



MODEL: LC MACHINE: LC-AFM8-Zig-Zag
OPERATIONS MANUAL

This manual provides the information required for operation and basic maintenance of C Davis Systems & Software, LLC's "Low Cost" LC Machine, our economy model for bench top electrical contact crimping. Information includes: description, receiving inspection and installation, machine operation, preventive maintenance, adjustments, and repair and replacement parts lists.

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:

C. Davis Systems & Software, LLC
725 SE Lincoln St.
Portland, OR 97214
(503) 280-0434

1.0 SAFETY

1.1 EMERGENCY

Unplug Machine at Source and Disconnect Air.

1.2 Know Your Machine

Read the manual carefully and learn the applications, limitations and hazards.

1.3 Power Supply

ONLY plug the Crimper Station power cord into a 110-120 VAC power source and an air supply with a range of 100-120 PSI.

1.4 Keep Guards in Place

1.5 Wear Safety Goggles

During the operation of the LC Machine.

1.6 Keep Work Area Clean

1.7 Avoid Dangerous Environments

Do not operate machine in damp or wet locations and keep work area well lit.

1.8 Keep Visitors Away from Work Area

1.9 Do Not Abuse Cords

Never pull machine by power cord and air lines. Keep them away from heat, oil and sharp edges.

1.10 Disconnect Machine

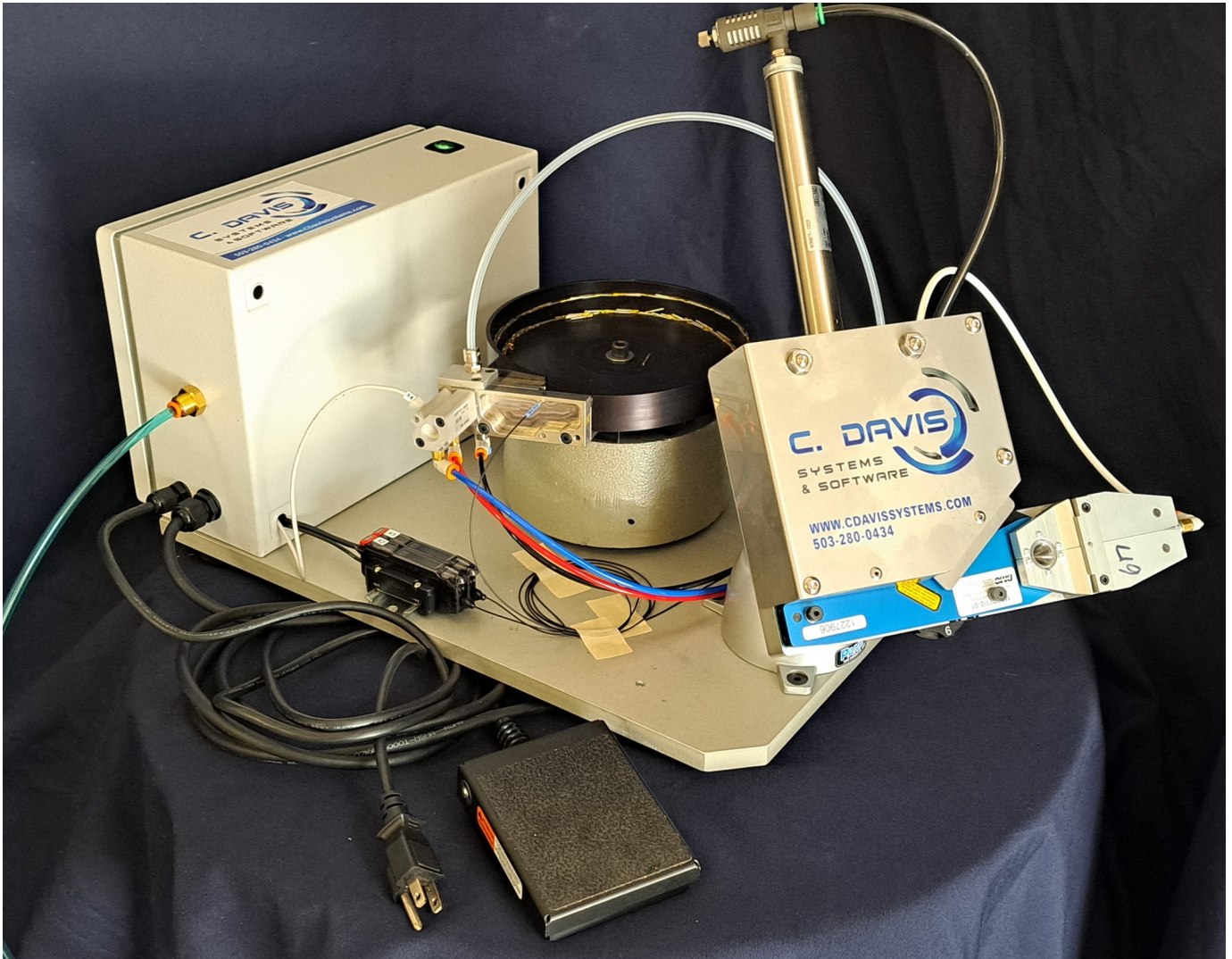
Disconnect Machine when not in use, before servicing and before troubleshooting.

1.11 Remove Tools

After maintenance or servicing, check the area for tools left in or on the machine.

1.12 Sharp Objects

Sharp Objects should not be used in the bowls or parts escapements as they can scratch the bowls' surface and restrict proper contact movement. Sharp tools can easily damage escapements beyond repair. Damage due to tool use is not covered by warranty.



[picture: 2023 LC Machine in standard configuration with Bowl Mounted Slide Escapement and Crimp Head built around the DMC AFM8 MILSPEC Crimp Tool.]

2.0 SYSTEM DESCRIPTION

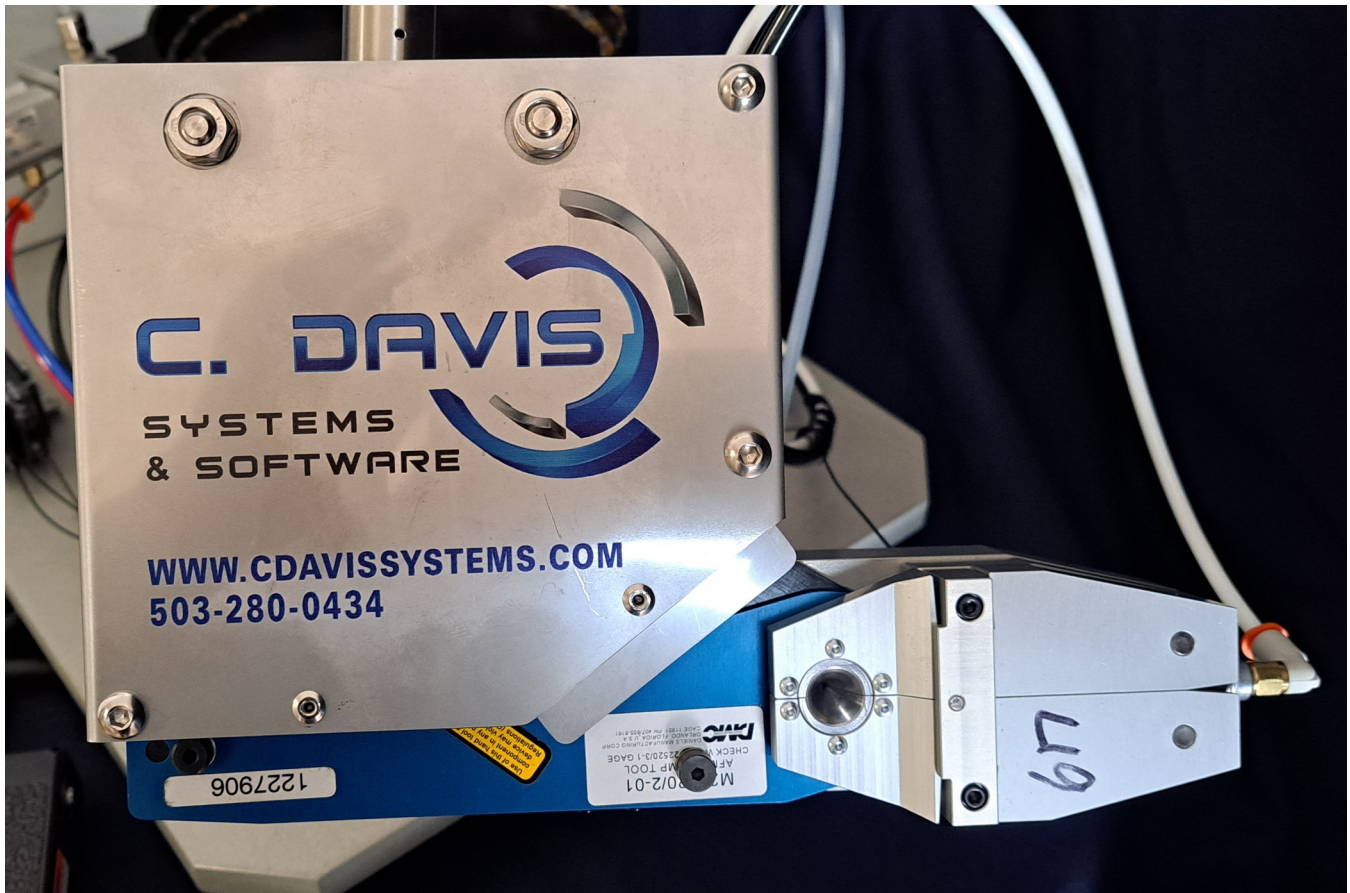
LC MACHINE:

Model # LC-AFM8-Zig-Zag

All standard configuration current generation LC wire termination machines have 3 basic assemblies mounted onto a single baseplate: 1) the Crimp Head Assembly 2) The Escapement Assembly, and 3) The Control Cabinet. The physical footprint of the LC Wire Termination Machine is approximately 19" deep and 12" wide.

For operation, the machine requires a constant air supply of clear dry air at 100 to 120 psi with adequate volume (3.5 cfm), as well as 110 AC.

This clean dry air needs to be regulated to the PSI required by the specific machine, which is noted on the Control Cabinet above the air inlet port and on the Pneumatic Diagram for that machine.



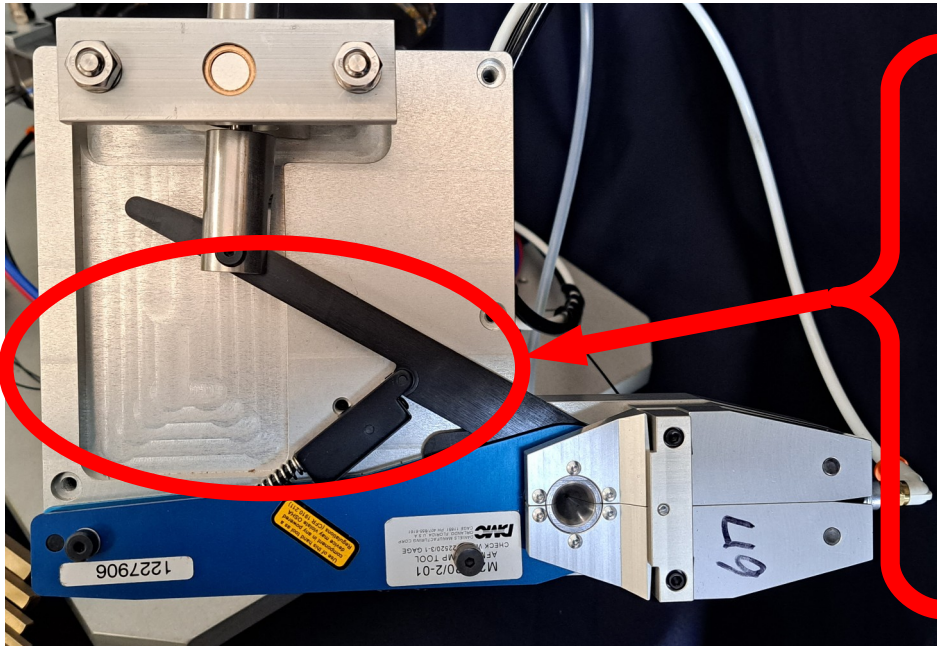
[picture: Crimp Head]

2.1 Crimp Head Assembly

The Crimp Head (Assembly Drawing 3) consists of a heavy machined aluminum plate (the Crimp Head Plate) with 3 sub-assemblies mounted thereon: the Funnel Jaws (Assembly Drawing 6) , 2) the Crimp Tool (Assembly Drawing 4) , and the Crimp Cylinder (Assembly Drawing 5).

The Crimphead receives the electrical contact which is fed via air pressure down the parts tube from the Escapement. When the part arrives, it is detected by a fiber optic sensor in the crimp head, and the crimp cylinder actuates with low pressure air to 'grip' the contact and hold it in place for wire insertion. After inserting the wire into the wire barrel of the contact via the funnels, the operator depresses the foot switch. The LC Machine first opens the funnels allowing the wire to fully insert into the wire barrel, and then crimps the contact with full air pressure, the funnels remain open until the foot pedal is released and the fiber optic no longer detects a contact in the crimper, at which point the machine closes the funnels and sends another part to the crimphead.

The Crimp Head is fitted with a rugged stainless steel protective Cover which should always be in place during regular use to insure that operators are unable to get their fingers or anything else caught in the mechanism. During the crimp cycle of the LC-AFM8-Zig-Zag the Crimp Cylinder articulates the handle of the Crimp Tool with enough force to badly injure an operator if they were to get their fingers or other body parts caught in the mechanism which can be actuated accidentally by the foot switch.



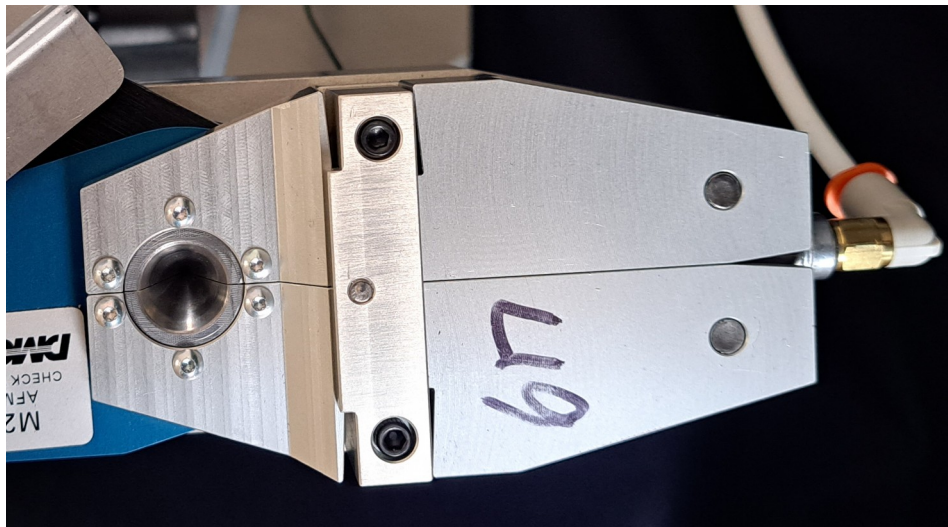
DANGER ZONE:

fingers or other body parts caught here will **SEVERELY INJURED** if crimp tool is actuated!

LEAVE PROTECTIVE COVER IN PLACE WHEN OPERATING THIS MACHINE

[picture: Crimp Head with protective Cover removed]

SAFETY WARNING: The LC-AFM8-Zig-Zag should always be operated with the protective Cover in place. Only remove the protective cover for service and maintenance, and disconnect the machine from air and power when doing so.



[picture: Funnel Jaw Assembly]

2.1.1 Funnel Jaw Assembly

The Funnel Jaws (Assembly Drawing 6) sits on the front face of the Crimp Head Assembly and consists of 2 pivoting split jaws (Assembly Drawing 6, Part No. 2) mounted on a base (Assembly Drawing 6, Part No. 1) with removable steel funnels (Assembly Drawing 6, Part No. 4) that guide the wire into the contact. After the wire is crimped the jaws are opened with a small air cylinder (Assembly Drawing 6, Part No. 6) to allow the wire with newly crimped contact to be removed. The funnel jaw guide (Assembly Drawing 6, Part No. 3) retains the jaws to the base, and allows adjustment and alignment of the Funnels to the Positioner via the three screws which hold it to the heavy plate that forms the body of the Compact Crimp Crimphead assembly.



[picture: Crimp Tool Assembly mounted on Crimp Head]

2.1.2 Crimp Tool Assembly (Assembly Drawing 4)

CDSS Crimp Machines automate the use of hand crimp tools to preserve the MILSPEC or other certification of individual tools. The LC-AFM8-Zig-Zag features Crimp Heads built around the DMC AFM8 Crimp Tool.

The DMC AFM8 Crimp Tool is modified slightly to allow it to interface with the CDSS funnels. The CDSS Positioner Body and Positioner is mounted to the tool in place of the DMC positioner, and the setting knob has an extension and auxiliary knob (Assembly Drawing 4, Part No.s 3 and 4) mounted to enable change of crimp settings without removing tool from Crimp Head.

NOTE: CDSS MODIFICATIONS TO THE DMC AFM8 CRIMP TOOL ARE MINIMAL: The indenters, cams, ratchet and crimp depth adjuster, etc are untouched -- the DMC AFM8 Crimp Tool as used in a CDSS machine will preform an identical crimp to the standard tool, and should be calibrated and maintained in an identical manner to a DMC AFM8 standard tool.

Additional tips and tricks for crimp tool maintenance can be found at www.cdavissystems.com

2.1.2.1 Contact Positioner

One of the most important components in the LC-AFM8-Zig-Zag for insuring a good in-spec crimp is the Contact Positioner (Assembly Drawing 4, Part No. 5), which is inside the Crimper Assembly -- it is oriented and located by the Positioner Body (Assembly Drawing 4, Part No. 2) which is mounted directly to the back of the Crimp Tool. The CDSS Contact Positioner extends through the Positioner Body and into the Crimp Tool -- when the Crimp Tool articulates to crimp a contact, the Crimp Tool's indenters pass through beveled slots in the tip of the Positioner. The Positioner insures that the contact will be centered in the indenters prior to gripping. The Positioner is made to close tolerances to insure correct crimp location: for some contacts it is a delicate part which should be handled carefully.

NOTE: the Contact Positioner is a precision part made to tight tolerances to insure proper crimp location, symmetry and Axial Concentricity (to meet Total Indicator Reading (TIR) and other requirements). **The Contact Positioner is a wear part** -- after high cycle counts and tens of

thousands of parts passing through the CDSS Positioner it will wear, enlarging the passage. The CDSS Positioner should be replaced when it exhibits wear or when crimp symmetry and/or Axial Concentricity are not longer in spec.

The Contact Positioner and Positioner Body have a 0.040" diameter cross-hole drilled to allow the Fiber Optic Sensor (Assembly Drawing 4, Part No. 18) light beam to reflect off the contact signaling to the PLC that a contact is in place and ready to be held in place for wire insertion. This cross hole is undersized so that the fiber unit can not enter the positioner. The fiber should always be installed as far forward to the positioner as possible.

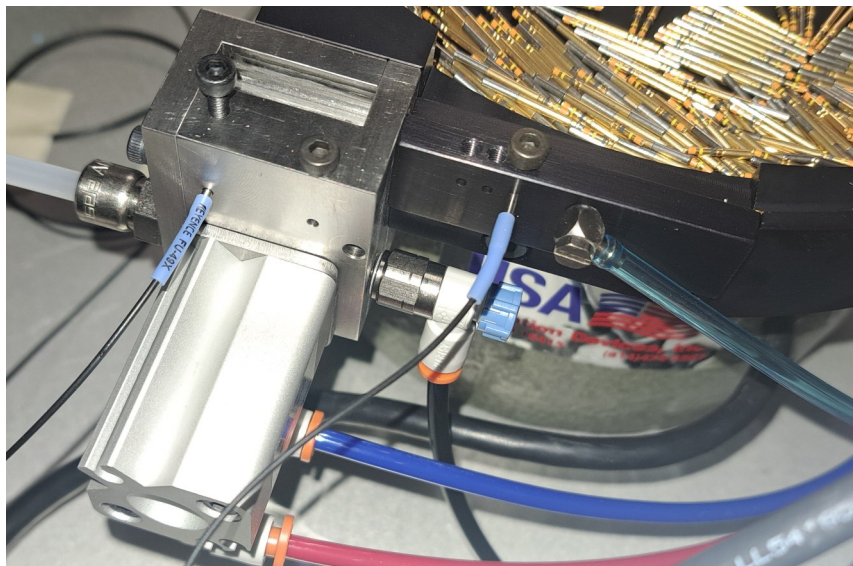
CAUTION

On some models the indentures may be protruding into the positioner. Be sure the crimper is fully open before removing.

2.1.3 Crimp Cylinder (Assembly Drawing 5, Part No. 3).

The crimp cylinder is the largest pneumatic cylinder on the LC-AFM8-Zig-Zag. It is attached via a clevis to the handle of the Crimp Tool. This cylinder performs both the low pressure Grip which holds the contact for wire insertion and the full pressure Crimp which completes the wire termination.

The pneumatic air lines are connected to the end of the cylinder via a quick exhaust with integral speed control (assembly Drawing 5, Part No. 4). The speed control can be adjusted via its knob to regulate the return of the cylinder after completion of the crimp -- this function is used to prevent the Crimp Tool from being slammed open by the force of the Crimp Cylinder's return spring. If adjusted improperly, the handle will return too slowly or not at all, interfering with the crimp cycle.



[picture: Zig-Zag Escapement]

2.2 Escapement Assembly

The Escapement Assembly (Assembly Drawing 1) consists a Bowl Driver with machined aluminum Parts Bowl mounted thereon, and Parts Escapement Sub-Assembly mounted onto or located adjacent to the Parts bowl. The LC-AFM8-Zig-Zag uses the CDSS Zig-Zag Escapement (Assembly Drawing 2)

The LC Escapement Assembly sits on the baseplate adjacent to to the electrical/pneumatic Control Cabinet and the Crimp Head. The standard parts bowl is eight inches in diameter, machined from a billet

of aluminum and with a single track. The bowls are driven by a powered Bowl Driver unit which is mounted to an aluminum base plate with rubber isolation feet and powered/modulated by a speed controller in the Control Cabinet.

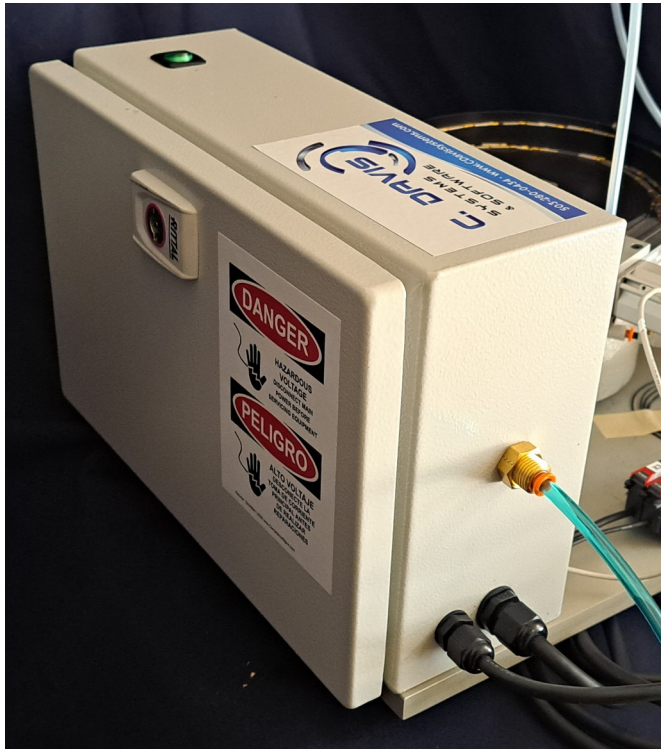
Escapements are the feeding and orienting mechanisms for the system. They move loose parts from the bowl, singulated, oriented and ultimately blow-fed individual contact parts to the Crimp Head via the Parts Tube. To enable reliable cycling and parts feeding, each electrical contact requires its own custom designed mechanism, which is custom tooled for each contact and cannot be used for any parts except for the contact it was designed to run.

WARNING: The Zig-Zag Escapement on the LC-AFM8-Zig-Zag is designed to run the specific parts quoted for the machine and should not be used for any other part.

USE OF INCORRECT PARTS MAY DAMAGE THE MACHINE. THIS TYPE OF DAMAGE IS NOT COVERED BY WARRANTY.

Contacts poured into the vibratory bowl are fed up the tracks of the bowl to the Zig-Zag Escapement's Orienter. When on the Orienter, a color detect fiber optic sensor determines whether the contact is pointing wire barrel or socket forward and returns the improperly oriented parts to the bowl. The correctly oriented parts are allowed to drop into the Zig-Zag magazine. They are then individually shuttled and blown to the Crimp Head assembly via the Parts Tube. The Zig-Zag escapement's Magazine has a second Fiber Optic Sensor mounted in to keep a steady supply of contacts in queue. When the sensor detects the escapement is full the feeder bowl will shut off, and/or the air gate will return contacts to the bowl. Part detection is indicated by the LED light on the fiber optic unit turning on.

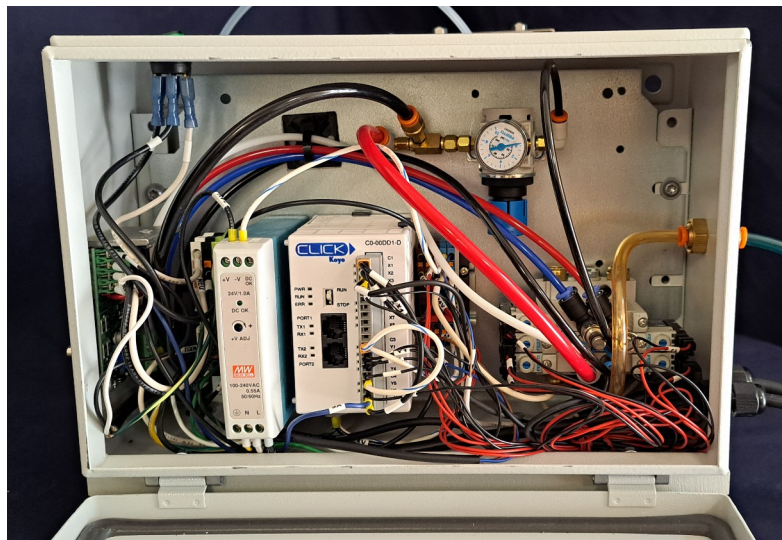
The force that the contact is blown down the parts tube to the Crimp Head can be adjusted by a pneumatic Speed Control (flow restricter) found on the bottom of the Zig-Zag Escapement (Assembly Drawing 2, Part No. 7). Excessive force can damage the contacts, whereas inadequate force will mean the part moves slowly to the Crimp Head resulting in a slow or incomplete cycle. If the air pressure is reduced enough, it will prevent the escapement from cycling and can cause a jam condition in the escapement. Once the desired air level is found, the adjustment knob should be locked to prevent the setting from being changed accidentally.



[picture: LC Machine Control Cabinet]

2.3 CONTROL CABINET

The electrical pneumatic Control Cabinet is mounted on the edge of the baseplate and it is connected to the other components of the machine as described above. External power (110 AC) and compressed air enters the machine at the cabinet on one side. The Foot pedal is likewise connected at that side. On the other side of the cabinet is the vibratory bowl speed control knob. Above that knob on top of the cabinet is the lighted power switch. The CDSS product tag with the Model Number and Serial Number of the machine is also located on the Control Cabinet.



[picture: Interior of standard LC Machine Control Cabinet]

Inside the cabinet are the various electrical and pneumatic components as per the Electrical and Pneumatic Diagrams provided with each machine.

3.0 INSTALLATION

3.1 Set-Up

- 3.1.0 The LC Machine ships fully assembled in a crate. It is secured to the bottom of the crate with double-ended rubber bumpers. To open the crate carefully pry back the metal tabs with a flat blade screwdriver or pry bar.

After opening the crate, unscrew the nuts from under the crate's plywood base and lift the LC Machine onto the floor. Unscrew the double ended bumpers from the LC Machine's Baseplate and replace with the provided Rubber Feet.

The provided crate (ULINE Part No. S-20435 for 1x LC or S-13372 for 2x LCs) and double ended bumper feet should be retained for future transport of the LC machine -- if opened carefully, the crate can be reused for safe machine storage and in the future to return the machine to CDSS for service.

- 3.1.1 After installing the provided rubber feet, place the LC Machine on a solid, level table or work bench. A soft or unstable work surface can dampen the vibratory feeder and prevent the parts bowls from properly feeding parts to the escapement mechanism.
- 3.1.2 The LC Machine requires one 110-120 VAC power source and an air supply with a range of 100-120 PSI. Hoses should be a minimum of 1/4" ID with 1/4" fittings.
- 3.1.3 The Standard Configuration LC Machine does not come with an Air Pressure Regulator, Air Filter or Moisture Filter. The End User must supply and place a regulator and filter assembly in-line to provide the LC Machine with Clean Dry Air regulated to the specifications listed on the Machine and noted in the machine's Pneumatics Diagram.
(CDSS will recommend and/or sell a suitable regulator/filter upon request)
- 3.1.4 Insure that the Funnels are still aligned with the Positioner and have not shifted during transport. This is critical as poorly aligned Funnels will not properly guide all wire strands into the contact prior to crimping.

4.0 SYSTEM OPERATION

4.1 Pre-Start Check List

- 4.1.1 Verify there is a 110-120 VAC power source and an air supply with a range of 100-120 PSI regulated to the specifications listed on the cabinet adjacent to the air intake port.
- 4.1.2 Load specified contacts in the bowl. Load contacts no higher than the lower lip near the escapement's cutout part return (approximately 3/4" from top). Overfilling will jam the bowl. The Contact Feeder assembly, positioner and Funnel Jaws are designed to accommodate only the contacts quoted on the machine document. Any attempt to use another type of contact will jam the Feeder mechanism and may cause permanent damage to it.

4.2 Start-Up Procedures

Turn the power switch on for the machine. The Power Switch should light up. If your LC Machine has been ordered with a Touch Screen PLC, the PLC should turn on and display the start screen.

The orientation and angle of the Crimp Head can be adjusted for the comfort of individual operators by loosening the knob on the Panavise and adjusting for rotation and angle. Be careful not to strain or tangle the pneumatic tubing, parts tube or fiber optic sensor when adjusting the Crimp Head.

4.3 Operation Description

Make sure that the Crimp Head Safety Guard is in place during regular operation.

NOTE: THE LC MACHINE WILL RUN WITHOUT THE CRIMP HEAD SAFETY GUARD to enable troubleshooting. For operator safety the LC Machine MUST be used with the guards in place during normal production.

During operation DO NOT insert anything other than wire into the funnels.

Operation Steps

- The bowl should fill the escapement and stop running when it is full.
- If there is currently no contact in the crimper, pressing and releasing the foot pedal will blow a contact to the crimper.
- When a contact is detected at the Crimp Head, the system will send low pressure air to the Crimp Head to grip the contact. The system is now ready for a wire to be inserted into the funnel.
- Insert a wire into the funnel. Ensure the wire has entered the contact and give gently pressure to the wire. Press and HOLD the foot pedal.
- The funnels will open briefly in order to allow the wire to fully enter the contact. This is necessary to accommodate thicker insulation, which might prevent the wire from entering fully with the funnels closed
- The pneumatic cylinder will then activate and cycle the crimper.
- When the crimper has fully opened the wire and contact should be removed. The funnels will remain open as long as the foot pedal is depressed or a contact is sensed at the crimp head.
- The system will cycle a new contact to the crimper and repeat the process.
- If the machine is to be left unattended for any time, perform a crimp and turn the machine off while holding down the foot pedal. If the machine sits for an extended period in the grip position the contact may be deformed or fall back into the parts tube.

If the machine does not sense that a contact has reached the crimper then pressing and releasing the foot pedal will attempt to send another contact. If for any reason a contact falls down the parts tube before or after crimping disconnect the tube at the head and remove the contact before proceeding.

CAUTION: FIRING MULTIPLE CONTACTS INTO THE TUBE MAY JAM PARTS IN THE TUBE REQUIRING REPLACEMENT OF THE TUBE

4.4 Shut-Down Procedure

Switch the Power button off on the electrical box. If the machine is to be dormant for an extended period of time, unplug the power cord and remove the air supply to prevent condensation in air lines.

4.5 Calibration Procedure

The crimper indenter spacing should be checked on the regular schedule for that hand tool. This test may be performed without removing the crimper from the machine. In order to perform the calibration

- Start with the machine OFF and NO contact in the crimper. Remove any existing contact before calibrating and power down the machine.
- Set the crimp selection wheel to the desired setting to calibrate
- While HOLDING the foot pedal DOWN, turn the machine ON and wait for the machine to power up.
- Release the foot pedal. The machine will softly close the crimper and then give full crimp air, closing the crimper fully
- The funnels will open, indicating that the crimper is ready for calibration
- Calibrate using go/no-go gauges as usual
- If a second calibration point is desired, **FIRST REMOVE GAUGE PIN FROM THE CRIMP HEAD**, then press and HOLD the foot pedal down. The funnels will close and the crimper will open.
- The next crimp setting may be selected with the wheel
- When the foot pedal is released the crimper will close and the funnels will open as before

5.0 Troubleshooting

DANGER: DO NOT open or clear the crimper without first shutting down electrical power and air.

<u>SYMPTOM</u>	<u>PROBABLE CAUSE</u>	<u>SOLUTION</u>
Contacts not feeding	Bowl is overfilled	Turn OFF machine, remove excess contacts and clear exit for proper shuttling.
	Dirty Sensor or Sensor out of Adjustment	Clean sensor by inserting a pipe cleaner. Or refer to Section 6.3 for sensor adjustment.
	Contact stuck in the feed tube	Turn OFF machine, shake feed tube to loosen contact.
	Air pressure for parts feeding set too low	Adjust speed control knob adjacent on escapement (adjacent to parts tube) to increase air pressure. Refer to section 2.2 Escapement Assembly.
	Feed tube obstruction	Remove & clean tube, and inspect shuttle at tube connection.
	Escapement jam	Refer to Maintenance Section 6.2.

Loss of air		Check air supply, hoses, air filter element, and air valve. Replace if needed.
Contact jammed in Crimper	Wire pushed in crimper before crimper was ready Loss of air pressure	Clear contact from crimper by cycling Check Air pressure and lines
Funnel does not open	Loss of air pressure	Check air supply hoses, air filter element and air valve. Replace, if needed.
After crimping contact, Funnels stay open and machine will not run.	Dirty Sensor or Sensor out of adjustment	Clean sensor by opening funnels and opening funnels and inserting a pipe cleaner. Or refer to Section 6.3 for sensor adjustment.
Bowl does not move contacts up to escapement	Bowl vibration is low	Bowl driver speed may need to be adjusted to factory setting. Or, Bowl mounting bolt not tight.
Contact do not feed all the way up the bowl to the Escapement	Bowl driver speed is too high	excessive bowl driver speeds can cause vibration strong enough for the contacts to bounce out of the track prior to making it to the escapement. reduce bowl speed to correct.
Contacts jamming in Zig-Zag Escapement	Incorrect parts placed into parts bowl	LC machines run only the part(s) that they are designed to run -- escapement are made with tight tolerances and will jam if the wrong parts are provisioned.
Contacts being fed backwards (socket end at crimper instead of wire barrel)	Bowl driver speed is too high	In some bowl mounted slide escapements, excessive bowl speeds may cause the occasional incorrectly oriented contact to get past the color detect without being returned to the bowl. Reduce bowl driver speed to the minim necessary to keep up with the operators crimping.
	Color detect is not correctly calibrated	Make certain that the color detect is properly calibrated and that the fiber is located in the correct position for the contacts being used. Refer to Maintenance Section 6.3 and 6.4.
Bowl vibration does not come on	Check Sensor	Check optical sensor to bowl driver controller
	Check Sensor	Check AC power to Bowl Driver controller, bowl driver controller speed control knob, and Bowl driver fuse. Fuse is located in electrical box on the bowl driver controller.

Ready light on but no contact in place	Sensor needs adjustment or cleaned	Refer to Section 6.3. Clean sensor by inserting a pipe cleaner.
	Air pressure too low	Check air pressure and grip air pressure.
Can't insert wire into contact in crimper/positioner	Funnel alignment to contact / positioner is off	Loosen the three screws in the back of press head (Section 6.1.5) and align funnels to contact.
	Grip Air pressure too low	Check air pressure (Section 6.1.4) and grip air pressure. The grip air pressure is in the control cabinet and must be set to lower the arm of the crimp tool but not crimp.

5.1 Troubleshooting Using Indicator Lights

The various electronic components used in the Standard LC Machine have LED indicator lights which are helpful for trouble shooting.



The KOYO PLC used in the standard configuration LC Machine has "Power" and "Run" lights to indicate that the PLC is on. Additionally, each input and output has an LED light. Using the machine's Electrical Diagram in conjunction with these LED lights can be useful to verify all components are working and to determine the source of an issue.

The FESTO pneumatic valves also have LED indicator lights on each valve showing when a valve has been actuated.

The 24V power supply and the RODIX vibratory bowl speed controller also have indicator lights of this type.

6.0 MAINTENANCE

6.1 Maintenance Procedures

**USE EXTREME CAUTION WHEN TESTING AND CALIBRATING ELECTRICAL AND PNEUMATIC DEVICES WHILE POWER IS ON.
HIGH VOLTAGE IS PRESENT WHEN CONTROL CABINET DOOR IS OPEN.**

6.1.1 The LC Machine requires CLEAN DRY AIR to operate properly.

This air needs to be set at the pressure indicated on the side of the cabinet for the machine to operate properly.

DO NOT USE AUTOMATIC OILERS ON THE LC MACHINE!

If your facility has automatic oilers in your compressed air system you must insure that there is a filter/moisture trap present inline prior to the air connected to the LC machine

Oil in the air line will deposit inside the escapement and parts tube. This oil will attract dust and gum up the escapement and feeding tube, resulting in poor running and jamming.

DO NOT USE AUTOMATIC OILERS ON THE LC MACHINE!

6.1.2 The Crimper should be inspected periodically to determine wear. Lubricate with Krytox, as required. Perform calibration at the usual interval for the crimper used.

6.1.3 Clean the bowls with water dampened cloth, as needed. The stainless steel escapements should be disassembled and cleaned using rubbing alcohol and non-linting swabs.

NEVER USE SHARP OBJECTS, ABRASIVES, OR STRONG CLEANING SOLUTIONS.

DO NOT LUBRICATE THE ESCAPEMENT!!!

The Escapement mechanism is designed to operate dry. lubrication will cause issues with part feeding and will cause jams.

DO NOT LUBRICATE THE ESCAPEMENT!!!

6.1.4 To set Grip Air pressure. There is a small pressure regulator in the control cabinet to set the grip air. The pressure must be adjusted with grip air on. The grip air feeds low pressure air to the crimp cylinder to push down the crimp arm. The pressure should be set so that the contact is held firmly by the crimp indenters without deforming the contact. If the contact is getting crimped at all, decrease the pressure of the regulator. If the contact is slipping back or not being held firmly, increase the pressure.

6.1.5 To set Funnel Alignment. The funnels must be aligned with the contact in the crimper. There are three screws in the back of the crimp head that hold the funnel mount in position. Loosen the three screws and align the funnels to the contact. You should not be able to see any part of the top of the contact through the funnels, any exposed brass may catch and bend a contact strand. Tighten the three screws moderately. Insert a wire a few time to ensure the alignment is correct, and finish tightening the screws.

6.2 Contact Sensor Adjustment

Fiber optic sensors should be placed as far forward as possible in order to get the best reflection of light. is located in a hole in the Positioner body. The sensor is retained in its hole by a screw or set screw. To move the sensor, the setscrew must be loosened.

CAUTION: OVER TIGHTENING THE SET SCREW MAY DESTROY THE FIBER

6.3 Adjusting Amplifier



[picture: KEYENCE Fiber Optic Sensor Amplifiers on LC Baseplate]

Locate the contact sensor amplifiers on the baseplate adjacent to the Control Cabinet. It has two sets of numbers on the front. The larger number is the current light count detected by the fiber and the smaller number on the inverted background is the setpoint. The setpoint is adjusted up or down with the rocker switch on front rocker switch to adjust the setting. For amplifiers set to light ON input will turn on when the detected count above the setpoint. When the input is on a red indicator light will also turn on.

With the contact removed the detected count should be below the setpoint and the red LED should be off. With the contact in front of the sensor the red LED should be on. Typical settings are between 1 and 4 thousand. You can push the rocker selector on the amplifier to move the green number up to a higher number so small debris or fluctuations do not set off the sensor while running. C-Davis systems can be contacted to assist you with this setting. If there are also amplifiers located in the electrical cabinet they are to be set in the same manor above.

All sensor amplifiers should be adjusted with and without a part in front of them and only while the mechanism is completely assembled.

6.4 Adjusting the Color Sensor Amplifier



[picture: KEYENCE Color Detect module mounted on the Control Cabinet of the LC-AFM8-56-348

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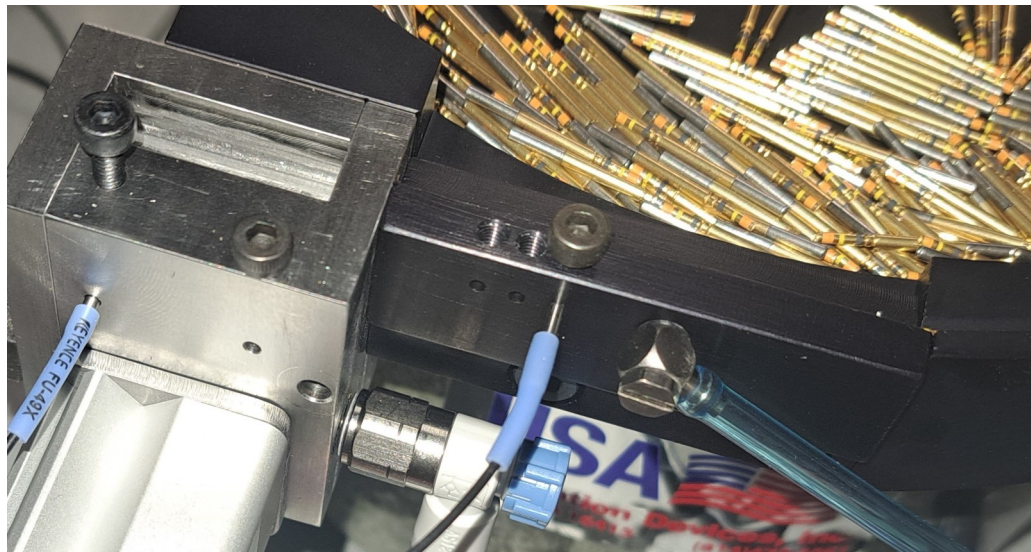


6.5 Adjusting the Fiber location for the Contact being used



[picture: various manufacturer's versions of the M39029/56-348. Note the wide variation in the length of the steel socket]

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[picture: multiple fiber locations on the orienter of the LC-AFM8-56-348]

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6.6 Replacing Parts Tube



The parts tubing for the machine is made of a material selected for reliable feeding and wear resistance. While it should last for many tens of thousands of cycles, it will eventually need to be replaced. Making a replacement tube is as easy as cutting the correct tubing to length and then putting a 45 or 60 degree chamfer on the end attached to the escapement. Usually both ends are chamfered so that the tube can't be put on backwards.

The machine specific notes sheet will list the description, manufacturer, part number, length, and any other information necessary to make the tube. The ends of the tube must be cut as square as possible for proper operation.

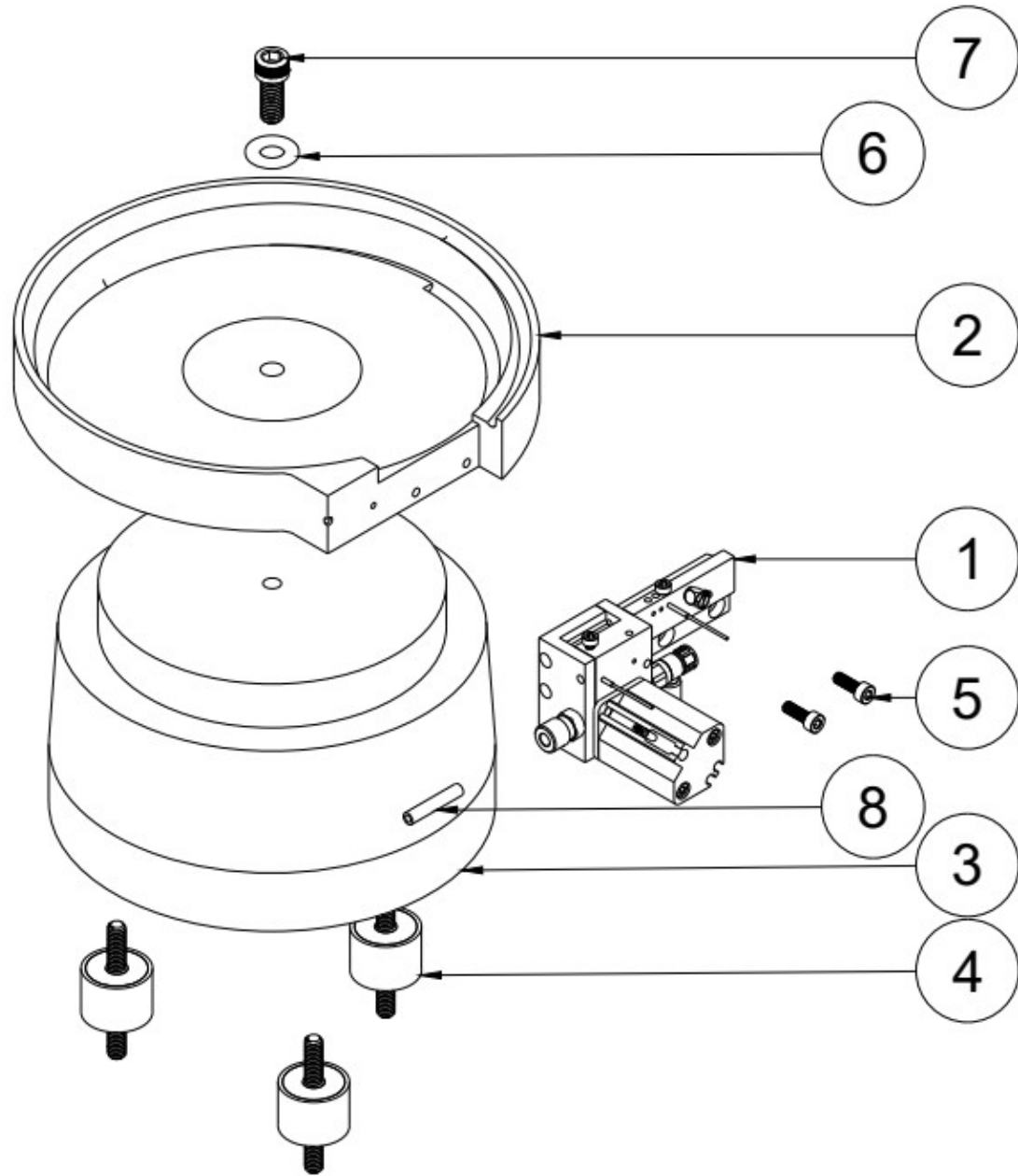
While the chamfered end does not need to be precise, we recommend the tube be chamfered with a single flute chamfer tool as this produces the cleanest cut. Make sure to remove any plastic chips from the tube before use.

Recommended chamfer tools are

45 degree-McMaster 2846A37

60 degree-McMaster 2846A22

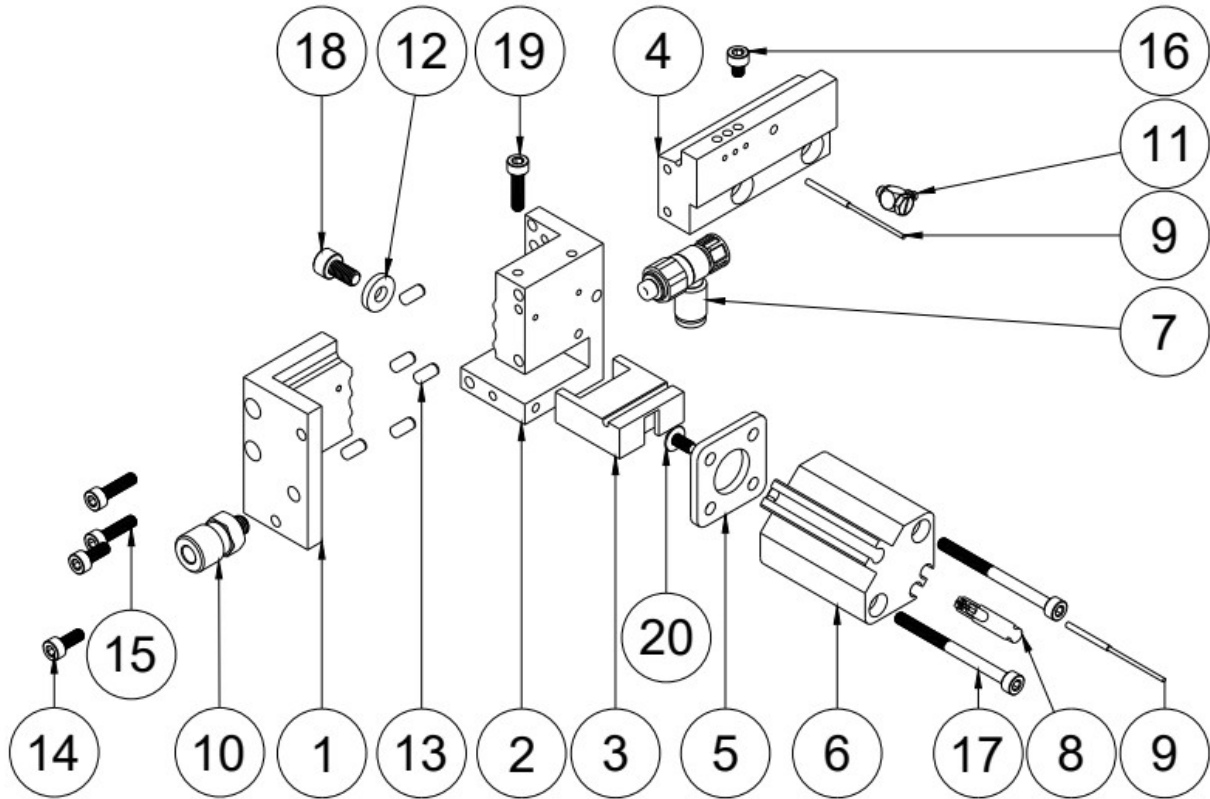
**ASSEMBLY 1:
Zig-Zag Escapement, Macro**



Bill of Materials: Assembly 1, Bowl Mounted Slide Escapement, Macro

Item	Description	Manufacturer	Part Number	Note
1	Zig-Zag Escapement Assembly		See Assembly Drawing 2	See Assembly Drawing 2
2	Parts Bowl	CDSS	CDS2M-00058-*	*Bowl is modified specific to escapement
3	Model 5 Bowl Driver	Automation Devices	Model 5*	*See Machine Specific BOM Sheet
4	Double ended rubber bowl driver mounts	McMaster	9376K29	
5	SHCS M4x0.7-12 mm	McMaster	91290A148	
6	Washer 5/16"	McMaster	92141A030	
7	SHCS 5/16-18x3/4"	McMaster	91251A581	
8	Parts tube Nylon Semi Rigid	*	*	*See Machine Specific BOM Sheet

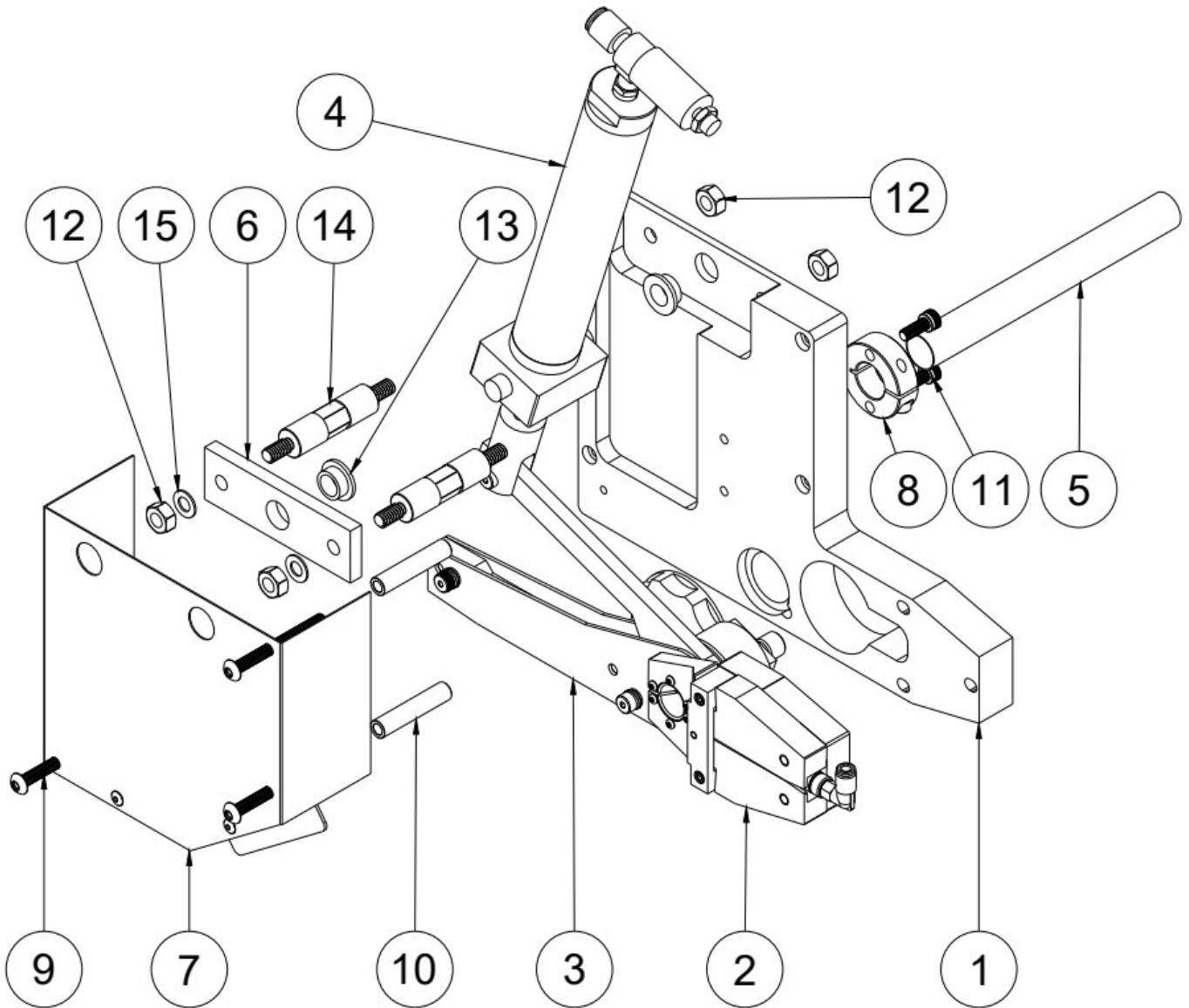
**ASSEMBLY 2:
Zig-Zag Escapement**



Bill of Materials: Assembly 2, Zig-Zag Escapement

Item	Description	Manufacturer	Manf. PN or Note	Note
1	Zig-Zag Assembly, Front	CDSS		*See Machine Specific BOM Sheet
2	Zig-Zag Assembly, Rear	CDSS		*See Machine Specific BOM Sheet
3	Shuttle	CDSS		*See Machine Specific BOM Sheet
4	Orienter	CDSS		*See Machine Specific BOM Sheet
5	Shuttle Cylinder Spacer	CDSS	CDS2M-00049-0625	
6	Shuttle Cylinder	SMC	CDQ2B12-10DZ	*CDQ2B12-10Z may be substituted if not using Sensor 8
7	speed control and pneumatic tubing quick connect	SMC	AS1211F-U1032-03A	
8	Inductive sensor for SMC cylinder	SMC	D-M9NV	*Not on all machines
9	Fiber-optic Sensor	Keyence	FU-49X	
10	Parts tube quick connect	*	*	*See Machine Specific BOM Sheet
11	Barb Elbow for Pneumatic Tube	SMC	M-3ALU-4	
12	Oversized M4 Washer	McMaster	98035A102	
13	Dowel Pin 1/8"x 1/4"	McMaster	98381A469	
14	SHCS M4x0.7mm-8mm	McMaster	91290A140	
15	SHCS M3x0.5mm-12mm	McMaster	91290A117	
16	SHCS M3x0.5mm-4mm	McMaster	91290A109	
17	SHCS M3x0.5mm-40mm	McMaster	91290A136	
18	SHCS M4x0.7mm-8mm	McMaster	91290A140	
19	SHCS M3x0.5mm-12mm	McMaster	91290A117	

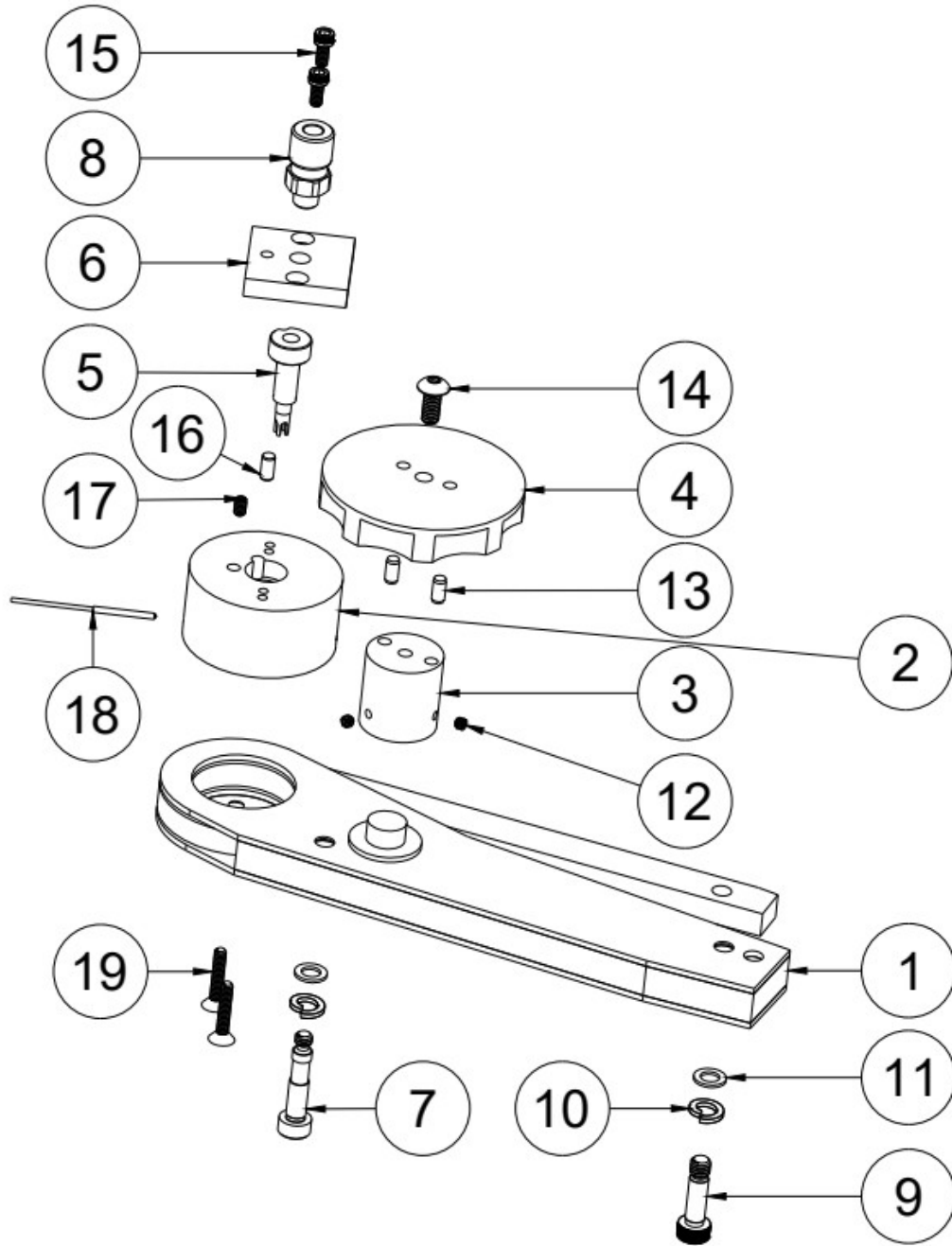
**ASSEMBLY 3:
AFM8 Crimp Head**



Bill of Materials: Assembly 3, AFM8 Crimp Head

Item	Description	Manufacturer	Part Number	Note
1	Crimp Head Plate	CDSS	CDS2M-00041-AFM8	
2	Funnel Jaws Assembly			See Assembly Drawing 6
3	DMC AMF8 Crimp Tool Assembly			See Assembly Drawing 4
4	Crimp Cylinder Assembly			See Assembly Drawing 5
5	Crimp Head Shaft	CDSS	CDS2M-00060	
6	Pivot Strap	CDSS	CDS2M-00041-R	
7	Crimp Head Cover, AFM8	CDSS	CDS2M-00059-AFM8	
8	Shaft Collar	Misumi	U-SCSM0.63-B0.44	Modified for #10 Clearance
9	SHCS 10-32x2"	McMaster	92949A275	
10	Aluminum #10 Unthreaded Spacer, 5/16" OD, 1-1/2"	McMaster	92510A571	
11	SHCS 10-32x1/2"	McMaster	91251A342	
12	Nut 1/4-20	McMaster	95462A029	
13	Oil-Embedded Flanged Sleeve Bearing 3/8" Shaftx1/4"	McMaster	1677K4	
14	Male Threaded Standoff	McMaster	94033A489	
15	Washer 1/4"-20	McMaster	90945A760	

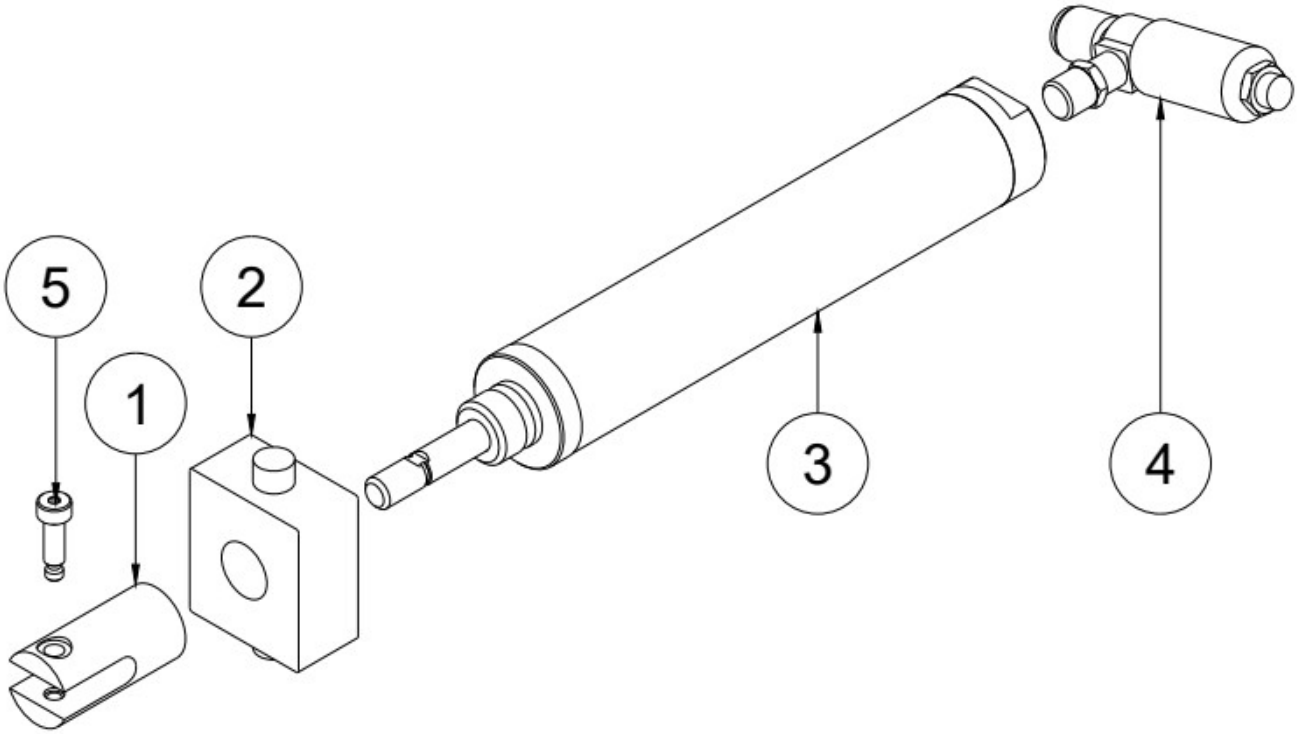
ASSEMBLY 4:
DMC AFM8 Crimp Tool



Bill of Materials: Assembly 4, DMC AFM8 Crimp Tool

Item	Description	Manufacturer	Manf. PN or Note	Note
1	DMC AFM8, Modified	CDSS	CDS2M-00004-AFM8	
2	Positioner Body	CDSS	CDS2M-00030-01S	
3	Selector Knob Shaft	CDSS	CDS2M-00056-1	
4	Selector Knob	CDSS	CDS2M-00056-2	
5	Positioner, AFM8	CDSS	CDS2M-00034-*	*See Machine Specific BOM Sheet
6	Back Cap, AFM8	CDSS	CDS2M-00030-SC-*	*See Machine Specific BOM Sheet
7	Crimper Mount Screw	CDSS	CDS2M-00004-AFM8-2	
8	Parts Tube Quick Connect	Eisele	*	*See Machine Specific BOM Sheet
9	Shoulder Bolt-3/16x, 1/2", 10-32 Thread	McMaster	91273A143	
10	#10 Lock Washer	McMaster	92146A550	
11	Shims for Shortening 3/16" Shoulder Bolt, 0.03" Thick	McMaster	94773A739	
12	Set Screw 4-40x3/32"	McMaster	92311A102	
13	Dowel Pin 1/8"x1/4"	McMaster	90145A469	
14	BHCS 8-32x3/8"	McMaster	97763A177	
15	SHCS 4-40x1/4"	McMaster	91251A106	
16	Dowel Pin 1/8"x1/4"	McMaster	98381A469	
17	Set Screw 4-40x3/16"	McMaster	91375A105	
18	Fiber-optic sensor	Keyence	FU-49X	
19	Torx FHCS, 4-40x5/8"	McMaster	94414A323	

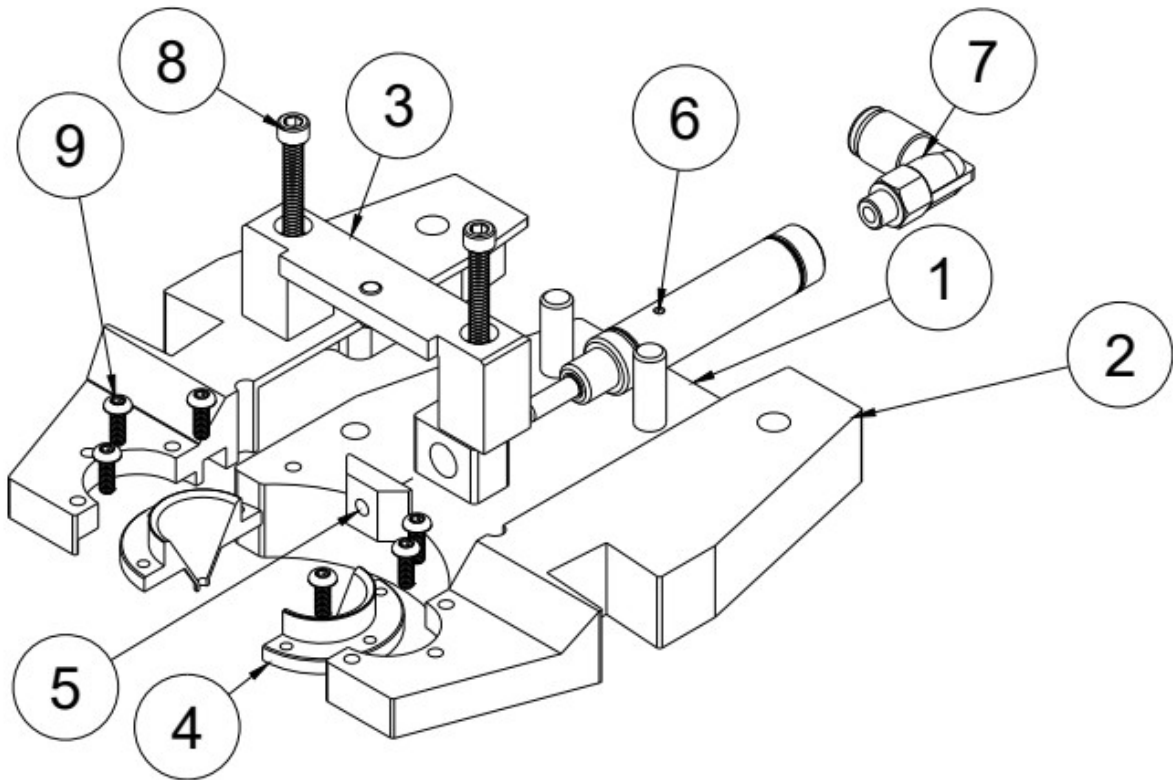
ASSEMBLY 5:
Crimp Cylinder



Bill of Materials: Assembly 5, Crimp Cylinder Assembly

Item	Description	Manufacturer	Manf. PN or Note	Note
1	Clevis	CDSS	CDS2M-00038-*	*See Machine Specific BOM Sheet
2	Pivot	CDSS	CDS2M-00021-*	*See Machine Specific BOM Sheet
3	Cylinder	*	*	*See Machine Specific BOM Sheet
4	Quick Exhaust with speed control and pneumatic tubing quick connect	SMC	ASV310F-01-06S	
5	Shoulder Bolt 3/16"x1/2", 8-32 Thread	McMaster	91259A166	

**ASSEMBLY 6:
Funnel Jaws**



Bill of Materials: Assembly 6, Funnel Jaws Assembly

Item	Description	Manufacturer	Part Number	Note
1	Funnel Jaws Base-0.51" Height	CDSS	CDS2M-00001-051	
2	Funnel Jaws (matched set, 2x parts)	CDSS	CDS2A-00002	
3	Funnel Jaw Retention Strap	CDSS	CDS2M-00003	
4	Funnels (matched set, 2x parts)	CDSS	CDS2M-00016-*	*See Machine Specific BOM Sheet
5	Funnel Jaw Separator Block	CDSS	CDS2M-00048	
6	Cylinder	Bimba	0070.5	
7	Pneumatic Tubing Quick Connect	SMC	KQ2L03-32A1	
8	SHCS 4-40x3/4"	McMaster	91251A113	
9	Torx BHCS 2-56x1/4"	McMaster	90910A682	