THE SOUNDPOST in the VIOLIN
A study of the effect of STIFFNESS and POSITION of the soundpost on the output of the violin.

SUMMARY

The variables, stiffness and position were explored for their effect on the sound output of a violin. Previous work has shown that the mass of the soundpost can be ignored.

In part I it is shown that the stiffness of the soundpost should be as high as possible. The main air resonance frequency falls as the stiffness is lowered. Body modes, B1- and B1+, are not affected for the normal stiffness variation expected. The sound output for the three lower strings is reduced for large decreases in stiffness. In the limit, a balsa crossgrained soundpost was equivalent to a no soundpost condition. The strength of these two resonances was not greatly affected until the balsa soundpost was used.

In part II it is shown that the effect on the sound output of the violin if the soundpost is placed towards the centre, approaches the no soundpost condition where the three lower strings have a reduced output. As the soundpost is moved towards the f-hole the output is raised towards that of the E-string. The body stiffness as measured at the G and E string notches increased as the soundpost was moved from inboard to outboard of the treble bridge foot. It decreased if the soundpost was moved further behind the bridge foot.

Only a vertical orientation of the soundpost was studied but the fit at the ends of the soundpost was found to be most important as was having the correct length at each position.

INTRODUCTION

The properties of the soundpost that can be usefully studied are (1) stiffness, and (2) position. This is evident from the review of the literature. It seems nothing would be gained by departing from the lightest material and for general use a high stiffness is desireable, in order to satisfy the condition set by Schelleng for maximum connection between the top and back of the violin. However posts of lower stiffness were used first in Baroque instruments.

A larger area of study is offered by the position of the soundpost. This not only concerns where the soundpost is situated with respect to the bridge but the fit at the plate surfaces and the force present determined by the length of the post. The angle of the soundpost with respect to the plane of the violin is another variable but this is not studied in the work described here.

The limits to the position of the soundpost across the violin are set by the Schelleng condition discussed in the literature review. The soundpost placed on the centreline of the top is equivalent to the no soundpost condition allowing the second symmetrical mode without a soundpost to operate but the lowest mode will be largely suppressed.

The limit in the other direction is the location of the f-hole; the actual position of the soundpost would be such that it moved in phase with the treble foot of the bridge and out of phase with the bass foot. The 'pivot' point of the bridge/top plate motion would therefore lie between the treble foot/soundpost and the bass foot. The soundpost will have a greater lever action on the back plate the further out it is placed. This means a compromise between optimising the top plate action with that of the back plate.

It is not known whether the centre of rotation is a single point or a more diffuse area or whether it moves about with mode frequency. Its approximate location is defined by the belief that the bass foot moves more than the treble foot which moves to transmit a force to the back via the soundpost.

The pivot point or centre of rotation, has to be to the left of the treble foot of the bridge and/or the soundpost, which ever is nearer to the bass foot of the bridge, if the two bridge feet are to move in opposite phase with the soundpost following the treble foot. If the soundpost is near the centre of rotation the action on the back will be least. This will only apply to the rocking motion of the bridge; modes that depend on the vertical motion of the bridge will not be affected.