How to Tune Your Equipment, The Basics of
Ver. 3.1
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- Necessary Basic Tuning Equipment:

Side and Base or "2 in 1" File Guide	Lighter/Matches
Thick Rubber Bands	Razor blade
Metal File	Brillo pad
Diamond stones	Cup of water
Waxing Iron	Old t-shirt/rag
Wax	Paintbrush
Wax Scraper	Ski or Board Vices (or other fastening device)
"P-tex"	Table

- Step 1: Prepping your skis and your mind for a tune – Tools: razor, rag, brillo pad

Before you begin, you need to know a little about your equipment. Namely, you need to know what degree your side and base angles are set at. You can get this information by contacting either the last ski shop to tune your skis or the manufacturer. If you don't know this, or cannot get the information, it is not much of an issue, but just be warned: it is somewhat more difficult to tune your equipment if you tune at an angle different than what your equipment is set at. But, if you tune your edges at a certain angle a couple times, your equipment will retain that angle and it will become easier over time. This is called "setting the bevel." I personally recommend a side angle of 1 and 2 degrees (or 89 to 88 depending on the maker of the file guide you are using) for beginner and intermediate skiers, respectively, and no more than 1 degree for snowboarders. Base angle is really your call, but I recommend 1 to 2 degree.

Now that the decisions are made, you have to prep your skis. Make sure that they are room temperature, clean and dry. From there, make sure that your bases are flat (i.e. no gouges developed from hitting rocks are protruding out from your bases). You can trim the excess base material by carefully shaving it off with a razor blade. This will ensure that your file guide has a smooth ride down the entire length of the ski or snowboard.

If your edges have developed rust, use the brillo pad to gently abrade the rust off the edges as best you can. DO NOT use WD-40. This common mistake heavily damages your bases and eats away at the longevity of your equipment. It is one of the worst things you can do to your gear.

- Step 2: Sharpening those edges – Tools: file, side file guide, paintbrush

Right, now that your skis are prepped, you can begin to sharpen those edges. By now you have hopefully realized that there are actually 8 surfaces that you potentially need to sharpen: 4 side edges and 4 base edges. You have some work ahead of you!

Let's start with the side edges. Place the metal file in the guide as instructed in the manual for your specific file guide. Make sure to align the file teeth such that when you pull the guide towards you, it will

cut. Firmly press the guide (do not lean on, you will cut your had badly – I have to scars to prove that this is a bad idea!) down on the edge and pull towards you. This (hopefully) will remove some of the edge material. If it did, you will feel some resistance to the movement coming from the guide, greater than what you would expect from normal friction. You might even see some bits of metal come off of your edge! If so, pick the file up and do it again, and again and again. Note that the file only works in one direction so do not push the file back up the ski. Use even-pressured strokes that are comfortable for you and your "rhythm" to get this done. (It can be tiring if you are not used to it, so do not worry if your arm gets sore.) I personally recommend strokes that are no longer than 6 inches long at a time. Continue down the length of the ski, feeling the edges of your skis with your hands or scraping your fingernails on them to determine when they are sharp enough. Periodically use the paintbrush to gently remove any excess edge debris from your ski. Rinse and repeat for all 4 side edges.

But what about the base edge? Usually I only sharpen mine once a season, as the base edges are an entirely new beast. These edges are very difficult to file, and if done improperly, can damage your skis. So I would say do not even attempt to sharpen these. We will just "stone" them in the next step and call it good. If you really want to know what you need to do to sharpen these edges, you can read up on it here: http://www.youtube.com/watch?v=GAGZ6R-yOr4 (this is an advert for SVST, so they go a little crazy on pushing their equipment, but it is a decent instructional video.)

If for some reason it does not cut into the edge, you may have one or more of the following issues:

1) There is sidewall in the way of the file and the metal. This is usually evident from bits of plastic that match your ski's color stuck in the file teeth. To remedy this, get out that razor blade and scrape away the overhanging plastic that is protecting the edge. See the following webpage for a schematic of what needs to be cut away: (Image A => Image B) http://www.racewax.com/category/tuning_tips.sidewall_cutting/
2) Your edge has "case-hardening" or "burrs" which prevent the file from biting into the edge material. You can usually hear if this is the case, as a scraping noise is usually present when this happens. You will feel it as well, since the file teeth cannot bite into the edge and cut it away. This can be fixed by performing the process in step 3 on the affected areas before trying to sharpen the edges again.

- Step 3: "Stoning" the Edges – Tools: diamond stones, side and base file guide, water, rag

After you have sharpened the skis, the file has left "micro-burrs" on your edges. While they may feel sharp, they are actually not as sharp as they can be, and the tune you just gave them will actually not last as long. These micro-burrs need to be removed to bring out the full potential of your equipment. To do this, you must swap out the metal file in your side file guide for the diamond stone. These stones are similar to the grinding stones one would sharpen a sword or a fine kitchen utensil with. The diamond deposits on the stones grind away the micro-burrs until only smooth metal is left on the ski. At this point the edge is like a fine knife. If done right and carefully, the final edge will be so smooth that you can cut yourself on your edge and not even feel it!

Before you begin stoning any edge, be sure to wet both the stone and your ski edge. This will help protect your stones from degradation and accelerate the stoning/sharpening process. The water on the edges will turn cloudy and grey as you stone the edges. This is normal and is just the result from the dust and micro-debris developed during the stoning process being absorbed by the water. Use the rag

to wipe it off of the ski when you are done. Also, be sure to rinse/wet the stone after every edge to prevent debris buildup on the diamond stone.

The same procedure that was used in Step 2 applies here. Smooth strokes, about 6-10 inches long. But here, you can move the stone in both directions and it will still cut, so have at it. Repeat this process, up and down the length of the edge, until you feel and hear no "grinding" underneath the stone. When you are done, you should only feel a smooth ride under the diamond stone. At this point, your edge is sharp. Repeat for all 4 side edges.

For the base edges, swap out the side file guide for a base guide and do the same process to the base edges. It's pretty easy, but just be careful to follow the instructions for your specific file guide to make sure that you are doing it right. Unlike filing, you should stone your base edges every time you tune.

- Step 4: Base repair and Maintenance – Tools: P-tex, matches, razorblade, brillo pad

You know that feeling when you hit a rock and you feel the ski or board underneath you slow down? Chances are that when you have, you put a nice gouge in you base. These are not good things to have just lying around. If you hit another rock or tree, the gouge can easily be made larger and deeper. It might even damage the core of your ski or board. Even worse, if the gouge is close to the edge of the base, the next tree or rock can literally rip out your edge and render your equipment broken! So we have to patch those things up before they cause some real damage.

Fortunately, it is pretty easy to patch these things up. Grab your P-tex "candle" and light one end on fire with your matches. Hold the stick almost horizontal, with the lit end tilted slightly downward and directly over the gouge in your base. Let it burn. After a minute, some liquid p-tex will drip off of the candle and land in the hole. Let it drip until the whole gouge is filled up and overflowing with p-tex. Blow the candle out and pick up the razor blade. Once the p-tex on your ski is cool, using the blade, slowly and gently scrape away at the p-tex patch until it is level with the base material. Repeat process as necessary. Once done, buff the area with the brillo pad.

- Step 5: Wax! – Tools: wax, iron, paintbrush

This step is very important, and really helps protect the base of your skis. Not only that, but regular waxing makes your skis run faster, smoother, and longer. This makes for an easier day out on the mountain for you, with less skating and pushing to get from point A to B.

First up, take that paintbrush and brush away any excess debris from the bases. You do not want anything but pure wax touching your bases from here on out. Heat up the iron, and begin choosing your wax.

When choosing a wax, it is important to consider the conditions you will be riding on the next time you use your equipment. Technically, cold days require a harder wax, warmer days, a softer wax and spring riding, when the snow is real old and dirty, may call for a graphite additive in addition to the normal wax. Confusing isn't it? Each wax company has different system and many different types of waxes to choose from for all snow conditions. No one company is better than another, so all you need to do is choose a company and stick to their products. In reality, only racers need to worry about snow

conditions and the like. For normal riding, just buy the cheaper “all-purpose wax” or just a hydrocarbon mid-temperature wax and wax with that for all occasions. Simple for you and your skis will love you for it.

Once the iron is hot, hold it sideways and press the wax block onto the iron. Let the wax melt and drip onto the base. Time the drops so that there is one every square inch. Once the length of the ski has been covered, press the iron to the ski and melt the wax into the base. Again, smooth movements are the key. Behind the iron, you should see the wax spread over the entire base. If not, add more wax to that area as necessary. **NOTE: Do not let the iron rest in one place for more than a few seconds to prevent burning your base.** With that, your gear is tuned! The first tune is always the hardest, believe me. Do not get frustrated with it. If you keep up on your equipment, and tune once for every 3-5 days on snow, your gear will act more consistently and the tuning will become easier.

- Epilogue – Gear: You, the mountain and a crisp winter morning

If taken seriously, tuning will become a habit and a natural part of your skiing or riding ritual. Over time, you will learn neat tuning tricks and get more comfortable with working on your gear. In doing so, you will learn more about your equipment, and understand how it reacts to different situations unlike ever before. On the mountain, this will become evident as your riding will become more confident, fluid and graceful. Even amidst all of the chaos on the slopes, you will know what your skis will do under your feet and how, where and when to apply subtle pressures to completely control every aspect of the turn. You and your gear will become one unit. At that point, and only then, will you have learned and mastered the Sacred Art of Ski Tuning.

Over time you may want to purchase better and more equipment to round out your “tuning box.” This can be very expensive and much of the equipment is unnecessary for a general rider (i.e. non-racer). I can recommend equipment but in the end it all comes down to personal preference. If you are looking for gear, check out these companies: Swix, Artech, Toko, Holmenkol, and finally Sun Valley Ski Tools (the most expensive, but best you can get on the market today). If you have any other questions, there is a ton of info on the net, but for a straight answer, I am always available at kbackman@mit.edu. Also, talk to people on the mountains, the race clubs, and the local ski shop techs. They usually will be happy to fill you in on techniques and gear tips if you ask nicely, and have completely different school of thought, their own dojo of the Sacred Art of Ski Tuning.

May the snow gods favor you and your endeavors. Good luck, and smooth riding!