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Designing a Reconstruction, or Reconstructing the Design. The Bassoons of Johann Poerschman[1]

Two bassoons survive by the Leipzig instrument maker Johann Poerschman (1680–1757) though neither is in its original playing condition. This paper describes a project that had the intention of producing a bassoon as if fresh from Poerschman's workshop, to find reeds, crook, fingerings and technique required to play it, and to assess its musical qualities.[2]

There are several reasons for choosing Poerschman's bassoons for a reconstruction project. Firstly instruments from Leipzig during Johann Sebastian Bach's time there are of interest because of the importance of the city and its musical traditions both at the time and to us now; the Leipzig repertoire of that period remains fundamental to the work of today's players. Furthermore, it is generally thought that the prevailing pitch for instrumental music in Leipzig at that time was around A = 415 Hz, so there is a good chance that a bassoon modelled on Poerschman's would be useable today without much modification.

Bassoons have survived from two Leipzig instrument makers of that period, namely Johann Poerschman and Johann Heinrich Eichentopf. The instruments of the latter are already being reproduced today, so recreating Poerschman's instruments will offer new information for players. His bassoon design is significantly different from that of Eichentopf, and this fact is in itself interesting as these two makers were exact contemporaries. Eichentopf had arrived in Leipzig by 1707, was described as an "Instrumentalischer Pfeiffenmacher" in 1710, retired there in 1749 and died in 1769.[3] Poerschman was established by 1708 when he was described as an "Instrumenten & Pfeiffenmacher in Leipzig" in his marriage records, and he worked there until his death in 1757. They and their wives were godparents to each other's children and to those of other colleagues they held in common, indicating that they were on friendly terms. They are both linked to

1 The stamp he used on his instruments spells his name "I. POERSCHMAN" so that spelling will be used throughout this paper.

2 This paper has its origins in research carried out for my doctoral dissertation: *The Baroque Bassoon. Form, Construction, Acoustics, and Playing Qualities*, London Metropolitan University 2011. With thanks to: The Winston Churchill Memorial Trust; Eszter Fontana, Museum für Musikinstrumente der Universität Leipzig; Bohuslav Cisek, Prague Nationalmuseum – Tschechisches Museum für Musik; James Kopp, Siona Crosdale, Jane Gower, Nathaniel Harrison, Rebecca Stockwell, Peter Whelan.

3 William Waterhouse: *The New Langwill Index. A Dictionary of Musical Wind-Instrument Makers and Inventors*, London 1993, pp. 103 f.

Johann Sebastian Bach through friendships with Caspar Gleditsch, Bach's principal oboist, and with Bach's close friend, the lute maker Johann Christian Hoffmann; Poerschman and his family shared a house with Hoffmann.[4]

Poerschman's professional activities are interesting too. He was evidently a maker of good standing as his apprentices included not just his own two sons but the two most important woodwind makers of the next generation, Carl August Grenser and Jakob Friedrich Grundmann.[5] He was also a player of some ability; the first recorded oboist in Leipzig[6] and, later, first bassoon in the "Grosses Concert", in whose public performances he would have played the latest and most fashionable music, often from sight.[7]

Poerschman would thus have had both a clear idea of playing characteristics desirable in a bassoon and the skills to make one that worked the way he wanted it to. There is also the possibility that he might have experimented further with instrument designs than a non-performing maker might have done. There is no evidence of Eichentopf having had apprentices or successors, nor of his having been a performer himself. This does not mean that he definitely did not play his instruments professionally, but records to prove it have not yet been found.

There are two surviving bassoons stamped "I. POERSCHMAN". One is held today by the Museum für Musikinstrumente der Universität Leipzig (No. 1384), the other by the Tschechisches Museum für Musik in Prague (No. 1375E). It is curious, though no more than coincidence, that both Poerschman and Eichentopf are each survived by two concert bassoons, one in boxwood and one in maple. In both cases the boxwood instruments are somewhat more elaborate in construction and fittings, while the maple examples appear to be more work-a-day models.

Neither of the Poerschman bassoons is in its original playing condition. The Leipzig instrument had a complete refit of keywork circa 1800 (judging by the style and number of the new keys). It now has keys for E♭ and F♯ and two keys on the wing added to the normal four Baroque keys. In terms of bassoon development, 1800 is considerably later than the bassoon's initial manufacture; the instruments of the last two decades of the eighteenth century were significantly different in design, tonal character, range and pitch from those of the early part of the century. It is reasonable to assume that in the course of this refit the instrument was also re-tuned to a pitch that was useful at the time the work was done and higher than that at which it had originally played. The tone holes look overly large, and a rather short crook is associated with the instrument that may date from

4 Ibid., pp. 305 f.

5 Ibid.

6 Bruce Haynes: *The Eloquent Oboe. A History of the Hautboy, 1640–1760*, Oxford 2001, p. 362.

7 Ibid., p. 431.

FIGURE 1 Bassoons by J. Poerschman. Left: Leipzig No. 1384 front and back; right: Prague No. 1375E

this time. However, the joints do not seem to have been shortened substantially, perhaps just the long and wing joints were shortened by around 5 mm each. Herbert Heyde reported that the wing bore had been lined with rosewood,[8] but this turned out to be the case only with the crook socket. However the fear remained that the bores may have been altered during this refit and retuning.

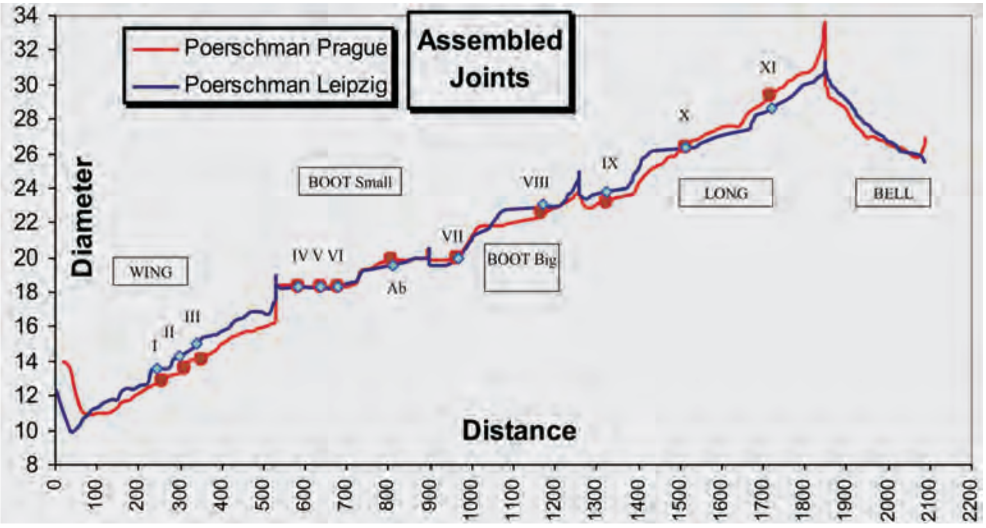
It might be thought easier to adapt an old instrument to new requirements than to make or buy a new one. However, some considerable effort would be needed to get a satisfactory, well-tuned and musically successful result, and there would be a high likelihood of failure. This might imply that the instrument was considered to have been of significant quality before the modifications, enough to justify the work required to bring it up to date. There is a possible converse explanation: that the old instrument had become worthless so that it would not matter if the experiment then failed. But the quality of workmanship and elegant design of the new keys argues against this. The efforts expended indicate an intention to produce an instrument of quality, while the use of boxwood – an expensive material requiring extra effort to work – indicates that Poerschman's initial intention had already been to make a high-quality instrument.

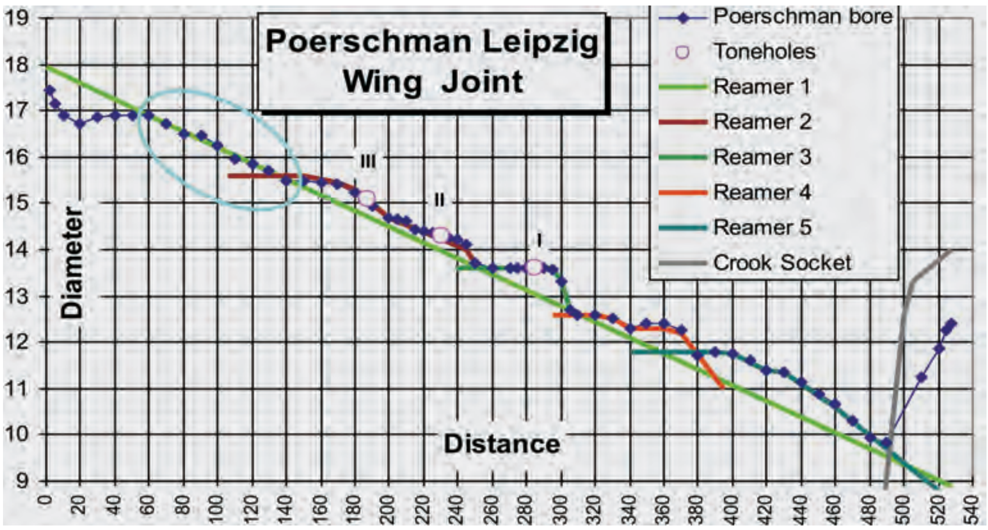
The Prague bassoon has not been altered so much. The original keys are all still present and none has been added. However, the original wing is missing and there is some damage in the bore, particularly in the boot joint. This bassoon might also have been tuned up in pitch a little, but the joints have not been shortened.

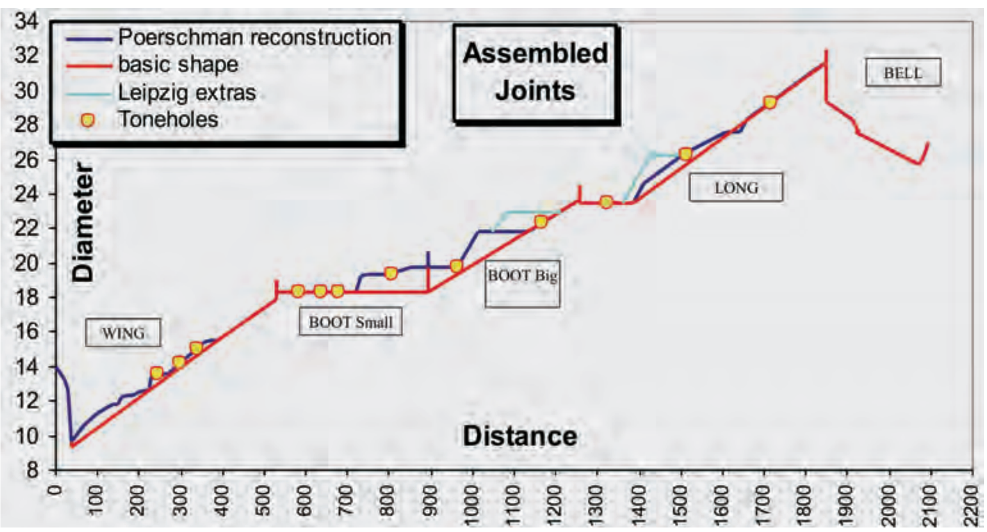
Apart from the wings, the joints of the two bassoons match in length to within a few millimetres; the greatest difference is between the bells where the Prague instrument is just 4 mm longer than that in Leipzig. The placing of the tone holes is very close to the same on each bassoon, though the sizes cannot be compared as those of the Leipzig instrument were enlarged later. Comparing detailed measurements of the bores shows that they are both of much the same design; there are just two areas where the Leipzig bassoon has been reamed further than the Prague. This in turn implies that the bore of the Leipzig wing – the only remaining original wing – has not been altered.

The following bore graphs offer a means of showing the details of the shaping of the internal bore. The shapes, angles of taper and sizes of bore all affect the way that the air column resonates in response to the reed's excitations, and therefore directly affect the response and tuning of the instrument. The shapes are rather subtle, and small changes can have an effect on playing characteristics. For this reason, we study the shape by exaggerating the diameter scale against the length in a graph.

8 Phillip T. Young: *Loan Exhibition of Historic Double Reed Instruments*, Victoria BC 1988, p. 57 and Herbert Heyde: "Catalogue notes of double reed instruments", (unpublished, Musikinstrumentenmuseum der Karl Marx Universität Leipzig).







Graph 1 Bore diameters versus distance from top of wing for the Poerschman bassoons (above)

Graph 2 Plot of wing joint bore with reamer shapes added (in the middle)

Graph 3 Complete reconstructed bore (below)

Here the bore plots of the two Poerschmans are overlaid for comparison, with dots to show tone hole positions. The instruments have been "straightened out" to give one continuous bore, and small vertical marks show the joints between sections.

In the long joints the general shape is similar, though the boxwood Leipzig instrument appears to have shrunk more than the maple instrument in Prague. They differ somewhat lower down the joint – the Leipzig instrument shows evidence of a bit of extra reaming to take out wood between tone holes IX and X (the D keyhole and the open thumb hole).

In the boot there is a very close correspondence in both bores, except again where an extra reamer appears to have been used to open out just upstream of hole VIII. These extra reamings might have been part of the retuning process, but were more likely made by Poerschman himself, perhaps applying newly acquired knowledge to an instrument made at an earlier date.

The wings are substantially different, and the bore comparison confirms that Poerschman probably did not make the one in Prague. It has a narrower bore, except for the wide throat that is probably worn out through wetting and cleaning. The good correspondence between the other joints (apart from the patches mentioned) shows that these two bassoons were made to substantially the same design, and imparts some confidence that the bore of the one surviving wing has not been altered from Poerschman's original design.

The tone holes are in almost exactly the same place in each instrument (these are the positions where the holes enter the bore). The greatest difference is in the positions of the A♭ – the Leipzig hole is drilled at a steeper angle downwards than that of Prague.

Compared to Eichentopf's bassoons, the "down bores" (wing plus small boot bore) are very similar, with only minor differences of detail, while the up bores are significantly different. In these, the Eichentopfs are much larger in diameter, showing a greater similarity to the J. C. Denner No. 2970 in Berlin. The Eichentopfs also have bell chambers (both considerably larger than that of the Denner) while Poerschman's bells have a small diameter and no chamber.

The Prague exterior design was chosen for the reconstruction; it is somewhat simpler and the keys could be copied directly, allowing for a quicker construction of the prototype. The differences internally are such that the Prague bore can be converted later to the Leipzig design if desired, with the additional use of two small reamers. The Leipzig wing naturally had to be used, as it is the only original. Once the external design was decided upon, the bore had to be considered and reamers designed.

The wing bore at first looks very irregular (see graph 2), but there are two aspects that can be addressed straight away. We know that the crook socket is too narrow – it has been lined with rosewood to fit a later, narrow crook. At the other end is the tenon, which we can expect to have shrunk from its original form. As all players know, the wing tenon gets very wet with moisture running down the bore and gathering in the socket. It soaks into the wood from the bore and into the end grain, even penetrating an oiled finish. When wet, the wood expands but is constricted by the thread binding; this, conversely, tends to shrink as it gets wet. The boot socket with its brass ferrule also holds the wood firmly. So these opposing forces crush the wood's cells, and when the wood shrinks after drying, it ends up smaller than it was at the start. So this part has changed shape and it is necessary to ascertain how it originally was.

Just after the tenon there is a relatively straight-tapered section that is ringed in graph 2. If we take that portion and extrapolate the line in either direction we see that it just touches the bore in a couple of places and almost intersects the narrowest point – the throat. This gives a solution to the reconstruction of the tenon section to the left of the ring and also offers a useful way of looking at the whole bore: it can be made initially as one long straight taper, which can then be modified in various regions by smaller reamers. It is known that smaller woodwinds were made in this way, with multiple reamers for tuning and adjusting, and indeed we have a text from the Dresden oboe maker Carl Theodor Golde which describes tuning and voicing of oboes by "Nachbohren mit gewölbtem Bohrer", that is "after-reaming" of specific sections of the bore using "convex" or "arched reamers".[9] Golde died in 1873, so this was written long after Poerschman. However, commentators agree that the methods he described also apply to earlier, Baroque period oboes and comprise the sort of knowledge that would have been passed from master to apprentice since that earlier period. Golde made bassoons and other woodwind instruments too, as did the majority of woodwind makers, it therefore seems highly likely that they would apply knowledge acquired on one instrument to the others that they made, and especially to both bassoon and oboe, which work on the same principles (both have a conical bore and a double reed).[10] So bassoon makers can expect to find useful information here. Golde's instructions relate to the final stages of making an oboe; the implication is that the oboe is first prepared with a basic set of reamers and the tone holes drilled a little undersize, then tuning and voicing proceeds by working on both the tone holes and the bore together. Tuning and voicing (refining the response characteristics) are treated as two sides of the same coin. As Ecochard puts it, "good tuning and good tone are reached at the same time".[11]

9 Translated in Cary Karp: Woodwind Instrument Bore Measurement, in: *Galpin Society Journal* 31 (1978), pp. 19–21.

10 Golde may be directly descended from Poerschman in master-apprentice terms, either via Grundmann – Johann Friedrich Floth – Carl Gottlob Bormann – Golde, or C. A. Grenser – Johann Heinrich Grenser – Samuel Gottfried Wiesner – Golde; see Waterhouse: *Langwill Index*, p. 140.

11 Marc Ecochard: Tuning the Hautboy. A Perspective on Original Tuning and Modern Adaptations,

There are also instructions from Carl Almenräder in chapter XVIII of his *Die Kunst des Fagottblasens* of 1842/43, entitled "On various faults occasionally met with on a bassoon, which may often be overcome with little trouble".[12] Here he talks about correcting faults found on an existing bassoon, perhaps as a result of poor design in the first place, and of faults that have developed over time through distortions of the joints. Again this is from considerably later than Poerschman but his comments are, for the most part, general enough to apply to any bassoon.

When making reamers, particularly the forged reamers of the eighteenth century, it is possible to make straight-tapered shapes of various taper angles and also convex, curved tapered shapes – Golde's "gewölbter Bohrer" – but it is difficult to make a concave cutting edge. So it is possible to hypothesise a separate reamer for each of the convex curves on the bore graph. Thus, with reference to graph 2 above: Reamer 2 takes out a very small amount of wood between, and including, holes II and III. Reamer 3 operates from below hole I to just above it. Reamer 4 works above hole I to about halfway to the throat, while 5 enlarges the upper bore, and even opens the throat a little when fully inserted. Finally the new crook socket is formed with another reamer used from the top end.

Both Golde and Almenräder refer to corrective reaming in the wing joint. Almenräder says the wing "up to a bit beyond its tenon" can be opened out to flatten G3 in the case that the octave G2–G3 is too wide.[13] Golde says that the equivalent joint can be opened out from the bottom up to just below hole III; in his case, reaming there can be used to sharpen the low G (equivalent to C3 on bassoon; the 3-finger note). So these are two problems that might arise as the tenon gets compressed over time: a high G3 and/or a low C3.

Almenräder also says that the whole wing joint bore can be widened to fix a wide C octave caused by a sharp C4. This implies a rather simpler bore shape than we have here – one perhaps made by a single reamer.

Golde says that if the A is flat (equivalent to D on bassoon; he does not specify the octave), a small chamber can be made between holes II and III – corresponding to reamer 2 and perhaps 3 in this design.

Golde says that D5 (G3 on bassoon) can be sharpened by very slightly chambering between hole I and just below the narrowest point – this corresponds to reamers 4 and 5

transl. Jem Berry, www.grandhautbois.com/publications/2009/tuningthehautboy2.pdf (accessed 22. 6. 2017).

12 Carl Almenräder: *Die Kunst des Fagottblasens, oder, Vollständige theoretisch praktische Fagottschule*, Mainz [1842/43], pp. 120–122.

13 Using American Acoustical Society notation whereby C4 = middle C, so G2 is at the bottom of the bass staff.

(we have two regions to play with). Middle C and D (F3 and G3 on bassoon) can be sharpened by reaming in from the reed socket to open up the narrowest part of the bore. Almenräder urges caution here: he says in § 6 that if the throat becomes too wide (through rot or wear), the high notes G4, A4 and B♭4 become difficult and imprecise (*unrein*, literally: impure or unclean).

Similar considerations of bore shape components are made in the remaining joints to design the reamers there, and the instrument as a whole can be seen as a series of simple straight tapers and cylindrical portions, modified here and there by short reamers. In graph 3 the simple shape is shown in red and the modifications (sometimes called "perturbations") in blue. The Leipzig bore uses a further two reamers, shown in light blue. Again several of these perturbations correspond to Golde's or Almenräder's instructions on how bores may be modified to improve tone and or tuning.[14]

In total, fifteen reamers were made for the reconstruction. While it may seem unlikely that Poerschman would have made such a heavy investment of time and money before starting to make his bassoon, some of the reamers needed might have been general purpose tools already in his possession, especially those used to make cylindrical holes. Nevertheless, it is known that some woodwind workshops did hold large numbers of these tools. The inventory of Heinrich Grenser's workshop made at his death in 1813 included 35 bassoon reamers, plus 43 reamers for flutes, 48 for oboes, 10 for clarinets and 86 unspecified.[15] On his death in 1787, Prudent Thieriot's workshop contained "233 tant grandes que petites rutisoirs", which would have been augers and/or reamers.[16]

The crook is something that has to be entirely invented anew. This gives the modern maker some flexibility because there is no original form to be adhered to. Preliminary calculations showed that for this instrument to play at A = 415 Hz a long crook is needed. This was convenient as it allowed for the initial use of the 370 mm long crook I employ for reconstructions of Denner bassoons (here called M2). However, after testing, a new design with a somewhat more arched profile (with inside diameters from 3.8 to 9.7 mm) was preferred (here called M3).

I put a 0.7 mm pin-hole at 40 mm from the big end, which was a break with authenticity. The origins and use of the pin-hole are still uncertain. Most original Baroque period crooks do not have one, and when they do, one cannot be sure that it was not added later. The first datable evidence is Horemans' portrait of Felix Reiner in Munich

14 See Dart: *The Baroque Bassoon*, pp. 306–318.

15 Waterhouse: *Langwill Index*, p. 145.

16 Jean Jeltsch: Prudent a Paris. Vie et carrière d'un maître faiseur d'instruments à vent, in: *Nouveaux timbres, nouvelle sensibilité au* XVIII^e *siècle. Première partie*, ed. Florence Gétreau, Paris 1998 (Musique, Images, Instruments, No. 3), pp. 128–152, here pp. 141 f. and 151.

dated 1774 showing a crook key,[17] and the first written evidence is from Pierre Cugnier in 1780:

> "A hole is pierced in the crook, locating it about an inch above the ferrule of the wing joint, into which the crook fits. Others place it higher, but it is better at the location just mentioned, because it can be closed, if you wish, with a key placed on the wing joint, that covers this hole and is opened or closed with the left thumb. This hole makes it easier to play the notes C, D, E of the third octave, that sound through the holes numbered 1, 2, 3 [sic]. Without it the C is difficult, as are the other two tones; but it is necessary that the hole does not exceed the size of a small needle, otherwise too much wind would be lost, and would harm the low notes, especially when they must be played softly."[18]

Almenräder talks of a crook hole without key (which is thus permanently open):

> "On a well-bored bassoon, where the bores of all the pieces fit exactly to each other and the wing and boot small bore are particularly accurately reamed, one can close the pinhole after a time when the instrument has been much used, if it is otherwise in good condition. The slurs for which this hole really exists are not impaired, and all the notes of the instrument gain in fullness as well as in delicacy ["gewinnen dabei an Fülle, wie an Zartheit"]. On new bassoons I have not, at first, been able to dispense with this hole, but after several years I have found it no longer necessary on my instruments."[19]

The reconstructed instrument has not yet reached that exalted state – it still needs the pin-hole for C4, and more particularly C♯4, at least with the setups tried so far.

Two wing joints were prepared; one was "fully reamed" with all the reamers to make the bore shape of the original, while the other was reamed to just the basic, straight taper. The other joints were made fully reamed.

The tone holes were initially drilled slightly smaller than those of the Prague instrument (holes IX and XI are definitely enlarged there); the wing holes are considerably smaller than the Leipzig holes, as these had been opened out in the refit. With the fully-reamed wing I tuned in the usual way, resulting in tone holes around the same size as those of the Prague bassoon. The whole instrument fell fairly easily into tune at A = 415 Hz. I then copied the hole sizes and shapes onto the simple-reamed wing.

Now the wing could be compared with the fully reamed one; with the tone holes matched, the only difference was the bore. I had expected the straight-tapered one to be out of tune but was surprised to find that this was not the case. The instrument was in fact perfectly acceptable: playable in tune, with reasonable balance in tone and tuning. So the auxiliary reaming is not necessary for tuning, but that is not to say it does not provide some benefits.

17 Peter Jacob Horemans: *Bildnis des Fagottisten Felix Reiner*, Munich 1774, Bayerisches Nationalmuseum, Munich (on loan from the Bavarian State Painting Collections, inventory number 4331).

18 Pierre Cugnier: Basson, in: Jean-Benjamin de Laborde: *Essai sur la musique ancienne et moderne*, Paris 1780, Vol. 1, pp. 323–343, here p. 334; my translation.

19 Almenräder: *Kunst des Fagottblasens*, Chapter XVIII, § 7, p. 120; my translation.

Five professional players compared the two wings in a blind test (the players did not initially know which wing was which). One of them preferred the straight cone to the fully reamed wing, while the other four players found preferable qualities in the fully reamed wing. Their subjective appreciation of the differences included the following comments: The instrument is "more responsive", "feels more resonant", tonal qualities are "more flexible – you can do more with it". The tone quality, especially of the range G3 to D4, seems "better focussed", with less extraneous noise, more "rounded" and "better projecting", with something of a "more vocal, singing quality". The notes in the octave G2 to G3 felt more secure in both tuning and tonal character, responding more consistently to changes in breath pressure. By comparison, the simple wing felt a little more "raw", and its tone quality somewhat crude. These qualities are subtle and difficult to pin down, but all of the players noticed some differences immediately upon trying out the two wing joints and could all easily tell them apart.

When compared with the Denner model, several issues of tuning or response were apparent.

1) The second octave A, although it played in tune, was very weak unless the right thumb hole was closed, with which it was then strong and clear. This had not been encountered on the Denner model, nor on the later Grundmann, but does occur on Eichentopf, Prudent and other bassoon models. The early charts, right through to the more sophisticated tutors of the nineteenth century, only show the simple fingering for both octaves, giving no indication that there should be a problem here. Cugnier mentions a tuning problem, but stops short of providing a solution:

> "For example it is rare that the two As an octave apart, fingered by closing the holes 1, 2, 3, 4, 5, are exactly in tune […] when one only uses the same fingering shown in the tablature as we saw above. There are special fingerings to correct this defect, there are also several ways to finger other notes, according to the passages where they are used. […] It is necessary to choose a skilled master, who knows the fingerings, and can teach them […]."[20]

2) The bottom D2 is difficult – there is a bi-stability with the note switching between flat of D2 to around E♭2, and sometimes jumping up an octave to the next E♭. This causes a good deal of stress when playing, for example, in D major. One of the sections of extra reaming in the Leipzig bassoon is just upstream of the D vent hole and seems related to this issue, so a new reamer was made and used to reproduce that shape. It did improve the problem slightly – raising the lower of the two pitches closer to D2 – but the bi-stability remained and the note has to be approached with care. It is notable that the same reaming

20 Cugnier: *Basson*, pp. 334 f.; my translation.

pattern is seen in instruments by Rottenburgh, Scherer and the Wietfelts, perhaps indicating that this is a common problem. However, it does not occur on the Denner.

The bassoons of all of Poerschman's successors have a small hole in the bell, so I decided to try one here, drilling a hole 4 mm in diameter about halfway along the joint. The result was a pleasing improvement in the stability of the D; it is now possible to play the note both strongly and softly, with a good pitch definition and a satisfactory tone. Almenräder wrote on this:

> "[…] take, for example, the small hole on the bell joint, from which B1 sounds; it was drilled on earlier bassoons so that it might make C2 sound more powerfully, and in this it was somewhat successful […] The large keyed hole on the bell now helps not only the C2, but also C♯2 and *especially the usually bad* D2, to become more powerful tones."[21]

This is quite inauthentic for Poerschman, and I am still seeking an alternative solution. However, it perhaps shows how the bell hole was a response to a problem that started in Poerschman's generation. The reason the problem does not exist on the Denner and Eichentopf is likely to be related to their more steeply expanding boot and long joint bores.

An acoustical analysis of the design with this fingering shows that the problem is caused by the "mode stretching" commonly found on the low notes of the bassoon and oboe.[22] This refers to the "air-column resonances", namely the frequencies at which the air column might readily resonate. Theoretically these frequencies should all be close to the harmonics of the note expected for that fingering, but in the low notes of bassoon and oboe they are more widely spaced. This is evident in the way that the F2 fingering overblows to F♯ in the next octave. With the low D fingering the first resonance is a little flat of the first harmonic of D2, while the next five resonances are all better in tune with harmonics of E♭2; thus there is a competition for control of the reed, and the played note switches between these two pitches. Drilling the bell hole realigns resonances above 350 Hz, bringing some of them into tune with higher harmonics of D2, and thereby allowing that pitch to be firmly established when playing.

3) However, moving up the scale, the instrument has a good E♭2. This note has always been a mystery; no Baroque period bassoons have a dedicated key, and yet the note is often required (e. g. the opening of Bach's *St John Passion*). It has always been an issue for modern players, and most makers today offer an additional E♭ key. On this bassoon it is

21 Carl Almenräder: Bemerkungen über Blasinstrumente mit Tonlöchern; insbesondere die Doppellöcher am Fagott betreffend, in: *Cäcilia* 19 (1837), pp. 77–87, here pp. 84 f.; translation by J. Kopp, private correspondence, my emphasis.

22 John Backus: *The Acoustical Foundations of Music*, New York 1977, p. 243.

possible to be confident of hitting the note accurately and of producing a full, rich tone. When one compares it with the Denner, it seems as though a good low D has been traded for a good E♭.

Similarly, there is a good low F♯; the cross-fingering is effective, and not too much lipping-down is needed. The same fingering is also good in the second octave as an alternative to the standard fingering using the F key, which is useful in passages with A3 as the thumb can be left on, and with G♯ as it is saves switching from the G♯ / A♭ key to the F key (in, for example, Bourrée 2 from Bach's *Orchestral Suite* No. 4).

4) Another bi-stable condition occurs on F3, played with all fingers off. The note switches back and forth between 24 cents sharp and nearly a semitone flat, although it is possible to play at the correct pitch at both dynamic extremes. The acoustical reasons for this are analysed in my doctoral thesis, and various approaches to solving it are described there.[23] It is less of a problem with crook M2 than with M3, but as previously mentioned there are other advantages to M3 that make it preferable. A larger reed also makes it less of an issue.

However, the all-off fingering is not given in the early fingering charts; the first to show it is Diderot in 1751.[24] The earlier charts and some later ones (e. g. Reynvaan 1795[25]) give the fingering used by all oboists of the period: -2- ---. As might be expected this gives a flatter note that needs to be lipped up, but it does cure the bi-stability. So hole 1 was opened out a little further to enable that fingering. Another fingering that gives a good, positive, in-tune F is opening the A♭ key, however, this is not found in fingering charts until some English ones of the 1790s. It is useful in some passages but not, for example, when there are octave leaps to low F, because of the need to switch between keys. So this is one place where the instrument itself dictates the use of what is probably a more authentic fingering – with the left-hand, middle finger on.

On playing characteristics more generally: There is definitely a shift to a higher tessitura when compared to the Denner model. The notes from C4 upwards speak with greater facility, and playing in the high range is more comfortable. However, this instrument does seem to demand the "harmonic" fingerings for E♭4, E and F, whereas the Denner can use the simple fingerings that are given in all of the early fingering charts.[26] The

23 Dart: *The Baroque Bassoon*, pp. 286–296.

24 Paul J. White: Early Bassoon Fingering Charts, in: *Galpin Society Journal* 43 (1990), pp. 68–111.

25 Ibid.

26 Note: subsequent to presenting this paper, the prototype has been played much more, and the simple fingerings for E♭4 and E4 are now useable too.

Poerschman can play up to high A4, though only with the modern long fingering: 123 -56 E. The "authentic" (French) short fingering is too weak. With the right reed it can also reach B♭4 and B4.

On any bassoon the harmonic fingerings speak with greater facility than the simpler fingerings, and they can produce a remarkable beauty of tone; it seems unlikely that proficient players in the eighteenth century did not know of and utilise this extra dimension. With the Poerschman instrument, it seems that the harmonic fingerings become less of an option and more of a necessity. While this is one indication of the overly simplistic nature of the earlier fingering charts, it might also indicate that Poerschman, as a skilled player, had decided that the advantages of the harmonic fingerings were such that there was no longer a need to retain the capability of simple fingerings. Perhaps he abandoned those to focus more on what became characterised as the "tenor register", which became a particularly attractive feature of the bassoon to composers from the next (Classical) generation onwards.

The Poerschman gives an impression of strength and power of tone not found on the Denner. It has a direct, positive feel and forthrightness of character, though this can tend to inflexibility; each note has a certain way it plays and it is difficult to bend from that. The Denner by contrast is a very malleable instrument; notes can be pushed and pulled in dynamic and tone quality, auxiliary fingerings used or omitted as desired, and a smoothly graded *messa di voce* is possible on most notes as are both *piano* entries and a continuous decrescendo to *ppp*. This is not to say that the Poerschman cannot be played quietly too, but maintaining the tone and accurately placing the pitch of some notes can be more difficult at a low dynamic level.[27] The Poerschman is more easily played strongly, the Denner more readily played with delicacy.

The Poerschman has a more distinctive, instrumental voice than the Denner, and it seems designed to stand out somewhat and be more clearly heard. A pair of them playing together might even make themselves clearly heard beside the horn in the "Quoniam" in Bach's *Mass in B minor*. This is a trend that is continued in all the orchestral winds in the Classical period by the next generation of makers, of whom Poerschman's two apprentices were particularly important. When one also takes the extended range of this instrument into consideration, Poerschman can perhaps be seen to be leading the way towards the German Classical style. While it cannot be claimed that he was prescient in this, it could be argued that whatever he was trying to achieve with his design, the characteristics of his instrument either prompted or at least allowed the further developments that led to the German Classical designs.

27 Again, this aspect is much improved with further playing-in.

Inhalt

Le Basson Savary

Bericht des Symposiums »Exakte Kopie« in Bern 2012 • Herausgegeben von Sebastian Werr und Lyndon Watts unter redaktioneller Mitarbeit von Daniel Allenbach

Musikforschung der
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Herausgegeben von Martin Skamletz
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