

THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

Report by Charles Moller 2002/2 Churchill
Fellow

To study recent developments and new techniques in steelpan building.
To learn new techniques to tune and adjust the timbre of steelpans from bass to soprano.

I understand that the Churchill Trust may publish this report, either in hard copy or on the internet or both, and consent to such publications.

I indemnify the Churchill Trust against any loss, costs or damages it may suffer arising out of any claim or proceedings made against the Trust in respect of or arising out of the publication of any Report submitted to the trust and which the Trust places on a website for access over the internet.

I also warrant that my Final Report is original and does not infringe the copyright of any person, or contain anything which is, or the incorporation of which into the Final Report is, actionable for defamation, a breach of any privacy law or obligation, breach of confidence, contempt of court, passing-off or contravention of any other private right or of any law.

Signed _____ Dated _____

Contents

Title Page	1
Contents	2
Introduction	3
Executive Summary	4
Background	5
Coyledrums	6
Panyard Inc	9
Conclusions	11
Recommendations	12

Introduction

This report outlines techniques I was taught and which have been recently developed in the USA to build steelpans. Some tuning techniques, of which I was not previously aware, are also outlined.

This study trip would not have been possible without:

- The financial support from the Winston Churchill Memorial Trust,
- Encouragement from my wife Karen Schultz who has always discouraged me from getting a 'proper' full-time job,
- Alan Coyle's willingness to teach someone he did not know from the other side of the world,
- The Australia Council which subsidised my first steelpan foray to Trinidad in 1994.

Executive Summary

Name: Charles Moller
Address: 3 Horton Street Marrickville NSW 2204
Occupation: luthier (specifically lute, hurdy-gurdy and steelpan)
Telephone: +61 2 95640001
E-mail: kaschm@iprimus.com.au

Project Description: To study recent developments and new techniques in steelpan building. To learn new techniques to tune and adjust the timbre of steelpans from bass to soprano.

Fellowship Highlights:

Coyledrums: 10 weeks, six days/week.

At Coyledrums I built and tuned a range of steelpans (about five) from bass to soprano. Kyle Cox demonstrated and taught the Coyledrums method for building steelpans. Alan Coyle demonstrated and taught the techniques that he uses to manipulate variables such as shape and tension to produce stable, in tune notes with good timbre and even quality through the range of the pan.

These methods and techniques included:

- using pneumatic hammers to shape the pans roughly to shape,
- developing visual acuity to see the shape and smoothness of the pan as it is being built,
- developing hand skills to produce a smooth tight surface using specially prepared hammers,
- developing techniques to locate and hear the overtones, particularly the second octave harmonic,
- developing techniques to manipulate the steel to tune up to 4 overtones per note,
- developing techniques to minimise out of tune pull and bleeding into adjacent notes,
- developing techniques to adjust the timbre of the notes over the whole range of the pan.

Panyard Inc: 8 days.

At Panyard Inc, I build a D lead pan using a Panyard Solid Hoop™ drum. Steve Lawrie gave most of the building and tuning tuition. I also observed Shelly Irvine tuning basses. The building and tuning techniques were similar but not identical to Coyledrums. The biggest difference was the use of the Solid Hoop™ drum. The cost of the Solid Hoop™ drum is significantly more expensive (about an order of magnitude) than the standard 200L industrial steel drum. The Solid Hoop's advantages are that the steel parameters (eg. carbon content), and the diameter of the drum can be specified by the pan builder.

Future possibilities: The community of steelpan musicians in Australia is a small but increasing group. Over the last five years several schools have acquired pans for their music programs. Being relatively easy to play, it is in music education and community groups where the steelpan excels. I believe that this trend will continue in Australia, as in North America and Europe.

The new knowledge that I have acquired at Coyledrums and Panyard will mean that the pans I produce in Australia will approach the high standard of Coyledrums or Panyard steelpans. For me personally, the knowledge I have acquired regarding building and tuning steelpans has been a great leap forward. In the long term, besides producing the pans for the Australian market, I also intend to teach other people to make these complicated instruments to ensure that this craft continues in Australia.

BACKGROUND

The steelpan was invented in Trinidad in the 1940's. Originally a primitive instrument of limited range and dubious tonal qualities, the steelpan has evolved into a family of sophisticated instruments ranging from bass to soprano. The notes in a well-made modern pan ring out clearly. One of the inventors and developers of the steelpan is Ellie Mannette who still produces them in the USA. A history of the steelpan can be found on the internet (see for example www.musikmuseet.se/pan, and www.mannettesteeldrums.com).

For me personally, my interest in the steelpan developed by accident. About 20 years ago while working in my workshop (I make lutes and hurdy-gurdies too,) a radio broadcast (2MBSFM 'Bebop and Beyond') of steelpanist Andy Narell who plays Mannette steelpans, attracted my attention. Several weeks later I found Pete Seeger's book 'How to make and play steel drums' at Folkways, Paddington. Building steelpans didn't look that hard. I decided I would make them. In 1991 I moved to the countryside and took this opportunity to build some pans using books written by Pete Seeger (about 1960) and Ulf Kronman (1990) as references. I made about 30; they all sounded terrible and were thrown away. Steelpans are certainly difficult instruments to make, and I still marvel that they were invented and developed at all. The steelpan is still evolving.

In 1994 I went to Trinidad and studied building and tuning the lead and double second steelpans (soprano and alto voices) in the workshop of Leroy Thomas for 10 weeks. My pans were now playable instruments, and improved as I made more. Email correspondence with Alan Coyle, who was taught by and worked with Ellie Mannette for 8 years, led to changes that further improved the quality of my pans. However there is only so much progress that one can make working in isolation in Australia. The Churchill Fellowship has allowed me to study the latest techniques for building and tuning the complete range of steelpans, ranging from bass to lead, from two of the foremost and innovative companies currently producing them.

COYLEDRUMS

Coyledrums: 8800 Sharon Lane Pensacola Florida USA 32534

Web: www.coyledrums.com

Duration: 10 weeks, 6 days/week, 8 to 11 hours/day

Dates: 23/11/2002 to 14/02/2003 with a break over Christmas/New Year

During my stay at Coyledrums, I built and tuned two lead pans (4th and 5th style, from C4=middle C, range: about 2.5 octaves), one double second (from F#3, range: about 2.5 octaves, whole tone scale on each top), one out of two tops of a double second (from E3), one triple guitar (from B1, range: about 2 octaves, diminished chord on each top), one out of four tops of a tenor-bass (from F2, range: about 1.5 octaves, augmented chord on each top), and three out of six tops of a six-bass (from C1, range: about 1.5 octaves). A total of four instruments plus three incomplete.

As soon as I walked into the workshop, it was quite clear that the building processes at Coyledrums were different to the methods I was familiar with. Traditionally in Trinidad, the pans are built by standing in front of the 200 litre industrial steel drum and beating it into shape using modified sledgehammers. At Coyledrums, the drum is cut off a little longer than the final length and strapped to a rotating table. It is rotated by hand but could be mechanised. The sinking is done using a modified sand rammer (JET-1T No. M-556633). The original rubber head has been replaced with a smooth and slightly rounded steel head. The note areas are shaped using a lighter rammer (JET-0T No. M-556632), and the whole surface is approximately smoothed using the lightest rammer (JET-00T No. M-556631). Sand rammers are pneumatic tools and this process is at least 10 times quicker than doing it manually.

Once the work with the sand rammers is completed, the final surface is prepared using several specially prepared ball peen hammers. Although time and effort is saved using the sand rammers, extra time is spent completing the pan by hand to achieve a completely smooth and tight surface. The smooth tight surface is visually appealing, and is one of the factors which reduces the amount of cross bleeding between notes.

During the building process, emphasis was placed on making sure that the notes were shaped properly. In general, each note should be as flat as possible on its long axis otherwise tuning can be extremely difficult or impossible. Wooden and plastic wedges are also used to tighten and smooth the borders of the note areas.

Kyle Cox taught and demonstrated the building procedures.

Traditionally steel pans have grooved borders around the notes. Grooving is a process where a filed-off nail punch is hammered around the note to leave an indentation, which is later smoothed out leaving a row of interlinking circles. Coyledrums do not bother with grooves on any of their pans. The borders are simply scribed with a sharp steel point so you can see where the notes are located. Grooving apparently has no acoustical advantages.

Over the ten-week period at Coyledrums I had numerous hours of instruction from Alan Coyle on tuning steelpan from bass to soprano. According to Alan Coyle, the parameters for tuning a note are (in order of importance) shape, tension, timbre and pitch. Each note is tuned with three or four harmonics. On the long axis the fundamental, the octave and possibly the second octave are located, and on the short axis the 12th or some other suitable interval.

While tuning, Alan Coyle would articulate his thought processes. He might comment on the shape of a note, explain why the shape needed to be adjusted, and go ahead and fix it. He would make observations about the pitch of a note, such as “fundamental is flat, octave (harmonic) is sharp”, then proceed to bring both into tune explaining why he was hitting a note in a certain area with a particular hammer in a certain manner. Some of these techniques I knew but Alan Coyle taught me new ones and clarified the ones I knew already. Sometimes notes did not respond as expected and would actually go further out of tune. Always, there would be alternative approaches to get the note in tune.

However correct pitch isn't everything. A note can be in tune but still sound bad. It may ring too much, it may sound dead, it may have a raspy quality, or it may bend in pitch. If the note doesn't sound good, steps are taken to adjust its timbre while bringing it to pitch. Since timbre is dependent on the shape, tension and geometry of the note, these factors need to be adjusted while tuning to produce a good tone.

To make up a string instrument analogy, tuning a steelpan would be like tuning a harp or a piano where you are given the string material which you firstly need to shape into a string which has the potential to make a good sound. Then instead of one tuning peg you would have three or four per string. Each peg would be responsible for tuning a particular harmonic. At the beginning the pitch would be very sharp (an octave or more), and the string extremely inflexible. As you bring down the pitch by slackening the fundamental's peg, you have to adjust the other pegs to bring the harmonics in tune. Since all the pegs affect the same string, changing one affects the other harmonics. As you keep dropping the pitch by slackening the string, you may finally reach a point where the pitch no longer falls but actually starts rising. At this point you would try something else or start again by increasing the tension, expecting to drive the pitch further down on the next round.

Usually it is easy to hear and locate the fundamental, octave and short axis harmonic on any note even if they are extremely out of tune. The strobe tuner also responds to these frequencies easily. However it is the second octave that is often difficult to find and adjust. At Coyledrums I learnt techniques to find the second octave harmonic and adjust its pitch. This harmonic is not always possible to place on a note and sometimes is not even desirable. A second octave harmonic will make a note ring brightly, which is desirable in high-pitched pans. Omitting the second octave will produce a mellow sound, which is desirable in the lower pans. I was also given a list of the best choice for the short axis harmonic for all notes on all pans.

Another consideration when tuning a steelpan is coupling between notes. Sometimes this is desirable, at other times it is annoying. A dull note can be brightened by effectively bringing it and its octave counterpart physically closer together. Conversely

a note may ring too much because the coupling between the octaves is too strong. In this case the notes need to be separated. At other times, a note and its octave counterpart (or some other note that contains a common harmonic) will be well tuned so long as one is prevented from vibrating (eg. with a fridge magnet). However when allowed to couple freely, they pull each other out of tune and wobble. I don't know how or why this happens but I learnt methods for reducing out of tune pull.

Sometimes a note will bend in pitch, or have a 'raspy' quality. Usually, this is a border geometry or note shape problem. Procedures for fixing bending notes were demonstrated.

A tool used at Coyledrums, which I had not used previously, is the propane blowtorch. After the pan is built, and before tuning, the pan is put on a burner for a few minutes. This procedure is necessary otherwise the pan will not tune. However Alan Coyle also used a propane torch to heat the notes during tuning. Sometimes the blowtorch was used if a note had been worked too much. All the inside notes were tuned while hot, as they cooled to room temperature. After the first tuning, each note would be reheated and tuned again. Alan Coyle claimed that the heating made the notes stable and they would not require retuning very often.

While Alan Coyle was tuning, I wrote down the tuning techniques as I observed them. I will compile these notes into a readable format to use for my own benefit and for students that I may teach in future.

Panyard Inc.

Panyard Inc 1216 California Avenue Akron Ohio 44314-1842

Web: www.panyard.com

Duration: 8 days, 9 to 14 hours/day

Dates: 15/02/03 to 22/02/03 inclusive

My stay at Panyard was not planned. During the Christmas/New year break from Coyledrums I went to Cleveland Ohio to visit friends and relatives. I took the opportunity to visit the Panyard factory in Akron Ohio. The management at Panyard, Ron Kerns and Shelly Irvine, invited me to investigate their processes after I had finished at Coyledrums. Since I was already in the USA I jumped at the opportunity. I may have stayed longer except that my US visa expired on 23 February. Given that I was 'randomly selected'¹ for a security check each time I boarded a plane, and the somewhat pre-war hysterical state of the States (at least its government agencies) I didn't think it prudent to overstay my visa.

While at Panyard I built and tuned a D lead pan using Panyard methods on a Panyard Solid Hoop™ drum. Steve Lawrie gave the tuition. Steve Lawrie has worked at Panyard for about 2 years after immigrating to the USA from South Africa. It seems that there is a well-developed steelpan community in South Africa. Musicians such as Andy Narell are well known and popular.

Steve Lawrie took a mathematical approach to designing steelpans. He wrote a computer program to create templates for the shape of the sunk pan, and the shape between the notes after the sinking had been completed. This precision in design was translated to the building process.

I also observed Shelly Irvine tuning bass pans. Although the choice of tools was somewhat different to Alan Coyle's, the tuning process was essentially identical.

Panyard has recently developed a new type of drum to build steelpans. It is the Solid Hoop™ drum. There are several advantages to the Solid Hoop™ drum. Rather than simply accepting the standard 200L industrial drum diameter, the diameter of the drum can be determined by the pan builder. The type of steel, or indeed any type of metal, can be specified. The size of the notes and the amount of space around them can be increased by using a larger diameter drum. On the standard size drum it is impossible to tune the second octave harmonic on some of the rim notes because the notes are not long enough due to insufficient space. At Panyard the rim notes are treated the same way as the inside notes. They are oval and are positioned away from the rim, making them independent of the rim. All the low notes on the D lead pan are long enough to tune the second octave harmonic.

¹ My impression was that foreign males travelling alone were randomly selected.

The disadvantage of the Solid Hoop™ drum is the cost of manufacture. To build a Solid Hoop™ drum requires several tradesmen: a metal spinner, a pipe bender, and a welder. On the other hand, the standard 200L drum is mass-produced cheaply. I will investigate whether producing Solid Hoop™ drums is feasible for the Australian market.

Other than the Solid Hoop™ drum and the different note layout, the building and tuning processes at Panyard and Coyledrums are comparable. Like Coyledrums, Panyard also use air hammers and no longer groove any of their steelpans. They too use heat during the tuning process. There are small differences regarding technique and choice of tools but essentially a member from either workshop could work in the other without major alterations to his technique.

At both Coyledrums and Panyard, the main topic of conversation was steelpans. Whether it was a building or tuning problem that needed to be solved, or pricing policy, or sourcing drums or steel, or comparing the sound quality of different pans, or promoting the steelpan in the community, conversation constantly revolved around the pan. In my opinion to make a steelpan, it helps to be obsessive.

Conclusions

The steelpan is still a novelty instrument in Australia. People might know that it originates in the West Indies, but often mistake its nationality as Jamaican, when in fact it is from Trinidad. I conjecture that the reason for the slow distribution of the pan in Australia is the distance from Trinidad, the small Trinidad population in Australia, and the lack of tuners in this country. This has begun to change in the last five or so years as people who are interested in the steelpan have found that there is a steelpan builder/tuner in Australia.

Fairly frequently, I do receive enquiries from individuals and schools. It is in schools and community groups where I believe the steelpan should have a prominent place, as it is an instrument that is relatively easy to play and learn music. In North America, Europe, South Africa and Japan, steel bands are used in schools and universities as part of the music curriculum.

The building and tuning techniques I learnt at Coyledrums and Panyard will make a huge difference to the quality of my steelpan. I will build my pans using air hammers.² I am much more aware of the factors that produce a quality steelpan. I have learnt numerous new tuning techniques.

² At time of writing this report, I am waiting impatiently for the air hammers to arrive from the USA.

Recommendations

Building/tuning:

From time to time I do receive enquiries regarding learning to build and tune steelpan (and lutes and hurdy-gurdies). I believe that other people in Australia should have these skills. So far this has not been possible. My workshop is too small and there are other issues such as personal liability insurance.

A regular class in a public institution such as TAFE would be ideal. TAFE does have craft courses such as ceramics (as well as trades) in well-equipped workshops. Universities have music and art courses, but there are absolutely no instrument making courses in any Australian teaching institution.

Alternatively, there are other potential public spaces where craftspeople such as instrument makers could work and teach. Examples include the railway yards at Redfern, the Casula Powerhouse in Casula, and the dilapidated tram yards in Newtown. Compared to the amount of government funds already invested in sporting facilities, art galleries and theatres, a relatively small amount would be required to establish an instrument making or craft centre.

Playing:

The steelpan is a relatively easy instrument to play. A mallet in each hand strikes the required notes. There is no fuss regarding embouchure, or intonation or any of the other prerequisite techniques so often required by conventional instruments. Anybody can start playing in an ensemble straight away. For this reason I believe that steel bands should be commonplace in schools and universities, and community organizations such as youth centres.