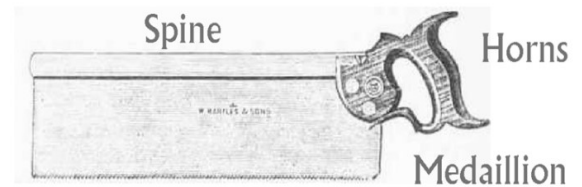
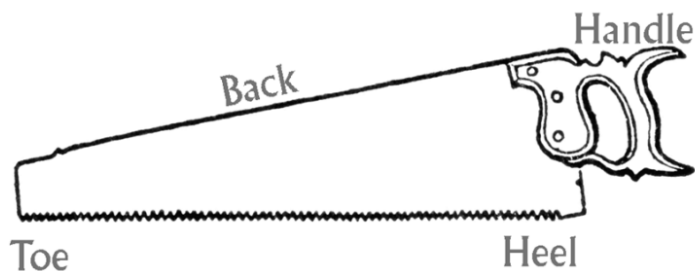




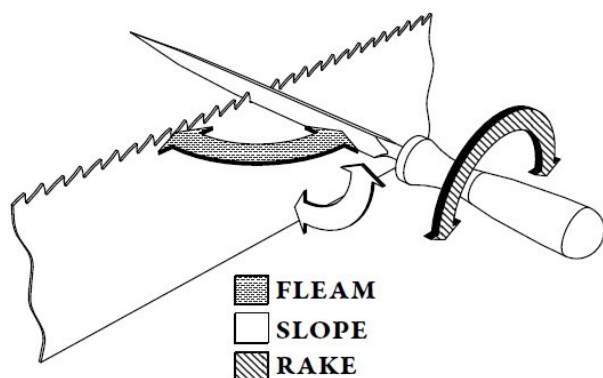
# Sharpening a Hand Saw



Type	Filing	Pitch	Length	Plate Depth
Hand Saw	Rip	4-6 ppi	24-28"	N/A
Hand Saw	Crosscut	6-9 ppi	24-28"	N/A
Panel Saw	Rip	8-10 ppi	18-24"	N/A
Tenon Saw	Rip	10 ppi	16-20"	Deep
Sash Saw	Crosscut	11 ppi	14-16"	Medium
Carcass Saw	Crosscut	12-14 ppi	12-14"	Medium
Dovetail Saw	Rip	14-20 ppi	6-10"	Shallow
Frame Saws	Rip	3-4.5 ppi	24-48"	N/A



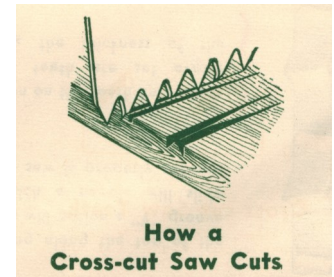
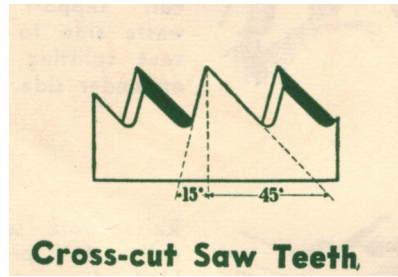
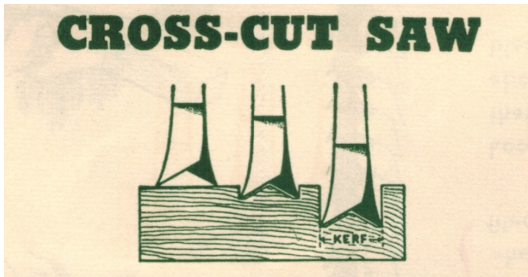
- **Rake:** eases the action of the saw
  - Positive rake is very aggressive usually softwoods
  - Relaxed rake for harder woods and cross-cutting
- **Fleam:** turns chopping teeth into slicing knives
  - More fleam equals cleaner cut but weaker tooth
- **Slope:** attitude of the file to the saw plate
  - More slope can increase dust removal
  - Too much can create tear-out.
- **Set:** creates the kerf for the saw to run in
  - Less is more in most hardwoods
  - More is more in green and softwoods



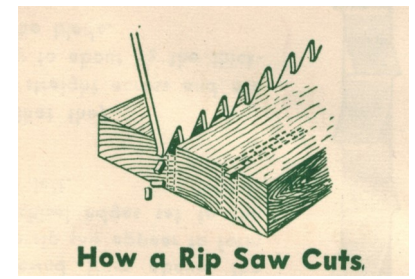
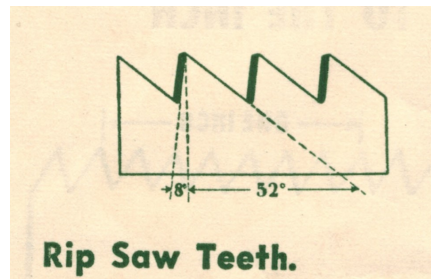
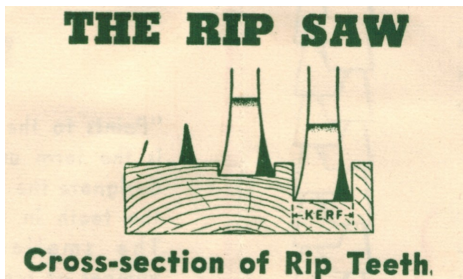
## Saw Geometry

RAKE	RIP	crosscut	backsaws
Hardwoods	6-10	12-15	12-20
Softwoods	0-6	12-15	12-16
Fleam			
Hardwoods	0-6	15-20	15-30
Softwoods	0-6	20-25	20-30

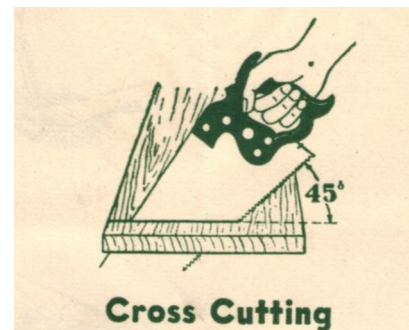
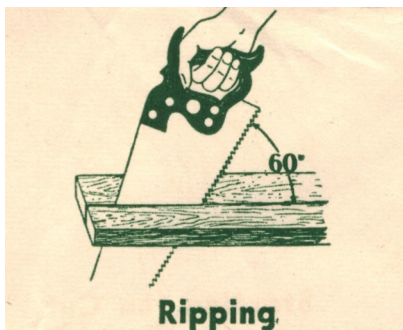
**Crosscut saw:** used to cut across the grain of the wood. Teeth are like serrated edges on a knife.



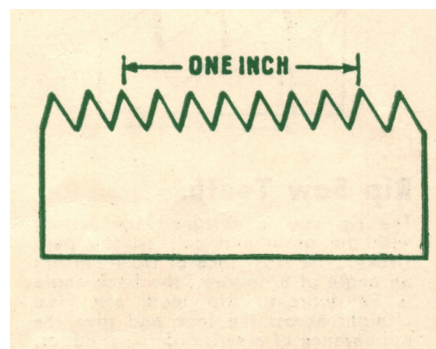
**Rip cut:** used to cut with the grain. Teeth are like small chisels.



Appropriate cutting angle for rip and crosscut saws.



Teeth are measured by points per inch (PPI)



My process for unrestored saws:

- Joint
- Shape
- Set
- Joint
- Sharpen
- Stone

If the saw is already restored maintenance sharpening can be done:

- Set (if needed)
- Joint
- Sharpen

When shaping or sharpening it is always done from the handle side to the toe side.

**Jointing:** Done by taking a mill file at a 90 degree angle to the teeth and running it down the teeth, from the handle to the toe. When done in connection with shaping jointing will probably take more passes than with sharpening. The more you joint the more work you will have to file to bring the teeth back up. If you have a short tooth or a broken tooth all the other teeth will have to be jointed to the low tooth's level to bring them all back up to the same height.

**Shaping the teeth:** This is the first step on an unrestored saw. This step gets all the teeth geometry the same and will bring all the gullets to the same depth. Shaping the teeth requires alternating pressure on the two teeth in contact with the file to ensure that the handle side tooth flat is filed away at the same time that the gullet reaches the same depth of the previous gullets. The flat on the toe side tooth will usually still remain when the handle side flat is filed away. When shaping the teeth on a crosscut saw, shape the teeth into a rip style to get the tooth geometry and gullets the same.

**Setting the teeth:** This is the process where every other tooth is bent in opposite directions to establish a kerf in the cut. Setting should be done to the upper half of the tooth. If no set is applied than the blade will likely bind while cutting (on most saws). Too much set will cause your cut to be rough and will require more power to push through the cut. Hardwoods require less set than softwoods. Crosscut requires more set than rip saws do. Setting with a saw set will often pinch the end of a tooth, slightly deforming the fresh edge that was previously filed on the teeth, this is why setting comes before sharpening. When re-sharpening a saw, setting isn't always required. Don't over do it!

**Sharpening the teeth:** Sharpening is similar to shaping but to a lesser degree. The teeth should already have the same geometry and the same gullet depth. Slightly overset the teeth so once they are jointed and sharpened they will have the appropriate amount of set. A light joint is usually enough to bring small flats to the teeth. The goal is the same as the shaping; to file the flat of the handle side tooth away at the same time that the gullet is brought to the same depth of the previous gullets. **If you file beyond a flat on a tooth you will create a short tooth!**

**Stoning the teeth:** This is done to eliminate the burrs on the sides of the teeth that were created by filing. Take painters tape and run it the length of the blade just above the teeth. The tape will be used as a depth stop for your file. Take a fine file and run partially over the teeth and partially over the blue painters tape. Use very light pressure on the file, only enough to move the file. Should be done both on the left and the right side.

## Troubleshooting:

- If you get a saw with too much set the best way to reduce the set is to joint and re-sharpen. Hammering out the set could make the teeth brittle and cause them to break when you try to set them later.
- If your saw is pulling to one side while sawing, stone the side of the saw that it is pulling to. For example, if the saw is pulling to the right, add painters tape to the right side of the saw and run the fine file over the right side of the teeth. This should remove some set or burrs and correct the issue.

### Recommended File Sizes:

File Size	PPI
7R	4-5.5
7S	6-7
6S	8
6XS	9-10
5XXS	11-14
4XS	15-18
Needle	Over 18

### Other Recommended Tools:

- Saw Vise
- 8" Mill File
- File Handles
- Dia-sharp 25 Micron Mini Hone
- Painters Tape
- Fleam and Rake Guages

### Common Backsaw Pitches

9-10" Dovetail	14-16	Dovetails
10" Carcase	14-15	Dovetails & small tenon
12" Carcase	12-14	Fine joinery & small tenon
14" Sash	12-13	General purpose
16" Tenon	11-12	Robust cuts (tenon cheeks/shoulders)
18" Large Tenon	9-10-11	Larger cuts (tenon cheeks/shoulders)
20"+ Miter	11-12	Large, controlled cuts in miter boxes

### Common Handsaw Pitches

28"	Rip: 4-6	X-Cut: 7 - 8	Breaking down stock
26"	Rip: 5 1/2 - 6	X-Cut: 7 - 9	Breaking down stock
24"	Rip: 6 - 7	X-Cut: 8 - 10	Breaking down stock & finish work
22"	Rip: 8 - 9	X-Cut: 10 - 11	Finish Work
20"	Rip: 10 - 11	X-Cut: 11-12	Finish Work