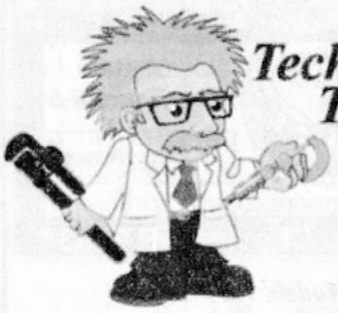
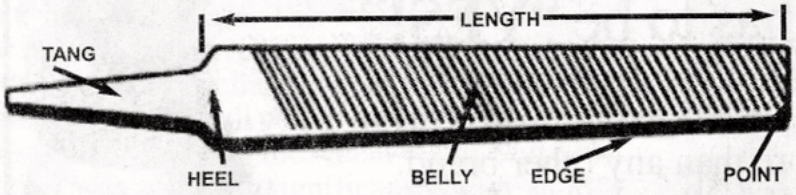


Using A Metal File

by Lee Carroll

The file is an old tool, probably dating back to the stone age. Leonardo DaVinci was the first to attempt to make files by machine. Originally files were made of soft metal which was cut and then hardened.

All hand files have similar component parts. The front of the file, generally square, is nevertheless called the point. The working body of the file has cutting edges along its length, and sometimes on the edges as well. This section is called the belly of the file. Beyond the belly is a smooth section called the heel, and beyond that is the tang, generally a tapered section designed to fit into a wooden or plastic handle. Files are measured from the point to the heel. The tang and/or handle is not considered a part of the file's length.



Most files (and there are always exceptions) fall under the category of American Pattern files or Swiss Pattern files. Okay, it gets a little confusing here. American files are available in three levels of coarseness: the Bastard, the Second Cut and then the Smooth Cut. The coarseness varies, even within a type of file. A 12" Bastard file is much more aggressive than an a 4" Bastard file. Smaller files are generally used for finer work. But within each class of file the relationship to coarseness remains constant. Regardless of size, the Bastard file is the most aggressive in removing metal; the Smooth is the least aggressive often used for final smoothing or finishing work.

Swiss Pattern files are often used for finer work by jewelers, clock makers, tool and die makers, etc. They come in seven grades of coarseness ranging from the most aggressive known as a 00 grade to a number 6, the finest level of coarseness.

Swiss-Pattern Files— Scale of File Cut Grades

00 Coarsest	0	1	2 Medium	3	4	5	6 Finest

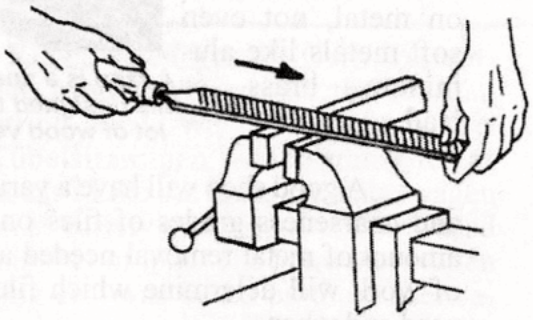
Teeth Per Inch	30	41	51	64	79	97	117	142	173
Files 10" and Over In Length	00	0	1	2	3	4	—	6	—
Files 4" to 9" In Length		00	0	1	2	3	4	—	6
Files 3" In Length			00	0	1	2	3	4	—
Escapement Files			00	0	1	2	3	4	—
Needle Files 4" to 7-3/4"			0	0	2	3	4	—	6
Regular Rifflers				0	—	2	3	4	6

The cutting surface of a file may be a Single Cut, with the cutting edges running at a single angle to the length of the file. The Double cut has two cutting edges, running perpendicular to each other.

There are a number of sub-categories of files such as Machinist's files, Saw Sharpening, Swiss Pattern, Swiss Pattern riffler files, Swiss Pattern needle files and others. For the most part, automotive work falls under the Machinist's file category, although fine, delicate work may require smaller, finer specialty files.

A file is a specialty tool, designed (primarily) to remove metal and smooth a surface. There are three techniques which are used in filing: Straight, Draw and Lathe.

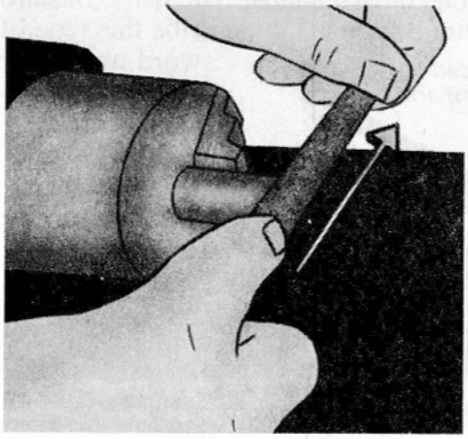
Straight filing is the most commonly used method. The workpiece should be held firmly in a vise. The file is gripped by the handle and the point and is moved across the workpiece straight or at a slight diagonal to the workpiece. The cutting is done on the forward stroke; the return stroke actually should not even contact the workpiece. Initially a



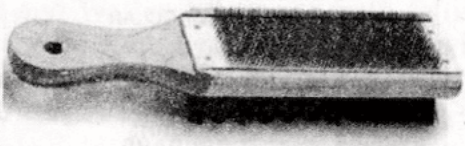
the filing with the least aggressive of the files.

Draw filing entails gripping the file at both ends and drawing it backward across the workpiece. Cutting is done on the return stroke.

Lathe filing has the workpiece chucked up in a lathe and rotating while the file is drawn across the workpiece. Lathe filing can be very dangerous. Proper hand and eye protection should be used and concentration on the job at its highest level is required. The rotating workpiece has a tendency to 'grab' at the file, either tearing it from the hands of the operator or slipping off the target area of the workpiece. A file with an exposed tang should never be used for lathe filing. The sharp end of the tang can be a spear, if grabbed by the workpiece.



A file cannot effectively be resharpened. As the teeth get dull and worn they lose their ability to cut metal and require more work to do a job. The end result will not be as effective as when using a clean, sharp file. Metal particles will get caught in the teeth of a file. These, too, impair the effectiveness of the cutting. The file's teeth should be cleaned regularly using a special tool known as a file card. A file card is a short stiff-bristled brush designed for removing the metal particles from the teeth of a file.



The strokes of a file should be slow and steady. Rapid 'sawing' back and forth is not effective. The teeth should do the cutting. When it gets to the point that excess pressure is required to cut metal, the file should be discarded and replaced with a new tool.

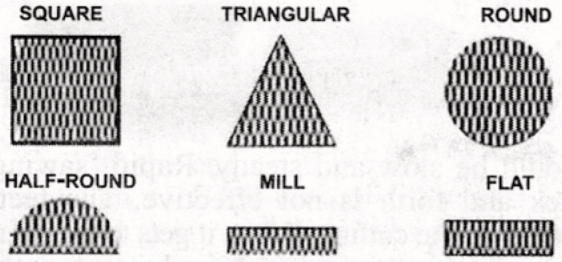
Most of us abuse our files; they are tossed into a box or drawer where they contact other tools. The teeth will get broken or dull. Files should be kept in a dedicated drawer or box with a soft liner and never stacked one on top of the other. Optionally a cardboard sleeve fitted over the belly of the file will protect it.

Different materials require different techniques and also present special problems. Steel and stainless are quite hard and require a sharp tool and long, steady strokes.

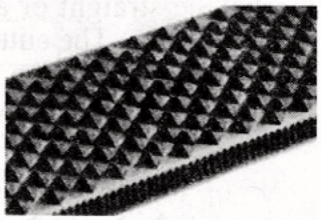
Soft metals like brass or aluminum often require a specialty tool. Aluminum in particular has a tendency to clog the teeth of a file, and the heat of the filing process can 'weld' the aluminum chips to the file belly. Slow, gentle filing is best on soft metals to keep the cut from being too deep and to keep the heat at a minimum. When filing aluminum, the teeth should be cleaned fre-

quently. If the file card is not able to clear the aluminum or brass chips, it may require cleaning the teeth with a wire brush in a bench grinder. If the wire brush does not completely remove the chips, it is probably time to replace the tool.

Most files are flat shaped or mill shaped, that is both major faces of the file are flat and parallel to each other. But specialty files can take any number of shapes: round, half-round, square, triangular, tapered or even flat on one side and half-round on the other. Needle files are often very pointed, with a sharp pointed end rather than the more traditional square end.



We have been discussing filing metal, but a file can be used to file and shape wood, plastic or other composition materials. Special rapid cutting tools for wood and plastic are called rasps. They remove a lot of material with each stroke, but leave a very coarse finish which has to be filed down using a less aggressive tool. Metal files (sometimes called mill files) can be used to shape wood or plastic, but a wood file (sometimes called a cabinet file or a pattern-maker's file) should never be used on metal, not even soft metals like aluminum, brass or lead.



A rasp is a special coarse file designed to remove a lot of wood very quickly.

A good shop will have a variety of types and coarseness grades of files on hand. The amount of metal removal needed and the type of work will determine which file should be used and when.

S.K.

WHY IS IT CALLED A BASTARD?

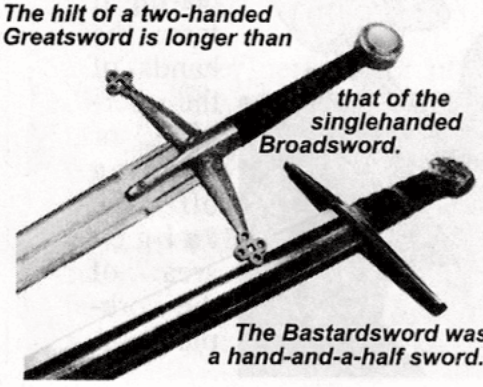
As a kid, I always appreciated the term 'bastard file' because I could use a bad word without getting punished or getting my mouth washed out; it was a chance to repeat a word that was otherwise verboten. But it doesn't answer the question of why that particular name.

A little research turned up a couple of plausible (if not verified) origins of the phrase 'bastard file'. As discussed above, the bastard file is a coarse file. I have read that there was an even coarser file, so the file that fit in between the coarsest and the second cut really didn't have credible parentage, and so it was a 'bastard'.

Another source credited the name to Medieval swords. The Greatswords were large two-handed swords. The length of the Greatsword ranged from from 50 to 72 inches, with a handle that measured 18 - 21 inches in additional length. Greatswords weighed between 6 - 10 pounds. The Greatsword featured an extended handle that allowed the blade to be used in two hands.

The Broadsword - one of the earliest of the Medieval swords - had a two-edged blade measuring 2-3 inches wide at the base and tapering to a point. The length of the Broadsword ranged from 30 - 45 inches and it weighed between 3 - 5 pounds.

A Bastardsword could also have been described as a long sword or a hand-and-a-half sword among other names that it probably had. Literally all these names refer to the same thing, which is a long sword with a long handle used with either one or two hands. The name Bastard sword had not been used to describe this type of sword until after the Medieval period had ended.



The hilt of a two-handed Greatsword is longer than that of the singlehanded Broadsword.

The Bastardsword was a hand-and-a-half sword.

Factual? Who knows? The answer is as good as any that I've come up with.

S.K.