

How to Properly Use an

Hand Reamer

by Lee Carroll

Let's start off by discussing what a hand reamer is not. It is not a drill. It is not a file. It is not a tool for undoing serious mistakes.

What a hand reamer is though, is a tool for dressing or finishing a hole. If you do not have the correct size drill bit, the reamer is not the tool to adjust to the correct size. If when drilling the hole, the bit chattered, grabbed or dug into the metal, the reamer might help, depending on how badly the metal was destroyed.

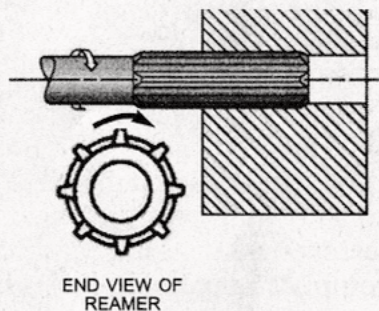
A hand reamer is intended merely to cut a thousandth or two from the surface of a hole and to result in a smooth polished hole. It will enlarge a hole a fraction to allow an insert to fit snugly, but with adequate clearance into an existing hole. If you have to enlarge a hole, let's say from $5/8$ " to $3/4$ ", the hand reamer is NOT the correct tool. But if you have to enlarge the hole from 0.498 to 0.500 or 0.502, then a reamer IS the right tool – if used judiciously.

We will only look at hand reamers in this article. Basically there are two types of hand reamers: fixed size and adjustable. Reamers are tapered; that is, one end is marginally smaller than the center. You will generally not find a major discrepancy between the starting end and the center – perhaps a few thousandths of an inch. As the reamer is turned in the hole, it

shaves a fraction of material from the surface, eventually resulting in a clean, smooth hole of the desired size.

If we may offer a one-word warning for using a reamer, that word must be STRAIGHT. The reamer must be perfectly aligned with the hole in order to result in a perfectly true bore. For this reason we recommend only hand reaming. Using a lathe, drill press, mill or (heaven forbid) a hand power drill will most likely result in a chattering reamer and a ruined hole. Low and slow. The best control over the end result is to very carefully feed the reamer into the pre-drilled hole in a smooth, continuous motion.

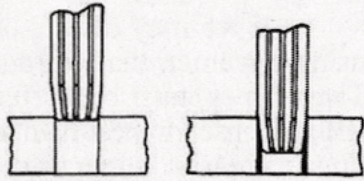
Before we go any further, let's discuss the **DON'T'S** of reaming. There are no exceptions here. When we say **DON'T**, we mean never! **DON'T** ever try to enlarge a hole more than one to two thousandths (maximum) in a single pass. If greater hole enlargement is necessary, shave only a minimum, enlarge the reamer (by using a larger sized fixed reamer or by adjusting an adjustable reamer) and then make a second pass. Be sure to clean the reamer after each pass. **DON'T** ever use a counter-clockwise rotation with a reamer. The blades are designed and honed to be turned in a clockwise rotation only. **ONLY!!** To remove a reamer from a hole, either continue to turn it in a clockwise direction until it comes out the other end, or, while still turning it in a clockwise direction, pull it out of the hole. Rotating it in a counter-clockwise direction will ruin the blades.



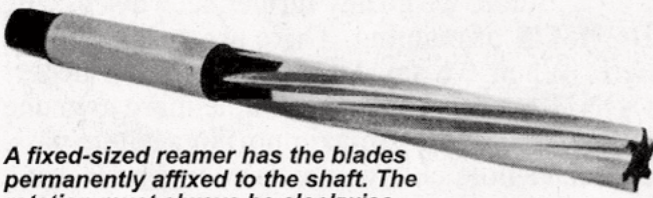
Like drill bits, files or other tools, there are a wide variety of reamers available, many designed for special uses. Since this is an introductory article on the reamer, we will not discuss the specialty reamers or their uses.

We will, though, look at both the fixed-size reamer and the adjustable reamer.

The fixed-sized reamer is a one-piece tool. The cutting blades are affixed to the shaft and may not be removed or altered. Although there is a slight taper to this reamer, the center of the tool is the maximum size. The end is generally slightly smaller than the cutting diameter to allow the reamer to be fitted into a pre-drilled hole. Each reamer will produce only a single sized hole. If the hole requires further enlargement, a larger reamer will have to be used.



The reamer end is slightly tapered. The center of the tool is the maximum cutting size.

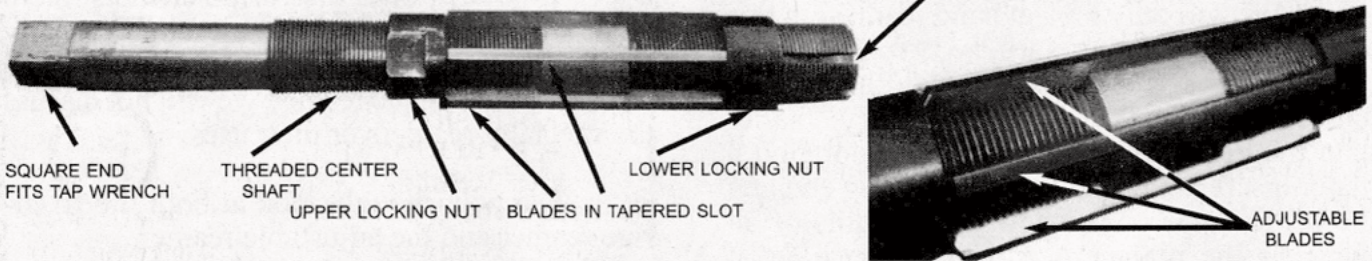


A fixed-sized reamer has the blades permanently affixed to the shaft. The rotation must always be clockwise. Note rake of the blades.

Fixed reamers are subject to blade wear which will decrease the size of the hole and the accuracy of the reamer. Once worn down, the reamer must be discarded since the blades cannot be replaced. Using an oil stone will keep the blades sharp.

The adjustable reamer makes considerably more sense for the non-production shop. Each adjustable reamer is designed to provide a considerable range of sizes. Often adjustable reamers are sold in sets offering a more or less complete range of hole-finishing options.

Basically, the adjustable reamer uses a center shaft. The center shaft is machined with a number of parallel tapered grooves into which



SQUARE END FITS TAP WRENCH
 THREADED CENTER SHAFT
 UPPER LOCKING NUT
 LOWER LOCKING NUT
 BLADES IN TAPERED SLOT

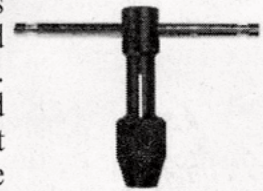
TAPERED SLOTS TO RETAIN BLADES

ADJUSTABLE BLADES

the blades fit. A nut at the lower end locks the blades into position at one end, and the nut at the upper end does the same for the opposite end of the blade. Adjustments are made by loosening the nuts, re-aligning the blades and then retightening the nuts. As the blades are shifted further up the center shaft the cutting diameter increases. The maximum amount of cut for each adjustment is limited by the taper of the blade slot in the shaft.

Like the fixed-sized reamer, the blades on an adjustable reamer do wear, but adjustment offers a greater range of flexibility in setting the correct size. When the blades wear too much or are dulled, they are replaceable. Blades are always replaced in sets so that the cutting diameter is constant.

Most hand reamers have a square end at the top of the shaft. This is so the reamer can be used with a standard tap wrench. A twelve-point box-end wrench or a twelve-point socket can be fitted to the shaft in order to turn it.



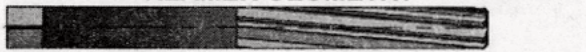
The piece to be reamed must be held in a rigid fixture. If a vise is used, the hole should be perpendicular to the top of the vise. The reamer must be inserted into the hole in a perfectly vertical position, parallel with the hole. When reaming steel, cutting oil or machine oil should be used to lubricate the blade. When reaming cast iron, soft iron, brass or other soft material lubrication should not be used.



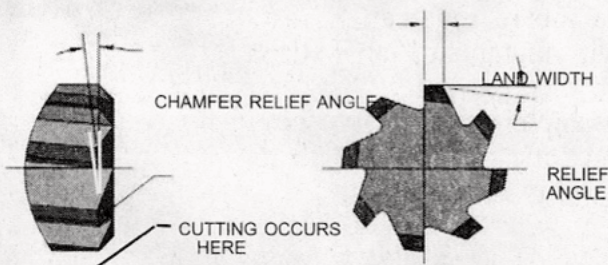
Once you begin turn the reamer in the hole continue with a steady rotation. Do not stop, remove the tool or alter your speed, or a less-than-perfect hole may result. A slow, steady pressure and rotation are best. Do not 'force' the reamer. As it rotates, the reamer will actually pull itself through the hole as it shaves the metal.

If the hole is a through-hole, continue to rotate the reamer in a clockwise position until it passes through the hole, and then remove it from the bottom. When reaming a blind hole, after the reaming operation is completed, continue to rotate in a clockwise direction as you pull the reamer out of the hole. Do not ever rotate the reamer in a counter-clockwise direction.

REAMER GEOMETRY

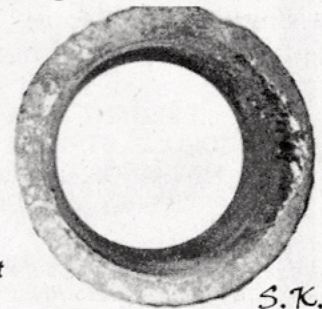


Do not push the reamer through the bore to increase feed rate. The reamer will actually pull itself through when rotated



If the hole requires additional reaming, after completing the first step either use a larger reamer or make the necessary adjustment to your adjustable reamer and then repeat.

Often, when pressing a bushing into a hole, the pressure of the press or vise will slightly distort the upper edge of the bushing. The reamer is the correct tool for removing the burrs or the rough edges prior to installing the shaft or mandrel into the bushing. Do not use a drill bit or a file to smooth the rough edges. This will generally make the roughness more noticeable.



The top lip and inside surfaces of this bushing were galled and crushed during installation. The correct sized reamer will clean up the bushing without altering the size.

A reamer is a precision tool. Keep it clean and lightly oiled between uses. Do not allow it to contact other tools or damage to the blades could occur.

EVENTS

CALIFORNIA

San Bernardino, June 11,12 Swap Meet, Little League Hdqtrs, by Model T Ford Club. Info 909-754-2360

Placentia, June 25, Swap Meet, El Dorado High School, by Orange County Model T Club. Info 714-542-8258

Pomona, June 26, Literature Faire, NHRA Museum by SoCal Chap of SAH. Info md.feinstein@hotmail.com

Oxnard, June29, Studebaker Car Show, Murphy Auto Museum, by LA Chapter SDC. Info (818) 606-0267

Los Alamitos, July 23, Swap Meet, Los Alamitos Race Track, by Long Beach Model T Club. Info 562-597-5936

NEW YORK

Liverpool, July 10, Truck Show, Longbranch Park, by American Truck Historical Society. Info 315-687-1165

TEXAS

Wylie, July 2, Car Show, Olde City Park, by the Wylie Downtown Merchants Association. Info 214-769-5314

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