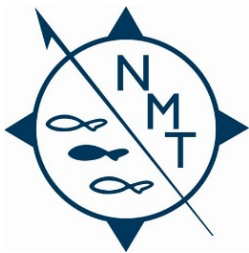


Handheld Multishot Tag Injector

Instruction Manual



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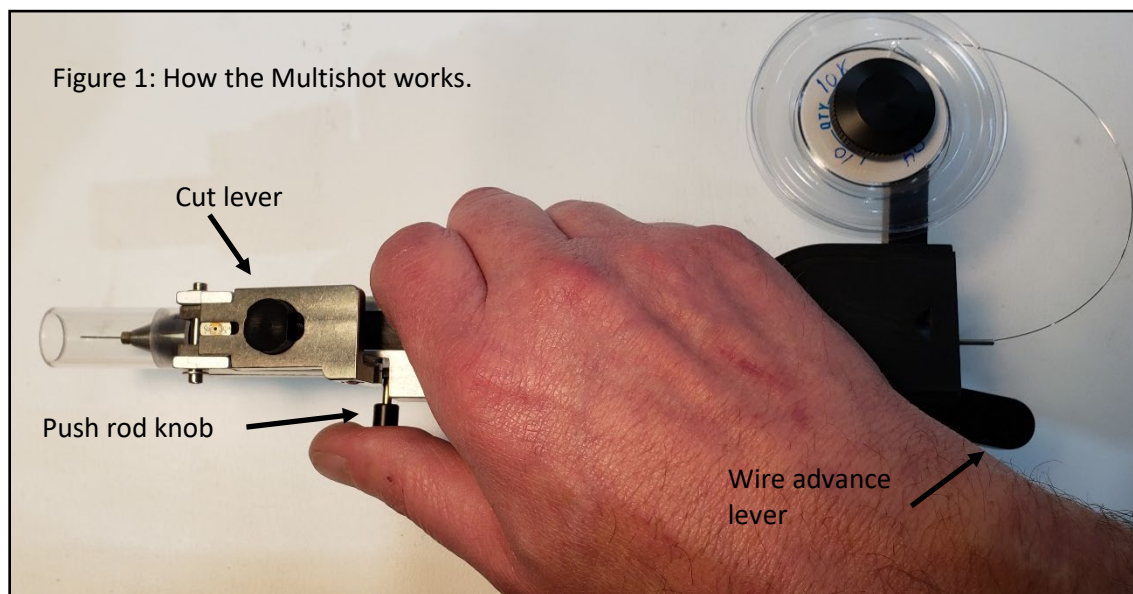
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1 Introduction

Northwest Marine Technology (NMT) designed the Multishot to be a small, portable, handheld “field” tool for injecting Coded Wire Tags (CWT) into small batches of fish or into very large specimens (e.g., brood stock, endangered

species, live trapped smolts, and adult paddlefish). A T-Wand or V-Detector is typically used with the Multishot to verify the presence of a CWT in an animal.

1.1 How the Multishot works



A complete injection cycle for the Multishot has the following steps (Figure 1):

1. The coded wire is advanced by depressing the wire advance lever. A ratcheting mechanism determines the tag length by moving the wire forward a fixed distance.
2. The tag is cut by pressing the cut lever.
3. The tag is magnetized and advanced to a point just short of the tip of the needle by moving the push rod knob forward until a slight resistance is felt (about 40 mm).
4. The needle is inserted into the specimen.
5. The push rod is moved forward the remaining distance (about 8 mm) to inject the tag into the specimen. The needle is removed from the specimen.
6. The push rod is fully retracted to release the cut lever to the “up” position. The Multishot is ready to repeat the cycle.

When operating the Multishot, use brisk motion to properly engage the springs and levers.

1.2 Overview of CWT tagging

Mark recapture experiments using the Coded Wire Tag (CWT) consist first of implanting tags in the specimens, verifying implantation and releasing the specimens. The second stage involves recovering and screening the specimens for tags and reading the tags.

Tag implantation sites influence which verification and recovery procedures are used. Please refer to our CWT Project Manual (<https://www.nmt.us/wp-content/uploads/2017/11/Coded-Wire-Tag-Project-Manual-Nov-2017.pdf>) for detailed information about using CWT.

Coded Wire Tags are supplied as a spool of wire. The Multishot cuts a tag from the spool, magnetizes the tag, and injects it into the specimen. The operator then verifies that the specimen contains a Coded Wire Tag using one of the detectors made by NMT.

Upon recovery of the specimen, CWTs are located using one of the available detectors. CWTs are removed from the specimen and then the tag code is read under magnification (25X or higher).

1.3 A few things to consider before tagging

- **Tag Type:** Coded Wire Tags are available in several formats. These include different tag sizes and coding options. The tag type you choose will depend upon specimen size, data requirements and recovery methods.
- **Tag Implantation Site:** The area or “target” where the tag will be implanted can vary for different applications. While salmon and trout have traditionally been tagged in the snout, other species are tagged in the cheek, adipose eyelid, jaw, scalp, nape, leg, etc. Choosing a suitable implantation site is critical to tag retention, specimen health, and tag recovery.
- **Tag Insertion Technique:** Some tagging is done with the aid of head molds to precisely position the specimen during tagging. It is very important to use a head mold of the proper size and shape for the particular specimen, otherwise tag retention may be poor. NMT offers a variety of head molds for different species of fish ranging in size from 0.25 grams to 225 grams. If you are tagging a species for which a head mold is not available, or if you wish to make your own molds, contact NMT about the head mold fabrication kit and instructional video. Tagging can also be done without the use of these fixtures if specimen size varies widely, the implantation site is large, or a suitable positioning fixture is not practical. A needle support tube is available for this type of tagging.
- **Tag Recovery:** How the tags will be recovered must be considered during program design. Specimen size at the time of recovery, tag location, tag type, recovery site and detector technology can all influence the method and success of tag recovery.

2 Getting Started

2.1 Keep it clean!

The Multishot **MUST BE CLEAN** to operate properly. The Multishot uses specially manufactured coded wire that is only 0.25 mm in diameter. This wire advances through a tiny hole in a cutter, the tag is cut, and then the tag is pushed through a needle with an inside diameter of 0.3 mm. The tag is pushed by the push wire, also only 0.25 mm diameter. There is little clearance for dirt and the Multishot will not work smoothly if fish slime builds up in the needle, in the cutter, or on the push wire.

The Multishot should be rinsed with fresh water regularly during use to remove fish slime and other dirt. It is also advised that after each hour of use the following sequence should be followed: The unit should be submersed in a

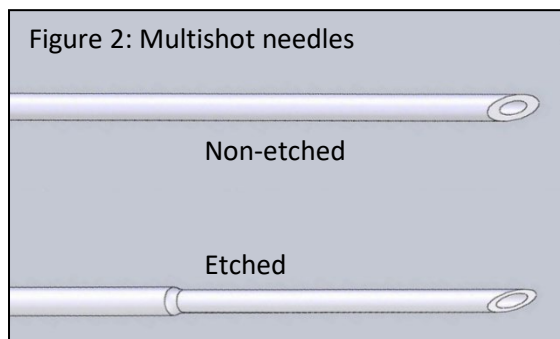
bucket of fresh water; the cut lever depressed and held down; and then the push rod advanced and retracted a dozen times (this sequence requires only a few seconds and is well worth the effort). This action works the push wire through the cutter and the needle causing a surging of fresh water through the system to dissolve any fish slime. A small amount of liquid detergent will help the cleaning. If you find that the push rod is not advancing smoothly it is likely one of two problems—either the needle is not seated properly or the unit needs cleaning!

Detailed cleaning procedures are described in section 3.2.

2.2 Needles

The Multishot uses a 1.55 inch (3.94 cm) needle. This needle will accommodate the use of head molds or a needle clamping nut with support tube (see Figure 6: needle clamping nut with support tube, see also discussion of head molds). Proper needle selection is important to the success of the tagging operation.

The Multishot needle is available as either “etched” or “non-etched” (figure 2). The non-etched needle has a constant outside diameter (0.0225 inch, 0.57 mm) from its base all the way to the beginning of the beveled tip. The etched needle is necked down to a smaller outside diameter (0.0185 inch, 0.47 mm) beginning approximately 0.3 inches (0.76 cm) from the beginning of the bevel.



Etched needles make a smaller injection hole in the fish and have been very successful with head molds for Pacific Salmon. The etched needle will not work as well (i.e., it has a greater likelihood of bending) with fish of tougher tissue such as steelhead, nor will it work as well

with most “body” tagging such as the cheeks of smallmouth bass, the scutes of sturgeon, or the rostrum of paddlefish. For this type of tagging, the non-etched needle in a needle support tube is often the better combination for penetration and tag placement.

2.2.1 Seating the needle

Properly seating the needle is critical for the Multishot operation (figure 3). An improperly seated needle may be ejected when the push wire is advanced, or the push wire may bend when trying to advance it through the needle. Either of these symptoms suggest that the needle should be examined for proper seating.

To seat the needle (assuming the needle clamping nut and needle are removed from the Multishot):

1. Position the nylon ball approximately one third of the length down the needle from the tip (the beveled end).
2. Slide the base of the needle (the funnel shaped end) into the magnetizer until it meets resistance; the needle will contact the cutter.
3. While pushing gently, rotate the needle until you

feel the funnel end of the needle slide into the cutter.

4. Slide the needle clamping nut (or the needle clamping nut with support tube if you are using it, figure 6) over the needle and thread it into the magnetizer; you may need to push the nylon ball into the magnetizer a short distance with your fingernail to provide room for the initial thread of the needle clamping nut.
5. Finger-tighten the needle clamping nut and then use the 1/8” hex driver to tighten the nut until it is snug - approximately a quarter turn.
6. Loosen the needle clamping nut a quarter turn and then re-tighten one quarter turn. Repeat the loosen/re-tighten step a total of three to four times. This step ensures that the needle is properly seated against the cutter without binding the cutter.

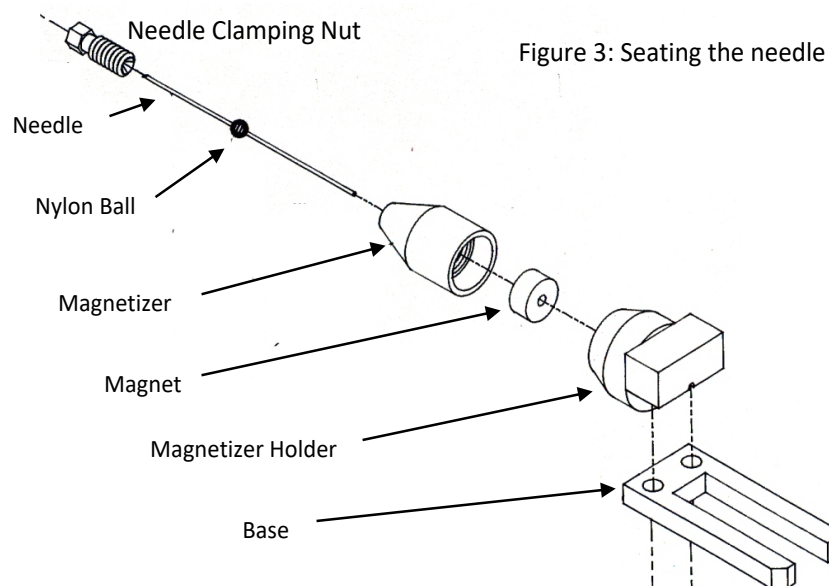


Figure 3: Seating the needle

2.3 Loading tag wire

Figure 4 shows the tag supply body, wire guide, and spool arm. See section 5 for parts schematics.

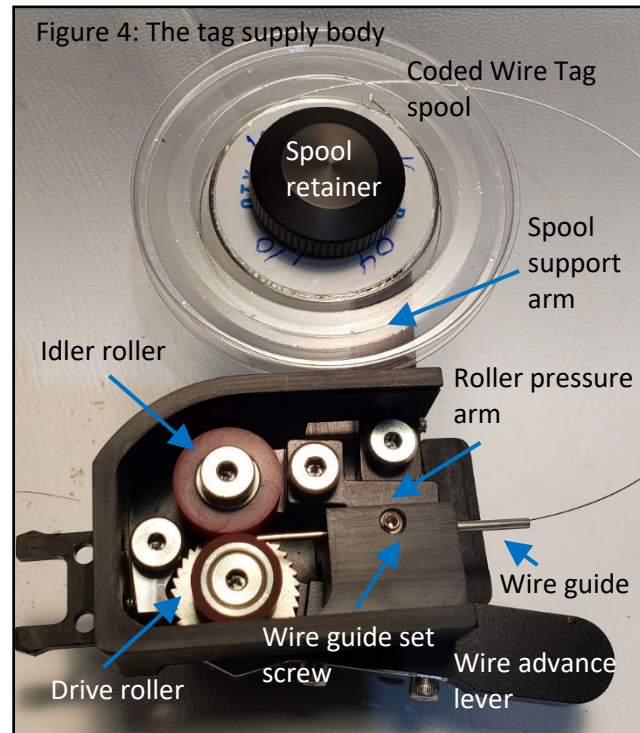
The tag supply body should be attached to the Multishot body (if it is not, refer to Reassembly item 21).

1. Remove the protective cover from the tag supply body by sliding it back. Unscrew the spool retainer, place the plastic tag supply spool onto the stud, and replace the spool retainer.
2. Rotate the spool support arm counter clockwise to place the roller pressure arm in the "off" position. This will separate the drive and idler rollers.
3. Threading the tag wire is easier if you straighten out any curl in the tag wire by running it between your thumb and forefinger. Thread the end of the tag wire into the wire guide, between the drive and idler rollers and into the feed tube that protrudes from the Multishot body. Use the tweezers to guide the tag wire if necessary.

4. Feed the tag wire by hand into the Multishot as far as it will go.

The cut lever must be up when the tag wire is fed into the Multishot.

5. To determine if the tag wire has been fully inserted in the cutter, press down gently on the cut lever (figure 1). A slight resistance will be felt if the tag wire is in the cutter. Lower the spool support arm to apply pressure to the two rollers. Replace the protective cover.



6. Cut the first tag (which will be a non-standard length and should be discarded) by depressing the cut lever, and then eject the tag by advancing the push rod all the way forward.

Never advance the push rod if it is jammed. See section 3, Troubleshooting, if this occurs.

7. Retract the push rod all the way so that the cut lever returns to the up position. The Multishot is now ready to start a new injection cycle.

2.4 Selecting the tag length

The Multishot can inject standard length (1.1 mm), one and a half length (1.65 mm) or double length (2.2 mm) tags. It will not inject the 0.5 mm half length tag. Standard and double length tags use the standard ratchet, and are selected by adjusting the wire advance lever stop set screw to control the throw (range) of the wire advance lever (Figure 5). See Section 5 for parts schematics.

Standard length tags are cut when the screw is in, and double length tags are cut when the screw is out. **Do not** take the screw all the way out! If the screw is removed too far then the wire advance lever will swing out of the bottom of the wire supply body. Cutting 1.5 length tags requires replacing the standard ratchet with the special ratchet. The special ratchet, which has fewer teeth than the standard ratchet, is optional.

To inject double length tags, the stop set screw does not have to be removed, simply retract the standard length screw.

-or-

If the Multishot is set to cut standard length tags and you wish to cut a double length tag without changing the wire advance lever stop set screw, press the wire advance lever twice before pressing the cut lever. Note, however, if you are using a counter, this approach will increment the counter by two. Similarly, if the special ratchet is installed to cut 1 1/2 length tags, then pressing the wire advance lever twice will generate a triple length tag.

Figure 5: The Multishot counter and stop set screw



2.5 Head mold and needle clamping nut with support tube

The needle clamping nut with support tube is a modified needle clamping nut that is supplied with the Multishot (Figure 6). The needle clamping nut with support tube is designed to stabilize the base of the needle to prevent the needle from bending when tagging. Use of the needle clamping nut with support tube is encouraged except when using a head mold.

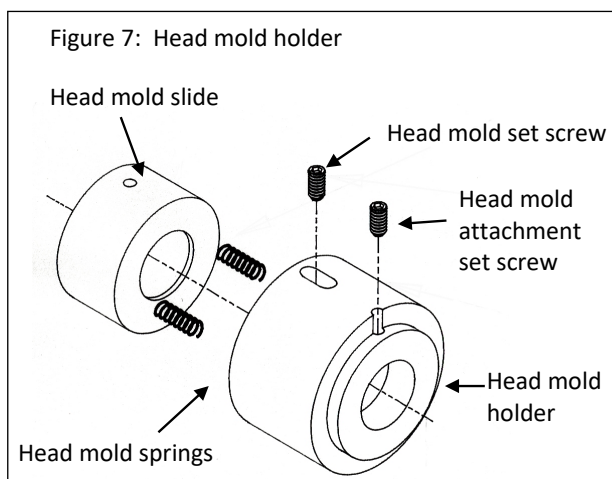


Figure 6: Needle clamping nut with support tube

The needle clamping nut with support tube can also be used to gage the depth of needle penetration by applying a piece of tape around the base of the support, or slipping a piece of plastic tubing of the proper length over the support.

Head molds are most often used for snout tagging. NMT supplies a variety of sizes and

shapes. Custom head molds can also be constructed. A head mold holder (supplied with the Multishot) is slipped over the needle and onto the front of the magnetizer (Figure 7: head mold holder). It is secured by tightening the set screw at the base of the head mold holder. A head mold is then inserted and secured by tightening the set screw at the front of the head mold holder.



2.6 Needle penetration depth

The depth to which the needle penetrates the specimen is controlled in one of two ways.

1. With the freehand method (using the Multishot without a head mold) the operator determines needle penetration by how far the needle is pushed into the specimen. It is useful to mark the needle with a depth stop of some type (tape, tubing, etc.) so you can repeat the tag position for each specimen.
2. When using a head mold, needle penetration can be adjusted by setting the distance that the needle protrudes from the head mold when the head mold slide is fully depressed. The head mold is adjusted in or out by loosening the head mold set screw and moving the head mold to the desired position, then tightening the set screw.

2.7 Push wire function and adjustment

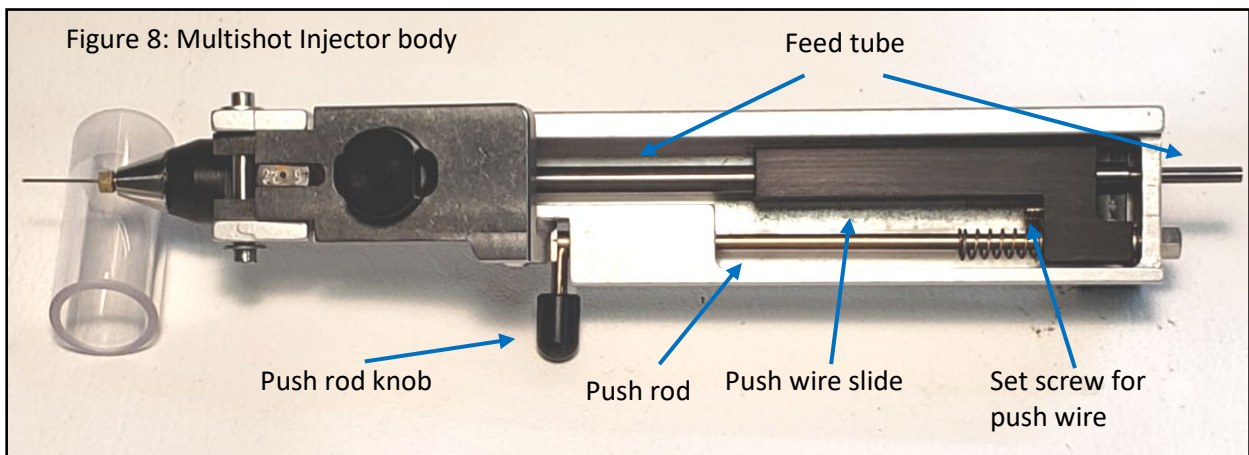
Tag placement depth refers to the position of the tag with respect to the tip of the needle. The push wire advances the tag to the tip of the needle. The only way to adjust tag placement depth relative to the tip of the needle is to adjust the advancement of the push wire.

The set screw at the center rear of the push wire slide (figure 8 and section 5) is used to adjust the advancement of the push wire.

1. Remove the tag supply body and body cover (see Disassembly Instructions 2 and 5).
2. Reach the adjusting set screw by pushing down the cut lever and moving the push rod all the way forward.

3. Using the 0.05" hex ball-driver, rotate the set screw counter-clock wise if you want the cut tag to be injected further out of the needle. Rotate the set screw clockwise if you want to have the tag further back into the needle. The approximate position of the cut tag can be determined by observing how the location of the push wire tip changes as the screw is rotated.

The push wire assembly is manufactured to a fixed length. **DO NOT** change the length of the push wire by cutting or filing the push wire.



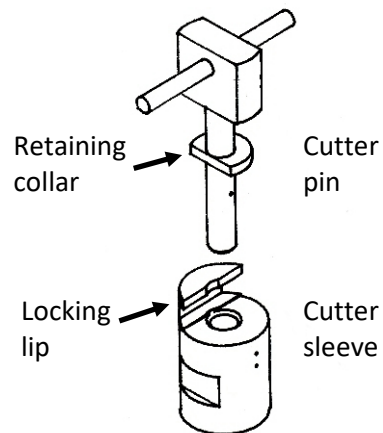
2.8 The Cutter

The cutter (figure 9) is a precision device to cut the tags cleanly from the spool of tag wire. The cutter is also the most expensive part of the Multishot to replace. It should be cared for accordingly. With proper handling the cutter should provide excellent service. It is not uncommon for a cutter to yield over 50,000 cuts.

2.8.1 Changing the cutting edge

The cutter pin has two cut edges available. To change the cut edge refer to instruction 10 in section 4.2, Reassembly.

Figure 9: The cutter



Keep the cutter clean! Clean the cutter periodically during use, and after each use. Do not let the cutter set for hours or overnight without proper cleaning. If you intend to leave the Multishot laying around for several hours between uses, soak it in a bucket of fresh water to prevent fish slime from drying on the cutter, in the needle, and on the push wire.

2.9 The Counter

The electronic counter is always on; there is no off switch. The estimated battery life is at least 3 years. Return the counter to NMT if it no longer works.

2.9.1 Resetting the counter

The counter increments by one each time the wire advance lever is depressed. Depress the white dot with a dull implement to reset the counter (figure 5). The counter will not decrement.

3 Troubleshooting

| PROBLEM | POSSIBLE CAUSES | SOLUTION |
|-------------------------------|---|--|
| Needle pulls out of Multishot | Improper seating of needle. | Tighten needle nut or reseal the needle. |
| Needle breaks | Dull needle into tough tissue; improper leverage from Multishot. | Use a sharp needle in a needle support tube, and do not pry up, down or sideways with Multishot while the needle is in the fish. |
| Push wire jams or sticky | Needle not seated properly; needle not coned properly; Multishot is dirty; burrs on the push wire. | Reseat needle; fix cone on needle; clean Multishot; use sharpening stone to remove burrs from end of push wire. |
| Push rod jammed or sticky | Push rod improperly secured to push wire slide; Multishot dirty; push wire jammed. | See reassembly item 5 for securing rod to slide; clean Multishot; see above for jammed push wire. |
| Cutter not cutting smoothly | Multishot dirty; cutter dull or damaged; push wire too long; cut lever damaged; cut lever spring or cut lever alignment pin screws missing. | Clean Multishot; replace cutter; adjust push wire; replace cut lever, cut lever spring, or cut lever adjustment screws. |
| Cutting short tags | Drive rollers worn. | Replace drive rollers. |
| Counter not working | Dead battery; counter damaged. | Return to NMT for battery replacement or repair. |
| Wire advance lever sticks | Dirty Multishot; advance lever pull spring damaged. | Clean Multishot, particularly the wire supply body; replace advance lever pull spring. |

4 Maintenance

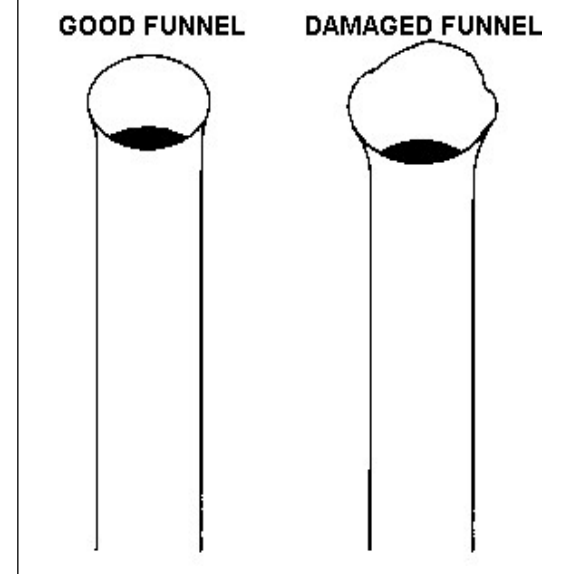
4.1 Needle care

A bent or dull needle must be replaced. Inspect the beveled end of the needle to see that it is smooth and sharp. A dull needle makes penetration difficult and may tend to push the specimen away, causing shallow implantation of the tag. Multishot needles have several bevels and can not be sharpened.

When inspecting or replacing a needle, examine the slight “funnel” at the back end of the needle with the magnifying loupe (figure 10). The funnel helps guide the tag into the needle and can be damaged if the tag wire jams in the Multishot. The funnel can be reshaped using the needle reamer and the Arkansas stone in the tool kit. Insert the point of the reamer into the funnel and turn it a few times with light pressure to restore the proper shape. The rim of the funnel can be smoothed with the sharpening stone to remove the external flare caused by reaming and/or jams. Inspect the

funnel end of the needle to make certain that the last 5 mm is straight.

Figure 10: Needle funnels



4.2 Cleaning

4.2.1 Disinfection

The possibility of spreading fish diseases between culture facilities and watersheds is of concern to both our customers and Northwest Marine Technology. Although we are unaware of a case of coded wire tagging equipment moved between locations as having served as a "vector" in spreading a disease, the consequences of such occurrences call for stringent preventative measures. Disinfection procedures should also be implemented

between groups of fish within a facility when signs of disease exist. Tagging should not be conducted during a severe outbreak of disease.

Chlorine solutions are recommended for use as disinfectants on tagging equipment. Commonly used source of chlorine are calcium hypochlorite ("HTH") and solutions of sodium hypochlorite ("bleach"). Household bleach comes in a concentration of about five percent

so that to achieve the desired concentration one would dilute an ounce of bleach in each two gallons of water (a ratio of 1:250). Stronger solutions may be available at fish rearing facilities so that a lesser proportion of material would be required to achieve the desired concentration (200 ppm) of active ingredient. An alternative is a solution of chlorine dioxide (sold under various trade names including *Oxine* [CH2O, International]). This material appears to be far less corrosive and less hazardous than the previously mentioned bleach and HTH. To reduce corrosion, alcohol (70 - 90%) is recommended as the disinfectant and cleaning agent for the interior mechanisms of NMT equipment.

Calcium hypochlorite and sodium hypochlorite solutions are highly toxic to fish but can be neutralized by adding sodium thiosulfate or

sodium sulfite to the solution. As a "rule of thumb", if a five percent solution of these chlorine compounds is used as a disinfectant, they can be neutralized by adding an equal weight of either chemical. For example, one ounce of 5% bleach added to two gallons of water would be neutralized by one ounce (dry weight) of either sodium sulfite or sodium thiosulfate. If the chlorine solution is stronger, the weight of the neutralizing agent should proportionately increase. As an added precaution, "neutralized" disinfectant should not be poured directly into water containing fish.

Before using any disinfectant, read and understand the Material Safety Data Sheets (MSDS) for each product.

4.2.2 Cleaning equipment and supplies

In addition to the disinfectants indicated above, the following equipment and supplies are recommended for cleaning your Multishot:

- Two spray bottles for dispensing alcohol and chlorine solutions
- Tap (pathogen free) water
- 50 ml syringe with 20 gauge needle
- Wiping sponge/cloth
- Cotton tipped applicators made of wood (available from medical supply stores)
- Cotton balls
- 2-3" of blank/excess coded wire
- Multishot tool kit
- Multishot instruction manual
- Paper towels
- An open container for soaking parts
- Material Safety Data Sheets
- Rubber gloves
- Eye protection
- Particle masks or respirator

Cleaning: The Multishot has many precision components which can become stuck or otherwise inoperable if not cleaned regularly during use and at the end of each day's tagging and before being stored. Careful cleaning will enhance performance and greatly extend the life of the unit so please take cleaning seriously.

4.2.3 Hourly cleaning

Each hour, or more often if necessary, the Multishot should be submersed in a bucket of fresh water to remove fish slime and other dirt. It is best to hold the unit under water, depress the cut lever, and then slide the push rod back

and forth a dozen times to surge water through the needle and cutter. This practice only takes a few seconds and clearly helps assure a smooth operation of the Multishot.

4.2.4 Daily cleaning

This simplified cleaning procedure should be performed at the end of each day's tagging. Use a chlorine solution and rinse with alcohol. Use cotton swabs or other non-abrasive cleaning tools.

1. Disassemble the Multishot following disassembly steps 1, 2 and 4 thru 11 in section 4.1. See section 5 for parts schematic.
2. Use the chlorine solution to clean the needle, cutter pin, inside of the cutter

sleeve and any exposed Multishot surfaces that are dirty.

3. Use a piece of tag wire dipped in alcohol to clean the inside of the needle, holes in cutter pin and holes in the cutter sleeve.
4. If you are using the head mold holder, it can be cleaned without disassembly by removing it from the Multishot and soaking it in the chlorine solution overnight (do not use alcohol on the head mold).
5. Dry all surfaces before reassembling or storing, especially the cutter sleeve and cutter pin to prevent corrosion.

4.2.5 Complete cleaning

This procedure is recommended if disease is a concern, and should also be performed before the Multishot is stored for an extended period of time. Again, use fresh water, a disinfectant, and non-abrasive cleaning tools.

1. Completely disassemble the Multishot following steps 1 thru 17 in section 4.1 and clean all parts in chlorine solution.
2. Use a piece of tag wire dipped in alcohol to clean the inside of the needle, holes in the cutter pin, holes in the cutter sleeve and the inside of the feed tube.
3. Use a piece of tag wire to clean the inside of the feed tube and nesting needle in the groove on the bottom of the feed tube.
4. Use alcohol and cotton swabs to clean the exterior of all other components.

5. If you are using the head mold holder it can be cleaned without disassembly by removing it from the Multishot and soaking it in alcohol overnight. Soak the head mold in the chlorine solution NOT in alcohol.
6. Dry all surfaces before reassembling or storing, especially the cutter sleeve and cutter pin to prevent corrosion. A thin film of silicone FEL-PRO LUBRI-SIL #51360 grease (or equivalent) is recommended on the following parts: alignment bar, cut lever alignment pin, detent assembly, and the pull spring screws.
7. Keep the needle protector in place during storage and transit to protect the needle and prevent injury.

5 Service

Although the Multishot requires little maintenance if properly cleaned and cared for, certain components of the unit will need service with regular use. The following is a recommended service schedule (which will vary with each unit depending on the cleaning, maintenance, and handling by the owner):

- After each **30,000** tag injections the drive roller, idler roller, wire advance lever spring, pull spring, push wire and needle clamping

nut should be inspected for wear, and likely replaced.

- After **50,000** injections the cutter, push rod assembly, and pull spring should be inspected for wear and likely replaced. This service should be performed at NMT by one of our trained service technicians.
- After 3 years the Counter's battery should be replaced. This service must be performed at NMT by one of our trained service technicians.

5.1 Disassembly

1. Remove the tag wire. Release the pressure on the drive roller by moving the spool support arm up to the "off" position. Grasp the tag wire and pull it out the rear of the Multishot. Remove the tag supply spool from the spool retainer.
2. Remove the tag supply body from the Multishot body. The tag supply body clips in a slot at the rear of the Multishot body. To separate the two, remove the alignment bar, being careful to lift it straight out to avoid binding of the two pins (you may have to initially pry the alignment bar loose with a thin implement). Once the alignment bar is removed, hold the tag supply body in one hand and the Multishot body in the other and pull them **straight apart** so you do not break the feed tube, which extends into the tag supply body from the Multishot body. The two pieces fit together fairly tightly so some resistance will be felt.
3. Remove the drive roller assembly:
 - i. Remove the tag supply body cover and relax the idler roller (off position of the spool support arm).
 - ii. Remove the ratchet pull spring, which is attached with two screws to the bottom of the wire advance lever.
 - iii. Back out the wire advance lever stop set screw and swing the wire advance lever down (figure 5).
 - iv. Loosen the wire guide set screw and slide the wire guide away from the drive roller assembly.
 - v. Remove idler shoulder screw and idler roller.
 - vi. Remove the drive roller shoulder screw and lift out the drive roller assembly.
4. If you are using the optional head mold holder, remove it by loosening the head mold attachment set screw (Figure 7) with the .050" wrench and slide it off the magnetizer assembly.
5. Remove the needle. Use the 1/8" wrench to remove the needle clamping nut (figure 3). Pull the needle and its nylon ball out of the magnetizer assembly.
6. The body cover is held in slots in the Multishot body. Remove the cover by sliding it back.

7. Remove the cut lever spring retainer and cut lever spring. Use your finger to apply slight upward pressure on the cut lever. Press down on cut lever spring retainer and turn it 90 degrees in either direction so it disengages from the cut lever, then lift out the cut lever spring retainer and cut lever spring. The spring and retainer normally come out together.

8. Remove the cut lever (figure 12). Use your finger to apply slight upward pressure on the cut lever. It may be necessary to retract the push rod so that the cut lever can be moved to its "up" position. Using two 5/64" hex head drivers, remove the cut lever alignment pin.

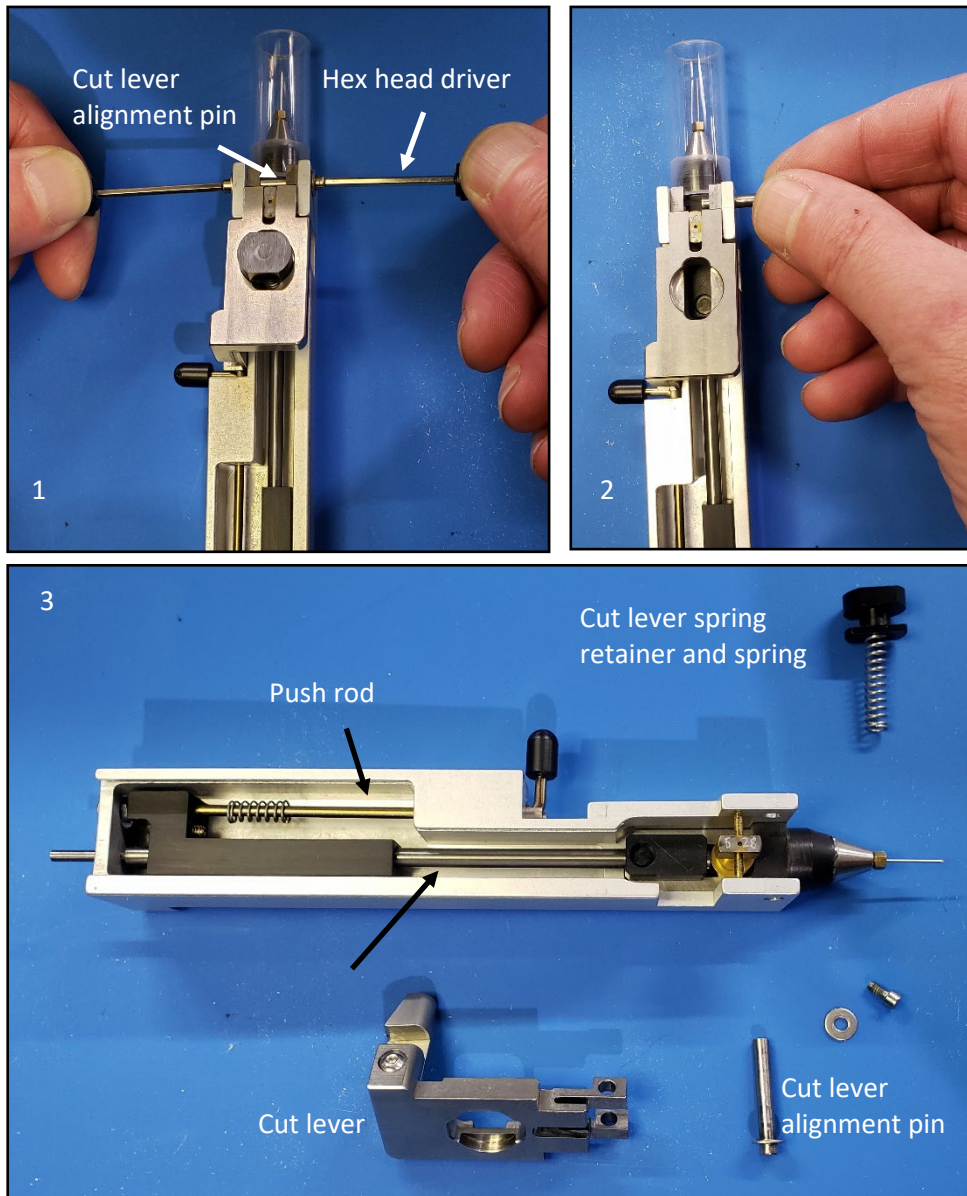


Figure 12: Cut lever removal sequence.

Only one side of the alignment pin cap screw will come free from the Multishot. The other side is permanently secured to the alignment pin.

9. Remove the cut lever by lifting the back of it to clear the Multishot body, then pulling it back to slide it off the dowel pin.
10. Remove the magnetizer assembly. Use the 3/32" wrench to remove the two main assembly screws from the bottom of the Multishot body (figure 13). Pull the magnetizer straight out away from the Multishot. The Magnetizer assembly is one piece. Do not try to separate the metal from the black plastic.
11. Remove the push rod from the push wire slide (figure 8). Pull the push rod back all the way and hold in place. Note the position of the groove in the forward end of the detent (horizontal to the left). The push rod must fit into this groove when it retracts and is important on reassembly. Use the 3/16" nut wrench to remove the nut and split washer that secures the push rod. Hold push wire slide in place and slide push rod forward so it is clear of the push wire slide. The push rod is held in the Multishot body by the push rod spring and e-clip. Remove the e-clip and slide the push rod and spring out of the Multishot body.
12. With the push wire slide fully retracted, use the 3/32" ball-driver to slide the base forward, away from the feed support tube. When the base is fully disengaged from the feed support tube, lift up, taking the base and cutter out together (figure 13).
13. Separate the cutter from the base. Rotate the cutter pin 90 degrees, in the direction which allows the flat spot on the cutter pin retaining collar to clear the locking lip of the cutter sleeve (Figure 9). The cutter pin can then be pulled up and out of the cutter sleeve.
14. Remove the feed tube support, feed tube and push wire slide. These parts are removed from the Multishot body at the same time by lifting up on feed tube support and then pulling it forward so the back of the feed tube comes out of the hole in the back of the Multishot body. Do not separate the feed tube support from the feed tube.
15. Remove pushrod detent and spring as shown in Figure 14 to complete the disassembly.

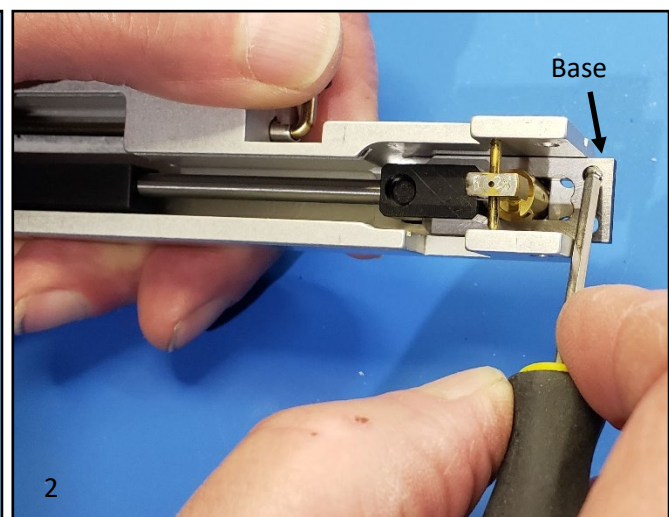
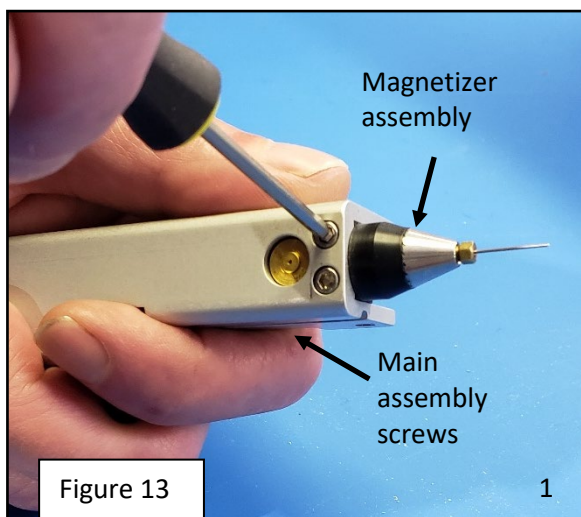
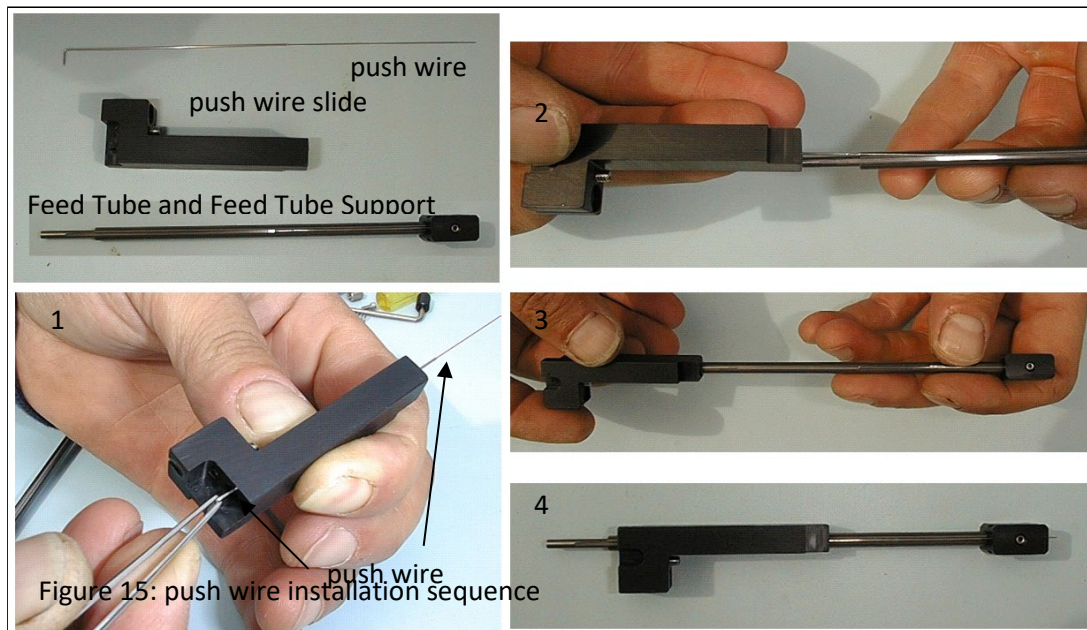


Diagram illustrating the removal of the detent from the handle assembly. The main image shows the handle assembly with a callout box highlighting the detent area. The callout box shows a close-up of the detent and detent spring. An arrow points to the detent nut, which is labeled "Detent nut". Another arrow points to the detent and detent spring, which is labeled "Detent and detent spring". A text box with an arrow pointing to the hole in the handle assembly says "Insert screwdriver through the hole to remove the detent".

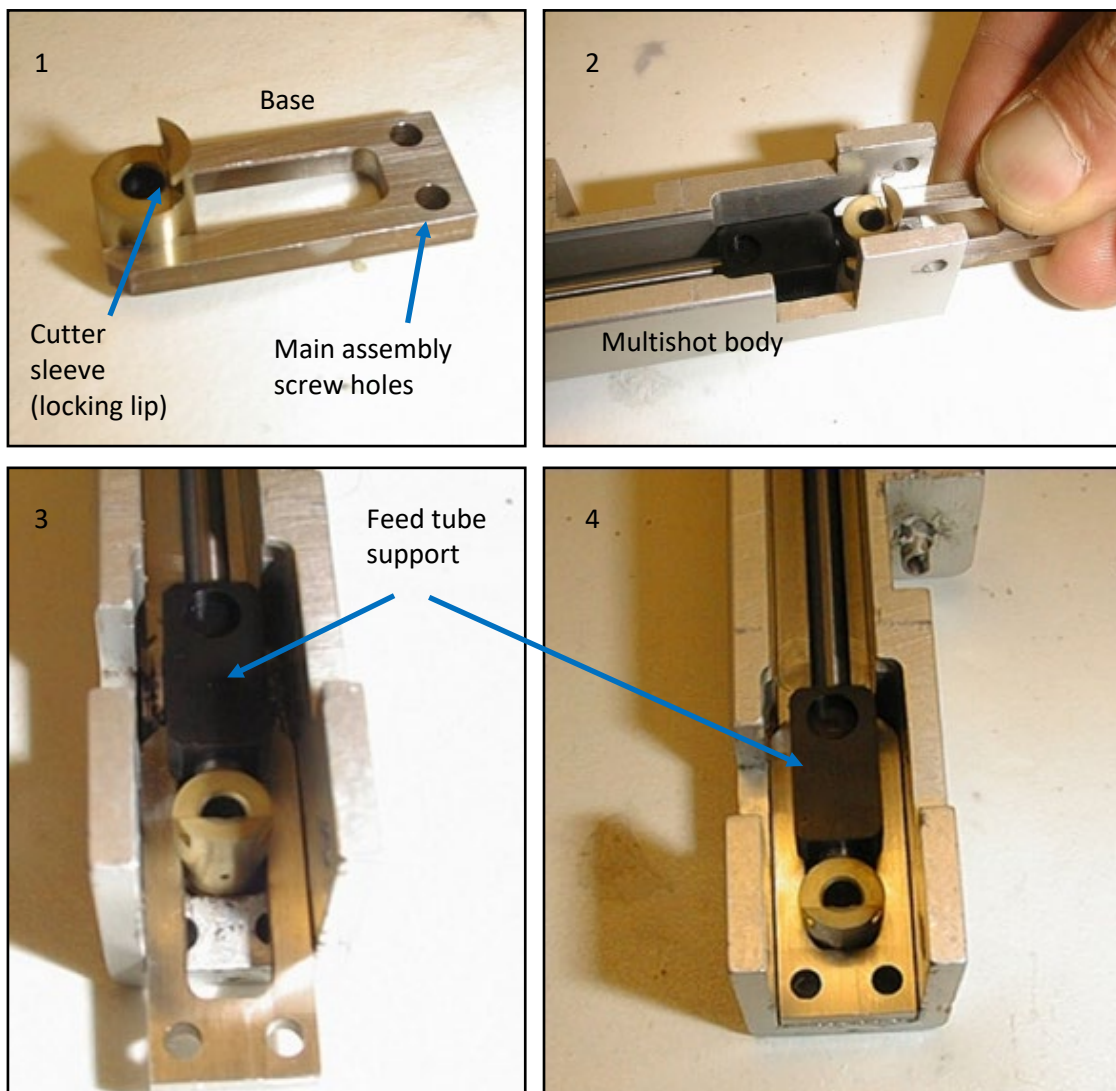
1. Reinstall the pushrod detent and spring (Figure 14). The groove in the pushrod detent should be oriented to the left so that it will accept the push rod when it is pulled back.
2. Install the push wire and push wire slide onto the feed tube (Figure 15). Note the nesting needle which is permanently

installed in the groove on the bottom of the feed tube. Note the “I” in the rear end of the push wire which fits in the small retaining hole in the push wire slide. When installing the push wire and push wire slide onto the feed tube, it is necessary to thread the tip of the push wire into the end of the nesting needle at the same time as the feed tube enters the push wire slide.



3. Hold the feed tube in one hand and the push wire slide (with the push wire installed) in the other hand. Before inserting the feed tube in the push wire slide, lay the push wire in the groove on the bottom of the feed tube. Use the tip of your finger on the hand holding the feed tube to guide the push wire into the nesting needle as the feed tube is inserted in the push wire slide. Note that the groove on the bottom of the feed tube must be aligned with the "I" in the rear of the push wire so that the feed tube can go all the way through the push wire slide.
4. Install the feed tube support, feed tube and push wire slide (assembled in step 2) into the Multishot body. With the push wire slide forward (towards the feed tube support), the feed tube and push wire slide are inserted in the Multishot body from the top. Using the feed tube support as a handle for the assembly, slide the feed tube in the hole in the rear of the Multishot.
5. Slide the fingers of the base over the grooves on the side of the cutter sleeve, until the cutter sleeve is flush with the end

Figure 16: Cutter sleeve and base installation

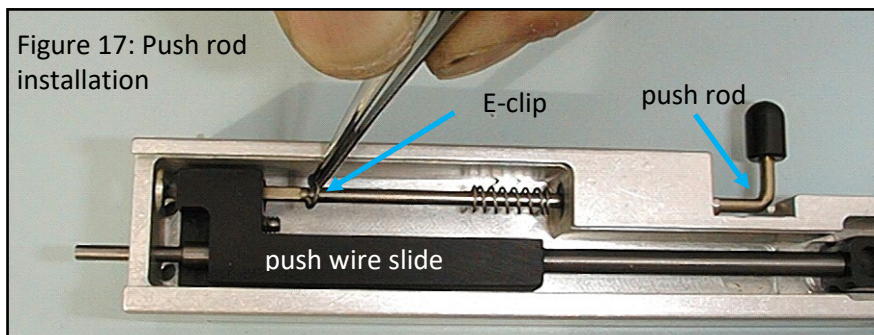


of the fingers (Figure 16). The cutter sleeve's locking lip should be oriented towards the main assembly screw holes of the base. Holding the cutter sleeve with the base, drop the sleeve into its hole on the Multishot body. Line the base fingers up with the grooves on both sides of the feed tube support and slide the base in as far as it will go. The main assembly screw holes of the base and Multishot body should now be lined up. Install the push rod. The handle end of the push rod must be horizontal so the threaded end can pass through the slot in the push wire slide. Also check that the groove in the forward end of the detent is horizontal, facing left, so that the push rod fits into the groove when fully retracted. Replace the spring on the push rod and secure it with the e-clip (Figure 17). The e-clip on the push rod must fit in the recess in the push wire slide. With the handle end of the push rod lever horizontal, insert the threaded end through the push wire slide and out the hole in the rear of the Multishot body.

6. Install and tighten (just snug, do not over-tighten) the nut and washer, which hold the push rod in place at the back of the Multishot body. Install the cutter pin. Make sure the push rod is fully retracted so that the push wire does not interfere with the insertion of the cutter pin. The cutter pin has a retaining collar with a flat spot. Align the flat spot on this retaining collar so that it clears the corresponding flat spot on the cutter sleeve. The pin can now be inserted

in the sleeve. After the pin has been inserted all the way, rotate it 90 degrees in either direction to lock it in the sleeve.

7. The cutter pin has two available cutting edges. The cut edge (1 or 2) is selected depending upon the direction of rotation (clockwise or counterclockwise) after the pin is inserted in the sleeve. The convention for identifying cut edges is that inserting the pin and turning it 90 degrees clockwise (when viewed from the top) selects cut edge number 1.
8. The push wire will be used to help align the magnetizer as it is installed. To extend the push wire out the front of the Multishot apply slight forward pressure on the push rod while turning the cutter pin slightly until the holes in the cutter sleeve and cutter pin are aligned. (the holes will be aligned when the dowel pin, at the top of the cutter pin, is exactly perpendicular to the long axis of the Multishot.) When the holes in the cutter pin and sleeve align, the push wire will pass through the cutter and extend out the front of the Multishot.
9. Thread the push wire through the center hole of the magnetizer and align the two mounting holes in the magnetizer with the matching holes in the Multishot base. Insert the two main assembly cap screws from the bottom side and use the 3/32" wrench to tighten the magnetizer in place. Keep the push wire extended.



10. Install the needle with nylon ball and the needle clamping nut (figure 3). As in step 11 above, the push wire will be used to guide the needle into the cutter sleeve. Slide the nylon ball on the needle so it is about one third of the length down the needle from the tip (the beveled end). This ensures that the needle will seat against the cutter

The cutter pin, which is installed in step 8, is the depth stop for the needle once it has entered the cutter sleeve. The cutter pin must be installed before the needle can be properly installed.

before the nylon ball bottoms out in the magnetizer. Use the push rod to keep the push wire extended out the end of the magnetizer. Insert the end of the extended push wire into the funnel (or dull end) of the needle. Insert the needle into the magnetizer and all the way back to the cutter. Rotate the needle as it is inserted so it will fit in the small recess in the cutter.

11. Place the brass needle clamping nut over the end of the needle and use the 1/8" wrench to push the needle clamping nut and nylon ball back until the threads of the nut can engage the threads of the magnetizer assembly. Tighten the nut until it is just snug (approximately a quarter turn). The nut will compress the nylon ball around the needle to hold the needle in place. However, note that over-tightening the needle clamping nut can damage the magnetizer.
12. Loosen the needle clamping nut a quarter turn and then re-tighten one quarter turn. Repeat the loosen/re-tighten step a total of three to four times. This step ensures that the needle is properly seated against the cutter without being so tight as to bind the cutter.

13. Install the cut lever. Slide the push rod all the way back to make sure the push wire is out of the cutter. Install the cut lever by tilting the front end down so the slots in the front of the cut lever can be slipped on to the cutter dowel pin. Make sure the push wire stays retracted. Position the cut lever so the cut lever alignment pin with two screws and washers can be installed. Tighten the screws with the two 5/64" hex head driver.

14. Install the cut lever spring and spring retainer. If the cut lever spring and spring retainer have separated, insert the cut lever spring in the hole in the cut lever spring retainer. Retract the push rod and move the cut lever to its "up" position. Use your finger to apply slight upward pressure on the cut lever. Insert the cut lever spring through the opening in the top of the cut lever and make sure the end of the spring goes in the recess in the top of the feed tube support. Install the cut lever spring retainer by inserting it in the slot in the cut lever, and while pushing it down, turn it 90 degrees to lock it in place.

15. Slide the body cover into the slots in the Multishot body, from back to front.
16. If you are using the head mold holder, install it by loosening the head mold attachment set screw with the .050" wrench and sliding the head mold holder onto the magnetizer assembly as far as it will go. Tighten the set screw snug, but take care not to over-tighten or you may damage the magnetizer.

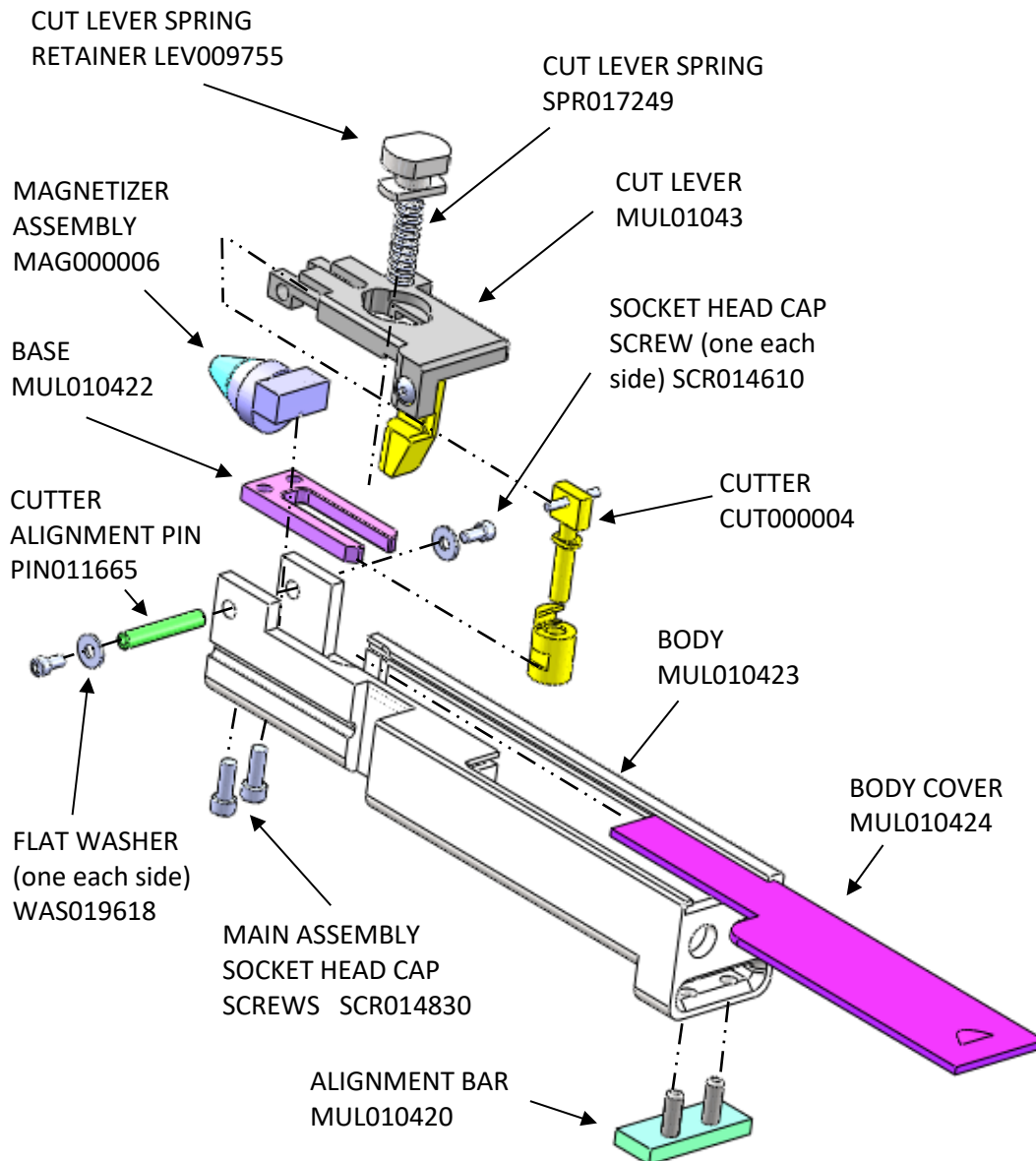
17. To reinstall the drive roller assembly, slide the wire advance lever into position through the side of tag supply body. Place the drive roller assembly into position through the hole in the wire advance lever. Secure with the drive roller shoulder screw. Slide the wire guide in towards the drive

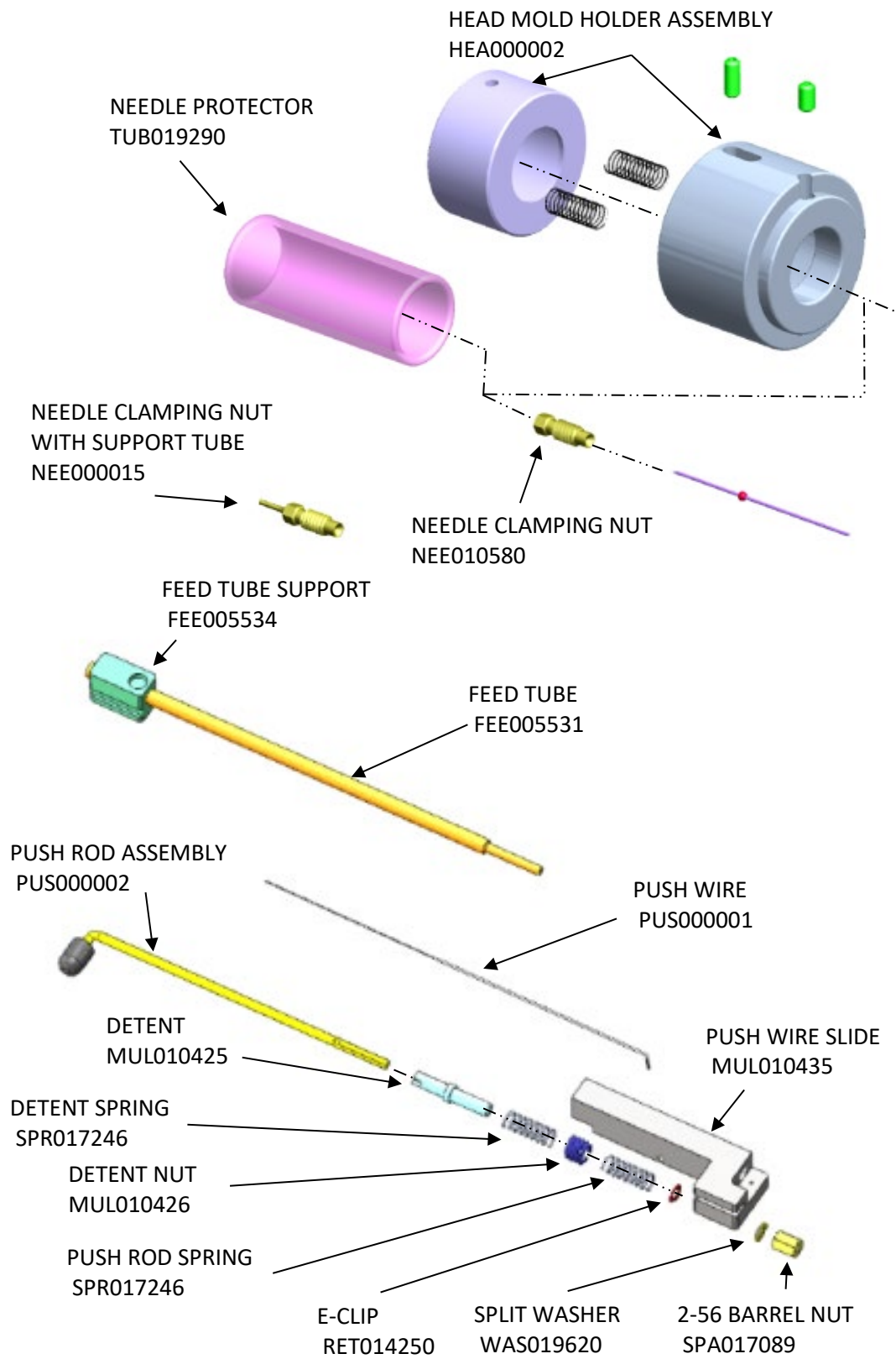
roller assembly and tighten the wire guide set screw. Position idler roller and secure with idler shoulder screw. Position wire advance lever spring into the location hole on the wire advance lever and compress this spring by pushing the wire advance lever until it touches the tag supply body. Holding this position, set the wire advance lever stop set screw to the position for a standard length tag and release the wire advance lever. Place the pull spring over the two holes on the wire advance lever and install the two pan head screws. Advance the wire advance lever to ensure that it “clicks”. Replace the tag supply body cover by sliding it into the slots from the back.

18. Attach the tag supply body to the Multishot body by pressing the two together. The two prongs on the tag supply body fit in the slot in the rear of the Multishot body. Ensure the two pieces are aligned so you do not break the feed tube, which extends into the tag supply body. The two pieces fit together fairly tightly so some resistance will be felt.
19. Insert the alignment bar to secure the supply body to the main body.
20. Test the now fully assembled Multishot by checking for smooth operation of cut lever through full range of motion. With cut lever depressed, test that the push rod slides forward and retracts smoothly.

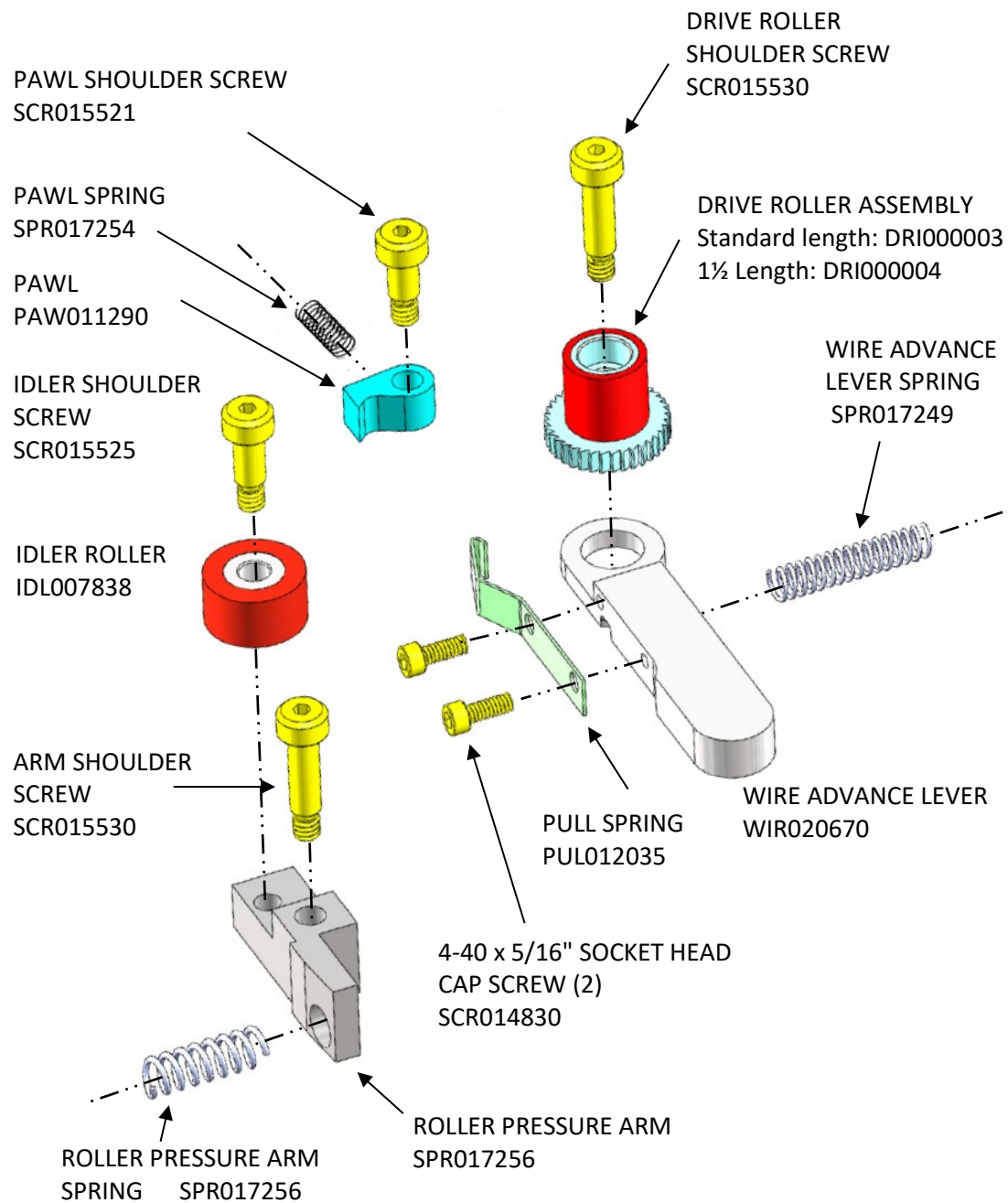
6 Parts Reference

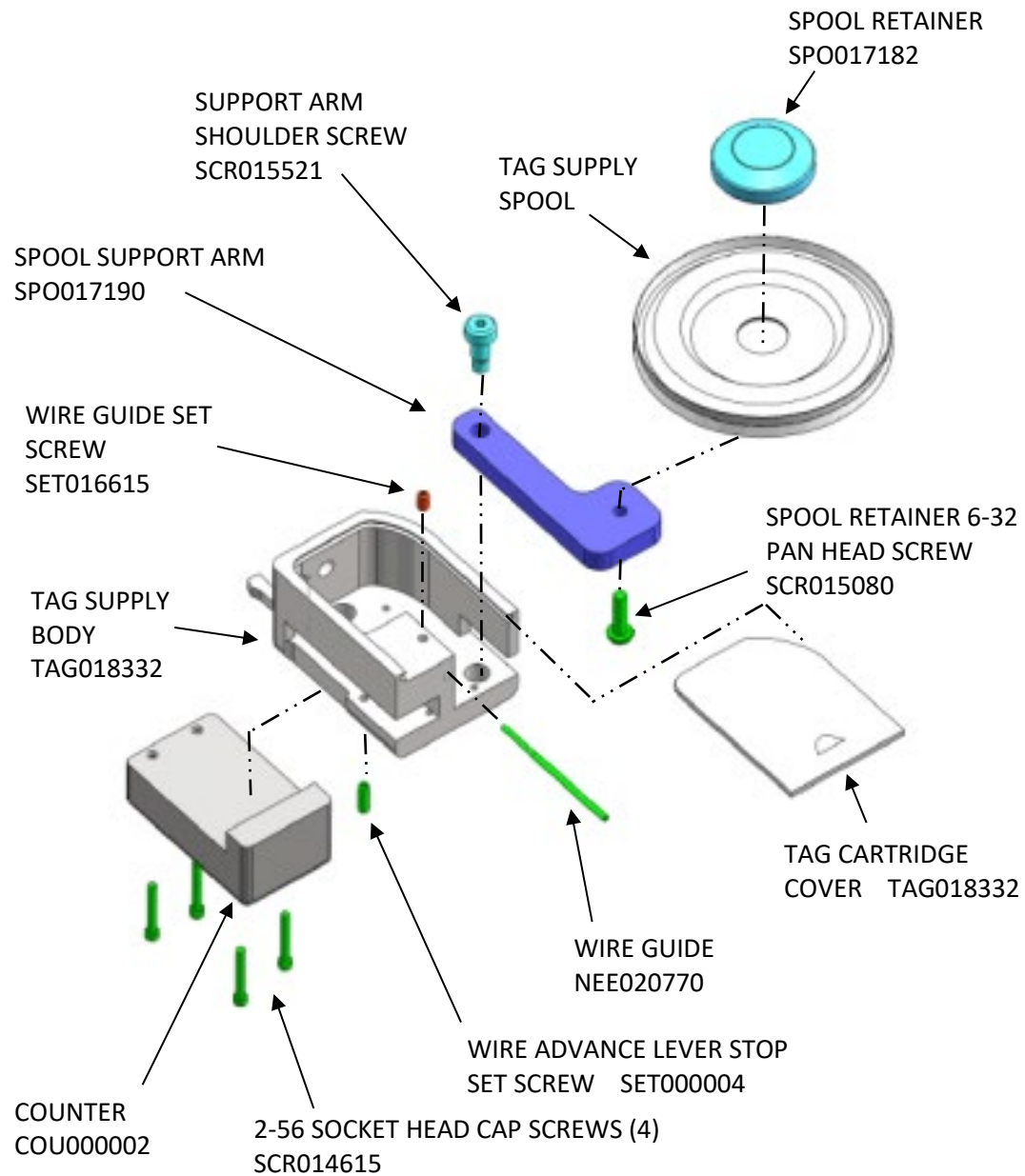
6.1 Multishot body





6.2 Supply body





7 Tool Kit Contents



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| 1. Needle nut with support tube and spare push wire assembly | 12. Pin-vise with reamer |
| 2. Hex ball driver 5/64 inch | 13. Hex nut driver 3/16 in. |
| 3. Hex ball driver 3/32 inch | 14. Spare screws (standard) & ratchet for 1.5 length tags (optional) |
| 4. Hex ball driver 5/64 inch | 15. Multishot CWT Injector |
| 5. Hard wire diagonal cutter | 16. Forceps |
| 6. Needles (1 package of 5) | 17. Arkansas stone |
| 7. Screwdriver, medium blade | |
| 8. Needle nut driver | |
| 9. Loupe 5x | |
| 10. Hex ball driver 0.050 in. | |
| 11. Head mold holder assembly | |