Harpsichords
For Piano Technicians
1/21/2013
Jack Peters, Bill Graham, Halden Toy
Notes by Dean Petrich

Graham Harpsichord, 16th Century Replica
Construction photos, beginning July 25, 2012. Designed & supervised by Jack Peters.

It has been over 100 years since the piano upstaged the harpsichord and clavicord. Curious fans have brought it back. Subsequently numerous monstrosities & overly complex instruments were created that were unmusical. Now lightweight instruments are popular. At the age of 90, Bill Graham wanted to make an instrument that he could move, tune and play. Bill had built an airplane from scratch. In a sense, Bill built two planes, since he built every part twice before he got it right the first time; it took him 16 years. Now done with that project, he wanted something to keep himself busy and thought making a harpsichord would be a good project. He did have the energy and the time, so Jack engineered the project around his needs. For starters, Jack built the left scroll and Bill copied him and built the right one. When Jack saw how proficient Bill was, he knew this project would go well.

Halden Toy came to play the instruments that were on display for us. Halden became serious about playing keyboards by the age of ten. He is now 19. Halden was originally interested in pedal clavichords. He is an excellent keyboardist and has won several organ contests. For the last year he has been helping Jack.

The bottom of Bill's harpsichord was made with a series of redwood shelves planed down to 19th". One of the prerequisites for making anything is to have clamps. You never have enough clamps. Sometimes Jack even notches slots in the wood to accommodate some clamps. Guitar clamps don't need a lot of force, but they need to go in deeply. The outside of the case was cedar. The sides are less than 4mm thick. The moldings were made with a rotating knife on a table saw, although a router could also work. The edges have miter boards for the name board. The top of the pin-block was veneer with the same wood as the soundboard. The soundboard is a solid piece of noble fir.

The case is laminated on the side with the grain opposite for more strength.
Bill took the case to his place on Camano and sand and finished it.
The soundboard was fit in, the nose hole was cut. The scroll was cut off a pattern.

The key-frame is very thin. Normally harpsichord key-frames are thicker, but in this case the bottom was raised. To make the key-frame flat and tight to the surface Jack laid everything out on a piece of Corean. The balance punchings are very thin and tiny. A lot of the work is making the keys and the keyboard. Split sharps have a natural on the front part of the note and the accidental on the back. The keys were cut apart with a scroll saw. The key material was from a wood called kiaat. Go bars were used to glue the wooden key-tops onto the keys. The go bars press down on wooden calls placed on top of the key tops.

Accidental risers are then glued on. The problem with accidentals is that they get too heavy and lead has to be added in the back. It takes two grams to press a key. The felts on the backs of the keys were then glued on. The sharps are stained on the sides. In this picture, the keys are done, but all the edges of the keys still need to be rounded so they feel good.

The soundboard is an eighth of an inch thick. The most difficult part of making a soundboard is so that the difference in color stays as even as possible, rather than contrasting colors and shades from board to board. The board must be air dried, not kiln dried.

The maple bridge is glued down using go bars. Broken go bars are repaired with glue and filament tape. One must remain calm when installing a sound board. Hot hide glue allows two minutes to get the board in place and adjusted before the glue hardens. Jack uses heat lamps to keep the glue warm and the room warm. Using go bars must be rehearsed first without the glue. If you make a mistake, use heat guns and hair driers.

Once the soundboard is on, insert molding around the perimeter. The moldings did not match the color of the case. Bill finished and blended the colors. Bill found some furniture legs at a thrift store. They drilled the centers on a lathe so the screws would be centered so that he could screw the legs to the bottom of the instrument. Normally harpsichords are set independently on a stand.

The music rack was drawn out first on paper. It is very delicate, and is held down by super magnets and is adjustable. In the old days harpsichords did not have music racks because the harpsichord was set up on a high table and the player would stand and would look down on the music. Bill likes to sit to play. They made a double lift stick for the lid. Use a scalpel to trim the mortises for the hinges. The music rack was biscuit-joined.

The lid was quarter inch ash plywood with similar grain pattern as the keys. They use Alaskan cedar for the perimeter trim.

They drew out the string template on a thin piece of paper. They then scribed with a knife to make a mark on the wood underneath to define where the pins and strings would go.

Jack invented a maintenance tray to hold his visual Snark tuner as well as a few tools. He padded the tray top by gluing a rubber mouse pad to it. The tray can be slid along the rail above the jacks. Jack ordered the jacks from Oregon, since it takes a special skill and precision tools to make them.

Bill pointed out that the problem is tuning, especially for Bill who is now 90 and his hearing is going. His mother was a professional singer who quit singing in her early 90s because she could no longer recognize the sounds. She died at 105. Bill likes using a tuning device since he can see what he is doing. The way to tune is to lower the sharps and raise the flats.

This instrument was designed with copper alloy tuning wire; there is red brass at the bottom, and the rest of the strings are yellow brass. The strings are very thin. The volume of sound is related to how little ribbing and bracing you put on the instrument. Minimize the load. Treat side bearing and down-bearing carefully. A single choir will give more volume than a double because with a double you are loading the soundboard.

Don't get shellac in places where it is not traditionally applied. Glue will not stick to shellac. Several pieces were shellacked, sanded down and shellacked again about six or seven times. In candle light or incandescent light the color has a glow to it, in contrast to fluorescent.

The clavichord and the harpsichord evolved in the 14th century. In the early days they couldn't decide if they wanted to go horizontally or vertically. The piano was a harpsichord with hammers, so they named

it loud-soft. Clavicymbalum was a keyboard harp. The clavicord is simple, subtle, can do vibrato, and has dynamics.

Jack built this clavicord for himself. Brian Whitney bought three from Jack. Halden played some pieces on the clavicord. Halden then played the harpsichord.

The oldest piano manufacturer to come up with a harpsichord was an Errard in the 1890s. There were 3 companies in France: Playel , Errard and Gaveau. We looked at a famous silhouette of Wanda Landowska playing a factory-made Playell harpsichord. The modern factory harpsichords are thicker and heavier compared to the classical instruments. The earliest pianos were harpsichords with altered actions. Many "revivals" were over-built and were full of overwhelming nightmares. Thumbtacks in hammers will not make a harpsichord.

Harpsichord technicians generally have a short amount of time to calculate what they are getting into. They must assess the style, model and parameters of the instrument, as well as the current condition. Sometimes the issue is making the stand hold the instrument. Tell the customer you are coming to tune, not to renovate the instrument.

Harpsichords are a cantankerous beast that should either be tamed or put down. It's hard to tell people to put down their instrument. Plastic jacks are the worst thing in most harpsichords. Once the platicizer goes out of the plastic and they oxidize, they don't work anymore. Buy new jacks – have them custom-made and the instrument will be revived. They cost about $5/apiece. The goal is to get the repetition back to its original functioning condition.

The biggest problem with building harpsichords is getting supplies. There is only one supplier in the US in Ashland OR. Litz is on dialysis and is hanging in there. The closest other supplier is in Germany and he charges twice as much. Consequently the European harpsichords are more expensive. The number of harpsichord builders in the US is at a low. The biggest business is not in sales, but in repair.

Every day Jack is challenged by some repair job. For example, a heavy book on the music rack broke the support, so he had to make up a repair that would hold. Since there is not much room for lid hinges, Jack invented a special bracket. The lid is very important for projecting the sound. The sound actually projects off the tail of the lid. The player should face the audience for the sound to go towards them.

Bill spent several hours a day twice a week for six months. Toward the end he came out every day to finish his harpsichord by Christmas. When he took it home to surprise his wife, they barely had room for it in their small place. For years Bill lectured on all the composers of the 30's. He sang and had an act with both his former wife and now his new wife. They go out to retirement homes performing the songs that they knew from that era.

Gershwinn, starting at age 16, made over 180 piano rolls. Then he wrote for Fred Estair and more. Go online for an enormous number of unheard Gerschwin pieces. Bach is too hard for beginning harpsichord players; they should try Gerschwin. A lot of people don't have pianos any more, but there is room for a harpsichord. They are particularly practical for houseboats. Harpsichords actually do better in moist areas; they don't like dry climates. Dry environments can crack the soundboard.

Plectra, the plural of plectrum – "plucker" – come from the katara. They were originally made with bird quills. The common nuisance duck is a good source. Jack buys strips of Delrin from his supplier in

Oregon, who can make a variety of thicknesses. Selcon is a little softer. Delrin gets harder as you play. In a single instrument several materials can be used, to graduate the sound just as strings are graduated.

Harpsichord strings break frequently. There are about ten different sizes of strings, from 7 thousandths This harpsichord that Bill made uses sizes 20, 28, 16, 14, 12, and 9 thousandths.

Alfred Hipkins, who wrote A Description and History of the Pianoforte, was taught by Ernst Power in the 1870s, both of whom gave lectures on the harpsichord.

In Germany the clavicord was the main practice instrument because they were not so sensitive to climate changes. Most clavichords are 4 octaves long. Almost all of the earlier standard clavicords have a short octave: the accidentals C, D, E.

BOOKS:

A Description and History of the Pianoforte by Alfred J Hipkins with Introduction by Edwin M. Ripin
Harpsichord Design and Construction by Evan KJ Kern
The Harpsichord Owner's Guide – A Manual for Buyers & Owners by Edward L. Kottick

TOOLS in Jack's portable case

Emory boards
Little tiny needle-nose pliers
Seam ripper for cutting plectra
Surgical scalpel
T tuning hammers of various sizes
Tiny saw
Cutting block
Tiny hammer
Tiny magnifying glass
Small screwdrivers
Small flashlight
Delrin strips
Wire cutters
Spare jacks
Key bushing felt for dampers
Clip for holding strings on hitch pin
Harpsichord tuning pins