

# C Davis Systems Seal Plug Gun Manual

Revision 2 4/27/2024

## **MODEL SPG-2 OPERATIONS MANUAL**

This manual provides the information required for operation and basic maintenance of C Davis Systems & Software, LLC's SPG-2 Seal plug insertion gun. Information includes: description, receiving inspection and installation, machine operation, preventive maintenance, adjustments, and repair and replacement parts lists.

For operation, the machine requires a constant air supply of clear dry air at 60-100 psi (80 recommended), as well as 110V AC.

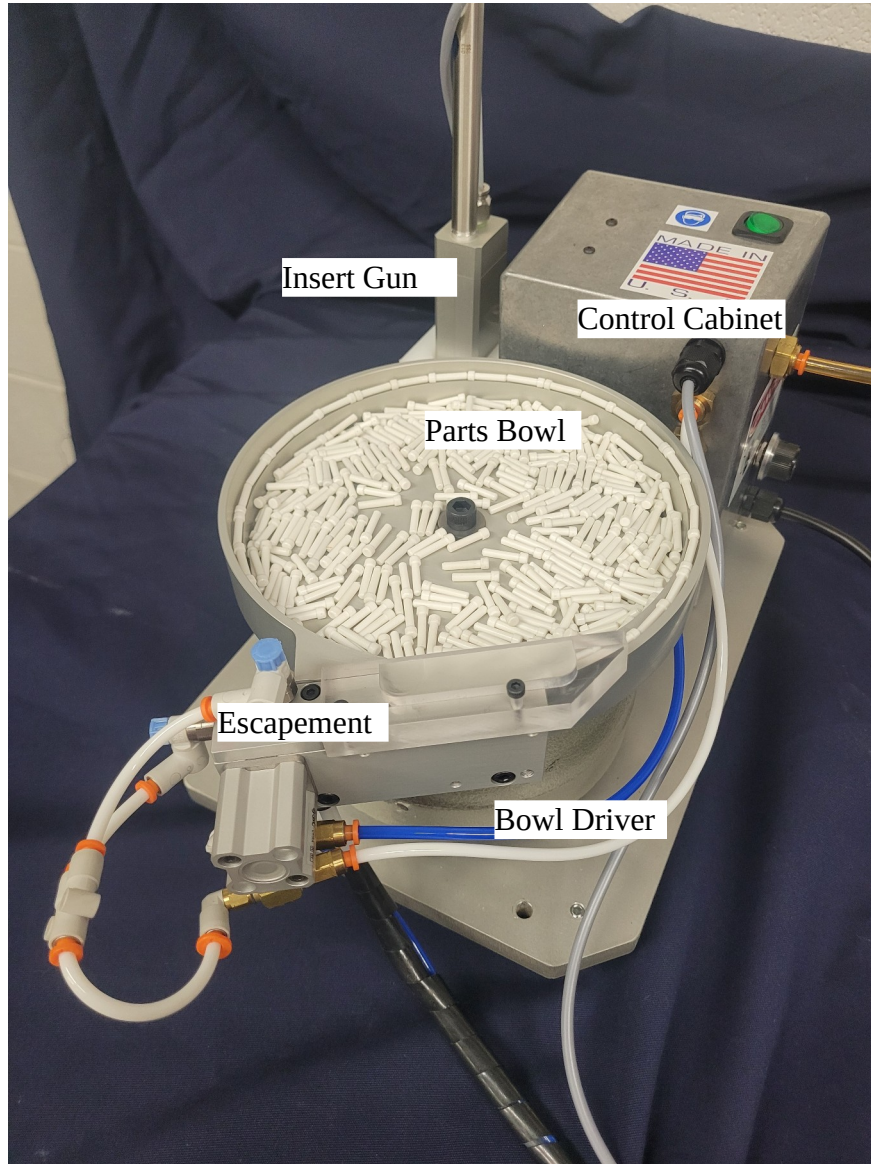
When reading this manual pay particular attention to DANGER, CAUTION, and NOTE statements. A DANGER is to inform you of possible hazards that could cause bodily injury, a CAUTION is to advise you of precautions to take to avoid damage to the machine, and a NOTE highlights special or important information.

**NOTE:** Each machine is shipped with a documentation package that should be retained for customer reference. The package includes electrical and pneumatic drawings of the machine along with this manual. For information beyond the scope of the documentation package, contact:

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Introduction:

The SPG-2 Seal plug insertion gun system consists of X main parts. The vibratory bowl system, seal plug escapement, insert gun, and control cabinet.



*Figure 1-Seal Plug Gun System*

Loose parts dumped into the bowl are fed up the bowl tracks into the escapement, which orients them into a magazine. This will be covered in more detail later in the manual.

Control Cabinet:

NOTE: NO OILER SHOULD BE USED ON THE INCOMING AIR TO THIS SYSTEM. Oil will prevent movement of seal plugs and can generate a slurry that may damage sealing surfaces.

The Control cabinet houses all electronics and pneumatics required to run the gun system. This cabinet should be plugged into a standard wall outlet and compressed air at ~80psi. When the power switch is set to the on position the bowl will begin vibrating and the system will be ready to use once the first part is seated in the escapement shuttle. Bowl Speed is set by the speed control knob, higher numbers indicate faster speed.

NOTE: If the bowl does not vibrate when the power switch is on and lit, check that the bowl speed has not been turned down too low to vibrate the bowl

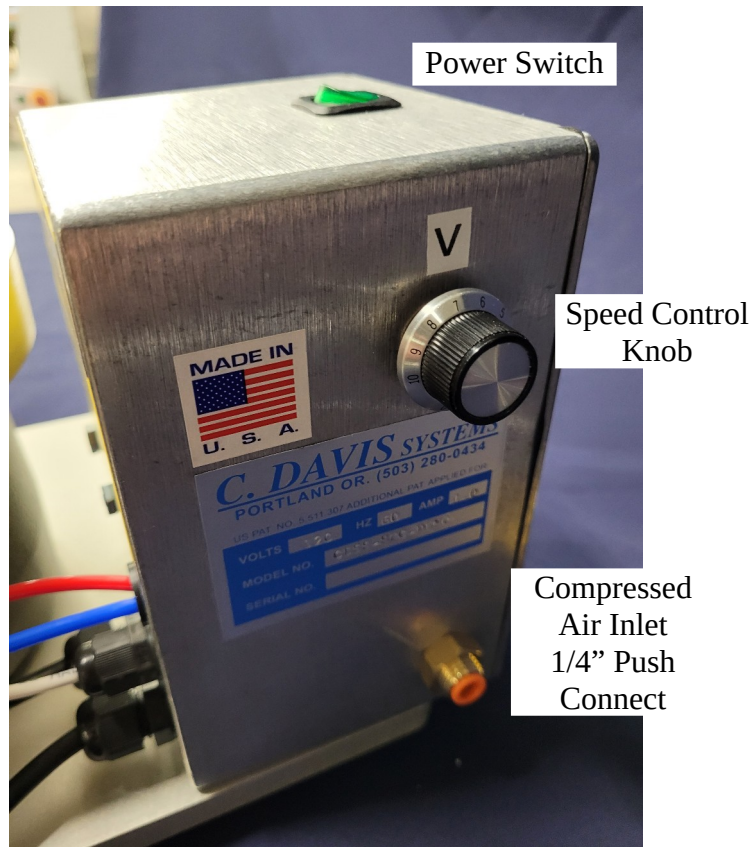


Figure 2: Control Cabinet

## Insert Gun:

NOTE: NO LUBRICANTS SHOULD BE USED IN OR ON THE INSERT GUN INCLUDING THE PUSH ROD. Lubricants will prevent movement of seal plugs

The insert gun contains all the parts necessary to deliver the plug to the connector and insert the plug to the required depth.

When the inserter tip is pressed onto the surface of the connector it moves back to close the safety switch. The gun will not fire until both the safety switch and button are depressed. When firing a part the insert rod retracts to allow the part through. When the button is released the rod pushes forward to push the insert to depth. Depth is controlled by the length of the plastic depth stop.

When disassembling only the four 10-32 screws need to be removed. Do not remove the 4-40 screw holding the handle on. When reassembling make sure to align the centering dowel pins with their respective holes.

The back of the Insert cylinder has a quick exhaust to allow the cylinder to retract quickly, and a flow restrictor to adjust the speed of the insert rod when it moves forward. Turning the flow restrictor clockwise will slow the rod down. Opening the flow restrictor will increase the rod speed.

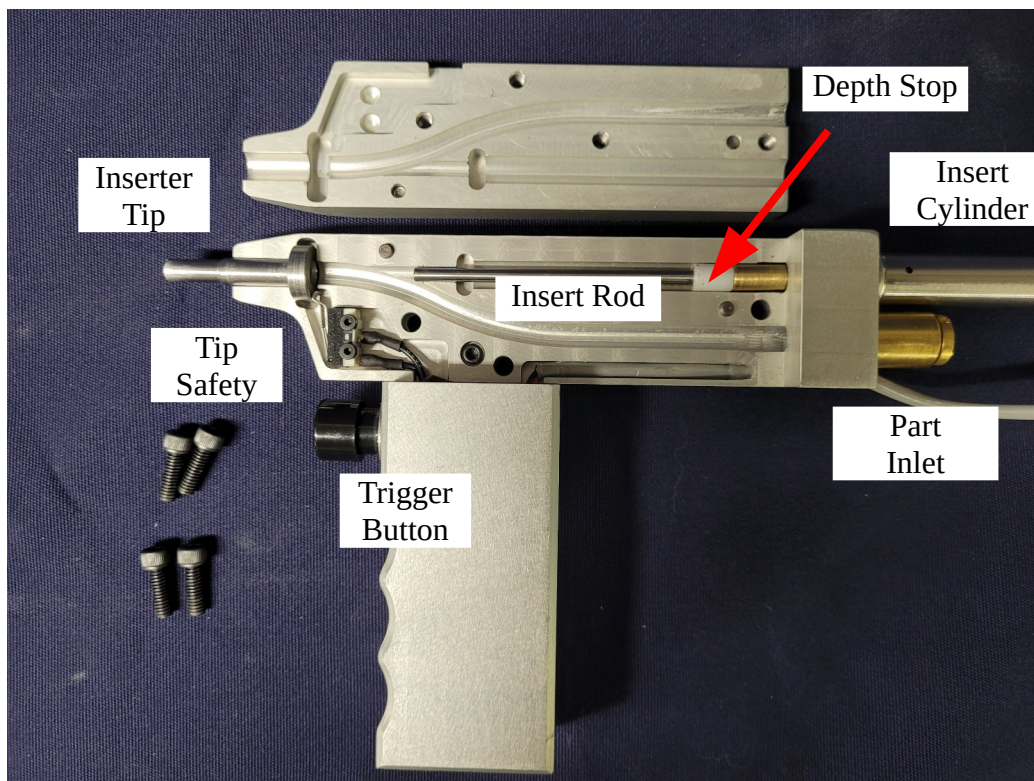


Figure 3: Insert Gun

Escapement:

NOTE: NO LUBRICANTS SHOULD BE USED IN OR ON ANY ESCAPEMENT PART INCLUDING THE SLIDING SHUTTLE. Lubricants will prevent movement of seal plugs and can generate a slurry that may damage sealing surfaces.

NOTE: NO METAL OR OTHER HARD TOOLS SHOULD BE USED IN THE ESCAPEMENT. The knife edges in the escapement are easily damaged and that damage will prevent running. If a part is jammed the escapement should either be disassembled or a soft tool (such as a plastic zip-tie) should be used to dislodge the part

The escapement orients and holds parts waiting to be fired. At the end of the escapement is a sliding steel shuttle that move the parts from the magazine to the blow section. Parts are fed by an air line that activates the shuttle cylinder and blows the part to the gun. The blow air is controlled by an adjustable flow restrictor. Turning the flow restrictor screw clockwise will decrease the blow air, counterclockwise will increase the air. The amount of air will affect both blowing the part off the shuttle and the speed/force with which the contact will arrive at the gun. Excessive blow air may damage the part blown. Once the desired air level is found, the jam nut may be tightened to lock the setting down.

Make sure the parts tube (and bowl) is oriented such that the tube is hanging off the base plate. Excessive bend on the tube may create feeding problems.

If reassembling the escapement, make sure the alignment dowel pins are through each half

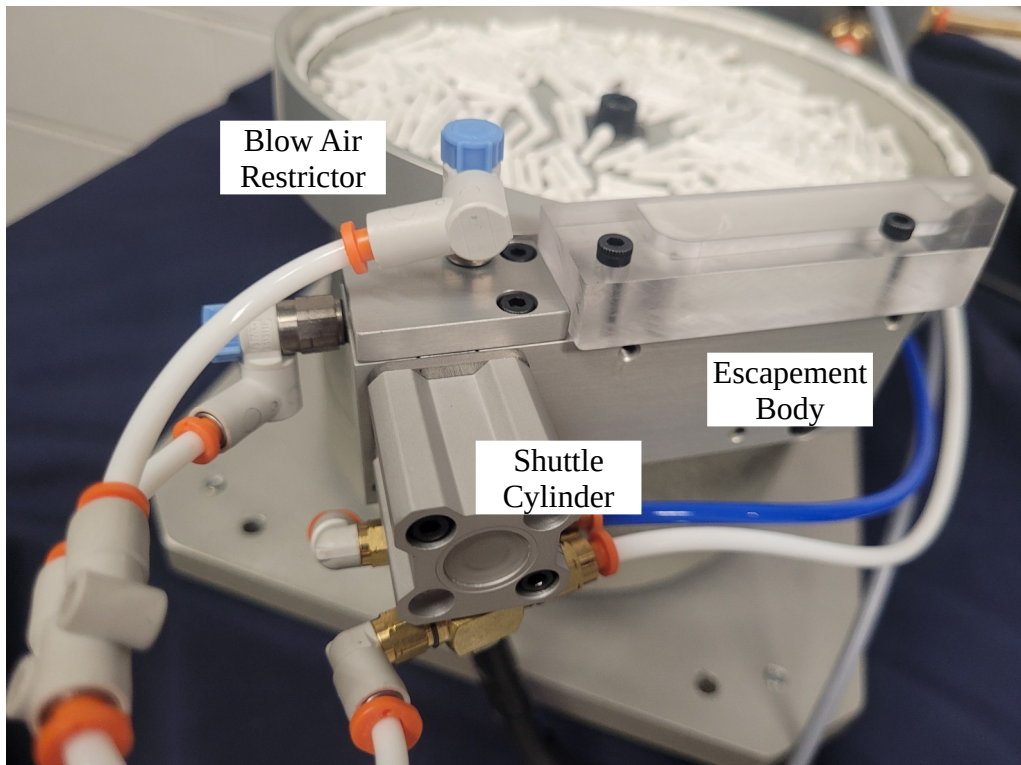


Figure 4: Parts Escapement

## Operation:

- 1) Turn system on and set bowl speed
- 2) Hold connector to insert parts into in one hand
- 3) Press insert gun tip LIGHTLY against surface of connector, over the cavity to be filled. Only enough force is needed to ensure the tip safety is pushed back. Make sure the gun is properly aligned over the cavity and is at a 90degree angle to the surface. (Remember we are pushing the part straight IN). Keep the tip pressed against the connector until the process is finished
- 4) Press and HOLD the trigger button. A part will feed to the tip of the gun. You should be able to see the part through the air relief hole in the tip and hear the blow air change pitch. If no part appears in 2 seconds, release the trigger, pause for one second, and press the trigger again
- 5) The part should now be at the connector cavity. Release the trigger button while holding the gun still. The blow air will turn off and the insert rod will move forward, pushing the plug into the cavity. Keep the gun pressed against the connector until the insert is finished
- 6) Remove the gun from the connector surface. If the plug did not insert fully into the connector it can quickly be pushed in by hand or with the tip of the gun.

Troubleshooting:

**System is on but bowl does not vibrate**

- 1) Check that the bowl knob is not turned down too far

**Gun does not activate when trigger pressed**

- 1) Make sure electric line from gun is connected to line from cabinet (twist connectors closed)
- 2) Press tip fully back into gun, you should hear a faint clicking sound as the safety tip switch closes
- 3) If the safety tip does not close with the tip fully back the safety switch may need to be moved slightly forward or the actuation lever may need to be bent to adjust

**Parts fire when tip not engaged**

- 1) Make sure there is no short in the safety switch line
- 2) If the safety tip does not open with the tip fully forward the switch may need to be moved slightly back or the actuation lever may need to be bent to adjust

Gun fires but plugs do not arrive at tip

- 1) Check blow air pressure. Pressure should be ~80psi
- 2) Adjust blow air restriction-Too little or too much air will not feed plugs
- 3) Make sure gun is not jammed. Open gun and check passages and parts inlet
- 4) Make sure escapement is not jammed. Open escapement and remove any jammed plugs. Be sure to check in parts outlet of escapement

**Seal plugs are coming out cut into pieces**

- 1) Make sure all parts tube are fully seated in their connectors. Tubes may seem connected but may not be fully seated. This creates shelves that can catch and break parts
- 2) Disassemble and clean shuttle system
- 3) Decrease blow air or insert rod air

**Parts do not fully seat into cavity**

- 1) Make sure air pressure to the system is ~80psi or higher
- 2) Turn the insert rod cylinder flow restrictor counterclockwise to increase rod speed

**Parts bounce out violently instead of inserting flush**

- 1) Make sure the inserter tip is properly over the cavity
- 2) Make sure the gun is at a 90 degree angle to the connector
- 3) Turn the insert rod cylinder flow restrictor clockwise to decrease rod speed

**Seal plugs jamming in tube**

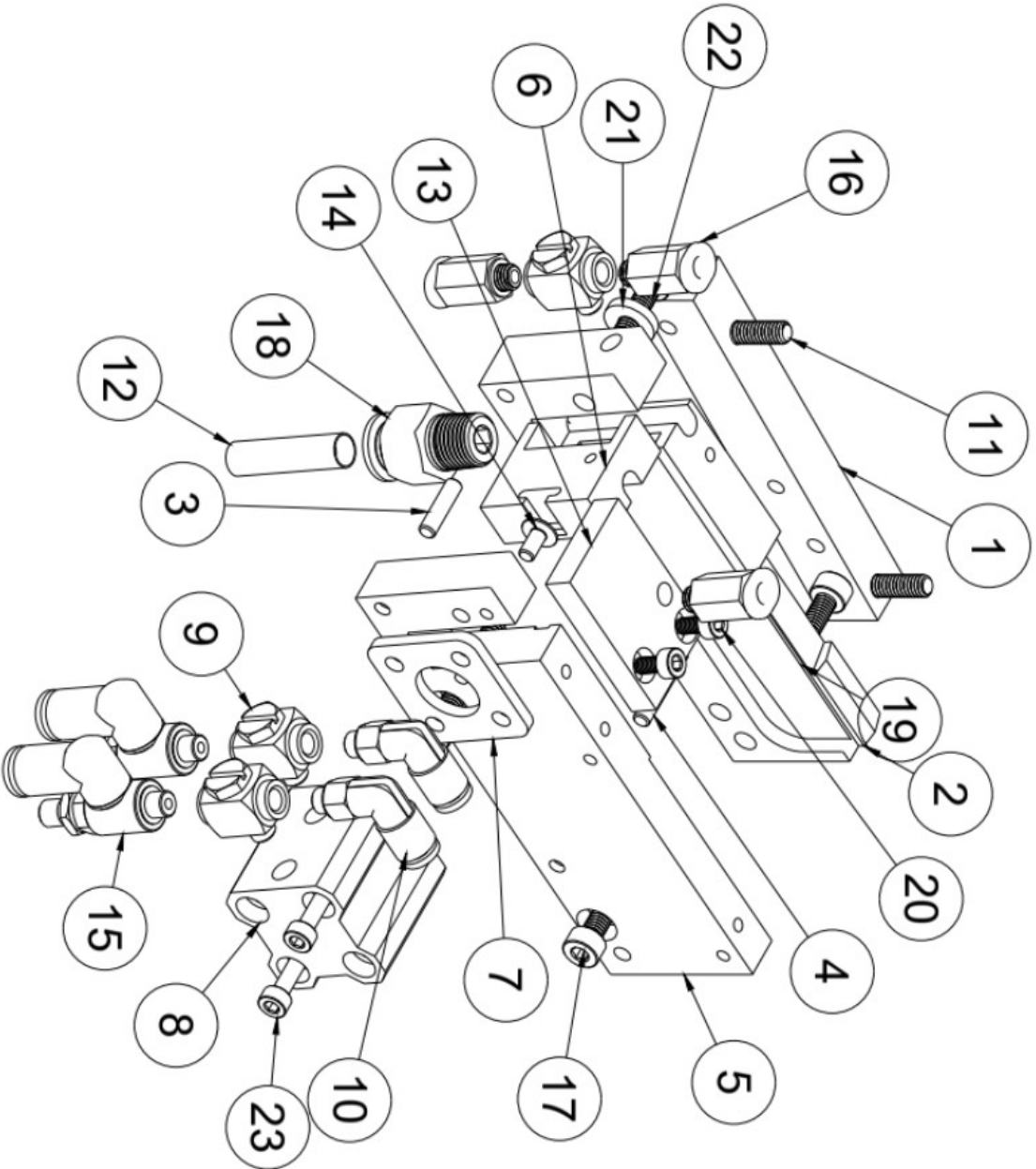
- 1) Make sure Part Tube is not kinked/obstructed and is oriented so that it goes over edge of plate
- 2) Turn up pressure on Part Tube Air Pressure Adjustment knob



### **Seal plugs blowing back out of shuttle**

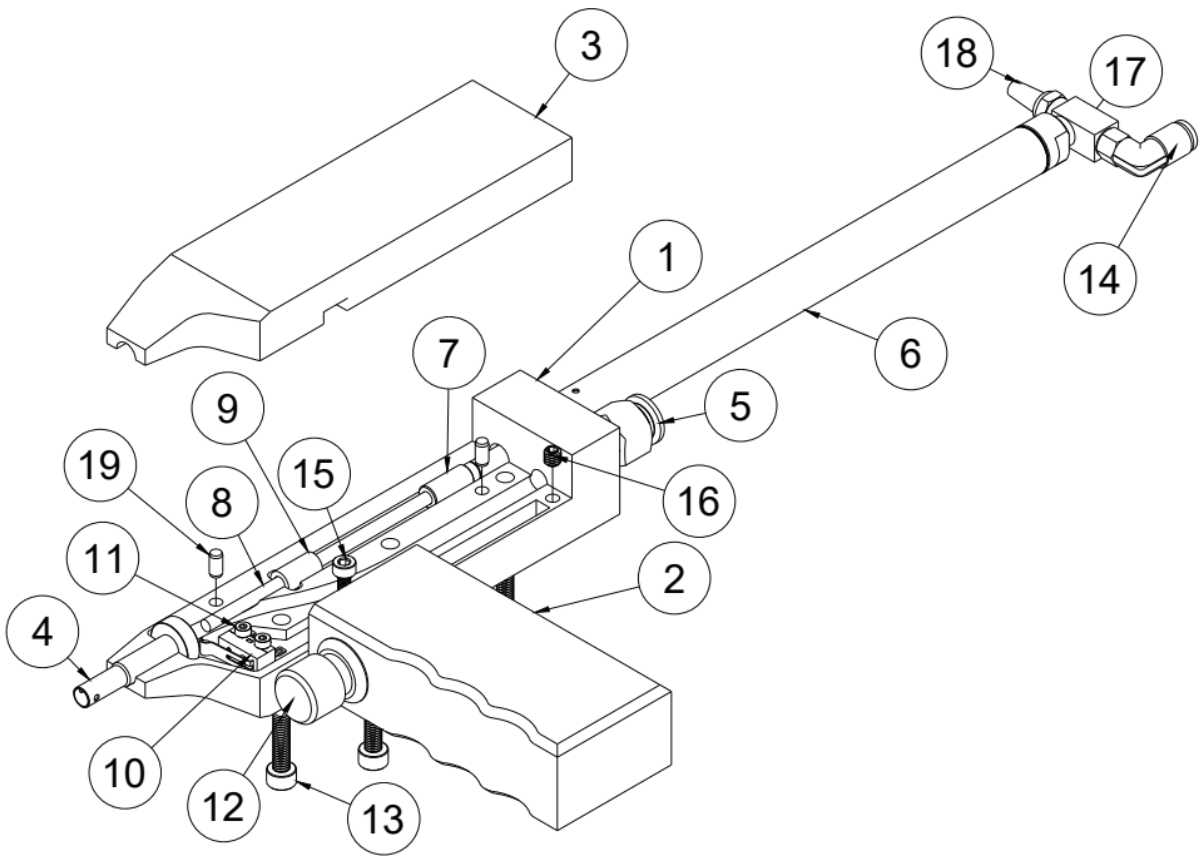
1) Turn down escapement flow restrictor

NOTE: Machine runs best when bowl has reasonable amount of seal plugs.  
Machine will not run until completely empty.



Escapement Exploded Diagram

ITEM	QTY	PART NUMBER	Description	Manufacturer	Manf PN or Note
1	1	CDS2M-00047-5-165M	Bowl Mount Block	C. Davis	
2	1	CDS2M-00050-1-114017-ZZ-AL	Slide for TE 114017-ZZ (Bowl Side)	C. Davis	
3	1	N/A	Dowel Pin 1/8Dx1/2L	McMaster	90145A471
4	1	N/A	Dowel Pin 1/8Dx1.5L	McMaster	90145A475
5	1	CDS2M-00050-2-114017-ZZ-AL	Slide for TE 114017-ZZ (Front)	C. Davis	
6	1	CDS2M-00050-4-114017-ZZ	Shuttle for TE 114017-ZZ	C. Davis	
7	1	CDS2M-00051-12	Spacer for 12MM CQ2 Cylinder	C. Davis	
8	1	CDS2P-00068-12-10D	Pneumatic Cylinder 12mm Double Acting	SMC	CQ2B12-10D
9	3	CDS2P-00004-10/32	Adjustable "T" Fitting 10- 32	Clippard	15002-6
10	2	CDS2P-00020-5/32	Push Connect 90 5/32x10/32	SMC	KQ2L03-32A1
11	2	N/A	SHCS 8-32x3/4	McMaster	91251A197
12	1	N/A	60 deg Chamfered Parts tube .250ODx.035ID-6 Feet	Parker-Watts	NNR-4-035
13	1	CDS2M-00050-3-114017-ZZ	Top Cap for TE 114017-ZZ	McMaster	
14	1	N/A	Flanged Button Head Screw M3-0.05x6	McMaster	92137A683
15	2	CDS2P-00019-90	Flow Restrictor 5/32 Tube 10/32	SMC	AS1311F-U10/32-03A
16	3	CDS2P-00016-5/32	Push Connect Fitting 5/32x10/32 Hex	SMC	KQ2H03-32A1
17	2	N/A	SHCS M4-0.7x25	McMaster	91290A176
18	1	CDS2M-00053	Modified ¼ Tube Clamp	C. Davis	Modified 7610N115
19	1	N/A	SHCS M4-0.7x16	McMaster	91290A154
20	2	N/A	SHCS M3-0.5x6	McMaster	91290A111
21	1	N/A	Black-Oxide Steel Oversized Washer	McMaster	98035A102
22	1	N/A	SHCS M4-0.7x20	McMaster	91290A168
23	2	N/A	SHCS M3x0.5x30	McMaster	91290A130



Gun Exploded Diagram

ITEM	QTY	PART NUMBER	DESCRIPTION	Manufacturer	Manf PN or Note
1	1	CDS2M-00052-1-114017-ZZ	Seal Plug Gun-Main Body	C. Davis	
2	1	CDS2M-00052-3-114017-ZZ	Seal Plug Gun-Handle	C. Davis	
3	1	CDS2M-00052-2-114017-ZZ	Seal Plug Gun-Top	C. Davis	
4	1	CDS2M-00052-4-114017-ZZ	Seal Plug Gun-Tip	C. Davis	
5	1	CDS2M-00053	Modified ¼ Tube Clamp	C. Davis	Modified 7610N115
6	1	N/A	Spring Retract Cylinder	Bimba	013
7	1	CDS2M-00049-1032-1285	Core Pin Coupler	C. Davis	
8	1	CDS2M-00055	Core Pin Insert Rod	C. Davis	
9	1	CDS2M-00054-125-0.44	Core Pin Depth Stop	C. Davis	0.44" Spacer
10	1	N/A	SPDT Limit Switch	E-Switch	SS0750302F035S1A
11	2	N/A	SHCS M2-0.4x10	McMaster	91290A017
12	1	N/A	Seal Plug Gun Trigger Button	E-Switch	PV5H24011
13	4	N/A	SHCS M4×0.7-16	McMaster	91290A154
14	1	N/A	Push Connect 90 5/32x10/32	SMC	KQ2L03-32A1
15	1	N/A	SHCS M3-0.5x8	McMaster	91290A113
16	1	N/A	FTSS M4×0.7-4	McMaster	92605A110
17	1	N/A	Mini Quick Exhaust 10-32	Clippard	MEV-2
18	1	N/A	Exhaust Muffler 10-32	Clippard	11130-N
19	2	N/A	Dowel Pin 1/8Dx1/4L	McMaster	90145A469