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Contents

Editorial
A Window in Time: Julian Dyer
A Window in Time - a response: Denis Hall
Cleaning the Windows of Time: Rex Lawson
The Pianola as a Means of Personal Expression: Alvin Langdon Coburn
Robert Casadesus (1899-1972) and the Duo-Art: Denis Hall
Review: Stravinsky: Les Noces (arr. pianola by Stravinsky and Larmanjat) and other music for pianola, Rex Lawson (pianola), Aeolus 1001: Nigel Simeone
Obituaries: Norman Evans - a tribute: Denis Hall
Rein Groos: Rex Lawson
Notes on contributors
Contents

Editorial
A Window in Time: Julian Dyer
A Window in Time - a response: Denis Hall
Cleaning the Windows of Time: Rex Lawson
The Pianola as a Means of Personal Expression: Alvin Langdon Coburn
Robert Casadesus (1899-1972) and the Duo-Art: Denis Hall

Review:
Stravinsky: Les Noces (arr.pianola by Stravinsky and Larmanjat) and other music for pianola, Rex Lawson (pianola), Aeolus 1001: Nigel Simeone

Obituaries:
Norman Evans - a tribute: Denis Hall
Rein Groos: Rex Lawson

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**The aims of the Institute**

A small number of pianola owners and musicians have been concerned for some time at the unnatural break between the world of music rolls and the world of music. Few members of the musical public know much about player pianos, and the Institute aims to bring about a better understanding and appreciation of the instrument in a number of ways.

The Institute publishes a regular journal, puts on public concerts, and has plans for a lending library of rolls, a travelling exhibition, and in addition a roll and information archive, with a small collection of player pianos for listening and study purposes.

The Pianola Institute will endeavour to preserve, research and document the pianola’s history, to improve the instrument’s present standing, and by the commissioning of new compositions, to ensure that it remains an important musical force for the future.

The directors of the Institute are:

Louis Cyr, Keith Daniels, Mike Davies, Denis Hall, Rex Lawson, Claire L’Enfant.

It is possible to support the work of the Institute by joining the Friends of the Pianola Institute. The Friends subscription includes a copy of the journal. Membership enquiries should be sent to Mike Davies, The Granary, Wharf Road, Fenny Compton, Southam, Warwickshire, CV47 2FE, England.

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- Institutional subscriptions in the UK: £15
- Institutional subscriptions overseas: £20

Overseas subscriptions should be made payable in sterling.

**Apology:**

In the Pianola Journal no. 10 we reproduced the front cover of the Music Trade Review 1914, announcing the introduction of the Duo-Art, without attributing the source, for which oversight we apologize sincerely. The picture was first published on the cover of the AMICA bulletin vol. 33, no.6, 1996 from a document in the possession of Robin Pratt.
Editorial

The history of the pianola and reproducing piano has come down to us via a number of oral and written sources, and can be interpreted more accurately by reference to such artefacts as have survived to the present-day.

The pianos themselves still exist in sufficient quantities that a reasonably precise analysis of their mechanisms can be undertaken at the very end of the twentieth century. There are already difficulties, however, most especially since piano tone is subject to the whims of musical fashion. In addition a very great number of instruments have been restored according to visual rather than musical parameters. How many Steinways or Mason & Hamlins have lost the sumptuous warmth of their original character by having their frames (their plates) removed and regilded without sufficient care taken in their replacement afterwards? And how many sets of hammers have been discarded in favour of new, heavier styles?

The music rolls are still with us, though the next fifty years will see the disintegration of many, especially in air-conditioned North America, and also in France, where the cardboard used by Pleyel for its roll-boxes has caused a deal of acidic damage to the roll paper itself. Without reasonably prompt action, the collection of Duo-Art originals owned by the International Piano Archives at the University of Maryland, for example, will have faded to dust by 2050, and quite probably a good deal earlier. The same is true of the original Ampico stencils now owned by Keystone Music Rolls in Pennsylvania. We are, all of us, witnessing the slow decay of the musical activity we profess to enjoy and support.

This is not to suggest the attachment of blame for this erosion of resources. The cost of de-acidification would no doubt be astronomical, and no one owner, be they an institution or an individual, can be expected to fund the sort of preservation techniques that even national libraries cannot afford. But for all that, the problem will not go away.

One of the ways we can help to preserve a true picture of the pianola and reproducing piano is to strive for historical and musical accuracy in the face of commercial pressures to do otherwise. We hope that the Pianola Institute can be seen as a beacon in this respect. We do not knowingly publish articles that ignore the facts, though it is often difficult to find authors who share our attention to detail.

In our last Pianola Journal of the twentieth century (ignoring the claims of 2001 as the start of the new millennium), we have three articles inspired by the conjunction of the reproducing piano and the computer. Julian Dyer has
provided technical insights into the processes used by Wayne Stahnke in converting Ampico music rolls to his Bösendorfer SE computer piano system, Denis Hall has reflected on the questions of musical fidelity surrounding such projects, and Rex Lawson has examined Ampico’s early recording methods, since these have a direct bearing on our perception of the original recordings, and their conversion to other media.

Nearer to the Institute’s home, the 1999 Aldeburgh Festival of Music and the Arts, in Suffolk, England, presented a series of concerts devoted to mechanical music (what an insidiously derogatory term!) in June of this year. The first we heard of these activities was in November, by means of comments in the Bulletin of one of our sister societies, the Player Piano Group. It is to be regretted that both we and the Player Piano Group remain so palpably unknown to the international musical establishment.

The Pianola Institute has been in existence for fifteen years now, with twelve Journals and one CD to its credit. We have a web page, and our members have given literally hundreds of player piano concerts in nearly a dozen countries. It may be a little depressing to contemplate the widespread ignorance there still is of the player piano, even amongst those who sometimes write about it, but it should encourage us towards renewed efforts at spreading the truth, in a world that concerns itself far more with appearance than with reality.

Finally, we have all been greatly saddened by the passing of two dear friends, both important members of the international player piano community. On 29th December 1999, Rein Groos, pianolist, of Haarlem in the Netherlands, was taken from us, and he was followed soon after by Norman Evans, one of the most meticulous and expert reproducing piano restorers in the world. Most importantly, both men were good friends to many of us; our thoughts are with their families, and a tribute to each is to be found within these pages.

We send you all our very best wishes for the new millennium, and, with due deference to those pioneers who just made it before 1900, for the second main century of the player piano’s existence.
A Window in Time

Julian Dyer

Wayne Stahnke’s recent *A Window in Time* CDs of Rachmaninoff’s Ampico recordings have surprised listeners with the musical quality obtained by using computerised techniques to read and play back the reproducing piano rolls. Exercises of this nature are regarded with suspicion, assuming the computer introduces all sorts of indefensible changes. This reaction is due largely to a lack of understanding of the process. This article describes the process in a fairly non-technical manner to show that, far from being black magic, it is driven by a logical and musical approach to the problem, and has clear analogies with setting up a reproducing piano. Some consideration is also given to reasons why this new process may well be better than traditional instruments for performing 1920s reproducing piano performances on modern concert grand pianos.

The piano as a measurable machine

The basis of the reproducing piano, old and new, lies in an understanding of the mechanics of piano performance. The fundamental point is that the piano’s escapement action detaches the key mechanism from the hammer an instant before it hits the string, so the pianist has no control over the hammer at the time it hits. Each note played therefore depends only on the precise time the hammer hits the string and how fast it is moving when it hits. This reduction of the somewhat mystical art of piano playing to measurable mechanical factors suggested to engineers that a device which can replicate both the speed and timing of a performer’s hammer movements would produce a performance identical to the original, everything else being equal. This final qualification turned out to be of vital importance.

A performance clearly does not depend on the hammer speed itself, but the sound it produces. The sound cannot be measured or controlled in an objective fashion (witness the huge variability of piano tone in disc recordings), but hammer speed is both measurable and controllable so can be used to make a practical playback device. The drawback of this approach is that the sound produced by a hammer hitting a string at a particular speed depends on many factors, such as the hammer toning, the efficiency of the particular piano at converting the string energy into sound, and the acoustics of the performance venue. A pianist will listen to the performance and control hammer speed to provide the desired sounds – something a machine cannot do by itself. A performance depends immensely on a controlling ‘musical intelligence,’ and this can be very obviously missing from a poorly-
regulated machine, whether it is an old pneumatic action or a modern solenoid-operated system.

**What’s on the piano roll**

Pneumatic player pianos contain a suction supply which plays notes by sucking shut small pneumatics, so moving the piano mechanism. The higher the suction, the faster the pneumatic shuts, so increasing the speed the hammer hits the string and therefore the loudness of the note. Along with the notes themselves, reproducing piano rolls contain all the information required to control the suction level to replicate the artist’s performance (on the original roll editor’s piano). This is usually called the dynamic coding.

The dynamic coding is not a ‘recording’ in today’s Hi-Fi-orientated sense of the output of some automatic, objective and repeatable measuring device. The historical evidence is quite plain: with a few exceptions late in the instrument’s history, automatic devices were not used to record dynamics. Instead, an artist – the roll editor – listened to the performance as the notes were recorded, and noted down an impression of the dynamics. Techniques differed: the Duo-Art system used a console that allowed the editor to add his impression of the dynamics directly onto the master music roll alongside the notes themselves, and Ampico for the majority of its rolls annotated the sheet music and only later created the dynamic controls on the roll. These notations were manually refined until the finished roll, when played back in the studio, satisfied the roll editors and (where they were interested) the recording artists. The finished roll was inevitably the product of two artists – pianist and roll editor. Even automatic dynamic recorders such as Ampico’s ‘spark chronograph’ (which directly measured hammer speed) required huge manipulation to construct codes to recreate the original dynamics using the pneumatic playing device. The artist-editor system was capable of producing excellent results, as witnessed by many comments from artists. (See Denis Hall’s article on the Duo-Art editing system in Pianola Journal No. 10.)

A fundamental point which emerges from the above is that the reproducing piano roll dynamic coding was created specifically for the purpose of operating the device it was intended for. There is no latent information in the coding awaiting discovery by a ‘better’ playback device (quite unlike old disc recordings, where more sensitive playback systems and noise reduction techniques have uncovered a surprising amount of extra detail). Instead, with a reproducing piano roll, a playback device that responds in any way differently to the original pneumatic one will simply get the dynamics wrong.

To summarise, the processes by which a reproducing piano plays a note are:

1. Dynamic control holes in the paper roll open alongside the notes;
2. A mechanism converts these dynamic controls to a particular suction level;
(4) The hammer hits the string at a speed determined by the suction level;
(5) The piano produces a sound whose tone and volume depends on the mass and toning of hammers, piano soundboard and room acoustic.

The difficulty of playing back 1920s piano rolls is that all the critical factors have changed: we do not possess either the original recording pianos or recording venue, and fashions in piano tone have changed. Inevitably modern-day playback of these rolls produces sounds at variance with the intentions of the original roll editors. The necessary musical intelligence must be provided by today’s rebuilders and regulators, who must control the variables so the playback performance stays within credible musical bounds. The most complex is probably stage 2, converting dynamic coding into suction levels, particularly matching the graduation of suction levels to the sound produced by the piano concerned. If the piano is very different to the original, it may not be possible to adjust the mechanism far enough to compensate – the problem which most concert grand recordings encounter.

**Using a piano roll as a computer program**

As described above, a piano roll does not contain an actual performance: instead, it contains controls to drive a mechanism which eventually produces a performance. The roll is therefore remarkably similar to a computer program, being a series of commands to a device to make it produce a particular action. The key to using the roll as a computer program is to construct a device that will produce identically the same series of hammer movements as an ideal player piano.

Clearly, the first thing that needs to be done is to convert the piano roll (an 11¼" wide sheet of paper with holes punched in it) into a computerised form. This can easily be done by converting each hole or slot in the roll into a pair of accurately timed instructions – an ‘on’ followed by an ‘off’ – for whatever that hole operates. The various subtleties of achieving this do not really concern us, although they are far from trivial – the end result of a stream of on/off instructions is readily understood (think of a playing a single note – pressing down the key is ‘on’, and lifting the key to silence the note is ‘off’).

These instructions are ideally suited for use by a computer, which itself works in the same on/off ‘binary’ manner. To use the piano roll’s binary data, a computer program is required. This must read the dynamic coding instructions and use them to calculate the suction level a real reproducing piano would have reached at each instant. This calculated suction level can then be applied to each note as it plays to determine how fast its hammer should move, and therefore how loudly it should play.

This is done by means of a ‘mathematical model’ of the actual mechanical device – in this case the reproducing piano action – a widely-used technique in engineering applications these days. Various modelling techniques may be
used. A rigorously analytical approach is to consider the behaviour and interaction of every lever, spring, etc, in the machine, applying geometrical and physics equations to calculate the resulting suction level (but choosing the correct equations is not simple, especially in fluid flow physics, and it is essential to incorporate every single aspect of the device accurately). Another approach is to measure an existing instrument and break down its behaviour into a series of rules which can then be used to predict how it will respond as its various controls are operated (this does not require the machine’s inner workings to be understood, but will obviously give the wrong results if incorrect rules are used to explain the measurements). A common approach suitable for reproducing piano models is to create a set of rules based both on measurements and theoretical analysis, so using the best aspects of both approaches.

It is important to understand that an accurate mathematical model will behave in a very similar same manner to the original physical device. It is a mistake to assume that it will inevitably ‘improve’ on the original so will not be authentic (although a model may deliberately choose not to be authentic, of course). However, what a good model will do is calculate the behaviour of a machine in good condition – it will not suffer from the various mechanical ills that any old machine tends to develop, which tend to make it behave both incorrectly and unpredictably. The model predicts correct behaviour, so can be used to determine when the real device is not working correctly. The model may actually be used as a regulating aid for the real instrument.

Applying the computer model to a real piano

Once the suction level implied by the dynamic codes has been calculated, it is necessary to apply this to an instrument to obtain a performance. Modern solenoid pianos typically require the note’s dynamic to be expressed as a number (known in the standard ‘MIDI’ electronic musical instrument control language as the note’s ‘velocity’). It is necessary to calibrate the overall system to match velocity and hammer speed. A common-sense technique is to adopt a three-stage process: (a) calculate a standard suction level in the mathematical model, (b) convert this to a standard velocity (in whatever type of input the piano requires) and (c) manipulate this standard velocity to suit the instrument being played. The advantage of this approach is that the intermediate velocity information is standard for all rolls and all pianos: anyone can create or use performances to this standard. Only the final ‘mapping table’ needs to be adjusted to suit local conditions, so the standard performance is never altered.

An obvious way to set these relationships would be to make the solenoid piano move each hammer in precisely the same way a pneumatic reproducing piano would have done, so the data from the piano roll delivers exactly the
same performance on both instruments. However, as has been discussed earlier, the dynamic coding is optimised for a 1920s 5ft 6in grand piano in good condition and with 1920s-styled hammers. A modern piano will sound significantly different with the same hammer speeds. The art lies in interpreting the suction levels coded into the reproducing piano roll so they are suitable for the modern-day circumstances – that vital musical intelligence again. In this case it must be provided by the programmer.

The dynamic range of a performance lies between a minimum level below which the notes will not sound, and the chosen maximum level. When setting a suction-to-velocity scale, the minimum level will hardly vary, but the peak level may vary widely depending on both the piano and the piece being played. It is not appropriate to scale the entire dynamic range evenly; the degree of scaling at each point must reflect the difference between original and modern systems at that point.

A reproducing piano mechanism may be adjusted at intermediate points only as far as the mechanics permit (usually quite restricted – it was not a useful adjustment on the original instrument), but a mathematical model can use any form of scaling pattern. Therefore a model may allow a better adaptation to circumstance than a mechanical device.

The Bösendorfer SE piano.
Adapting to a specific reproducing piano system

The above discussion is generally applicable, not specific to the *Window in Time* series. Indeed, it is highly likely that the techniques used for that series are quite different in detail, although the general outline is likely to be similar.

If the *Window in Time* CDs have achieved anything unusual, it is their adaptation to circumstance. Wayne Stahnke has been researching the nuances of Ampico’s roll editing techniques for many years, and he has applied his understanding of them to allow the original roll to be interpreted from the original 5ft 6in recording piano to a modern 290cm Bösendorfer. This section investigates particular aspects which, although easy enough to model, require detailed understanding to get right.

Overall tempo of roll performances has long been contentious, because it is easily changed on the pneumatic reproducing piano, and easily marked incorrectly on the roll. Speed changes during the performance have also been subject to much debate. Here, the issue is whether the system maintains the original performance speed throughout the roll, or whether it results in a gradual acceleration. The CD liner claims that earlier Ampico rolls tend to accelerate but later ones maintained the speed – the modern-day interpreter must understand which is which to get the model right. (Details of the acceleration debate are fascinating but not relevant here.) For a discussion of Duo-Art practice, see Player Piano Group Bulletin 139, ‘Duo-Art Roll Speeds and Recording Methods,’ (Rex Lawson).

The overall tempo for these CDs has been set relative to the 78 rpm records which for the most part parallel the roll repertoire. This approach has been adopted for other recent recordings, although it is prone to error where there is any possibility that disc recordings were compromised to fit within the time limitations of discs. However, matching roll to disc appeases the historical recording lobby, so is probably forced on the rolls whether accurate or not. An argument given specifically for Rachmaninoff is that he would only record pieces that would fit on disc at their proper speed, so his disc tempos can be relied on.

When it comes to the overall dynamic range each piece uses, we need to understand the Ampico Company’s policy in this matter. As discussed earlier, the dynamic coding was derived from a complex editing process. The evidence Stahnke deduced from surviving Ampico roll editors in the 1960s is that the policy was to use the full dynamic range of the system for each and every piece, while maintaining the relative relationship between different dynamics. Given the size of pianos involved, quieter salon pieces (a major part of the Ampico catalogue) are played at something like their original dynamic range, or even somewhat amplified, while concert pieces were scaled
down throughout so that their climaxes stood out proportionately from the rest of the performance. This approach is obviously inappropriate for concert grand recordings.

What Stahnke appears to have done for the *Window in Time* recordings is to rescale the dynamic ranges to match the true range of each piece – in other words, the suction-to-hammer speed calibration has been set individually for each roll. The available disc recordings make this feasible for Rachmaninoff rolls. Although old disc recordings do not possess a wide dynamic range, the piano timbre suggests how hard the piano was being played. It is therefore possible to calibrate the system for each piece so the modern piano reflects the timbre heard on the disc. This approach maintains the character and integrity of the original performance, and could well be the main reason why these CDs are more credibly musical than attempts using mechanical playback systems, which as described earlier are significantly harder to calibrate in this respect.

Finally, Ampico were known to have manipulated the starting times of some notes in the performance to allow the dynamic coding system time to set the correct accents. This can cause chords to sound ‘split’ when it is unlikely the pianist did any such thing. With the ability of solenoid pianos to control the dynamic level of each note individually, manipulation of note timing is no longer necessary. It therefore seems perfectly valid to move the note timings back to where the pianist put them – assuming you can determine where that was. Whether this has been done in the present case I cannot say.

**Conclusion**

I hope this article has shown the kinds of processes a project such as *A Window in Time* must follow, and how much depends on understanding the technical nature of the machine the rolls were coded for, the musical decisions the original roll editors took and how these relate to the modern piano. It should also be clear how matching the mathematical model’s results to the piano is similar to regulating the reproducing piano, but that it offers greater regulation possibilities than the reproducing piano, which may explain the greater success of the technique when applied intelligently to a modern concert grand piano.
A Window in Time – a response

Denis Hall

Elsewhere in this Journal, Julian Dyer has written a succinct and convincing argument for the application of modern computer technology to the playing back of reproducing piano rolls ‘recorded’ for use on the pneumatically operated instruments of the first three decades of this century.

Three points in particular stand out in this article which ought to be common sense, but are usually ignored or misinterpreted.

1. There is no latent information coded into the rolls awaiting discovery by a reproducing system which differs from an original in first class order. This is a trap into which those who are not familiar with the original pianos are inclined to fall.

2. What Dyer describes as the ‘mathematical model’ need not ‘improve’ on the original on which it is based. Indeed, if it is the intention for it to mimic the original, then it must not. Because of the vast resources available in modern computers, it must be very tempting to think that, 70 years on, one can see limitations, or even errors, in the original which it would be easy to correct, particularly when there are not the constraints of the mechanical reproducing action.

3. The pianos for which reproducing rolls were produced were very different animals from their modern counterparts. Fashions in piano tone alter over the years as much as fashions in piano playing. What was admired 70 or 80 years ago may be barely worthy of mention today. As to piano tone, the pianos of the first 30 or so years of this century in general had lighter and softer hammers than are fitted to new pianos; this also usually applies to the hammers fitted when old instruments are rebuilt.

These factors do not, of course, apply only to the *Window in Time* project. They have to be borne in mind by anyone working with reproducing pianos, be they pneumatically or electronically operated.

The publicity for the Rachmaninoff/Stahnke CDs has been expertly handled, feeding critics selected information which encourages them to express opinions with confidence. They alternately praise and dismiss what they hear, in many cases without really having the knowledge on which to base their opinions. The enthusiasts praise the ‘ideal acoustic surround’, the ‘awesome clarity’, the ‘added detail and far wider dynamics, as well as a bass sonority that is barely hinted at in the disc versions.’ These and similar eulogies typify what this school of opinion enjoys and values. The sceptics, on the other hand, note the ‘mere shadow of the titanic personality we know
from those imperfect but inimitable RCA 78s”; ‘Inhumanity pops up elsewhere . . . I’m not sure whether I am listening to Rachmaninoff, Mr. Stahnke or a shadow doppelgänger; some artificial conglomerate made in the laboratory but claiming a life of its own,’ and so on. A detailed subjective comparison between the 78 rpm discs and the Telarc CD renditions of the same pieces tends to demonstrate the similarity of the two. It seems there is nothing audible on the Stahnke CDs which one cannot also hear on the 78 rpm discs.

Two questions arise from these critics’ opinions.

Firstly, does the playing as heard on the Telarc CDs sound like a real pianist? One critic, Terry Teachout in Fi magazine, set out to test this. He asked a professional pianist ‘intimately familiar with Rachmaninoff’s music’ (not, however, intimately familiar with Rachmaninoff’s disc recordings) to listen to the Stahnke version of ‘Lilacs’, together with the 1942 RCA 78 rpm disc version. She found the Stahnke version ‘really, really beautiful. The voice-leading is almost too perfect to be true.’ The 1942 disc was ‘very good and very similar in style to the [Stahnke] recording’. This would probably be the sort of general reaction of most critics who do not have a particular knowledge of Rachmaninoff’s 78 rpm discs or Ampico rolls.

However, none of the critics seems to have played a Stahnke recording ‘blind’ to a professional pianist and asked my second question – ‘Who is this playing?’ That would have been the real test, and I do doubt if a definite ‘Oh! It could only be Rachmaninoff,’ would have been the response. Why should this be when in an A/B comparison there is so much recognisably similar?

There can be only a very few people still around who heard Rachmaninoff play in the concert hall and who can carry that memory clearly in their mind today. The result is that what most of us are basing our opinions on is the sound of those 78 rpm discs which we know are Rachmaninoff. If an unpublished title was to be found and played to us without revealing the pianist’s name, would we be quite as sure of recognising him? I wonder. Victor, and later RCA, favoured a close microphone placing for their piano recordings which gives a splendid immediacy to even the older disc recordings, and lets the listener hear much detail of actual tone production and colouring which is part and parcel of the type of American Steinway concert grand sound favoured by Rachmaninoff. Incidentally, Rachmaninoff’s first choice in pianos was the American Steinway, followed by the German Steinway. In Europe, he was also quite happy to play a Bechstein, but apparently not a Bösendorfer. So, I suggest that a Bösendorfer (not a Steinway) recorded in the flattering acoustic of a reverberant concert hall with spacious, even distant, microphone placing will not sound like the Rachmaninoff we have grown to know and love.

Those who heard Rachmaninoff play repeatedly comment on his unique sound – one which could really only be produced on a certain type of piano –
the Steinway. It is unfortunate that Stahnke’s standard instrument is the Bösendorfer Imperial. Or perhaps it would be more accurate to say only that it is unfortunate from the point of view of this particular project. Had he chosen to record the Ampico rolls of Rosenthal, then the instrument would have been ideally suited. As it is, a fuller, more immediate, closer sound might have proved more satisfactory. As an example, there is a very different recording made on a Bösendorfer SE piano. Dick Hyman, the jazz pianist, recorded a CD for Reference Recordings of San Francisco (Dick Hyman plays Fats Waller – RR-33DCD). Probably the piano used was a different Bösendorfer voiced to produce a warmer sound; maybe it was the microphone placing (just above where the pianist would have sat, the insert note tells us); maybe the ribbon microphones helped; and maybe the studio was smaller and less reverberant. For whatever reasons, the sound produced on this recording is closer, fuller and rather more reminiscent of RCA’s technique. Perhaps we might have recognised the great man more readily recorded by Stahnke in this way.

It seems that there will always be educated musicians who, for whatever reason, find recordings of reproducing pianos completely unacceptable, and those who have an interest in this form of music carrier have no option but to acknowledge this. However, the Stahnke interpretations as heard on the two Telarc CDs, in spite of subjectively at least reproducing so much of the Ampico roll information, do present some difficulties to those of us familiar with the rolls played back in the traditional way. My personal opinion is that it is the tone of the piano, so foreign to what we are used to hear Rachmaninoff play on his 78 rpm discs, and the rather distant, reverberant recording hall, so much in general favour at this time, which in the final analysis make the result something of a disappointment.
Cleaning the Windows of Time

An Examination of Recording Methods for the Ampico Re-enacting Piano

Rex Lawson

Introduction

Reproducing piano history has not always been recorded with the greatest of care. In particular the system of recording used by the German firm of Welte in Freiburg has been subjected to a number of wild theories, quite possibly in some cases with the intention of providing a spurious authenticity for latter-day vinyl recordings of the Welte legacy. In a similar way, the legends surrounding the recording of Ampico rolls have been allowed to crystalize without sufficient attention being paid to accurate detail. Since Telarc has recently published two CDs of Rachmaninov's Ampico recordings, as transferred by Wayne Stahnke to his proprietary computer system on the Bösendorfer SE, the present Pianola Journal provides a timely vehicle for an article on the subject.

Hitherto it has been generally stated and accepted that, prior to the invention and development of the spark chronograph by Clarence N. Hickman, Ampico recordings measured only the note pitches and durations of a pianist's performance. Just a few references have been made to Charles F. Stoddard's early attempts at dynamic recording, by that perceptive observer, Charles Davis Smith, in his authoritative treatise on the American Welte system, and by Richard Howe, in an article entitled 'The Early Days of Ampico' in the Amica Bulletin for January 1972. But the subject has not been covered in detail, and it has certainly not put Hickman's undoubted achievement into its proper historical perspective.

Contemporary references are not much help, though they do emphasize that any initial practice there may have been of using a dynamic recorder had faded away by the period immediately after the Great War. As part of a series of interviews that took place from 1969 onwards, between Nelson Barden and various former members of the Ampico staff, Angelico Valerio, an Ampico roll-editor who began working for the Company in 1923, is reported verbatim in confirmation of this point of view:

VALERIO: 'Now if they were in a hurry for a roll, we'd know generally what dynamics to put in, because any piece they played we would have the music for it. We would read it over ourselves if we didn't know it, and we'd get a general idea of what they wanted. But we usually used to wait until we got the first record back with all the perforations, and then we'd put in the pedal and dynamics. This was
before you had the dynamic machine.’

BARDEN: ‘Now, when you were working in the pencil roll, which was just the hand punchings, could you do anything else except take out wrong notes? That is, would you get to dynamic markings at that point?’

VALERIO: ‘No, because there were no dynamic markings. You’re talking now about what happened with the dynamic machine?’

BARDEN: ‘No, this is before.’

VALERIO: ‘Before. Well, there were no dynamics.’

Similarly, Edgar Fairchild (the assumed and Anglicised name of Milton Susskind), Ampico’s Editor-in-Chief from 1917 until 1925, as reported and paraphrased by Jim Elfers in the Amica Bulletin for September 1969, states that ‘the recording mechanism, invented by Charles Stoddard, recorded the notes, the sustaining and una corda pedalling, and nothing else.’

And yet we have clear evidence, from US patents 1,095,128 and 1,367,364, applied for on 30 April 1908 and 12 November 1910, that Stoddard had conceived, developed and refined a recording piano and mechanism that would have allowed varying degrees of dynamic subtlety to be automatically registered on either the note recording roll, or with more accuracy on another roll moving at a higher speed. Clearly some further investigation is needed.

A similar, though less widely understood dichotomy exists with regard to the built-in acceleration of Ampico music rolls. Any roll pulled through by means of a take-up spool accelerates during performance. This is not necessarily to say that the recorded performance accelerates, but simply the paper speed. The acceleration of the paper depends on four factors: the initial diameter of the take-up spool, the efficiency under load of the spool driving means, the thickness of the paper itself, and the feed-spool brake tension, which causes the roll to wind on more or less loosely. As can be seen from this author’s article on ‘Duo-Art Roll Speeds and Recording Methods’, the acceleration of rolls from the Duo-Art recording pianos in New York and London can be mathematically proven, and it is clear from all the early player-piano literature that such acceleration was widely known and accepted. It is, after all, not difficult to hear, for example, on metronomically transcribed rolls played without the intended use of the tempo control.

In the booklet accompanying the second CD in his Telarc series, A Window in Time (CD-80941), Wayne Stahnke has pointed out that the early Ampico recording piano, as described in a patent he does not specify, but which is presumably the grand piano with multiple mercury bath contacts in Stoddard’s US patent 1,367,634 mentioned above, used a roll that was pulled through by pinch rollers, which therefore did not accelerate as the recording progressed. It cannot actually be seen in patent 1,367,634 that this is the case,
but patents 1,095,128 and 1,370,614 seem to represent the same theoretical device, even if one of them uses an upright piano, and in both cases a pinch roller is clearly in use.

However, in two more patents relating to the early Ampico recording and production system, both concerning perforating machines, it is clear that the acceleration process was indeed in Charles Stoddard’s mind, since he makes allowance for its re-introduction at the initial trial roll stage. Stahnke has used what he perceives to be a lack of paper acceleration in early Rachmaninov Ampico recordings (and thus an apparent acceleration of the performances), to justify their transfer without any take-up spool compensation to his computer piano system. He may be right, of course, and in particular the G minor Prelude sounds convincing in this way, but his practice cannot be justified by simply calling the Ampico recording piano patents to his support, without taking into account the subsequent processes in the production of the finished music rolls.

**Early Recording Pianos and Dynamics**

Charles Stoddard, inventor of the Ampico system, was a methodical engineer, whose initial conception of a re-enacting piano included not only the player mechanism, but also the recording system, and the design and production of the accompanying music rolls. His earliest patent applications for the recording and production of rolls date from between 1908 and 1914, and there are five of them, if one leaves out those that apply simply to the device of extending perforations in order to simulate or enhance the effect of the sustaining pedal.

Three patents cover the progress of his ideas towards a recording piano, and they are 1,095,128, 1,367,634, and 1,370,614. For the sake of completeness, all the illustrations from these patents are included in the next few pages. However, we may dispense rather quickly with the third patent of the group, which deals only with a means of recording a pianist’s use of the sustaining pedal, except to note that the roll illustrated therein is pulled through by pinch rollers, using an identical worm-driven mechanism to the first patent of the series.

In many ways patent no. 1,095,128 is the most ingenious, since it provides a means of recording dynamics, pitch and duration on only one roll, and this with only two electrical contacts. It was applied for in April 1908. At the top of the page it can be seen from Fig. 1 that an upright piano has been used, and indeed that an upright action is necessary for the simplicity of the recording mechanism, if mercury rather than spring contacts are to be used. To describe the mechanism in the simplest terms, a piano hammer C has two thick contact wires 10 and 11 attached at the base of its shank, and these are able to make electrical connections with mercury baths 12 and 13. In Fig. 1 the hammer is
Charles Stoddard's first recording piano.
at rest, and so only wire 10 and bath 12 make contact. Similarly in Fig. 2 the hammer is striking a string, thus causing a note to sound, and only wire 11 and bath 13 are making contact. However, in Fig 3, during the brief forward movement of the hammer as the key is depressed, and also after the hammer has rebounded and is in its check position, both wires and both mercury baths are in contact, thus allowing an electrical circuit to be completed.

The effect on the recording roll R is that the stylus 28 is pressed down during the travel of the hammer to the string, and also after the note has been sounded, as long as the key is held down. The roll in Fig. 8 thus has a series of short lines, their length in inverse proportion to the dynamic of the notes in question, followed by a series of longer lines, roughly equivalent to the duration of the notes. In fact it can be seen in Fig. 8 that the gaps following the dynamic lines 50 and 51 are rather longer than those following 52 to 55. It would no doubt be the case that with quieter notes it would take longer for the hammer to rebound sufficiently from the string to make the electrical contact, so the start of the notes would presumably occur about halfway through the gap, rather than at the beginning of the secondary lines. The fact that this small detail was included in the drawings is a good indication that Stoddard had made practical experiments with such a device, though perhaps at roll speeds rather higher than normal.

To put the marks into context, the later spark chronograph detected timings over the last one-eighth of an inch of hammer travel, from about five-thousandths for pianissimo, to one-half of a thousandth for fortissimo. Allowing for a total hammer travel of just under two inches, and for the fact that considerable acceleration would have been needed for the higher dynamic levels, this gives an approximate time of overall hammer travel of about eight-hundredths of a second for pp, to around three for ff. A roll travelling at speed 100 (120 inches per minute) would translate these timings into distances of about .16” for pp, or .06” for ff. Someone with a good eye and a marked rule could make enough sense of these markings to read off a simple dynamic value.

The dual spring contacts in Figs. 5 to 7 work in a similar, but not identical way, completing a circuit only as the key is depressed or let off, so that a dynamic line occurs at the start of a note, and another line as the note ends, with the duration of the note left blank. Fig. 4 is simply a detail of one of the recording styli, which marked a roll by pressing it against a roller covered in carbon paper. This had the advantage of needing very little movement, and so would record with great accuracy.

At the left-hand end of Fig. 1 it can be clearly seen that the recording roll is being pulled through by two pinch rollers, one driven by a worm gear, so there can be no doubt that any roll produced on such a mechanism would not have included any built-in take-up spool acceleration.
There is a matching patent, split between nos. 1,409,478 and 1,557,732, which despite their relatively late issue dates of 1922 and 1925, were both applied for in July 1908, and these cover the earliest of Charles Stoddard’s conceptions for a reproducing piano system. Six marginal perforations control three additive intensity steps and three cancel valves, providing eight
intensities of touch, very clearly itemised as such in the description, and not seven, as in the later Ampico. There is no crescendo facility on this earliest of designs, nor on a modification of January 1910, in which the three individual cancel valves are replaced by only one, so a simple dynamic recording system would have been just about sufficient to cope with the relatively small number of steps available.

... and the accompanying roll.
Patent for recording sustaining pedal.
The early Ampico recording grand.
Patent 1,367,634, applied for in November 1910, is an adaptation of the first recording system, this time for a grand piano, while still allowing mercury baths to be used, in view of their negligible effect on the touch of the piano. At the same time, Stoddard has modified the system to record note durations and dynamics on two separate rolls, the dynamic roll running at a higher speed, thus allowing greater accuracy to be obtained. This would also obviate any confusion that might have arisen between note and dynamic lines in fast, repetitive passages. In this case the white note dynamics are obtained through a circuit connected through wires 28 and 20, at each end of the keys, which make contact with mercury baths 30 and 21. The blacks have a similar arrangement, though their front contacts dip into baths 33. Note durations are obtained by wires 40 and 50, for white and black respectively, connecting via wires 45, which remain constantly in baths 41.

The two rolls, one for dynamics, and one for pitch and duration, have identical marking mechanisms, which in turn are identical to those in the other two patents, so it is not unreasonable to assume that the driving means for both are the same as before, namely by means of a worm gear and pinch rollers, thus causing no paper acceleration.

Overall, the conceptions show both an appreciation of pianistic demands, that the touch of the action should be relatively unaffected, which would be the case with mercury contacts, and also some evidence of the inventions being put into practice. The realisation that one roll was not enough for both notes and dynamics implies practical experimentation between 1908 and 1910. As it happens, it also puts one misconception about Welte’s recording system into its proper perspective; namely that no marking system, soft rubber wheels or no, could hope to achieve any subtlety of dynamic measurement on a roll running anywhere near final playing speed, and especially on one being drawn in an accelerating manner on to a take-up spool.

Early Perforating Machines and Paper Acceleration

We now come to what are in many ways Stoddard’s most revealing patents of the time, being nos. 1,280,578 and 1,323,614/5, both applied for in August 1914. Although a recording piano could be designed and experimented on before the production of music rolls began in earnest, the patenting of perforating machines implies strongly that roll production was already well under way. Ampico recordings, as opposed to early Rhythmodik hand-played rolls that had perhaps been enhanced for selected customers with eight degrees of touch on early Artigraphic players, began to be issued in earnest in late 1912 or early 1913, and a year or more’s practical experimentation might sensibly have been formulated and safeguarded by these two patents.

At first glance the two machines appear to be virtually identical, but a closer examination of their detail reveals their purposes to be radically different. The
drawings need to be viewed with the pages rotated clockwise through 90 degrees, and the locations of individual components will be described with this perspective in mind. At the bottom right of both drawings is a roll transport mechanism, with chain-driven pinch bars ensuring that a number of freshly perforated rolls are drawn through at a reliable and intermittently constant speed. There is nothing unusual about this arrangement, which is to be found in many perforating machine designs, and the shafts and ratchets that run both machines can be seen at nos. 26, 65, 56 and 57 in both drawings. Equally the punches and selectors seen in the lower left of each drawing are substantially the same, and the identical numberings are a reflection of this similarity.

However, the top halves of the two drawings are markedly different, so it will be as well to examine these in more detail. The second patent, split between nos. 1,323,614 and 1,323,615, is the more conventional of the two designs. Both patent numbers use the same drawing; at the top left it can be seen that a stencil or pattern roll 2 is being drawn on to a take-up spool 9, which is driven through gears 11 and 12 by a wind motor M. The take-up spool 9 can also be seen in transverse section in Fig. 2, at the extreme left. Under normal circumstances such an arrangement could be guaranteed to provide a constantly accelerating feed to the stencil roll, such that it would be quite impossible to use it with any accuracy for controlling the perforation of multiple rolls driven at a constant speed. However, as a result of Charles Stoddard’s ingenious mind, the wind motor speed is governed through a complex registering mechanism, causing the motor to slow down as the roll winds on to the take-up spool, and also allowing the stencil to be made from normal roll paper and to be read pneumatically. By contrast, Aeolian’s stencils were thick, cardboard affairs that needed lightly sprung levers to press through their perforations, rather like the systems used on Dutch street organs. As a result, the perforation speeds of Aeolian machines measured some two or three punch rows per second, in contrast to the seven or eight that could be achieved by Ampico.

Ideally, what is needed for the exact synchronisation of a stencil roll is a control perforation for every punch row, just like the frame sync pulse in a television system, that causes the electron beam to return to the top of the cathode ray tube for the next picture frame. However, a perforation in every row would be nothing less than a long slot that ran for the whole length of the roll, and as such it would divide the roll in two. Clearly this would be an impossibility. The next best option is a regular control perforation, but one that repeats only once in a given number of punch rows. Stoddard’s invention uses control perforations 90, 91 and 92, one perforation to every five punch rows on the stencil roll. However, he manages to use these perforations to register every single punch row, by means of a drum 70, with a rotating sleeve 74, mounted on a stationary shaft 72, all just above the take-up spool.
Early production perforating machine.
Early trial and stencil perforating machine.
The drum 70 and its various components can be seen from different angles in Figs. 1 to 4. In the rotating sleeve are six small holes 83 to 88 that match up to the control perforations in the stencil roll. The sleeve is rotated in the same direction as the travel of the roll, at a fixed speed governed by the main perforating machine shaft 26 through subsidiary shafts and gears 110 to 113, transferring the final motion to the sleeve by means of gear 79 mounted on its periphery. The speed of the sleeve is such that each of the six holes 83 to 88, seen in Fig. 4, remain in contact with the stencil for five successive punch rows, but are moved each time to uncover a slightly more advanced position of the port 81, which is just deep enough to span five rows. If a control perforation in the stencil uncovers one of the holes 83 to 88 while it in turn uncovers port 81, then a small valve is operated that cuts off the suction supply to the wind motor M. In this way the motor advances only by the amount necessary to keep the roll and its control perforations in correct synchronisation with the rotating sleeve 74, and thus also with the tracker bar 15.

In essence the machine described in patent no. 1,323,614/5 is a normal production roll perforating machine, albeit one that combines great accuracy with considerable speed, and in a most ingenious way. It is noticeable that the Ampico perforating machine in use today at Keystone Music Rolls in Bethlehem, Pennsylvania, has a similar, though not identical rotating sleeve device.

By contrast, the perforating machine illustrated in patent no. 1,280,578 is not designed for production perforating at all. Indeed, if one looks at the spool ends of the apparent stencil roll 2, they can be seen to be rounded, in contrast to the flat edges of the stencil in the other patent. This tiny discrepancy in design, together with the smaller size of the perforations on the stencil roll, provides a useful clue to the real purpose of the machine as described.

In both patents Stoddard labels the roll 2 as ‘the pattern or stencil sheet’, and he seems to use the two terms interchangeably, even though they had separate meanings in the roll industry of the time. A stencil was originally a cardboard master roll, used for the perforation of multiple rolls on a production basis, whereas a pattern was a normal sized roll, used for duplication in some other way. In the terminology of the time, the roll taken from the recording perforator was an ‘original’, the subsequent rolls used for editing and testing were known as ‘trials’, and the final ‘trial’, approved and signed by the artist, became a ‘pattern’. In order to make the first ‘trial’, a ‘stencil’ had to be made from the ‘original’, in this instance used as a ‘pattern’, and any alterations made to the ‘trials’ had to be painstakingly duplicated on the ‘stencil’. Once the final ‘trial’ had become the final ‘pattern’, a new fair copy of the ‘stencil’ was usually made, since the first ‘stencil’ would by that time have ended up with a considerable amount of
black tape over it, and would thus not have been in very good shape for roll production purposes.

We are dealing in patent no. 1,280,578 with a normal sized roll, generally called a ‘pattern’ when used in this way. It will be seen that the right hand margin of the pattern roll has a repeating series of three perforations 73 to 78 and so on, and these are used in an ingenious way to draw the roll forward as much as is necessary for each new punch row, whether or not the increments are regularly spaced. Attached to the main shaft 26 of the perforating machine is a three-way pneumatic selector switch 111, something akin to a large version of the rotary switches found in Ampico spoolboxes of the 1920s. For each punch row on the main perforator, this switch is rotated one-third of a complete revolution, and so successively opens a series of three small ports to atmosphere. The resultant signals are used to control a three-part valve system V, V1 and V2, which allows a wind motor M to turn until the corresponding marginal perforation on the pattern sheet uncovers a hole in the tracker-bar 15. In this way the movement of the pattern is wholly controlled by the main perforator, but in exact accordance with previously punched synchronising perforations on the pattern.

One of the most significant statements in the patent description comes right at the very end, just before the claims to priority of invention, and is worth reproducing in full:

‘If it is desired to reproduce upon the note sheet material [the roll being perforated] exactly the relationship of the perforations in the stencil sheet, then the spaces between the successive marginal perforations of the stencil sheet would be made of uniform length so that the feed steps of the stencil sheet would be uniform. But by varying the spaces between the marginal perforations in the stencil sheet, the note sheet may be provided with perforations having predeterminedly different relations from the relations of the perforations of the stencil sheet.’

Now it is always possible that the rhythm of dance rolls could be corrected or stylised in this way, and in classical music it would give the roll editors the opportunity to insert tiny fragments of breathing space into rushed passages, a facility that Duo-Art editors notably lacked. But by far the most plausible use of such a mechanism is the introduction of compensation for take-up spool acceleration. The phrase ‘predeterminedly different relations’ has a clear implication of converting between two differing but internally consistent tempo relationships, and not merely the odd alteration to tidy up a beat or to pause soulfully. Equally, Stoddard is not simply describing a means whereby a recorded roll could be reproduced at a consistently slower or faster tempo, because he takes care to distinguish between the first case, where the marginal perforations would be spaced uniformly, and the second, where they would be predeterminedly varied.
In such a case, the automatic recording of accelerating marginal perforations would have been a very simple matter. A template roll with a mathematically regular series of three perforations could have been run on to a take-up spool at the same time as a recording was being made, with the perforations triggering three of the styli at the edge of the recording roll. As the template roll was drawn further on, its perforations would have speeded up, causing the marginal markings on the recording roll to draw closer together. When such a recorded roll was subsequently perforated and used for the production of trials or a stencil on the machine described in this patent, it would have been driven faster at the start, and progressively slower as it proceeded further. The result would have been a trial or stencil on which the music (though not the perforations) was more closely spaced at the start, and more widely spaced at the end, needing to be drawn on to a take-up spool in order to reproduce a performance correctly.

One can always argue about individual roll performances, especially in cases where absolute or relative tempi seem unnatural, perhaps as compared to recordings on 78s. However, in the case of the Duo-Art it is mathematically established that all its genuinely recorded performances were produced on rolls which accelerated. In the case of the Ampico, it is clear that such acceleration was at least in the mind of its inventor, Charles Stoddard, and one should not summarily dismiss such evidence.

Personal Testimony

Unfortunately, much as one might wish that the crystal water of the patents would allow an absolute truth to shine through, there is not a little muddy personal testimony to obscure the clarity of history. The individual recollections of musicians and engineers need to be analysed with a great deal of care, especially when given in old age, and sometimes in answer to loaded questions.

One thing is clear beyond any doubt, however, and that is that a new recording piano, together with Clarence Hickman’s spark chronograph dynamic machine, replaced a previous recording piano in early 1926. Hickman’s diaries of the time are by definition not subject to any confusion of memory, and they make it clear that the new combination was first properly tested in January 1926, with Edgar Fairchild playing some trilled arpeggios. This was followed in the same month by Angelico Valerio and Charles Stoddard each undertaking a similar exercise, and after final adjustments, the first regular recording artists to try out the piano were Robert Schmitz and Benno Moiseiwitsch, both in March of that year. In April Moriz Rosenthal made 13 roll recordings, so it would be fair to state that the new system was first used in earnest in the spring of 1926.

Whether it replaced the earliest design of recording piano, or an
intermediate or modified one, is far from clear. In his interview with Nelson Barden, Hickman is honest enough to admit that he has few memories of the immediately preceding recording system:

BARDEN: 'What measures did you take so that on long rolls there wouldn't be a speedup at the end of the roll because of the take-up spool getting bigger in the piano? Was there any thought about that? Were the take-up spools on the recording machine the same size as they were on the piano?'

HICKMAN: 'Yes. You see, what we did, we made the take-up spool very large in diameter. Real large so that its diameter was comparable with even the largest roll that you have, so that there wasn't much build up on the take-up spool. You know that from your own piano, which has a great big spool in it. Now in the old piano, there was a small spool. And then you did have a variation. Of course, that was a problem which was introduced because the take-up spool on the recorder, as far as I know, was always a big spool. In other words, he didn't try to make that the same size. I could be wrong about that. It may be, that when they were making the note sheet for the "A", that they did use the same size take-up spool as they used on the piano, and then when they went to the other one, they used the bigger spool.'

This is simply an experienced engineer making speculative guesses about a situation that existed prior to his own involvement. Are we to believe that the previous recording machine used a "B" sized spool (8.75" circumference), as Hickman at first suggests, an "A" sized spool(6" circumference), which is his second choice, or a non-accelerating pinch roller, as indicated in Stoddard’s early patents? In an interview with Wayne Stahnke on 19 May 1979, Hickman even chooses the third option, since he is reported in the CD booklet as indirectly agreeing with Stahnke’s conclusion that “A” rolls were probably recorded without acceleration. But Stahnke took the original recording patents along to the interview, and effectively persuaded Hickman of his own point of view, rather than eliciting a response based on genuine recollections.

Angelico Valerio is even more vague:

BARDEN: 'Was there any compensation, as far as you know, in the stencil machine for the fact that the roll was building up on a larger diameter as it played? So that if the diameter of the take-up spool got larger, because of the paper buildup on it, you'd seem to get the music faster and faster, like you do on an 88-note roll if it's long enough?'

VALERIO: 'No, they compensated for that. Let me see how they did that ... as the roll would fill up, of course, the paper would go through quicker.'

BARDEN: 'On the recorder?'

VALERIO: 'Yes.'

BARDEN: 'So that would be automatic?'

VALERIO: 'On the recording machine, yes. And also on the old pianos, they had small spools; on the new ones, larger ones, so the buildup would be less.'
If there was automatic compensation on the recording machine after 1926, and in fact we know there was, because the photos of it clearly show a take-up spool in use, then the lesser buildup on the new, larger spools would be an irrelevance. Perhaps Valerio had the mechanically regularised popular rolls in the back of his mind in making his last statement, or the incompatibility between rolls recorded on the new machine and the older “A” take-up spools, but it is much more likely that he did not fully understand the question. In essence all he is telling us is that the later recording machine used a take-up spool of similar size to the “B” pianos, and we already know that.

Perhaps the best witness for earlier practice is Edgar Fairchild. Fairchild began his work at Ampico in 1917, and was dismissed from the company, apparently in 1925, for failing to turn up to an appointment with Rachmaninov, though he continued to record in a personal capacity. His association with Ampico predates that of the other two witnesses by several years, and he must have had much less intimate knowledge of the 1926 recording piano, since he had left the staff by that time. His recollections are therefore likely to have been based solely on the piano and other equipment in use during the early twenties. Jim Elfers reports him as follows:

‘Cookie indicated that the original recorded rubato of pop tunes was not retained in the edited result; but the performances were “mapped out” to produce a perfectly even “pulse”. This involved a quasi-mechanical process of measuring so many punches to the quarter-beat, etc. Apparently this was done as some sort of compensation for the increased tempo that would result as the roll got thicker on the take-up spool. This problem was later corrected by a “compensator gimmick” in the recording device, but Fairchild did not indicate whether this changed their recording and editing procedures.’

This recollection fits entirely with the perforating machine patent, no. 1,280,578, described earlier, in which a repeated series of three synchronising perforations had to be punched into the original roll by hand, before it could be duplicated to produce both a stencil and trial rolls for editing. It would surely have made no commercial sense to have re-perforated every recorded dance music arrangement by hand on new blank rolls, and so some form of automated process would have been needed. In the case of classical rolls, where the original freedom of rubato was to be kept, then such synchronising marks could have been punched out in some automatic way, but for dance rolls needing exact regularity, the sync pulses could have been carefully inserted on a musical basis by trained staff.

One avenue for further research might well be the detailed analysis of tempo, in terms of the number of perforations per beat, in early popular Ampico rolls that last for longer than the usual three or four minutes. It would be significant if a duration of, say, twelve perforations per beat, were left unchanged at fifty feet into the roll, or instead gradually increased to thirteen,
fourteen and so on. Of course, one would have to be sure that the roll was originally recorded, and not merely transcribed in the fashion of Frank Milne. But given the analysis of a number of such rolls, it would be possible to come to a rough and ready conclusion with regard to the perception of the Ampico editing staff towards the extent of any audible problems caused by paper acceleration.

Prior to 1926, the details of stencil manufacture would perhaps have been less obvious to staff working at the studios in New York, because it was apparently only in that year that a new stencil and trial perforating machine was brought into use at the Ampico headquarters at 57th St. Up until that time, according to Valerio, large cardboard stencils were used, and these were punched out by hand, mainly in the factory at East Rochester:

BARDEN: ‘Okay. So then the hand-perforated rolls went to the automatic stencil machine?’

VALERIO: ‘No, what it did originally, they used to have big, cardboard stencils. This was before they had the dynamic machine. These would go to the factory, and the factory would put the roll on the table. The roll would make just the holes in the beginning of the note. They’d just see where the line was marked, and then they’d punch out the holes. On the long, cardboard stencil, that is.’

BARDEN: ‘What an incredibly long process that must have been!’

VALERIO: ‘That’s how they did it.’

If we are to take this evidence at face value, it means that the cardboard stencils were sent from New York, with only the beginnings of the notes perforated, and completed and then used for making the first trials at East Rochester. But Barden and Valerio had just been talking about the original rolls that came off the pre-1926 recording piano, and following the process by which the note lines were corrected, and the beginnings of the notes perforated by hand. No mention is made of how the beginnings of the notes were transferred from original to stencil, and so it remains unclear whether this was done by musically trained personnel in New York, or by factory staff at Rochester, and to what extent, if any, automatic machine processes were used. Presumably the cardboard stencils were similar to those in use by the Aeolian Company, in which case it would have been a simple matter to print squares or other indexing marks as the marginal sprocket holes were punched out on blank stock. But if the process of note transcription to stencil was carried out simply by hand, then some form of timing marks would have been needed on the original rolls as well, in order to ensure accuracy and speed.

In Larry Givens’ seminal monograph on the Ampico, "Re-enacting the Artist", there are photographs of original rolls in various stages of development, and on three of these a regular marked pulse can be seen, in the position on the roll usually occupied by the re-roll perforations. At every
1926 Ampico originals at different stages of production.
tenth marking, the mark has been erased and an incrementing number written in its place. This information can be seen to have been used by the roll technician in drawing pantograph lines across the roll, in order to gauge, for example, the start of individual notes in trills. It can be calculated that each mark corresponds to eight perforations on the finished roll, and this is indirectly confirmed by an adjoining photograph of a stencil, with a marginal sync perforation at every eight punch rows.

The trial rolls illustrated in Larry Givens' book date from 1926, and so were produced by means of Clarence Hickman's new recording system. The use of only one synchronising mark cannot therefore be taken as necessarily representing prior practice, but since it must have been based at least in part on a previous system, it provides a useful clue towards the past. Charles Stoddard was always keen not to waste perforation positions that might be filled more usefully, and the extra expression perforations of the Ampico "B" may well have used up positions that were previously filled by further sync tracks on the 'originals' of the "A" system.

As an aside, it may be noted that the re-roll position was also used as a control device, to lock and unlock the automatic chaining mechanism on the 1926 stencil and trial perforating machine. When locked off, by means of a

*The 1926 Ampico trial and stencil machine.*
quarter-inch perforation, it caused all notes (except those already in the
process of being chained) to be perforated as punched on the pattern roll.
When unlocked, by means of a single dot, it allowed any note of at least one
quarter of an inch to be automatically held and chained, to be released by a
single dot terminating perforation in the appropriate note position on the
pattern. This conception of the perforation of long notes as a separate
operation certainly tallies with the notion that it was previously carried out by
untrained personnel at the factory.

The 1926 stencil machine also contained a “floating” tracker bar that
apparently read ahead in the roll it was copying, and made its own decisions as
to the length of beats, or fractions of beats, in popular rolls that needed exact
timing. Nowhere in the literature is the operation of this tracker bar
explained in detail, but it is clearly a nonsense to imagine that it was capable
of reading an entire roll and working out the positioning of beats on its own.
A device that was capable of recognising the starts of notes would have had no
means of distinguishing between notes on the beat, syncopated notes or grace
notes, especially since Hickman confirms that it had only the usual single row
of reading holes. It is an inevitability that control perforations were needed
for this clever pneumatic reader, which is probably the “compensator
gimmick” referred to earlier by Edgar Fairchild.

Just as the automatic extension of long note perforations on the stencil
machine replaced a specific operation previously carried out by factory staff, it
is very likely that the invention of the floating tracker bar had a similar
intention of replacing manual labour. The tracker and its associated
mechanism must have sensed the distance between one control perforation
and the next, which may or may not have had any specific relationship to the
pulse of the music, and then split this distance into a predetermined number
of steps, for each of which it produced a perforation row on the stencil or trial
roll. The roll being copied would have to be halted while it carried out these
operations, and would then move by the distance between the control
perforations. The equivalent manual process before 1926 would have been for
staff at the factory to have read the editors’ beat markings on the original
rolls, and to have used these as a guide to punching out the synchronising
perforations that were used in perforating the first stencils.

An additional problem that stood in the way of perceived accuracy of dance
rhythms is referred to briefly by Angelico Valerio:

VALERIO: ‘If you took a roll before we had a dynamic machine, and an artist
would change it around in a certain place, you’d have to try to compensate it
yourself from what you heard; whether it would put the rhythm out or something,
so we’d change the dynamics. The same dynamics that you would use where notes
were a certain space apart, would suddenly need to be much louder, or they
would be out of kilter with the rhythm. You’d have to readjust that yourself. With
the dynamic machine, all of it was taken care of. You still have to move some notes back, if you feel they struck just a second too soon or too late, but generally you wouldn’t be doing as much of it as you did before.’

The links between dynamics and minute agogic accents are well known to musicians and perhaps actors, although they are not generally understood elsewhere. It must have been a devilish job to produce just the right combination to satisfy someone like Charles Stoddard, who by all accounts was enough of a perfectionist to demand dance rolls of exactly perceived accuracy, but not enough of a musician to understand the difficulties involved in editing a live performance, with all the microscopic hesitations and accents that cause it to “swing”.

Dynamic Editing

Two styles of Ampico dynamic editing have been recorded in print, covering the periods from roughly 1918 to 1925, and from 1926 onwards. What is missing is any record of practices prior to 1918, when Theodore Henrion was Editor-in-Chief. Henrion died as a result of the New York flu epidemic, as did one of his counterparts at Aeolian, Felix Arndt, and the testimony of both men is sorely missed.

But we know from Charles Stoddard’s patents that a system of dynamic recording had been designed way back in 1908, that it had been tried out in practice, and that it had been refined by late 1910. We know that its capacity for detail, albeit limited, was enough for the eight-step expression system that pre-dated the earliest Stoddard-Ampico. We know that Edgar Fairchild in 1918 drew pencil lines along the scores of pieces being recorded, to represent the general crescendos and diminuendos of an artist’s playing, and that he then pencilled in accents as accurately as was possible in real time.

With all this in mind, the most likely scenario prior to 1918 is that the very earliest of Charles Stoddard’s recordings did indeed measure dynamics automatically, though in a rudimentary way that divided the entire range into eight steps. With the introduction of the Stoddard-Ampico in 1912, with both fast and slow crescendos, it may well be that dynamic recording continued, but that the editing staff (Henrion, perhaps) devised a system of drawing a continuous line on the score in order to cope with the ebb and flow of crescendos, using the limited automatic dynamic information only as a guide to accents.

Whatever the case, it is clear that by 1918 the use of the early dynamic recorder had ceased, no doubt because Henrion, and thereafter Fairchild, were able to create rather more convincing musical portraits than the rough and ready musical photographs provided by Stoddard’s early dynamic marking machine.
From 1918 until 1925 we have Fairchild’s direct testimony, as passed on to us by Jim Elfers:

‘The recording piano was a Chickering 6-foot grand with no name on the fallboard. The recording mechanism, invented by Charles Stoddard, recorded the notes, the sustaining and una corda pedalling, and nothing else. Wires led from the piano to the recording room. Cookie sat in an upholstered chair about eight feet behind and to the left of the pianist. On some such pretext as “timing the performance”, or “killing time while they get the equipment ready”, he would call for a complete run-through. During this performance the ‘Cookie Chronograph’ (Suskind himself) would ‘record’ the crescendo pattern by drawing a continuous line on the composition’s music sheet - the bottom of the bass staff representing pianissimo; the top of the treble staff representing fortissimo. If the dynamics stayed at the same level for awhile, Cookie would break the line to write notes describing the effect of the artist’s playing - “crisp”, “delicate”, “legato”, etc.

‘During the actual recorded performance, Cookie would again follow on the music sheet, this time marking the accents above the treble staff. A short line directly above the note indicated a soft accent only slightly above the basic volume; a long line denoted a heavy accent. That was the ‘Cookie Chronograph’.

When Cookie began an editing job, he would try the roll on an upright piano which had four buttons on a box in front of the keys, to operate the bass and treble crescendos. This was used only for experimentation, and did not add any dynamic coding to the roll. So important was the crescendo to Cookie’s coding philosophy, he says he could achieve satisfactory effects on some compositions with the crescendos alone. In fact, the upright was used in some public performances, and the audience was unaware they weren’t listening to a fully-coded roll.

‘Cookie’s editing philosophy was to recreate the general dynamics with what he called “crescendo” and “speed” (described in the manuals as “slow crescendo” and “fast crescendo”), and he used the “steps” (“intensities”) only for accent. Usually his intensity perforations were accompanied by a cancel - the cancel to discontinue the previously-set intensity as the new one replaced it. Since he supervised his editors closely, one assumes the same philosophy was imposed on them. However, Angelico Valerio, who worked with Suskind and took over responsibility for the classical recordings after he left, has described to Associate Peter Brown a totally different philosophy: he started with the intensities and used the crescendos only for final modification. Presumably this was in conjunction with the spark chronograph, which was put into use after Suskind left Ampico.’

In early 1926, the absence through dismissal of Edgar Fairchild coincided more or less with the introduction of the note dynamic recorder developed by Clarence Hickman. Inevitably a change in editing styles took place, mainly on account of the new technology, but also because new talents took their place in the driving seat. The spark distances from the dynamic recorder were measured and transcribed as numerical values on to the original marked roll. Valerio is quoted above as having used the intensities first, and he confirms it to Nelson Barden in his own, rather confused, words:
BARDEN: 'With the old rolls, it looks as though the editors thought in terms of the crescendo mechanism first, and then the intensity steps second.'

VALERIO: 'No, it's the other way around.

BARDEN: 'Did you always think first in terms of intensities, and then the crescendo to kind off polish it off?'

VALERIO: 'Yes, that's right. To smooth it up.'

BARDEN: 'Weren't most of the rolls before 1926 very crescendo oriented?'

VALERIO: 'Yes, they were. And some of them sounded atrocious too.'

Valerio, and other late 1920s roll editors, were able to work in this way as a result of a far more automatic process of reading dynamics from the roll, subsequently converting the numerical markings, with a certain human judgment, into specific intensity combinations. It should be noted, however, that the 1926 recording piano and spark chronograph predated the public launch of the Ampico "B" by three years. The more instantaneous response of the "B" to dynamic coding, coupled with the automatic recording of dynamics, may have helped later editors to achieve a more lifelike portrayal of the Ampico recording artists of the time, but at least for a while it was exclusively the owners of "A" pianos who benefitted from the new recording system.

A Snapshot of the Studio Process

One particularly revealing feature of the photographs in 'Re-enacting the Artist' is the series of operations listed on the imprints of two rubber stamps, which were apparently used to keep track of the progress of each roll in the Ampico studios. The recording date of the roll in question is 3 April 1926, after the new recording piano was introduced, although not necessarily meaning that the latter was used. However, it will be noted that, while the new 'compensation' operation is listed, so is the older practice of extending notes, a device that was abandoned once the Ampico "B" was fully in operation. It will be useful at this point to list and comment on those headings that warrant it, in the order in which they appear:

FIRST STAMP

Selection: Simply the title of the work on roll.

Length: Apparently measured to the nearest three inches.

Corrected: This category seems to be the first of three operations carried out in pencil, and presumably applies to removing and altering wrong notes.

Extended: Presumably extending notes in pencil where musically needed, but mainly to fit with Charles Stoddard's patents for mimicking the sustaining pedal by the widespread extension of note lengths.
Compensated: This operation involved repositioning the start of notes according to their intensity or loudness. A note played more loudly is also played more quickly, whether by a human finger on a key, or by a player-piano pneumatic motor, though it seems that the Ampico pneumatics worked particularly promptly. In this way the louder notes tended to play earlier than they should, and therefore had to be set back by very specific amounts. A numerical table was produced, indicating how much delay should be attached to a note in proportion to its dynamic, and the operator who transcribed the dynamic values from the spark chronograph recording sheet to the original roll, also set back the notes as necessary.

As an aside, it is worth remarking that the problems with Busoni’s early London Duo-Art recordings of the Chopin Preludes may well have a lot to do with this phenomenon of dynamic versus note position. It is one of the great disappointments of the reproducing piano that such a historically important and well respected pianist should have left such an unsatisfactory musical testament. Unfortunately the great man was not able to assist in any way with the editing of the rolls; he was admittedly a highly individual pianist, and his recording producer, Reginald Reynolds, was at the start of the 1920s, completely new to the job. Clarence Hickman’s machine would have been welcome at Aeolian Hall in Bond Street!

SECOND STAMP

Editor: The person in charge of musical decisions.

Note Perf: The punching out by hand of the initial perforations: complete notes where they were short, and at least one quarter of an inch for longer notes.

Stop Perf: The punching out by hand of the single dot perforations that marked an end to the longer, chained notes.

Guard: The punching out by hand of the automatic chaining control perforations.

Cuttings Requested: How many trials and stencils were needed.

Synchron Perf: This space has been marked “Yes” in the illustration in Larry Givens’ book, so it gives the impression of a request rather than a confirmation of the completion of an operation, where a signature would have been appended. If there were any intention on the part of the editor of splicing in extra paper or correcting rhythm to any significant extent, then it would have been a pointless exercise to have produced a stencil with synchronising perforations at every eight punch
Two rubber stamps showing the Ampico editing processes.
rows. After any detailed corrections involving the addition or removal of paper, such perforations would then be out of position and would perhaps hinder the production of a new trial or stencil. So the request for synchronising perforations would seem to indicate that the overall tempo and rhythm of a roll had received preliminary approval. We should remember that we are dealing with a 1926 roll, demonstrably recorded on to a take-up spool, so that paper acceleration was already built in.

Add Paper: Adding pauses of whatever length or brevity necessitated slivers of paper being added as necessary. It would have been far easier to do this at the point of making the first trial, by halting the original being copied, and by feeding the new trial roll forward by hand, before continuing with the perforating process. Like the following two boxes on this stamp, this space was presumably filled as necessary with the exact positions where the extra paper was needed, using the pencilled numerical markings on the original roll as a guide.

Sub. Paper: This needs little comment, being simply the reverse of the previous operation.

Spliced: The fact that a past participle is used as an instruction to the perforating machinist has the clear implication of giving a warning of the positions where splices occurred. No doubt splicing was regularly undertaken for musical reasons, but in view of the gummed tape and resultant thickness of the roll, it was presumably sensible to announce such variations in advance, so that the machine could be carefully watched.

Reduction: Presumably the trial perforating machine had facilities for varying the relative speeds of the original and copies, in order that roll speeds could be altered as necessary. The distortion of paper acceleration that such a process would entail provides a realistic insight into the weight that such considerations carried in the minds of those in charge at Ampico, but we are here dealing with rolls made on a large take-up spool, where any differences would be less.

Through a Glass Darkly

In December 1925, Clarence Hickman complained in his diary:

‘Had long argument with Mr. Stoddard. He wants to put lots of “bunk” on recording table to mislead visitors. I see no good in it, and much harm that may result.’

Let us be quite clear, reproducing piano manufacturers were in it for the money. There may have been a goodly number of staff who were motivated, like Hickman, by a fascination with invention, and the ambition to prove their
own worth in that respect. Similarly, the recording and editing staff probably did a lot of their work out of a genuine love of disseminating music, though perhaps in the main for the listeners of yesterday rather than today. But the overall structure and development of the industry was governed by the men in suits, and the requirement for a good return on capital inevitably coloured the more detailed technical and musical aspects.

In trying to establish the true nature of the recording systems at Ampico, one needs to see through a number of layers of "bunk", be they Charles Stoddard's "bunk", or more recently applied examples of the art. It was greatly in the American Piano Corporation's interest to have Clarence Hickman write up his new recording system for the Scientific American, as though it were the first time anyone had been able to measure the dynamics of piano playing. This ignores Edwin Welte's elusive technique from 1904, the Hupfeld DEA, which recorded notes electrically and dynamics pneumatically, the seismographic invention of Philip Meahl, and Samuel Dickinson's enormous waxed cylinder that sat over the hammers, which latter triggered styli into its surface according to their final velocity. Now it is probably true that the last two examples were not commercially used, but that still leaves us with two other major reproducing piano companies which did use automatic dynamic recording. And, last but not least, there is Charles Stoddard's invention of 1908. Piano roll recording is still seen through a glass darkly, though there is a great deal of information still to be found, in patents, in rolls, in the detail of personal testimony, perhaps even in lofts or cellars.

This article has been written at least in part for those who are already familiar with the history of the Ampico Re-enacting Piano, so it has not gone into technical detail about the workings of Clarence Hickman's spark chronograph, for example, because this has already been expertly described in other publications. But there will be those who have loyally ploughed through the text and illustrations featured above in order better to place in context the remarkable recordings made on Wayne Stahnke's piano.

At present, at the tail end of the twentieth century, reproducing piano technology has the appearance of being very well understood, especially because computers seem to be able to help us with some of the detailed measurements necessary. But we live, to quote a very recent and judicious phrase of Jerrold Northrop Moore, in an age of zealous triviality, and there are commercial interests endeavouring to persuade us that each new CD of the reproducing piano represents a new level of fidelity. "Bunk" is still with us. Similarly, the InterNet has its own breed of trivial zealots, and one cannot place an unqualified trust in such sources. The whirling of suction levels within a reproducing piano is not dissimilar to the weather, and it has taken thousands of specialists and millions of pounds of computers to provide weather forecasts that even now fail to predict with unerring accuracy. It is
worth remembering that in practice only one or two specialists ever had a full understanding of even one reproducing piano system, and today there are precious few who have adequately analysed the details.

The late Gordon Iles, a very shrewd observer, commented that while a gramophone record is like a photograph, a reproducing piano roll is like a portrait. Both forms of visual record have their strengths and their weaknesses, and so it is with aural recordings. Any attempt to reproduce a sound portrait, especially through a different medium, is likely to involve a good deal of personal judgment, and so will be coloured differently according to the person attempting it.

To be fair to Wayne Stahnke, one should congratulate him for his efforts. He may well have a point about the paper speeds of some Ampico rolls, but he has not yet proved his case in any rigorous way, or conclusively demonstrated that his dynamic conversion program is objectively correct. If one is attempting to discover the real Rachmaninov, the essential Rosenthal, or the genuine Lhevinne, perhaps it is better for the moment to listen to several different reproductions of their performances, and to form one’s own internal portrait, using musical common sense, seasoned with just the merest hint of scepticism. Even though the rapidly responsive tone of a Bösendorfer provides the wrong impedance for Rachmaninov’s musical wizardry, one can still be certain that Charles Stoddard, Clarence Hickman, and Rachmaninov himself were all magicians of the highest order.

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The Pianola as a Means of Personal Expression

Alvin Langdon Coburn

Alvin Langdon Coburn printing a lithograph.

This article is taken from The Sackbut, Vol. 1, No. 2, for June 1920, a short-lived monthly publication organised by Philip Heseltine, otherwise known as Peter Warlock, the composer. Alvin Langdon Coburn (1882-1966) was an American, a professional photographer, and a keen amateur pianist. He was friendly with George Davison, at one time head of the European branch of Eastman Kodak, who owned two Aeolian residence organs, and two Pianola and grand piano combinations, installed at his grand houses in Regent's Park and Harlech, and on which the two men sometimes played roll duos.

At Davison's homes Coburn met many of the young composers of the day, amongst them Granville Bantock, Eugene Goossens, Joseph Holbrooke and Cyril Scott, the first three of whom made special Pianola compositions or arrangements for the Aeolian Company. Coburn is known to have given public concerts with the Pianola, at Aeolian Hall in London, where in 1916 he performed works by Stravinsky and Joseph Holbrooke, the former from rolls cut by Esther Willis.

However, Coburn himself was an ardent roll perforator, and he assembled a large collection of his own rolls, including music by contemporary composers. Unfortunately he
lived near the Thames at Barnes, and a particularly high tide saw his basement, roll collection and perforating machine inundated and destroyed.


Almost anyone can play a pianola, but to play one well means practice. It requires two hours a day for a year really to master the instrument, but this of course compares very favourably with the more laborious method of playing ‘by hand.’ Just fancy drudging one’s life away and making night hideous and infant days a little purgatory, just to be able to give a very indifferent and inadequate rendering of some of the lesser and more banal pieces of Chopin, until these works of that really quite excellent composer, who undoubtedly knew something of the instrument for which he wrote, have become almost unbearable to the really musical.

There are some who are born with an appreciation of music but whose tender years have not been made unbearable by musical drudgery. Hours of ‘five-finger exercises’ with the thoughts on the playground, and lessons from an uncongenial teacher, never did a child any good and never will. All art-expression should come as a pleasure, a welling-up of an inner joy. Without this, art is dead, a stale and tasteless thing, and, as I have said, some have this innate musical instinct slumbering and dormant in their natures, unable to find a way of expressing itself, and to such the pianola comes as a positive exultation! For the first stages of pianola playing are so easy. The melody flows on evenly and smoothly, almost uncontrolled. There is something inevitable about it like the music of a brook. Then gradually with knowledge and familiarity comes almost unconsciously the critical faculty, and the personal element enters in, and this personal element is the thing that matters.

Questions of technique are resorted to by nonentities to cover up the fact that they have nothing to say. A great artist, whether in music or paint or any other medium, was never at a loss for a method of expressing himself; if a technique did not exist to suit his particular purpose, he invented one instantaneously.

Now your great musician will not sneer at the pianola, for he will realise its value as a means of education, and its marvellous perfection in rendering almost impossible piano pieces, and quite impossible transcriptions of orchestral works. Furthermore, if he is a ‘modern’ composer, he will know that it will be a means of hearing his own works performed. You will always find, however, that the most deadly enemy of the pianola is the mediocre pianist. He will inquire ‘Where is the handle?’ and ‘Is it a self-starter?’ and speak of it with a curling lip as ‘mechanical,’ as if a piano itself were not mechanical as well!

Here it might be as well just to mention a difference between the
gramophone and the pianola, as they are often classed together by the unthinking. A gramophone disc is a fixed and invariable record of an individual performance. It is crystallised or embalmed and remains the same always until it wears out, or is smashed. And I do not say this as anything against the gramophone. It is a marvellous method of recording performances of exceptional excellence, and brings music into the most inaccessible corners of the world, where the modern orchestra or even a good string quartet have never penetrated. But it is not like the pianola, a means of personal expression.

The pianola roll is like a sheet of printed music, in that it has the notes, and you make of them what you will according to your knowledge and temperament. With a very little practice the ‘pianolist’ is able to read the perforations in his paper, as the pianist does his notes, and can give a tolerable ‘sight reading’ of a roll he has never previously played. The rolls are also supposed to have tempo and other indications as well, but these are not always to be trusted, as the careful student will soon discover, and it is advisable to go through the rolls with the sheet music, making the markings correspond. The real enthusiast may even go to the trouble of cutting his own rolls, if his tastes are uncommon, or unpopular; and it is even possible to compose directly for the pianola in this manner, things which cannot be played in exactly the same way by any other means. The method of cutting rolls by the amateur is quite simple. There is a machine somewhat resembling a typewriter with one key or punch. This travels across the paper until the desired note is reached, as indicated by a keyboard, and it is then pressed down a number of times until the length of note desired is obtained, for at each punching the machine automatically moves forward the length of the hole. For a chord it is necessary to move back again after each note. This is much more difficult to explain than to put into actual practice.

I have punched many rolls in this way but I cannot recommend anyone to do likewise. It is a laborious business at best, and now there is such an astonishing selection of music to be obtained – to suit all tastes, even the most exotic – that there is not the necessity for all this trouble.

Commercially, music rolls are cut on huge machines rather resembling printing presses, about thirty at a time, from ‘stencils’ which are arranged from the sheet music.

There is also a ‘hybrid’ roll which is a reproduction of the playing of some particular person, celebrated or otherwise, in which the tempo of this particular individual is cut in the roll. That is, you put it on the instrument, set the tempo lever at 50 or 70 as directed, and you are supposed to get the rendering correctly. But you don’t. This rather absurd attempt to compete with the gramophone is not a success. If you have any musical mind of your own, you do not want to be thus forever fettered to the one rendering of a particular piece. With the normal roll it may be varied with the mood, and is
never, of course, twice alike. If you have no musical initiative – well, buy a
gramophone and be done with it. All that you need to do is to change the
needle, and you can sit in a soft chair and enjoy yourself!

I was, however, born under Scorpio, and therefore dislike having things
done for me. I want to have a finger in the pie, as the saying goes, and the
pianola is therefore for me a constant source of joy.

It may, at first hearing, appear strange that one is easily able to recognise
the personality of a player on the pianola even if he is in another room, but of
course a moment’s thought convinces us that this should be so. If the
personality is potent enough it ‘gets through’ in some extraordinary way
whether the fingers are used or the feet, for it is the guiding impulse that
counts.

Here we come to a point which requires clearing up. I have repeatedly
heard people say that they think a pianola spoils the ‘touch’ of a piano on
which it has been used. I can say on the highest authority of pianola experts
that this is the most utter nonsense. A vigorous pianist can do more real
damage to a piano in a month than a pianola can do to the same instrument
in a year. Look at the opportunities he has. He can raise his arms a yard in
the air and bring down his fingers with the full force of his body behind them.
The pianola can only drop its fingers half an inch!

Given an individual note, the pianola can never compete in volume of
sound with a note struck with a human finger, but when it comes to chords, it
is a different matter. What I mean is this: the pianola is a different medium
and must be treated as such. When we speak of perfection of rendering the
pianola leaves all but the most accomplished of pianists absolutely
outdistanced. This does not take the question of personality into account. If
you want personality in your music (and some do not, it is too difficult to
understand) you must supply it, and it may be done as easily through the
pianola as in any other way.

This is the age of ‘mechanical art’, but great artists are not less numerous
than in the past, only they are more difficult to find in life’s complexities, for
they may to-day be designers of aeroplanes (which are very beautiful things)
or they may even express themselves through photography or the pianola.

Please do not misunderstand me. I do not mean that every man who owns a
pocket kodak is a Holbein, any more than I think every man with a pianola is a
Paderewski, although his technique may compare very favourably. What I do
mean is this: in this age of cogwheels and levers we have just as many
mediocrities as there were in the past, but they make a better showing. The
technical average is higher, things have been ‘speeded up’, and it is of no use
for the arts to sulk and say ‘this is not the way they did things in Michael
Angelo’s time,’ or in Beethoven’s, for the matter of that. No, the arts must
accept the new conditions and make the most of them, for in this way lies
progress. Modern musicians are beginning to realise this, and some of them (composers of the first rank) are writing works expressly for the pianola, and many are arranging their own works for it. This is not at all an easy matter, for the technique and little peculiarities of the instrument have to be known and appreciated or disaster will result. It is not the slightest use, for instance, taking the usual four-handed piano arrangement of an orchestral work and cutting it for the pianola without careful editing, as was done in the early days of roll making. Pianissimo passages for strings often obliterate the theme and must be judiciously dealt with, and melodies need accenting and sometimes doubling in octaves. These and many other little points must be carefully considered if a perfectly balanced roll is to be obtained; and then there must be appreciation and understanding on the part of the player.

Pianola recitals are not yet as frequent an occurrence as they will one day be, and perhaps this is as well for a long-suffering musical public, for good 'pianolists' are even more rare than good pianists, who are very rare indeed.

The pianola in concerted music is another point I might enlarge upon. I have known eminent musicians to be astonished at the piano part of a difficult violin and piano sonata as rendered by the pianola, and to say that they had never known of the existence of certain harmonies, as pianists invariably omitted some of the notes owing to the complexity of the passages. 'Pianolists' with the gift of accompanying can follow a vocalist with the greatest ease, and orchestral song backgrounds that would baffle any pianist may be rendered with the most dramatic effect. The piano part of trios, quartets and quintets may be given with an unequalled note-perfect accuracy, which makes the 'pianolist' a most critical listener at a concert of chamber music.

Please understand that I have no connection with any firm of piano-player makers. Nor have I any interest in them beyond the quality of their products. Neither have they any interest in me except that I have been in the past rather a good customer. But I have a pianola made by the Aeolian Company and I think it a very good instrument; not all that could be desired, perhaps, for improvements are always possible, but the best I know of at the present time. Credit to whom credit is due. No, and I am not even a professional musician, for I am a photographer, a painter and an astrologer, and I also keep bees.

I play the pianola because it gives me great joy, and I play it whenever I get the chance. When I started I played four hours a day, and was not tired, but now I am older and wiser; but still the zest of a good sonata holds me, and in the twilight I delight to lose myself in the mysterious rhythms of Stravinsky, Schoenberg and Scriabine. The pianola offers the nearest method of approach to pure musical enjoyment. The notes are there, it is only the interpretation that need be thought of.

Music is like incense, it curls up and is lost in the immensity where few can follow it.
Robert Casadesus (1899 – 1972) and the Duo-Art

Denis Hall

1999 being the 100th anniversary of the birth of the distinguished French pianist Robert Casadesus, it is perhaps an appropriate time to note his involvement in recording rolls for the Duo-Art, although one will not find his name listed in any Duo-Art catalogue.

In 1919 Reginald Reynolds visited Aeolian in America to learn the techniques of making Duo-Art roll recordings, with a view to Aeolian in London launching its own independent programme of releases. The earliest of these seem to have been on the market by the end of 1920, and include rolls by Cyril Scott, Cécile Chaminade, Arthur de Greef and the young Claudio Arrau. Even before the first of these rolls was issued, Aeolian was making plans for future releases including recordings by Maurice Ravel. On 15th May 1920, Ravel signed an exclusive contract to record at least 10 of his works for the Duo-Art, for which he would receive £50 for each work. The recording date was set for 30th June 1922 in London. In fact only five rolls were issued:

082 Oiseaux tristes (Miroirs No. 2)
084 Pavane pour une infante défunte
086 Toccata (Le tombeau de Couperin)
0219 Le gibet (Gaspard de la nuit)
72750 La vallée des cloches (Miroirs No. 5)

One other title, the Alborada del Grazioso, was announced as being in preparation in the launch brochure for the British Audiographic Duo-Art roll series, but was never issued.

In spite of the brilliance of his piano writing, Ravel was not a virtuoso
player, and apparently felt inadequate to cope with some of the titles which had been planned. On 24 March 1922, in a letter to M. D. Calvocoressi, he wrote:

‘You can reassure Mr Mead: I’m presently working on 5 piano pieces (still counting the Sonatine as only 2), am busy finding a better pianist than myself for the 5 others, and will have everything ready for the month of June. I haven’t informed him of this yet, because I don’t know exactly when I will be able to go. I’m not asking Ricardo [Vines] . . .’

Alfred Mead was the representative of Aeolian with whom Ravel was dealing. A Welte-Mignon roll of the first two movements of the Sonatine had been made in 1913, but Ravel had not essayed the brilliant last movement!

On 8 June 1922, Ravel wrote to Debussy’s widow:

‘I hope that you will be in Paris toward the 25th of this month, and that I will have the pleasure of meeting you there. I’ll be passing through on the way to London, where the Aeolian company is supposed to record the precious wrong notes which I will assuredly add to my works.’

By that time Ravel had decided to enlist the help of Robert Casadesus with the more difficult pieces, and needed to confirm the arrangements for the trip to London. He wrote to Roland-Manuel on 9th June 1922:

‘Damn it! I don’t have the address of Casadesus. Would you tell him that I said we would be arriving in London on the 29th? – Recording session on the 30th. And tell him to inform me immediately if these dates don’t suit him.’

This visit to London was the beginning of a close friendship between Casadesus and Ravel, and over the next few years, Casadesus studied all Ravel’s works with him and became one of Ravel’s favourite interpreters.

As to which of the rolls were played by Ravel and which by Casadesus, there is no contemporary evidence. What we do have, however, is a testimony of Madame Gaby Casadesus, Robert’s widow, who heard the rolls in 1981 and claims to have recognised her husband’s interpretations of the Toccata and Le Gibet. She apparently was undecided about La vallée des cloches, but felt that the Pavane pour une infante défunte and Oiseaux tristes were definitely the playing of Ravel himself. Ravel played these last three pieces in public, but there is no trace of his ever having played the Toccata or Le gibet in recital.

There is no help to be found in the wording printed at the beginning of the rolls themselves. The earliest copies of British Duo-Art rolls carry the statement ‘Recorded by . . .’. By the time the rolls under discussion started to be published (an early copy of the Pavane can be dated to November 1922), the regular wording had changed to ‘This roll is a correct reproduction of my performance . . .’. The only roll published in America, La vallée des cloches, did not appear until 1928 and may or may not have been recorded in the 1922 session in London; we do not know. The wording at the beginning of that roll
reads 'This Music Roll is my interpretation. It was recorded by me for the Duo-Art and I hereby authorise its use with that instrument . . .' This was the standard wording. The annotated 'Audiographic' version of the *Toccata*, known to have been played by Casadesus, still bears the wording 'This roll is a correct reproduction of my performance – Maurice Ravel.'

These two, or possibly three, Duo-Art rolls were Casadesus' only involvement with Aeolian, although he made a substantial group of roll recordings for the French company of Pleyel. Many of these would have been 'hand-played' rolls, i.e., without special expression perforations, although some may have been prepared for Pleyel's reproducing piano, the Auto-Pleyela.

How authentic, then, are the rolls played by Casadesus? The visit to Aeolian in London formed the start of a long and close friendship, but the session was before he started his period of study with Ravel. Gaby Casadesus recognised her husband's interpretations in some of the rolls and Ravel's in others. Probably the fairest verdict we can cast on the *Toccata* and *Le gibet* is that we have Casadesus' interpretations which had Ravel's approval.
Review:

Stravinsky: *Les Noces* (arr. pianola by Stravinsky and Lamanjat) and *other music for pianola* Rex Lawson (pianola), Aeolus 1001, available from The Pianola Institute, price £10, inclusive of postage and packing.

**Nigel Simeone**

Stravinsky laboured for almost a decade over *Les Noces* until he eventually arrived at the definitive scoring for voices, percussion and four pianos, and it was this version which was first performed by Diaghilev’s Ballets Russes at the Théâtre de la Gaîté-Lyrique in Paris on 13 June 1923, with choreography by Bronislava Nijinsky and sets by Natalia Goncharova. Encouraged by the firm of Pleyel (and working in a room at their premises in the rue Rochechouart), his last version of *Les Noces* was prepared at about the same time as the première, arranged for pianola and issued on five Pleyela rolls as part of the remarkable series which Stravinsky worked on in Paris during the 1920s. It is particularly appropriate that Stravinsky should have arranged *Les Noces* in this way as an earlier version of the work included a part for roll-operated cimbalom. Later, in a 1928 interview, Stravinsky admitted that he considered using four pianolas for the definitive version, in place of pianists, so that ‘no emotionally wilful musician’ could interfere with his intentions.

The arrangement heard for the first time on this CD was made with the assistance of Jacques Lamanjat who was Pleyel’s head of music rolls in the 1920s. Well-known by piano roll specialists as an important figure at Pleyel, he was also an impressive musician in his own right. According to René Dumesnil’s *La musique en France entre les deux guerres, 1919-1939* (Paris, 1946), his music was notable for its ‘extremely delicate refinement’. Dumesnil mentions several compositions including a *Fantaisie romantique* performed at the Pasdeloup concerts on 9 October 1932, and a *Divertissement* for orchestra and four harps which he describes as ‘luminous’. Other works include songs to texts by Léon-Paul Fargue, Francis Jammes and Francis Carco. In short, an intriguing and talented figure who was very much more than just Stravinsky’s Rollmaker-in-Chief.

Rex Lawson’s performance of *Les Noces* on the new Aeolus CD is a world première recording of this version. As the producer of the disc, I must declare an interest, but I well remember my excitement when I heard these rolls (kindly loaned by the Royal College of Music) for the first time: the Stravinsky-Lamanjat transcription is thoroughly convincing and extremely interesting for anyone familiar with the work in its usual form. For instance, at certain points in the ballet Stravinsky writes only for voices, sometimes
notated without pitch, and to cover these passages on the Pleyela version Stravinsky has created new music, only heard here; at other times the sheer rhythmic precision of the rolls produces an exhilarating energy. The end of the work comes off remarkably well, though there is at least one chord which was transcribed wrongly on the original roll and evidently not noticed by Stravinsky. Altogether this recording was a fascinating project; and I hope others will agree that Rex Lawson’s account of the work in this version is surely as impressive as any is likely to be. I hope he may now turn his attention to some of the other rolls of ‘new’ music from the period – Honegger, Milhaud, even Fauré (albeit for an exceptionally rare reproducing system) – as well as more Stravinsky. (I have heard him give a performance of the roll of Stravinsky’s ‘Russian Dance’ from Pétrouchka which rightly brought the house down at a concert.)

The remainder of the disc is sheer fun: Rex Lawson’s own arrangements of Rachmaninov’s Rhapsody on a Theme of Paganini and Lutoslawski’s Variations on the same theme, and two ‘lollipops’: Widor’s Toccata and Handel’s Arrival of the Queen of Sheba. The disc ends with a suite from Pineapple Poll, Sir Charles Mackerras’s brilliant arrangements of Sullivan which transfer very effectively to the pianola. I hope that this CD will not only give delight to committed fans of the reproducing piano, but also to any listeners with lingering doubts.
Obituary:
Norman Evans – a Tribute

After a very long illness, Norman Evans passed away on 23 January 2000.

His poor health had prevented him from being as active as he would have liked in recent years, but he was without doubt one of the most important figures of his generation in the field of mechanical musical instruments. It is difficult now to appreciate how the reproducing piano, thirty or forty years ago, was totally forgotten, but it is thanks to a small handful of people, including Norman, that it is once again recognised as an important part of musical history.

Norman’s contribution to the revival in interest is unique. It was his refusal to accept anything less than perfection that drove him to carry out the magnificent restorations of the instruments he so loved, and allowed those who were able to enjoy the results to appreciate just how musically reproducing pianos could be persuaded to play.

His first piano, a Marshall and Wendell Ampico, came to him when he was still in his twenties. The fact that there was a pneumatic mechanism in the piano which was patently not working intrigued his enquiring mind, and a lifetime’s interest was fired. From that time on he was never without mechanical musical instruments of one sort or another. He was a collector, but one of considerable discrimination. The result is a houseful of beautiful treasures, many of them the finest examples of their kind one will find anywhere.

His exceptional skills were self-taught. From a very young age, he had a lathe which he taught himself to use. He was fascinated by metal – and wood-working, and by the tools used to craft these materials. He enjoyed poring over technical books and catalogues, but only in so far as they gave him instruction to enable him to apply the knowledge practically; he had little time for book learning which, in his opinion, did not lead anywhere.

His love of finely crafted mechanisms was not limited to musical instruments. It embraced cars, clocks, watches – in fact anything which was made with skill and care, two qualities which Norman demonstrated in all that he did. However, the field where his and my interests met was largely musical, and I came to appreciate that he was the most fastidious restorer of pianos and mechanical instruments in particular that I have ever experienced. To see the sheer quality of the repair of some small component in a piano which would never be seen once it was installed was a sobering education. His patience was legendary.

If a repair did not turn out quite as he would have liked, then it would be done again – and if necessary, yet again – until it reached his standard. Right
Norman Evans with his Welte Orchestrian.
up to the time of his death, he was still puzzling over a quirk in the regulation of a grand piano action which had been troubling him for probably ten years! I suspect that if he had lived long enough, he would have solved it.

Norman was a very private man, and so many of his triumphs were only shared by a handful of close friends. The complete restoration and rebuilding of a great Welte roll-playing orchestrion was one such project, and a most beautiful Steinway Welte-Mignon grand piano was another, brought back to life and playing as it would have done over seventy years ago.

There were, however, two projects, somewhat inter-related, which the public was able to enjoy. For a number of years, Norman had a dream of installing an Ampico reproducing piano action into a brand new concert grand to produce the perfect medium for listening to the Ampico piano roll recordings. This dream became a reality partly as a result of an approach by the Decca Record Company, who wanted to make some recordings of a Grotrian-Steinweg Ampico grand which he had quite recently restored. Some earlier recordings had been made for the BBC on a similar piano, but Norman realised that the results were compromised by the fact that the piano was not a full concert instrument. So the project was put on hold, and after much deliberation, Norman chose a Russian ‘Estonia’ concert grand for his instrument. The tasks of adapting the piano case to accept the player mechanism, and the rebuilding of all the original Ampico parts took several years, but the piano was ready for its debut in the Purcell Room, London, in 1974. Even after twenty-five years, I still remember well the thrill of hearing this magnificent instrument for the first time – reproducing piano rolls as none of us had ever heard them! The piano appeared for a second time the next year, to much critical acclaim, and made a lot of people think again about the value of piano roll recordings. Norman reluctantly appeared before the wildly enthusiastic audience. Now that the Estonia was proved, the Decca project once again came to life, and plans were made for the instrument to be taken to London’s Kingsway Hall, the finest recording venue in the country, for a week’s recording in the Spring of 1978. During that exhausting week, all the published Ampico rolls of Rachmaninov, Rosenthal and Lhevinne were committed to tape. Regrettably, due to legal wranglings and an inexplicable dilatoriness on the part of Decca, the recordings in the form of seven LPs were not issued until 1985, by which time the CD had started to make inroads into the recorded music scene. The LPs thus had a short catalogue life, and reached far fewer people than their splendid qualities deserved. Decca eventually reissued the Rachmaninov titles on CD, but their publicity for the reissue was so poor that again few people knew about them, all were able to enjoy them.

Having achieved the two goals – to see his Estonia Ampico piano on the concert platform and to have it recorded – Norman did not seek further
public acclaim, and in any case, quite soon after the issue of the LPs, his health first showed signs of deteriorating, which militated against any further major projects of this kind, had he had the inclination. His interests and enthusiasms did not wane, and as his health permitted, he continued to collect and restore both clocks and musical instruments. He was essentially a practical person, and his lack of pleasure from reading in particular made his ill health more frustrating and difficult to bear than it would for someone with a more academic background. His hold on life, though, was unbelievably strong, and time and again he amazed both the medical profession and his family by overcoming his illnesses. As his strength allowed, he remained active at home, and it was only a few weeks ago that he was working on rebuilding a Steinway Welte piano and lovingly restoring a fine clock.

Norman was a devoted family man, with a loving wife, Joyce, and two daughters, Sally and Madeleine. Throughout his illnesses, Joyce looked after him and encouraged him to fight on, and he pursued his interests until only a few days before his passing; she deserves to be included in this appreciation, and all our thanks go to her for the vital part she played in the life of this modest, kind man who was also one of the most important figures in the world of self-playing musical instruments.

DENIS HALL
Obituary:

Rein Groos - Pianolist and Friend:
6 June 1921 - 29 December 1999.

One of the most rewarding aspects of the player-piano is the way it brings together as friends those in whose care it rests. Rijnier Jan Groos, my friend, our friend, was a gentle, refined man who had an instinctive talent for communicating his deep love and knowledge of music to all comers. Tucked away in his ancient Dutch house, in the Begijnhof, the quiet Haarlem square shared by the Waalse Kerk and the ladies in the red-light windows, he worked incessantly on his collection of pianolas, reproducing pianos and rolls.

Rein was born in 1921, to a particularly musical family, and grew up, like his father, as a string player, inheriting a fine collection of old violins which graced his living room. Indeed his family had lived in Haarlem since the early nineteenth-century, and even in the same house for over a hundred years. An ancestor had been involved in founding the local choral union in the 1820s, and Rein kept up an active membership, with the Dutch Pianola Society (the Nederlandse Pianola Vereniging) holding its meetings in the union's music hall from time to time. One can remember him standing beside the backwards clock in the bar there; a fitting memory of someone who retained
the sparkle of youth in his old age.

Rein Groos's life took him through the Second World War, during which his family helped to hide their Jewish friends from the Gestapo, and he could remember how his knees shook at the sound of jackboots echoing on the cobbled streets outside. In peacetime he was a teacher, for some thirty-five years, and in the fifties he played the violin and viola with various small orchestras. The pianola became his passion quite late in life, and allowed him to continue with his instinctive love of sharing what was important to him. In his retirement it was a wonder to see the way he could captivate a hall full of young listeners, all spellbound by the magic pianola that only he could bring to life.

The NPV was founded in 1976, and Rein became a member very early in its history. He and Ria hosted one of the society's earliest social meetings, in the summer of 1981, and by 1982 he was giving pianola concerts, at a jazz festival in Haarlem, and as part of a magic lantern show at the Concertgebouw in that city. Gaining his experience, like many of us, by writing for the Society bulletin, he became Chairman for four years, from 1984 to 1988, and continued as mainstay of the Bulletin team throughout the 1990s.

His contact with the Pianola Institute was long and enthusiastic. He had begun coming to England in the early eighties, partly to visit the auction rooms at Christie's, and also to make friends. I first met him at the PPG annual party held in March 1983 at the old Decca studios, and he and Ria made the journey again for the Founding Concert of the Pianola Institute, at the Queen Elizabeth Hall in December 1985. Rein joined the Friends of the Pianola Institute in April 1986, becoming a founder member of the Committee later that year.

Over twenty years or so, Rein's concert career as pianolist blossomed, and he played on numerous occasions all over Holland, both as soloist, and with the North Holland Philharmonic Orchestra, occasionally going on tour with them overseas. He may well have been the only person who ever gave a pianola recital in Estonia! More recently he attended the AMICA Convention in London in 1995, and performed most musically in the Pumper Contest. In 1998 he recorded a CD on his Steinway Pianola Piano, entitled 'My Favourites', published by Erasmus in Rotterdam, catalogue number DDD 228.

Over the years we saw Rein and Ria many times, often unexpectedly, in London, in the provinces, at the Purcell Room, and in our homes. They shared our love of pianolas and of music, and we are very glad that Ria will remain as a Member of the Friends. Rein is survived by his two sons, Maarten and Rijnier.

In the NPV Bulletin for March 1983, after a particularly detailed article about his travels in and around London, Rein Groos penned the following words:
'Why actually all this prose about my adventures in England? Because it is of interest to many of us to know that, on the other side of the North Sea, another group of people shares the same hobby as we do. Because they can boast a wider knowledge and experience, and will certainly, if we ask them, be willing to help us. And not least, because I personally have made especially friendly contacts amongst them.'

We salute the passing of a talented pianist and a good friend.

REX LAWSON
Contributors

**JULIAN DYER** is one of the younger generation of enthusiasts for the player piano in all its forms. His scientific background enables him to bring to the subject a logical approach which, coupled to a musical appreciation, gives his writings a particularly well-balanced character. In recent years he has become an enthusiastic and skilled player of the pianola. He is the editor of the Player Piano Group Bulletin which, under his guidance, makes a valuable contribution to mechanical music publications.

**DENIS HALL** has for many years been an enthusiast of historic performance recordings both on piano roll and disc and in making them accessible to present-day music lovers. He has involved himself in the restoration and preparation of reproducing pianos for concerts and recordings and in the transfer of 78 rpm recordings to master tape for LP and CD reissue.

**REX LAWSON** is a concert pianolist who has been involved in research and music-making with these instruments since 1971. He has travelled with his pianola to the USA, Canada and many European countries transporting it by plane, ship, car and even, in 1986, by gondola in Venice. He has made a special study of music written for the pianola, by the eighty or so composers who have been interested in its possibilities during the course of this century. In 1998 he accompanied the Siobhan Davies Dance Company in their many performances of 88, a new dance work to the music of Conlon Nancarrow.

**NIGEL SIMEONE** is a lecturer in music at the Department of Music, University of Wales, Bangor. His publications include two books on Leos Janáček and two on Oliver Messiaen. Yale University Press publish his *Paris: a Musical Gazetteer* in April 2000.