

THE WINSTON CHURCHILL MEMORIAL TRUST OF AUSTRALIA

Report by - LUCY O'SHEA - 2009 Churchill Fellow

The Peter Mitchell Churchill Fellowship to study the repair and maintenance of functional and tuning mechanisms of the harp - Italy

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Signed Lucy O'Shea

Dated 25<sup>th</sup> May 2010

## ACKNOWLEDGEMENTS

Thank you to Alice Giles and Anthony Maydwell, my former harp teachers. At times during the course when I felt that no one in their right minds would play the harp if they realised what a pain it was to assemble and regulate, I thought of Alice and Tony, pretended the harp I was working on was for them, and that thought got me through.

I would like to thank Salvi Harps NSM S.p.a for allowing me to learn from their craftsmen and technicians. In particular, I thank Mr. Victor Salvi for inviting me to study in his factory, and for accepting me as a certified Salvi/Lyon & Healy harp technician.

I thank the following technicians and craftsmen who taught me at various stages throughout the course: Laura Peragine (Celtic harp assembly), Davide Arduino (Celtic harp regulation), Christian Battisti (pedal harp assembly) Luca Roscini (pedal harp mechanism assembly and registration) and Marco Bertola & Alessandro Ciauri (pedal harp regulation and registration).

I would like to thank my parents for their support throughout the project.

Finally and most importantly, it is with gratitude that I thank the Winston Churchill Trust and the Peter Mitchell Foundation for giving me this incredible opportunity.

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## EXECUTIVE SUMMARY

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### Project Description

My role during this fellowship was to study the maintenance and repair of the Celtic and pedal harp at Salvi Harps N.S.M S.p.a. The course focused on the reparation and regulation of both Salvi and Lyon & Healy harps, both of which belong to the N.S.M group.

My reason for studying the course arose due to the constant request for a harp technician, and my personal interest in harp regulation. Currently, the Australian harp community is fortunate to have Lyon & Healy technicians visit us every year and whilst we are grateful for their time and expertise, harpists often need a "doctor out of hours", so to speak. A locally-based harp technician would see that harps can be serviced more or less when needed. For the harpists who already have some regulation knowledge, it would also mean that harp parts are more easily accessible, as a local technician would have a good supply available.

### Project Goal

The project goal was to master the following procedures which are all required in order to receive Salvi/Lyon&Healy Technician Guild Certification:

- Inspection of the base, neck, soundboard, column and mechanism
- Cleaning of the base
- Replacement of pedal lever felts and pedal slot felts
- Regulation of pedal movements - levers, pedal rods
- Regulation of intonation - centering, gripping, intonation
- Noise control
- Screws tightening
- Greasing of springs
- Strings and wires replacement
- Pedal springs replacement
- Pedal rods lubrication
- Replacement of individual pedal rods
- Tubing replacement

The outcome of the course was entrance into the Salvi/Lyon & Healy Technicians Guild as a certified harp technician.

I would like to instruct harpists on the basic maintenance of the harp - how to tell when the health of the strings has deteriorated and the strings need to be changed; the most efficient method, both ergonomic and instrument-friendly, to move and lift the harp; the mechanical functionality. Being aware of unusual noises, irregular pedal movement or poor intonation can also prompt a harpist to have their harp regulated before a small buzz leads to a big crack.

## FELLOWSHIP PROGRAMME

I travelled to Italy to study harp maintenance and repair at the The Victor Salvi Harp Factory in Piasco, Piedmont, Italy.

In order to work as a technician, a person must study at a factory in order to achieve certification. If a harpist who plays a Salvi or Lyon & Healy harp chooses to employ a technician who is not certified by Salvi/Lyon & Healy, he or she will forfeit the warranty. As the two companies are both governed by the NSM Group, studying under one brand automatically allows certification for the other. I chose to study at the Salvi factory as I have a keen interest in Italy.

The programme was divided into six stages with each stage culminating in an exam:

1. Assembly of the Celtic harp
2. Regulation of new and used Celtic harps
3. Assembly of the wooden structure of the pedal harp
4. Assembly of the mechanism, pedals, tubing and strings
5. Regulation and registration of the pedal harp
6. Regulation of used Salvi and Lyon & Healy harps

During the use and ageing of a harp it can often develop irregular vibrations or noises caused by the displacement or dislodgment of parts. These noises are referred to as “buzzing”. Aside from studying the technician course, I was also taught by the resident harpists how to decipher the various types of buzzing so as to have a clearer idea of a possible cause for the buzz when carrying out regulation.



Assembly of a Salvi pedal harp

## INTRODUCTION



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### Victor Salvi

Victor Salvi was born in Chicago in 1920 into a musically-gifted family. His Father, Rodolfo, was a renowned violin maker and harp restorer who moved from Italy to the U.S. during the First World War. Victor and his two siblings, Alberto and Aida, all became renowned harpists. Whilst Alberto stole the limelight, being hailed as “the greatest harpist of all time” by Nicanor Zabaleta, Victor followed his Father’s path and moved his attentions to instrument making.

Victor constructed his first harp in 1954 with the ambition of creating a harp which exceeded the quality of sound and craftsmanship of any harp he had played. In 1955 he moved to Italy in search of his Italian roots as well as Italy’s renowned craftsmen. Salvi Harps commenced as a modest venture in Genoa, but shortly moved to Saluzzo, then its current location in Piasco in the 1970’s.

Piasco is a small mountain town at the foot of the Valle Varaita which has a tradition in wood working that dates back to medieval times and much of the local community was, and still is, comprised of master carpenters, wood sculptors and inlayers.

The town, despite housing less than 3,000 inhabitants is famed for, and very proud of, the world’s leading harp factory which now employs over 90 master craftsmen, technicians and design engineers. In fact, the Salvi harp factory produces over 1000 handmade pedal and Celtic harps annually, each of which takes between four to six months to create.

During his youth, Victor played a Lyon & Healy harp. Lyon & Healy is a Chicago-based factory, created in 1864 by George Washburn Lyon and Patrick J. Healy. Victor acquired this company in the 1980’s under his business name, the NSM Group. Today the NSM group sells both Salvi and Lyon & Healy harps to 80% of the global harp market.

Victor, despite being 90 years of age, can be seen almost daily eagerly discussing new developments and models with his four engineers at the Salvi factory. Victor has pioneered new inventions for the modern pedal harp, including a corrosion-resistant stainless-steel mechanism, nylon bushings and double bearing surfaces that reduce friction within the harp and a high-grade laminated neck adding structural resistance to the pull of the strings. Victor also sponsors master-classes and competitions throughout the world and commissions new works for the harp.

## MAIN BODY

### The Celtic Harp



Tuning of a Salvi Celtic harp

The main difference you will notice between the Celtic and pedal harp, apart from the size, is that the Celtic harp uses levers to change the accidentals instead of pedals and action discs. Therefore, the Celtic harp is the simplest of all harp models as it does not require pedals, pedal rods or a complex mechanism.

For this reason regulation is quite straight forward as problems such as buzzing are produced primarily due to old strings which are easily changeable or broken arms on levers which result in the lever needing to be changed. Eyelets along the soundboard, particularly on old models which used brass eyelets instead of the modern plastic often need replacing as over time they can permeate and damage the soundboard due to the pull of the strings.

The harpist tunes her Celtic harp either in E flat major or C major. Salvi Celtic harps are all tuned at A440 Hz to E flat major, however much of the beginner repertoire for the Celtic harp is written in C major. The tuning is important when factoring in your limited ability to produce accidentals. The harpist produces accidentals by manually moving the lever downwards so it pinches the string, hence shortening the length. The shorter string produces a pitch which is a semitone higher. This means that, if the harp is tuned to C major, achieving the 'flat' accidental is not possible - the harpist must play the enharmonic equivalent. For example, instead of playing D flat, the harpist would play C sharp.

Regulation of Celtic harps involves three stages - centering, gripping and pitch. Centering requires making sure that the string lies in the centre of the lever. Gripping refers to the amount of string that is pinched when the lever is moved down. Too much gripping can break the string, so it is vital that the string is pinched with a specific amount of lever, even if this results in the centering being slightly out of line. On Celtic harps, the tension of the strings in the upper register is lower which equates to a need for less gripping. The pitch of a string is initially controlled with the tuner and tuning key in its diatonic<sup>1</sup> position. The string is then pinched, or gripped, to produce the semitone above and the tuning of the quarter note is controlled. If the pitch in both positions is not perfect,

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<sup>1</sup> based on the standard major or minor scales consisting of 5 tones and 2 semitones without modulation by accidentals

the lever is moved upwards in order to flatten the quarter note, or downwards to sharpen. Finally, the centering and gripping are re-controlled due to the lever being altered

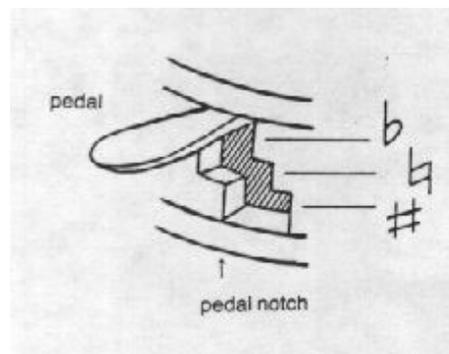
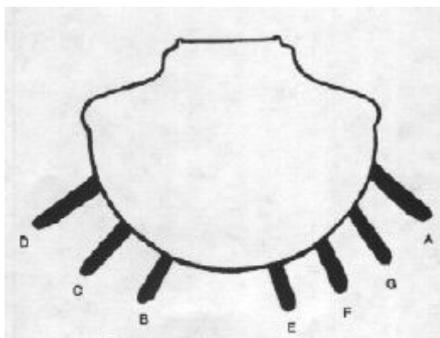
### The Pedal Harp



Parts of a pedal harp

The concert harp has 47 strings which create a whopping 1,200kgs of tension, supported by the balanced ratio of neck - column - soundboard. The tension is so strong in fact, that combined with the maturing and softening of the wood, the strings pull the neck down. This results in a change in the length of the strings. The calibration of the strings is measured at a  $1/18$  ratio<sup>2</sup> and in order for the string to be perfectly in tune, this ratio must be maintained when in flat, natural and sharp positions. When the length of the string changes, so too does this ratio due to the action discs remaining in their original location. Hence, during regulation, the position of stationary nuts and action discs is changed in order to recreate the perfect ratio.

Accidentals (flat, natural and sharp) are maintained on the harp by the movement of seven pedals - Do, Re, Mi, Fa, Sol, La, Si - each pedal governing every octave of that particular note. When the pedals are resting in their highest groove, the note is in the flat position. When the harpist pushes the pedal down to the middle groove, the note is raised by a semitone to the natural position.



Detail of harp pedals

<sup>2</sup>  $1/18$  ratio of the length of the relevant string



The dimensions for Salvi Concert Grand harps are generally 190cm in height, 100cm in width, and an average weight of 41kgs.

### Pedal Harp Regulation

Regulation of a pedal harp commences with general inspection for wear and tear. Strings and broken/rusting parts may be replaced and pedal felts are always replaced as part of a standard Salvi/Lyon & Healy regulation. Length of the pedal rods is controlled prior to tuning taking place.

The pedal harp is tuned to A442 Hz using the same three processes as the Celtic harp: centering, gripping and pitch (tuning). The string is centered to the lower action disc up to the 2nd octave when it changes to the higher action disc. When the string is pinched, the gripping for both action discs should create a slight bend, and the string should never come away from the disc when pulled to maximum capacity. As all three accidentals are able to be produced on the pedal harp, all three accidentals must be controlled for tuning. When tuning the natural accidental (governed by the higher action disc) gripping should not be altered, but rather the string nut (cradling the string) may be moved higher or lower to decrease or increase the pitch, respectively. When tuning the sharp accidental (lower action disc) the gripping may be increased or decreased. If perfection is not possible (usually on older harps) it is better to leave the accidental slightly sharp. No accidental should ever be tuned slightly flat.

The final stage of pedal harp regulation is noise control. Considering the amount of moveable parts inside the harp, noises (predominantly buzzing) can be caused by many different problems. I have listed the most common causes below:

There are a significant number of screws on a pedal harp - the crown on the top of the column, the feet under the base, the wheels attached to the feet, the brass arms of the pedals and the screws lining the front and back plate, can all produce a rattling buzz if they are not screwed down properly.

“Dead” strings - the rivets on action discs that cradle the string produce a “dead” or dull sound often accompanied by a particular buzz. Simply cleaning the rivet with a piece of thin, coarse rope can rectify this problem.

Bass wires can produce a sizzling buzz if tarnish grows between the wire wraps, which is why harpists are recommended to change wire strings annually. Always check the back plate screws in case the buzz is actually coming from them before changing a string.

Action discs produce the most common noises. As the shape of the neck lowers and twists over time, the links and arms become misaligned and rattle every time the string is played. This usually occurs in the 5th, 6th and 7th octaves where the strings are wire or thick gut. Often it is enough to insert a plastic eyelet between the action disc and front plate. Alternatively, the technician can puncture the rim of the front plate screw which cradles the action disc. This diminishes the size of the opening so that the action disc fits completely once again and there is no space for rattling to occur.

Inside the column, the seven pedal rods are nestled in a protective padding, called tubing. If the padding wears down over time, the tubing no longer fits snugly in the column anymore. Particularly when the wire strings are played, as they produce the most vibration and are also closest to the column, a strong buzz may be heard. If you hold the column firmly whilst someone plays from 5th octave G down to the bass wires and the buzzing stops, you know the problem is the

tubing which needs to be re-padded.

'Tac' is a type of noise which occurs due to worn pedal felts, in which the pedal hits the wooden groove in the base due to the felt no longer protecting it. A 'tac' sound can also be produced if a pedal rod has snapped. This is an obvious problem as when you move a pedal and it doesn't connect with the mechanism, the pedal rod must be broken.

A standard pedal harp regulation performed by a Certified Salvi/Lyon & Healy Technician includes the following procedures:

- Inspection of the base, neck, soundboard, column and mechanism
- Cleaning of the base
- Replacement of pedal lever felts
- Replacement of pedal slot felts, if required
- Regulation of pedal movements - levers, pedal rods
- Regulation of intonation - centering, gripping, intonation
- Noise control
- Screws tightening
- Greasing of springs
- Strings and wires replacement, if requested or required
- Pedal springs replacement, if necessary
- Pedal rods lubrication
- Pedal rod replacement, if necessary
- Tubing replacement, if necessary

## CONCLUSION

During the final two months of my course I worked with minimal supervision in the factory. I corrected under-motion and over-motion of rods; I regulated the centering and gripping of action discs; I shortened, lengthened and replaced pedal rods or entire pedal tubing; I inserted pins and attached rod couplings; I located and corrected buzzes in the strings and rods; I straightened pedals and was able to place harps up to semi-concert grands in a supine position unaided.

I received an official report from the Salvi factory declaring me fit to work as a certified harp technician, which is a prerequisite for official regulation of Salvi harps.

I have a keen desire to continue to learn about harp regulation and am in touch with several independent and factory-employed technicians in Europe and the U.S. with whom I hope to share findings and seek support. My future plans include a trip to the U.S. to meet with several prominent independent technicians in order to further my knowledge and practical application of harp regulation.

I would like to encourage expert technicians from Salvi, Lyon & Healy, Venus, Aoyama and Camac factories to continue, or commence, to provide their services to the Australian community.

## RECOMMENDATIONS

As a harpist, I really knew very little about the mechanical function of the instrument I had played for twenty years but did, at least, know how to change a string. Many harps that were brought in for repair had cracked soundboards due to the incorrect “knotting” of the strings which put excess pressure on the wood, particularly on older styles of harps with more fragile wood or less support along the string ridge. Such a simple procedure resulted in the soundboard needing to be replaced. This involves a lot of time, and a lot of money. We as musicians, particularly when instructing students, should take the time to inform ourselves about our instruments - the appropriate way to care for them in order to ensure optimal health and longevity of the instrument.

I leave Italy not only with an experience which I truly enjoyed and appreciate, but with a new skill set with which I can hopefully be of value to my community. I highly recommend the technician course for anyone interested in learning how to regulate the harp, whether it be for their own personal use or to serve their community.