood blocks have much wane, it will be necessary to angle the Sensor Assembly so that the detection point is the LOWER leading edge of the block. Refer to the installation notes for more detail.

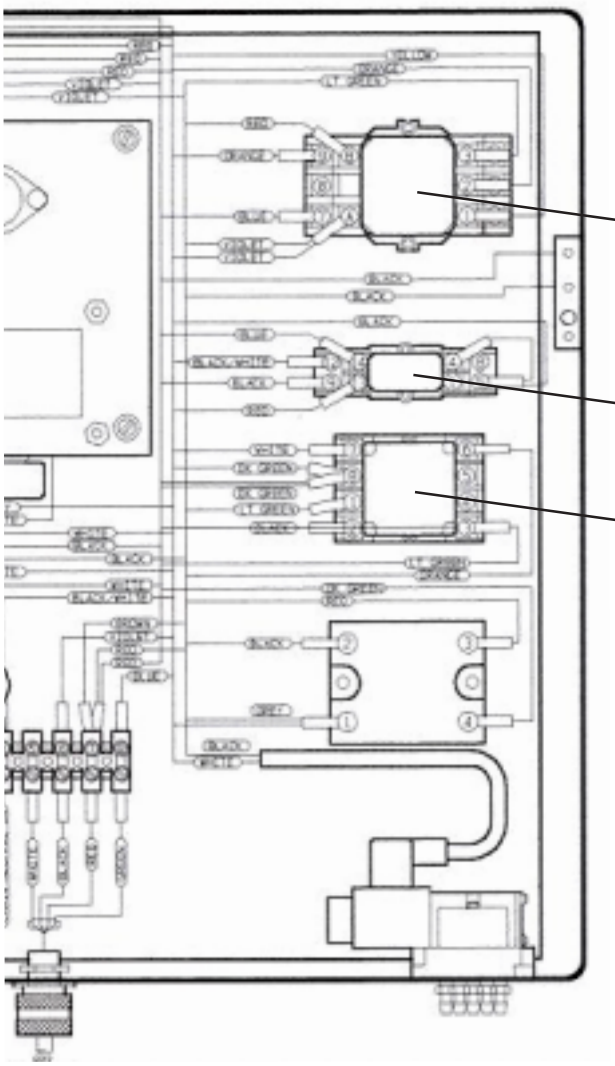



2) MANUAL VALVE OPERATOR.

On the face of the Control Enclosure, locate the "TEST/FLUSH" switch. This switch has 3 positions: up (FLUSH), down (TEST), and the center position for automatic running. This switch must be in the center position.

3) PLUG-IN RELAYS AND TIMER

Check that all three plug-in modules located inside the Control Enclosure are firmly in place. They are the Timer Module, Test Relay, and Chain Relay.



## TROUBLESHOOTING SENSOR FUNCTION

PLACE DOOR SAFETY SWITCH TO OVERRIDE / POWER SWITCH TO ON:
With 115 VAC at terminals (1) and (2), pull the Door Safety Switch plunger to the override. (Pull the plunger button with insulated pliers or pull the #6 screw attached to the plunger outward about 1/4".) The override position closes the Door Safety Switch and allows the Enclosure to operate with the Door open. Move the ON / OFF Switch to ON. The Power Indicator Lamp will light.

**REFER TO DRAWING 821 AND 821-32**
**FOR COMPONENT AND TERMINAL IDENTIFICATION.**

Before checking the operation of the #822 sensor, verify that the Sensor is wired as follows:

| | |
|---|---|
| Input / Output Terminal Strip 5 | White |
| Input / Output Terminal Strip 6 | Black |
| Input / Output Terminal Strip 7 | Red |
| Input / Output Terminal Strip 8 | Green |

Examine the mounting of the Sensor Housing and confirm that the red LED at the back end of the Sensor Housing is lighted. It will light when there is no wood within range of the Sensor beam. This is the normal "unblocked" condition for the Sensor.

Bring a wood target within 1-1/2 inches of the Sensor Housing. When the wood is detected the red LED at the back end of Sensor Housing will extinguish. This is the normal "blocked" condition for the Sensor.

The LED will be lit only when wood is NOT being detected. If this is not the case, replace the Sensor assembly.

**NOTE:** Under certain low voltage conditions, the Sensor LED will go into a blinking state. This is a circuit protection function for the Sensor. To restore normal operation, remove power to the Control Enclosure, wait 5 seconds, then restore power. If this does not restore normal function to the Sensor, check the DC Power Supply output voltage.

## TROUBLESHOOTING SENSOR OUTPUT SIGNALS

PLACE DOOR SAFETY SWITCH TO OVERRIDE / POWER SWITCH TO ON:
With 115 VAC at terminals (1) and (2), pull the Door Safety Switch plunger to the override. (Pull the plunger button with insulated pliers or pull the #6 screw attached to the plunger outward about 1/4".) The override position closes the Door Safety Switch and allows the Enclosure to operate with the Door open. Move the ON / OFF Switch to ON. The Power Indicator Lamp will light.

**REFER TO DRAWING 821 AND 821-32**
**FOR COMPONENT AND TERMINAL IDENTIFICATION.**

REMOVE TIMER, CHECK TIMER BASE VOLTAGE:
Remove the Timer Module (Part #821-34) from the Timer Base; grasp firmly as near as possible to the base and pull. Connect a positive meter lead to Timer Base terminal (B) and the negative lead to terminal (A). About +12VDC should appear across the terminals. If the proper power supply voltage does not appear, then the DC Power Supply (Part #821-26) is defective.

CHECK SINK SIGNAL FROM SENSOR:
Plug the Timer Module back into the Timer Base. Connect the negative meter lead to Timer Base terminal (A) and the positive meter lead to Timer Base terminal (7). Have an assistant move the FLUSH / TEST switch down to TEST and then block the sensor. When the Sensor is blocked, the voltage will be about +10VDC to +12VDC. When the Sensor is unblocked the voltage will be 0VDC. If not, check wiring of the following points.

| | |
|---|---|
| Timer Base Terminal A | Violet (2 wires) |
| Timer Base Terminal B | Red |
| Timer Base Terminal 7 | Blue |

CHECK SOURCE SIGNAL FROM SENSOR:
Connect the positive meter lead to Timer Base terminal (9) and the negative meter lead to Input / Output Terminal Strip (4). Have an assistant move the FLUSH / TEST switch down to TEST and then block the sensor. When the Sensor is blocked, the voltage will be 0VDC. When the Sensor is unblocked, the voltage will be about +10VDC to +12VDC. If not, check wiring of the following points.

| | |
|---|---|
| Timer Base Terminal 9 | Orange |
| Input / Output Terminal Strip 6 | White (from Sensor) |

**NOTE:** The Sink and Source Signals are named for the function of the signals when the Sensor is adjusted for "Light" detection. Apquip uses the Sensor adjusted to "Dark" detection. When the Sensor is adjusted for "Dark" detection, the signals work opposite of their named function. The Sink Signal (Green wire) will be at 0VDC when the Sensor is unblocked, and +12VDC when the Sensor is blocked. The Source Signal (White wire) will be at +12VDC when the Sensor is unblocked, and 0VDC when the Sensor is blocked. Reference is DC Common on the Sensor's Black wire.

## TROUBLESHOOTING TIMER OUTPUT SIGNAL

PLACE DOOR SAFETY SWITCH TO OVERRIDE / POWER SWITCH TO ON:
With 115 VAC at terminals (1) and (2), pull the Door Safety Switch plunger to the override. (Pull the plunger button with insulated pliers or pull the #6 screw attached to the plunger outward about 1/4".) The override position closes the Door Safety Switch and allows the Enclosure to operate with the Door open. Move the ON / OFF Switch to ON. The Power Indicator Lamp will light.

**REFER TO DRAWING 821 AND 821-32**
**FOR COMPONENT AND TERMINAL IDENTIFICATION.**

RECHECK TIMER INPUT SIGNAL:
With the Timer Module installed, connect the negative meter lead to Timer Base terminal (7) and the positive meter lead to Timer Base terminal (A). Have an assistant move the FLUSH / TEST switch down to TEST and then block the sensor. When the Sensor is blocked, the voltage will be about +10VDC to +12VDC. When the Sensor is unblocked the voltage will be 0VDC. The LED located on the upper left, inside the Timer Module case will light when the Sensor is blocked. If this is not so, replace the Timer Module.

CHECK TIMER OUTPUT SIGNAL AT THREE PLACES:
Connect the negative meter lead to Timer Base terminal (A) and the positive meter lead to Timer Base terminal (9). Have an assistant move the FLUSH / TEST switch down to TEST and then block the sensor. When the Sensor is unblocked, the voltage will be about +10VDC to +12VDC. When the Sensor is blocked, the voltage will be 0VDC. If this is not so, replace the Timer Module.

Connect the negative meter lead to Timer Base terminal (A) and the positive meter lead to Chain Relay Base terminal (6). Have an assistant move the FLUSH / TEST switch down to TEST and then block the sensor. When the Sensor is unblocked, the voltage will be about +10VDC to +12VDC. When the Sensor is blocked, the voltage will be 0VDC. If this is not so, proceed with TROUBLESHOOT TEST, CHAIN AND SOLID STATE RELAYS.

Connect the negative meter lead to Timer Base terminal (A) and the positive meter lead to Solid State Relay terminal (3). Have an assistant move the FLUSH / TEST switch down to TEST and then block the sensor. When the Sensor is unblocked, the voltage will be about +10VDC to +12VDC. When the Sensor is blocked, the voltage will be 0VDC. If this is not so, proceed with TROUBLESHOOT TEST, CHAIN AND SOLID STATE RELAYS.

## TROUBLESHOOTING TEST, CHAIN, AND SOLID STATE RELAYS

PLACE DOOR SAFETY SWITCH TO OVERRIDE / POWER SWITCH TO ON:
With 115 VAC at terminals (1) and (2), pull the Door Safety Switch plunger to the override. (Pull the plunger button with insulated pliers or pull the #6 screw attached to the plunger outward about 1/4".) The override position closes the Door Safety Switch and allows the Enclosure to operate with the Door open. Move the ON / OFF Switch to ON. The Power Indicator Lamp will light.

**REFER TO DRAWING 821 AND 821-32**
**FOR COMPONENT AND TERMINAL IDENTIFICATION.**

CHECK TEST RELAY:
The Test Relay (Part #821-20) can be checked by measuring a voltage of +12VDC between Test Relay Base terminals (14) and (13). Connect the negative meter lead to Test Relay Base terminal (14) and the positive meter lead to Test Relay Base terminal (13). Have an assistant move the FLUSH / TEST switch down to TEST. When the Switch is in TEST, the voltage will be about +12VDC and the Test Relay will Shift. Look for audible and visual indicators of the Test Relay shifting. If it does not shift, replace the Test Relay.

CHECK CHAIN RELAY:
The Chain Relay (Part #806-02) can be checked by measuring a voltage of 115VAC between Chain Relay Base terminals (7) and (2). Set the meter to read AC Voltage and connect the meter leads across Chain Relay Base terminals (7) and (2). Have an assistant move the FLUSH / TEST switch down to TEST. When the Switch is in TEST, the voltage will be about 115VAC and the Chain Relay will Shift. Look for audible and visual indicators of the Chain Relay shifting. If it does not shift, replace the Chain Relay.

CHECK SOLID STATE RELAY:
Solid State Relay (Part #821-17) is satisfactory if the following conditions are met:

With the FLUSH / TEST Switch in TEST, the DC Voltage between Solid State Relay terminals (3) and (4) will be +12VDC when the Sensor is blocked. The voltage will be 0VDC when the Sensor is unblocked. When the FLUSH / TEST Switch is in FLUSH, the DC Voltage will be +12VDC. When the FLUSH / TEST Switch is in OFF (center position), the DC Voltage will be 0VDC.

With the FLUSH / TEST Switch in TEST, the AC Voltage between Solid State Relay terminals (1) and (2) will be 0VAC when the Sensor is blocked. The voltage will be 115VAC when the Sensor is unblocked. When the FLUSH / TEST Switch is in FLUSH, the AC Voltage will be 0VAC. When the FLUSH / TEST Switch is in OFF (center position), the AC Voltage will be 115VAC.

# APPLICATOR VALVE ASSEMBLY

See Assembly Drawing 268.

The Applicator Valve assembly is composed of two subassemblies, the Air Cylinder and the Adhesive Valve Body. The moving parts are the Air Piston and Valve Spool. The Air Piston drives the Valve Spool towards the Applicator Head to open the Adhesive Valve and away from the Applicator Head to close the Adhesive Valve. The Valve Spool is designed to create a sniffing action when the Adhesive Valve is closed to draw the adhesive back into the Adhesive Head to reduce waste and prevent drips. The parts subject to wear in normal operation are the Valve Spool (Part #206-07 or #206-26) and any of the Adhesive Valve's Seals and O-Rings.

If the Adhesive Valve leaks adhesive in its OFF position, it indicates that Spool Seals are worn. If adhesive backs up into the Air Cylinder, this condition indicates worn Spool Seals and a worn U-Cup Seal (Part #258-24 or #268-37).

Adhesive in the Air Cylinder will cause valve operation to be sluggish, giving an indication of an electronic timing problem.

Take the Adhesive Valve apart and thoroughly clean all the pieces. Inspect the Spool and Seals, and replace parts which show wear. Use only APQUIP replacement Seals and O-Rings. Other Seals, though they look the same, will not offer the same resistance to chemical attack or mechanical wear due to compound characteristics.

******* IMPORTANT NOTE *******

Observe the correct orientation of the Spool Seal (Part #206-14) and other two-part seals that consist of a modified U-cup and O-ring expander. The "open" side of the seal that contains the O-ring MUST face toward the incoming adhesive pressure. The correct orientation of seals is well illustrated in Drawing 268. Lubricate all parts with Silicone Grease which is available from Apquip. DO NOT USE PETROLEUM-BASED GREASE.

Therefore, when installing the Spool Seal (Part #206-14) in the "Valve Body Inlet" (Part #206-05), the lips of the Seal must enter the cavity first. However, in the "Valve Body Mounting Segment" (Part #258-04), the inner Seal (the face which contacts the Valve Body Inlet) is installed with the "heel" entering first while the outer Seal, the lips are inserted first.

Note that the U-Cup Seal (Part #258-24 or #268-37) for the Air Cylinder must have its "open side" face the incoming air pressure to seal properly.

# OPTIONAL VALVE PARTS

Optional Parts:

If the Valve Spool (Part #206-07) is experiencing unusual wear because if its use with a filled or abrasive adhesive, then use of the ceramic coated version of the Valve Spool (Part #206-26) is recommended. This special Valve Spool is normally kept in stock.

Part #206-14 is the standard Spool Seal (Black in color) that are normally installed into new Part #268 Adhesive Valves. Optional Seals are available that may last longer with your adhesive. There are two optional Spool Seals: Part #268-31 (Orange in color) and Part #268-33 (White in color), that may extend the working life of your valve between rebuilds. Please consult with an Apquip representative if you feel you have to rebuild your valve too frequently.

The standard U-Cup Seal (Part #258-24) is a soft Black rubber with no O-Ring and the optional U-Cup Seal (Part #268-37) is Orange in color with an O-Ring.

# ADHESIVE FILTER

See Assembly Drawing 600.

The Adhesive Filter accepts replaceable screen elements in three different wire mesh sizes. Screen sizes are 16, 30, and 50 mesh. Refer to drawing 600 for part numbers.

For single component adhesives, use the 30 or 50 mesh element. For two component adhesives, with powder catalyst, the 16 mesh element provides less restriction. For low viscosity, unfilled adhesives, use the 50 mesh element.

Some powdered catalysts contain large particles that are not removed during the manufacturing process. Use of these catalysts will require pre-filtering after mixing in your mill. This pre-filtering can be done by pouring the mixed adhesive through an ordinary window screen into a plastic bucket.

Apquip also provides a large capacity Adhesive Filter (Part #600B) that can be used when there is a large volume of adhesive being applied. 600B Filters also accept screen elements in three different wire mesh sizes. Screen sizes are 16, 30 , and 50 mesh. Refer to Drawing 600B for part numbers.

## PRESSURE TANKS

See Assembly Drawing 582

All Adhesive Pressure Tanks have a maximum working pressure of 125 PSIG which is set by Federal safety standards. Do not remove or alter the safety Relief Valve which is a required part of the Adhesive Pressure Tank Assembly. A typical operating pressure is 20 PSIG for a low viscosity adhesive in a warm mill. Higher viscosity glues and lower operating temperatures will require higher tank pressures. Under no circumstances should 125 PSIG tank pressure be exceeded.

If an application requires a greater pressure than 125 PSIG, then the positive displacement Adhesive Pump (Part #522) will be required.

## SPECIAL ADHESIVES

The Apquip System is quite versatile in that it may be used with many different types of adhesives. Systems may be capable or running a completely different adhesive with only a few modifications. With over twenty-five years of experience in woodworking applications, a quick phone call, fax or e-mail may make your adhesive switch a much nicer experience. We have worked with isocyanate, melamine, polyurethane, PVA, resorcinol and soy based adhesives. Please consult with an Apquip representative if you are planning on switching adhesives.