Sharpening Handbook

Because *sharp enough* … usually is not

Chapter 6

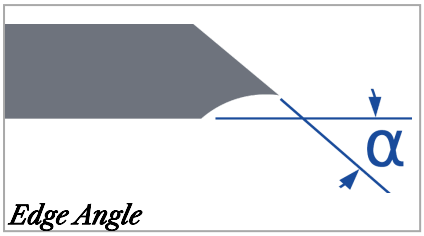
Bench Tools

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SharpeningHandbook.info

The full handbook, and the latest version of this chapter, are on the web at **SharpeningHandbook.info**. This chapter: November 2026.

Knife Awls



Edge Angle

This tool is typically one of the tools in a Swiss Army knife.

Guidelines shown below are for **Included Angles** (α).

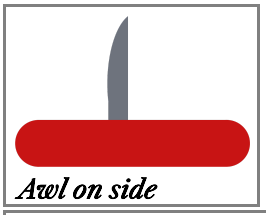
No treasure made by human hands can match the splendor of a flowering tree.
Anonymous

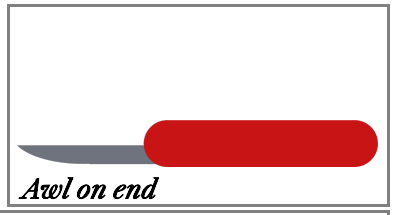
General Guidelines	
Type	**α**
General	50˚

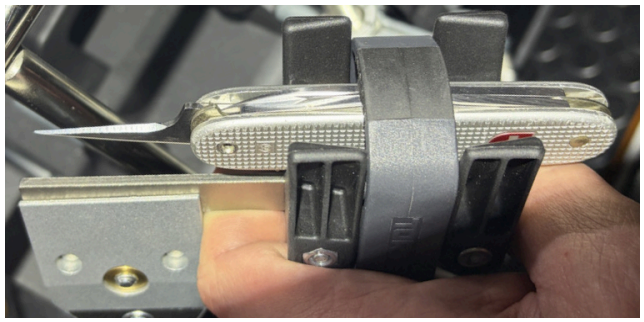
Notes & Comments

Jigs for Sharpening this Tool

As noted above, this tool is typically one of the tools mounted in a Swiss Army knife. Experience has shown that the metal in these knives is easily ground. Care should be taken to not over-grind it.


Awl on side


Awl on end


Holding the Victorinox Pioneer in a Tormek SVM-00
Image courtesy Hans Kruger

Some variations have this tool mounted so that it opens on the end (as shown in the far left picture). Hans Kruger (Brock O Lee on the Tormek forum) noted that this can be sharpened using the Tormek SVM-00 Small Knife Holder. You should consider using the *"Sharpie method"* for identifying the sharpening angle.

Hans further noted that he used a Spyderco Ultrafine triangle stone for deburring, and finished with a light stropping.

If sharpening one of these awls which is mounted so that it projects from the side of the knife, you will probably have to sharpen this using a small, finely graded machinist's hand file or a diamond file.

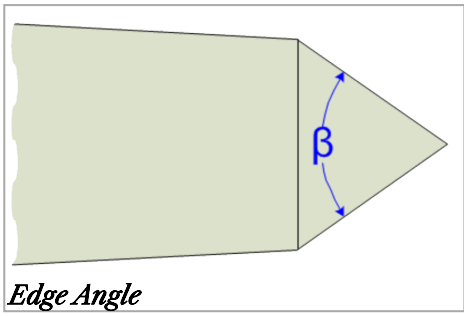
Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on your own experience. Additional notes are available on separate web pages for Grind Profiles (see Chapter 1), and Micro / Secondary Bevels (see Chapter 1).

Grindstones and Other Sharpening Media - see Chapter 2.

Cold Chisel

The **Cold Chisel**'s cutting edge is typically shaped on a bench grinder, though an angle grinder could be used (holding the chisel in a vise). And you can certainly use a file to do this (especially if you have as my father called a, "*strong back, weak mind*").



Edge Angle



The U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site) advocates grinding off the corners of the cutting edge so that the cutting edge has a convex shape as shown to the left. This is similar to adding camber to a wood plane's blade (see Chapter 18).

I haven't tried this to gain an understanding of the value. Rather, I see more value in sharpening often.

> *The main rule of this class is to not be a dumbass.*
>
> Unknown Shop Teacher

General Guidelines

α	Sharpness
60° - 70°	3

Notes & Comments

Can be up to 90° if cutting extremely hard metals.

High Speed Grinders

If grinding this on a high speed grinder or sander, be sure to manage the temperature so that the temper is not lost due to overheating.

High Carbon Steel

Temperature control is critical for high carbon steel. Tempering will be lost in the steel if heated until it is blue (~550°F / 300°C). Cool by dipping as needed in water.

High Speed Steel

Cool by dipping as needed in water.

Steel with Carbide Insert

DO NOT cool by dipping in water. This will cause the carbide to crack due to shocks.

It is also recommended to use a high grit wheel for sharpening carbide as lower grits can cause cracks in the edge leading to it being far more crack-ridden and brittle. (Lower grits can be used for shaping the edge -- see also, Grindstones and Other Sharpening Media - Quick Selection Guide (see Chapter 2).)

More Information

Books & Papers

- The definitive source is Leo J. St. Clair's book from 1952 titled, Design and Use of Cutting Tools. He was working in the industry as it was changing from HSS to carbide, so both are covered well. His experimental data helps validate or disprove many theories. Unfortunately, this book is hard to find.
- The U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site) is a great guidebook.

Videos & Presentations

- Tormek Tool Rest SVD-110 (YouTube video)
- Tormek AngleMaster WM-200 (YouTube video)

Web Sites

- Conversion of Brinell vs. Rockwell hardness measurements (engineersedge.com).

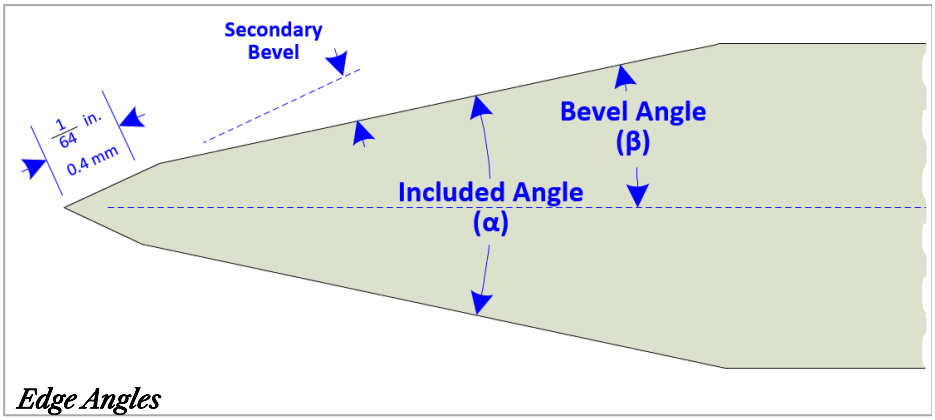
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Metalworking Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Marking Knives

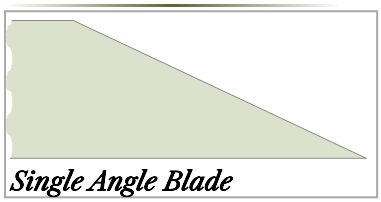
Guidelines shown below are for **Included Angles** (α).

Japanese marking knives are typically sharpened on only one side (as depicted in the picture to the left). For those,

$$\alpha = \beta$$



Edge Angles


Single Angle Blade

> *A knife is only as good as the one who wields it.*
> Patrick Ness

The Projection Calculator (on the web site) is available for calculating setup for Tormek knife jigs. This one is web-based and does not require Excel. CB's USB Projection Calculator is also available for calculating setup for Tormek knife jigs.

General Guidelines		
α	Point Angle	Sharpness
25°	120°	6

Notes & Comments

The Tormek KJ-45 or SVM-45 Knife Jigs work well for these, and the Tormek SVM-00 Small Knife Holder may be needed, depending on the blade and the blade's handle.

Note: In the Tormek video. Part 18: Sharpen rare and specialized tools, the use of the side of the stone is recommended. To do this, the SVD-186-R and MB-100 are used.

Nose of the Marking Knife

When looking at the blade from the side, generally it has a 120° angle. Some choose to round off the pointed tip.

Even if that is not done, setting a small nose radius of 0.007 in. (0.2 mm) is a good idea. If it is too pointy, the blade's tip can rip at the wood fibers.

Grind Shape & Experience

The shape of the grind used is a call best made by the tool's use, based on their own experience. Additional notes are available on separate web pages for:

- Grind Profiles (see Chapter 1), and
- Micro / Secondary Bevels (see Chapter 1).

Micro/Secondary Bevels

A micro bevel is not usually added to this tool as the sharpened surface area is so small that this is not needed to make re-sharpening easier and faster.

Notes are also available on a different web page for Micro / Secondary Bevels.

More Information

Books & Papers

- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).
- *The Razor Edge Book of Sharpening* *(archive.org)* (2000), by John Juranitch

Videos & Presentations

- **Tom Bartlett (Sharpening Supplies)**
  - How To Sharpen A Scandi Grind (YouTube video) - This video Tom discusses less about how to sharpen a scandi grind than a lot of tips on sharping this grind profile.
- **Steve Bottorff**
  - Using Tormek Knife Jigs (YouTube video)
- **Jeff Farris**
  - Knife Sharpening with Tormek (YouTube video)
- **Dave Jeske (Blue Spruce Toolworks (bluesprucetoolworks.com))**
  - Dave Jeske Sharpens a Marking Knife (YouTube video). Dave Jeske, the founder of Blue Spruce Toolworks, shows the simple way to sharpen a spear-point marking knife. Plus, he shows two simple tricks you can do on the sharpening stone that will make you knife work even better.
- **Dr. Vadim Kraichuk (Knife Grinders)**
  - Common Tormek mistakes in knife sharpening (YouTube video)
  - How to mount the pin pivot collar on your knife jig (YouTube video)
  - How We Sharpen Japanese Knives on Tormek (YouTube video)
  - Sharpening knives with convex curves (YouTube video)
  - Sharpening knives with concave curves (YouTube video)
  - Why Felt for the Wire Edge (YouTube video). Dr. Vadim Kraichuk with KnifeGrinders (knifegrinders.com.au) has posted this video on why felt is best to remove the wire edge when honing a knife, and why they chose the hardness of felt that they sell.
- **Herman Trivilino**
  - Herman Trivilino showing the use of a platform jig (YouTube video)
- **Tormek's Videos**
  - Tormek AngleMaster WM-200 (YouTube video)
  - Tormek's Centering Knife Jigs KJ-45 & KJ-140 (YouTube video)
  - Tormek Live Sharpening Class - Part 1. Knife sharpening (YouTube video). Wolfgang and Sèbastian from Tormek talk about different techniques for knife sharpening.
  - Tormek Live Sharpening Class - Part 9 - Sharpen a flat bevel with Tormek MB-100 on a diamond wheel (YouTube video). Sèbastian and Wolfgang show how to achieve a flat bevel with your Tormek wet sharpening system, They also touch upon the differences between the different types of bevels.
  - Tormek Live Sharpening Class - Part 10. Advanced knife sharpening (YouTube video). Wolfgang and Sèbastian from Tormek talk about advanced techniques for knife sharpening.

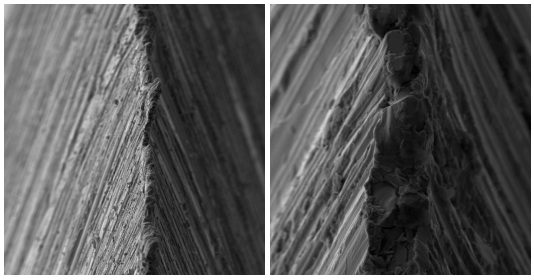
- Tormek Live Sharpening Class - Part 15. Repair a damaged knife (YouTube video). Wolfgang and Sèbastian from Tormek show you how you can repair a damaged knife on your Tormek sharpening system.
- Tormek Live Sharpening Class - Part 24. KS-123 Knife Angle Setter (YouTube video)
- Tormek Knife Jig SVM-45 (YouTube video)
- Tormek Long Knife Jig SVM-140 (YouTube video)
- Tormek Small Knife Holder SVM-00 (YouTube video)

Published Articles

- Research Articles, Other Information, and some Final Thoughts (see Chapter 20). Some key ones for this topic are below.
  - If you want to get truly sharp, Dr. Vadim Kraichuk with KnifeGrinders (knifegrinders.com.au) has a really good method and has adapted the Tormek system to these wheels. The KnifeGrinder method (knifegrinders.com.au) is one that is proven, and has great tools (knifegrinders.com.au) to assist with making it easy.
  - It is a common, but quite bad, practice of drawing the newly sharpened knife edge through a piece of wood or some other media to "rip off" the remnants of the burr. When this is done, the ripped off metal builds up on the front of the slice, and you then drag the rest of the edge through this crud. This crud, together with breaking off of ledges of material along the edge, will roughen the edge and worsen sharpness.

    The scanning electron microscope (SEM) images to the right show the burr on a knife in the 1st image, that was then "ripped off" by cutting cross-grain into a piece of redwood in the 2nd image - loss of the sharp edge is obvious.

    Key take-away from these photos: don't skip the honing step.



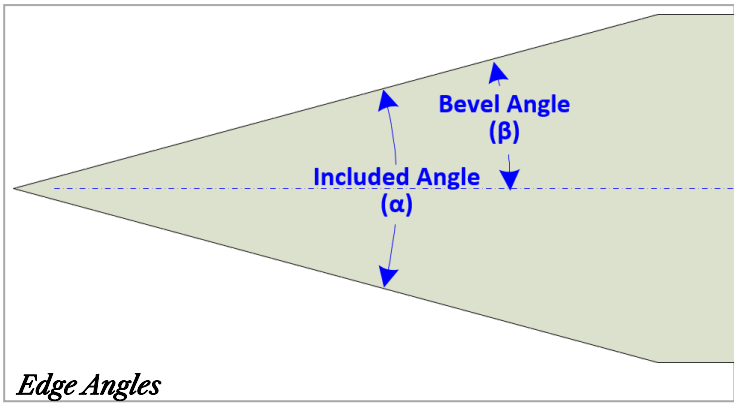
Images courtesy Todd Simpson via Dr. Vadim Kraichuk of KnifeGrinders.

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Woodworking Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Outdoor & Pocket Knives

Outdoor & Pocket Knives get used to do work, and the guidance provided below is based on that. Other types of knives are addressed separately:

- **Fish filleting knives**: Use the guidance for kitchen knives (see Chapter 10).
- **Gardening knives**: Use the guidance for gardening knives (see Chapter 9).



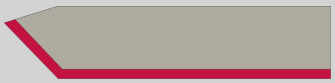
Edge Angles

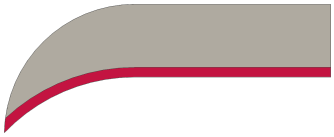
Guidelines shown below are for **Included Angles (α)**. The sharpened edges are denoted in the pictures below using red.

> *A knife's worth is measured not by its blade alone but by the hands that hold it.*
> Anonymous

The Bevel Angle (β) is sometimes called "degrees per side" or DPS.

General Guidelines

Blade Type	Blade Thickness	α	Sharpness
 **Drop Point**	≤ 1.6mm / ≤ 0.063"	23° - 24°	7
	1.6mm to 2.5mm / 0.063" to 0.100"	25° - 30°	
	>2.5mm / >0.100"	30° - 35°	
 **Double Edge**	≤ 1.6mm / ≤ 0.063"	23° - 24°	7
 **Ka-Bar**	1.6mm to 2.5mm / 0.063" to 0.100"	25° - 30°	
 **Tanto**	>2.5mm / >0.100"	30° - 35°	

General Guidelines			
Blade Type	Blade Thickness	α	Sharpness
 Spey Point	*(any)*	30˚	6
 Wharncliffe Blade	*(any)*	40˚ - 45˚	5
 Hawkbill	*(any)*	*(see above)*	7
 Hook Blade	*(any)*	*(see above)*	3

Use the same α angle for both setting the apex angle, and for edge-leading honing (up to 8,000 grit).

Deburring Guidelines					
Type	1st Deburring		2d Deburring		Notes
	Angle	Grit size	Angle	Grit size	
Harder steels	-0.2˚	3 - 6 µm	5˚	0.25 - 0.5 µm	**Edge Angle Stropping** - for steels which are brittle, have high hardness, are high carbon or carbide steels.
Softer steels	0˚	3 - 6 µm	1.5˚	1 µm	**High Angle Stropping** - for steels which are tough or ductile, have low hardness or low carbon, or are fine carbide.

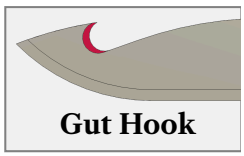
Grit size measured in µm (aka, microns)

Notes & Comments

Drop Point
The drop point blade is a very common blade shape.

When there are two such blades in a pocket knife, the sharpener may wish to have a less acute angle on the shorter blade. This will be used more often for prying activities (*despite all the recommendations to the contrary*), or for cutting up stiffer materials like cardboard. A less acute angle will be less likely to dull as quickly.

Gut hook: Some blades have a gut hook used for splitting the skin on a game animal when butchering in the field. Sharpening this concave edge requires a round slip stone or sandpaper wrapped around a dowel rod. The gut hook does not have to have the same angle as the main blade, and will probably benefit from a fairly acute angle (e.g., low α).


Gut Hook

Morakniv knives are shipped with a Scandi Grind and often with a micro bevel (see Chapter 1). The resulting cutting edge angle is 35° - 45°. The micro bevel (see Chapter 1) is 0.05 - 0.5 mm (0.002" - 0.020") wide. This is done to make the edge less fragile and enable better edge retention.

Multi-tool drop point knife blades also benefit from a micro bevel. Adding 2° - 3° per side will make the re-sharpening much faster.

Victorinox recommends sharpening your **Swiss Army Knife** at 15°-20° per side (β; α = 30°-40°). These blades are quite thin (aprox. 0.5mm / 0.020"), so consider sharpening them at 12° per side and adding a 2° - 3° micro bevel. This approach will make the re-sharpening much faster and significantly reduce the metal removed with each resharpening.

The metal in the Swiss Army Knives is softer, so consider a concave grind with a microbevel. The microbevel can be added to the knife's blade using a very high grit grindstone (such as the Tormek SJ Japanese water wheel), and then re-sharpened using this same grindstone.

General Purpose Outdoor Knives: There is a strong liklihood that these tools will be used for a number of activities which would easily dull a very sharp knife. They do need to be sharp enough to be useful (and safe to use), especially if using them in gardening activities; however they do not need to be terribly sharp (thusly, the recommended sharpness scale rating of 6).

Sharpness Scale
6

More about using micro bevels is below in the section, Sharpening Using Multiple Grindstones.

Double Edge & Ka-Bar & Tanto

These knive blades may be sharpened with a multi-angle grind:

- a more acute angle on the slicing edge (the side), and
- a more obtuse angle on the pushed edge
  - the pointed end of the double-edge blade,
  - the top side of the Ka-Bar, or
  - the end of the Tanto.

Such grinds are common on tactical knives. Also note, the grind profiles can be different (e.g., concave on the slicing edge; convex on the end).

Japanese Tanto blades have a similar shape to the American tanto blade (shown), and should follow these same guidelines.

Spey Point

This blade is often seen as an additional blade on a pocket knife (e.g., the stockman knife), and oftentimes is shorter in length than the drop point blade. This blade is sharpened to a greater angle. This is to allow for its use on tougher materials.

If the sharpener wants to add a micro bevel, an additional 2°-5° should be sufficient.

Wharncliffe Blade
This is a blade often used for scraping actions. Thusly, it is sharpened to a higher angle, and no micro bevel is added.

Multi-tool Wharncliffe knife blades should not use a micro bevel (as noted above for the drop point blades): it is not necessary.

Kitchen knives which have this shape are sharpened differently. The kitchen knives page is useful for that.

Hawkbill
Hawkbill Blades can be folding or fixed knives. Recommended angles should follow the same guidelines as above for the drop point blades.

Hook Blade
Hook Blades, unlike hawkbill blades, are not folding knives; rather they have a stout handle (usually wooden) into which a blade is affixed. They are often used in construction to cut vinyl flooring, tar paper for roofing, and drywall (AKA, Sheetrock). As they are used under such laborious working conditions, a greater angle is preferred for longer life of the cutting edge (and less beer at the end of the working day).

Micro/Secondary Bevels
I've not found value in adding micro/secondary bevels to pocket knives which get used, especially knives with blades which fold into a handle. Thusly, it is not recommended here. That said, the honing steps may add a slight micro-bevel.

If the sharpener wants to add one, an additional 2° should be sufficient. (*More notes are also available on a different web page for Micro / Secondary Bevels.*)

Concave Blade Edges
Blades with a concave edge need special attention when sharpening to not mess up the curved edge.

The YouTube video by Dr. Vadim Kraichuk, Sharpening knives with concave curves, is worth reviewing if you have questions on the approach to use.

Necessity for Re-shaping the Folding Blade
Image 1: As the blade is resharpened over time, the blade's point will be raised. This is shown graphically in the image's progressively darker pink-to-red lines. Those lines show the metal being removed during the sharpening processes over time. And over that same time, the blade's point will be made to be above the knife's sides (the brown background) when the blade is closed into the handle. This is especially the case on drop point & spey point blades.

Image 2: This image shows the blade's point now above the knife's sides. This situation is problematic: I have pierced my thumb on the exposed point, and caught it on my trouser pocket.

Image 3: The solution to this problem is to reshape the top of the blade by grinding off some of the metal towards the blade's point. This is shown as the removal of the blue parts.

This picture shows a few things of note. Firstly, the 1st resharpening did not require a reshaping of the top as it did not take the blade's point above the side. But, as the blade is resharpened more, reshaping becomes also necessary. Maybe not every time, but certainly more than once.

Such steel removal (and repositioning of the blade's point) can often be the case when the blade requires great reshaping after damage to the cutting edge (e.g., when your father-in-law uses your knife

to open a paint can).

With some drop point blades like the ones on a stockman pocket knife, this is a concave surface, so more care will need to be taken to ensure the resulting shape is good.

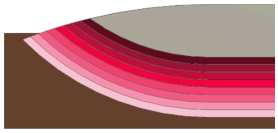


Image 1

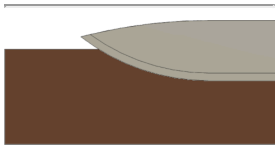


Image 2

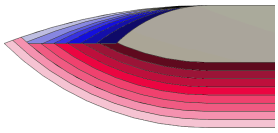


Image 3

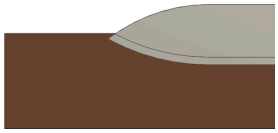


Image 4

Image 4: After grinding down the top of the blade, the blade's point is now below the knife's sides.

The YouTube video from Tormek, Tormek Live Sharpening Class - Part 15. Repair a damaged knife, shows this process and the video is worth viewing if this process is new to you.

Safety Note: Be careful when grinding down the top of the blade. You cannot push down on the blade's cutting edge to make it happen.

Grindstone Notes

When sharpening using multiple grindstones (e.g., starting with the SG-250 grindstone, and following-up with the SJ-250 Japanese grindstone), adding a micro bevel of 2˚ - 3˚ per side will make the re-sharpening much faster.

This approach is particularly useful for:

- Thinner knife blades as the blade can often be resharpened using only the SJ-250 Japanese grindstone and then honing again.
- Multi-tool blades, especially if you also carry a pocket knife. The multi-tool's blade can re-sharpened quickly as noted above.

An example process is:

1. Start with the SG-250 grindstone, set at 12˚ per side. (Fundamentally, this is not so much sharpening as shaping the edge.)
2. Switch to the SJ-250 Japanese grindstone, set at 14˚ - 15˚ per side.
3. Hone using the Tormek leather honing wheel using the PA-70 honing compound.

Note: The Tormek KS-123 Knife Angle Setter jig is very useful when changing between grindstones.

Japanese Waterstone and Honing

Some question the need to hone after using the 4,000 grit SJ-250 Japanese grindstone; I have found it useful, especially as the PA-70 honing compound is 8,000 grit.

The composite honing wheel is considered to be in the 2,000-2,500 grit range, so it may not be as useful for following up after the SJ-250 Japanese grindstone.

Jig Notes

A laser goniometer is quite useful for identifying the edge angles on knives. There is a design in the jigs section on making your own (see Chapter 3).

The KS-123 Knife Angle Setter jig is very useful if using the WM-45 Knife Jig to hold the blade. The values determined by the laser goniometer can be easily set using this jig.

MB-102 Multi-Base can be quite useful if grinding with the grinding wheel rotating away from the position where you are holding the tool on the universal support bar.

Calculators

I find that usage of calculators for setting specific angles to a high degree of accuracy is not critical. It is much more critical to resharpen often. If you choose to use a calculator to achieve a specific angle to a high degree of accuracy, there are a number of online calculators (on the web site) that can also be used for sharpening knives.

Acute Edge Notes

He further added,

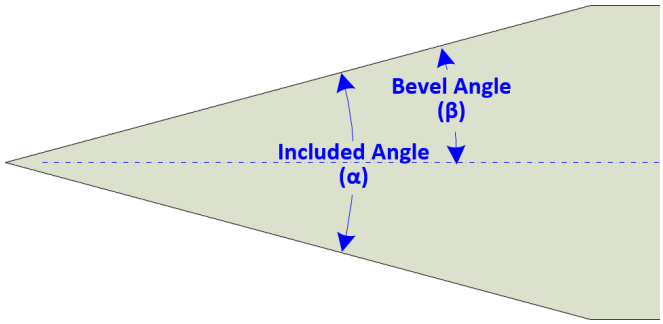
> *The force required for a slice is lower than for a push cut. ... However, some types of cuts require a push cut, such as shaving, chopping, or whittling. Therefore optimizations of push-cutting sharpness are still worthwhile for certain types of cutting or slicing, as the mechanisms are somewhat different.*

(See also, Cutting, by 'pressing and slicing,' of thin floppy slices of materials illustrated by experiments on cheddar cheese and salami.)

Good Guidelines Regarding Edge Angles

This information was posted on the Tormek forum and has been copied here as it is a good reference.

The diagram for the α and β angles is repeated to the right.



α	β	Comments
<20°	<10°	Edges in this range are good for cutting softer materials. For example, razor blades are sharpened at angles of 5° to 9°. This results in a delicate edge which is easy to damage.
20° - 30°	10° - 15°	Knife edges in this range of angles can be applicable in providing a smooth cutting action for knives which are used to slice meat or cut other soft items. This is why fine Japanese knives are usually sharpened is in this range. It is also common for some woodcrafts knifes and fillet knives. Do note: 1. Many Japanese and carving knives are only sharpened on one side. In that case, α = β. 2. Also note that a knife which is sharpened at such an acute angle has an edge angle which is too weak to handle any chopping motion type of work. And, if the steel is harder (such as with Japanese knives), such a sharp angle will easily fracture if used in chopping activities.
30° - 34°	15° - 17°	With an α angle of 30° to 34°, these knives will cut quite easily. Japanese knives and newer chef's knives are usually sharpened at this angle from the factory. Although less durable than those with higher angles, their cutting power makes it an appropriate tradeoff.

α	β	Comments
34° - 44°	17° - 22°	Knives in this angle are common in kitchens and outdoor activities. It is also a useful edge angle range for pocket knives. This is a common sharpening angle when you are looking for a general-use blade, and is the typical sharpening angle for most standard kitchen knives. These knives are often built of tough material that can withstand a sharpening edge of this angle and still cut well without any issue.
44° - 60°	22° - 30°	Edges in this range are more durable, and are appropriate for forrest and hunting knives, pocket knives, and tougher applications. This is a typical edge angle for durable knives.
>60°	>30°	Edges past 30° are very durable, although their cutting ability is significantly reduced. Most knives won't benefit from this sharpening angle. These angles are common in tools and cutting blade such as cleavers, machetes, and axes, especially as these tools are often made from softer steel.

More Information

Books & Papers

- *Concerning the Sharpness of Blades* *(hroarr.com)* (PDF), by Tremonia Feterkurier
- *Creative Propagation* (2005), by Peter Thompson
- *The Razor Edge Book of Sharpening* *(archive.org)* (2000), by John Juranitch

Videos & Presentations

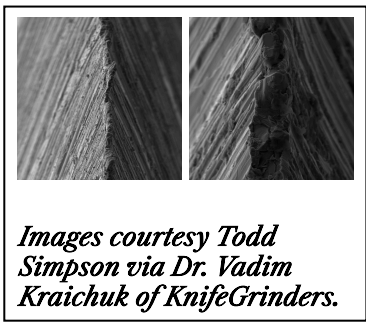
- **America's Test Kitchen**
  - Equipment Review: The Best Heavy Duty Cutting Boards (YouTube video)
  - Equipment Review: Honing Rods (YouTube video)
- **Tom Bartlett (Sharpening Supplies)**
  - How To Sharpen A Scandi Grind (YouTube video) - This video Tom discusses less about how to sharpen a scandi grind than a lot of tips on sharping this grind profile.
- **Steve Bottorff**
  - Using Tormek Knife Jigs (YouTube video)
- **Jeff Farris**
  - Knife Sharpening with Tormek (YouTube video)
- **Dave Jeske**
  - Dave Jeske Sharpens a Marking Knife (YouTube video). Dave Jeske, the founder of Blue Spruce Toolworks (bluesprucetoolworks.com), shows the simple way to sharpen a spear-point marking knife. Plus, he shows two simple tricks you can do on the sharpening stone that will make you knife work even better.
- **Dr. Vadim Kraichuk (Knife Grinders)**
  - Common Tormek mistakes in knife sharpening (YouTube video)
  - How to mount the pin pivot collar on your knife jig (YouTube video)
  - How We Sharpen Japanese Knives on Tormek (YouTube video)
  - Sharpening knives with convex curves (YouTube video)
  - Sharpening knives with concave curves (YouTube video)

    - Why Felt for the Wire Edge (YouTube video). Dr. Vadim Kraichuk with KnifeGrinders (knifegrinders.com.au) has posted this video on why felt is best to remove the wire edge when honing a knife, and why they chose the hardness of felt that they sell.

- **Herman Trivilino**
    - Herman Trivilino showing the use of a platform jig (YouTube video)
- **Tormek's Videos**
    - How to Sharpen a Tanto Knife on a Tormek T-8 (YouTube video). Wolfgang shows how to sharpen a tanto knife using the Tormek T-8 Original. It's a precise and repeatable method for blades with two separate cutting edges.
    - Tormek AngleMaster WM-200 (YouTube video)
    - Tormek's Centering Knife Jigs KJ-45 & KJ-140 (YouTube video)
    - Tormek Live Sharpening Class - Part 1. Knife sharpening (YouTube video). Wolfgang and Sèbastian from Tormek talk about different techniques for knife sharpening.
    - Tormek Live Sharpening Class - Part 9 - Sharpen a flat bevel with Tormek MB-100 on a diamond wheel (YouTube video). Sèbastian and Wolfgang show how to achieve a flat bevel with your Tormek wet sharpening system, They also touch upon the differences between the different types of bevels.
    - Tormek Live Sharpening Class - Part 10. Advanced knife sharpening (YouTube video). Wolfgang and Sèbastian from Tormek talk about advanced techniques for knife sharpening.
    - Tormek Live Sharpening Class - Part 15. Repair a damaged knife (YouTube video). Wolfgang and Sèbastian from Tormek show you how you can repair a damaged knife on your Tormek sharpening system.
    - Tormek Live Sharpening Class - Part 24. KS-123 Knife Angle Setter (YouTube video)
    - Tormek Knife Jig SVM-45 (YouTube video)
    - Tormek Long Knife Jig SVM-140 (YouTube video)
    - Tormek Small Knife Holder SVM-00 (YouTube video)

Published Articles

- Cutting, by 'pressing and slicing,' of thin floppy slices of materials illustrated by experiments on cheddar cheese and salami (scienceofsharp.com), by A. G. Atkins, X. Xu, & G. Jeronimidis.
- Research Articles, Other Information, and some Final Thoughts (see Chapter 20). Some key ones for this topic are below.
    - If you want to get truly sharp, Dr. Vadim Kraichuk with KnifeGrinders (knifegrinders.com.au) has a really good method and has adapted the Tormek system to these wheels. The KnifeGrinder method (knifegrinders.com.au) is one that is proven, and has great tools (knifegrinders.com.au) to assist with making it easy.



Images courtesy Todd Simpson via Dr. Vadim Kraichuk of KnifeGrinders.

    - Dr. Vadim Kraichuk posted a great analysis titled, "Edge Stability in Butcher's and Kitchen Knives as a Function of Edge Angle and Initial Sharpness" (bessex.com) on the BESS EXchange (bessex.com).
    - Effect of the Chopping Board Material on Edge Longevity (on the web site)
    - **Polished or "toothy" bevel?** An article by Larrin, "How Chipping of Edges Happens at a Microscopic Level" (knifesteelnerds.com) (on Knife Steel Nerds (knifesteelnerds.com)), debunks the idea of coarse edges due to the increased propensity for chipping and faster dulling of the blade. As noted by Dr. Vadim Kraichuk, "Meat plants are well aware that knives with coarse edges worsen product presentation and increase operators' fatigue and repetitive

strain injuries. On the contrary, polished edges improve product quality through higher value cuts and increase throughput."

- It is a common, but quite bad, practice of drawing the newly sharpened knife edge through a piece of wood or some other media to "rip off" the remnants of the burr. When this is done, the ripped off metal builds up on the front of the slice, and you then drag the rest of the edge through this crud. This crud, together with breaking off of ledges of material along the edge, will roughen the edge and worsen sharpness.

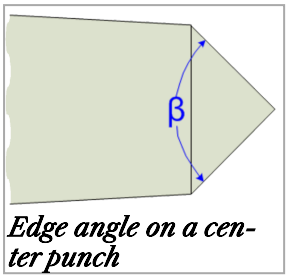
  The scanning electron microscope (SEM) images to the right show the burr on a knife in the 1st image, that was then "ripped off" by cutting cross-grain into a piece of redwood in the 2nd image - loss of the sharp edge is obvious.

  Key take-away from these photos: don't skip the honing step.

> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Woodworking Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

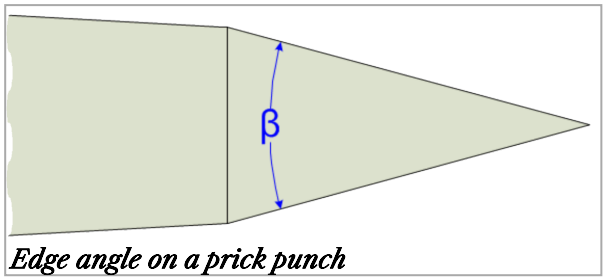
Punch

The **Punch**'s cutting edge is shaped on a grinder using a drill (the preferred way), or on a metal lathe.



Edge angle on a center punch

The center punch is used to mark the position for drilling (particularly on metal), helping to prevent the drill bit from drifting.



Edge angle on a prick punch

The prick punch is used to mark positions by hand for work. Generally a hammer is not used, or is only lightly used.

I will give you an A+ in this class if you SWEAR to me that you will NEVER take this class again.
Unknown Shop Teacher

General Guidelines		
Punch Type	β	Sharpness
Center	90°	3
Prick	60°	3

Notes & Comments

Prick

I have seen recommendations for angles as low as 30°, but that makes for a point that will be easily dulled when using with metal. Such an angle might work well if using this with wood though.

High Speed Grinders

If grinding this on a high speed grinder or sander, be sure to manage the temperature so that the temper is not lost due to overheating.

High Carbon Steel

Temperature control is critical for high carbon steel. Tempering will be lost in the steel if heated until it is blue (~550°F / 300°C). Cool by dipping as needed in water.

High Speed Steel

Cool by dipping as needed in water.

Steel with Carbide Insert

DO NOT cool by dipping in water. This will cause the carbide to crack due to shocks.

It is also recommended to use a high grit wheel for sharpening carbide as lower grits can cause cracks in the edge leading to it being far more crack-ridden and brittle. (Lower grits can be used for shaping the edge -- see also, Grindstones and Other Sharpening Media - Quick Selection Guide (see Chapter 2).)

More Information

Books & Papers

- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

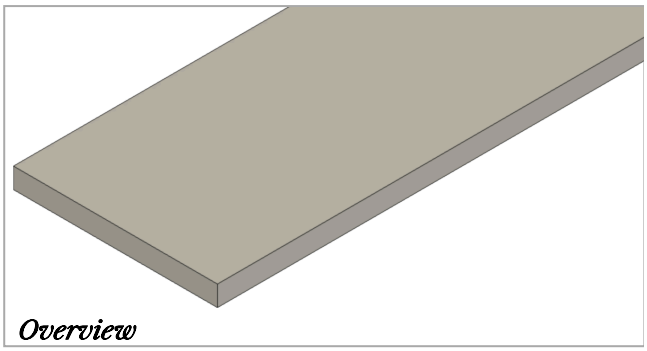
> **Sharpness Scale** - see Chapter 1.
> **Ongoing maintenance** - see Chapter 4, *Metalworking Tools*.
> **Grindstones and Other Sharpening Media** - see Chapter 2.

Putty Knife

The **Putty Knife**'s edge is shaped on a belt sander (preferred) or bench grinder.



Side View



Overview

The leading edge is ground to be straight across, and 90° to the edges. There is no thinning of the leading edge to form a blade (as with a scraper (see Scraper, in this chapter)).

> *He could tear up an anvil with a wet noodle.*
> Unknown Shop Teacher

Notes & Comments

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More Information

Books & Papers

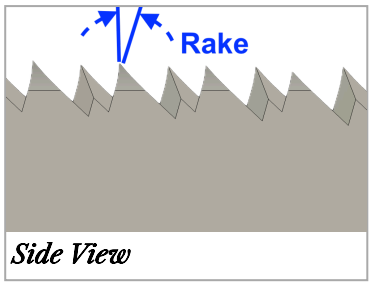
- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

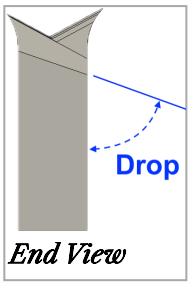
Ongoing maintenance - see Chapter 4, *Metalworking Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

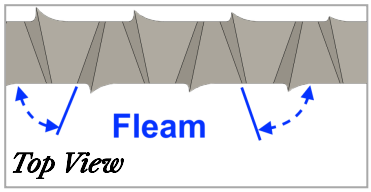
Hand Saws

In "The Handyman's Handbook", Paul N. Hasluck states,

> *A saw in thoroughly good order is so sharpened that each tooth does a share, and no one tooth more than the others.*







Sharpening steps:

1. If the saw is in need of repair, disassemble it.
   a. Clean and re-oil the handle.
   b. Clean the fasteners, especially the slot in the nuts.
   c. Clean & de-rust the saw blade
   d. Repair & smith the blade as necessary.
2. Joint the tops of the teeth.
3. If the saw is in a bad condition, and the teeth need to be re-shaped, file the teeth to get a consistent tooth shape.
4. Set the teeth (historically, this was done after de-burring the teeth - step 6).
5. Re-joint the tops of the teeth.
6. File the teeth to sharpen them (historically, this was step 3, before setting the teeth).
7. De-burr the teeth (also called, "dressing" or "stoning").
8. Wax the blade.
9. If the saw was disassembled, reassemble it.
10. Test the sharpened blade.

> *It should be borne in mind that the workman who can saw squarely to a line is at least two hours a week ahead of one who, either because his saws are in bad order or because he has never got out of the bad habit of sawing out of square, cannot do it.*
>
> Paul Nooncree Hasluck, in "The Handyman's Handbook" (1903)

General Guidelines

Saw Type	Saw Purpose	Rake ①	Fleam	Drop	Set ① ②
Backsaw	Crosscut	-15°	20°	0°	25%
	Rip	-10°	0°	0°	25%
	Hybrid	-10°	10°	10°	25%
Compass Saws	(all)	-5°	0°	0°	25%
Hand Saw	Crosscut	-15°	25°	0°	25%
	Rip	-5°	0°	0°	25%
Pocket Knife Saw Blades	(all)	-30°	30°	0°	25%
Pole Pruner Saw Blades	(all)	0°	20°	0°	25%
Reciprocating Saw Blades	(all)	0°	8°	0°	25%
Veneer Saws	(all)	0°	0°	0°	0%

Notes:

① When a saw is to be used for sawing wet planks, especially for crosscutting, consider increasing the kerf by increasing the **Set**. Also consider setting the **Rake** angle higher to help clear the sawdust. (These same recommendations do not apply to dried wood.)

② **Set** is expressed as a percentage of the saw blade's thickness, before de-burring the teeth.

Notes & Comments

Backsaw
Drop: Older texts recommended a drop of 5°.

Rip
Drop: Older texts recommended a drop of 10°.

Hybrid
This hybrid approach works well with hard woods.

Hand Saw
Rake: Higher rake angles make the saw's cutting more aggressive (and faster). For soft, fibrous woods, consider rake = 45° and increase **Set**.

Fleam: With fleam at 10°, a crosscut saw acts more like a modified rip saw. At 45°, it requires more resharpening and is less tolerant of variable grain alignment. For soft, fibrous woods, consider fleam = 30°.

In older texts, fleam = drop, and it is common to see both at 10°.

Rip
Rake: For general, all-around use, set to -5°. Higher rake angles make the saw's cutting more aggressive (and faster).

Fleam: For dense wood with wild grain, increase to 10°.

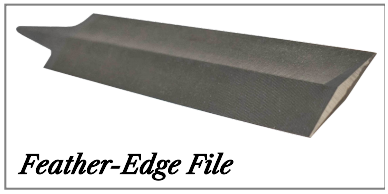
Drop: Older texts recommended a drop of 10°.

Pocket Knife Saw Blades
There is no set with these saw blades.

As with pole pruner saw blades, a feather-edge file is needed to sharpen this saw blade due to the acute angles between this saw's teeth.

Pole Pruner Saw Blades
When sharpening these saws, a typical, 60° triangular file cannot be used as the angle between the teeth is in the 35°-40° range.

Instead, a feather-edge file is needed. These files are quite thin and are able to fit into the small space between this saw's teeth.



Feather-Edge File

Veneer Saws
Use a stone to de-burr, and then bevel the sides of the teeth.

Tool Kit

Handsaws are sharpened using a number of tools.

Required
- Files
  - Flat, mill file
  - 60° triangular file
- Sawset tool

Optional (wooden jigs can be made)
- Saw jointer file holder
- Rake indicating jig
- Fleam indicating jig
- Hand saw vise, or some form of clamp-on filing guide

Other
- Saw nut screwdriver
- Sawsmithing hammer
- Anvil, esp. one designed for sawsmithing

A saw nut screwdriver is a key tool for ensuring that you do not damage the saw nuts when removing the saw's handle. The typical measurements for this screwdriver are:

tip width	0.350" - 0.4375"	8.9 - 11.1 mm
tip thickness	0.032" - 0.040"	0.8 - 1.0 mm
convex grind		

A $^{5}/_{16}$" or $^{3}/_{8}$" slotted screwdriver is close to these measurements; though it may need to be thinned on the tip.

Purchasing Tools

Lee Valley sells some tools & jigs which are worth investigating:

1. A set of saw sharpening files in a roll (leevalley.com) which makes it easy to keep them organized. The Bahco files seem good.
2. Saw file holder (leevalley.com) which has alignment marks to make holding the files at the correct fleam angle much easier.
3. Jointer & edger (leevalley.com) which makes jointing the tops of the teeth much easier and more consistent.
4. Grace Saw Screwdriver (leevalley.com) which helps reduce the damage to the saw nuts when removing the handle.

These tools are a bit more expensive, but are worth considering if you sharpen many saws.

1. The Gramercy Tools 14" Saw Vise (toolsforworkingwood.com) which is quite nice, especially if you are sharpening a lot of blades. I also find it to be less "fiddly" than trying to use some of the home-made vises.
2. Lie-Nielsen Toolworks sells an SD-3 Tenon Saw Nut Screwdriver (lie-nielsen.com) which is quite nice.

Jointing the Teeth

In "The Handyman's Handbook", Paul N. Hasluck states,

> *There are always several teeth at the heel and at the point that do little work; those in the middle portion do most, and consequently wear away faster. All saws ... have a consistent tendency to get hollow, and this must be prevented; and the only way to prevent it is to file teeth down by passing a partly worn file along the edges until it touches every tooth.*

When jointing the tops of the teeth, a saw jointer makes this easier. However, you could also use one of the jigs in the recommended books below. Engler's and Lie-Nielson's books show this best.

Setting the Teeth

When setting the teeth, a sawset is critical.

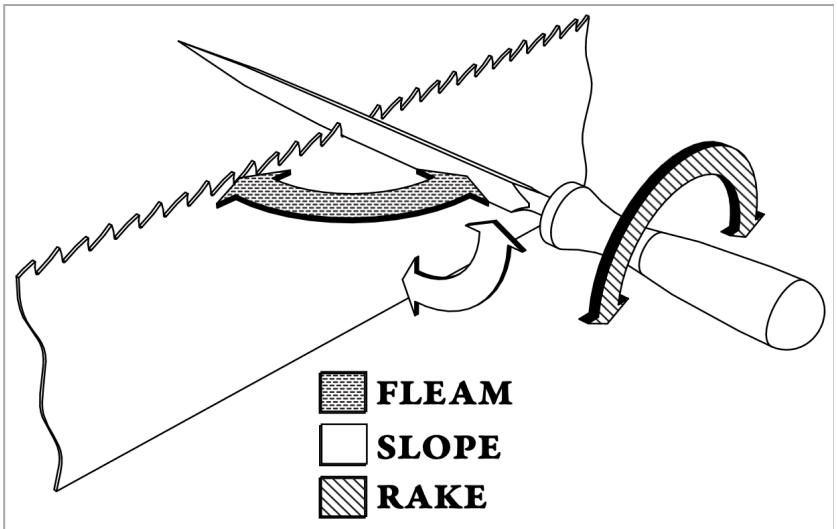
There are two types of sawsets:

1. The tools used used to set the tooth by hand (e.g., like using pliers).

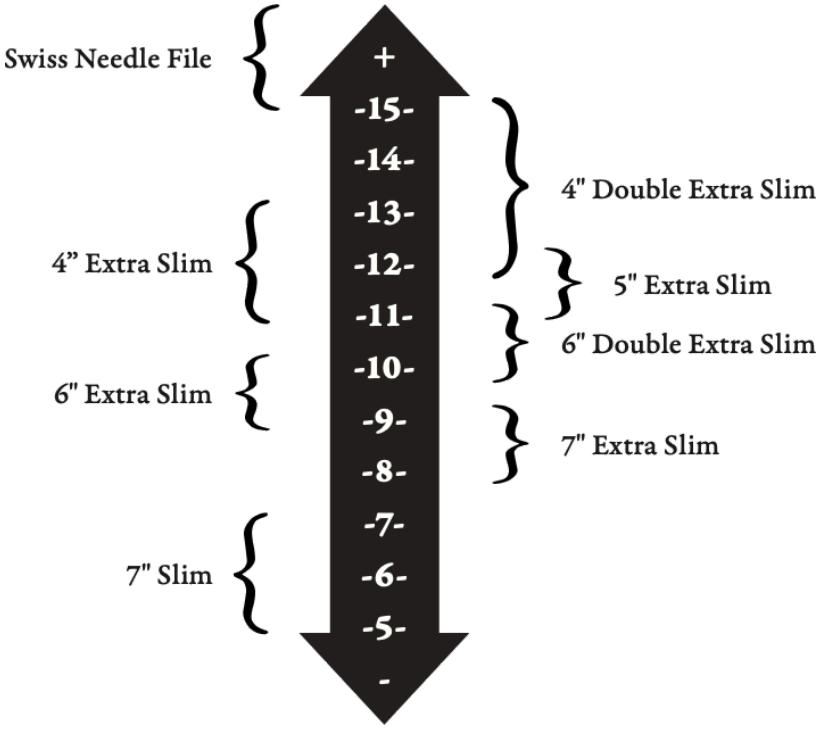
   If buying one, get one with a pistol-grip, and which accommodates 4-16 TPI. The sawset I use is a Stanley model 42W. It works much better than the models 42 or 432.

   I have not tried the Stanley model 42S nor the model 42X, nor any of those newer ones available on eBay, so I cannot speak to their abilities.

2. Hammer style tools. Mark Harrell recommends the hammer style as it bends the saw's spring steel better with less spring back, and it is easier on the hands. I have found that two are needed: one for saws with many teeth / inch, and a different one for larger saws. If you can afford these, they are nice (do note that they are hard to find: look for "hammer sawset" on eBay, or in antique tool stores).

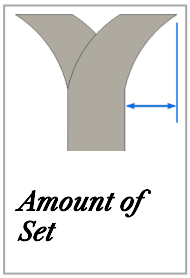


Another View of Filing Angles



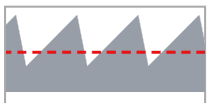
Triangular File Used vs. Saw TPI
Image courtesy Tools for Working Wood

Increase the amount of **Set** for saws with coarse teeth. Decrease the amount of **Set** for saws with finer teeth.



Amount of Set

For very fine saws, the burr from the filing may give an adequate set. If it does not, you may need to have a second sawset where you have filed down the width of the hammer. This is especially the case for saws with 15 points per inch or more. Matt Cianci's book, Set & File, shows good pictures of this.



Break Line

Only set the top ½ - ¾ of the teeth. This is down to the "break line".

Note: a number of older texts such as "The Handyman's Handbook" by Paul N. Hasluck note that the saw's teeth should be set after filing them. The standard approach today is to set the teeth before filing them.

Filing the Teeth

When filing the teeth, the saw must be held solidly along a straight edge. The goals are to

1. ensure consistent gullet depth, and

2. ensure the angles (flame, slope, and rake) cut into the gullets are consistent.

A saw vice like the Gramercy Tools 14" Saw Vise is very good for this, but it can also be made from wood (e.g., a 2x4).

There are jigs in the recommended books below. Engler's and Lie-Nielson's books show the options best.

For the triangular file, use the specified size based on the saw's teeth per inch (TPI) as shown in the lower picture to the right.

My experience has been that the file can quickly chew through the metal in the blade. It is best to not get too aggressive.

De-Burring the Teeth

De-burring the teeth is also known as **dressing** the teeth, or **stoning** the teeth.

Again, to quote Paul N. Hasluck from "The Handyman's Handbook",

> *After a saw has been sharpened, it should be carefully laid flat on its side and the teeth rubbed down with a whetstone or smooth file to remove any feather edge that may be left by the file in sharpening. This gives a larger and better cutting edge to the saw. If the points only of the teeth are allowed to do the work, the action is a scratching and not a cutting one.*

When de-burring the teeth, be sure to use a hard stone or file to even out the amount of set and create a consistent cutting by the saw.

Mark Harrell recommends using a coarse stone for the 1st pass, and then a fine Arkansas stone for the 2nd pass. Mark also recommends using painter's tape to protect the blade when performing the deburring step.



Painters tape to protect the saw's blade when de-burring

Testing the Sharpened Blade

Once the blade has been sharpened, it should be tested on a typical piece of wood, preferably the type used by the woodworker.

1. The blade should start the cut easily.
2. The blade should not bind.
3. The blade should clear the sawdust well (especially when ripping a board).
4. When used, the blade should not pull away from the directed line. If it does, stone the teeth on the side to which it is pulling. A single stroke with a hand stone or file should be sufficient, but a second pass may be needed. (*Do not overdo this as you will remove the saw's set.*)

Repairing & Smithing Saw Blades

"The Handyman's Handbook" by Paul N. Hasluck offers instruction on repairing a number of issues which may be seen:

- Straightening a buckled blade, and
- Straightening a buckled tenon saw (i.e., the back reinforcement)

I will not try to restate what he has outlined, the book does a great job.

A newer resource is the video series, “Restoring, Sharpening, & Tuning Handsaws with Mark Harrell”. This is worth the cost as he does a great job of explaining and showing what to do.

Saw Handle

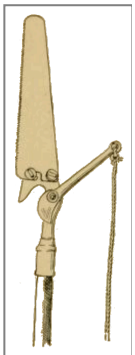
Aaron Keim wrote a great article for “Fine Woodworking” about reshaping a blocky panel-saw handle, adding a touch of chip carving, and refinishing it for another lifetime of use.

French Veneer Saws

French veneer saws have a variable rake towards the center, and only have a bevel on one side. Best to have a professional re-sharpen these.

Saw Blades on Pole Pruners

Saw blades on pole pruners also need to be sharpened to work as expected. The saw blade is sharpened following the instructions for a crosscut hand saw.



Pole Pruner with Saw Blade

Other Notes

Blackburn Tools' web page, Saw Tooth Geometry, has good visuals to explain **Drop** (which they call, Slope), **Fleam**, and **Rake**.

More Information

Books & Papers

- “Set & File: A Practical Guide to Saw Sharpening”, a book by Matt Cianci (AKA, the Saw Wright (thesawwright.com)) and published by Lost Art Press (lostartpress.com), June 2024. Matt addresses the fundamentals of maintaining backsaws and handsaws: how to file and joint your saws with the correct rake, fleam and pitch to keep them sharp for cutting. He also addresses how to deal with saw teeth which are in good shape but dull, and how to successfully fix teeth which have been abused.

  Matt's book is one of the first I've seen which not only explains the process well, but also shows the necessary activities in well-done pictures.

  If you are only going to get one book for sharpening hand saws, get this one.

Other recommended books and papers are listed below alphabetically, not by preference.

- Art of Saw Filing, Scientifically Treated and Explained on Philosophical Principles (ia800304.us.archive.org), an ebook version of the book published in 1871 by H. W. Holly.
- “The Complete Guide to Sharpening”, a book by Leonard Lee.
- Disston Saw, Tool and File Manual (archive.org), an ebook version of the manual published in 1939 by Disston Saw (en.wikipedia.org). Disston Saw were the premier handsaw makers at that time. This is a really good overview.
- Elements of Saw Tooth Design (on the web site), 2009. Joel Moskowitz at Tools for Working Wood (toolsforworkingwood.com) published this on his blog under the title, Everything you have ever wanted to know about saw tooth design (toolsforworkingwood.com). He later added another blog posting on historical saws titled, Sherlock: The Saw Tooth Detective (toolsforworkingwood.com).
- Everything you have ever wanted to know about saw tooth design (toolsforworkingwood.com). Really nice diagrams about the

terms used for the process. This is another good overview.

- "The Handyman's Book", a book by Paul N. Hasluck. My copy is the 1903 edition and is quite useful.
- How to Make Custom Saw Handles (leevalley.com). Good article at Lee Valley Tools (leevalley.com).
- "How to Sharpen Every Blade in Your Workshop", a book by Don Geary.
- "Keeping the Cutting Edge: Setting and Sharpening Hand and Power Saws", a book by Harold H. Payson.
- New Design Sawset No. 42SS (on the web site), a pamphlet from Stanley Tools (stanleytools.com) on the sawsets number 42 & 43.
- Saw Filing and Management of Saws (ia802808.us.archive.org), an ebook version of the book published in 1901 by Robert Grimshaw. As noted on the opening page, this is *"A practical treatise on filing, gumming, swaging, hammering, and the brazing of band saws, the speed, work, and power to run circular saws, etc.etc. A handy volume for all who have charge of saws as it deals with the proper shape and pitches of teeth of all kinds and gives many useful things and rules for gumming, setting, and filing."*
- Saw Filing--A Beginner's Primer (vintagesaws.com), a web page at Vintage Saw (vintagesaws.com)
- "Saw Sharpening 101" (PDF), an article written by Matt Cianci (AKA, the Saw Wright (thesawwright.com)) and published in Popular Woodworking (popularwoodworking.com) Magazine, December 2014, ages 36-39.
- Saw Sharpening Basics (blackburntools.com) (PDF), a very good document published by Blackburn Tools (blackburntools.com).
- Saw Tooth Geometry (blackburntools.com), a web page at Blackburn Tools (blackburntools.com)
- "Sharpening", a book by Nick Engler
- "Sharpening", a book by Thomas Lie-Nielsen

Videos & Presentations

- Getting Started with Western Saws (Vimeo video). This video from Lee Valley is a great overview of various saw types.
- How to Sharpen Your Saws (YouTube video). Mike Updegraff with "Mortise & Tenon" Magazine (mortiseandtenonmag.com) walks through the sharpening of hand saws. It is easy to get lost in the specialized terminology, but Mike gives a dead simple explanation that will be hard to forget.
- "Restoring, Sharpening, & Tuning Handsaws with Mark Harrell". This online class is taught by Mark Harrell (founder of Bad Axe Tool Works), and is published by "Popular Woodworking".

  Mark's video series is one of the best I've seen, and he goes through some steps I've not seen elsewhere (e.g., smithing a saw straight). That said, he uses a lot of old tools to sharpen his saws, and most of those are not easily found. I would prefer him to have used more readily available tools (such as the Gramercy Tools saw vise).

  Mark has a lot of experience (and muscle memory) built in to his process. He does not use any jigs to assist with the fleam, rake, nor slope during the filing process.

Published Articles

- "Reshaping a Classic: Bringing Comfort Back to a Vintage Saw Handle", by Aaron Keim. Published on the "Fine Woodworking" web site in December 2025.
- "Sharpen your own backsaw: It's easier than you think", by Mark Harrell. Published in the "Fine Woodworking" magazine in November/December 2015.
- "Shop-made Saw Vise", by Robert W. Lang. Published in the "Popular Woodworking" magazine in June 2010. This is useful when you are getting started, and do not want to invest in a

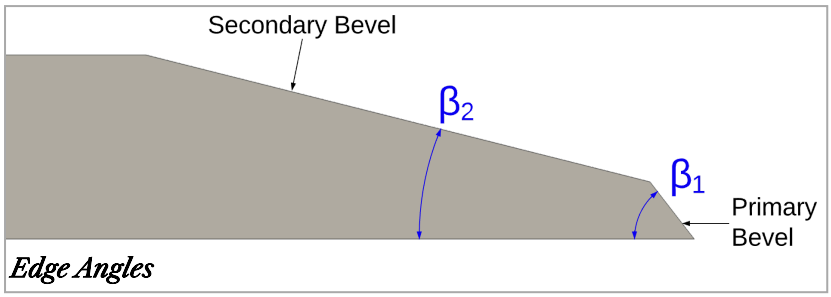
Gramercy Tools saw vise.

Web Sites

- Blackburn Tools (blackburntools.com)' web page, Saw Tooth Geometry (blackburntools.com), has good visuals to explain **Drop** (which they call, Slope), **Fleam**, and **Rake**.

> **Ongoing maintenance** - see Chapter 4, *Woodworking Tools*.

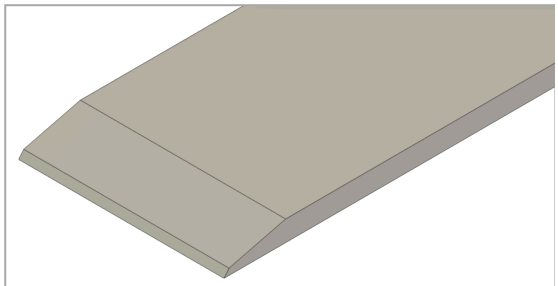
Scraper



Edge Angles

The **Scraper**'s edge is shaped on a belt sander (preferred) or bench grinder.

What did you shave with, private? A bowl of milk and an angry cat?
Unknown Sergeant


Overview

General Guidelines		
Edge Angle	**Value**	**Sharpness**
β_1 Primary Bevel	40° - 75°	4
β_2 Secondary Bevel	~ 30°	*n/a*

Notes & Comments

β 1 Primary Bevel

Increase this angle when the tool is being used for scraping harder items (e.g., a gasket scraper).

This edge should be thin, and I recommend it be no larger than $^1/_8$" (3mm). If it is, re-grind the secondary bevel as necessary to reduce its size.

Be sure to de-burr this edge after sharpening. Breaking off the burr through use will cause the edge to be jagged.

β 2 Secondary Bevel

It is recommended to keep what came on the tool from the manufacturer. An estimate is given here in case the tool needs to be re-ground, as will happen when the primary bevel becomes too large.

High Speed Grinders

If grinding this on a high speed grinder or sander, be sure to manage the temperature so that the temper is not lost due to overheating.

High Carbon Steel



Temperature control is critical for high carbon steel. Tempering will be lost in the steel if heated until it is blue (~550˚F / 300˚C). Cool by dipping as needed in water.

High Speed Steel

Cool by dipping as needed in water.

Steel with Carbide Insert



DO NOT cool by dipping in water. This will cause the carbide to crack due to shocks.

It is also recommended to use a high grit wheel for sharpening carbide as lower grits can cause cracks in the edge leading to it being far more crack-ridden and brittle. (Lower grits can be used for shaping the edge -- see also, Grindstones and Other Sharpening Media - Quick Selection Guide (see Chapter 2).)

More Information

Books & Papers

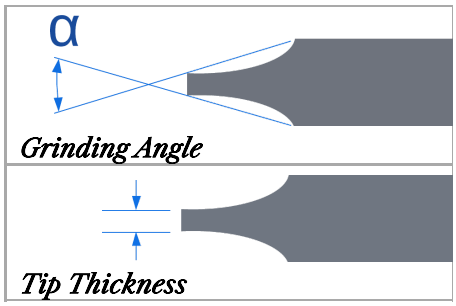
- U.S. War Department's TM 9-867 Maintenance and Care of Hand Tools (on the web site).

Sharpness Scale - see Chapter 1.
Ongoing maintenance - see Chapter 4, *Metalworking Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.

Slotted Screw Drivers

Slotted Screwdrivers are sometimes called “flat head screwdrivers”, however purists argue that “flat head” is an improper terminology for this tool, noting that “flat head” refers to a type of screw shape.

Guidelines shown below are for **Included Angles** (α) and tip thicknesses.



A screwdriver can easily have the tip damaged, especially when the screwdriver is used as a prying tool. Fortunately, these can be re-ground. Using a Tormek makes this an easy task, and helps to ensure you do not soften the metal. If re-grinding on a bench grinder, care must be taken to ensure the metal is not overheated, weakening it.

Note: Some toolmakers will not harden the entire shaft of the screwdriver, only the tip and a bit up from there. If grinding off too much of the metal, the sharpener may find that the exposed metal is not hardened. Hardening that metal is difficult to do as most handles will be damaged in the process.

> *A workman who wants to do his work well must first prepare his tools.*
> Confucius

If the user wishes to retain the tool in a working state (e.g., for historical purposes), then the handle can be replaced after re-hardening the tool's steel. The Machinery's Handbook addresses hardening of metals, as does the American Machinists' Handbook.

General Guidelines		
Type	α	Tip Thickness
1/16” Slotted	10°	0.015” - 0.020”
1/8” Slotted	10°	0.020” - 0.025”
5/32” Slotted	10°	0.025” - 0.030”
3/16” Slotted	10°	0.035” - 0.040”
1/4” Slotted	10°	0.040” - 0.045”
5/16” Slotted	10°	0.050” - 0.055”
3/8” Slotted	10°	0.060” - 0.065”
Jeweler’s	25° - 35°	0.010” - 0.015”

Notes & Comments

Jeweler’s

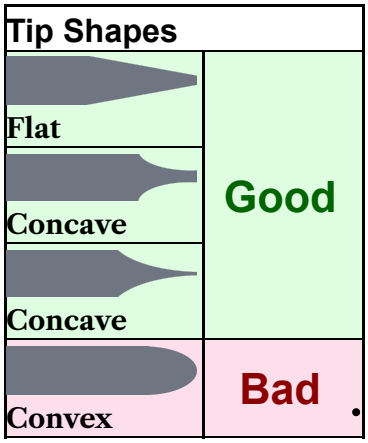
Jeweler's screwdrivers like those seen in the picture to the right can easily have the tip damaged, especially when the tool is used (improperly) as a prying tool. Fortunately, these can be re-ground.


Jeweler's Screwdriver

The thicker angle for α provides for more strength at the tip. The tip is ground down to a minimal thickness to allow fitting the tool into the screw's slot.

Tip Shape

The best shape for the tip is slightly concave or flat.



Holding the Tool Whilst Grinding It

I found that it is best to hold the screwdriver in a jig which allows the sides to be easily ground opposite each other. The Tormek SVM-45 knife jig works well to hold Jeweler's tools by the knurled sides.

More Information

Books & Papers

- "American Machinists Handbook", by Colvin and Stanley
- "Machinery's Handbook", published by Industrial Press
- Maintenance and Care of Hand Tools (on the web site), 1945 Edition (PDF), from the U.S. War Department
- Use and Care of Hand Tools and Measuring Tools (on the web site), 2004 Edition (PDF), from the U.S. Dept. of Defense
- Use and Care of Hand Tools and Measuring Tools (on the web site), 2020 Edition (PDF), from the U.S. Dept. of Defense

Ongoing maintenance - see Chapter 4, *Metalworking Tools*.
Grindstones and Other Sharpening Media - see Chapter 2.