



## Making a low-C extension for a double bass

A guide to designing a custom-made extension for individual instruments

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**THE FORM OF C EXTENSION** described here represents a significant departure from earlier types of extension. Earlier C extensions were typically made of metal and mass-produced in machine shops, where it was necessary to take a one-size-fits-all approach to construction. These appliances were purchased by shops that then needed to adapt them to the instrument at hand.

This often meant cutting away large portions of the scroll and pegbox to allow the extension to fit and function properly.

The method described below shows how to fabricate a custom-made ebony extension for each individual double bass: an extension that is much lighter and quieter, and less invasive to the instrument.



**1** First, I cut away the area of the nut containing the E-string notch. Next I make an accurate cardboard template that fits around the scroll and the nut platform. I also make a cut-out on the template that I can follow for the upper profile of the pegbox. This template represents the starting outline of the extension, allowing extra material to accommodate further refinements.

ALL PHOTOS: JUSTIN ROBERTSON



**2** After planing the ebony for the extension to a workable thickness, I make the initial cut-out using the template as a guide. Then I slowly trim away the wood from the extension until it fits perfectly around the scroll, nut platform and pegbox. The extension fits closely, but does not touch the pegbox wall to prevent unwanted vibrations.

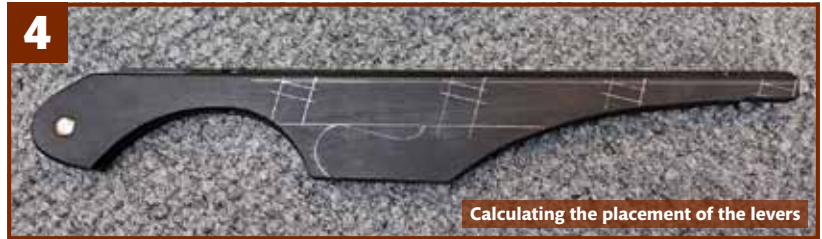
To ensure the extension aligns with the original path of the E string, I use a string attached to the tailpiece, stretched over the E-string notch in the bridge, and extended along the extension. This simulates the path of the new C string and acts as a guide as I fit the extension.

3



Adding a mortise to the extension's end

4



Calculating the placement of the levers

3 Once the extension is properly aligned and fitted, I plane the top of the extension so that it agrees with the profile of the fingerboard. Next I cut a mortise into the end of the extension, which allows for the installation of a pulley to aid the return of the C string through the scroll to the tuner. At this point, the extension is anchored to the scroll and nut platform area and I drill a hole to allow the string to pass through the scroll back to the tuner.

Next, I make a nut for the extension, and with the C string installed, I take a string height measurement at the original nut to check for string height: 4.5mm works well. I make a few small adjustments to the extension to achieve this height.

4 After removing the extension from the bass, I can lay out the placement of the levers. I calculate each placement by multiplying the string length by the logarithmic multiplier 1.05946. (This is done in the same manner used to calculate fret spacing on fretted instruments.) This method eliminates the need for 'adjustable' or 'tunable' levers. The new C-nut of the extension will need to be positioned or 'compensated' in the same manner as a bridge on a fretted instrument.

5

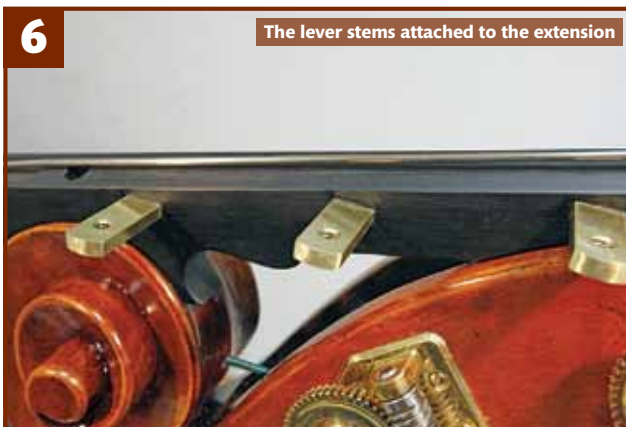


A milling machine is used for accuracy

5 For the levers to function properly, I now have to mount them into the extension at an angle to the extension's surface. I use an angle of 14 degrees in most situations. I use a milling machine to achieve a precision cut for all the levers. The final fitting of the brass lever stems is accomplished by hand.

6

The lever stems attached to the extension



6 Once the lever stems are fitted, I drill and tape them to accept the screws to which the levers will be attached. At this point I glue the lever stems into the extension and begin to make the levers. >



Levers made from a selection of woods

**7** Our shop offers players a choice of wood for the levers, allowing them to select wood that best matches their instrument's varnish. I start with a profile cut-out of the levers, which are milled, finished by hand, and buffed to a high polish. Then I mill a recess into the top of each lever to conceal Teflon and compression washers, which aid in tensioning the lever. The goal here is to make a lever that is light, strong and aesthetically pleasing.



Each extension is marked with the appropriate string length

**8** Next, I shape the face of the lever to pass over the string and capture it on the extension at the precise location for proper intonation. I cut a small, round groove into the lever face with a round file to help catch the string, making sure the lever does not disturb the alignment of the string.

Finally, I line the face of the lever with leather. As a reminder to the player that the lever placement for their extension was

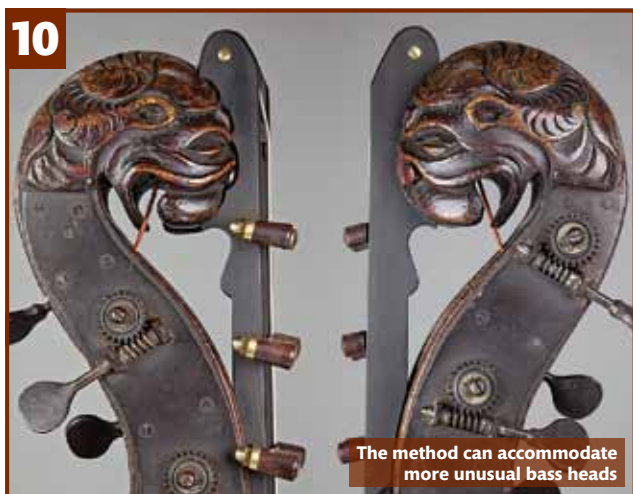


The C extension ready to be used

calculated on a specific string length, I stamp this length on the side of the extension. (Improper lever intonation will occur when bridges shift enough to alter this string length.) Also visible in the picture next to the marking is a small cutaway that allows for easier clearance of the A string.

**9** Once completed, the lever can be attached and properly tensioned on the lever stem. When tightened, the lever should have enough resistance that it is not affected by the vibration of the string, yet not so much as to make it difficult for the player to move it back and forth.

When the appropriate tension has been achieved, a lock nut is tightened against the bottom of the lever stem. This keeps the tensioning screw from turning



The method can accommodate more unusual bass heads

**10** For more complex scroll shapes, such as lion heads, I make two templates at the start of the process — one for each side of the extension as it fits to the scroll. I find it more aesthetically pleasing to leave as much of the scroll face exposed on the player's side of the instrument as possible. ■

**NEXT MONTH TORBJÖRN ZETHELIUS ON MAKING CREMONESE CORNER TEMPLATES**