ON USING THE STROBOCONN*

by

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Though most research workers are nowadays familiar with the *Stroboconn*, it is time that an assessment should be made of the best way of using it in the field of African music.

For the benefit of the uninitiated, we start with a brief description. The *Stroboconn* is an apparatus for measuring the pitch of notes, either sung or played: this it does to an accuracy of one hundredth of a semitone (= 1 cent). It consists of twelve stroboscopes, one for each semitone of an octave tuned in equal temperament, that is, our western chromatic scale, with a basic pitch of A = 440 v.p.s. By turning a knob, all the stroboscopes can be tuned by steps of one hundredth of a semitone, as far as half a semitone flat, or *per contra*, half a semitone sharp. A microphone picks up any given sound, and by turning the knob till the stroboscope nearest to its pitch is stationary, the resulting reading gives the exact pitch of the sound.

We have long waited for an apparatus giving objective and accurate readings of pitch where the subjective element of the researcher's ear is eliminated. But the *Stroboconn* can be used or abused and it certainly needs suitable handling if valid results are to be obtained. Its essential requirement is that the notes to be measured *must not* be short: each note *must* persist for, say, at least two seconds. Thus it is useless to hope to measure with it the pitches of notes in a song, nor can one use it for measuring any instrumental music as it is played, except in the case, say, of prolonged notes played on a horn. In fact, the prime thesis is that to get reliable results with the *Stroboconn*, one *must* adopt special procedures.

There are two basically different ways of using it — direct measuring, and indirect measuring. For the sake of simplicity let us imagine we want to measure the pitch of notes of a xylophone. For direct measuring one has the xylophone and the *Strobocom* in the same place. Holding the microphone successively over each key while it is struck, one obtains a direct and very accurate measurement of the pitch of each note. A valuable tip is to hold the microphone about two feet above the note while striking, and immediately the strike is made to bring the microphone down to about an inch above the centre of the key and to hold it there till the sound dies off. In this way, a strong continuous signal is transmitted to the *Stroboconn* and this makes easy a very accurate reading. The Doppler effect made by moving the microphone is too momentary and small to be perceived.

In most cases, however, the field worker will not be able to use the direct method and will have to rely on making tape recordings which will subsequently be measured when he returns to his laboratory. This is the indirect method, and it is here that special precautions need to be taken in order to get accurate results.

First let it be said, categorically, that long experience shows that it is impossible to get good results merely by running the tape through a tape recorder and measuring on the *Stroboconn*. The reason is twofold: firstly, unless a very good tape recorder is used, it will be found that when stopping and restarting the tape to take repeated readings on the *Stroboconn*, the tape recorder varies in its exact speed of running. Secondly, the tape recorder needs a little time after restarting to gain its proper speed, and it is all too easy when repeating a note, to allow insufficient time for this. Ideally, once the tape recorder is switched on, it should not be stopped till the end of the recording. But any one who has tried this knows that it is impossible to take *Stroboconn* readings

*Made by C.G. Conn Ltd., Electronic Division, Elkhart, Indiana, U.S.A.

at this rate of progress. Thus it is essential to use a two-stage method in indirect mearing, to wit — having made the tape recording, to dub this on to discs before using the *Stroboconn.*

An objector may say that by doing this, a new inaccuracy is introduced, namely that in cutting a disc, as the gramophone arm moves nearer the centre, the drag on the record lessens and the pitch tends to rise. So it does, unless one has a good disc-cutting machine, but not to any great extent, and if one wants to be fussy, it is easy to make compensation for this if a proper procedure in the original recording is adopted. Such a rise in pitch will probably amount to around one tenth of a cent per note, and in any case the final result will be far more accurate than those obtained by any other way except direct measurement. In passing, one should mention that the method of using two tape recorders, one fitted with an endless repeating loop, and transferring the recording note by note from the original tape to this loop and then measuring it, is hopeless for accurate work, as one has to keep stopping and starting the main tape recorder, with the disadvantage already referred to.

Let us now see the whole process of indirect measurement from start to finish.

The field worker, in making his tape recording, must proceed as follows. He should have a tuning fork pitched at A = 440 v.p.s. When he turns on his tape recorder, on no account must he stop it till he has finished recording one particular instrument. Turning it on, he first announces in the microphone the provenance of the instrument, then says, 'Tuning fork A 440,' and strikes the fork, and holds it an inch away from the microphone, letting it stay there till the sound dies away. This he does three times in all.

Now he records the notes, beating them each three times, and allowing plenty of time between each beat, as explained above, to let the note give a long continuous sound. After the last note, he again sounds the tuning fork three times. Then, and only then, may he stop the tape recorder. Each successive instrument to be recorded is treated in exactly the same way, preceded and followed by the A-440 tuning fork.

We come now to the second stage. The researcher has returned to his laboratory and dubs the tape on to discs. It is essential to ensure that the tunings of any one instrument should be contained on one side of a disc. It is no use if, having covered one side of the disc without having come to the end of the notes, one turns it over and continues dubbing. Doing this means that one cannot guarantee that the interval between the last note on one side and the first note on the other is the exact interval as recorded on the tape. If, for any reason, it becomes essential to turn over the disc during the recording of a particular instrument, the procedure is when starting the second side, to stop the tape recorder, go back a few notes, and then go on dubbing. In this way the repeated notes will show how many cents (plus or minus) one has to allow to *all* the notes on the second side of the disc, in order to correct them to their exact pitches. It is much better to avoid having to do this.

The discs having been prepared we are now ready to use the *Stroboconn.* The absolutely essential rule is that once the gramophone turn-table has been switched on, on no account must it be stopped till the whole of one side of the disc has been measured on the *Stroboconn.* It is also essential to run both the turn-table and the *Stroboconn* for about half an hour before use, to let them warm up and settle down to constant performance.

One proceeds now to read the measurements on the *Stroboconn.* First the A-440 signals: any deviation, plus or minus, as shown on the *Stroboconn* is noted, and the requisite adjustment is made to all the pitch figures for the notes of the instrument when the readings are complete, thus giving the exact pitch of each note as sounded on the original instrument itself. One can make repeated readings of any note by lifting the gramophone arm back, and this is a great help to accuracy.

It frequently happens that a note on the original instrument gives out, when struck,

a note of extremely short duration — too short to get a steady reading on the *Stroboconn*. Here a simple technique can be recommended. Repeatedly playing this note on the disc, the *Stroboconn* is tuned so that the stroboscope nearest in pitch to this note moves slowly to the right — in other words one has tuned it sharp. The *Strobocom* reading is written down. Now repeating this process, one tunes the *Stroboconn* so that the stroboscope moves to the left at as nearly the same speed as one can judge, as it moved to the right. We have now tuned it flat. Again the *Stroboconn* reading is written down. If now we take the average of these readings, we shall have arrived as nearly as is humanly possible, at the exact pitch of this recalcitrant note — in fact the error, if any, will not amount to much either way.

There is no doubt that the *Stroboconn* is an invaluable tool if used in a way suited to its capability. We make the suggestion that the techniques we have set out do indeed exploit the *Stroboconn* in a way that will give accurate and valuable results.

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