Key rebushing using the Two Caul Method

This method allows installation of new bushings in both rails in 1 1/2 hours or less, with excellent quality and little or no key easing needed. The secret is in the economy of motion and tool usage due to handling only one piece of cloth at a time. An **Intermediate Caul** temporarily holds the first piece of cloth in place, then a **Final Caul** is used to clamp the second piece.

By using bushing cauls accurately made to correspond to the size of the key pins, a quality bushing cloth, and hot hide glue, the bushings are molded into the correct shape and size as the glue hardens. This greatly reduces the need for key easing, preserving the keys and yielding a more stable job.

» Recommended tools see page 6

Step 1

Measure the key pin sizes of both rails: *Never assume a pin size*. Always take a micrometer reading, then choose the appropriate Intermediate and Final cauls from the caul size chart.

Step 2

Choose a cloth thickness using a dry-fit test: You will need a selection of cloth thicknesses on hand for all bushing jobs. Loop a piece of bushing cloth into the mortise, then test the fit of the correct **Final** caul. It should be snug but not tight: snug enough that you can lift the key up by holding the caul, but loose enough that the key falls off with one or two shakes.

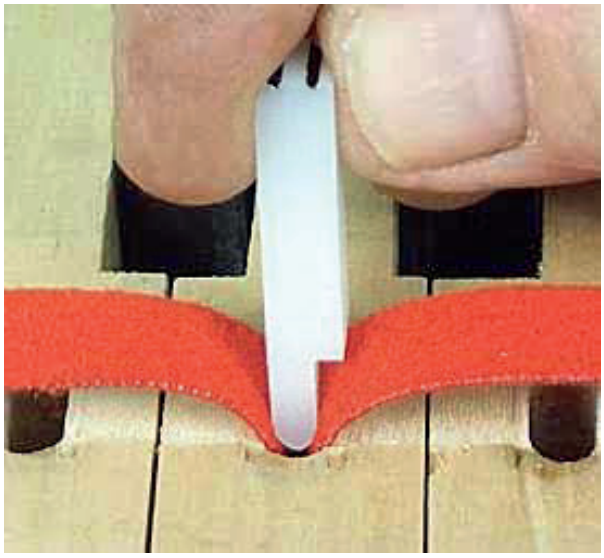
Test several mortises for an average. Each rail may require a different cloth thickness.

Step 3

Lay out all tools and materials: Clamp the keys together as a unit so both your hands are free. Our aluminium Key Clamps are shown here.

Have your hot hide glue mixed to the right consistency, and a small flat stick for spreading (popsicle size). Lay out the correct **Intermediate** cauls, several 12“ long pieces of bushing cloth, a small hammer, and a sharp knife.

A small knife with a sectioned, snap-off blade is ideal for key bushing.





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Step 4

Apply glue to the cloth: Your glue should be 1/2“ deep or less in the container, so that when you withdraw the stick it holds about the right amount.

Holding the cloth as shown, spread the glue with one or two strokes, then wipe once with the dry upper part of the stick to level and remove excess glue.

When first learning, apply glue to only about 1“ of cloth. After a little practice you should be able to work with 1 1/2“ to 2“ of glued cloth.

You should have a thin but complete coating of glue, with no dry spots or globs.



Step 5

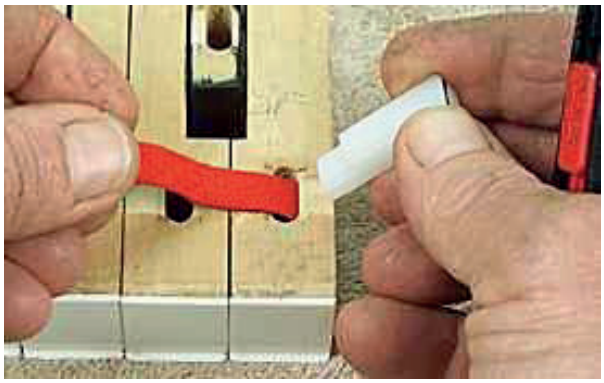
Position the cloth on the key: Holding the knife in the palm of your hand, pick up an Intermediate caul with that same hand. Lay the cloth across the mortise with the end just touching the far side of the mortise. **This positioning assures proper depth of cloth in the mortise. 3/16“ is ideal.**

The knuckles of the cloth hand should be resting on the keys, making exact positioning simply a matter of rocking the hand slightly right or left.



Step 6

Insert the Intermediate Caul: Hold slight tension on the cloth to avoid drawing more into the mortise, and insert the caul.





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Step 7

Trim the cloth: Still holding slight tension on the cloth, trim it flush to the caul.

Note the advantage of a knife that you can hold in the palm of your hand while still picking up and inserting cauls. Razor blades have to be held in the finger tips, and thus have to be picked up and set down continually.

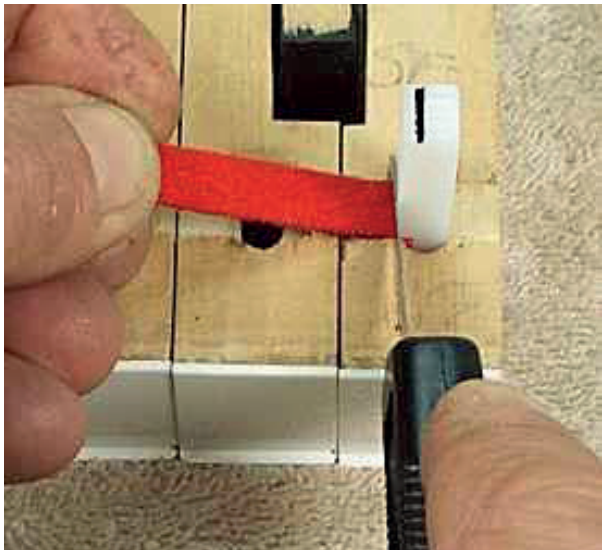
Step 8

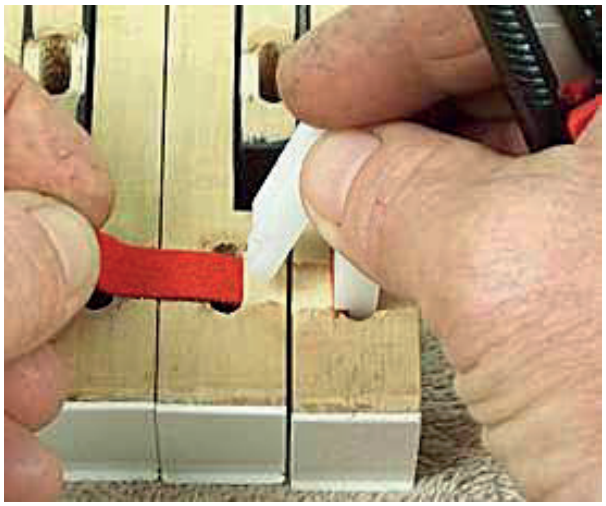
Proceed to the next key: Without setting down the knife, move to the next key and immediately repeat the process of positioning the cloth, inserting the Intermediate caul, and trimming.

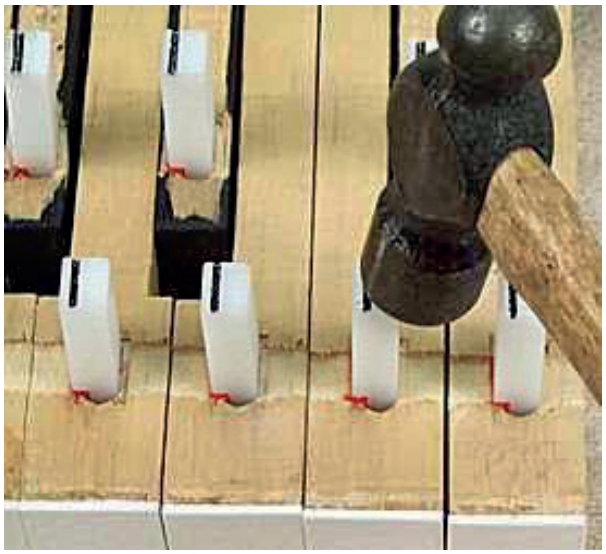
Because you continually hold the cloth in one hand and the knife in the other, time spent picking up and setting down tools is minimized. And by working with only one piece of cloth and using the mortise width as a depth gauge, speed and consistency are automatic.

Every 5 or 6 keys, set down the knife, tap the cauls lightly to seat them, reapply glue to the cloth, and proceed.

Note: You can economize and get by with only 45 Intermediate cauls if desired. Once you've done the first 45 keys, immediately pull out the first 20 Intermediate cauls, bush keys 46 - 66, pull out another 22, and bush 67 through 88. Since you will be inserting the second piece of cloth and the Final cauls soon, the Intermediates are only needed temporarily. However, if you do much rebushing you will find it faster and more convenient to have 90 Intermediates so you can work down the rail without interruption.







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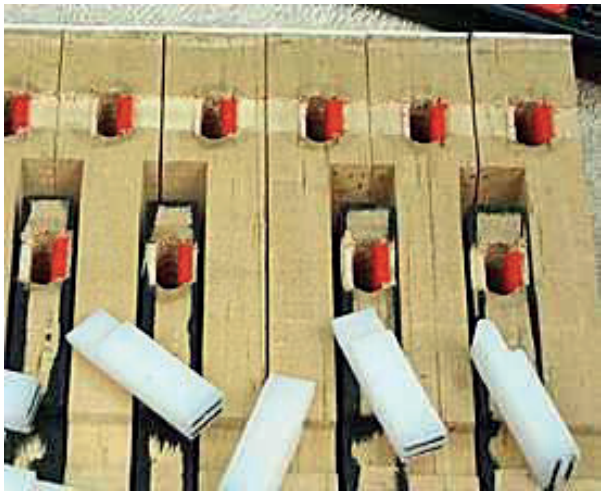
Step 9

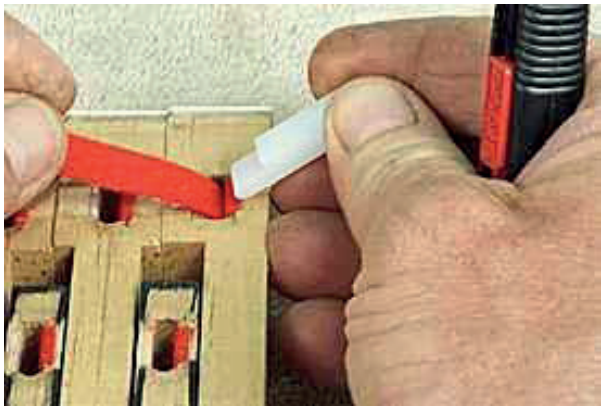
Install the Final Cauls: Most people find it easier to work in one direction (e.g. right to left or left to right). If so, turning the keyboard around as shown here will let you continue working in the same direction as you bush the second side of the mortise.

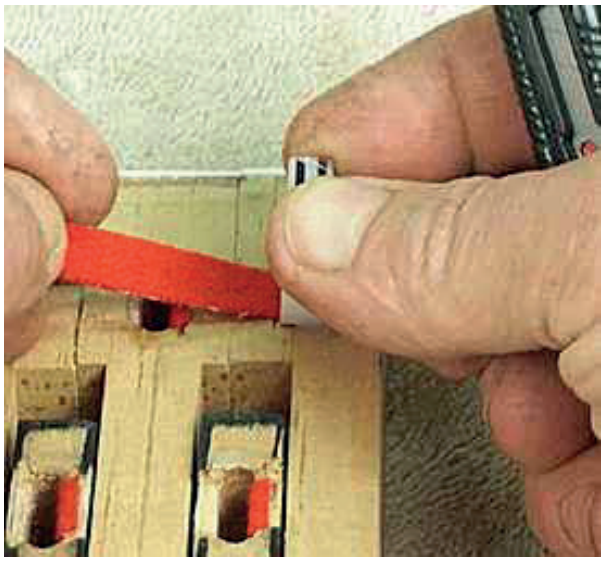
Since the Final cauls must stay in place for several hours to size the bushings, you need at least 90 Finals to do one rail, or 180 Finals to do both rails at one time.

Lay out the **Final** cauls now, and proceed to bush in the same manner as before with one exception: since the mortise opening is now slightly narrower, dip the cloth down into the mortise slightly, as shown here, rather than laying it straight across. This will compensate for the narrower "depth gauge", and will keep the glued side of the cloth away from the cloth already in place.

Position the cloth, insert each Final caul, and trim as before.



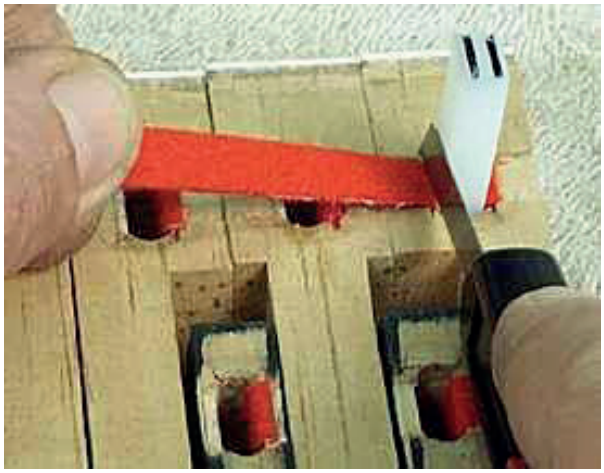


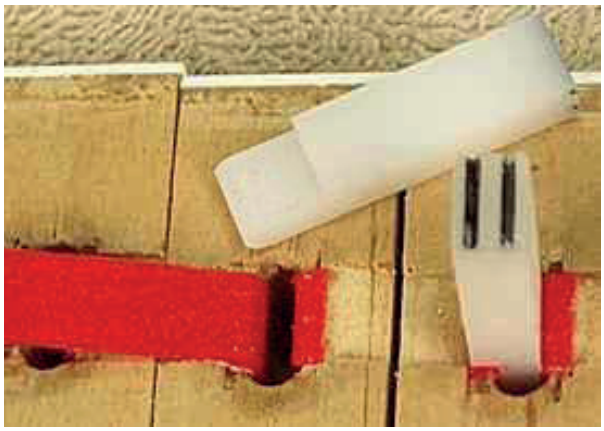


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Snap off a knife section to expose a fresh tip periodically; trimming the cloth should be just a simple quick swipe of the knife.

It‘s wise to check yourself to ensure correct cloth depth, especially when learning. Every few keys just insert the caul, but instead of trimming just wait a few seconds, withdraw the caul, and look down into the mortise. Adjust your technique as necessary until you achieve consistent cloth depth.





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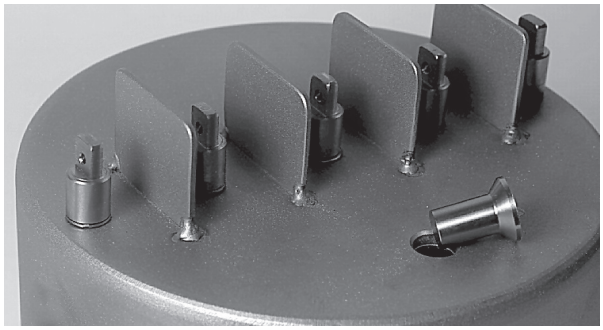
Art.Nr	Art.Bez.	Info	Katalog Seite
Vorbereitung			
42.06.00	“Key Beaver” bushing remover kettle		74
42.04.50	Tweezer cranked		75
42.05.92	Mortise sizing cauls, .125 - .133", 3,2 - 3,4 mm	90 pcs	N 9
42.05.94	Mortise sizing cauls, .146 - .152”, 3,7 - 3,9 mm	90 pcs	N 9
42.05.95	Mortise sizing cauls, .162”, 4,1 mm	90 pcs	N 9
Filze & Tuche			
46.10.45	Tro-Fex, profelt, felt and cloth treatment, 100 ml		N 9
17.30.00	Key bushing 1,0 mm; cashmir, strips	9 mm wide, 4,5 m long	33
17.30.01	Key bushing 1,3 mm; cashmir, strips	9 mm wide, 4,5 m long	33
17.30.02	Key bushing 1,5 mm; cashmir, strips	9 mm wide, 4,5 m long	33
17.30.05	Key bushing 1,35 mm, 5% nylon; cashmir, strips	9,5 mm wide, 5 m long	32/44
17.30.30	Key bushing 1,6 mm; cashmir, strips white	9,0 mm wide, 4,5 m long	N 9
Hilfsmittel & Leim			
42.02.30	Key clamps; for 44 keys		76
40.23.50	Baby glue pot; electrical thermostat		61
40.23.20	Electric hot glue pot; temperature adjustable 025l		61
40.23.40	Glue pot electrical; temperature adjustable 1 l		61
26.00.00	Hide glue granulate		46
27.09.13	Mixer spatula for polyester/rex-lith		123
40.25.20	Breakaway knife		72
42.03.50	Bushing knife		75
Garnierklötze			
42.05.61	Single shoulder cauls, # 1	45 pcs	N 9
42.05.62	Single shoulder cauls, # 2	45 pcs	N 9
42.05.63	Single shoulder cauls, # 3	45 pcs	N 9
42.05.64	Single shoulder cauls, # 4	45 pcs	N 9
42.05.65	Single shoulder cauls, # 5	45 pcs	N 9
42.05.66	Single shoulder cauls, # 6	45 pcs	N 9
42.05.67	Single shoulder cauls, # 7	45 pcs	N 9
42.05.68	Single shoulder cauls, # 8	45 pcs	N 9
42.05.69	Single shoulder cauls, # 9	45 pcs	N 9
42.05.70	Single shoulder cauls, # 10	45 pcs	N 9
42.05.71	Single shoulder cauls, # 11	45 pcs	N 9
42.05.72	Single shoulder cauls, # 12	45 pcs	N 9

Single shoulder cauls

Key pin size	2,2 mm .087“	3,2 mm .125“	3,3 mm .129“	3,35 mm .131“	3,4 mm .133“	3,5 mm .137“	3,7 mm .146“	3,9 mm .152“	4,1 mm .162“
Intermediate caul	#5 **42.05.65**	#4 **42.05.64**	#4 **42.05.64**	#4 **42.05.64**	#4 **42.05.64**	#7 **42.05.67**	#1 **42.05.61**	#1 **42.05.61**	#3 **42.05.63**
Final caul	#6 **42.05.66**	#5 **42.05.65**	#12 **42.05.72**	#10 **42.05.70**	#9 **42.05.69**	#8 **42.05.68**	#2 **42.05.62**	#11 **42.05.71**	#4 **42.05.64**
Mortize sizing caul									
		MS125 **42.05.92**	MS125 **42.05.92**	MS125 **42.05.92**	MS125 **42.05.92**	MS125 **42.05.92**	MS146 **42.05.94**	MS146 **42.05.94**	MS162 **42.05.95**

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Preparation



With this kettle for removing bushings, developed by Master Piano Technician. Wiese, old bushings can be rapidly steamed off five keys a time. The additional top “Key Weasel” allows you to remove all further action bushings such as back-check felts, balance-hammer leather, pilot cloth, dampers and even piano hammer heads in a fraction of time.

Instruction: Fill water into the “Key Beaver” until half-filled and boil it on the stove until steam pours out of the nozzles. Next, put 5 keys a time onto them. Depending on the type of glue, keys can be taken off after 2 to 5 seconds. Remove the detached bushings with tweezers while the next 5 keys are on the “Key Weasel”. As wood swelling cannot be completely avoided (a useful by-product as far as the balance-rail pin-holes are concerned), leave the keys overnight for drying before re-bushing or calibrating.

1. Calibrating



These special cauls further improve the consistency of your bushing jobs by uniformly sizing the key mortises after removal of the old bushings. Just steam out the bushings, insert a Sizing Caul into each mortise while the wood is still damp, and allow to dry. The mortises will then be very evenly sized with smooth, flat sides as shown below. Bushing stability will also be improved because the moisture-swollen wood will be compacted back to its original dimension, not left in a soft, expanded state.

2. Prepare the felt



Treating bushing cloth with Tro-Fex
Method of use and results:
Pre-treat the cloth using a pipette or pump spray bottle (40.24.35) and allow to dry at least 8 hours.
After drying, the felt has following advantages:
Higher water resistance. *The felt fibres are* ***strengthened****; the cloth retains its dimensions longer.*
Friction between felt and pin is reduced *through the lubricant component in Tro-Flex.*
Thus pre-treatment already ensures an exact bushing fit, stable regulation, noise reduction at both front and balance pin and a more pleasant touch.
Tro-Fex is also suitable for existing key bushings.
The compressed felt ***regains elasticity, slides better*** *and is* ***more water resistant****.*
Apply one drop with a pipette to the bushing and allow to soak in for a few seconds. Then insert a suitable caul into the bushing and allow to dry for at least 8 hours.

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Appliance

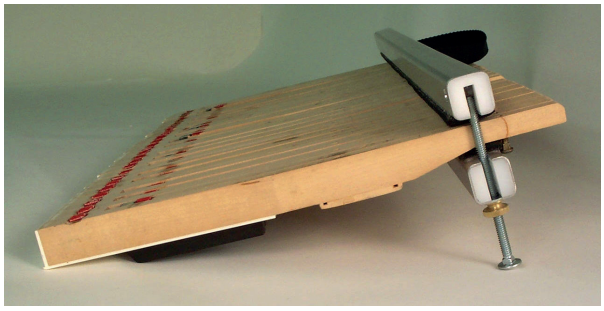
Key Clamp for 44 Keys (Item 42.02.30)

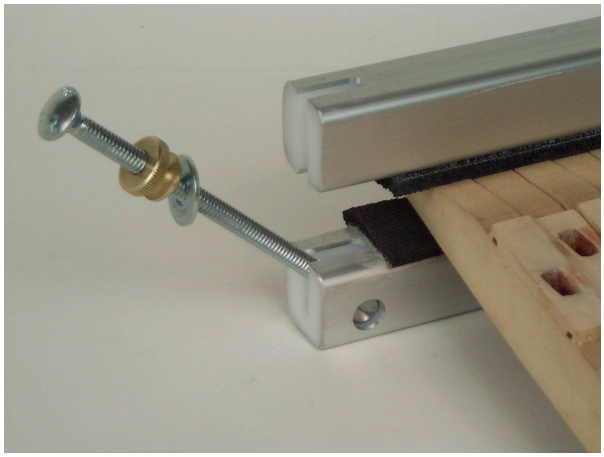
These clamps hold keys together as one unit for such jobs as key rebushing and backcheck work. Speed and efficiency are greatly increased by eliminating handling

of individual keys, leaving both hands free to do the work.Keys can be easily moved around the shop to different work stations with no danger of dropping and damaging key tops. Carrying handles make these clamps a convenient and professional alternative to the box or shopping bag for transporting keys to and from the customer's home.

Support in Field Service and Workshop

When the keys are turned over for work on the front bushings, the carriage bolts rest on the bench top, holding the keys at the correct angle so that front mortises of sharps and naturals are even in height. They're quick and easy to use. Just lay keys onto the lower half of the clamp, position the top half and swing the bolts up into the end slots. Knurled brass nuts need only be twisted a few turns in order to clamp or unclamp a set of keys. These clamps are made from 1" square anodized aluminum tubing, 28" long, and are lined with sponge neoprene to grip the keys. The clamp halves are bowed convex, providing good clamping pressure without the need for a center bolt.





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