

## **LAMBETH - MICROMETER ADJUSTABLE REAMER STOP – (MARS)**

### **BACKGROUND**

There have been many changes in the techniques to chamber a rifle barrel. Great improvements in technology and materials has moved rifle barrel chambering from very slow and tedious to a high-speed operation. In the past, it could take several hours to cut a chamber, today this is possible in thirty minutes or less. There is one thing that has not changed. If you cut a chamber too deep, you have at least another hour of work to correct the problem assuming you have enough barrel tenon to work with. If the over cut barrel is too short, you have to start all over with a new barrel that you cannot bill to the customer. The old adage 'measure twice and cut once' really applies when talking about chambering especially considering the difference between a go and no-go gage is only about .0035 of an inch.

When holding the receiver action in your hands, it is easy to measure the depth from the face of the receiver to the bottom of the bolt face. When you cut your tenon, it is relatively easy to measure the tenon length. One would think it would be easy to measure from the back of a case head or head-spacing gauge to the face of the tenon but it is not easy because the case or gage is not held steady in the unfinished chamber. Rimless cases headspace off the shoulder, belted magnums headspace off the belt rim, and rimmed cases headspace off the rim. When what you are measuring can rock and you are only measuring thousandths of an inch, it is very difficult to get an accurate reading. With coned tenon and bolt faces, there is no flat surface to measure on either meshing surface. Often, a gunsmith makes many measurements, and many cuts before he gets the chamber cut precisely to the depth needed. This can be a very slow and meticulous process. Many gunsmiths measure the reamers cut depth with the micrometer index on the lathe tail stock hand-wheel, others use a dial indicator and a piece of stock clamped on the tail stock body; these methods work only if the tail stock returns to the exact same location on the lathe ways after the reamer is withdrawn. Most gunsmiths withdraw the reamer and tail stock many times when clearing the chips making it difficult to consistently measure the reaming depth by using the tail stock hand-wheel and/or an indicator against a piece of stock clamped to the tail stock body.

There are several very precise and critical metal-to-metal unions in a firearm. One is the fit of the barrel to the action. Another is the relationship of the chamber to the union of the barrel and action. If these relationships are not done correctly and precisely then the firearm will not shoot accurately and may even be dangerous. Some smiths cut the threads and complete the tenon first. Some chamber first then thread. Some cut the tenon long and chamber a little deep then part off as needed. No matter the method used, the best method includes the cutting of the tenon, threading, and chambering all in the same set-up insuring concentricity and co-axial alignment. Measuring .001 off the back of a case go-gauge to the tenon or shoulder can be a little tricky as the go-gauge may rock a little. This measurement needs to be precise and is critical. Measuring from the action and transferring those measurements to the tenon and chamber can be difficult for some people; there is another way;

### **WHY USE THE MICROMETER ADJUSTABLE REAMER STOP**

1. Precision measurement is necessary for accuracy and safety.
2. It make a job for the beginner much easier
3. It makes a job for the expert much faster.
4. It prevents mistakes.
5. It saves on tool wear.
6. It allows exact duplicate chambers so precision loaded ammunition may be shot in different barrels.
7. It allows for custom throat depths and lead angles to be cut to precise depths.

## PURPOSE

The Micrometer Adjustable Reamer Stop (MARS) is exactly what the name implies. It is a mechanical stop that is attached to a reamer (chamber or throat) giving the user a fixed stopping point that can be adjusted to any other measured fixed stopping point. The (MARS) measures off the reamer and is designed to work with high-pressure flush systems and/or floating reamer holders. Returning the tailstock to the exact same position on the ways is not necessary when using the MARS.

The only way one can consistently measure the reaming depth is to measure from the front or back of the reamer to the point on the reamer where the barrel tenon ends. This is difficult because the reamer has no graduations marked and measuring the actual chamber depth is often difficult. Without the MARS, the gunsmith has to return to the same exact point where the reamer was located prior to withdrawal to accurately continue reaming the chamber. All reamer makers have made collars that attach to a reamer shaft with a setscrew. These collars would be preset to allow for a specified reaming depth. This works but often requires multiple adjustments. One afternoon while thinking about chambering and making a collar like previously described, a new idea came to make a body that had a threaded OD and make two collars with IDs threaded to fit the body OD. These two collars would jam against each other allowing for lockable length adjustment of the two collars. With threads cut at 40 per inch and 25 evenly spaced marks on the collar, in essence the collar became a micrometer dial. There are four evenly spaced marks put on the reamer stop body for referencing. When the outer collar is threaded down on the body, each time a mark from the outer collar passed a mark on the inner collar the length of the entire combined pair of collars would be lengthen or shortened by .002 two-thousandth of an inch. Each body is threaded to allow for .250 of adjustment. There are two different lengths of collars; one is .375 (short) and the other .625 (long) each having a .125 knurled section for easy handling. The collar is designed to bottom out on the barrel tenon and prevent the reamer from reaming any deeper. The reamer becomes a micrometer pinion. The outer collar becomes the micrometer anvil.

Knowing the depth from the front of the receiver to the surface of the bolt face and knowing the length of the barrel tenon, one can add the thickness of the recoil lug and the .001- .002 crush factor; calculating the needed length of case protrusion from the barrel tenon. The head spacing needs to be between .001 and .0035 to meet the SAAMI specs. With all this information, we can pre-set the MARS preventing the reamer from going too deep in the barrel. Just for safety sake, we would set the MARS about .020 to .030 thousands of an inch short of final cut. Then with the MARS adjustability, we go to the specified depth by using the micrometer adjustments. One method to measure reaming depth while the action is still set up in the lathe is to use a feeler gauge between the barrel shoulder and/or recoil lug and the receiver face. With the MARS, one can now cut to the final chamber depth. Additionally, a gunsmith can cut multiple chambers identical in depth without any other measuring.

The MARS can be used in conjunction with any known floating reamer holder. The MARS can also be used by gunsmiths who do not have a lathe by using a hand powered driver and/or wrench. The MARS affixed to the reamer will bottom out at the designated depth when hand reaming a short chambered barrel. The MARS can also be used with throat reamers to cut precise depth throats. The MARS can also be used to cut wildcat chambers.

With this assortment of different length bodies and collars, you should be able to cut chambers from rim fire through the largest black powder cartridges. If you need a longer MARS body, we can make that for you. If you have a need for 50BMG or shotgun reamer stops we can custom make them. Other Micrometer Adjustable Reamer Stop products are available for other industry needs.

## HOW TO USE THE MARS

Most commercially produced reamers have a squared juncture between the .437 shank and the reamer body. Some reamers have a datum line identifying the end of the case head location.

- Select the correct body length so the MARS can adjust with the selected length collar giving the case protrusion needed for the correct head spacing.
- Remember to include the distance into the bolt face and the crush factor with a suggested safety buffer of .030-.050. This allows you to cut with confidence and then make a final measurement and cut.
- Cut the tenon the correct major diameter and OAL. Use a sharp ninety-degree shoulder with or without an undercut as a reference point for measuring.
- Using the receiver with the stripped bolt inside, the go gauge is inserted into the chamber. The action is screwed onto the tenon in the lathe. This gives a rock solid reference point to measure. Then use a feeler gauge to measure the distance between the shoulder or lug and the receiver. Then you can adjust the MARS the necessary amount to properly headspace your chamber.

If you have questions, you may call Nathaniel G. Lambeth, Sr. at Custom Guns and Ammunition, (919) 556-0554 e-mail [nlambeth@embarqmail.com](mailto:nlambeth@embarqmail.com).

## DESCRIPTION

### BODIES

The MARS comes as an eight-piece kit each piece in its own protective case. There are five different length bodies ranging in length from .750 to 1.750 inches accommodating most needs. These bodies all fit a standard .4375 reamer shank. The threaded end is counter-bored .640 to accommodate most reamer fluke ODs. Each body is threaded 40tpi for .500 and has four laser engraved marks at 90-degree intervals to be used as reference marks. There is a #10 32tpi set screw in each body. Make sure the setscrew anchors on a reamer flute and not in a reamer groove. Choose the right length body so the body can be set up against the back edge of the flutes. There is at least .250 of adjustment in each body. With the two different length locking collars: .375 and .625, the user gets an additional .500 of adjustment with each body.

### DIAL

The internally threaded micrometers dial screws down over the end of the bodies. It is counter bored so the dial will screw down past the threads and use the marks on the bodies as a counter reference. The Micrometer Dial has 25 equidistant marks and every fifth marking has a reference number. (0-20, with zero and twenty-five being the same point) The MARS dial has about .250 of adjustment with each body.

### COLLARS

There are two different length collars supplied with the MARS. The long Collar is .625 OAL and the short collar is .375 OAL. Two collar lengths give, approximately .500 in additional adjustment.

## Words of Caution

The Micrometer Adjustable Reamer Stop (MARS) is a mechanical device and is designed to be used in manual machines with hand controls and feel. It is designed to bottom out from the lathe operator's hand power. **The MARS is not intended for use on CNC or automated machines** and is not intended to stop and/or disengage a mechanical or CNC powered lathe carriage or tailstock. Use good judgment when chambering.

Do not get your fingers, hands, or any other body parts between the barrel tenon and the MARS. This tool can cause serious injury if not used correctly.

The cutting of a firearm chamber requires that the person doing the chambering have a good working knowledge of machining, metallurgy, and firearm engineering. Firearm chambers have to withstand very high pressures. This tool is designed to be used by a knowledgeable gunsmith. If you have any doubt about how to use this tool, consult with someone who knows how to use it.

Make sure your chamber is cut to the Small Arms and Ammunition Manufactures Institute Standards (SAAMI) specs.

The MARS is a precision measuring instrument. Dropping it or abusing it will void its warranty. The MARS is made from tool steel and can rust; it should be kept clean and properly lubricated. Each piece of your MARS has been packaged in individual labeled crush resistant containers to protect them from damage. The eight separate containers are contained in a heavy clear plastic zip bag with a set of instructions. You will need an Allen wrench to tighten up the setscrew.

This tool has been used and tested for several years by the manufacturer. It should last you a lifetime with proper use and care. The MARS comes with only a warranty against materials or manufacturer's defect. Any product warranty claims are to be determined by the manufacturer and are at the manufacturer's discretion. Because the use of this tool is beyond the control of the manufacture there are no other warranties expressed or implied.

Nathaniel G. Lambeth, Sr. of Custom Guns and Ammunition is not responsible for property damage, bodily injury, and/or death resulting from the use or misuse of the MARS.

The Lambeth Micrometer Adjustable Reamer Stop is available from:  
Nathaniel G. Lambeth, Sr., Custom Guns and Ammunition, 15 Sunflower Drive, Youngsville, NC 27596,  
(919) 556-0554 e-mail [nlambeth@embarqmail.com](mailto:nlambeth@embarqmail.com)