

1. INTRODUCTION

The OCEAN 2.0 Inverted Splice applicator includes a special double-acting pneumatic feeder. The applicator accepts end feed splice terminals and applies them to either pre-stripped wires and/or magnet wires in a pig-tail splice or through splice configuration.

**NOTE**

Dimensions in this instruction sheet are in metric units [with U.S. customary units in brackets]. Figures are not drawn to scale.

**NOTE**

This instruction sheet, the exploded-view drawing with the associated parts list packaged with the applicator, along with the applicable customer manual provide all the information required to operate and maintain the applicator and machine.

The following terminating machine customer manual applies:

409-10204 AMP 3K/40* CE Terminating Machines PN 2161400-[] and AMP 5K/40*, 5K/30* CE Terminating Machines PN 2161500-[]

**NOTE**

Refer to Instruction Sheet 408-35005 for translations of the Safety Warnings specified herein.

2. DESCRIPTION

2.1. Overview

1. Main components of the pig-tail splice and through splice air feed applicators are identified in Figures 1 and 2, respectively.
2. Each applicator is individually designed for specific splice terminals. The crimp height can be adjusted to accommodate different wire sizes.
3. The OCEAN 2.0 Inverted Splice applicator can only be used with a specially configured 5K/40* CE Terminating Machine (PN 2326540-[x]).
4. Though the Pig-Tail Splice and Through Splice applicators are different, most of the OCEAN 2.0 Inverted Splice applicator features and adjustments are the same.

The terminal strip must be fed into the applicator with the wire barrels turned upside-down, through the Strip Guide, passing the Drag and Feed Finger, and with the lead terminal positioned under the Anvil and Terminal Guides. The Feed Finger will feed one terminal during each cycle of the machine. The Ram Post (also referred to as the Ram Mounting Post) will engage the Post Adapter of the Press Ram, and the Press Ram will actuate the applicator.

The Wire Crimp Disc is located just below the ram post interface, which is designed with a spring-loaded adjustment mechanism for precise crimp height adjustment in increments of 0.01 mm [.0004 IN]; with a total adjustment range of 1.45mm [.057 IN]. By rotating the Wire Crimp Disc, the ram interface raises and lowers relative to the applicator housing. The indicator notch of the ram points to the numbers on the outer diameter of the Wire Crimp Disc, indicating a relative crimp height.

The ram tooling, including the anvil and terminal guides, are mounted to the applicator ram in a preset position. The applicator mounting surface is the base plate. The Crimper, Strip Guide Plate, and applicator housing are mounted on the base plate. The Drag, Strip Guide, and Air Feed are mounted on the Strip Guide Plate.

Pig-Tail Splice Applicator

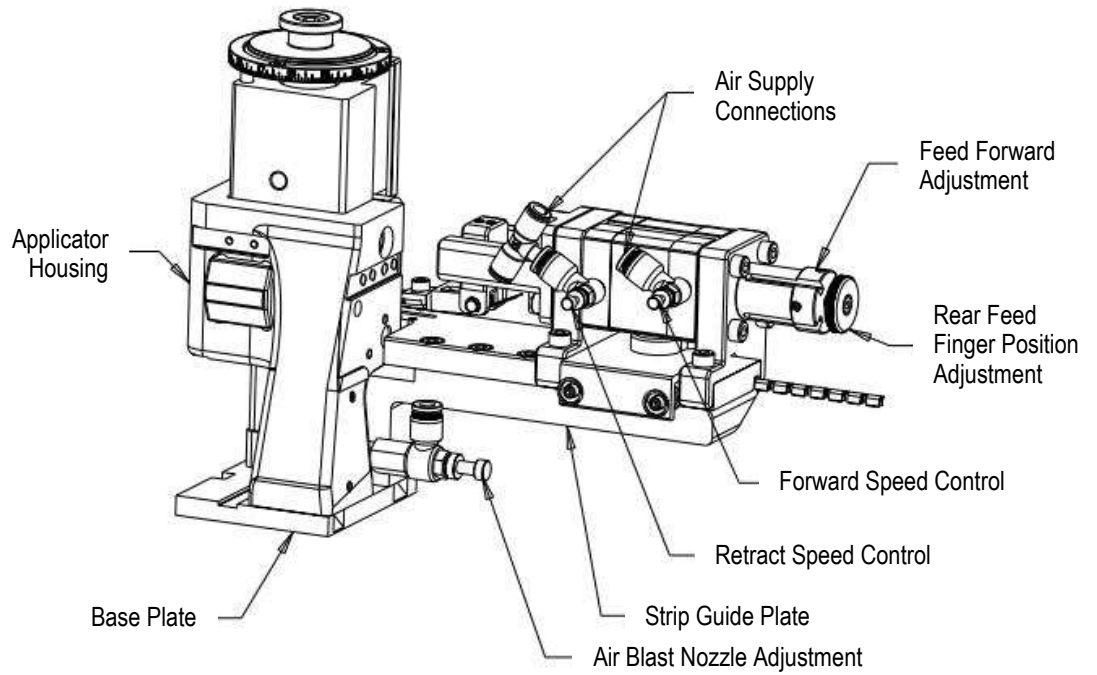
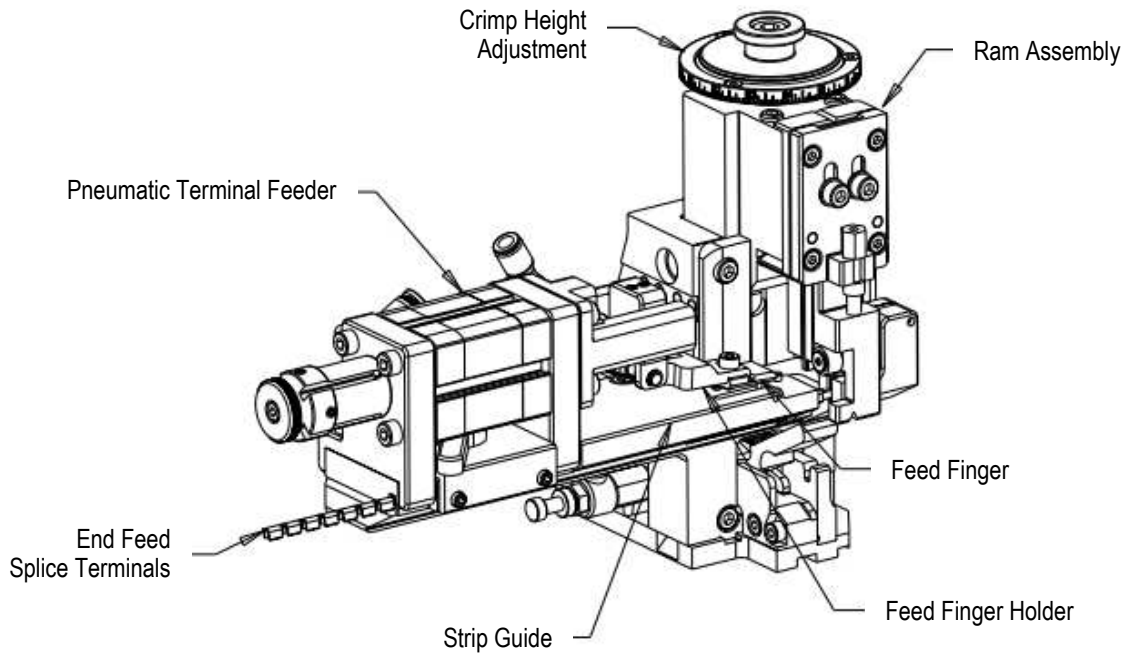


Figure 1

Through Splice Applicator

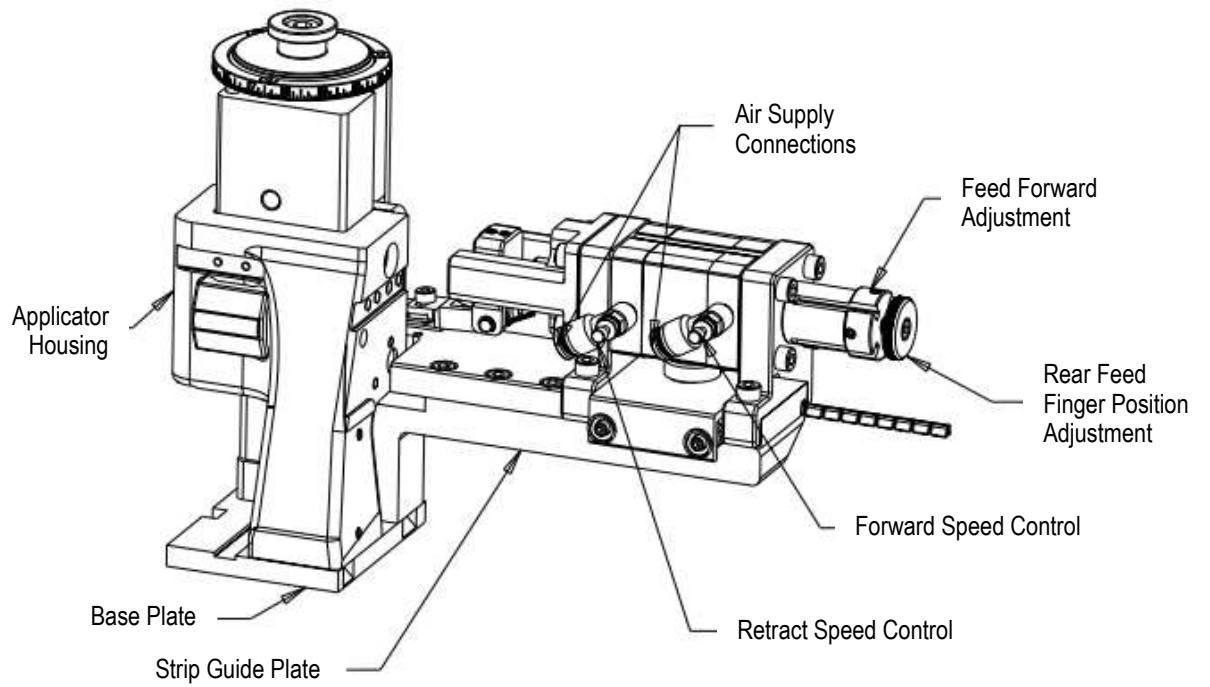
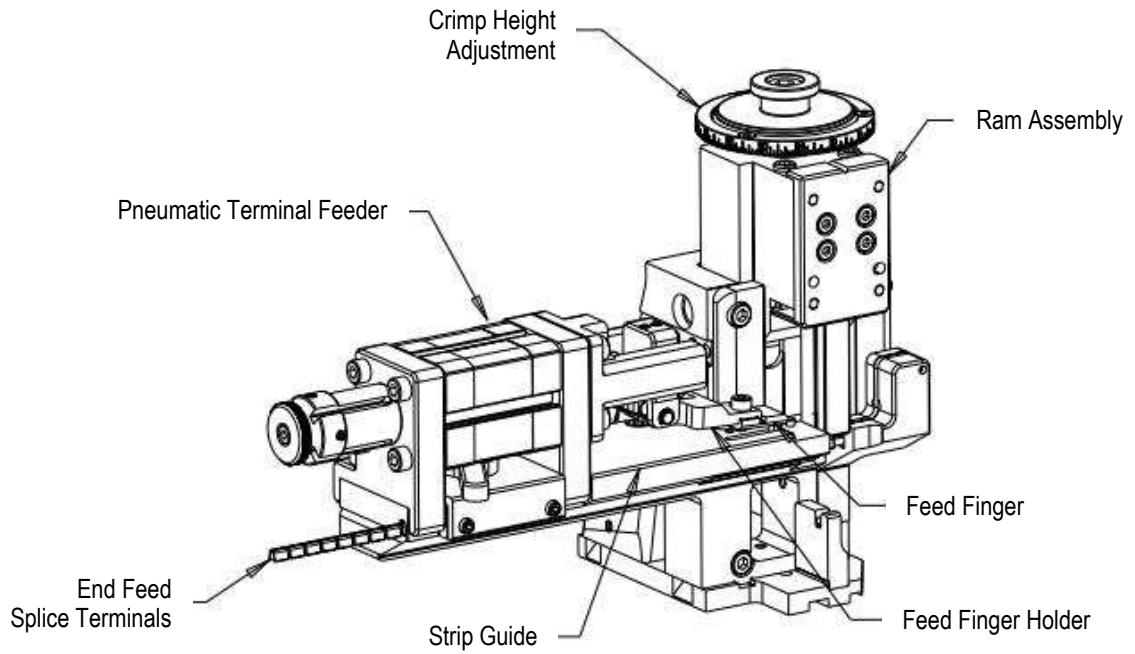
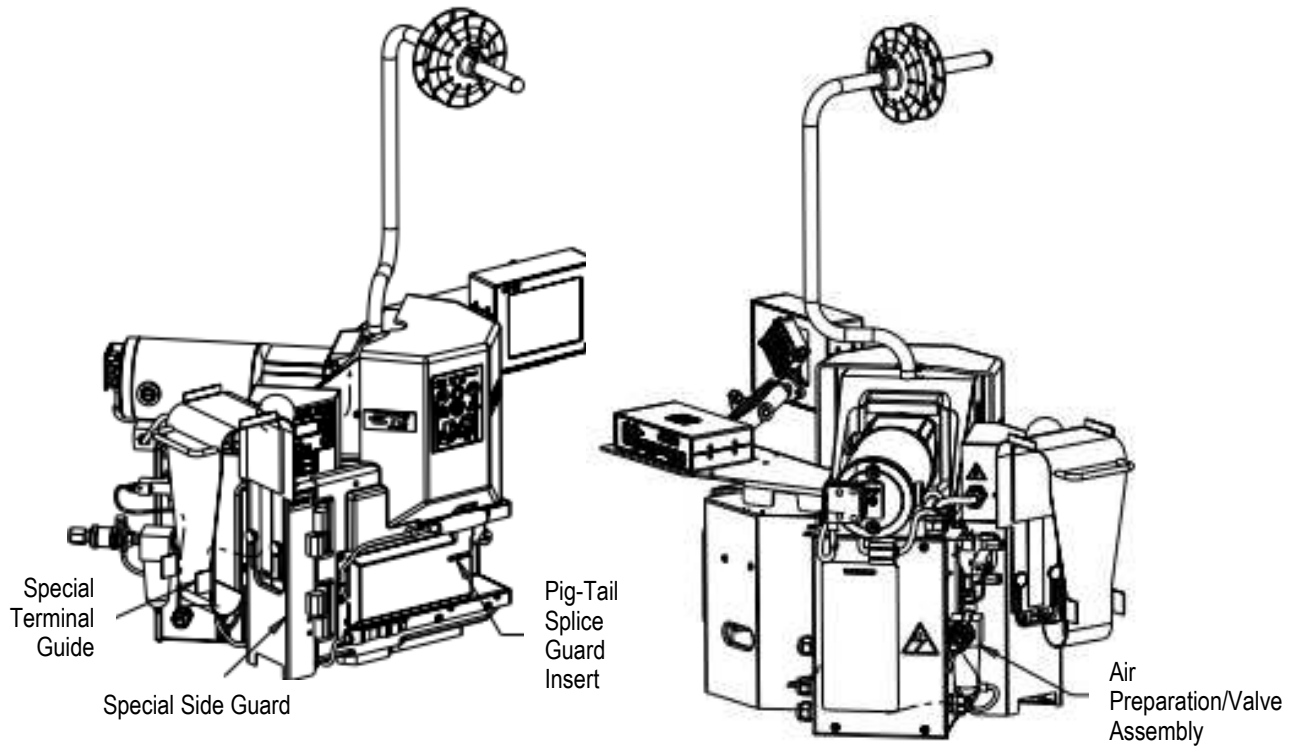


Figure 2

Pig-Tail Splice Configuration



Through Splice Configuration

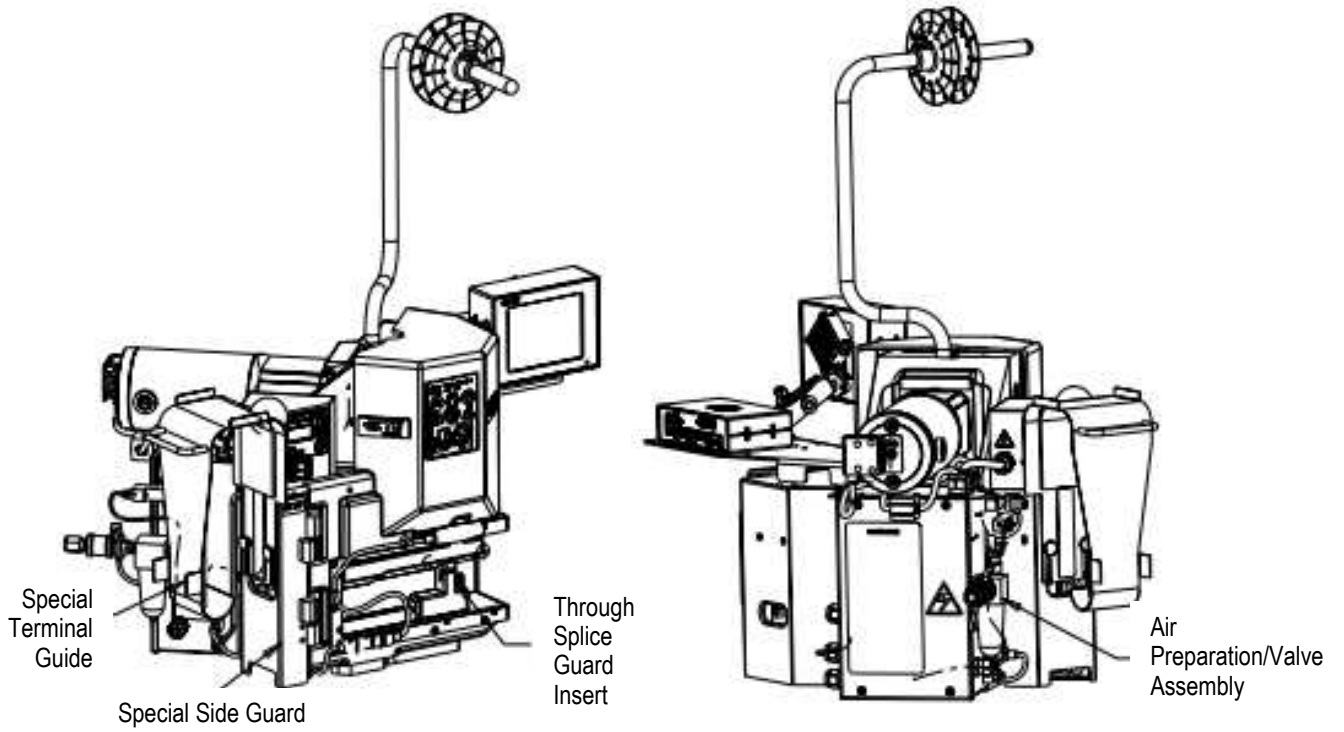


Figure 3

2.2. Inverted Splice Applicator Air Feed System

**NOTE**

The air preparation/valve assembly included with the special 5K/40 Terminator must be connected to an air supply line providing continuous pressure of 5.0-6.0 bars [72-87 psi] at the applicator.

**NOTE**

NO oil lubrication of air for the OCEAN Air Feed module is required after receiving and use within a production environment.

The applicator ram continues downward, completes the crimping action and returns to its fully raised position, the terminator air preparation/valve assembly actuates the retract side of the air feed cylinder (which retracts the feed finger), the valve assembly then actuates the extend side of the air feed cylinder (which extends the feed finger) and feeds a new terminal into position under the anvil and terminal guides. The flow controls on the air feed cylinder control the speed of the feed retract and extend stroke.

3. APPLICATOR INSTALLATION AND REMOVAL

**DANGER**

To avoid personal injury, make sure the power and air source to the machine is turned OFF and power cord/air supply are disconnected before installing or removing the applicator.

**NOTE**

Always remove the Ram Transportation Collar after installing the applicator on a machine and be sure to install the Ram Transportation Collar back onto the applicator ram just prior to removing the applicator from the machine.

**NOTE**

With the applicator in the machine, *never* attempt to cycle machine under power without terminals properly loaded, as described in Section 4; otherwise, the tooling may be damaged.

**DANGER**

To avoid personal injury, the applicator should be used only in an appropriate terminating machine. The pressurized air supply should only be connected after the applicator is properly installed in the terminating machine.

3.1. 5K/40 CE Terminating Machine

A. Installation

1. Turn to loosen the Quick Release Handle on terminator base plate until it is disengaged enough to accept the applicator.
2. Place the applicator onto the terminator base plate and position it so the two notches of the applicator engage the two hooks on the left side of the terminator base plate and the applicator ram post is positioned onto the terminator ram adaptor.
3. Turn and tighten the Quick Release Handle on the terminator base plate.

B. Removal

1. Disconnect the power cord.
2. Cut the terminal strip one or two terminals from the end of the applicator.
3. Turn to loosen the Quick Release Handle on terminator base plate until it is disengaged enough to remove the applicator.
4. Slide the applicator forward until it is clear of the Ram Post Adapter.

4. APPLICATOR LOADING AND UNLOADING

4.1. Terminal Strip Loading



NOTE

Before loading the terminal strip in applicator, make sure the installed applicator is the right one for the terminal to be applied. Compare the terminal part number on the reel with the numbers listed on the applicator print.

1. Turn off and disconnect the power to the machine.
2. Make sure the ram assembly is all the way up. If necessary, hand-cycle the machine to raise the Ram. Refer to the applicable 409 Series Customer Manual.
3. Open terminator guard.
4. Disable the Stock Drag by turning the Drag Release Lever to the *Released* position. Remove a length of the terminal strip left in the applicator by grasping the terminals at the strip guide entry, raising the Feed Pawl, and pulling the strip straight out of the applicator.
5. With the reel of terminals installed on the Reel Support, feed the terminal strip into the applicator between the Strip Guides.



NOTE

Make sure the terminal strip enters the Strip Guides with the terminal open-side down.

6. Raise the Feed Finger, and continue to feed the terminal strip until the lead terminal is under the Anvil and the Feed Finger engages the terminal strip.

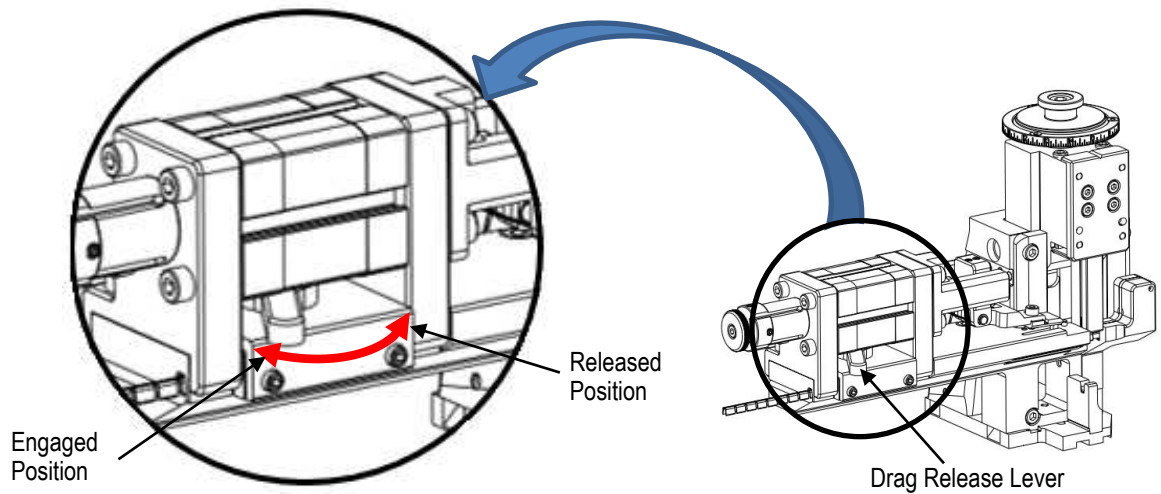


Figure 4

7. Turn the Drag Release Lever to the *Engaged* position to enable the drag.
8. Hand-cycle the machine several times to make sure the applicator is properly adjusted as described in Section 5.
9. Close the terminator guard.

4.2. Terminal Strip Unloading

Cut the terminal strip one or two terminals from the end of the applicator.



NOTE

The applicator should never be unloaded unnecessarily. A section of terminal strip should always be left in the unit. Since it is not necessary to remove the strip section for cleaning, lubrication, or repair, it should only be removed as a part of the loading procedure.

5. ADJUSTMENTS

5.1. Wire Crimp

A. Crimp Height

1. The wire crimp is adjustable by rotating the Wire Crimp Disc from 0 (largest crimp height) to 14.5 (smallest crimp height) in increments of .01 mm [.0004 in.].
2. Select a crimp height reference setting number from 0 (largest crimp height) to 14.5 (smallest crimp height) from the applicator print for the wire size to be used.
3. Turn the Wire Crimp Disc to line up with the specified crimp height reference setting number with the indicator notch/cut out on the front of the Ram (see Figure 5).
4. Turn the Wire Crimp Disc *clockwise* to decrease the crimp height and turn the Wire Crimp Disc *counterclockwise* to increase the crimp height. Each increment represents a change in crimp height of 0.01 mm [.0004 in.].

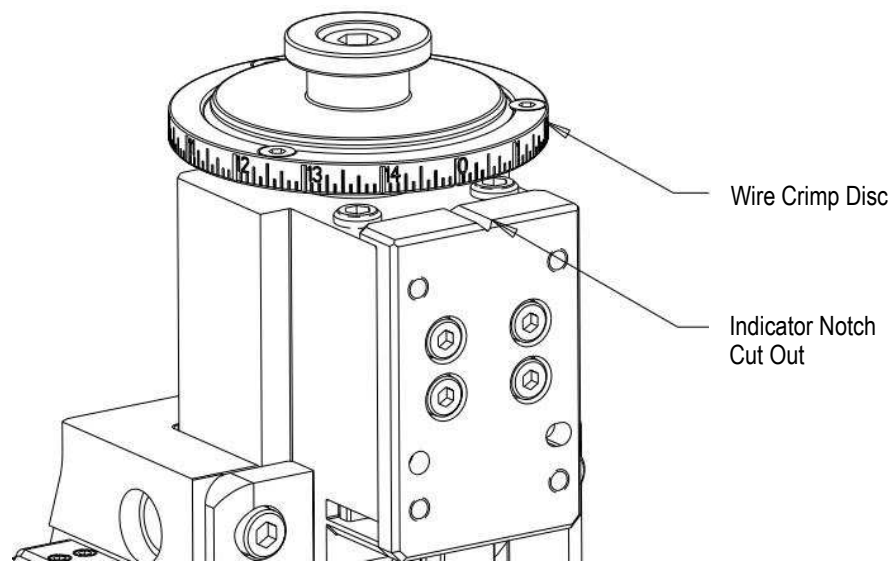


Figure 5

- If the terminations appear normal, measure the crimp height of each termination as described in Instruction Sheet [408-7424](#), packaged with the applicator. The crimp height must agree with the measurement specified on the applicator print for the wire size being used. Record crimp height dimensions for reference.
 - If the crimp height is incorrect, remove the applicator, and install one that is known to produce terminations of correct crimp height. Make several test cycles and repeat the inspection. If the crimp height is incorrect for this applicator, the problem is the machine shut height, and corrective information can be found in the applicable 409 Series Customer Manual. If the crimp height is correct, the problem is in the original applicator, and refer to Paragraph 6.7: Adjustable Crimp Height Repair, for corrective measures.
5. During extensive operation, periodically inspect the terminals as described in Step 4 to make sure the applicator is producing correct terminations.

B. Wire Crimp Adjust Lock Position

1. The wire crimp height adjusts can be locked in position by changing the Detent Pin orientation (see Figure 6).

a. Verify the setup dimension to the top of the Crimp Height Adjust Head (see Figure 7).



NOTE

This distance is also provided on the Applicator Print.

b. Hold down the spring-loaded Detent Pin and turn the Adjust Head out of the Ram until the Detent Pin can be removed.



DANGER

The spring-loaded pin can injure if released unexpectedly.

c. Invert the pin so the locking end will contact the Detent Plate and re-install the pin and spring.

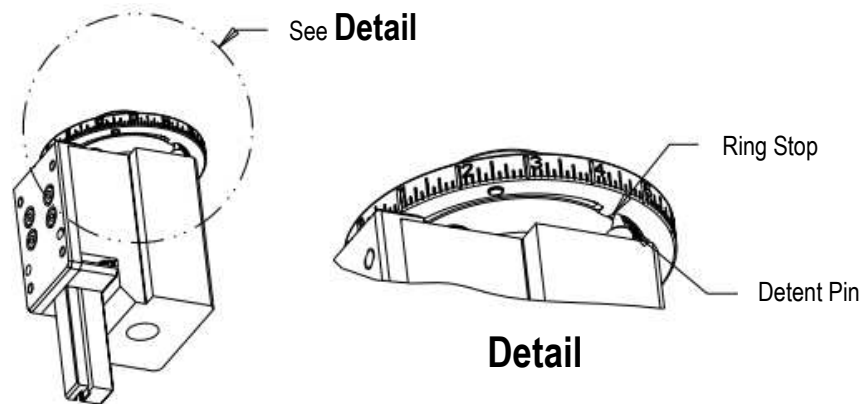
d. While holding the pin down, turn the Adjust Head until the proper set-up dimension is reached.

e. Verify the crimp height as described in Paragraph 5.1.A.



CAUTION

When changing crimp height while in the locked orientation, the spring-loaded Detent Pin must be depressed to rotate the number ring, or damage will occur.



Pin in Detent Orientation

Pin in Lock Orientation

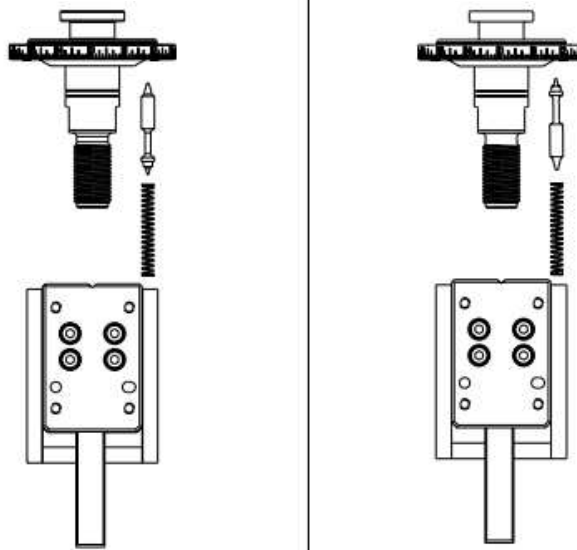


Figure 6

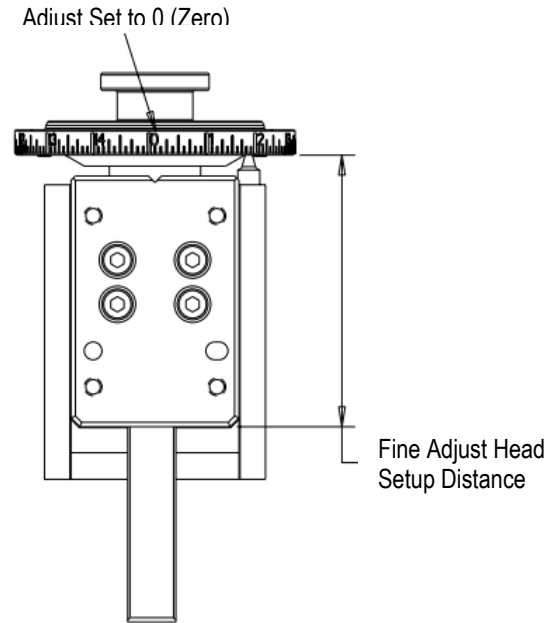


Figure 7

5.2. Terminal Strip Feed

The feed mechanism is actuated by compressed air.



DANGER

To avoid personal injury, this applicator should be used only in an appropriate terminating machine. The pressurized air supply should only be connected after the applicator is properly installed in the terminating machine.



DANGER

Take extra precautions during adjustments. When the machine is manually cycled, the mechanism will move forward and backward once during each machine stroke, unless the air is disconnected.

The feed stroke is adjustable in a range from 3 - 10 mm, in stepped increments of 0.04 mm [.0016 in.] for the feed forward position, and in 0.08 mm [.0031-in.] increments for the rear feed finger position (backstroke).

1. Mount the applicator onto the machine.
2. Insert the terminal strip until the lead terminal is located under the anvil.
3. Connect the air supply to the applicator.
4. Cycle the machine. The next terminal must now be located exactly above the anvil. If that is *not* the case, proceed with the following.
 - a. Release the strip guide drag, and manually move the strip to the proper position—a rough-position only. The fine adjustment will come in a later step.
 - b. Position the feed finger to the proper back position. Back the edge of the feed pawl to the back of the terminal. Rotate the feed adjustment knob. The adjustments are in 0.08-mm [.003-in.] increments or 30 degrees, and can be felt as “clicks”.



NOTE

To facilitate adjustments with certain machines or applications, the feed adjustments can also be made with the air pressure removed. This allows more tactile feel of the detents. This requires manually moving the feed forward and back to check feed positions. Make sure that the feed forward and back positions are verified after restoring air pressure.



NOTE

At the end of its backstroke, the feed pawl should be at the back edge of the terminal. The backstroke must not be longer than this; otherwise, the feed finger might not drop into the feed hole.

- c. Run a test cycle. The feed will move the next terminal over the anvil.
- d. Check position of the terminal under the anvil, noting if the terminal feed-forward position should be moved.
- e. Cycle the machine until the feed finger shifts back. This releases the air pressure on the feed adjustment, making the adjustment detent positions easier to feel.
- f. Using the feed-forward adjustment knob, change the feed-forward position based on the direction and amount noted in step 4.c. The adjustments are in 0.04-mm [.0016-in.] increments or 15 degrees and can be felt as clicks during the feed-stroke adjustment knob rotation. Turning the feed forward adjustment knob *clockwise* moves the feed pawl away from the anvil and turning it *counter-clockwise* moves the feed pawl toward the anvil.


NOTE

When adjusting, make sure that only the feed adjustment knob turns, not the entire shaft. The backstroke adjustment knob may have to be held stationary to prevent unintended backstroke adjustments (use a 3-mm wrench when the end cap is in place).

- g. Cycle the machine back to top-dead-center, causing the feed to shift forward and feeding the terminal over the anvil. Repeat steps 4.c. through 4.g. until the terminal is centered over the anvil.

5. To adjust the air feed speed, proceed as follows:


NOTE

The air feed speed has been set at the factory and should therefore require re-adjustment only in exceptional circumstances.


NOTE

Take extra precautions during adjustments. When the machine is manually cycled, the mechanism will move forward and backwards once during each press stroke unless the air is disconnected.


CAUTION

Do not tamper with the detent screws on feed adjustments, which were set up properly by the factory; otherwise, damage will occur.

- a. Open or close the flow control needle valves on the feed cylinder to speed up or slow down the feed retract and extend rate.


NOTE

The speed controls should not be fully opened to maximize feed speed. Excessive feed and/or retract speeds can cause inconsistent feeds and/or air feed module damage. It is recommended to only open the flow control valves two complete revolutions.

Loosen the locking ring, and turn the adjustment screw *clockwise* to decrease the speed and *counter-clockwise* to increase the speed. When complete, tighten the locking ring.

5.3. Strip Guide Plate and Feed Finger

This procedure moves the plate on which the Strip Guides are mounted. Since the terminal strip is fed into the applicator between the Strip Guides, it is moved front and back over the Anvil as the Strip Guides are moved.


NOTE

Getting the adjustment of the Feed Finger to match any change in the position of the Front Strip Guide is also described here.

1. From the front of the strip guide plate, loosen the Strip Guide Plate Locking Screws.

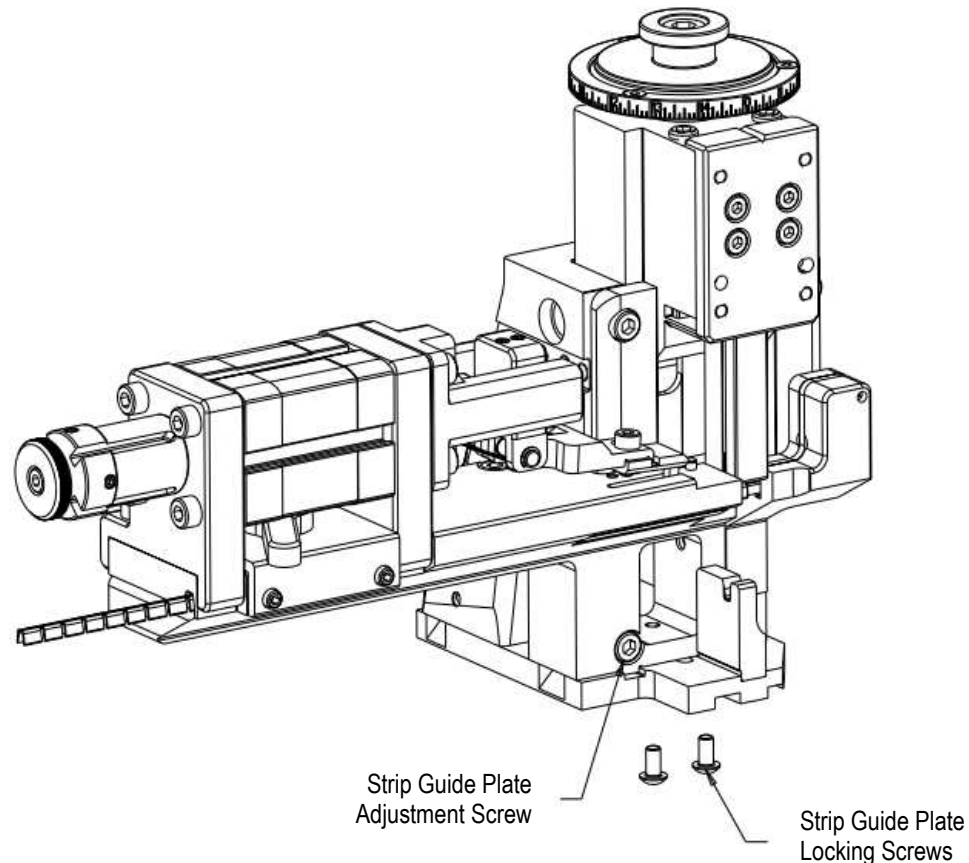


Figure 8

2. Turn the Strip Guide Plate Adjustment Screw *clockwise* to move the Strip Guide Plate toward the rear or *counterclockwise* to move it toward the front. Tighten the locking screws to hold the Strip Guide Plate in position.
3. Hand-cycle the machine, checking for proper terminal feed and Strip Guide Plate alignment.

5.4. Guillotine Tonk Adjustment (Pig-Tail Splice applicators only)

This procedure adjusts the amount the guillotine blade is compressed by the guillotine tonk when the applicator ram is at its bottomed position in the press cycle. This adjustment is made when the guillotine blade is not being compressed enough by the guillotine tonk to fully cut through the excess wire of a pig-tail splice application.

1. Loosen (2) screws holding the guillotine tonk in position.
2. Turn guillotine tonk adjustment screw clockwise to reduce guillotine blade compression and counter-clockwise to increase guillotine blade compression.
3. Manually cycle press to determine how much adjustment is required.
4. Re-tighten (2) screws holding the guillotine tonk position

5.5. Guillotine Blade Air Blast Adjustment (Pig-Tail Splice applicators only)

To increase or decrease amount of air blast, adjust air blast flow control needle valve.

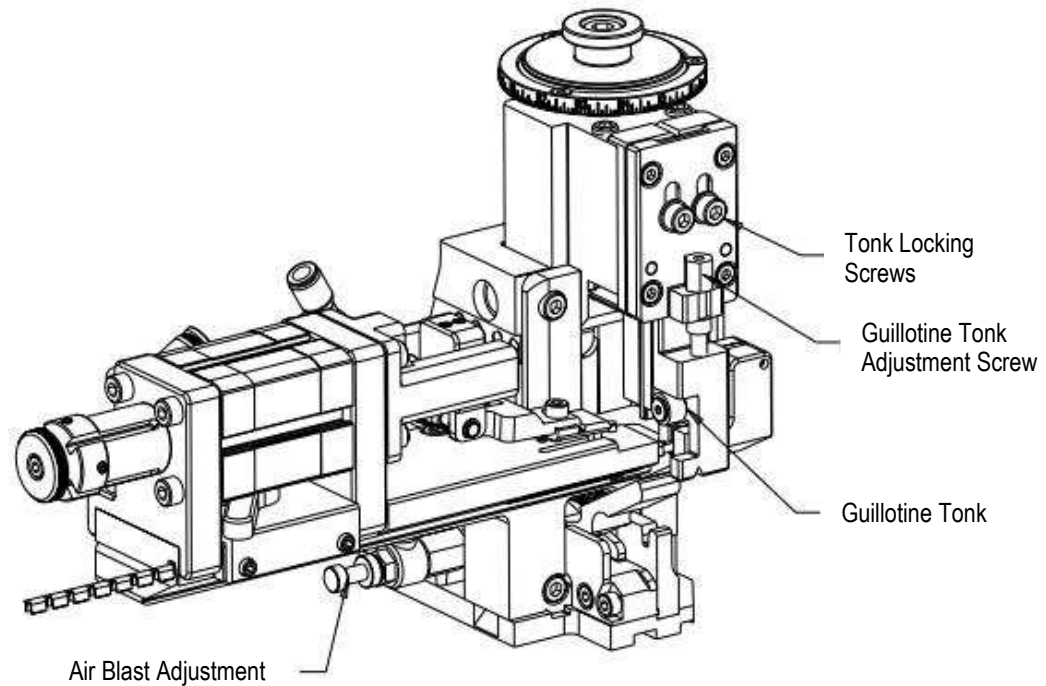


Figure 9

6. REPLACEMENT AND REPAIR

These procedures cover the applicator parts which most often need replacement or repair because of wear. Proceed with the following:



NOTE

Make sure to order replacements for parts used from the spare parts stock so more will be available when needed.

6.1. Preparation

1. Remove the applicator from the machine before performing any maintenance work.



DANGER

Before taking the applicator out of the machine, make sure the machine power is turned OFF and the power cord is disconnected. The machine ram should be in the raised position.

2. For proper identification of parts, refer to the exploded view drawing and parts list on the applicator print packaged with the applicator.
3. Wipe the parts with a clean, dry cloth as they are removed from the applicator. When reinstalling into the applicator, wipe the mating surfaces with your fingers to make sure that all lint and other foreign matter has been removed.

6.2. Crimper Replacement

1. From the bottom of the base plate, remove the screw that holds the Crimper to the base plate.
2. Remove the Crimper from the groove in the top of the base plate.
3. Install the Crimper using the reverse procedure. **Note:** If a new Crimper is needed, verify the part number of the new Crimper agrees with the number on the applicator parts list.



NOTE

When the Crimper is replaced, the Crimper and Anvil must be re-aligned using paper.

6.3. Guillotine Blade Replacement

1. Loosen collar holding air blast nozzle and remove air blast nozzle from guillotine blade mount.
2. Remove screw underneath applicator base plate, holding the crimper in place, and slide crimper and attached guillotine components away from applicator.
3. Remove screw holding guillotine blade pivot pin in plate and remove pin.
4. Replace guillotine blade and re-install the parts using the reverse procedure.

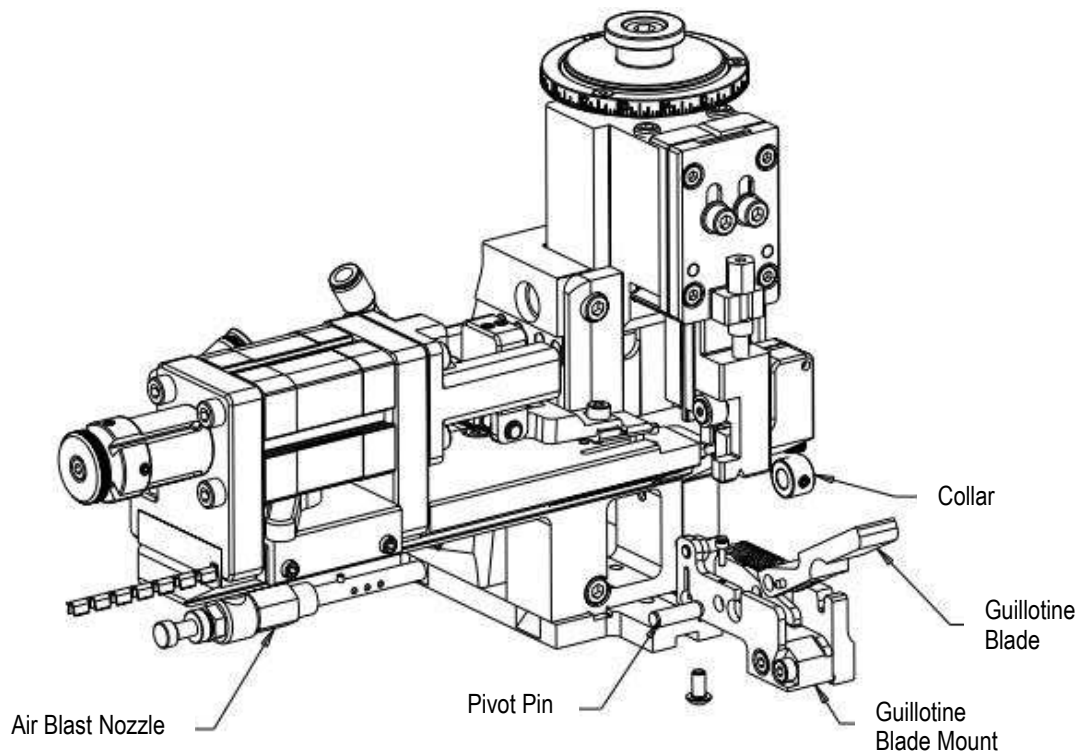


Figure 10

6.4. Shear Blade Replacement

1. Disassemble Strip Guide from applicator assembly by removing (3) Screws.
2. Remove (2) Screws holding Shear Blade to Strip Guide
3. Replace Shear Blade and re-install parts using the reverse procedure.



NOTE

When reassembling Strip Guide, be sure to bias Strip Guide against Strip Guide Mount Surface and bias Shear Blade against Anvil Shear Surface.

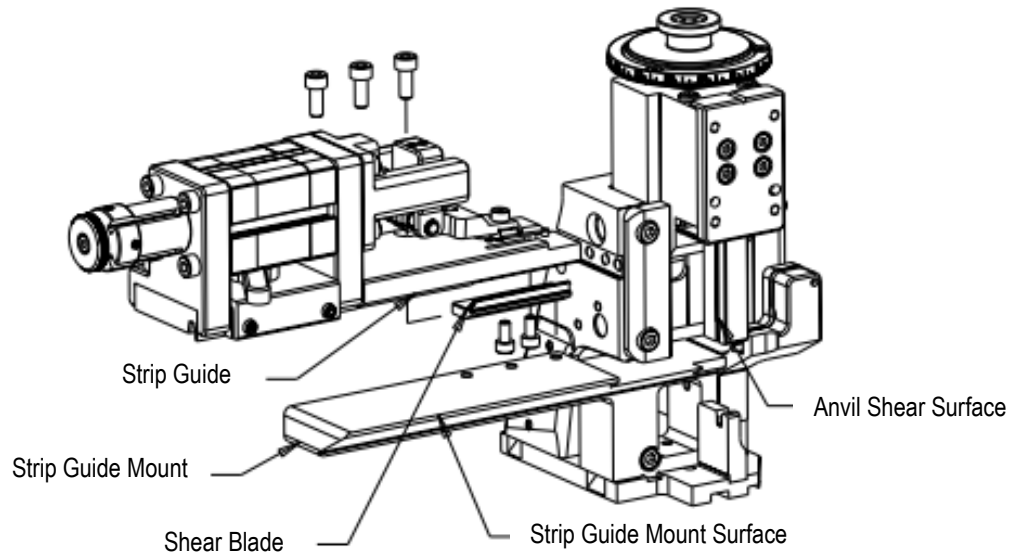


Figure 11

6.5. Feed Pawl Replacement

1. Remove the Fine Feed Adjust Lock Screw that holds the Feed Finger to the Feed Finger Holder.
2. Replace the Feed Finger using the reverse procedure. **Note:** If a new Feed Finger is installed, verify the part number agrees with the number on the applicator parts list.

6.6. Anvil Replacement

1. Remove screws holding Cover Plate and (2) set screws at top of ram.
2. Disassemble Cover Plate, Terminal Guides, and Anvil.
3. Re-install the parts using the reverse procedure.
4. Put the ram assembly back into the applicator and install the applicator in machine.
5. Lift the Feed Finger and pull the terminal strip back until the lead terminal is between the Strip Guides.
6. Before using applicator, set wire disc crimp height reference setting to zero, and then, incrementally adjust toward desired crimp height. A crimp height reference setting larger than needed may cause damage to the crimp tooling.

6.7. Adjustable Crimp Height Repair [Reference Figure 12]

A. Replacement of Detent Plate

Under severe, long-term use, the Detent Plate may become worn and make it difficult to feel the increments of adjustment. To replace the Detent Plate:

1. Note the number indicated on the Wire Crimp Disc.
2. Turn the disc to 0 (zero), against the stop.

3. Measure the set-up dimension from the Crimp Height Adjust Head to the Crimper Seating Feature on the Ram (see Figure 7). **Note:** The factory setting is listed on the Applicator print.
4. While depressing the Detent Pin, rotate the disc and head assembly out of the Ram.
5. Remove all (3) M3 flat-head screws from the disc.
6. Separate the disc from the head.
7. Inspect the Detent Plate for wear in the areas the Detent Pin contacts. Replace the plate if webs of ring are broken.


NOTE

In some cases, the plate can be rotated or flipped over so the Detent Pin contacts a new (unused) section.

8. Re-assemble, keeping the (3) M3 screws loose to allow the disc to rotate on the head.

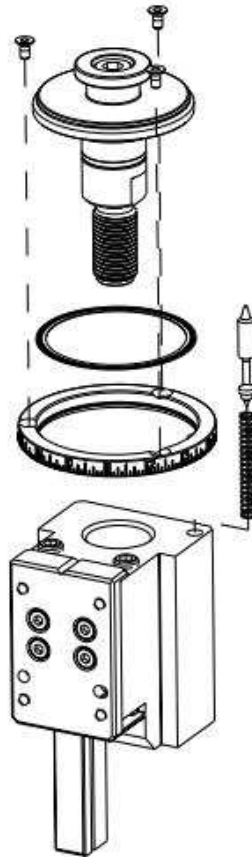


Figure 12

9. Apply grease to the Detent Plate to lubricate the Detent Pin contact surface.
10. After re-installing the Crimp Head assembly and Detent Pin, rotate the head assembly until the proper set-up dimension is re-established.
11. Turn the Wire Crimp Disc to the stop. 0 (zero) should be indicated on the Number Ring.
12. Torque the (3) M3 flat-head screw to 6-8 lbf-in [0.7-0.9 Nm].
13. Verify proper crimp height as described in Paragraph 5.1.A.

B. Recalibration of Crimp Height Adjustment Mechanism

If the crimp height adjust mechanism has been removed for any reason, it MUST be re-calibrated. The Applicator print lists the proper setup dimension for the applicator. To perform a Ram Fine Adjust Calibration:

1. Loosen (3) M3 flat-head screws on the Wire Crimp Disc.
The disc must freely rotate on the head.
2. Using calipers, measure the distance between the Crimp Height Adjust Head and the Crimper Seating Feature on the Ram (see Figure 7).
3. Rotate the Head Assembly up or down to achieve the measurement listed on the Applicator print.



4. **NOTE**

As the head rotates, the Wire Crimp Disc should remain free to rotate relative to the Head Assembly (the Detent/Locking Pin prevents continued disc rotation).

5. Turn the Wire Crimp Disc against the Detent/Lock Pin, to the 0 (zero) position.
6. Torque the (3) M3 flat-head screws to 6-8 lbf-in [0.7-0.9 Nm].



CAUTION

An applicator cycled under power that HAS NOT been calibrated to the proper setup dimension is highly likely to be damaged at startup and imperil nearby personnel.

6.8. Counter Magnet Orientation

The applicator counter magnet will properly actuate the applicator counter only if it is installed with the correct side facing out from the ram. If for any reason the magnet is removed, it will need to be determined before re-installing the magnet in the ram which side of the magnet actuates the counter. Running the magnet behind the counter by hand will reveal the side that actuates the counter properly.

7. CLEANING, LUBRICATION, AND STORAGE

For best performance and minimum downtime, the applicator should be cleaned daily and monthly, and inspected, lubricated, and stored as indicated in Instruction Sheet [408-8059](#).

8. REVISION SUMMARY

Initial release