Stoney End Harps,
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INSTRUCTIONS FOR INSTALLING LOVELAND LEVERS ON STONEY END HARPS

Introduction: These instructions are written for installing levers on our harps; if you have another make of harp, you may have to modify the procedure. We use Loveland brand levers because we believe them to be the best available; the sound is the most consistent and the string deflection is the least of any that we have seen. When the nylon cam (or handle) of the lever is lifted up, the string is firmly pinched against the stainless steel fret bar. This provides a solid termination for the sharped string and produces a clear sustained semitone without buzzing.

*Note:*Levers can't be installed on harps without bridge pins.

When to install the levers: We feel that the harp must be stable before the levers can be put on, so, if possible, let a new harp settle for a few weeks before installing the levers. Tune the harp often during this period and the harp will become more stable and lever installation will be easier and smoother. Installation is exacting and detailed, but not overly difficult if you are careful and patient.

Lever sizes: The size (diameter) of the strings varies from .025 inch to about .1 inch on our harps and the sharping levers are manufactured to fit only a certain size of string. The identifying number embossed on the cam of each lever indicates the size of the lever. *The string chart that comes with each model of harp lists the size of each string, the note that it is tuned to and the correct sharping lever to install for that string on that model.*

Ordering levers: When you order levers, either tell us which strings you want sharped or order the levers by lever number. Below is a chart showing the sharp and flat keys and the correct strings on which to install a lever in order to play in that key. To get a flat, you must tune the harp to a flat and use the lever to raise the note a semitone up to the natural. On a fully levered harp, we ordinarily tune the 'A', 'B', and 'E' to their flats. Remember to count the number of levers needed carefully. A three-octave harp, for example, will have three 'F' strings and require a separate lever on each one. At the same time, since the lowest and highest notes are 'G', there are four 'G's on a three-octave harp; you'll need to order four separate G levers. (Call us for help.)

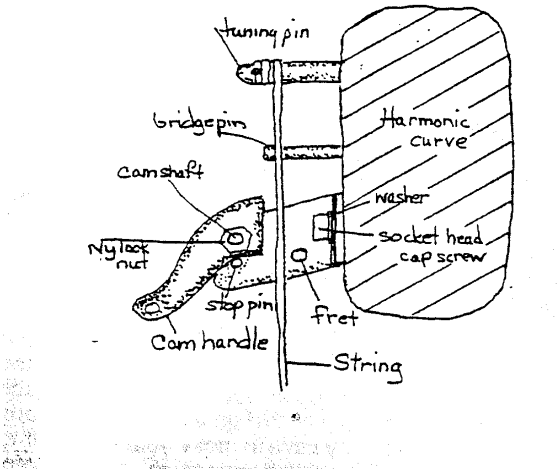
CHART OF SHARP AND FLAT KEYS

Sharp keys

Key	No of sharps	Names of strings for levers
G	1	F
D	2	FC
A	3	FCG
E	4	FCGD
B	5	FCGDA
F#	6	FCGDAE
C#	7	FCGDAEB

Flat keys

Key	No of sharps	Names of strings for levers
F	1	B
Bb	2	BE
Eb	3	BEA
Ab	4	BEAD
Db	5	BEADG
Gb	6	BEADGC
Cb	7	BEADGCF



THE ANATOMY OF A LEVER

Above is a cross section of a harp's harmonic curve (pinblock), showing an installed lever, the string, bridge pin and tuning pin. Please refer to it while you follow the instructions on the back of this page.

STEP BY-STEP INSTRUCTIONS FOR INSTALLING LOVELAND LEVERS ON STONEY END HARPS

Work area: When you have the right levers and are ready to start installation, gather the tools you will need and prepare a place to do the work. Any big solid table will do, but cover it with a soft blanket or path Position the harp with string side up, pin block nearest you, and the pin block elevated on a 4" high padded solid object.

Tools needed: You will need to have an electronic tuner plus the following: an electric drill; a 3/32 inch drill bit (included); a 7/64 inch ball end allen wrench (included); a sharp awl or ice pick: a hammer; a punch, 1/4 inch open end wrench, a small piece of very fine sandpaper, and a needle-nosed pliers.

Getting started: Tune the entire harp as accurately as you can. It the harp has tuning pins that go all the way through the pinblock, you may have to move your padded rest so that you can fit the tuning wrench on the proper pin. You'll note that the sharping levers have an angled base with an oblong slot in it. Carefully examine each lever and remove any sharp edges on the base with fine sandpaper so the base will not scratch the pinblock. You're ready to begin levering, starting with the longest string that is to receive a lever.

Preliminary positioning of a lever Position the lever by. hand so it is underneath the correct string approximately where you think It should go. Hold it solidly and tightly to the wood and examine the relationship of the lever and the string. The string must pass through the lever with approximately one string diameter of clearance above the fret bar so that ft can vibrate freely, not touching either the fret or the cam when the string is plucked. If this clearance is not correct, you must make some adjustments before proceeding by either (a) pulling the bridge pin up from the pinbiock to raise the string or (b) driving the bridge pin in deeper to lower the string until the correct clearance is achieved. Retune the string to the correct pitch and again hold the lever firmly in place by hand. Raise the cam to pinch the string and force it against the fret bar making sure that the string is not deflected sideways.

Testing the position: Still holding the lever firmly, test the position by engaging (lifting) the lever and plucking the string while watching your electronic tuner. The string will produce a sharper note: if it is too sharp, move the lever closer to the bridge pins; if too flat, move it away from the bridge pins and try again. The note should be at the correct unsharped pitch when the cam is open (down) and the corresponding sharp when the cam is raised (pinching the string).

NOTE: See the cross-.section *of* a harmonic curve on previous page for identification of lever and parts.

Fastening the Lever When the lever is positioned so the pitch is correct, use the point of the awl and mark the spot in the wood in the center of the oval hole of the lever where you will attach the screw. Drill a 3/32 inch hole in the wood at this mark and screw in a hex-headed machine screw to make threads in the pinblock. Remove the screw, then use the screw and a washer to firmly fasten the lever to the pinblock. With the cam in the open (down) position, check to see if the string is still in tune. Retune the string to the correct pitch if necessary. Now pluck the string with the cam in the closed (raised) position and see if the pitch is exactly one semi-tone higher. If the pitch is not correct, open the cam, loosen the screw and adjust the lever by moving the lever away from the bridge pin if the pitch is too low, toward the bridge pin if too high. Re-tighten the lever and test again, repeating the process until you get it right. Repeat the above steps with all the levers.

Hints: If the Nylock tension nut is too loose to hold the cam tightly, tighten it with the 1/4 inch wrench. It should be just tight enough to hold the cam snugly but not so tight that the lever is hard to turn. Remember that the strings must be set so that they clear the fret bar by about one string diameter; this becomes more and more critical as you get to the shortest strings. When installing a lever on any of the three shortest strings, note that the lever doesn't have a fret bar because it must be installed so close to the bridge pin that it is impossible to use a fret bar. This is not a defect in the lever.

Troubleshooting: If you find that a string buzzes, first determine where it is buzzing by determining whether the string is touching the fret bar or the cam as it vibrates. Either raise or lower the string by tapping in or pulling out the bridge pin to correct the problem and then adjusting the lever placement. Looking from above, make sure that the lever is exactly straight with the string. When you engage the lever it should not move the string to either side. When' you engage or release the lever it should not make any sound.

You're done! As your harp ages and the soundboard reaches its mature arching, you may have to adjust your levers slightly for exact intonation, by loosening the hex-headed machine screw and sliding the lever a bit.