

Waxing Clinic For Hollyburn Jackrabbit Coaches

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Waxing Clinic for Hollyburn Jackrabbit Coaches

INTRODUCTION

- My background: Previous chairman of CCBC and CCC, Previous member of the National Ski Team Committee, Coached at a number of Regional, Provincial and National training camps. Presently part of CCC's 3-person committee acting as consultants to VANOC on cross country ski issues in the Callaghan Valley. Have on-going contact with coaching development in Norway. I ski competitively in the master category.
- What is your Coaching background? (Number of years coaching? Level of coaching certification? Age categories being coached?).
- At the outset: "Youngsters deserve a good skiing experience". What does this mean?:
 1. Skis that fit (i.e. correct length, the right camber stiffness etc.)
 2. Properly prepared ski base (clean skis, saturated glide zone, stone grinding, structuring etc)
 3. Skis that have been waxed for the actual snow conditions.

In terms of importance (good and fast skis), item 1 above (specially camber stiffness) counts for 60 to 70%, item 2 for 20 to 30% and item 3 for 10%.

Note that an aspiring young athlete should have developed good technique by the time he/she is 12 years of age. In order to get to that point he/she needs good (not necessarily the most expensive) equipment.

Note that children younger than 6(7) years should only ski on non-wax skis.

SKI SELECTION

Ski and Pole Length

- Classic skis should reach just below the wrist of the skier's outstretched arm. (Poles must have adjustable straps and should reach to the armpit when the skier is standing on the floor)
- Skating skis should reach 3 to 4 cm. above the head of the skier. (Poles must have adjustable straps and should be the same height as the chin)

Camber Testing of classic skis

Camber Air Space:

- A good pair should have adequate space between the skis in the center section when the skis are held together without applying any force: 5-6 cm for adult skis and approximately 3cm. for skis suitable for 8 to 9 year-old skiers, with space increasing proportionally as the skier gets older. Good quality skis for skiers younger than 8 years of age are made with quite soft camber. The emphasis is on good grip and not speed. There is no point in measuring center section space on skis for this age group.

Camber Stiffness:

- 8 years and younger.
Testing not applicable.
- 8 to 10 years of age.
Camber testing based on approximately 65% of skiers weight i.e. skis should come together at the centre when this force is being applied.
- 10 years and older.
 1. When standing on one ski (i.e. all weight on one foot) a dry wax ski should have a ski to surface distance below the binding of 0.0 mm. A klister ski should have a distance of 0.8 - 1.0 mm.
 2. When standing on both skis (i.e. half the weight on each ski) a dry wax ski should have a ski to surface distance of 0.6-1.0mm and a klister ski a distance of 1.4-1.8 mm.
 3. Do paper test. Stand on skis with body weight equally distributed on both feet. Move a standard sheet of type writing paper towards the tip. Mark (*use a black waterproof felt pen on the side of the ski*) where it stops. Do the same towards the tail. The cold snow wax-pocket has now been established. Fold the paper once. Repeat test to establish the zero-degree (soft dry waxes) wax-pocket. Fold the paper again (you have now 4 layers of paper) to establish the wax-pocket for klister.

Generally the length of the wax-pocket (also referred to as the kick-zone) using hard-wax is approximately 50-55 cm (30-35 cm. from front of binding to the front of the kick-zone). For klister it is 45-50 cm (25-30 cm from front of the binding to the front of the kick-zone). If you have selected a good pair of quality racing skis, you should not be required to wax past the heel (5-10cm. ahead for racers). In cold snow and soft tracks you may have to extend the waxing zone 10-30cm further towards the tip.

Test the kick-zone by waxing 5 to 10cm beyond the markers. Go for a long ski on abrasive snow. If the extra 5 to 10cm has been worn out the wax pocket is OK. If not, adjust the marker.

Other Ski Selection Tests:

Check to see that serial number is the same on both skis.

1. Press skis together at heel. Should come together evenly, tips should not separate (open up).
2. Check to see that tip is not twisted.
3. Look down the ski. No waving should be seen.
4. Hold ski up against light. Move a perfectly rectangular plexiglass scraper (or any even surface object) along ski to check for flatness i.e. no light should be seen between scraper and ski base. (A little concavity just at the tail appears often on new skis and is of little significance since this is a low-pressure area).
5. Klister skis should have two distinct camber pockets. The pocket under the middle of the ski should be shorter and stiffer than the pocket for a dry wax ski. Using your hands, you should not be able to press together the second pocket.
6. New skis are normally best in wet conditions (i.e. the base has not “hardened” through a lot of hard wax applications).
7. Inspect ski base and edges for damage.
8. Check the flex in the tip and the tail of the ski. Tip should be more flexible than tail. Watch for a curve with a long smooth radius.

Classic ski selection for racing.

The right ski for the race is basically dependent on skier's weight, ability and actual snow conditions.

1. Soft camber ski (for use in new snow and loose tracks - especially zero temperature conditions. Can also be used in new and loose snow in very cold conditions). *The skis should have a long gradual wax pocket at the front.* A soft camber ski in freshly fallen wet snow at around zero temperature will permit the use of very thin and few wax layers (say 2-3 layers).
2. Medium camber ski. Hard packed tracks (for use in older snow as well as fresh snow when hard packed). Also softer tracks in klister conditions. *The skis should have a medium stiff and short wax pocket.*
3. Stiff camber ski (usually for hard and/or icy tracks (abrasive conditions). Use fairly thick klister layers. *The skis should have a shorter and stiffer wax pocket.*

If you select to have only one pair of classic skis, select medium camber. If two pairs of skis, select medium and stiff camber.

Skating ski selection for racing.

Skating skis that are good in cold conditions are normally not very good in wet conditions.

Skating skis are constructed with a stiffer middle section than is the case for classic skis. This is done to distribute body weight evenly over a shorter ski. It is therefore important to find a ski with an even transition from the stiffer middle part to the softer tip and tail area. If the transition is too abrupt, it can act as a brake.

1. Select soft skis for: - wet loose/soft snow conditions
- loose powder snow (i.e. cold conditions) and generally all conditions with loose snow.
2. Select hard skis for: - all conditions where tracks are hard (i.e. both hard _ compacted, icy and wet when hard compacted)

If you select to have only one pair of skating skis, select hard camber.

BINDING LOCATION

As a general rule, locate binding at the balance point of the ski.

If the tip catches the snow on skating skis, move the binding up to 10mm forward (towards the tip).

If the tips on classic skis do not come down properly in the track, it will help to move binding back up to 10 mm.

Use epoxy glue when patching old screw holes (i.e. when you relocate binding position).

STONE GRINDING (Machine Shop)

This applies to athletes 12-14 years and older and only for those that are good enough to participate in fairly advanced competitions (nationals etc.).

Note that all skis now come from the factory with a fine structure stone grinding.

For the younger skiers it is therefore not recommended to stone grind new skis - just perform standard base preparation as outlined in this paper. Stone grinding should be delayed until the skis start to feel slow.

When stone grinding is recommended, the trend is now to stone grind the skis using a fine texture then adjust for actual snow temperature using ski structuring devices (rillers). More about ski structuring in the following section.

Again, stone grinding should only apply to the older and more advanced skiers.

SKI STRUCTURING

Note that metal scraped skis is equivalent to fine structure i.e. good for very cold snow.

Swix ski structuring devices are cutting into the base and therefore the structure is more permanent (i.e. the structure will stay on the ski for a long time). Swix ski structuring is used prior to the application of glider. It requires a firm hand pressure and with only one single pass from tip to tale. This is a linear rilling tool. Best results with this device have been obtained in quite wet conditions using 2-3 mm rilling irons. Note that removing the “peaks” from aggressive Swix structuring with the use of a metal scraper will normally improve ski maneuverability. Refer to Swix booklet for further details.

Holmenkollen ski structuring device does not cut into the base but the structure is rather pressed into the base. It is therefore applied both before and after the glider wax. If ski is not completely flat then go over the ski twice i.e. tilt the device first to the left and then to the right to cover the entire ski. The structure will eventually disappear after re-waxing.

Toko ski structuring device is very expensive and the Canadian National Team has not had any more success with this device than with the Swix and Holmenkollen devices.

The most recent trend for ski preparation is the following procedure:

1. When stone grinding the ski, apply only a fine texture.
2. Adjust with Holmenkollen ski structuring device during average and cold conditions.
3. Adjust using Swix rilling device during wet conditions.

Structuring is considerably more important in humid than cold, dry conditions (i.e. most of the time structuring is not important in temperatures below minus 10 degree C if humidity is low).

Note that in any specific condition, structuring may be necessary for classic but not for skating due to the slicker conditions you get in the track (when classic skiing) after a number of skiers have gone through.

If time allows, a structured ski should always be tested.

SKI CALIBRATION (For Testing Purposes)

The following has been included for information only and does not apply at the club level.

- Need 4 to 6 pair of skis (same length, same stiffness and same camber)
- Base preparation of the skis to be identical.
- Select area for testing with stable wind conditions, temperature and no exposure to sun (if it is snowing, reliable test results will be difficult to obtain).
- Test area to be steep in the beginning with a long “run out.
- All skis must be “skied in” for the same amount of time prior to starting testing.
- Test skier must keep same body position throughout the tests, also same body weight distribution on the skis (i.e. test skier to select a comfortable body position and stay with it).
- Only test results from the same test skier are relevant when comparing skis.
- Set test gates up in steep portion of test area (testing time should be approximately 5 sec)
- Test each pair of test skis at least 3 times
- Calculate % deviation. Fastest ski is 100%

Now all the calibrated skis can be used for testing any “wax of the day” since each pair has a speed correction attached to it.

After deciding and applying the “wax of the day”, test the skis for “feel” i.e. “flow and free glide”. Note that this is often as important as the speed.

Use a *separate* set of test skis when testing structures.

BASE PREPARATION (For New Skis and/or after Stone Grinding).

Apply the following procedure:

Note that except for item #1, all of the following applies to the gliding zones only.

1. Use fibertex at least 30 times aggressively (more for “cold” skis) *back and forth* down the ski, using gray colour fibertex i.e. medium coarse.
2. Brush with medium stiff bronze brush 15-20 times. Use continuous movement from tip to tail (*no back and forth movement*).
3. Melt on a soft glider wax and go over with iron one time from tip to tail (always in one continuous movement). *Never put pressure on the iron*. Remove immediately while the wax is still liquid using a plastic scraper. (i.e. *hot wax cleaning*)
4. Items to pay attention to when scraping:
 - Keep scraper sharp using a file.
 - Start scraping the groove using the klistler scraper or the scraping “pen” made for the purpose.
 - Scrape the sides of the ski.
 - Hold scraper at 45 degrees to the longitudinal direction of ski and on a 45 degree angle (angle to the left on one stroke and to the right on the next stroke. This keeps the scraper from “following” any waves in the base).
 - Be light on the hand and press down the scraper evenly across the ski surface.
 - Start with one continuous *drag* down the ski (tip to tail) then *push* the scraper (tip to tail) in one continuous movement down the ski.
 - Do some more passes, holding scraper quite loosely, covering short distances (15-20 cm) to remove all glider wax.
 - If the edges of the ski are quite rounded (should be minimum on a good racing ski), angle the scraper and scrape with an extremely light hand.
 - The object is to scrape off as much wax as possible without damaging the base structure.
 - Clean off any remaining wax powder by going over the ski with fiberlene.

- 5 Brush with medium stiff bronze brush 15-20 times (continuous movement).
- 6 Repeat item three above but this time go over with iron 2-3 times (if iron is smoking then temperature is too hot. Be careful. Also, if you cannot touch the base with your finger you are moving the iron too slowly. Keep checking base temperature by touching with your finger). Let the wax cool for 10 minutes.
- 7 Scrape and brush.
- 8 Start hot wax saturation. Apply *soft* glider. Go over with the iron 2-3 times. Let cool for 5-10 minutes then go over with the iron 2-3 times. Again (for the third timer), let cool for 5-10 minutes and go over with the iron 2-3 times. Let cool for 10 minutes then scrape.
- 9 Ski is now ready for the “glider of the day”.

Seal damage on top of ski or on sidewall using carpenters glue. Use same type of glue in screw holes for the bindings.

Oxidised skis.

Do not leave the ski base facing the sun. The base will oxidise and slow the ski down. Skis also oxidise when stored for longer periods without proper storage wax treatment. For extensively oxidised skis you need to remove 0.1 to 0.2 mm of the ski base using a *sharp metal scraper*. This requires an aggressive use of the metal scraper and is very difficult to do without damaging the base. Coaches without experience in this area should leave this task to a professional. An alternative to the above is stone grinding (by machine shop).

GRIP (KICK) WAXING

Learn the waxes of one manufacture really well before you even make an attempt on other waxes. (Note that all colour references in this paper apply to Swix waxes).

Prior to proceeding with grip waxing, try to answer the following questions:

1. What is the air temperature? (in the shade and ideally at highest and lowest point of the trail).
2. What is the snow temperature? (measured close to track, in shade, and approx. 5 cm down).
3. Is the humidity high (above 80%), medium (50 to 80 %) or low (under 50%)?
4. Is the snow old or new?
5. Snow conditions in the track: Soft? Hard? Abrasive? Glassy? Icy? Wet? Man- made?
6. Type of track preparation/compaction?
7. Race time? Is it going to warm up? Is the sun having an impact? Is it starting to snow? (increase in humidity).

All of the above may have an impact on your choice of wax. However, some initial ski preparation work including Base Waxing (see below) must be done prior to applying the “grip wax of the day”.

Always favour grip before glide in a classic race (do remember that in 1 hour of racing you only spend around 10 minutes of downhill i.e. you stand to lose much more time when skis are slippery). If you have problems getting good grip, do not be afraid of experimenting by waxing warmer even in cold conditions (i.e. -2 to -6 when temperature is -10).

Initial ski preparation work in advance of grip waxing:

All of the following can be done at home i.e. prior to leaving for the ski hill.

1. Also Refer to "SKI SELECTION" and "BASE PREPARATION".
2. It is assumed that the *wax pockets or kick wax zones* have been established and *marked* as previously described.
3. Clean existing kick wax from skis starting with a putty knife then with liquid wax-remover. Dry with air blower (or paper towel).
4. Also clean the edges and the top of the ski using liquid wax-remover.
5. Clean the gliding zones by hot-waxing (i.e. apply hot glider wax and scrape off with plastic scraper while still liquid. You do not have to do this often). When skis are very dirty you should use a tiny bit of wax-remover in the glide zones (remove liquid before it evaporates).
6. Buff the gliding zones with Fibertex (10 times with grey Fibertex).
7. Fasten a masking tape (green colour) across the ski at both ends of the kick zone in order to avoid spilling wax into the glide zone when grip waxing.
8. Rub the kick zone with sandpaper in the longitudinal direction. Generally use #100 grit (#80 for wet klister conditions and #120 in very cold weather). Go over the ski 2-3 times with a "light hand". *Do not sand the entire kick-zone, apply sandpaper only in the designated klister zone.*
9. Scrape off excess 'hairs' using sharp acrylic scraper.
10. Clean the kick zone with Fiberlene.

You are now ready for the first layer(s) of wax referred to as base waxing.

Base Waxing

Prior to applying the "wax of the day", the kick zone has to be "base waxed". The base wax is per definition the bottom or first layer(s) of kick wax and is intended as a binder for the "wax of the day". After base wax application the ski must be cooled off prior to applying wax of the day. Actual conditions dictate different choices for base waxing. Any of the following can be used for base waxing:

- manufacturer's "base binder wax".
- klisters.
- some dry waxes .
- any combination of the above.

(Note that the very sticky "base binder wax" is considerably easier to apply when the ski is slightly heated and the wax cold. Smooth out the "base binder wax" with a cork. It is important to get a very *even and thin layer*).

Very abrasive snow conditions and/or longer races:

Use base binder wax in combination with klister wax. Heat the ski base prior to application and keep the base binder wax cold. Use a light hand when applying. Iron in (no smoking of iron). Cork out to a *very even and thin layer*. Make certain no base binder wax deposits on the edge of the ski or in the groove. These conditions also require a *thin layer* of Blue klister as the second base layer (if Blue klister is the wax of the day, use Green klister). The klister layer should be just tacky to touch i.e. just a film)). Again, use the iron and cork.

Fairly abrasive snow and semi-long races:

Use any of the manufacturers' base binder waxes (*one* even and thin layer). Heat with iron and then cork.

Non abrasive snow (Dry wax conditions):

Use Extra Blue or the dry wax of the day as a binder wax. Heat with iron. Cork.

Wet snow (Klister conditions):

Use as binder a klister that is one or two steps colder than klister of the day. Heat and cork.

Grip wax of the day (a few general items):

After completing the base waxing, you are now ready for the wax of the day.

- Skis should be cooled off prior to further wax application.
- Do not use iron but cork in all layers for the wax of the day (klister might be different).
- Have a game plan if temperature turns colder/warmer.
- Note that what works very well in a track that few people have skied, may not work well after a number of skiers have been through (e.g. second lap).
- When testing the kick wax, make sure you test both uphill grip and "free glide".

There are basically 3 "groups" of grip waxes:

- Dry waxes (also referred to as hard waxes).
- Klister waxes
- A combination of klister and dry waxes

The following outlines some important considerations related to wax application for each of the three "groups".

Dry Wax conditions:

- Apply fairly thin wax layers.
- Cork from end of the kick-zones towards the middle of the ski (not necessary if you use masking tape as previously outlined).
- Usually no more than 4-7 thin layers in old snow (start with 4).
- Usually no more than 3-5 thin layers in new snow (start with 3).
- If slippery, add layer (up to max layers as indicated above).
- If still slippery, go to the next warmer layer. Start off with one short layer (only 10 cm. in front of and behind the balance point of the ski). Note that sometimes it works to skip a layer (i.e. if extra blue is slippery skip special violet and go directly to violet).
- If still slippery, scrape off all waxes and start all over with a warmer wax.
- Note that too warm wax also results in slippery skis. This is due to icing i.e. the wax is frozen. Skis must be scraped and colder wax applied.
- A thin layer of a colder dry wax on top of a soft dry wax is often used to "speed up" the ski or to avoid icing. To facilitate this it is best that the ski be cooled off after applying the soft wax and the cold wax heated slightly (in your pocket) prior to application. The last cold wax layer must be corked out with a "quick and light hand".
- Mixing/alternating soft and harder waxes is often used with success.
- Fluoro dry waxes are only used as a last layer to speed up the ski. These waxes are not very durable and must therefore not be used as the main wax. In general, fluoro waxes are great

for glide but poor for kick. *However, they tend to prevent icing in a more effective manner than conventional waxes.*

- In new snow (mostly cold) the wax zone is at times extended 10 to 30 cm towards the tip. This technique can at times also apply to new snow at warmer temperatures when the track is soft.
- *In high humidity (80% plus) a softer wax than what temperature alone would dictate is always required.*
- Softer dry waxes are easier to apply if kept cool.

Klister Conditions:

Klister tubes tend to leak over time. Therefore, store all klister tubes separate from all other waxing equipment. Also, keep tubes separate from each other in small plastic zipper bags.

After klister application, ski must cool 10min. before use (to prevent icing).

- Only pierce a small hole in the klister-tube.
- Heat colder temperature klisters with a burner or heat gun prior to use (don't make the tube so hot that the klister "runs"). If possible, it is helpful to keep the colder klister types in a tin of warm water during waxing application.
- A klister wax will generally work right away if it is the correct type (after 10 strides you know - Dry waxes you usually have to ski on for some time before you make your decision).
- Note that the kick-zone for klister is shorter than for dry wax application.
- Apply klister in a herring bone pattern except when the klister is used as a base wax (then only a tiny "drop" every 5 cm. is required).
- Not too thick layers (thinner layers in fine grained snow and thicker layers in coarse snow).
- Do not use heat (except for klister used as a binder). Spread out with thumb (circulating movements) or palm of hand (cork can also be used). Note that the use of the scraper that comes with the klister tube never provides a good even layer.
- As already outlined, in abrasive conditions or long races use a harder klister than the klister of the day as base binder.
- In dirty track conditions mix in a small portion of silver klister (1:3 or 1:4) Also note that a number of today's klister waxes have silver already mixed in.
- If skis are too slow, remove one inch at front, if too slippery add some under the middle.
- Klister must *always* be spread out to an *even layer* (not lumpy). A lumpy final product is often caused by:
 - Too thick layer(s) to start with (therefore impossible to work to an even layer).
 - Too much heat due to friction when applying (i.e. corking too hard).
- Work from the end of the kick zones towards the center in order not to spill into the glide zone (not required if you are using masking tapes).
- Remove klister from the groove and the sides of the ski.
- Two (2), sometimes three (3) layers of different klister waxes are not uncommon. The 2nd and 3rd layer should stop 5 cm. short of the base layer at the heel in order to prevent spill over to the glide zone when skiing.
- If mixing two different types of klister, apply heat. This is best done with a heat gun (careful - not too hot).
- Fluoro klisters are only used in *very thin* layers for fresh snow and as the last layer on top of other klisters to speed up the ski. Also use Fluoro klister as last layer when there is a lot of dirt and pine needles in the track.
- Adding Silver klister to any other klister will harden the wax i.e. speed up the ski.

- In high humidity (80% and above) use klister that are approx. 2 degrees warmer than air/snow temperature would dictate (opposite in low humidity).

Dry wax on top of klister:

In difficult conditions (often around 0 degrees or when fresh snow is mixed in with coarse snow) a thin layer of klister with a multi-layer of dry wax on top may provide excellent skis. The klister assists with better grip and the dry wax in speed as well as reducing the potential for icing.

Note that this waxing technique is normally only used in temperatures around 0 degrees and colder and is only successful if the klister can be frozen prior to dry wax application.

- Start with a very thin layer of a base klister (when klister is used as a base wax only a tiny “drop” every 5 cm is required. Heat and cork out to a very thin layer. We are talking about a “film” and only shiny parts shall be seen.
- Apply a *very thin* and *even layer* of klister of the day (in the warm end i.e. closer to 0 degrees you may require 2 layers of different klister of the day)
- Freeze klister.
- Warm dry wax (inside or in pocket).
- Carefully apply the first layer of dry wax. Apply the dry wax outside i.e. in the cold. Use a light hand with both the wax and the cork (i.e. long and light sweeping actions).
- In the warm end (i.e. closer to 0 degrees) it is difficult to apply more than one layer of dry-wax. As the temperature gets colder a multi-layer of dry-wax must be applied.
- Use even and light strokes with the cork and cool off the skis between each layer of dry wax.

Grip waxing for some of the more common conditions

As can be seen from all of the above, a number of parameters influence the final choice of the “wax of the day”.

It is helpful to initially simplify the process by considering some of the more common types of snow conditions such as:

- New and new fallen snow
- Fine grained, old snow
- Corn snow/man-made snow

The following includes some of the items that may be helpful towards deciding on the “wax of the day” for the different snow conditions as listed above.

New and New Fallen Snow:

It is usually more difficult to wax for new snow, and very difficult in new snow around 0 degrees. New snow has sharp fine snow-crystals. As older the snow gets as rounder the crystals and as easier it is to wax. (Speedy increase in temperature will also round off the crystals).

Application of a softer wax (i.e. one level softer than what the snow temperature dictates) under the middle of the ski (say 25cm.) is often required in conditions with fresh snow.

A soft camber ski in fresh/fallen wet snow at around zero temperature will permit the use of very thin and few layers.

Klister is generally not the wax to use in new snow. However, some manufacturers make klister listed for new snow around 0 degrees. This klister does at time work when applying a super thin layer covered with dry wax. The skier must stay in the tracks and keep moving the skis so that they do not ice up.

Most manufacturers have dry waxes that are supposed to work up to plus 4 degrees. Warmer temperatures than that in new snow dictates the use of klister.

As previously outlined, in high humidity a softer wax is required.

Also a longer wax pocket is often required in new snow with loose tracks.

Fine grained, old snow:

Waxing in this condition is most of the time quite easy. Start waxing using manufacturers dry wax recommended for the actual snow temperature. However, adjust for high humidity.

Use of klister usually starts at plus 2 degrees and warmer.

For hard tracks with small ice particles (i.e. a mixture of corn snow and fine grained snow (temperature below 0), the use of dry wax only is often too slippery. This is a classic condition where *a very thin layer* of a blue klister plus an equally thin layer of a warmer klister (purple) covered with 4-5 layers of “the days” dry wax will provide excellent skis. Remember to freeze the ski between each layer of dry wax and cork with a light hand. In the end, the dry wax must cover all the klister i.e. no shiny klister should be seen.

Corn snow/man made snow:

This is a classic klister condition. Choice of wax should be as per manufacturer’s recommendation with adjustment for humidity.

GLIDER WAX

Learn the waxes of one manufacturer prior to venturing into the maze of glider waxes available in today's market.

In dry conditions (especially when -10 degrees and colder) pure paraffin gliders are used and as the temperature and the humidity increases, waxes with increasing amount of fluoro are used.

A few general conditions regarding glide waxing:

- Note recommended temperature setting as shown on the iron. Iron must be warm enough to easily melt the wax. It should not be necessary to move the iron back and forth in order to melt the wax and the iron shall not be so warm that the wax is smoking. If you cannot touch the ski base, you are either moving the wax too slowly or the iron temperature is too high.
- Skis should be waxed indoors.
- When testing skating skis for speed always test outside the tracks.
- Note that every time you apply a cold wax (which requires the use of high iron temperature) the ski base will harden and will therefore go slower in warmer temperature. It is therefore an advantage to have a set of skating skis for cold and one for warm temperatures.
- Clean the brushes a few times during the ski season.
- Experience seems to indicate that it is *not* necessary to use a lot of different brushes. The Canadian National Ski Team is using a soft bronze brush, a plastic brush plus a horsehair brush for Cera F.
- When in doubt, err on the warm side when selecting your glider wax (it is more of a problem to have cold glider on the skis in warm conditions than the other way around).
- For longer races, a glider wax colder than the glider for the day is often used as a base layer (binder).

Step by step procedure for glide waxing.

It is assumed that base preparation as previously outlined has been completed and "storage" glider wax has been applied.

1. Remove "storage" wax with plastic scraper. Scraping technique has previously been outlined.
2. Clean the ski by hot waxing with a soft glider wax as previously outlined (or tiny bits of wax remover if the ski is very dirty).
3. Brush with a bronze brush 10-15 repetitions from tip to tail to "open" the base and remove surface oxidation.
4. On the day prior to the race apply a hard glider wax as a base binder if the snow is abrasive and/or the race is long.
5. Apply wax of the day. Note that the temperature of the iron must be adjusted to the actual glider wax chosen. The coldest waxes are the most difficult to apply. *It is quite easy to damage the base or "fuse" it by overheating.* (Note that the melting temperature for the ski base is 130-140 degrees).
6. Don't skimp on wax - this could also potentially damage (burn) the base.
7. Move the iron slowly down the ski in a continuous movement (do not move iron back and force over the same area). Always check temperature of the base by placing your finger on it.

If you cannot touch the base it is too hot. Similarly, if the iron is smoking the iron temperature is set too high. Let it cool off.

8. Go over each ski 2–3 times with the iron. Again continuously check the temperature by touching the base with your fingers.
9. Cool off the skis (*indoors if possible*) for at least 10 min.
10. Repeat item 7 to 9 two more times.
11. Scrape off the sides and the groove of the ski. You must be careful when scraping the groove so that scraper doesn't "jump" out and damage the base. Use manufacturers "groove pen" or a klister scraper.
12. Scrape off wax of the day with a plastic scraper. (*Note that the coldest glider waxes may be very brittle and should be heated somewhat prior to scraping. Use iron or electric air blower. Alternatively remove most of the hard wax before it becomes solid.*)
13. As already outlined, the process followed during scraping is:
 - Keep scraper sharp using a file.
 - Start scraping the groove using the klister scraper or the scraping "pen" made for the purpose.
 - Scrape the sides of the ski.
 - Hold scraper at 45 degrees to the longitudinal direction of ski and on a 45 degree angle (angle to the left on one stroke and to the right on the next stroke. This keeps the scraper from "following" any waves in the base).
 - Be light on the hand and press down the scraper evenly across the ski surface.
 - Start with one continuous *drag* down the ski (tip to tail) then *push* the scraper (tip to tail) in one continuous movement down the ski.
 - Do some more passes covering short distances (15-20 cm) to remove all glider wax.
 - If the edges of the ski are quite rounded (should be minimum on a good racing ski), angle the scraper and scrape with an extremely light hand.
 - The object is to scrape off as much wax as possible without damaging the base structure.
 - Clean off any remaining wax debris by going over the ski with fiberlene.
14. Brush 10 strokes (continuous i.e. not back and forth) with the Bronze Brush.
15. Make a couple more *light* passes with the plastic scraper.
16. Brush with a stiff nylon brush (back and forth down the ski). Brush hard until wax no longer seems to come off the base (you are removing wax from the structure of the base i.e. you only want to be left with the wax that has gone into the base).
17. Do final polish with a soft nylon brush or pad (made for the purpose).
18. Re-brush (with soft brush) skis after skiing 1 km.

Note! If using a rotator brush it must rotate in the direction of ski travel. Careful, too long time and/or too much pressure may cause overheating and consequently destroy the ski structuring (or in the worst case the base could be destroyed).

Always apply a layer of soft glider wax on the skis immediately after use and during storage and transportation.

Fluorocarbon Powders

This wax is included in this paper for information only and is way too expensive to apply in local racing (especially for kids).

When applying Fluorocarbon Powders go over with a hot iron (highest setting). Move iron across the ski very fast (3-7 sec).

1. Ideal conditions for this wax is very high humidity, new snow or snowing at 0 degree and warmer.
2. Always use a hard glider as a base wax for Fluorocarbon Powders.
3. Make sure to use sufficient amount of powder (the entire ski should be covered with a layer of the powder) to avoid burning the ski base. Move the iron at a speed so that you can see small tiny sparks (keep touching the base to check for extreme temperature).
4. Brush, that is *do not scrape*, Fluorocarbon Powders. Use horsehair brush forcefully back and forth in short moves. The brush you are using should be dedicated to Fluorocarbon Powders only.
5. Leave the powder on the skis after brushing.
6. After 10 minutes go over the skis again (3 - 7 seconds) with the iron.
7. Use the horsehair brush again.
8. Remove excess powder with fiberlene.
9. Polish using a pad dedicated for the purpose.

See Swix booklet for further details.