The Baroque Bassoon: form, construction, acoustics, and playing qualities

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Abstract

The bassoon was newly invented in the 1670s-1680s as one of several musical innovations that emerged from Paris, and spread rapidly across Europe. The essential elements of its structure – four wooden parts plus a brass crook, with three or four keys – remained stable for the next seventy years, but within those limits, appearance and internal design varied significantly.

This study examines approximately 80% of known surviving baroque bassoons. Detailed internal measurements of thirty-six bassoons were made and graphs are constructed to compare bore designs. Based on comparison of stylistic traits, a new typology of the external design of baroque bassoons is proposed. In a system to parallel that established for the early oboe, extant instruments and those represented in the visual arts are classified into two types and five subtypes. National and regional traditions and affinities are identified and discussed, and design influences, evident in both external and internal forms, are shown to have existed both within and across national boundaries.

Eighteenth-century woodwind construction processes and tooling are analysed in order to establish, from incomplete examples, the original design of a particular bassoon. That instrument is reconstructed as a working example, and its playing characteristics are assessed in comparison with those of a contrasting, earlier bassoon design.

Acoustic impedance analysis is used to demonstrate connections between the instrument's internal design and its playing characteristics. The two reconstructed bassoons are found to have differing characteristics, and impedance analysis is shown to be helpful in explaining some of those differences.

Bore and tonehole dimensions of the bassoons studied are presented, along with photographs of each instrument, to provide a database for further research.

Contents

Volume 2

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Conventions and Terminology

Parts of the bassoon

Compass points are used for orientation. They refer to the current view of the instrument standing upright, so the bell end is always north, the boot end is south. West and east depend on the current view, so the wing is west of the long joint when viewed from the front but east of the long joint when viewed from the back. Both the long joint and the wing are north of the boot; as this could cause confusion when discussing the bore as a whole, the use of compass points is avoided when the whole bore is being discussed; instead, the 'reed end' and 'bell end' are referred to.

Toneholes: All of the holes covered by fingers or keys are called toneholes, subdivided into finger-holes, if covered by fingers, and key-holes, if covered by keys. The toneholes of the 3-keyed bassoon are named using Roman numerals, starting from the reed end; the holes on the wing joint are I, II, III; the hole under the 'F' key is VII; that under the D key is IX; and that under the Bb key is XI. Any toneholes and keys added to the 3-keyed format are named according to their primary function: Ab, Eb, etc.

Keys: Flap: on a two-part key this is the part that covers the tonehole; on a one-piece key it is the end that covers the tonehole.

Touch: on a two-part key this is the part that is operated by the finger; on a one-piece key it is the end that is pressed by the finger.

Block: a wooden mounting for key, usually integral with the body of the joint. May be made by cutting away most of the circumference of a turned bead. The axle pin enters into the side face of the block.

Ring: a turned bead for key mounting, left at full circumference or nearly so.

Vestigial ring: a key-mount ring which has had part of its circumference cut away, but the key's axle pin still enters into the turned surface of the ring.

Saddle: a three-sided brass channel mounting for key, screwed or pinned to the joint.

Wing: Épaule: the sideways-extending flap that carries the three angled toneholes.

Shoulders: the north and south corners of the épaule.

Ferrule: the brass ring on north end.

Crook socket: the wider section of bore in the north end, into which the crook fits.
Tenon: the part that is inserted into the boot socket.

Boot: Small bore: the smaller diameter of the two bores in the boot. The wing and small bore in conjunction are sometimes referred to as the down bore.
Big bore, the larger bore in the boot. In conjunction with long and bell can be called the up bore and also the extension bore though strictly this latter begins at hole VIII (the F vent hole).
Septum: the wood that separates the two bores.
Window: the hole cut through the septum at the south end of the joint to join the two bores together.
Plug(s): the wood or cork stopper(s) put in the south end of the bores below the window. In some cases the window is drilled between the bores, some way in from the south end of the joint, so there are two cylindrical plugs to block the bores south of the window. In others the septum is cut away right to the south end of the joint so there is a single oval plug bridging across the two bores, of a thickness that leaves a window open to its north.
Ferrule: the brass bands at north and south ends of the joint.

Long: Fully turned: without a platform - the full circumference is formed on the lathe. Key mount rings may be left full circumference, partly cut away to vestigial rings, or more fully cut away to leave blocks.
Platform: a flat strip running along the joint, through the holes IX to XI and carrying the D and Bb keys in either saddles or blocks. It is integral to the joint as a whole, but usually raised above the 'turned' or circular surface which continues around the remainder of the circumference, giving an increased wall thickness for the toneholes to pierce. It may have little vertical sides, or sides that are tangential to the 'turned' surface.

Bell: Reverse taper bore: the bore is tapered, getting smaller in diameter towards the top (open) end.
Chamber: a section hollowed out with turning tools, with the bore diameter smaller to north and south. It is usually but not always near the north end of the joint.
Vent hole: a hole drilled usually around halfway along the joint – it is not operated by key or finger on the early instruments but stands permanently open.

Crook: Pinhole: a small hole drilled into the crook usually around 50 to 100mm from the big end. It is not operated by a key on early instruments, so if present, it is permanently open.

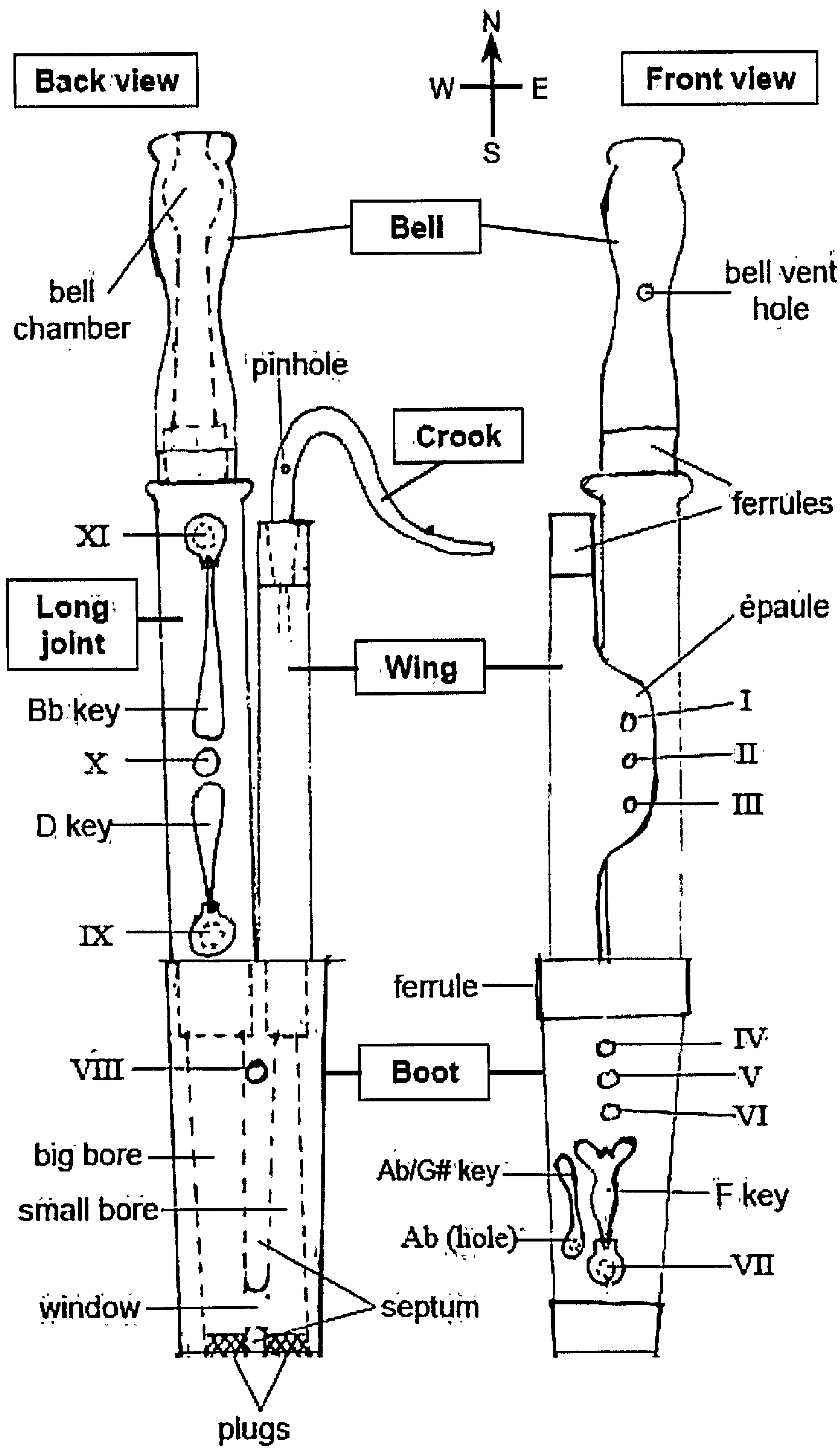

Fig i. Parts of the baroque bassoon

Bassoon Sizes:

The term concert bassoon designates the normal bass-sized instrument that plays from Bb below the bass staff to G in the treble staff (Bb1 to G4), at whatever pitch standard it has been made. Thus the small Kenigsperger bassoons are concert sized, as is Meiningen 1366, despite the pitch of the low G on the former being around 103.8 Hz and that of the latter around 87.2 Hz.

Other sizes discussed here are:

High octave bassoon, which plays at an octave above the concert size.

Tenor, which play at a fifth above concert, i.e. the six-finger note is D.

Quart-bass, which plays at a fourth below concert, an octave below a Tenor.

Contrabassoon, which plays an octave below the concert size.

Pitch and note designation

American Acoustical Society notation is used throughout: C4 = middle C; octaves are numbered from C to B. The terms do not here denote a particular frequency, but rather a place on the stave, independent of the pitch standard to which the instrument is made.

Instrument pitch is usually indicated by the frequency of A4, e.g. A=415Hz. Use is also made of Bruce Haynes' system showing semitones distant from A=440Hz, where 'A+1' means one semitone higher than A=440Hz, and 'A-1' means one semitone lower. These terms actually designate a range of pitches, so A-2 covers A=384-397Hz; A-1½ covers 398-408Hz; A-1 covers 409-427Hz; A+0 covers 428-452Hz and A+1 covers 453-479Hz.[1]

Fingerings

Fingering patterns are notated using a system adapted from that of White,[2] and developed to be easily understood by players. It has elements of pictorial layout while being easily typewritten. The first six fingerholes are designated with Arabic numerals, keys and thumb-operated holes are designated by letters. A monospace font is usually used to produce equal spacings between letters, numerals and other symbols.

- Holes closed or keys operated are indicated with their number/letter; otherwise '–' indicates hole left open or keys (whether open- or closed-standing) un-operated.

[1] Bruce Haynes, *A History of Performing Pitch: The story of 'A'*, (Lanham: Scarecrow, 2002), (henceforth *HoPP*), pp. li-lii.

[2] Paul, J. White, 'Early Bassoon Fingering Charts', *GSJ*, 43 (1990), pp. 112-124.

- A number struck through means that hole should be partially opened; 'half-holed' or leaked. e.g. ~~1~~
- The Ab/G# key is labelled #.
- Keys on the up bore are labelled as they appear to the player: e.g. the large key on the boot is called 'F', because it is operated primarily to produce the note F2; on the long joint the lower key is 'D' and the upper key is 'Bb' often shortened to 'B' for convenience. In a similar manner, hole VIII is called 'E', because it is closed to produce E2; hole X is 'C', as it is closed to produce C2.
- Holes/keys beyond the large F (i.e. those operated by thumbs) are not shown unless closed/operated.

Examples:

Bb1: 123 456 F EDCB

In this case all fingerholes are closed and all three open-standing keys are operated; the G# key is not mentioned so it is not operated; so all holes on the instrument are closed.

Ab3: ~~1~~23 456 # D

Half-hole I, close holes II, III, IV, V, VI; operate (open) the Ab/G# key; operate (close) the D key.

C#4: 12- 4-- #

Close holes I, II, IV; leave holes III, V, VI open; operate (open) the Ab/G# key.

<u>Standard fingering:</u> White gives 'standard' fingerings for notes from Bb1 through to F4 and takes note of variations from them.[3] The standard fingerings are given in Appendix 2, and in discussions a standard fingering is to be assumed unless otherwise stated.

<u>Simple fingering:</u> where all holes beyond (i.e. further from the reed than) the first open hole are open, (except possibly for any under closed-standing keys).

<u>Cross fingering:</u> where a hole or holes beyond the first open hole is/are closed in order to flatten the note from the pitch of the related simple fingering, usually by a semitone.

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[3] White, 'Early Bassoon Fingering Charts', pp. 77-83.

<u>Fork/Vent/Harmonic fingering:</u> where a hole or holes is/are opened within an 'ancestor' fingering in order to cause a switch to second or higher mode of vibration.

Note: it is not always easy to identify whether a fingering is 'cross' or 'fork' and elements of both may be present in the same fingering, for example:

G4: ~~1~~23 --6 F

Here the 'ancestor' fingering is that of C3: 123 ---. Hole I is half opened to force the air column to vibrate in a regime based on the third vibration mode of that fingering – the 'vent' element – to produce a pitch at an octave plus a fifth higher than the first mode (fundamental). However, due to the complexities of bore and tonehole lattice, the pitch produced is too sharp, so holes VI and VII are closed to flatten the note – the 'cross' element of this fingering.

<u>Register:</u> This term is used to indicate which mode of vibration is being used, so G2 is a first register (or fundamental) note, G3 is a second register note, using the second mode of the G2 fingering, and G4 is a third register note as it utilises the third mode of the C3 fingering.

List of Abbreviations

DWIATM: Jan Bouterse, *Dutch Woodwind Instruments and their Makers*

FoMRHI: Quarterly of the Fellowship of Makers and Researchers of Historical Instruments

GSJ: Galpin Society Journal

HoPP: Bruce Haynes, *A History of Performing Pitch: The story of 'A'*

HWI: Philip T. Young, *4900 Historical Woodwind Instruments*

JAMIS: Journal of the American Musical Instrument Society

JAMS: Journal of the American Musicological Society

JASA: Journal of the Acoustical Society of America

LoM: Philip T. Young, *The Look of Music*

NLI: William Waterhouse, *The New Langwill Index: A Dictionary of Musical Wind-Instrument Makers and Inventors*

TEO: Bruce Haynes, *The Eloquent Oboe: A History of the Hautboy, 1640-1760*

IDRS: Journal of the International Double Reed Society

Instrument Collections Represented

Bate Collection, Oxford

Gemeentemuseum, The Hague

Germanisches Nationalmuseum, Nuremberg

Grazzi Collection, Mantua

Händel-Haus Museum, Halle

Horniman Museum, London

Metropolitan Museum of Art, New York

Musée Instrumental, Brussels

Museum Bellerive, Zurich

Musikinstrumenten-Museum des Staatlichen Instituts für Musikforschung Preussischer Kulturbesitz, Berlin

Musikinstrumenten Museum der Universität Leipzig

Musikinstrumenten-Museum in Münchner Stadtmuseum, Munich

Muzeum Insrumenów Muzyczynch, Poznan

Oberösterreichisches Landesmuseum, Linz

Prague Nationalmuseum – Tschechisches Museum für Musik, Prague

St-Annen Kloster Museum, Lübeck

Schloss Elisabethenburg Kunstsammlungen, Meiningen

Schlossmuseum Sondershausen

Stedelijk Museum, Zwolle

Waterhouse Collection, Gloucestershire

Chapter 1
Introduction

The purpose of this study is to demonstrate and classify the variety of designs found in bassoons made in the late seventeenth and early eighteenth centuries. It examines both the external form, as appreciated by the onlooker, and the internal design, solely perceived by the maker but which produces the playing characteristics appreciated by the player. The external morphology of baroque bassoons seems to imply certain family relationships and distinctions. This dissertation investigates the relationship of external form to internal form, and whether the two consistently match with notions of geographical schools of making.

This work is intended to parallel Haynes's and Adkins's classification of oboe types and analysis of oboe forms.[1] It expands on Cronin's work tracing bassoon development through measuring and analysing bore profiles, by significantly enlarging the database.[2]

The processes involved in constructing the internal forms of the instrument are considered for the information that can be gained regarding the intentions of, and constraints upon the early makers. Playing characteristics are also considered, in as much as they are a product of the internal design. Two contrasting styles of bassoon are reproduced and played, in order to juxtapose empirical evidence of playing characteristics with historical evidence of the bore design and construction processes.

The bassoons studied are those of four-piece construction with three or four keys. This construction - of wing joint, boot, long joint and bell, plus crook and reed; fitted with three open-standing keys and, on some, a closed key - comprises the essential elements of bassoons that were used from c. 1680 to the 1770s. Further keys began to be added from

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[1] Bruce Haynes, *The Eloquent Oboe: A History of the Hautboy, 1640-1760* (Oxford: Oxford University Press, 2001), pp.78-88. (Henceforth *TEO*).
Bruce Haynes and Cecil Adkins, 'Hautboy Types', a collection of postings to the Hautboy Listserv May-June 2001, www.hautbois.net/docs/hautboy_types.pdf.
Cecil Adkins, 'Proportions and Architectural Motives in the Design of the Eighteenth-Century Oboe', *JAMIS,* 25 (1999), 95-132.
Cecil Adkins, 'The German Oboe in the Eighteenth Century', *JAMIS,* 27 (2001), 5–47.
[2] Robert H. Cronin, 'Evolution of the Bassoon Bore', notes for a talk given at the 1981 meeting of the American Musical Instrument Society, Vancouver, British Columbia, 3 April 1981.

around 1760, but bassoons with more than four original keys are not included in this study.[3]

The origins of the four-piece bassoon are still somewhat clouded: none survive from the very first makers, and there is relatively little documentary evidence.[4] The sparse evidence relating to their design is surveyed and discussed in Chapter 3. Despite some uncertainty, it appears that the bassoon emerged as one of the new woodwinds developed in Paris in the second half of the seventeenth century, along with the oboe, the tapered-bore transverse flute and baroque recorders. The developers drew on the principles of previous woodwind types but substantially re-worked those types as new instruments intended for different uses.

Greater musical demands were made on these new instruments: they were required to play in a wide range of keys while making the enharmonic distinctions of unequal temperaments, to play with increased expressive capability and *affect*, to fill solo and ensemble roles in the new types of chamber groups and the developing orchestra, and to stand out in the latest concertos.

It is apparent from the extended capabilities of the instruments that new knowledge was gained in the processes of their development. Michel de La Barre, writing in c. 1740 about the rise of Lully and the downfall of the old woodwinds at the court of Louis XIV, gave a hint of the process of experimentation and discovery when he remarked that '... thanks to the Philidors and the Hotteterres, who spoiled so much boxwood and played so much music that they finally succeeded in rendering [the oboe] usable in ensembles'.[5] These expanded capabilities were achieved with very little additional keywork: the two keys added in the creation of the bassoon and oboe (compared to the preceding forms) were the maximum, while the transverse flute had only one added. It was not simply a matter of drilling more vents and controlling them with increasingly elaborate mechanisms, as later woodwind developments are often characterised. Instead, the extended capabilities seem to have been achieved by refinements of bore and tonehole design, which are examined here. Close examination of bore designs shows a great degree of subtlety of shaping, with

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[3] With the exception of one of two bassoons by Gedney, for reasons explained in Chapter 3.4.

[4] See: James B. Kopp, 'Precursors of the Bassoon in France before Louis XIV', *JAMIS*, 28 (2002), 63-117, and by the same author: 'The Emergence of the Late-Baroque Bassoon', *The Double Reed*, 22.4 (1999), 73-86.

[5] Haynes, *TEO*, p.14.

evidence often of multiple reamers per joint, re-reaming after initial use, and other adjustments. The internal shapes (the *undercutting*) of toneholes, particularly in the air-reed instruments, also demonstrate considered and careful control.[6]

The new instruments rapidly spread across Europe, with the fashion for all things French courtly, and the old instruments were rapidly replaced.[7] There was a great flowering of musical invention: in composition, with new forms and expanded harmonic structures; new types of ensemble, with the development of the orchestra and mixed chamber ensembles; new roles in the ballet and opera; and in performance style, with technique and ornamentation directed at increasing expressive affect. The constructors of the instruments had to fulfil not only these demands but also greater volume of demand, both to replace the old instruments and to provide for a burgeoning popularity. The already-established makers seemed to pick up the new instrument types with great alacrity: Haka, for example, was selling consorts of '*Fransche haubois*', including '*1 franse Esdorenhout dulsian Basson in 4 Stucken*' (1 French, maple-wood, four-piece, dulcian bassoon), by 1685;[8] and J. C. Denner applied for permission to make the new '*französischen musicalischen Instrumenta, so mainsten in Hautbois und Flaudadois bestehen*' (French musical instruments, mainly oboes and recorders) in 1696.[9] Others soon joined their ranks, several appearing to come directly into woodwind making, possibly via training in general turning.

In the case of the bassoon there seems to have been an immediate division into a variety of styles, at least partly geographical based. Thus the first Dutch makers and some of the

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[6] See studies of woodwind bore design such as:
Jan Bouterse, *Dutch Woodwind Instruments and their Makers 1660-1760*, trans. by Ruth Koenig (Utrecht: Koninklijke Verenigning voor Nederlandse Muziekgeschiedenis, 2005). (Henceforth *DWIATM*).
Thomas Lerch, *Vergleichende Untersuchung von Bohrungsprofilen Historischer Blockflöten des Barok* (Berlin: Staatliches Institut für Musikforschung Preußischer Kulturbesitz, 1996).
Frederick Morgan, *The Recorder Collection of Frans Brüggen* (Tokyo: Zen-on Music Company, 1981).
Kirkpatrick, Mary, 'Neun Oboen aus der Sammlung Michel Piguet', *Basler Jahrbuch Für Historische Musikpraxis*, 12 (1988).
Frederick Morgan, 'Making Recorders Based on Historical Models', *Early Music*, 10.1 (1982), 14-21.
Jem Berry and Lewis Jones, 'Oboes by Thomas Stanesby Sr.: Bores and Perturbations', paper presented at *Making the British Sound,* GSJ and HBS conference, Edinburgh, Sept 2009.
Cary Karp, 'Woodwind Instrument Bore Measurement', *GSJ,* 31 (1978), 9-23.
[7] The rapidity and completeness of this process was aided by a change in pitch standard – a shift downwards of two or three semitones. While stringed instruments could at least partly accommodate this, wind instruments could not – there is no way to adjust them over this extent – so the old ones were rendered instantly unusable in the new music, unless they were especially accommodated through transposing parts. Kopp, 'Precursors', pp. 63-64, and Haynes, *TEO,* p. 56.
[8] Jan Bouterse, *DWIATM,* table 4.1.
[9] William Waterhouse, *The New Langwill Index: A Dictionary of Musical Wind-Instrument Makers and Inventors* (London: Tony Bingham, 1993) p.86. (Henceforth *NLI*).

Germans seem to have invented for themselves a decoratively turned style, which (the meagre evidence seems to show) the French inventors never used. The earliest surviving English bassoons seem to have been modelled on the first French, plain-styled designs (but again the evidence is thin), and were already distinguishable from their German and Flemish counterparts. The English become so fixed in their styling throughout the eighteenth century that they are immediately recognisable.

This study proposes two types of bassoon design in the baroque period, divided into five subtypes.[10] They were preceded by a 'type 0' which includes the missing first French bassoons. None of these bassoons survives, but the type is known, if only dimly, from written and iconographical evidence.

Type 1 comprises the decoratively turned bassoons. They are subdivided into: 1a 'Haka' style, exponents of which worked in Amsterdam but also in a pocket of southern Germany, around Nordhausen - Weimar (Thuringia, bordering on Saxon-Anhalt). There are enough differences of styling to distinguish a type 1b, which includes the other decorative bassoons of German origin, and some found from further east (Poland and Austria). This group includes the works of the Denner family of Nuremberg and the Kenigspergers of nearby Roding. Thus a second distinct style is linked to Franconia, again in the south of Germany.

Type 2 comprises the plain-styled bassoons, with smoothly contoured bell and wing joints. These are subdivided three ways. The English bassoons, starting with that by Thomas Stanesby, have such a unified design, so readily recognised, that it deserves a subtype of its own; and since that styling is thought to be derived from the first French designs, it is called type 2a. Charles Bizey is of the second baroque generation and is the only known French baroque period maker from whom bassoons survive; his two bassoons are similar in several ways to the English but different enough to establish a second subtype. Two bassoons also survive by the well-known Flemish maker, Jean Hyacinth Rottenburgh, and are similar enough to the French that they join this group too. So type 2b is a rather loose grouping; although called French/Flemish, it also encompasses some bassoons by makers of whom little is known. The German plain-style bassoons, readily recognised by their brass bell-crowns, make up type 2c. Although it would be tidier to be able to say that the

[10] This follows the work of Haynes and Adkins on the classification of early oboe (hautbois) types. See: Haynes, *TEO*, pp. 65-89, and: Haynes and Adkins, 'Hautboy Types'.

plain style followed after the decorative in Germany, this does not appear to have been the case; some of the instruments of this group are contemporary with instruments of type 1b. There is a variety of personal styles within this 2c group too, again throwing the English into contrast for their lack of such. Exemplars come from Butzbach in Hesse (the Wietfelts), Burgdorf in Lower Saxony (J. Scherer II), and Leipzig in the centre of Saxony (J. H. Eichentopf and J. Poerschman). Un-stamped examples are also found in Poland and the Czech Republic, indicating that makers may have worked in this style further east too.

These classifications are made by decorative style, but the bassoon is primarily a tool for musicians, and the external styling has no causative effect on their playing characteristics. These are the products of the internal design: the shape of the bore and the sizes, shapes and positions of the toneholes. Those elements need to be studied in fine detail, as small-scale changes (of the order of fractions of a millimetre) can make appreciable differences in playing qualities, especially to practitioners as finely attuned as professional musicians. The internal designs are compared here and two basic forms identified, though again there is variety within those forms.

These internal styles are not classified but they are compared across the design types. There is at least some correlation found with the external categories, but there are contradictions too. Again the English are very homogeneous, presenting a good example of direct correlation. But there are instruments with, for example, very similar exterior styling but quite different internal design, including one master-apprentice pair. There are also found a pair of instruments with otherwise no known connection, probably made several hundred kilometres apart, but with bore shapes so similar that they could have been made with the same tools. The bore profiles are found to range not just in style but also in complexity, and a trend to greater complexity amongst a particular group of makers is noted.

Structure

For the purpose of the study, measurements and photographs were taken of twenty nine bassoons of the appropriate types in museums and private collections, and those for seven more were obtained from helpful colleagues or supplied by collections themselves. Together these represent around 80% of the known surviving bassoons that fall within the scope of this study.

Chapter 2 describes the data collection procedures, data processing, and methods of presentation used, and discusses the ways in which measurement data can be interpreted to infer the original designs of damaged parts and those of the original tooling.

Aspects of design, both external and internal, are discussed in Chapter 3, where the five design categories are proposed and explained. The bassoons studied are described within their design type groupings, and interesting features, including correlations with other bassoons, both expected and unexpected, are noted. Some historical background is given of both makers and their milieu, and iconographical sources discussed.

In Chapter 4, a qualitative explanation is given of the acoustics of conical bore reed instruments in order to aid understanding of the internal designs. It is explained that the air column is the primary vibrating element (working in a feedback loop with the reed) and that the air column is the product of the internal design, that is, of the bore plus toneholes. The acoustical properties of the air column, as they determine pitch and other playing characteristics, can be studied through the measurement or calculation of the column's *input impedance*. A software tool for making such calculations is first described and then wielded, to show some properties of simple, bassoon-like bore designs. It is then used to analyse the acoustic reasons for a problematic note on a baroque bassoon, and to demonstrate how bore design and fingering patterns affect the behaviour of the air column.

As a further part of the study, a bassoon was reconstructed from measurements of a pair of damaged survivors from a particularly interesting maker: Johann Poerschman. This serves several purposes: to illustrate the considerations required to extrapolate backwards from measurements of the surviving parts of the two bassoons to their original dimensions; to have the opportunity to play upon an instrument as near as possible to a new one from the maker's workshop, as his customers would have done; to test this instrument and see how it plays with respect to requirements and expectations of its period (as represented in repertoire and fingering charts); and to provide the opportunity to compare characteristics with an already-prepared and familiar, reproduction of a J. C. Denner bassoon. Thus two German instruments from different generations and of different design styles are compared. Since Denner was of the first German generation of baroque bassoon makers and Poerschman's successors created a quite new design, these two can be seen as representing the beginning and end of German baroque bassoon making.

In Chapter 4 the process of interpreting the measurements of the originals, and determining the designs of the original tooling is documented. Playing characteristics are described in comparison with the Denner reproduction, along with acoustical explanations. The characteristics are also set in the context of the expectations of repertoire and of fingering charts of the period. Methods of adjusting tuning and response described in historical sources are discussed in relation to particular features of this bassoon's behaviour and to the tooling designs previously identified.

Appendix 1 is a translation of Chapter XVIII: 'On various faults occasionally met with on a bassoon, which may often be overcome with little trouble' of Carl Almenraeder's *Die Kunst des Fagottblasens* of 1842/43.

Appendix 2 presents contemporary fingering charts for the appropriate bassoon types, and the fingerings used for the Poerschman and Denner reproductions.

Appendix 3 presents photographs and measurement data of the bassoons studied. For each bassoon discussed there is a page of photographs; two versions of *bore profiles* (graphical representations of the internal shape); and a table of tonehole dimensions and their positions, joint sizes and assembled lengths.

Appendix 4 presents full views of the artworks from which details are shown in earlier chapters.

Appendix 5 presents the data files used in the *Impedps* program, along with graphs of the bore data.

Chapter 2

Methodology, Presentation and Interpretation

2.1 Measuring methods and devices

The core of this study is a body of measurements of surviving eighteenth century bassoons, most now in museum collections. The purpose of measuring the bassoons is to record, and be able to compare their designs. The particular interest here is to understand how the makers designed their bassoons as tools for use by musicians – as devices for producing pitches and tone colours. Thus it is the acoustically significant aspects of design that are of particular interest: those aspects that are significant to the sound-production, and the musical capabilities of the instrument. The maker had to integrate these with ergonomic aspects before aesthetics and decoration could be applied on top of both, to his or her taste.

In Chapter 4, it is explained that the primary vibrator in a woodwind instrument is the air column contained within the instrument tube. The resonance frequencies of the air column are determined by its configuration: its size and shape. The instrument itself is merely a vessel for the air column; it provides the form of that column in the bore shape and the forms and positions of the toneholes. To clearly describe the workings of an instrument it is necessary to specify accurately its bore shape and tonehole configuration – the acoustically significant aspects of woodwind design.

Woodwind bores are not necessarily regular in shape, and they become particularly complex in the baroque period. Although the bassoon is often defined as a conical-bore instrument, the cone that makes up the bore of a baroque bassoon is commonly composed of several sections, of different angles of taper and of length. Some sections are not straight tapered at all, but have a curved profile; some are cylindrical; and the bell commonly tapers in reverse direction to the rest of the cone. The bore may not continue smoothly from one joint to another; steps in diameter often appear. Thus it is not enough simply measure the internal diameters at each end and assume there to be a simple cone between them; it is necessary to measure in many places along the length of each joint to get a significantly detailed picture of the construction.[1]

[1] In Bouterse, *DWIATM,* p.37, the author says of his own study: 'the present study does not dwell in detail on the average conicity of the various sections but focuses on the route taken by that conicity: a route in

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Toneholes similarly are usually not simple cylinders bored through the walls of the instrument body: they may be conical, opening out as they enter the bore; or the reverse, narrowing as they enter the bore. That shape too can be made of several differently tapered sections.

In addition to the deliberately made complexities, the shape and size of the bore may change over time. Wind instruments that are made of wood are subject to variations of humidity throughout their working lives, and even in storage. Changes in surrounding humidity cause wood to change dimensions, not in a regular way but by different amounts in different directions. Different species of wood will behave differently from each other in this respect. A billet will change with humidity by only a negligible amount in length but by a significant amount in cross section. On drying, the wood will shrink more in line with the annular rings than in the direction of log radius. A billet cut from the side of a log (i.e. not including the log's growing centre) and turned on the lathe, will later become, to some extent, oval in cross section. Even if the wood is well seasoned, the cycles of wetting and drying to which a wind instrument is subjected in use can cause this sort of distortion to occur.

So the bore of a wooden instrument is seldom circular in cross section, and is often distorted to different degrees in different sections. Thus it is common to measure the bore in two axes: the maximum and minimum diameters of the oval cross section.

The tooling, processes and considerations of measuring these aspects have been topics of much discussion amongst researchers and makers of woodwind instruments, particularly in *FoMRHI Quarterly* and in the *Galpin Society Journal*.[2]

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which the bore narrows only slightly, with steeper parts and sudden constrictions'. And on p. 12 that 'the information obtained from this detailed examination proved to be extremely valuable, but also discouraging: it demonstrated clearly the limitations of the less detailed measurements of the other instruments that were examined in their own collections'.

[2] a) Tools and processes:
Cary Karp, 'Devices for measuring the undercutting', *FoMRHI Quarterly*, 23 (1981), C-333.
Charles Stroom, 'Some measurement techniques for recorders', *FoMRHI Quarterly*, 40 (1985), C-639.
Cary Karp, 'Woodwind bore measuring tools', *FoMRHI Quarterly*, 45 (1986), C-762.
Robert H. Cronin, 'A bore measurement tool', *FoMRHI Quarterly*, 50 (1988), C-859.
Bernhard Schultze 'A contact-free woodwind bore measuring tool', *FoMRHI Quarterly*, 59 (1990), C-970.
Alec Loretto, 'Recorder bore measuring', *FoMRHI Quarterly*, 83 (1996), C-1354.
b) Accuracy, wood shrinkage, and other considerations:
Cary Karp, 'Woodwind Instrument Bore Measurement', *GSJ*, 31 (1978), 9-23.
Cary Karp, 'Accuracy of measurement of woodwinds and the exact copy', *FoMRHI Quarterly*, 7 (1977), C-84

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Bore shape is usually specified as a series of measurements of diameter versus distance along the instrument. The sort of accuracy that is desirable is diameter increments of .1 or .2 mm, or distance increments of 5 to 10mm. It is generally considered by wind instrument makers that to measure the bore to a resolution of 0.2 mm is adequate, while 0.1mm is the maximum required to capture all acoustically significant details. For example the oboe and bassoon measurements published by the Bate Collection, University of Oxford, give the bore diameter in 0.2 mm increments, as does the publication '*Neun Oboen aus der Sammlung Michel Piguet, Messungen von Mary Kirkpatrick*'.[3] The drawings by F. Morgan of recorders in the Frans Brüggen collection have bore diameters taken every ten millimetres along the bore, so bore diameter increments are not even but range between .05 to .2 mm.[4]

These sets of co-ordinate pairs can be obtained in variations of two methods:

1) A disc or gauge of known size is put in the bore from the wide end and the distance at which it jams in the conical bore is recorded. In order to get a full set of data either a set of gauges must be made in appropriate increments of size or an adjustable gauge is set to one size at a time.
    a) Discs can be used screwed one at a time onto a calibrated rod. These can fairly easily be made (a set is illustrated in T. Boehm's 'The Flute and Flute Playing').[5] However if the bore is distorted from truly circular these will stick at the point where the minimum diameter equals that of the disc. More commonly a set of oval

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Paul Whinray, 'Woodwind measurements', *FoMRHI Quarterly*, 11 (1978), C-121.
Ephraim Segerman, 'Wood contraction and Instrument Bores', *FoMRHI Quarterly*, 31 (1983), C-460.
Robert H. Cronin, 'More thoughts on woodwind bore measurement', *FoMRHI Quarterly*, 49 (1987), C-828.
Robert H. Cronin, 'Forces exerted by bore measuring techniques', *FoMRHI Quarterly*, 76 (1994), C-1281.
Jan Bouterse, 'How accurate and understandable are measurements of woodwind instruments', *FoMRHI Quarterly*, 83 (1996), C-1437.
c) Museum curatorial and conservational issues:
Ephraim Segerman and Djilda Abbott, 'On measures of instruments in museums', *FoMRHI Quarterly*, 7 (1977), C-63.
Jeremy Montagu, 'What should measuring tools be made of', *FoMRHI Quarterly*, 44 (1986), C-733
Jeremy Montagu, 'What can we reasonably expect museums to provide or allow? (on measuring instruments)', *FoMRHI Quarterly*, 74 (1994), C-1212.
Michael Ransley, 'Measuring instruments in museums & conservation', *FoMRHI Quarterly*, 74 (1994), C-1213.
[3] Kirkpatrick 'Neun Oboen'.
[4] Morgan, *The Recorder Collection'.*
[5] Theobald Boehm, '*The Flute and Flute Playing in Acoustical, Technical and Artistic Aspects*', (Munich, 1872), trans. Dayton C. Miller, (New York: Dover Technical Publications, 1964), p.51.

shapes is used, so that both the maximum and minimum distances at which each sticks can be recorded.

b) A set of engineers' T-gauges can be used. These have a telescopic head that is pushed out to its maximum size by an internal spring. The head can be locked at any size in its range by a screw in the handle so it can be set to one size at a time in a micrometer, inserted into the bore as above, and the distance to where it sticks recorded. It can then be withdrawn and set to the next required size. The stock handles of commercial gauges need to be extended to be useful for woodwinds; instructions for doing are set out in an article by Alec Loretto in *FoMRHI Quarterly*.[6]

2) Diameters are measured at intervals of distance along the bore:
   a) The same T-gauges can be left unlocked and slid along the bore from the wider end, so that the bore taper will work against the internal spring and gradually squeeze the telescoping parts together. When the required depth is reached the gauge is locked, withdrawn and the diameter measured off the T head with callipers or micrometer.
   b) The T-gauge can be locked at its minimum size, inserted to the required depth and unlocked to allow the head to spring open and hit the bore sides; then it is locked, withdrawn and measured. This is the method used by Burton for his study of modern bassoon bores.[7]

As the spring tension is high in these gauges, both methods 2a and 2b apply impact and frictional forces that risk damaging delicate antique wooden instruments.

Since the subjects of these investigations are rare, made of wood, and up to 300 years old, it will be clear that care must be taken in using any of the above techniques, and that some are less likely to cause damage than others. A related consideration here is the attitude of museum curators who have the conservation of the objects in their care as a high priority, and develop rules of access to protect those objects. Techniques and devices that can be shown to have a low risk of causing damage may well elicit approved access to instruments that would otherwise not be allowed.

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[6] Loretto, Alec, 'Recorder bore measuring using modified telescopic bore gauges', *FoMRHI Quarterly*, 83 (1996), C-1355

[7] James Burton 'Bassoon Bore Dimensions'. (DMA dissertation, University of Rochester, USA, 1975), pp. 15-18. See also pp. 10-15 for discussion and considerations of alternate methods.

Non-contact methods of measuring woodwind bores are now being explored, for example using *computer tomography*.[8] However, that method is not yet practicable for transporting to museums, and in any case was not available for this study. *Acoustic pulse reflectometry* is a non-contact method that has been successfully used for measuring brass instruments, but is not (yet) applicable where the bore has a large number of side-branches, such as those of woodwind toneholes.[9] It is expected that both of these methods, or derivations of them, will eventually become the preferred ones for woodwind research, once issues of cost, transportability and availability have been dealt with.

There is another type of engineers' bore gauge which has a self-opening head connected to a dial gauge on the handle where the diameter is read off. These are very expensive, each head has only limited travel and the spring force on the head opening is again too strong for use in antique instruments. However, a variation of the type was designed and built for this study, using much lower contact pressure, with nylon for the contacting parts. Something similar had been suggested by Cronin in an article in the *FoMRHI Quarterly* in 1988.[10] The design also provided for a larger range of travel and the prototype worked well over a range of 12-20mm. It had been intended to make more to cover the range required for bassoons, but that intention was superseded by the purchase by the department of another type of bore measuring tool.

<u>Description and use of the Evald calliper</u>

The device consists of a lightly sprung calliper whose degree of opening is detected by a simple electronic circuit and displayed on a digital, LCD readout. It was designed and made by Jesper Evald of Copenhagen, using an idea developed in the 1980s by the flutemaker Rod Cameron.

This device has several advantages, not least in relation to the issues of instrument conservation. There is very low contact pressure with the walls of the bore, and the contact

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[8] Thomas Sherwood et al, 'Computed Tomography of a Heinrich Grenser Bassoon', *GSJ*, 63 (2010), 242-243.

[9] David Sharp, 'Acoustic pulse reflectometry for the measurement of musical wind instruments', (unpublished doctoral thesis, Edinburgh University, 1996).
David Sharp, A. Myers and D. M. Campbell, 'Using pulse reflectometry to compare the evolution of the cornet and the trumpet in the 19th and 20th centuries', *Proceedings of the Institute of Acoustics*, 19-5 (1997), pp.541-548.
Arnold Myers, 'Characterisation and Taxonomy of Historic Brass Musical Instruments from an Acoustical Standpoint' (unpublished doctoral thesis, Edinburgh University, 1998), http://www.era.lib.ed.ac.uk/handle/1842/1824.

[10] Cronin, 'A bore measurement tool'.

points are rounded-off soft buttons of plastic and wood. Once set up, the joint being measured does not need to be further handled; but sits in a pair of cradles while the measurements are taken. The tool does not need to be inserted and withdrawn for each measurement, but can be drawn slowly through the bore just once for each cross-sectional axis being measured.

Other advantages are to do with the quantity of data collected. If several bassoons are to be measured at the same location, the tool can be set up and calibrated for, say, the wing joints, and all the wings measured before re-setting for another joint. Workflow can thereby be very efficient, allowing, for example, seven bassoons to be fully measured (internal and external measurements) in a five-day visit to Leipzig. The operator can choose the increments of bore length at which diameters are taken, adjusting the amount of detail recorded according to the complexity of the instrument or the time available. Some of the wing joints here have been measured at every 5mm along the bore; though mostly the increment is 10mm for at least the maximum axis, or 20mm in the contrabassoon. The majority of the bore measurements in this study were made using this device. The methods of its use are described below.

The measuring head of the calliper is a 150mm long piece of half-round steel rod, which is attached to a one metre long handle of hollow aluminium rod, 5 mm in diameter. A second piece of half-round steel is attached to the first by a steel leaf spring, which is lightly tensioned to spring the two halves apart. The fixed half-round arm has a threaded hole near the end for attachment of various sizes of button or foot pieces, and the sprung arm has a small wooden button glued on. It is these two buttons which make contact with the bore.

In the photograph below the wooden button is visible on the upper arm and the lower, fixed arm, has a 20mm long foot piece of grey plastic attached. The leaf spring is the flat part connecting the sprung arm to the fixed one.

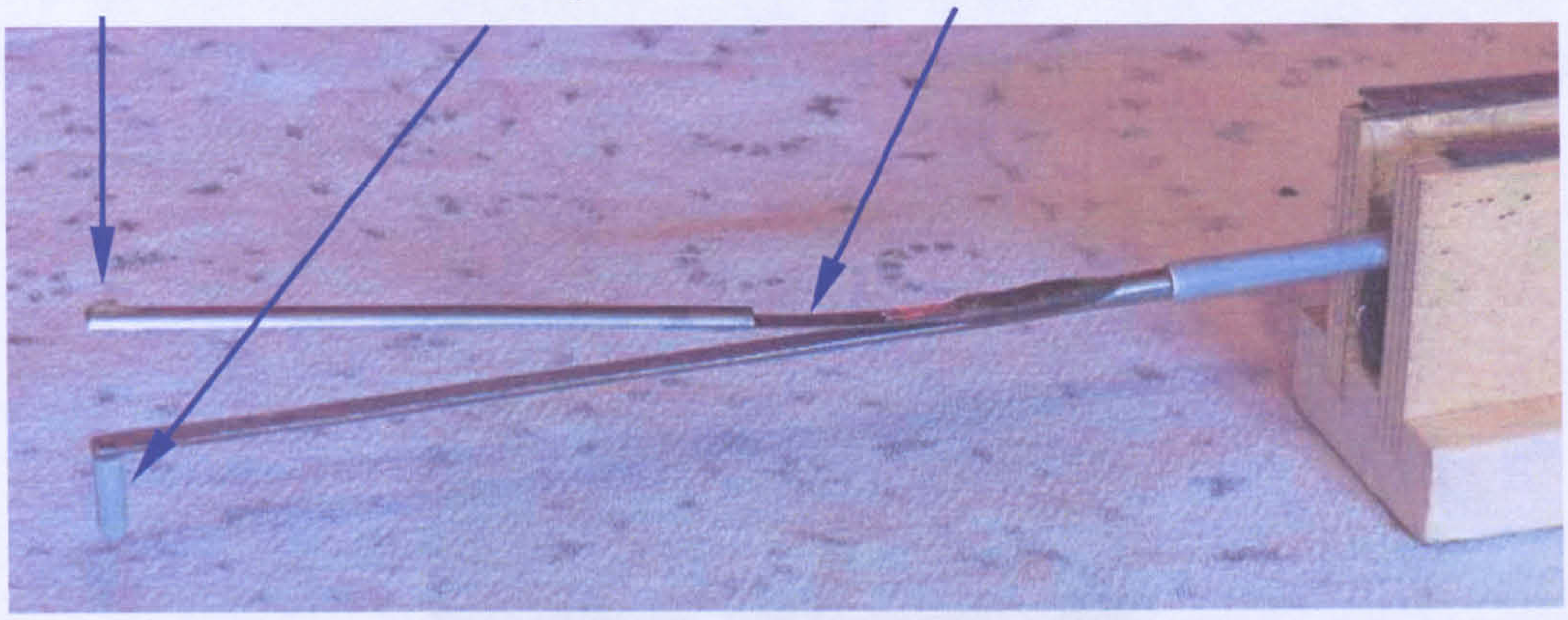

Fig 2.1. Evald calliper with 20mm foot piece attached

Attached to each face of the leaf spring is a strain gauge; these are thin sheet devices that change their electrical resistance according to how much they are bent. These resistors are connected in a Wheatstone Bridge arrangement, via wires fed down the hollow rod and a cable to the readout box. A small current is fed through the resistors and the return current is compared by circuitry in the box. As the arms of the calliper are squeezed together or allowed to diverge, the leaf spring straightens or bends, and the resistances of the attached strain gauges change. The circuitry is calibrated so that the digital display reads out in units directly proportional to the distance spanned by the arms of the calliper.

In use the foot piece attached to the fixed arm, itself attached to the long rod, trails along the lower surface of the bore under the weight of the rod itself; while the sprung arm pushes the button attached to it against the upper surface. The spring tension is low, so pressure at the button is very little, and the weight of the rod and calliper arms is also low, so pressure at the foot is only a few grams. There is little to no chance of damaging the instrument with these levels of pressure acting through plastic and wood buttons, though often after use it was possible to see a track through the dust in the bore.

The device was supplied as just the rod, calliper with minimal sized button attached, and the readout unit; so various accessories had to be made. The calliper itself has a usable range of around 19mm, so different length foot pieces can be attached to the fixed arm to set the range at different levels. The supplied foot allows measurements from 7.5mm to around 26mm. A set of further foot pieces was made to cover the ranges 8-27, 15-34, 20-39, 35-54 mm necessary to measure bassoon bores. The ranges were made with a large degree of overlap, so that it should always be possible to find one foot that would cover the whole range of any one bore section. These feet were made of a fairly soft plastic rod (knitting needle), while the fixed button on the sprung arm is wooden. An extra large foot for 45-64mm was improvised on the spot from a wooden lolly stick to measure the big end of the Eichentopf contrabassoon (max. 61.5mm).

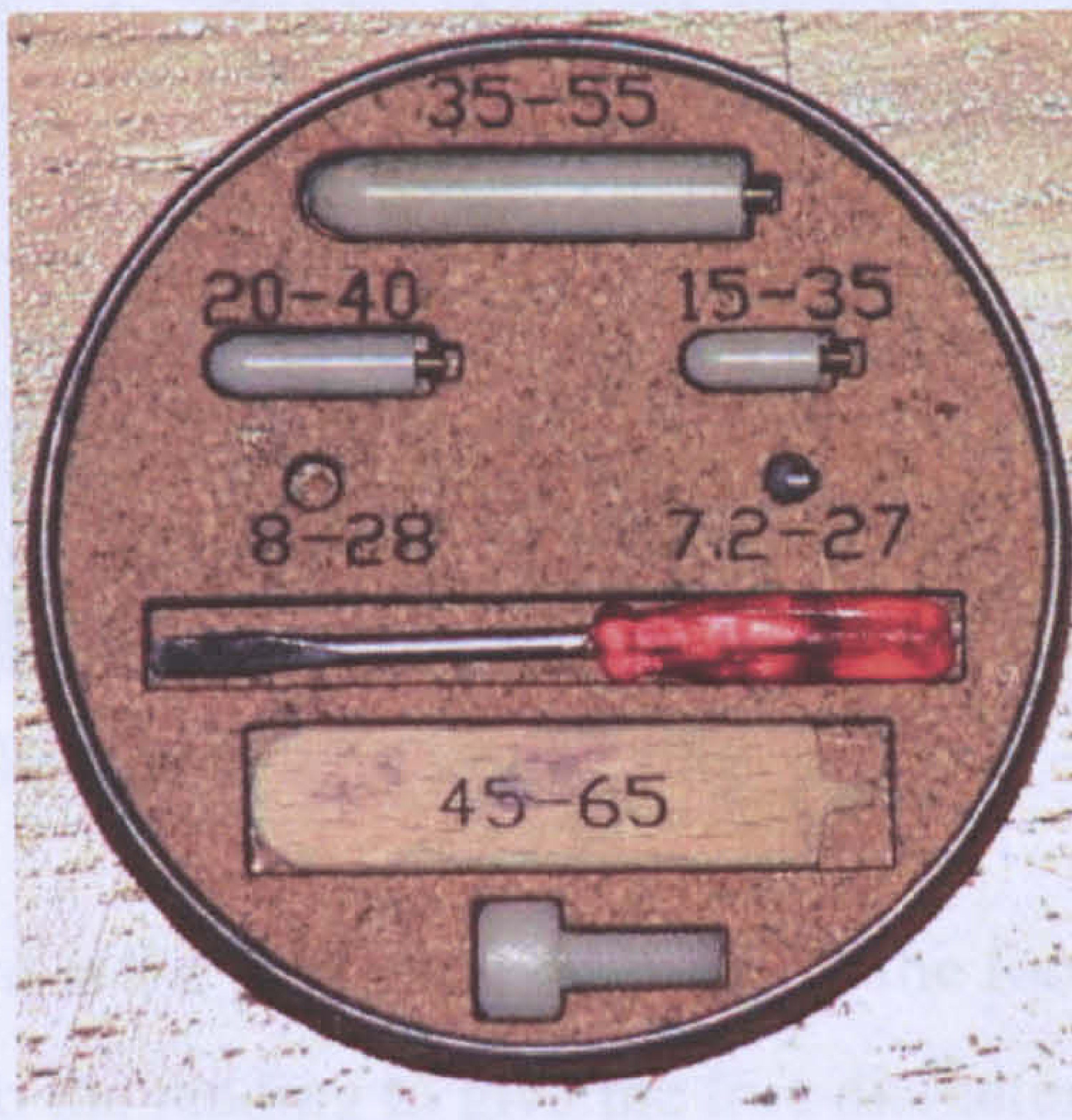

Fig 2.2. Alternative foot pieces and other accessories for Evald calliper

A channel/track arrangement was built to hold the rod, to keep alignment with the joint being measured and to hold a scale for the length dimension. A cursor was made of transparent acrylic with nylon thumbscrew to attach it to the rod. This straddles the channel and serves both to keep the calliper arms vertically aligned and to allow the distance to be read off the attached scale. Its position on the rod is set so that the cursor reads zero when the calliper foot is just at the near edge of the bore under study.

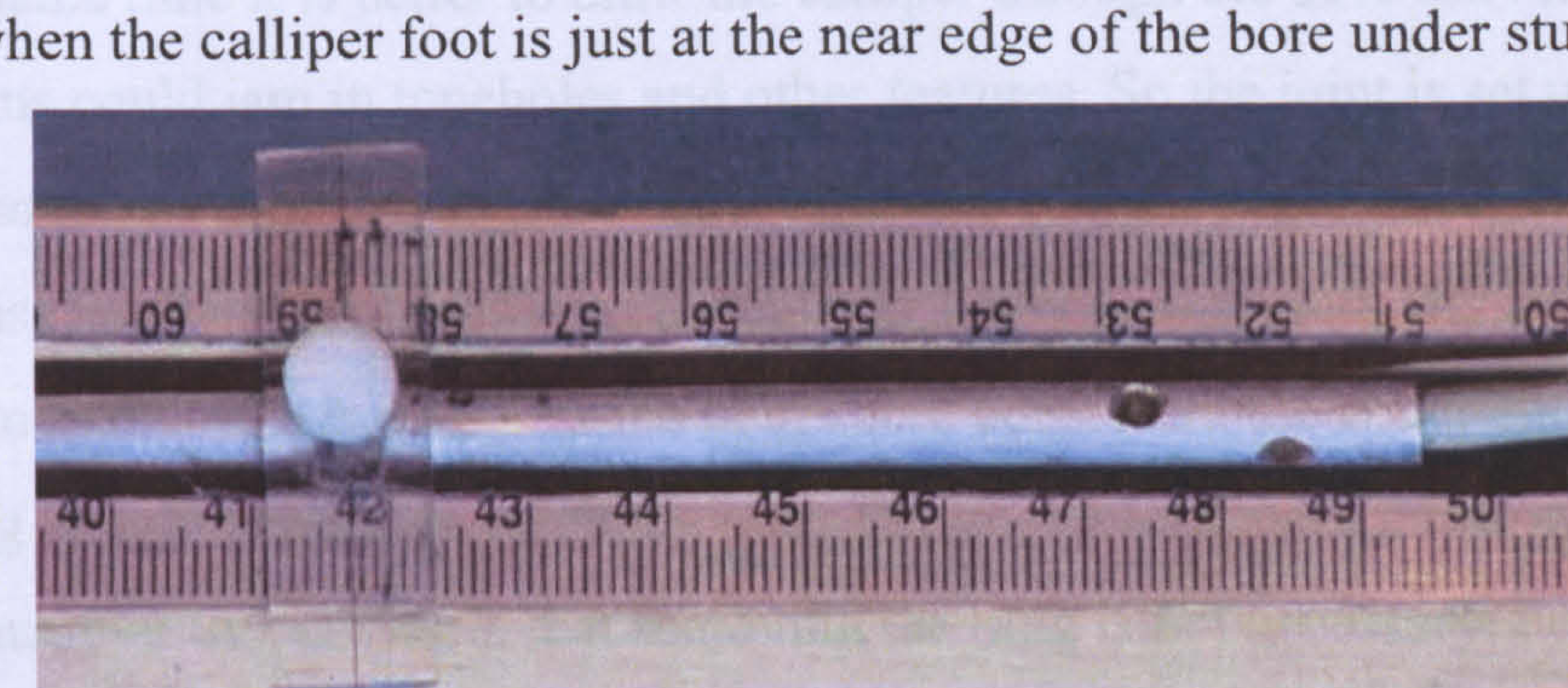

Fig 2.3. Cursor and scale

Two height-adjustable v-shaped cradles were made to support the joint being measured with its longitudinal axis horizontal, and at a height so that the measuring rod runs close to horizontal.

Before use the electronics must be calibrated with the calliper at two settings; first the minimum opening then open to about three-quarters of the range (minimum + 16mm), so a pair of setting rings to match each foot piece was made from 10mm acrylic sheet.

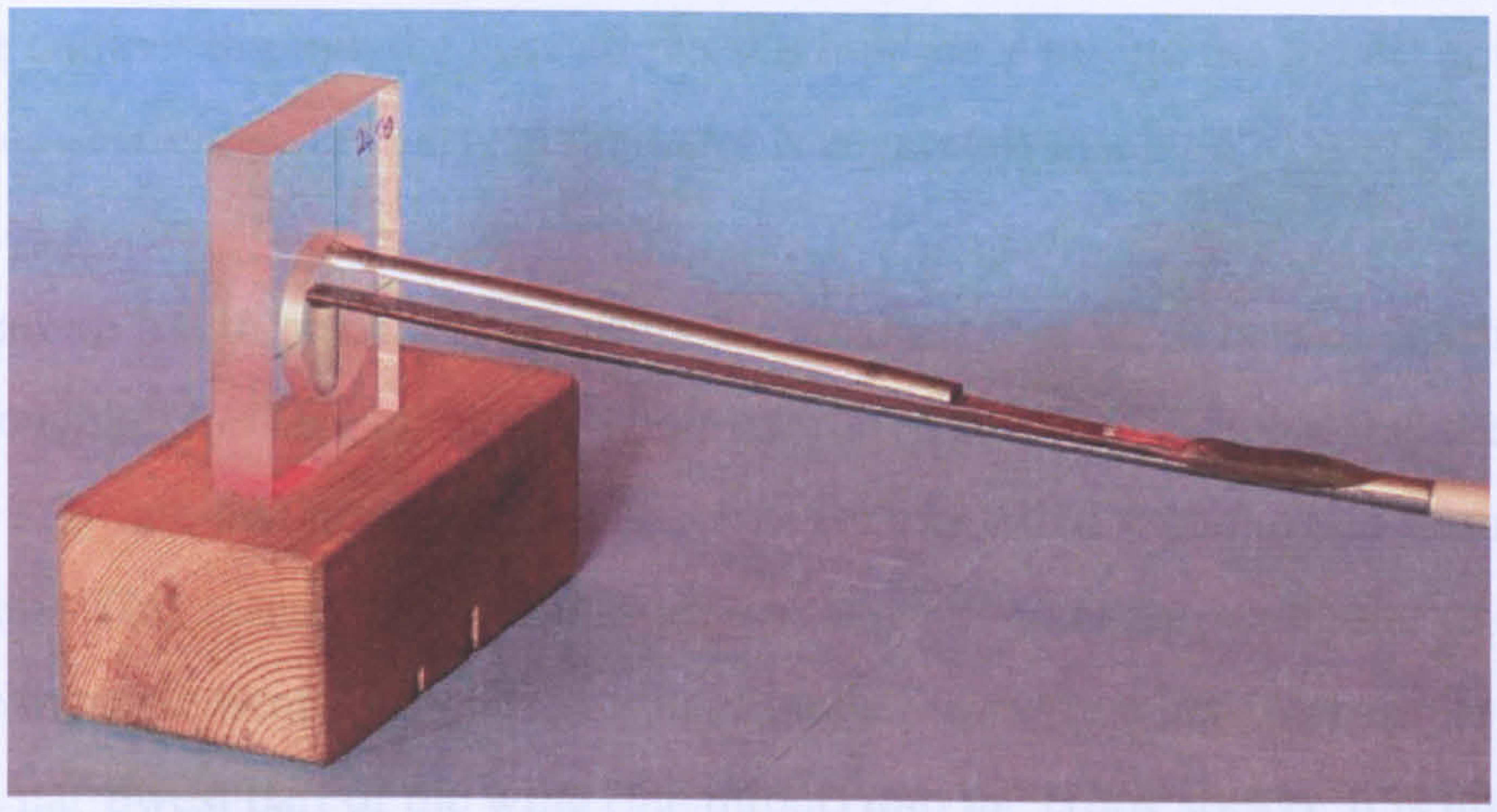

Fig 2.4. Calliper with 20-40 mm foot, in setting ring

The digital scale reads zero at the minimum opening, so the foot size must be recorded and that 'offset' value added to the reading to give the true diameter. The scale reads out to two decimal places but the specifications state the accuracy to be in the order of ± .02 mm, and in practice the 1/100ths were rather unstable; so the diameter readings were rounded off to the nearest 0.05mm for writing down.

The instructions for the device point out that it is slightly more accurate in expansion than in contraction, so it is best to proceed from the narrow end of the joint towards the wide end. At the same time it is better to draw the calliper through the bore than to push it, when the arms could jam in toneholes and other features. So the joint is set up with the wide end nearest the measuring bed and the calliper slid right down to the far, narrow end to start. Measuring then proceeds with the calliper being drawn gradually out of the joint. An exception to this rule is made for the boot small bore. Here the wider end is blocked by the boot plug which owners are often reluctant to remove for fear of causing damage. A major advantage of this device is that removing the plug is not necessary, because the calliper can be fed through the narrower end and allowed to open up inside; measuring can then proceed from the wider, far end towards the nearer. This bore is always of sufficient diameter to require the 10 or 15mm foot piece so there is not a problem with the calliper rod fouling the narrower opening.

A drawback of the light spring tension is that the spring force is not enough to centralise the calliper in the bore, to ensure that it is measuring the full diameter. In practice this is not too much of a problem so long as the joint is reasonably straight. The calliper is first set up carefully with the sprung arm moving vertically; then the technique of gradually drawing the calliper through the bore allows the foot piece to find the lowest point of the circular cross-section, so the vertical diameter is accurately spanned.

Special attention has to be paid when using the smallest foot-piece because of the danger of the rod touching the bore and lifting the foot off the surface. To avoid this the joint (the wing is the only one that needs the smallest foot) can be tilted with the end furthest away raised slightly. This means that the measuring axis is not quite perpendicular to the bore axis but the measurement error caused is negligible. Similarly when the calliper passes through the narrowest part of the wing (the throat) into the crook socket, it is unable to open out fully to properly span the diameter. The only way around this is to measure the wing from both ends; it was usually measured for 100-150 mm from the top (crook) end and all the way through from the south end. On earlier measuring trips this was not done and the resulting picture of the crook socket is inaccurate. That is not of great importance though; the measurements of the critical throat area are still good.

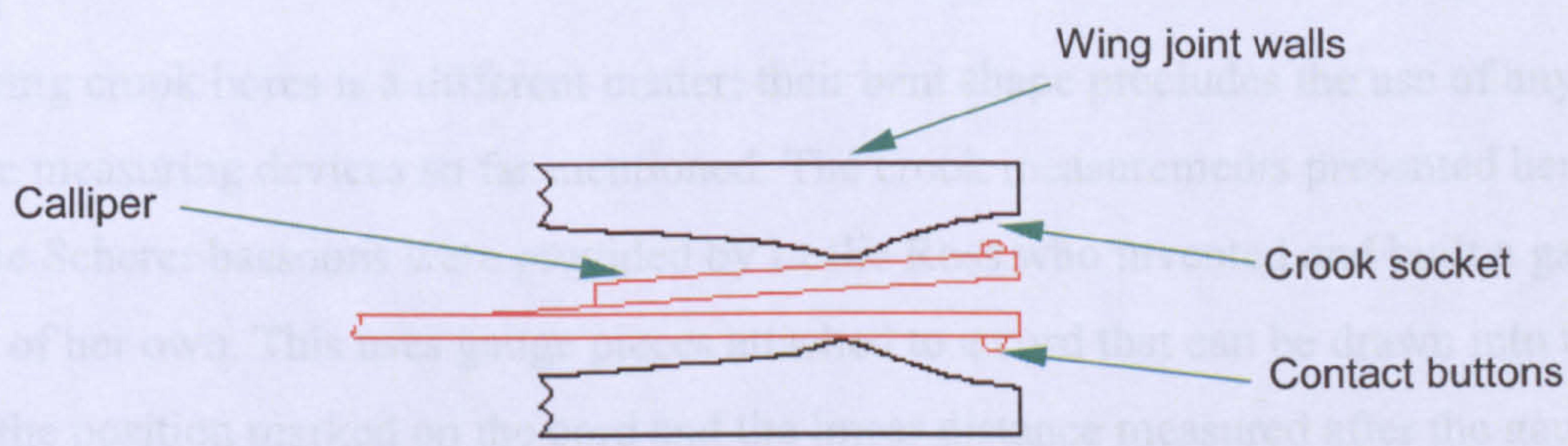

Fig 2.5. Calliper fouling on wing throat

When the joint being measured is warped into a curve there can be similar problems; it is best to arrange the joint with the curve in the vertical plane and it may also be necessary to tilt the joint. It was sometimes necessary to rearrange the joint partway through measuring.

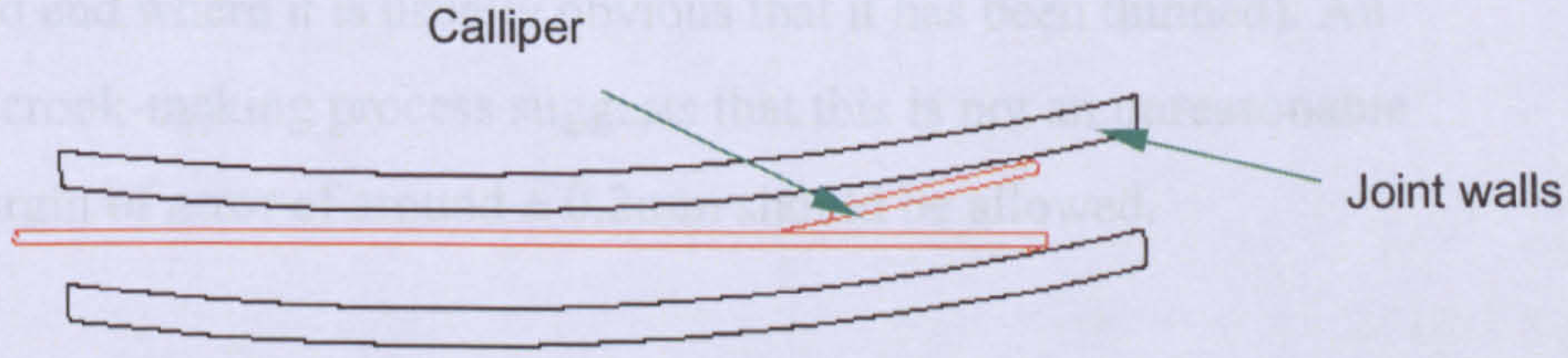

Fig 2.6. Calliper measuring curved, tilted joint

The diameter was recorded at five or ten millimetre intervals along the bore. The joint then rotated 90° and the process repeated to give two diameters for every point along the bore. These two diameter axes are usually: 1) in line with the tonehole axes (so that the calliper occasionally entered the tonehole opening) and 2) at 90° to that. They are recorded as 'tone hole' and 'transverse' axes respectively. In the majority of cases eighteenth century woodwinds have the fingerholes drilled into the quarter grain, so these axes usually coincide with being in line with, and at 90° to the annular rings of the wood; and so are also the 'quarter-grain' and 'slab-grain' axes respectively. Because of the way that wood shrinks differentially across or in-line with the annular rings, they also coincide with the minimum and maximum diameters; the tonehole axis is usually the minimum and the transverse axis the maximum. In cases where either the holes were not drilled exactly on these axes, or where the maximum and minimum were not so aligned, the measurements were made along the maximum and minimum as far as they could be ascertained by eye. However once set, the orientation of the joint was not changed; so if the axes of ovality rotate along the joint as they sometimes do, this is not followed by the calliper, but is indicated in the bore graph when the two traces cross.

Crooks

Measuring crook bores is a different matter; their bent shape precludes the use of any of the bore measuring devices so far mentioned. The crook measurements presented here from the Scherer bassoons were provided by Leslie Ross who invented and built a gauge system of her own. This uses gauge pieces attached to a cord that can be drawn into the crook, the position marked on the cord and the linear distance measured after the gauge is withdrawn. There are measurements of just four other crooks given here and they were made with the rather more crude method of measuring the outside diameters of the crook and subtracting twice the thickness of the brass. The diameters were measured in two planes – the plane of the bend and vertical to that – in 20mm increments along the length. The wall thickness can only be measured at the open, big end of the crook, and the assumption must be made that the thickness is consistent along the whole of the crook (apart from at the reed end where it is usually obvious that it has been thinned). An understanding of the crook-making process suggests that this is not an unreasonable assumption, but a margin of error of around ± 0.2mm should be allowed.

This is an area where acoustic pulse reflectometry (a.p.r.) could be very usefully applied, though again it was not possible to do so in the course of this study. A related, preliminary study by Sharp and Dart was reported at a 2007 meeting of the Musical Acoustics Network.[11] This used a.p.r. to measure the bore of a crook both before and after it was bent into 'S' shape, and impedance testing to check for any changes of input impedance values after bending. Its findings were that; a) there was a good correspondence between the a.p.r. measured, and the designed bore profile of the straight crook; b) the bore profile did not change at all in the bending process (neither diameters nor overall length); c) unsurprisingly therefore, the input impedance spectrum did not change either.[12]

Toneholes

Further special tools were needed to obtain tonehole data. For the long toneholes drilled at an angle to the bore axis it is necessary to determine the position where they enter the bore; something not required for other woodwinds, where it is sufficient to record their place along the outer surface. A simple measuring stick was made of a piece of dowel with a small lateral branch placed at one end. A scale was drawn on the dowel so that the branch could be hooked onto the internal edge of the tonehole and the distance to end of the joint read off. The stick was then pushed the short distance for the branch to catch the far side of the hole and that distance also recorded (by adding the branch's thickness to the scale reading). These distances were recorded to the nearest 0.5 mm. Needless to say, the branch is well smoothed off and these actions are all carried out with due delicacy, and care for the possibly brittle tonehole edges.

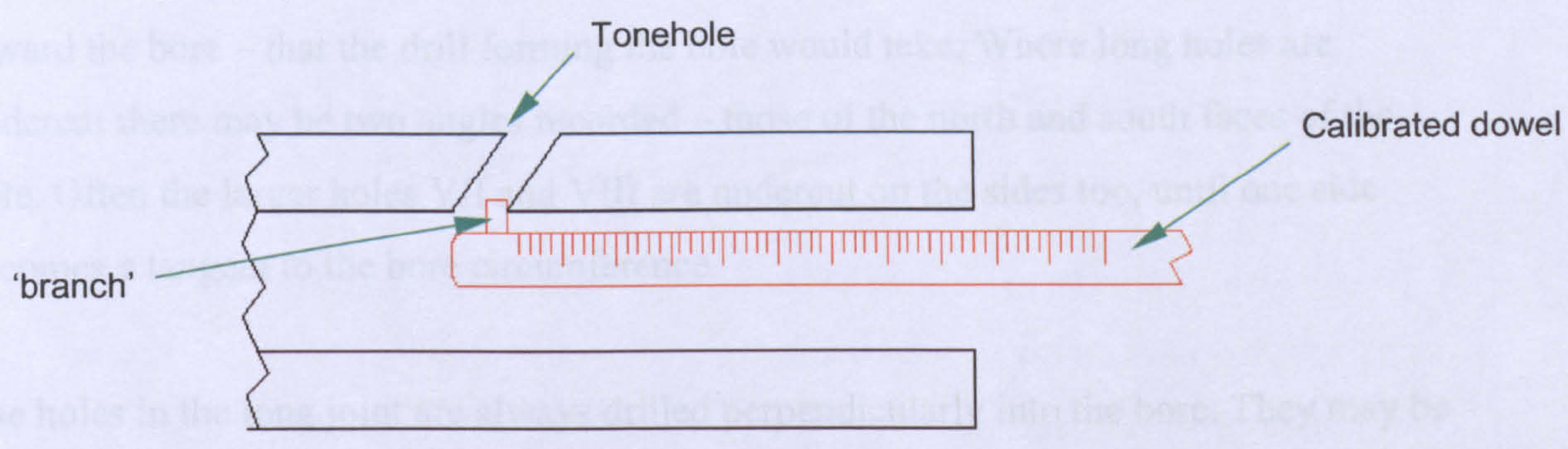

Fig 2.7. Tonehole position measuring stick

The same device was used to detect the north edge of the septum window and measure the distance to the top of the boot.

[11] David Sharp and Mathew Dart, 'Investigating the effect of bending a bassoon crook on its internal profile and input impedance', report presented at the Musical Acoustics Network Summer Meeting, 20 June 2007.
[12] Myers surveyed the literature regarding the acoustical effects of bends in brass instrument tubing, concluding that the effects are not large, even in tightly curved tubes, to the extent that they can be discounted for taxonomic purposes. See Myers, 'Characterisation', pp. 43-47.

Measuring the diameter of bassoon toneholes is also no simple matter. The deep holes are sometimes undercut (opening wider towards the bore) as is expected of eighteenth century woodwinds, but more often they are larger at the outer surface and contract towards the bore. Normal vernier-style callipers can measure the major and minor axes of the oval opening at the surface and at a depth of about 10 mm with their internal-measuring jaws. To get deeper in, a set of plastic rods was made in 0.2mm increments of diameter; so the depth each one reached into the hole could be recorded along with the diameter of the largest one to pass right through. Usually an attempt was made to describe the fit of the passing rod; it was either loose, tight or a 'smooth' fit, meaning that it would pass through touching the sides of the hole, without being tight. Approximate numerical values corresponding to these fits are:

Tight:	hole diameter = rod diameter (r.d.) to r.d.+0.05mm.
Smooth:	hole diameter = r.d.+0.05 to r.d.+0.1mm.
Loose:	hole diameter = r.d.+0.1 to r.d.+0.2mm.

The angles that the toneholes make with the exterior surface were measured using a protractor, adapted with a swivelling pointer that could be inserted into the hole. Alternatively one of the diameter-measuring rods was inserted and a protractor held against it. Angles were recorded as deviations from perpendicular to the longitudinal surface of the joint, and the direction (North or South) recorded, is from the surface toward the bore – that the drill forming the hole would take. Where long holes are undercut there may be two angles recorded – those of the north and south faces of the hole. Often the larger holes VII and VIII are undercut on the sides too, until one side becomes a tangent to the bore circumference.

The holes in the long joint are always drilled perpendicularly into the bore. They may be undercut, in which case the angles that the sides take from perpendicular are measured with the adapted protractor. This was not always possible, especially when keys could not be removed, so an estimation and classification system was used similar to that described by Bouterse:[13]

[13] Bouterse, *DWIATM*, p.40.

Very or extremely undercut: the hole opens internally to circa twice as wide (e.g. from 5mm externally to 10 mm internally).

Moderately undercut: the hole opens to circa one-and-a-half times as wide internally (e.g. from 5 to 8 mm).

Slightly undercut: the hole becomes only a little wider (from 4 to 5 mm or from 6 to 8 mm).

Often when undercut, a cylindrical section is left at the intersection with outside surface. This is called a chimney and its length is recorded. Sometimes these holes are also significantly opened out towards the surface; in which case they are labelled 'overcut' and both the diameters at intersection with the surface and the minimum diameters are recorded.

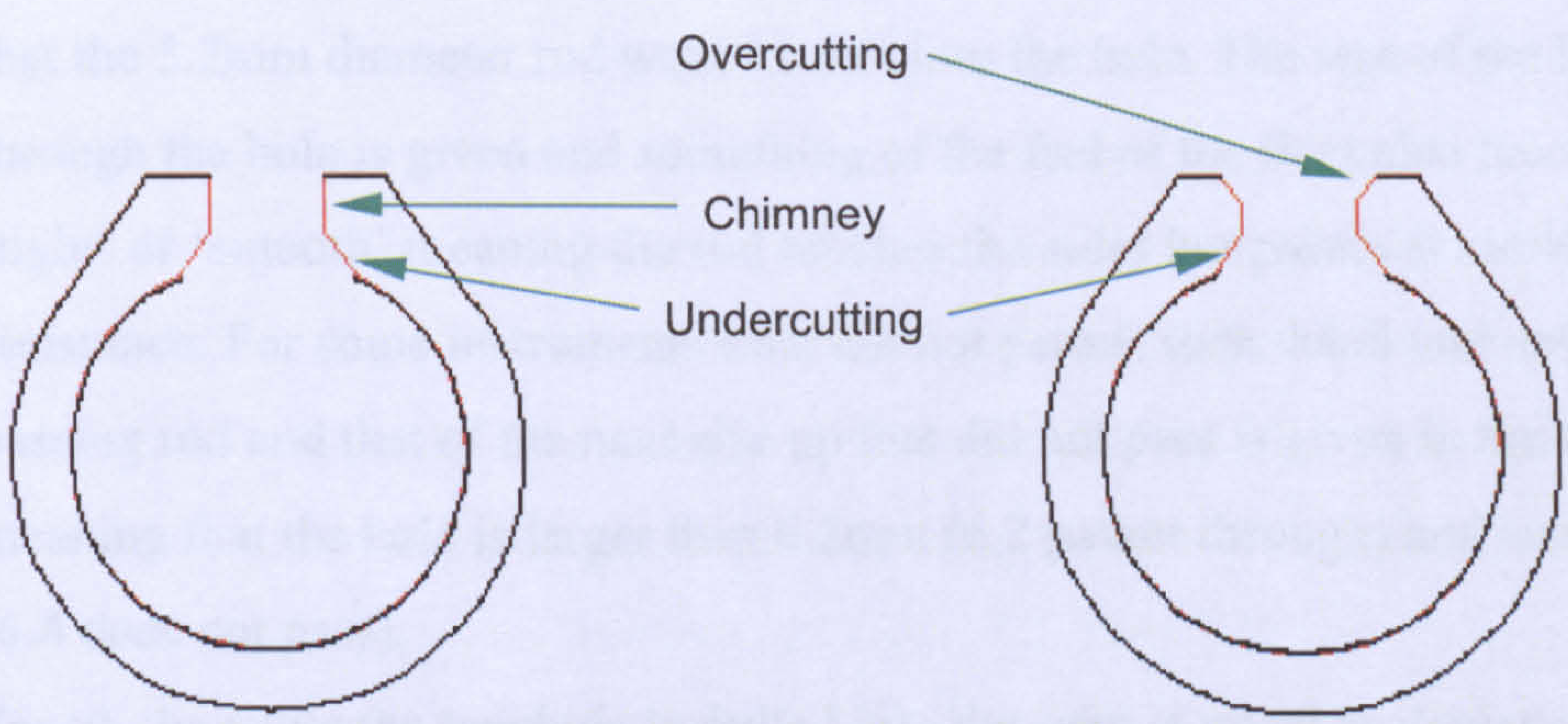

Fig. 2.8. Cross section of a typical long joint, through a tonehole; showing tonehole facets. Left; an undercut tonehole, Right; an over- and undercut hole

The tonehole undercuttings in the bassoons discussed here do not display the degree of refinement and sophistication found in the toneholes of flutes and recorders by the same and contemporary makers. Whether this is because it was considered less necessary, or because it is less easy to undercut a deep and relatively narrow hole, is not clear.

2.2 Data Processing and Presentation

Toneholes

Tonehole data is presented in Appendix 3 on a single page for each instrument.

For each tonehole the distances of each edge of the hole, to one end of the joint is given; both for inside (the intersection with the bore), and outside (on the joint surface). The positions of the intersection with the bore are also shown on the bore graphs.

Diameter information is given in several columns:

First the minor and major axes of the opening at the joint surface.

Second the reading given by internal callipers inserted to their maximum depth (about 8-10mm) in the column 'calliper min.'.

Third a column called 'rods etc', where the fit of the hole measuring rods is recorded. The diameter of a rod and the depth it went into the hole is given, for example: 5.2->12 means that the 5.2mm diameter rod went 12 mm into the hole. The size of the largest rod to pass through the hole is given and something of the feel of the fit is also recorded, as 'loose', 'tight' or 'smooth' meaning the rod touches the sides but passes smoothly, without resistance. For some instruments time did not permit such detail and only the size of the passing rod and that of the next size up that did not pass is given in the form; >6.2 <6.4, meaning that the hole is larger than 6.2mm (6.2 passes through) and smaller than 6.4mm (6.4 does not pass).

Fourth the angle the tonehole is drilled into the joint is given as deviation from perpendicular to the surface.

Holes in the long joint are treated differently. The inside distances are not given as they are drilled perpendicular to the joint axis. Two diameters are given for each hole; measured north-south and east-west. Some indication of undercutting is recorded in column 'U/C' along with the length of any chimney present.

The position of the septum hole (window) in the boot is given by the distance from the top of the boot to the north edge of the window and to the face of the boot plug(s). The same sheet also shows the lengths of each joint (OAL = overall length) and of the tenons. Total bore length and standing height are also presented.

Bore profiles

The bore measurement data is tabulated and processed in Excel. The appropriate offset value (depending on foot-piece used) is added to the diameter readings and a graph plotted of the diameter against distance from one end of the joint. This bore graph is a device commonly used by woodwind instrument researchers and makers to help visualise the shape of the bore.

The plot is made with the diameter scale expanded, and in the case of bassoon joints, the distance scale shrunk (with smaller woodwinds the distance scale can be actual size). The ratio between diameter and distance scales is usually between 20 and 40 to 1. The result is that any complexities in the shape of the bore (any deviations from a straight taper), are exaggerated and can be more readily appreciated. This analysis, though, should be tempered with the understanding that the expansion of the diameter axis also exaggerates measurement error. The plotted line is called the bore profile. When the bore has been measured in two axes, as it ideally should be, then both sets of data are plotted together and the differences if any can again be readily seen.

Bore graphs are extensively used in this study for several purposes. They can give information on presence and extent of deformations; out-of-roundness of cross section, crushed tenons, irregularities caused by rot or wear. They can be a means of analysing a maker's design, giving information on the tooling used, and whether the same tools have been used in another instrument. They can be used when comparing instruments by different makers to show common practices or differing ideas.

Appendix 3 contains bore graphs for each bassoon studied, presented in the order in which they are discussed in Chapter 3. For each instrument there is one page with profiles for each joint plotted on the same scales and one page with the joints assembled to show the complete bore. One problem with Excel is that it does not make it easy to print out these graphs to a known scale on the page, but two standard scale pairs are used; one for the separate joints and one for the complete bores. This rule is broken for the large quart-bass and contra-bassoons.

On the page with separate joints each measured point is shown with a marker so that the measuring intervals can be appreciated. The points are joined with straight lines to aid the eye in discerning the pattern of the bore but when the measuring intervals are relatively large these lines get less accurate and may disguise bore features not detected in the measurements.

On the complete bore page individual measured points are not marked; only the joining lines are shown. When assembling the complete bore the bassoon has to be effectively straightened out to give one continuous bore profile. For this visual representation the down bore is joined to the up bore at the position of the boot plug's inner surface: i.e. the down bore is measured as far as the plug face and the up bore from the plug upwards. This is a relatively simply derived solution which is not affected by modifications to the window size that quite frequently occur, however it gives an approximation of the total bore length which may differ slightly from the distance along the centreline of the bore axis. The method used will be shorter than the centreline by an amount equal to:
mean bore diameter at window + septum thickness – window height.

In the case where the height of the window is equal to the mean of the large and small bore diameters at the window position, the centreline will be longer by the thickness of the septum: generally around 4mm. When the window height is greater than the mean bore diameter by an amount equal to the septum thickness, the bore lengths will be the same and if the window height is even greater then the approximation will be too long. The window height in an undamaged bassoon is usually around the same as, or a little larger than, the bore diameters at its position; if it is found to be significantly greater, then damage or deliberate cutting-back of the septum to raise the instrument's pitch should be suspected. Therefore the method used here makes a simple approximation of the total bore length in undamaged condition.[14]

The positions of the junctions between bore sections are shown as vertical lines; these are actually the positions of the tenon ends; and any small gap where a socket is deeper than the tenon length is not shown. The window position is shown as two vertical lines, which are at the position of the window's north edge in both the up- and down-bores, so the plug face is in the middle between the two lines.

<u>Bore profile comparator</u>

In order to make comparisons between bassoons it is useful to be able to plot more than one bore profile on the same graph, so to facilitate this an Excel workbook was constructed to combine functions of database and data comparator. Each bassoon has a separate page in the workbook on which is entered the co-ordinates of the whole,

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[14] There are other acoustic considerations regarding the turn-around apart from the length of the bore centreline; these are discussed in section 5.3 under the fingerings for G2/G3.

assembled bore. When the instrument has been measured in two axes the maximum diameter value is used, as presenting two lines for each of several instruments rapidly creates an unreadable mess.

A master page contains a graph display and buttons labelled for each bassoon which, when pushed, set off a macro that plots the bore of that bassoon on the graph. Any number of bores can be overlaid on the graph and the name of each instrument plotted appears in the key.

There are further buttons labelled for the various bassoon joints. When one of them is pushed the graph's scale ranges are changed to effectively zoom in on the appropriate section of bore. The title of the graph changes appropriately.

The bores are plotted with the top of the wing joint at zero on the distance scale but it is often desirable to be able to shift a whole bore laterally, up or down the distance scale; for example, to align the ends of differing length joints on several instruments. Provision is made for this with a keyboard shortcut, allowing any bore to be shifted in increments of either ten or one millimetre in either direction. A counter next to the instrument's button records how far the bore has been 'shuffled', in positive (to the right) or negative direction.

To make the extents of each joint clear a small vertical tick has been added at the position of intersection between one joint and another. Tonehole positions can be added in a further operation.

The screenshot below shows each of these features:

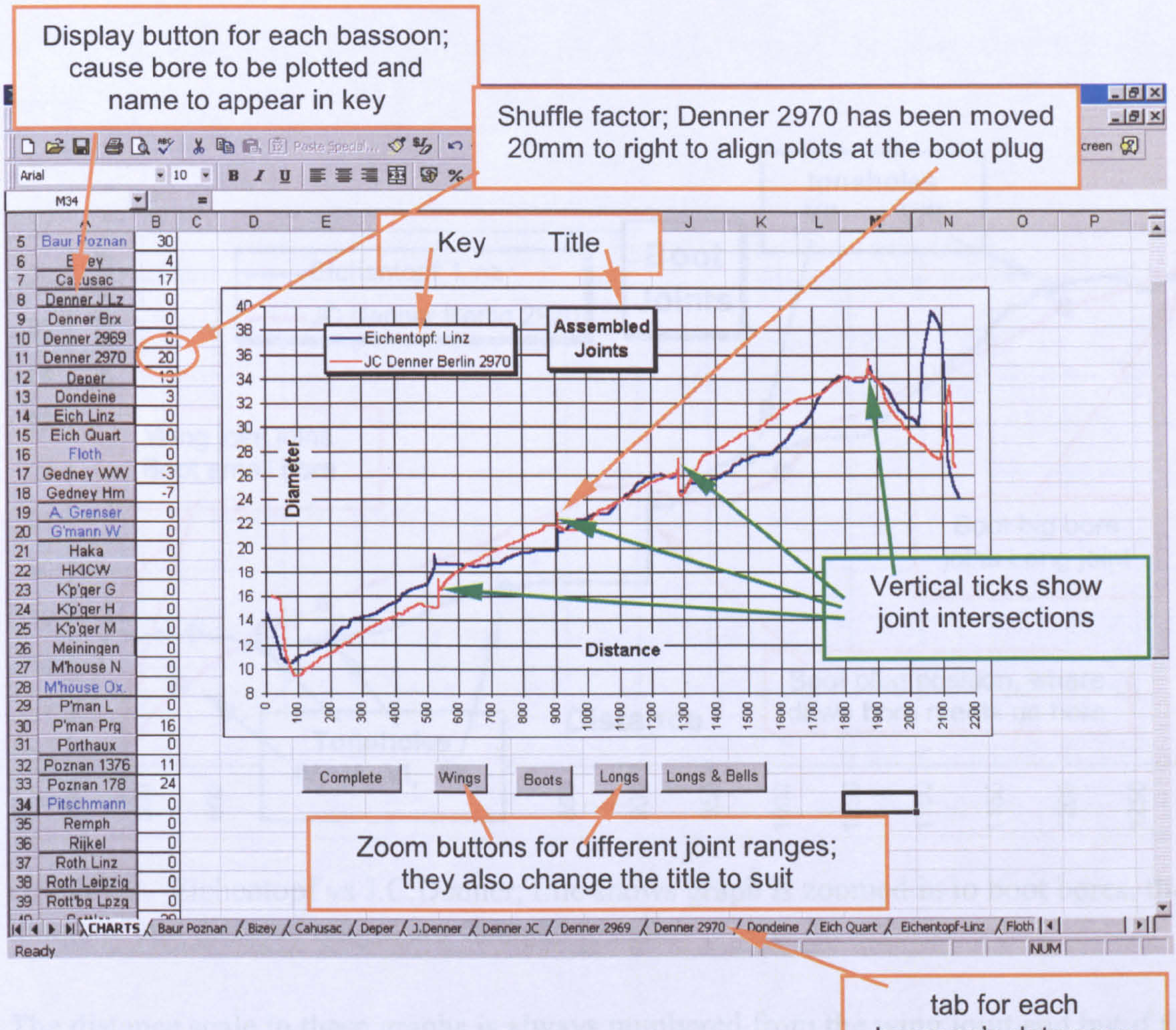
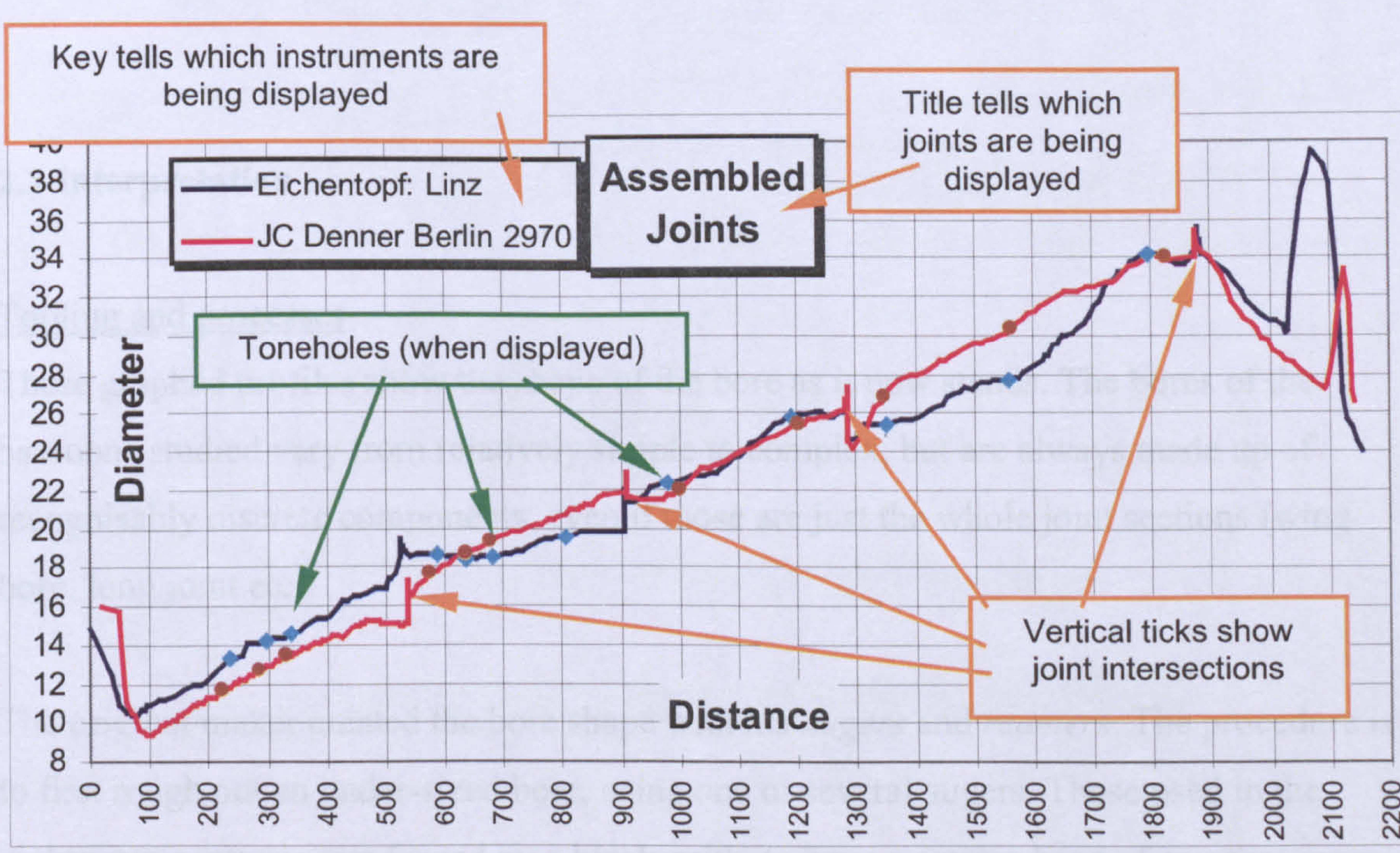
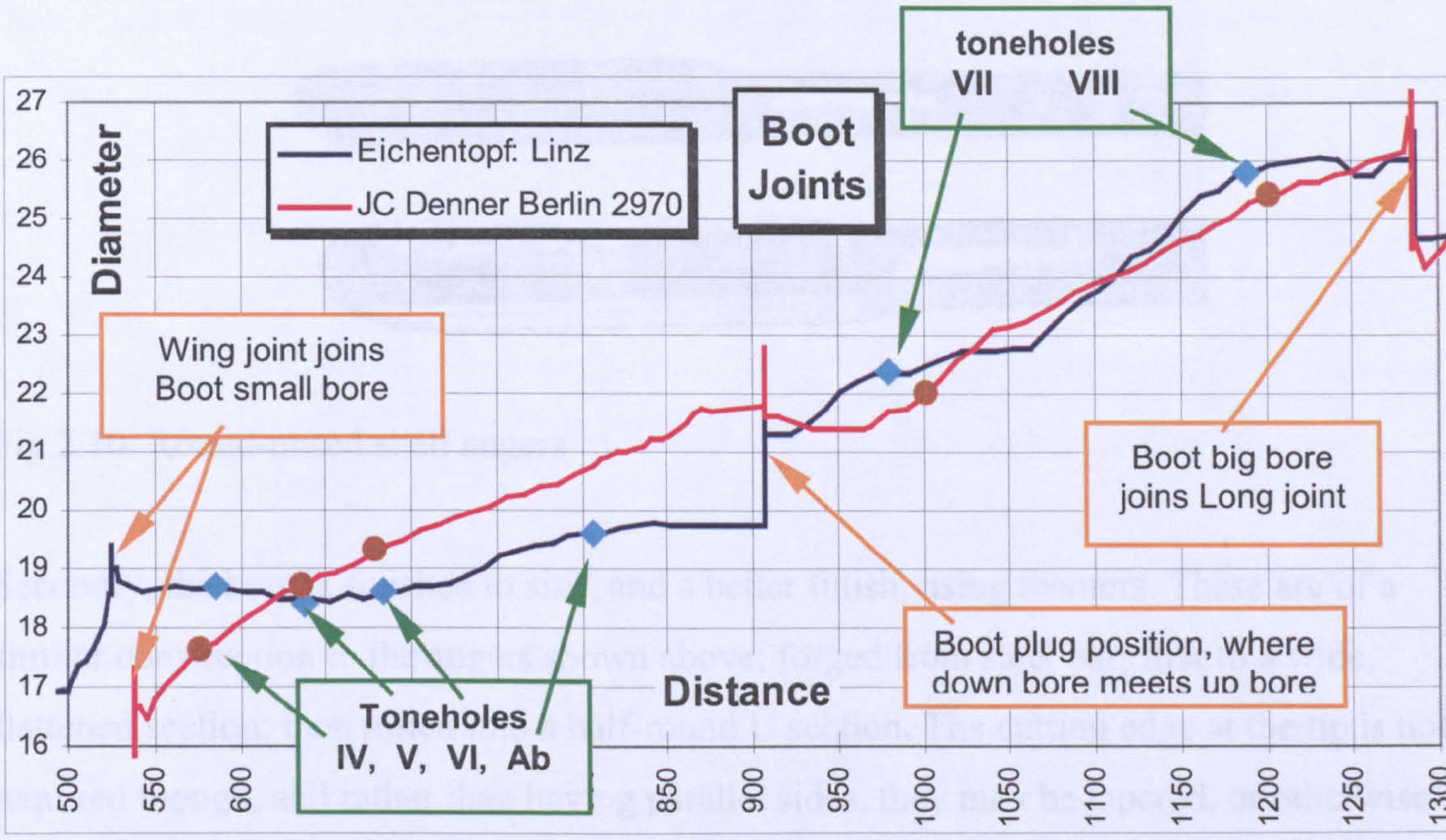


Fig 2.9. Screenshot of Bore Comparator workbook

The graphs constructed in the workbook are frequently used in the following chapters to illustrate various points; they appear as in the following examples:



Graph 2.1. Whole-instrument bores of Eichentopf vs J.C.Denner



Graph 2.2. Eichentopf vs J.C.Denner; title shows graph is zoomed in to boot bores, the diameter and distance ranges are changed to suit

The distance scale in these graphs is always numbered from the wing joint end but if the plot has been shuffled in either direction the distance values become nominal only. The scale may be used in the text to refer to particular areas and features of the bore, but the shuffle value may not be given; so if accurate location of those features is needed the individual plots in Appendix 3 should be consulted.

2.3 Interpretation

Tooling and processes

These graphed profiles show the shape of the bore as it now stands. The bores of the bassoons studied vary from relatively simple to complex, but are always made up of recognisably discrete components, even if those are just the whole joint sections (wing bore, long joint etc).

The original maker created the bore shape with his *augers* and *reamers*. The procedure is to first rough out an under-sized bore, using one or several augers. Those used in the eighteenth century were forged by a blacksmith, to have a cutting head of crescent cross section and a rounded tip. Some modern examples of similar form are shown in Fig 2.10 below:

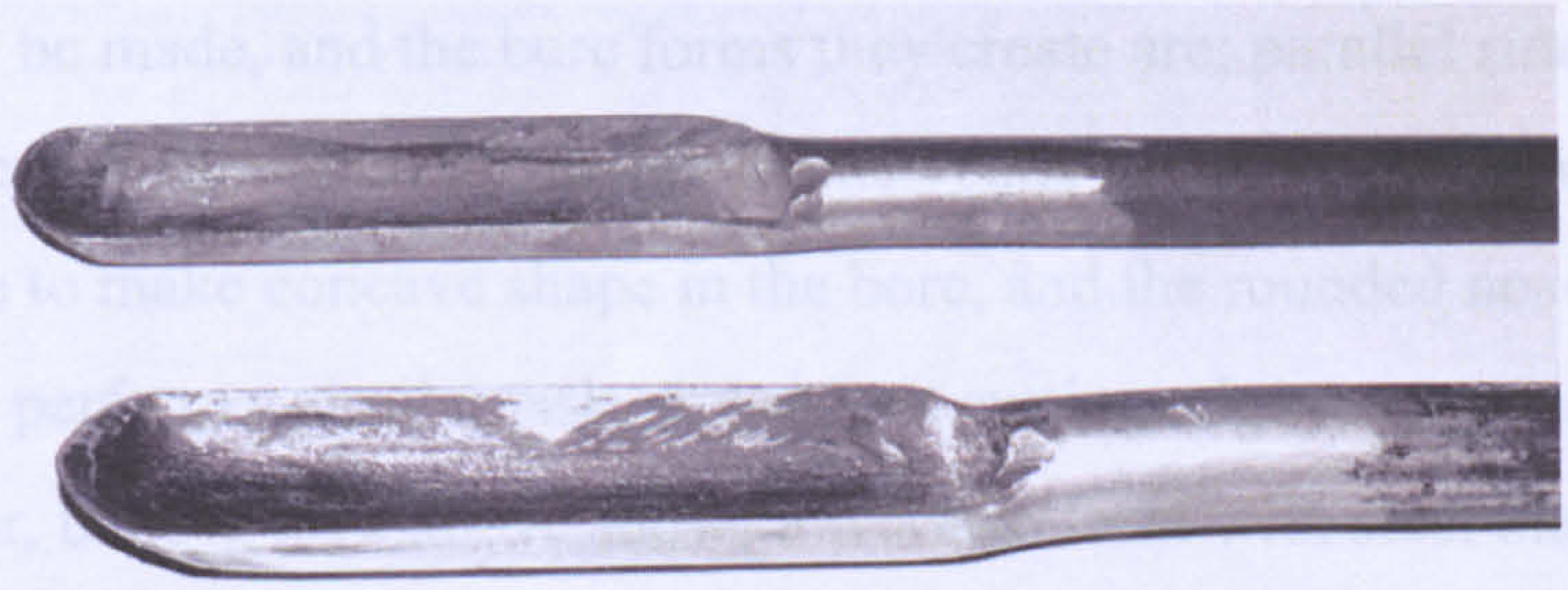


Fig 2.10. Round-nosed shell augers

Secondly, the bore is finished to size, and a better finish, using reamers. These are of a similar construction to the augers shown above; forged from steel bar; first to a wide, flattened section; then rolled into a half-round U section. The cutting edge at the tip is not required though, and rather than having parallel sides, they may be tapered, or otherwise shaped longitudinally. One side edge does the cutting, so it is carefully sharpened. The photographs below show some surviving early nineteenth century reamers of various sizes.

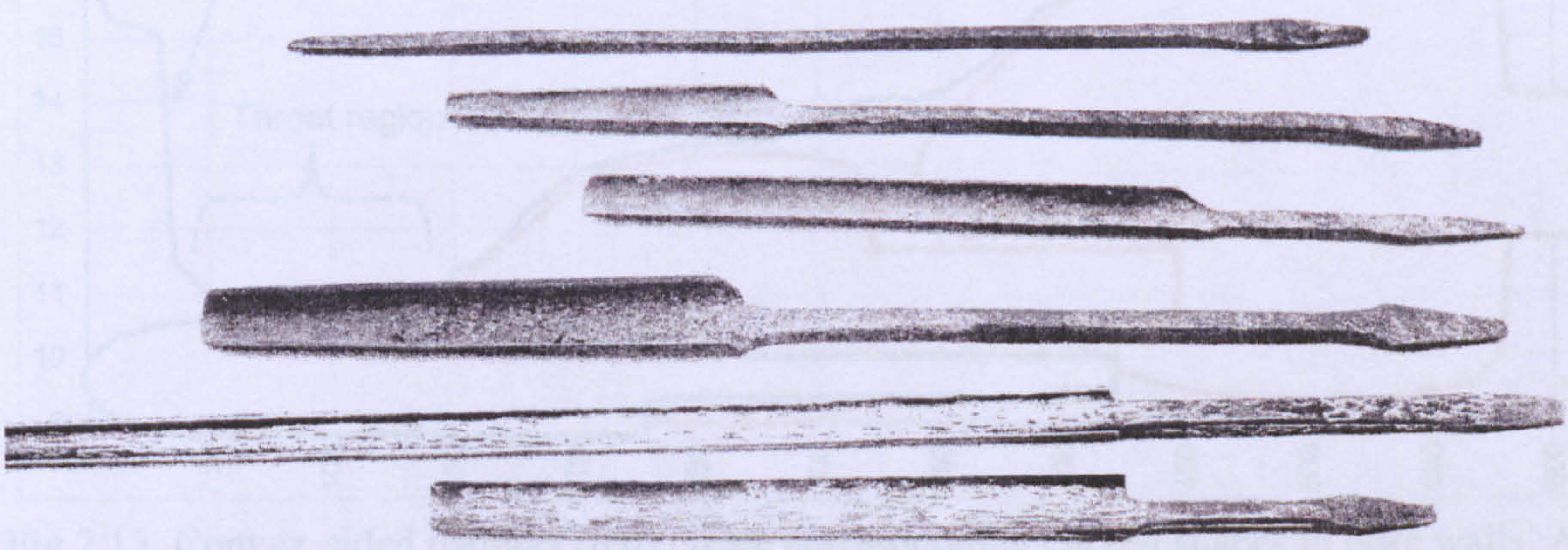


Fig 2.11. Early nineteenth century bassoon reamers; collection of Martin Wenner

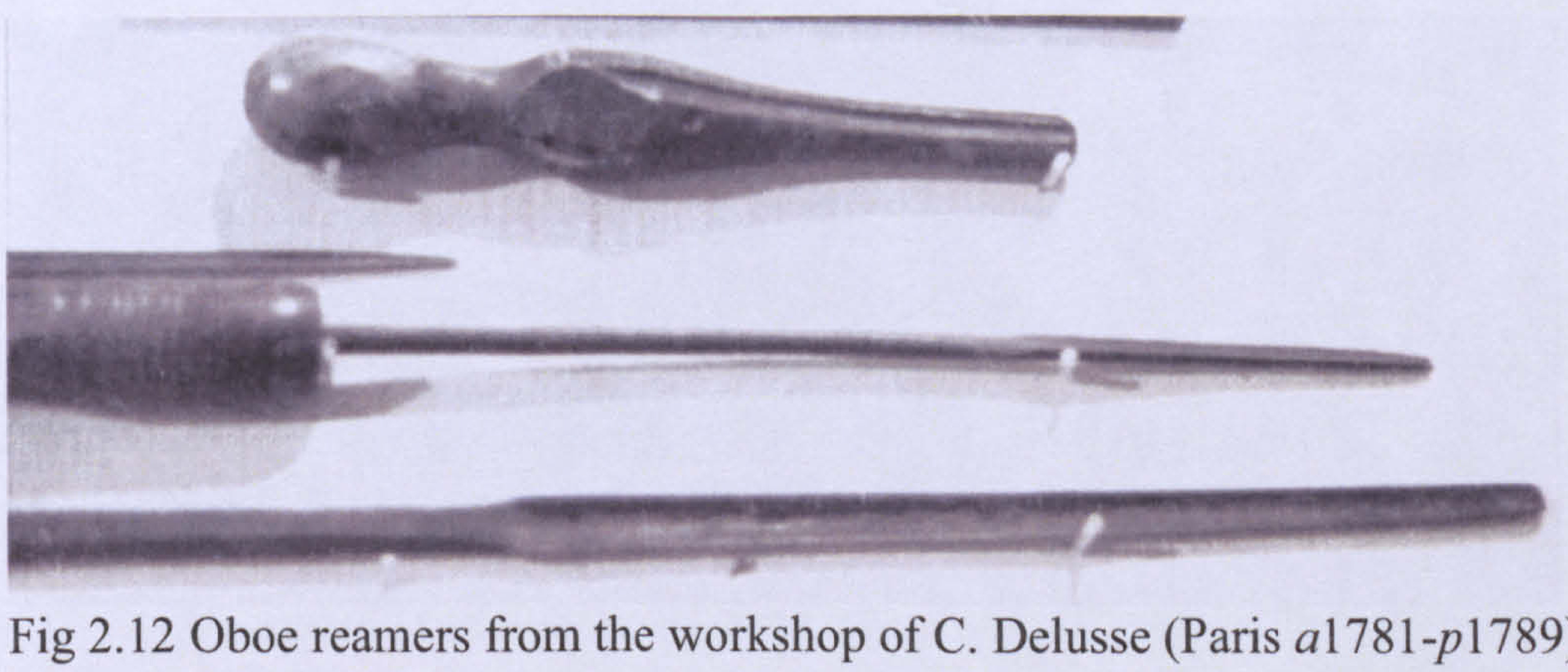


Fig 2.12 Oboe reamers from the workshop of C. Delusse (Paris *a*1781-*p*1789)[15]

[15] Musée de la Musique, Paris, E1508/C1422; see Waterhouse, *NLI*, p. 85.

The shapes that reamers can be made to are limited, so certain patterns in the bore profile will indicate where separate reamers have been used. The three basic shapes to which a forged reamer can be made, and the bore forms they create are; parallel sided to make a cylindrical bore section; a section of a straight-sided cone to make a straight-tapered bore; convex sided cone to make concave shape in the bore, and the rounded nose of parallel-sided reamers can perform a similar task. A concave cutting edge cannot readily be made on a forged reamer, but Fig 2.12 above shows a wooden form with steel blade inserted, for shaping the internal, curved flare of an oboe bell. This type of reamer would only be used to remove a small amount of wood, to finalise a shape already prepared on the lathe.

The three shapes are illustrated diagrammatically below, with each placed alongside a section of bore graph, to show the correlations between the shapes of each.

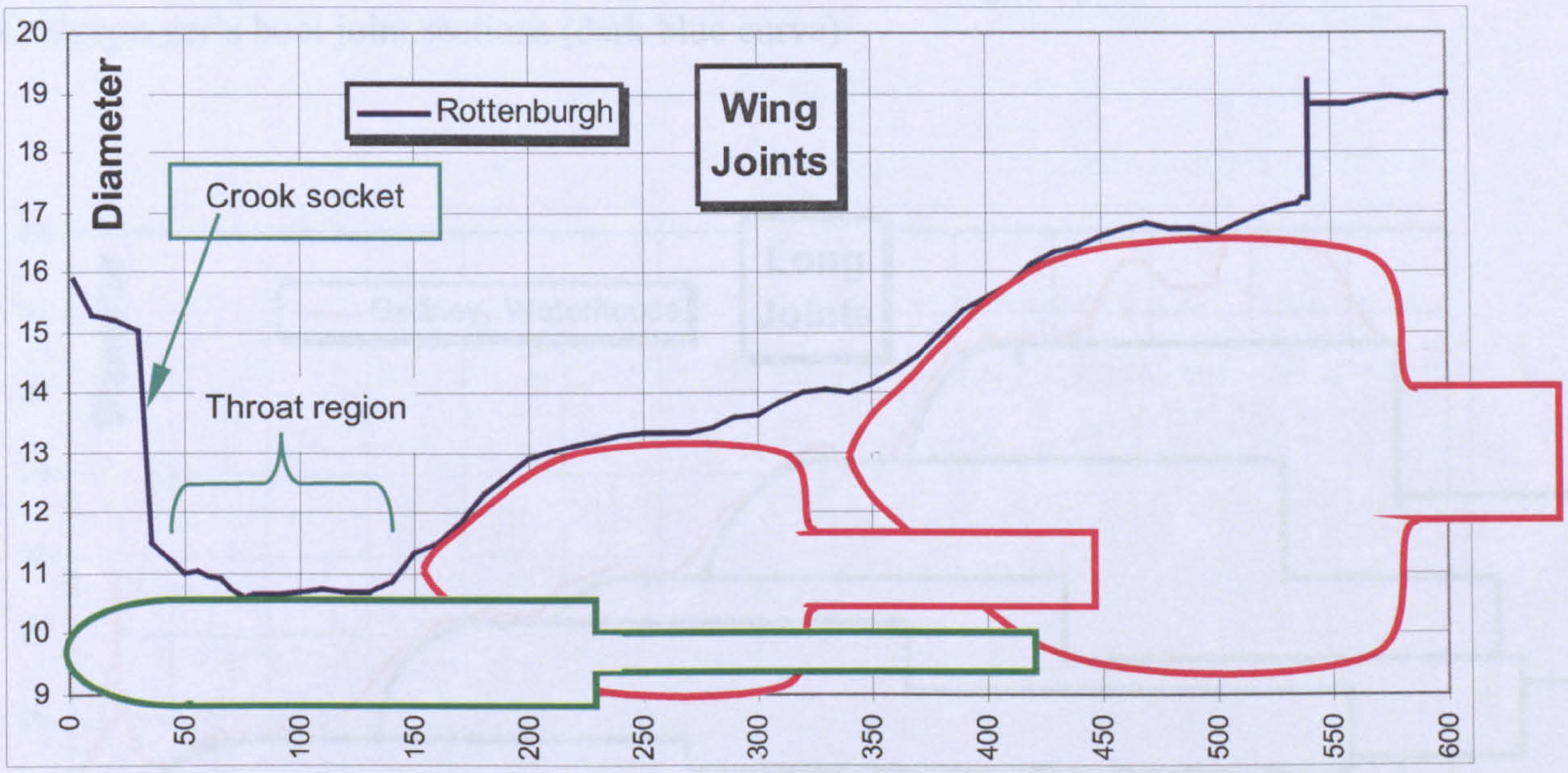


Fig 2.13. Convex-sided reamers (red) create corresponding curved shapes in bore walls. A parallel-sided reamer (green) creates a cylindrical section at the throat of the wing joint.

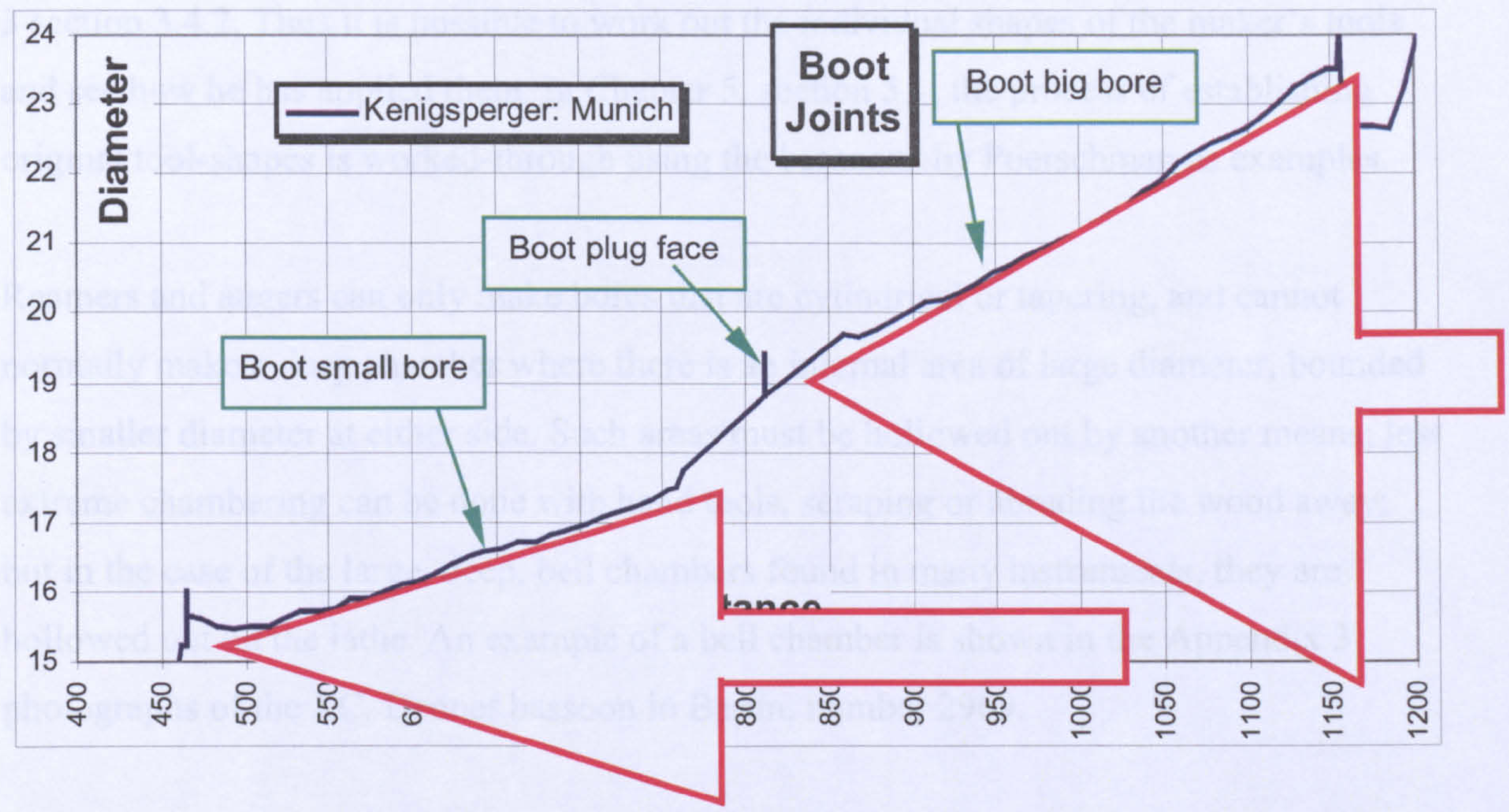


Fig 2.14. Straight-sided conical reamers (red) create the straight-tapered sections of Kenigsperger's boot joint.sections (dark blue curve)

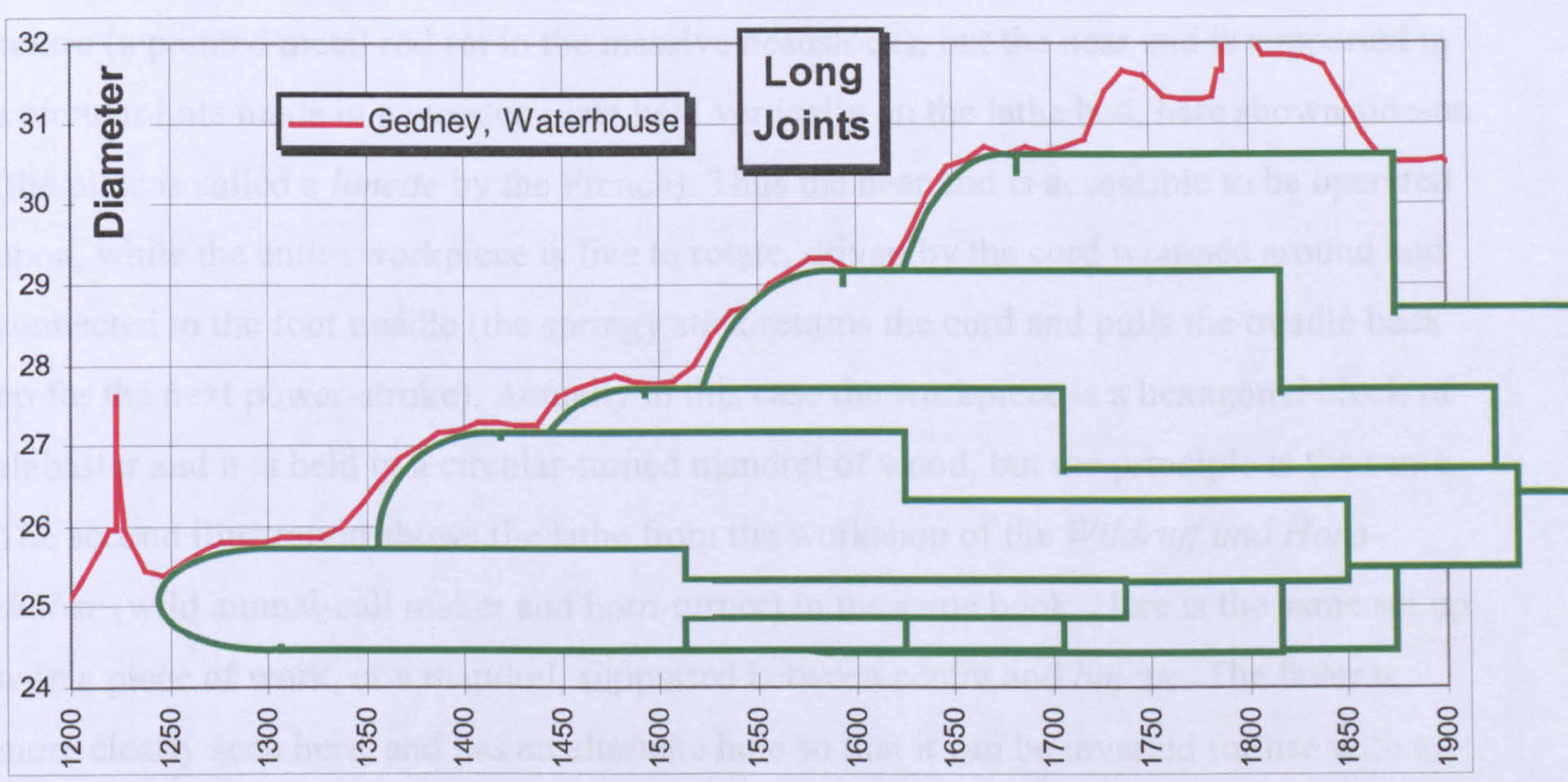


Fig 2.15. Several round-nosed reamers or augers (green) create the stepped bore in Gedney's long joint (red curve)

Note that several reamers are proposed in the last example, rather than a single tool with a stepped profile; that is because it is difficult to make a reamer with a concave edge as a consequence of its rolled, U-shaped cross section. So when there is a change in the angle of the bore profile from steeper to less steep, it is generally taken to indicate the intersection between two sections formed by different reamers. In the case of the Gedney bassoon these steps are quite noticeable to the eye; there is a discussion of this in Chapter

3 section 3.4.2. Thus it is possible to work out the individual shapes of the maker's tools and see how he has applied them. In Chapter 5, section 5.1, the process of establishing original tool-shapes is worked-through using the bassoons by Poerschman as examples.

Reamers and augers can only make bores that are cylindrical or tapering, and cannot normally make a deep chamber where there is an internal area of large diameter, bounded by smaller diameter at either side. Such areas must be hollowed out by another means; less extreme chambering can be done with hand tools, scraping or abrading the wood away; but in the case of the large, deep, bell chambers found in many instruments, they are hollowed out on the lathe. An example of a bell chamber is shown in the Appendix 3 photographs of the J.C. Denner bassoon in Berlin, number 2969.

The following illustration is from the same book that contains the woodwind instrument maker (*Pfeiffenmacher*) discussed in Chapter 3, section 3.3.3, Iconography. It is of an alabaster worker but the lathe technique is just the same for working in wood. The workpiece is supported at the end away from the worker on the lathe's normal headstock *centre* (a pointed metal rod set in the massive headstock); but the near end is supported in a circular hole made in a wooden plate held vertically on the lathe bed, here shown side-on (the plate is called a *lunette* by the French). Thus the near end is accessible to be operated upon, while the entire workpiece is free to rotate, driven by the cord wrapped around and connected to the foot treadle (the springy stick returns the cord and pulls the treadle back up for the next power-stroke). Actually in this case the workpiece is a hexagonal block of alabaster and it is held in a circular-turned mandrel of wood, but the principle is the same. The second illustration shows the lathe from the workshop of the *Wildruff und Horn-dreher* (wild animal-call maker and horn-turner) in the same book. Here is the same set up with a piece of work, or a mandrel, supported between centre and *lunette*. The latter is more clearly seen here, and has an alternate hole so that it can be inverted for use with a different sized work piece.

These illustrations are shown in full in Appendix 4.

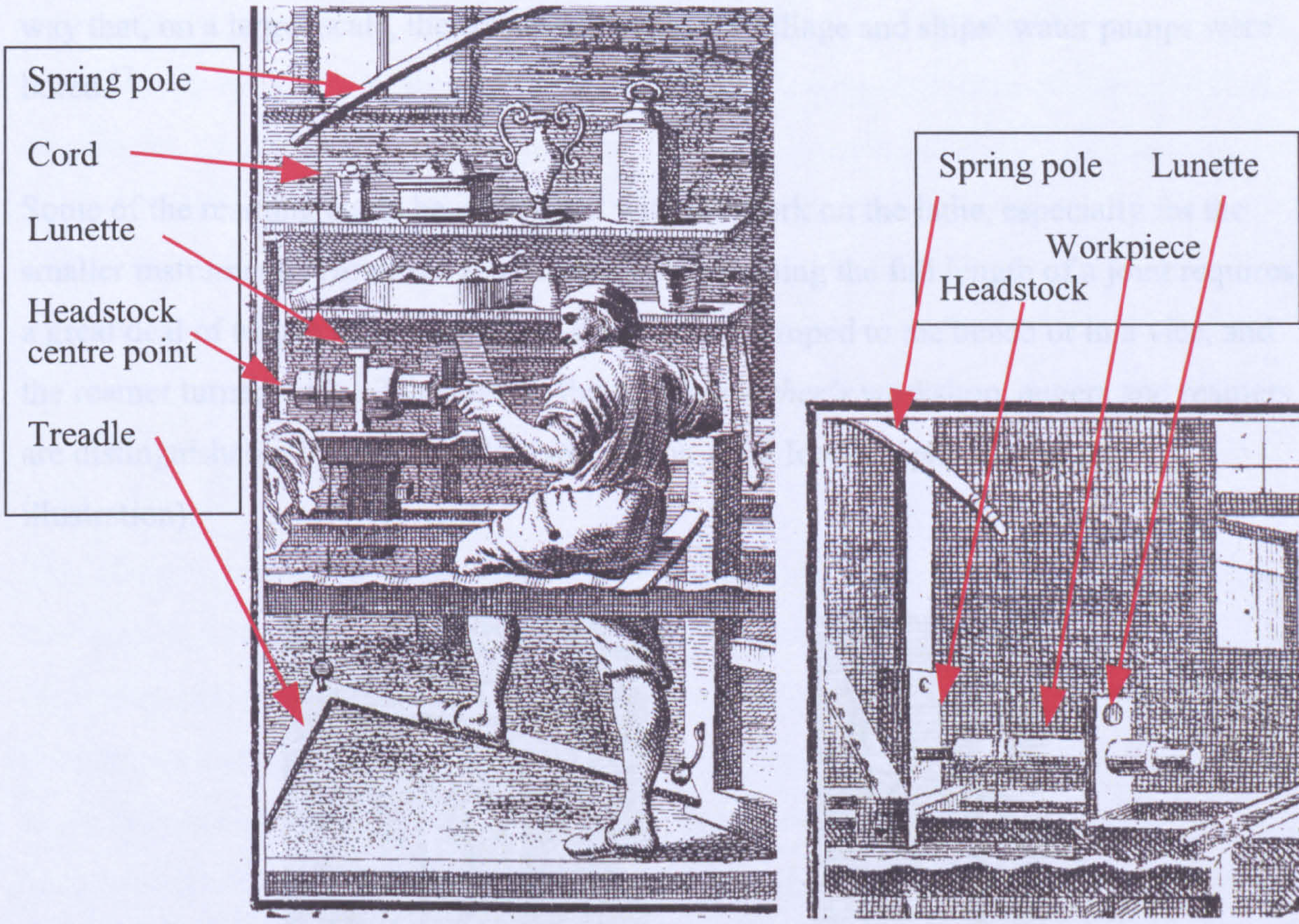


Fig 2.16. Details from *Der Alabasterer* (left) and *Wildruff und Horn-dreher* (right) from the *Ständebuch* of J.C Weigel, published 1698 [16]

With this arrangement, hollow forms can be made inside the workpiece; bell chambers; bell sockets; and in at least one instance it appears that the whole of the bell's bore has been turned out by hand (Meiningen MJ17, see section 3.3.2).

The initial boring of the billets can be carried out in just the same set up. A starting hole is made with a gouge in the end face of the workpiece, to centre the auger, which is then pushed axially into the rotating wood. The leg-powered lathe, shown in Fig 2.16, rotates the workpiece in a reciprocating motion, but despite the apparent symmetrical form of the reamers, the cutting phase is always on the down-stroke of the leg, when the power is greatest.

Boot joints were probably not bored in this way as they can not be readily set up in the lathe to rotate about their off-centre bore axes. Instead they were most likely bored with the billet clamped to the bench, the auger hand-powered via a large T-handle. This was the

[16]Johann Christoff Weigel, *Abbildung der Gemein-Nützlichen Haupt-Stände*, (Regensburg, 1698). The illustration of the *Pfeiffenmacher* shows the elements of a similar lather, but the arrangement is rather confusing. See Chapter 3.3.3 under Iconography.

way that, on a larger scale, the corpus and pipes for village and ships' water pumps were bored.[17]

Some of the reaming could be carried out with the work on the lathe, especially for the smaller instruments. However, a bassoon reamer shaping the full length of a joint requires a great deal of torque to be applied, so the billet is clamped to the bench or in a vice, and the reamer turned with a T-handle. In the *Pfeiffenmacher's* workshop, augers and reamers are distinguishable by their handles (see section 3.3.3 Iconography for the full illustration):

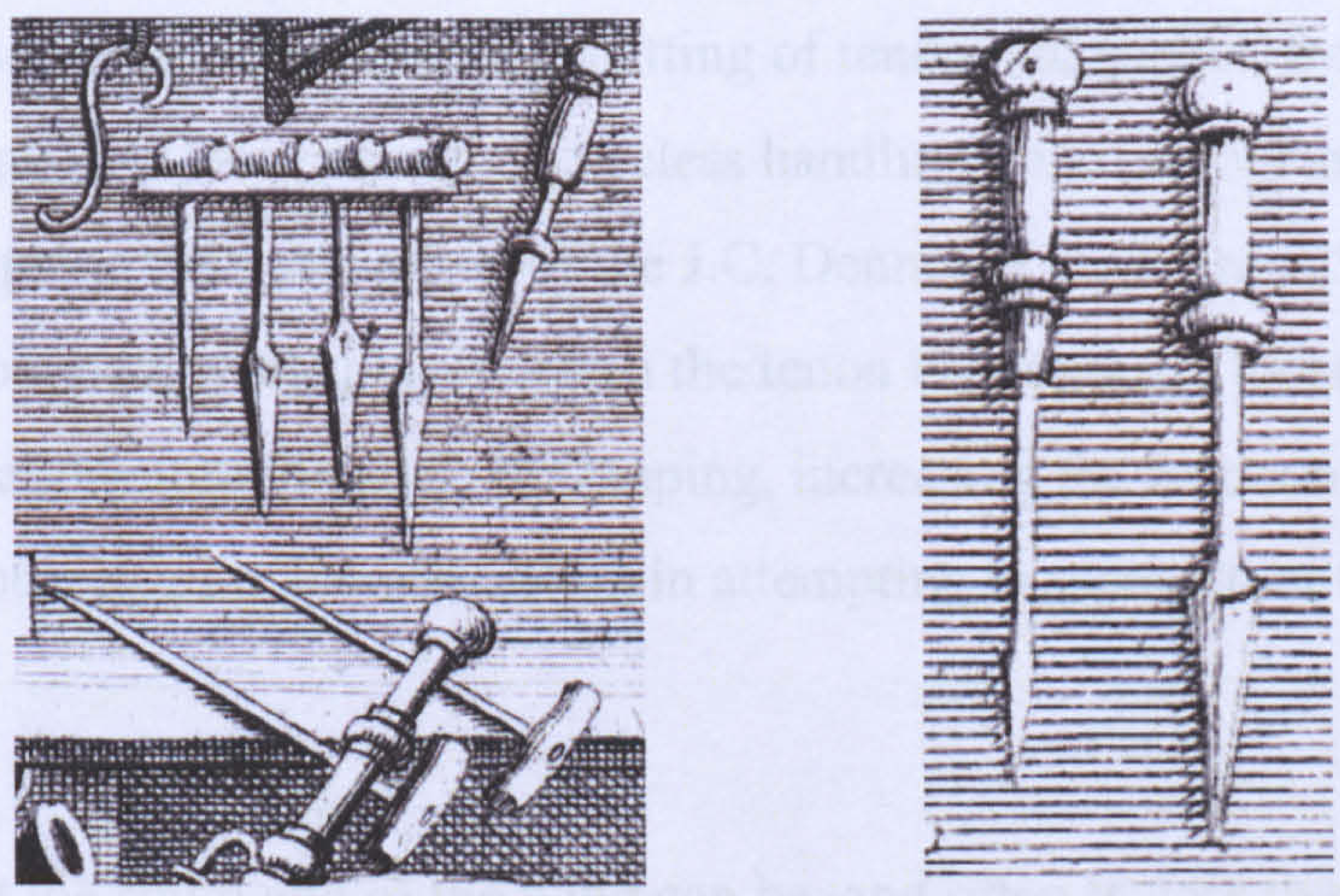


Fig 2.17. Details from *Der Pfeiffenmacher*.[18] Left: reamers with T-handles, including full-length bassoon reamers lying crossways on the bench (the T-handles are shown rather too short). Right: augers or short reamers with in-line handles, for use at the lathe.

<u>Tenon contraction</u>

A chamber can also appear in places unintended by the maker, as the result of shrinkage or crushing of part of the bore. This occurs most commonly at tenons, and particularly the wing tenon, which is subjected to frequent wetting. Moisture from the player's breath condenses onto the walls of the crook and wing, the first cold surfaces it meets. Some of this condensate soaks into the wood (penetrating the oiled finish), and some runs down to collect at the end of the joint and in the boot socket. It is then able to soak into the even

[17] Good descriptions of the process, which both emphasise the use of a round-nosed, rather than screw-tipped auger, and the need for careful marking out and alignment of auger and billet before boring starts, are found in: James Arnold, *The Shell Book of Country Crafts* (London: John Baker Ltd 1968) pp.117-119; and Walter Rose, *The Village Carpenter*, (Cambridge: Cambridge University Press, 1939; repr. Ammanford: Stobart Davies, 2009) pp. 77-87. Lyndesay Langwill in *The Bassoon and Contrabassoon* p.113, reports Curt Sachs re contrabassoon-making 'writing in 1920… that old wood-wind instrument-makers still recalled having, as apprentices, dragged the rough trunks to the well-sinker to be bored.' Neither Langwill nor Sachs mentions it, but it was no doubt the case that the 'well sinker' was also the pump-maker and so had the tools for boring wood (and not that he used his well-sinking tools). A ships' pump maker is illustrated partway through the job in *Der Schiff Pompenmacher* in Weigel's *Ständebuch*; see appendix 4.

more permeable end-grain of the wing, and to run up the outside of the tenon, wetting the thread wrapping. Thus the thinner wood of the tenon is subjected to wetting from inside, outside and into the end-grain. This causes it to want to swell, but at the same time the linen thread of the wrapping is dampened and wants to shrink. The whole assembly is in any case constricted in the boot socket, supported by the brass band around the boot. The result of these conflicting forces is that the cells of the tenon wood are crushed, and when allowed to dry out the tenon shrinks to a diameter less than it started out with; the bore correspondingly gets smaller too.

This effect is greatest at the wing; the tenons of the long joint do not get such moist air but there can still be some crushing from tight fitting of tenon into socket, from the tension of the thread wrapping, and from repeated, careless handling on assembly and disassembly. An extreme example is the north tenon of the J.C. Denner in Berlin no. 2970. The damage tends to be compounded by the player: when the tenon becomes too loose a fit in the socket the player adds more thread to the lapping, increasing the forces of compression. This effect must be taken into consideration in attempting to reconstruct the original bore shape.

So the diameter at the south end of the wing can be, and often is, less than that of the bore beyond the tenon. This shows another great advantage of the measuring system used here over the fixed-diameter systems, which cannot reach the larger diameter regions beyond a crushed tenon. A good example is the measurements of J.C. Denner in Brussels made with fixed-diameter gauges; where the largest measuring disc or T-piece that could fit through the tenon was 14mm, and that did not make contact again until 165mm into the bore from the tenon end (see Appendix 3). In contrast the Gottlieb Wietfelt (Waterhouse Collection) has a similar degree of tenon shrinkage but the Evald calliper was able to reach into the chamber. The result is a much better picture of the shape of the bore, allowing a better-informed estimate of the bore shape before this damage occurred.

Ovality

The *anisotropic* shrinkage that causes the circular cross section of a turned piece of wood to become oval was discussed above. There has been much discussion of this topic too, in relation to interpreting measurements for the purpose of reconstructing museum

[18] Weigel, *Abbildung.*

instruments.[19] Cary Karp introduced (to the musical instrument making world) the suggestion that the degree of ovality (the difference between major and minor axes) could be used to establish the amount that the wood had shrunk and therefore the diameter that the bore had been made to originally.[20] He reproduced a table of ratios 'r' for the anisotropic shrinkage for various types of wood; that is, the ratio of shrinkage in the radial direction to the tangential direction.[21] Values of particular interest here are those for maple and boxwood, which are given as: 2.5:5.0 and 11.0:15.0 respectively. Those indicate that maple shrinks twice as far in the tangential direction as in the radial. Another value 'R' is also given so that the original diameter of an oval section can be calculated as: $D_{original} = D_{max} + R(D_{max} - D_{min})$. R for maple is 1.00 and for box it is 2.75. For example, if a section of the bore of a maple instrument is measured to be 20mm x 21mm, then its original diameter would have been: $21 + 1\times(21 - 20) = 22$mm.

There are problems with applying this formula in a blanket fashion. The distortions found in instrument bores are not all caused by this type of shrinkage; but can be due, for example, to tensions caused by the circumstances of the tree's growth. These tensions are gradually released as the billet is worked, and waste wood is removed; then more simply through the passage of time and the cycles of humidity and drying to which the instrument is subjected. The surface of the bore can degrade through continued soaking; then wiping out removes some of the softened wood, so the track that condensed breath takes down the bore can become indented. The forces imposed on the tenons have already been discussed, and cracks and other faults can introduce further distortion. Karp acknowledges that the ratios are derived from the amount those timbers shrink from a wet state to a dry one, so may not be appropriate for wood that is seasoned before being worked. He also points out that if the billet from which the joint is made has come from near the heart of the log, the annular rings will be curved, and the anisotropic shrinkage will be less predictable.

In real instrument sections there are many instances where the difference between the major and minor axes varies along the length of the joint. In such cases, applying the formula overall will significantly change the shape of the bore; the rates of taper, as well as the volume. Perhaps some of this varying difference is caused by the original maker having re-reamed parts of the instrument sometime after the initial completion, thus making sections circular again. That is certainly what most of today's makers do; many of

[19] See note 2 b) above, and in particular the C. Karp and E. Segerman articles.
[20] Karp, 'Bore Measurement', p.13.

them stipulating in their literature that instruments should be returned for re-reaming after some months of use. If used regularly (whether that is frequent or not) an instrument will stabilise at a level of moisture content; and if in that state the maker is happy with its playing characteristics, then it has the correct dimensions. It is possible that some of the instruments now in museums are not so far different in critical dimensions than they were when first put away.

Another well-known instrument maker, Fred Morgan, stated that he used 'the maximum axis as my dimension when making reamers for copies'.[22] This set off more discussion, with E. Segerman challenging this attitude and re-stating the information given by Karp.[23]

In the case of the Poerschman bassoons from which reproductions were made as part of this study, it is interesting to see how closely the bore sizes match; one instrument made of boxwood and one of maple, both made at least 250 years ago.[24] In the boot joint, the bores of both are almost circular, and are the same size apart from some obvious damage and one section of differential reaming. The greatest difference that might be due to wood movements is in the long joints; the boxwood joint is very nearly circular while the maple one has around 1mm difference between major and minor axes. The minor axis of the maple joint matches the diameter of the boxwood (for part of the length). Applying Karp's formula to each gives inconsistent results, so the decision was taken to largely keep to the maximum diameters, as per Morgan's statement above. The reamers decided on are, in any case, fairly simple shapes; so much of the bore could be enlarged simply by reaming further in with each.

[21] Ibid p.27.
[22] Morgan, 'Making Recorders', p.17.
[23] Segerman, 'Wood contraction'.
[24] See Chapter 5: Reconstructing the Poerschman Bassoon.

Chapter 3
Bassoon Morphology and Design

3.1 Introduction

This work proposes a system of categorisation of bassoon designs, limited to the baroque period, to parallel Haynes' and Adkins' classification of oboe types and analysis of oboe forms.[1] The characteristics of each proposed design type and subtype are set out in the subsections below. Well-known and significant iconographical examples are also discussed for the further evidence they can offer and the bassoons illustrated are classified by type.

Cronin's work on bassoon bore profiles discussed nine baroque bassoons in the context of seven earlier curtals and fourteen later bassoons;[2] this study increases the database of baroque bassoon bore measurements to thirty six and examines the varieties of design in the larger sample. Eric Halfpenny analysed the development of English bassoon design, again including instruments from the baroque period and later. His study did not make use of detailed bore measurements but did discuss tonehole sizes and exterior design.[3] The current study places the English baroque design in the context of continental contemporaries.

The interior design of the baroque recorder has been treated comprehensively by Lerch.[4] He used mathematical techniques to analyse the bore profiles and to correlate bore design to some aspects of playing characteristics. Similarly Myers uses mathematical calculations derived from acoustical analysis as a tool for brass instrument taxonomy in his doctoral thesis.[5] Both Lerch and Myers sought to find numerical values that can be calculated from measurements of an instrument and used them to characterise that instrument and understand its musical behaviour without the need to play vulnerable museum exhibits.

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[1] Haynes, *TEO,* pp.78-88.
Haynes and Adkins, 'Hautboy Types'.
Adkins, 'Proportions and Architectural Motives'.
Adkins, 'The German Oboe in the Eighteenth Century'.
[2] Cronin, 'Evolution of the Bassoon Bore'.
[3] Eric Halfpenny, 'The Evolution of the Bassoon in England, 1750-1800', *GSJ,* 10 (1957), 30-39.
[4] Lerch, *Vergleichende.*
[5] Arnold Myers, 'Characterisation and Taxonomy of Historic Brass Musical Instruments from an Acoustical Standpoint' (unpublished doctoral thesis, University of Edinburgh, 1998), http://www.era.lib.ed.ac.uk/handle/1842/1824

Such techniques are not used here, in part because bassoon researchers are not so well served as those of recorders or brass instruments are. Even well looked after bassoons are rarely complete, with missing crooks and reeds being the norm. Thus it is more difficult to establish precise parameters of playing qualities in the first place and bore data of the crooks, required for such calculations, is missing.

In this chapter each of the bassoons examined and measured for this study is discussed, with comment on its outward style, bore design, distinguishing features and current condition. A summary is given of what is known about their makers and the circumstances of their manufacture and use, and attempts are made to add to that knowledge with conclusions from the measurement data.

Appendix 3 presents, for each instrument examined, a page of photographs, two of bore profile graphs, and one of tonehole dimensions in the same order as discussed here; it is intended that it should be available to view while reading this chapter. Further photographs and bore graphs are included in the text, mainly for the purpose of comparing one bassoon with another. Instructions for reading and understanding bore graphs are given in Chapter 2, Methodology.

While Haynes and Adkins identify a 'standard baroque oboe' design, their Type A2,[6] I argue that for bassoons there is no one such thing; instead there were several contemporaneous types, suggesting a complex web of influence and fashion. Those authors also identify a line of development for the oboe from elaborately turned early and 'standard' baroque types, through a simplification tendency amongst some makers culminating in the 'straight top', then returning to the ornamental for an even more strongly profiled classical-period instrument. Again, the case is different for the bassoon, where there is no such recapitulation; firstly the elaborate turnery appears never to have been used in some circles, and in those where it was used (the Netherlands and southern German territories), once it was left behind it never returned.

[6] Haynes and Adkins, 'Hautboy Types'.

3.2 Type 0

Entirely missing from this study are any of the first bassoons - those made in France after Mersenne's time, in the second half of the seventeenth century - for the simple reason that none survive. However clues to their design indicate that they were made with plain style turnings and that the recently extended bell section had a cylindrical bore.

In 'The Emergence of the Late-Baroque Bassoon' Kopp made a search for possible makers involved in the transition from the instruments depicted in Mersenne's '*Harmonie Universelle*' to the four-piece, three-keyed bassoon.[7] He discussed and thoroughly sifted the evidence regarding the earliest makers in France, the Netherlands, England and Germany. Further significant evidence – the Haka 1685 invoice – was published in 2000 and is discussed below.

The same author's later 'Precursors of the Bassoon in France before Louis XIV',[8] makes an equally thorough dissection of the five twin-bore, double reed bass instruments depicted and described by Mersenne.[9] He makes it clear that the French baroque bassoon did not derive from the dulcian, but that at the French court several versions of twin-bored bass instruments were tried out. Some were made in two full-length pieces bound together, and others from one piece of wood but carved to imitate, or at least allude to the former configuration.[10] These bassoon precursors were made in full knowledge of the dulcian form, which had existed since at least 1563,[11] but were 'essentially anti-dulcians in their

[7] Kopp, 'The Emergence of the Late-Baroque Bassoon'; Marin Mersenne, *Harmonie Universelle*, (1636-7) trans. R.E.Chapman (The Hague:1957).

[8] Kopp, 'Precursors of the Bassoon in France'. There is a clash of terminology between Kopp in these two articles and myself. Where Kopp mentions the 'late-baroque bassoon' he is referring to the bassoon after the transitional period, i.e. once it has been established as a four-piece instrument with three or more keys and range down to Bb1, whereas in this study, which starts with the four-piece instrument already established, the 'early baroque bassoon' refers to those instruments made in the early period of the four-piece bassoon's existence, so approximately during the three decades from 1680 to 1710. Thus Kopp's 'late-baroque bassoon' is my 'early baroque bassoon' This should not be seen as a disagreement between authors, just that the appellations 'early' and 'late' are relative to the periods or technologies discussed in the respective dissertations.

[9] The first is the Basse des musette de Poitou, and Kopp labels the others M1 to M4.

[10] On p. 83 Kopp credits P. White with first suggesting that there may not have been simply a transition from curtal to bassoon and that Mersenne's drawings and descriptions of proto-bassoons could be taken seriously. However White suggested a transition from Mersenne's instruments to the standard curtal and thence to bassoon while Kopp explains that Mersenne's instruments existed at the same time as curtals/dulcians.

[11] Probably the earliest dateable illustration of the dulcian is an alabaster carving in the memorial to Moritz, Elector of Saxony carved in Antwerp, then installed in Freiberg Cathedral by 1563. Maggie Kilbey, *Curtal Dulcian Bajón: A History of the Precursor to the Bassoon* (St Alban's, England: self published, 2002), p.118. Kilbey also lists references in Italy going back to 1516, ibid., p.18.

rejection of dulcian technology and embrace of shawm-based solutions [to the design challenge posed by a folded-bore bass woodwind]'.[12]

Kopp's appellation of 'anti-dulcian' arises from several features that seem deliberately counter to standard dulcian design:

Kopp's M1 and M2 were made of two separate pieces lashed together at the south end ('*fagotées ou liées ensemble*'). M3 was made from one piece of wood ('*ex uno frustrum ligne*' in the Latin version); though both it and M4 appear to have been carved with a cleft between the two sides for part of the length of the instrument, presumably to resemble the previous construction.

The bores were arranged front-and-back; the bass- or up-bore next to the player, with the down-bore on the far side, the crook reached across the bell to the player. Thumb-operated holes enter the up-bore, fingerholes enter the down-bore.

The outside diameters of the two pieces are apparently similar to those of a shawm; there is no extra thickness of wood for the toneholes to pierce; though they are still possibly drilled at angles to the surface.

Hole VII was drilled into the down-bore, unlike that in dulcians.[13]

The crook was very short. On the final M4 it has just a right-angle bend, not the S shape of dulcians and later bassoons.

The bass joint was extended to play down to Bb (on the bass instrument) so there were eleven toneholes as opposed to dulcian's standard ten.

Kopp suggests some possible reasons for the apparent antipathy to making dulcian-form *Basson* to which might be added one from the maker's viewpoint. In the Interpretation section of Chapter 2 Methodology I explain that turned joints such as those of oboes, cromorne, flute and recorder can be bored on the lathe; with the wood rotated under foot power, a hand-held auger being pushed in to one end and fed down the length of the billet. The techniques would be those naturally instilled in the training of a turner-instrument maker and the two sections of a proto-bassoon to be '*fagotées ou liées*' together could also have been bored in this way.

On a fairly sophisticated lathe such as makers-to-the-court might be expected to have, or have access to, short multi-bored sections such as the shuttle drones of musettes can be set up with a special jig set on a rotating mandrel. However large-sized double-bored pieces cannot be drilled out in this way and the job must be done with a different technique: the

[12] Kopp, 'Emergence', p.104.

[13] A quartbass dulcian in the Oberösterreichen Landesmuseum, Linz, Mu 217 is an exception, though there the original hole has been plugged and it is a later one that is drilled into the down-bore.

wood is clamped down to a workbench and a long-shafted auger, carefully aligned with the desired direction, is rotated by a cross-handle and fed forward by main strength into the wood.

This is not a turner's technique but a different kind of skill, also requiring greater physical strength. The experts at the job were the makers of water pumps and pipes, perhaps not the sort that courtier-musician-instrument makers such as the Hotteterres and Philidors would like to associate themselves with. Even leaving this class-based explanation aside, it may simply have been that these courtly makers wanted a more lathe-based solution. Getting a long hole accurately aligned this way is not easy; but is a matter of experience and careful preparation, while on the lathe it is more easily achieved.

The last of the forms shown by Mersenne (Kopp's M4) reverted to some of the characteristics of the dulcian. It discards the bound-together, front-and-back joints of M1 and M2, and reinstates the dulcian's side-by-side bores and deep toneholes drilled at a compound angle to the surface. It retains a little of the appearance of separate tubes joined side-by-side with a cleft between the down- and up-bore sections above the fingerholes.[14] Compared to a standard bass dulcian it has an extended up bore of cylindrical external appearance, topped by a flared bell; these together extend the range down to Bb1. There are two keys in dulcian-like positions on the lower end and two more higher up on the back side to aid the reach to the holes of the extended bore. All are covered with pierced brass boxes or *poches.* Also retained from the previous forms is the very short crook, here compensated for by a long section between the crook and the first fingerhole.

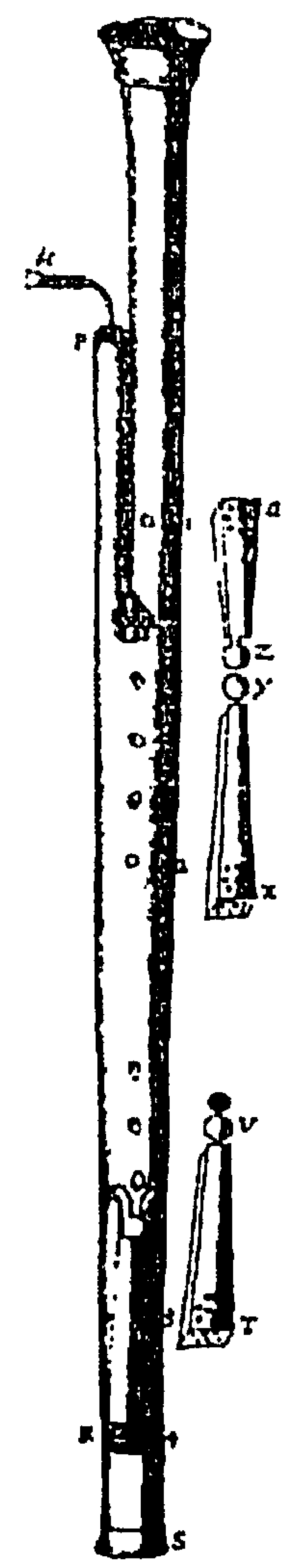

Fig 3.2.1. *Fagot* (M4) from Marin Mersenne *Harmonie Universelle*, (1636-7)

[14] These may or may not show separate turned parts joined in to the oval-sectioned main corpus. Lyndon-Jones suggests it does in: Graham Lyndon-Jones, 'Basstals or Curtoons: The Search for a Transitional Fagott', in *From Renaissance to Baroque*, ed by J. Wainwright and P. Holman (Aldershot: Ashgate Publishing, 2005), pp 73-86 (p.75).

One other known French illustration of a possibly similar instrument is Larmessin's '*Habit de Musicien*' published in 1695.[15] This shows the same long bass joint of essentially cylindrical appearance. The bell flare, though, has been replaced by a simple wide disc, and the bore within is portrayed as of small diameter, again suggesting that the conical bore stopped some way down the joint and was continued as a cylinder for the upper part of this bore extension. An indication that this is not the same design as M4 is the longer, S-shaped crook.

It must be noted, though, that this illustration comes nearly 60 years after Mersenne, and is some years later than the sources discussed next. If it is to be taken seriously as an accurate representation of an actual instrument, then that instrument would have been very old-fashioned by the time the engraving was made.

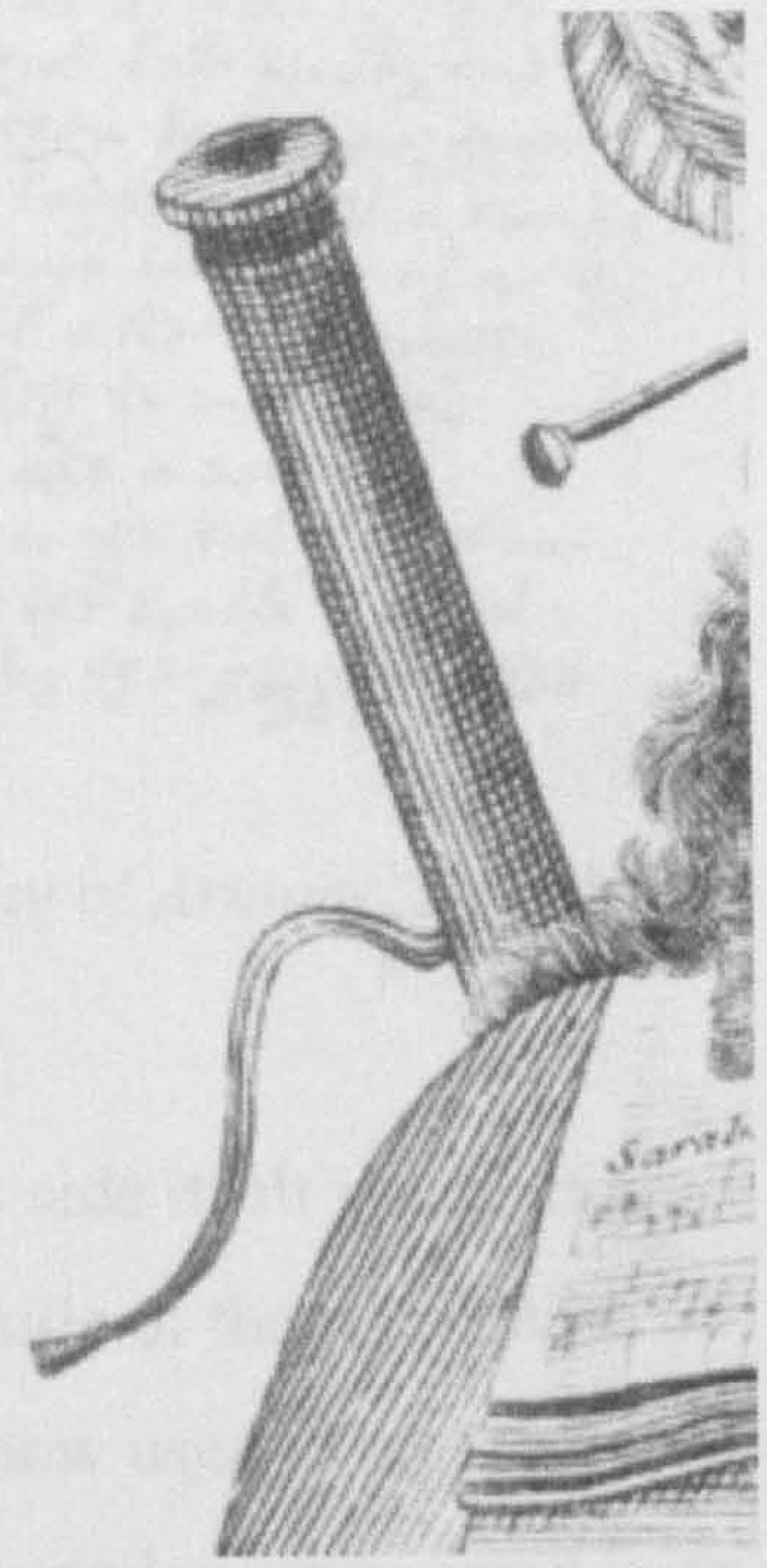

Fig 3.2.2. Detail from N. de Larmessin '*Habit de Musicien*' 1695

A similar bass joint arrangement appears to be shown in the English source; in the manuscript for 'Academy of Armory' by Randle Holme, published in 1688 (illustration reproduced below).[16] Again this is more than five decades after Mersenne, so it is not surprising that there are some differences here. Most significantly the wing joint exists as a separate part with the now familiar épaule crossing over the bass joint and carrying the first three fingerholes with their long and angled chimneys. The crook is a full S of the sort that we are now used to.

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[15] The engraving was published in 1695 by one of four generations of Nicolas de Larmessin, probably Nicolas III (1640-1725).

[16] An edition of Books I, II and thirteen chapters of book III was published in 1688, but did not include this illustration (nor an engraved version of it). The page; British Library MS Harl. 2034f, fol. 207v, which contains this illustration and text comes from preparatory material for Book 3, Chapter 18, section 8 and the 'double cutaille' is picture number 158. The period of this preparation is not clear; Alcock and Cox say 'The compilation of the manuscripts took place over at least three decades. Some of the illustrations seem to have been completed by 1649. On the other hand Holme was still working on the text into the 1680s'. They also suggest that 'the precise detailing of some of the drawings, such as those of musical instruments, suggests that they may be derived from published illustrations'. See: N.W Alcock and Nancy Cox, *Living and Working in Seventeenth Century England: an Encyclopedia of Drawings and Descriptions from Randle Holme's Original Manuscripts for The Academy of Armory (1688)* (London: The British Library, 2000).

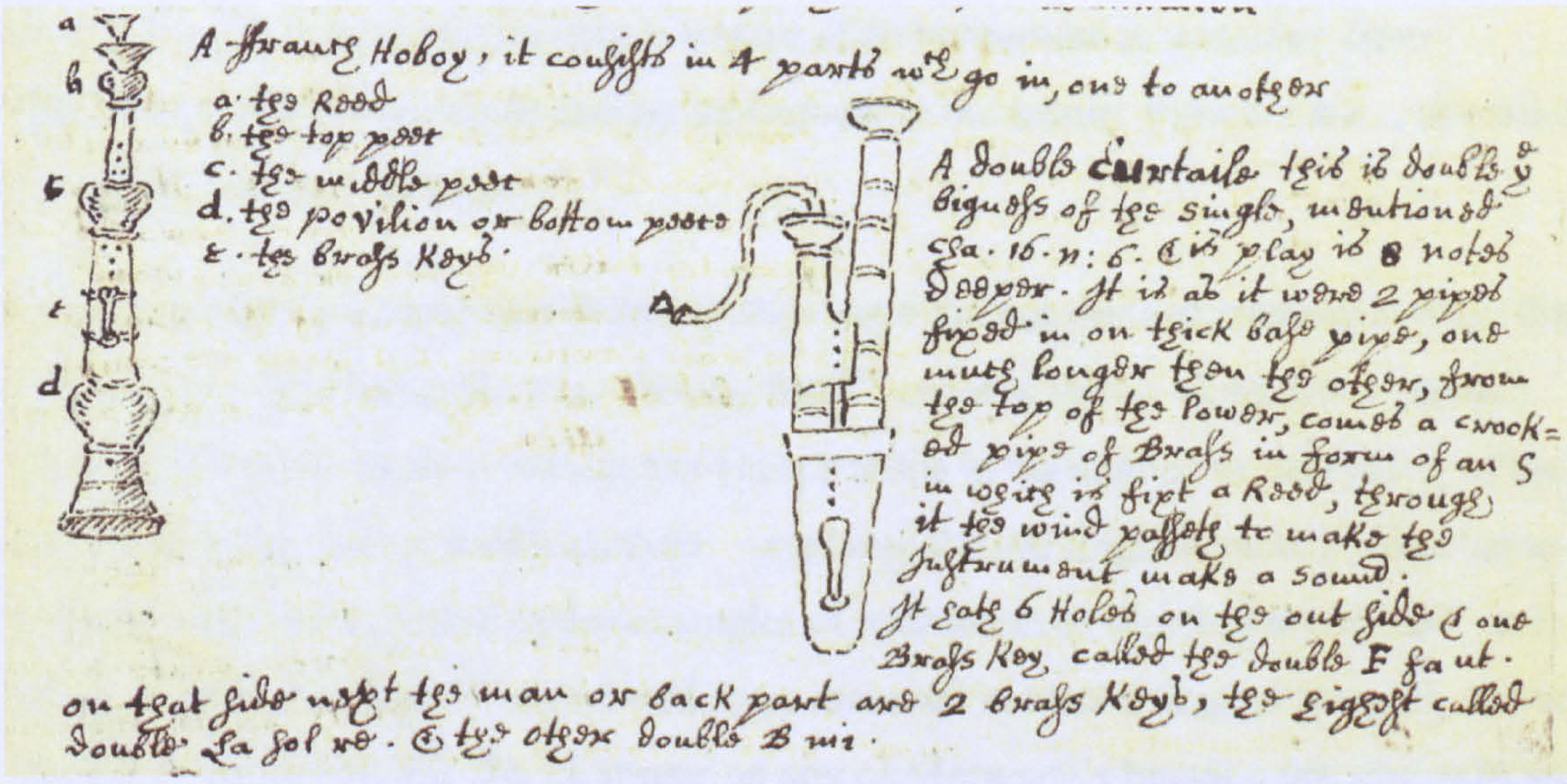

Fig 3.2.3. Drawings 157 and 158 from Randle Holme III, *Academy of Armory*, British Library MS Harl. 2034f, fol. 207v; prior to 1688.

Two keys on the 'back part' are described in the text and the bass side itself is depicted here with some turned rings, as mounts for those keys on the far side of the joint. With those and the one key shown on the boot, the keys are as we are now used to seeing on the early bassoon; three open-standing keys for F2, D2 and Bb2, each no longer covered with a brass *poche*.

There is some ambiguity about the depiction of the bass side, allowing a disagreement between Kopp and White as to whether there is a separate bell joint. White points to the presence of five rings along the bass side; as only four are needed for the key mounts, he argues that the fifth represents a ferrule on the socket of a separate bell joint.[17] Kopp, for his part, points out that a ring shown on the wing joint below the épaule must be ornamental, and suggests that the fifth ring on the bass joint may be so too.[18] He makes the point, and White acknowledges, that there is no indication of the bulging baluster that strengthens the socket on all ornamentally turned bassoons (which includes all known bassoons having their long joint keys mounted in full rings as shown here). The corresponding features are clearly shown on each joint of the accompanying 'Ffranch Hoboy', so cannot have been present on the model of 'curtaile' Holme was drawing.

Thus we are able to take Holme's words literally; 'it is, as it were, 2 pipes fixed in on[e] thick bass pipe, one much longer than the other…'. Both authors can agree that, in White's

[17] Paul White, 'The Early Bassoon Reed in Relation to the Development of the Bassoon from 1636' (unpublished doctoral thesis, Oxford University, 1993) note 65 p.109.
[18] Kopp, 'Emergence' p.74.

words, it '... has the form one should expect of an instrument in transition from Mersenne's early seventeenth century instrument to the mature form we see... toward the end of the seventeenth century'.[19]

It is convenient to assume that Holme is showing a French-derived instrument here; that seems to be where bassoons were coming from[20] and it is shown alongside a 'ffranch Hoboy'. However, he does not use any French terms in his naming or describing of the bass instrument; it is a 'double curtaile' – applying the old English name for dulcian to its usurper. There are no other extant examples of instrument or illustrations of the French proto- or fully-developed bassoon with keys mounted in turned rings or integral, carved blocks. Neither rings nor blocks appear on any of Mersenne's bassoon precursors in any of the later illustrations discussed below; or on any known bassoon of French origin (although those all come from significantly later than this period); or on the earlier and supposedly French-derived English bassoons. These ring mounts are familiar to us though, as they are commonly seen on the ornamentally turned German and Dutch bassoons. If the instrument is French, then it is also a unique depiction of a very short-lived French use on bassoons of this key-mounting technique and also of decorative turned rings. It could, on the other hand, show a non-French interpretation of the instrument being developed in Paris; perhaps it depicts the very starting point for the Type 1 (Dutch and German) bassoons.

One further illustration bears at least a brief consideration. It appears in a stucco relief panel on the case of an organ in the Collegiata Nuova, Offida, Italy, shown below:

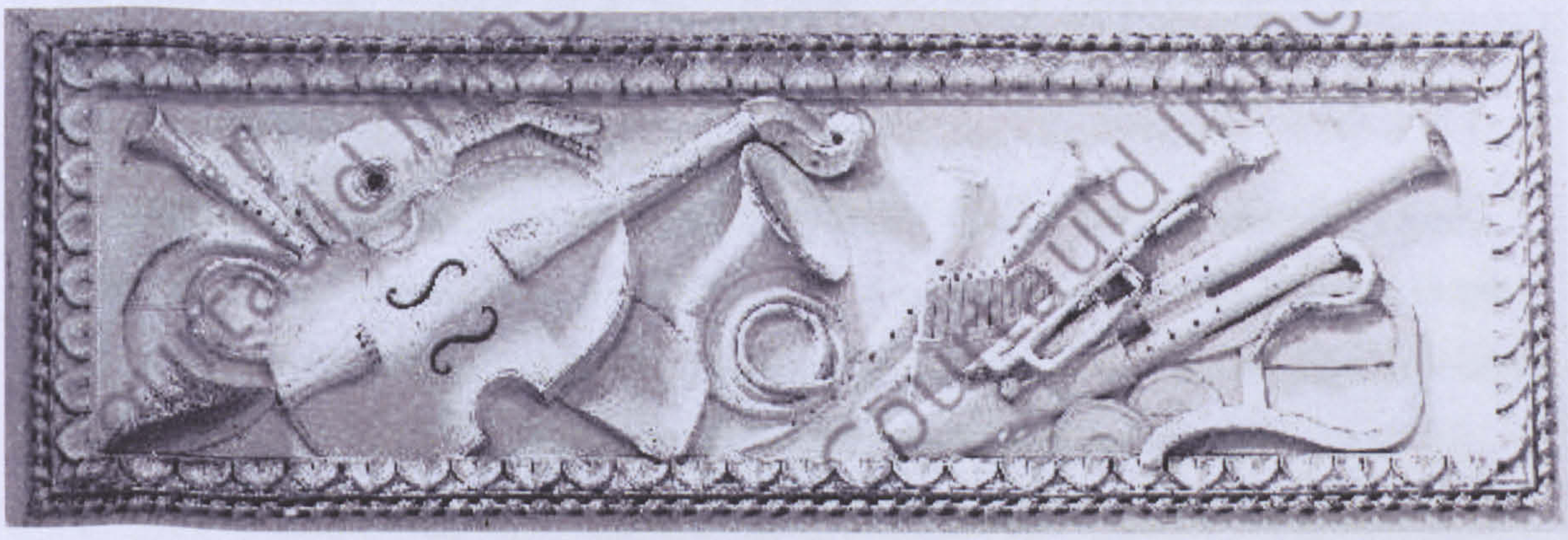

Fig 3.2.4. Panel on organ of Collegiata Nuova, Offida[21]

[19] White ibid., p.109.
[20] See discussion of Talbot later in this section.
[21] The Courtauld Institute of Art online gallery.
http://www.artandarchitecture.org.uk/images/conway/13e95ec1.html accessed July 2010.

Unfortunately the organ was built in the 1780s so its relevance here is questionable. However the composition gives the distinct impression of referring to earlier material; it shows, amongst the other instruments, a cornett and a lute, both more in keeping with the seventeenth century. The depiction of quasi-bassoon would be an odd interpretation of an up-to-date instrument of the 1780s, but it has several features in common with Holme: the one-piece bass+bell joint with flared terminal, separate wing with épaule, and single key on the boot. Of course the utterly false fingerhole positions do not excite confidence in the depiction, but there is enough here to warrant further investigation. If anything could be found about the source material or inspiration for this illustration, it might be illuminating.

An important conclusion from these three early forms (Mersenne, Larmessin and Holme) is that they cannot yet have included a reverse taper at the top of the one-piece bass section, as found in most baroque bassoon bells. Although it would not be entirely impossible to form a flaring and then contracting bore inside a single, long, turned piece, it would be very difficult to do so accurately. Makers were by this time quite familiar with the concept and technique of dividing joints when complex bore shapes were required and would surely have divided this piece into long joint and bell, had they wanted to create that bore shape. As all three give the distinct impression that the bore does not continue expanding all of the way up that long bass joint; at least part of it towards the top end must have been cylindrical, though topped with a short flare in Mersenne and Holme.

The Holme flare should, perhaps, not be taken too seriously: he has exaggerated the shape of the finial at the top of the wing so this too might be just an exaggerated view of a terminal bead or some such.

The Larmessin illustration, if it can be taken seriously, shows that this short flare may actually conceal something else: it seems to show a separate disc or plug attached to the top of the joint with a smaller diameter opening that would restrict the radiation efficiency of the lowest notes, in the same manner as the pierced plate or 'pepper-pot' covers of *gedact* dulcians. This adds a tone-quality suggestion in agreement with the anti-dulcian argument – that these instruments are not just anti-dulcian in form but in sound too. If made in this way, then it is a precursor of the reverse-tapered bell.

By the penultimate decade of the seventeenth century, whatever instrument it was that was referred to as '*basson des hautbois*', was being used in company with stringed instruments, flutes, recorders and the early forms of oboes. There was a requirement to refine, soften, and sweeten the tone to suit the new milieu. The dulcian was particularly forceful and inflexible in the lowest notes, so those needed taming. The lower taper-angle bass bore, extended bell and new hole XI together do that job for notes down to C2, which is now vented through a tonehole rather than from an open and wide-flared bell. The smaller vents and extended 'tonehole lattice' restrict radiation and lower the cut-off frequency making the notes softer, darker and more flexible in dynamic and tone quality.[22] A restricted opening at the very terminus of the bore adds that effect for the lowest note, Bb1.

This idea of restricting the radiation at the bell was applied in a different way to the dulcian outside of these Parisian circles. *Gedakt* or covered dulcians are found in Germany and Austria, in two forms; either with a pierced brass plate covering the bell or the bell is capped by a 'pepper-pot'; a domed or flat wooden cover with multiple holes pierced in its top and sides. [23]

The earliest known reference to the four-piece bassoon proper comes from the Netherlands, but acknowledges the French origin of the instrument. In 1685 Richard Haka billed Johan Otto in Kalmar (Sweden) for (amongst other items):[24]

> *Fransche haubois*
> *1 franse Esdorenhout dulsian Basson in 4 Stucken 42/ 0 / 0*
> *1 franse palmenhout tenor Haubois onder beslagen 14/ 0 / 0*
> *4 franse palmenhout discant hautbois alle Coortoon. 32/ 0 / 0*
> *1 Kooper Es tot de dulcian Basson 1/10/ 0*
>
> French oboes:
> 1 French maplewood dulcian bassoon in 4 parts
> 1 French boxwood tenor oboe mounted below
> 4 French boxwood descant oboes, all in Chorton
> 1 brass S (crook) for the dulcian bassoon

The earliest French pictorial evidence of the four-piece bassoon is thought to be the frontispiece to Marin Marais' '*Pieces en Trio*' (Paris 1692) engraved by Georges Simoneau.[25] Here the crook, reed and bell are pictured peering out from behind the title

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[22] See Chapter 4 on these acoustical matters.
[23] Not all are by German makers; some are stamped with the mark now thought to be that of the Bassano family, e.g. Mu 32 in *Oberösterreichisches Landesmuseum*, Linz. All of the dulcians by J.C. Denner are *gedakt*, with a distinct pepper-pot style unique to him, see Iconography in section 3.3.3.
[24] Bouterse, *DWIATM*, Table 4.1.
[25] However the earliest pictorial evidence of all is Dutch from at least two years earlier. It is discussed under Type 1a in the next section.

cartouche. This is clearly different from the *basson* of Mersenne and gives every appearance of representing the now familiar four-piece bassoon.

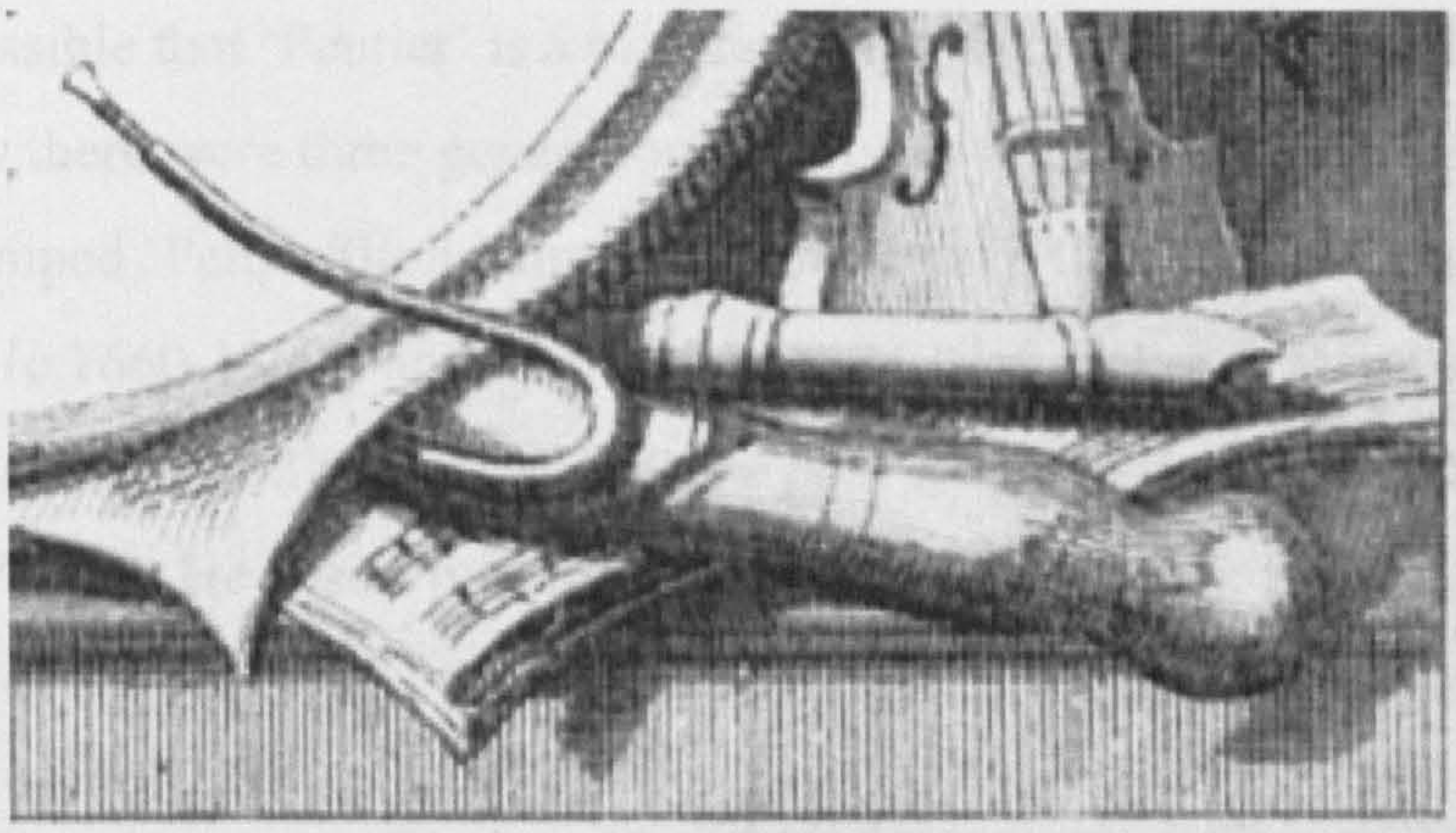

Fig 3.2.5. Detail from frontispiece to Marin Marais *Pieces en Trio*, Paris 1692[26]

The bell is shown smooth, without elaborate turned beads; it progresses from the long joint at the same diameter (no bulge) with a slightly flaring column, reduces to a waist, swells again to an elongated bulge, then a narrowed neck before finishing with a globular terminal. There is an indication of a brass ferrule but it is placed too far up the bell and should really appear at about the point where the instrument emerges from behind the cartouche. This same work is credited as the earliest illustration of the three-piece flute.[27] The two flutes are illustrated reasonably accurately given knowledge of similar real instruments, though the cap, for example, of the left hand traverso is somewhat exaggerated. The bassoon form is further discussed under Type 2a, the English bassoons.

There are no other French illustrations from before 1700. Useful information on early forms of the oboe comes from the 1664 designs by Charles Le Brun for the Gobelins tapestries '*L'Air*', but they do not include anything resembling a bassoon. That and other early illustrations show the *cromorne* as the apparent bass to the oboes.[28]

The next early French source is the well-known drawing from the collection of Edward Croft-Murray, now of his widow, Jill Croft-Murray.[29] The drawing is in red chalk and shows early-style French woodwinds. It is neither signed nor dated, but has on its reverse

[26] Marin Marais, *Pieces en Trio Pour les Flutes, Violon, & Dessus de Viole* (Paris: 1692).
[27] Tula Giannini, 'Jacques Hotteterre le Romain and His Father, Martin: A Re-Examination Based on Recently Found Documents', *Early Music*, 21 no. 3 (1993), 377-395.
[28] See Haynes, *TEO*, pp. 26 & 31 for illustrations of the tapestry panels and p.15 for the frontispiece from Borjon's *Traité de la musette* showing a shepherd playing an oboe with a *cromorne* lying at his feet.
[29] Edward Croft-Murray, 'An Early 18th Century French Drawing of Wind Instruments', *GSJ*, 33 (1980), 130 and plate XII.

side a list of French names, three in pen: Raon, Cazel/Cazes, Reutier/Peutier, and in a different hand in black chalk: Dupuis. These may be the names of the owners or makers of the instruments although the first two are not known from any other source as makers or players. It is possible that 'Peutier' is a mis-transcription or alternative spelling of Pelletier of which family there were three generations of woodwind makers in Paris, survived by instruments stamped 'Peltier/(lion rampant)'. The second, Charles II, was brother-in-law to Pierre Naust (c.1660-1709), an important early Parisian maker.[30] Dupuis is also a known name, listed in 1692 in Paris as '*Maitre pour le Jeu et pour la Fabrique des Instruments à Vent*'.[31] He is survived by three known instruments; two recorders and an oboe, the latter of the very early, Haynes Type A1 style, with a pierced ivory fontanelle covering the keys.[32]

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30 William Waterhouse, *NLI*, p.297.

31 Waterhouse, *NLI*, p.98

32 Young, *HWI*, p.66, illustrated Haynes, *TEO*, p.68.

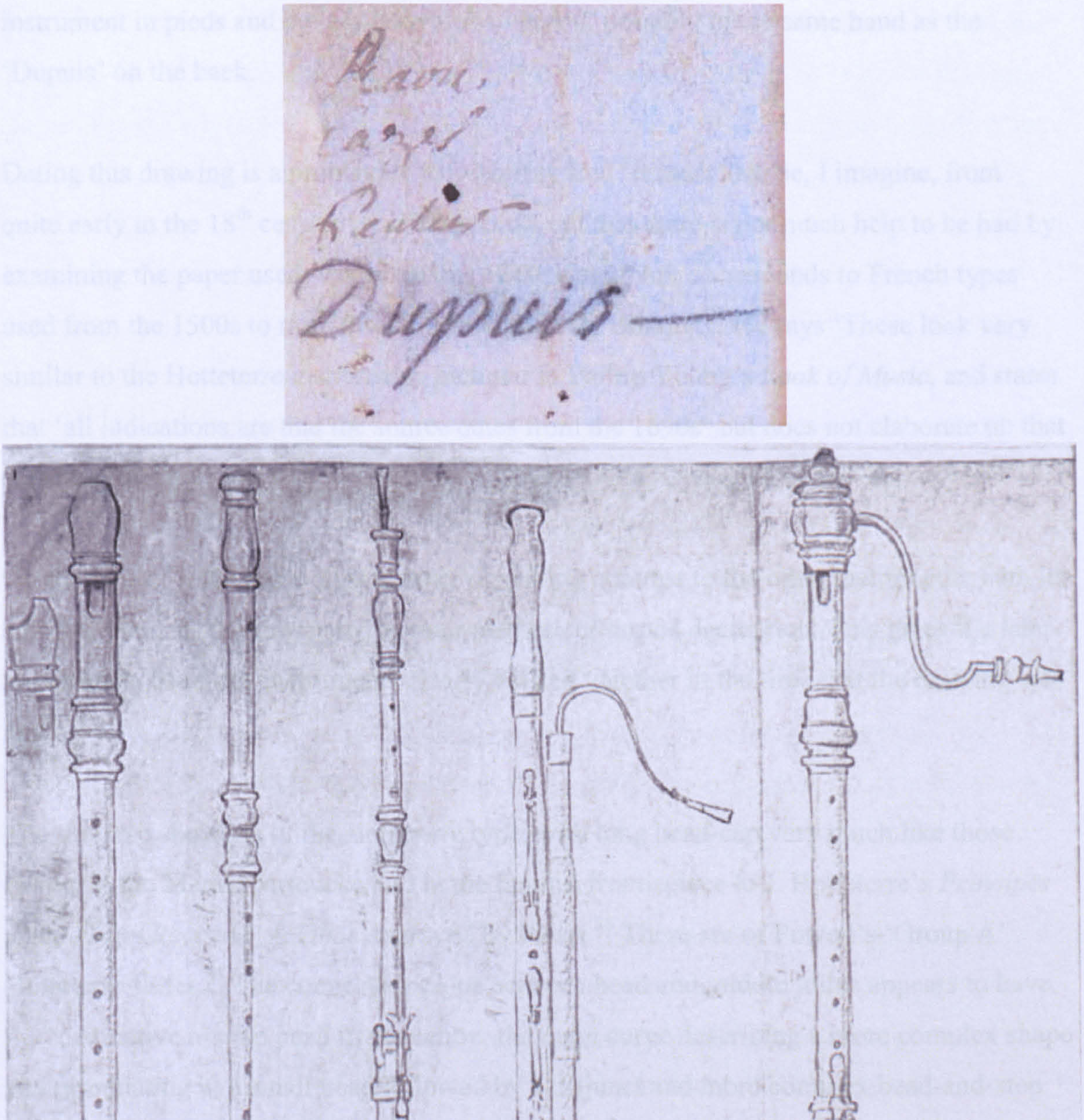

Fig 3.2.6. Below: drawing in red chalk. Above: inscription on reverse. Collection of Jill Croft-Murray

The drawing depicts an alto recorder, transverse flute, oboe, bassoon and bass recorder all drawn to the same length with careful attention to details of turnings, keys, toneholes, reeds and other features. An additional detail of the top end of the alto recorder shows the cut-away of the beak. Although each is drawn to a different scale, the lengths of each instrument in pieds and pouces is written in pencil, possibly in the same hand as the 'Dupuis' on the back.

Dating this drawing is a problem: Croft-Murray said 'It must also be, I imagine, from quite early in the 18th century'.[33] White points out that there is not much help to be had by examining the paper used; what remains of the watermark corresponds to French types used from the 1500s to right through the eighteenth century.[34] He says 'These look very similar to the Hotteterre instruments pictured in Phillip Young's *Look of Music*, and states that 'all indications are that the source dates from the 1690s' but does not elaborate on that argument.[35]

On the face of it the bassoon is a rather surprising contrast to the other instruments with its smooth, plain styling compared to their plethora of turned decoration. This gives it a later appearance, but these instruments clearly existed together in the time that the drawing was made.

The traverso shown is of the Hotteterre type, with long head-cap very much like those shown in the Marais cartouche and in the famous frontispiece to J. Hotteterre's *Principes of the Flute, Recorder & Oboe* engraved by Picart.[36] These are of Powell's 'Group A' Hotteterre flutes.[37] The connecting piece between head and middle joints appears to have the 'distinctive *double* bead in the centre, the main curve describing a more complex shape and terminating in a small bead followed by a disjunct and more complex bead-and-step combinations' that Powell sees as a defining characteristic of Hotteterre flutes when compared to other three-piece flutes.[38] The length is given as '2p 2p'; two *pieds* and two *pouces*, which comes to 704 mm.[39] This is very close to the average of Powell's Group A flutes: 705.65 mm.

[33] Croft-Murray, 'An Early 18th Century French Drawing', p.130
[34] White, 'The Early Bassoon Reed', note 83 p. 115
[35] White, ibid., pp. 114-115
[36] Jacques Hotetterre, *Principles of the Flute, Recorder & Oboe*, (1707) trans. and ed. by David Lasocki (London: Barrie & Jenkins, 1978).
[37] Ardal Powell, 'The Hotteterre Flute: Six Replicas in Search of a Myth', *Journal of the American Musicological Society*, 49 (1996), 225-63 (p.261).
[38] Powell ibid note 4 p 226. His italics.
[39] Philip Stanley, 'Rules: Obsolete Units of Length', *Tools and Trades*, 13, (2002) 97-113 (p.101) gives 1 Pouce = 27 mm, 1 Pied du Roi = 325 mm.

The bass recorder is similar to the one stamped 'Hotteterre/ [anchor]' in Paris,[40] though with several differences in the details of the turning and especially the key, which is here shown straight while that on the Paris instrument is fish-tailed, like the corresponding key on the oboe. Another bass recorder stamped 'N/Hotteterre', sold at Sothebys in 1989, is quite different in form. Giannini shows that the Hotteterre/anchor stamp is that of the workshop of Jean I and his successors: sons Jean *fils ainé* and Martin, and Martin's son Jacques Martin *le Romain.*[41] This is the same stamp as one of the two known, stamped, genuine Hotteterre flutes.[42] The length is given as '3p ½' (presumably 3.5 *pieds* rather than 3 *pieds* and half a *pouce*), which comes to 1137.5 mm, a little shorter than the 1162 mm long one in Paris.

The treble recorder has a longer foot joint than the two Hotteterre examples shown in LoM,[43] one of each of the other two Hotteterre stamps, but is much like the recorder shown in Hotteterre's *Principes....*[44] It is '1p 7p' long: 514 mm, which corresponds well with altos by Hotteterres Louis (Washington, DCM 326: 525 mm) and Nicolas (Rosenbaum Collection: 510 mm), but not so well with the one surviving with the anchor stamp (Paris, E979.2.8: 480 mm).[45]

The oboe is of Haynes' Type A2, the 'standard hautboy shape' from the 1670s through to 1760s, so it is hard to find a direct comparison. Looking first to the Hotteterre family, there are no anchor-stamped oboes with which to compare. It certainly bears a good resemblance to the N. Hotteterre (c. 1646-1727) oboe in Brussels,[46] but there are again differences in detail (in any case the bell on this oboe is made by Debey). An instrument that comes closer is a Dutch one by Thomas Boekhout (1666-1715) in Amsterdam.[47] All of the groups of beads and decorations are similarly shaped, proportioned and placed. One notable irregularity in the drawing is the lower key-mount ring which is shown as flat in profile whereas it is almost universally made rounded on oboes from all places in the eighteenth century. Early Dutch instruments seem generally to have this bead only

[40] Musée Instrumental du Conservatoire de Paris C.413, E.589. Illustrated Phillip T.Young, *The Look of Music* (Vancouver: Vancouver Museums and Planetarium Association, 1980) p.73. Hereafter *LoM.*
[41] Giannini, 'Jacques Hotteterre', p. 381.
[42] The other is stamped Hotteterre with a monogram below of LR. See Ardal Powell 'Update to my article, 'The Hotteterre Flute: Six Replicas in search of a myth', http://www.flutehistory.com/Players/Jacques_Hotteterre/update.php3 accessed June 2010.
[43] Young, *LoM*, p.71.
[44] Hotteterre, *Principles of the Flute, Recorder & Oboe,* facing p. 34.
[45] Young, *HWI*, pp. 125-126.
[46] Musée Instrumental 2320 illustrated in Young, *LoM*, p. 74.
[47] Rijksmuseum Ea 6-X-1952, illustrated Young, *LoM*, p. 83.

partially rounded and on the Boekhout it is almost flat. The drawing is marked '2p' long, which is 650 mm, but it is not clear whether this includes the reed illustrated.
Lengths of some surviving oboes: L. Hotteterre: 575 mm, N. Hotteterre: 590 mm (bell not original), T. Boekhout: 580 mm.

The bassoon here is most definitely of the non-ornamental kind, with smooth bell, long joint and wing profiles. There are indications that it is not as carefully rendered as the other instruments; the long joint is shown greater in diameter at the south end and tapering to the north, the north boot ferrule is shown oversize and the south one pinched in. It is drawn from the back so we do not see the boot keys or the épaule. There are indications, though, of the latter of where it joins the column to north and south, with a small step to the south. As depicted, it forms a relatively large proportion (almost half) of the total length of the wing joint. There is a metal ferrule at the crook socket.

The bell has a slightly different shape from Simoneau/Marais: the globular terminal of the bell has narrowed into a large bead and the central bulge has moved upwards, leaving a long waist. To the south, it is considerably larger in diameter than the long joint, though pulled in at the ferrule, which is rather longer than the (misplaced) Marais one. The long joint is completely free of any beads, even of remnants of carved-away beads for mounting the keys, suggesting that the keys are mounted in saddles. The keys themselves are simple in profile. It is unfortunate that we cannot see the F key on the boot, nor whether there is a G# key.

There are surviving bassoons that come very close to this in form: two by J.H. Rottenburgh (1672-1756), in Bruges and Leipzig, differ from the above description only in not having a step at the ends of the épaule. They have a long épaule, making up nearly half of the visible length of the wing; their bells are of very similar shape and even the long joint keys are of the form illustrated. Another similar instrument is one by I.F. Roth in Linz. These three are discussed further under Type 2b.

The length is given as four *pieds* and three *pouces*, which comes to 1381 mm. This at first seems very long; White at least is surprised, and concludes that this might be some sort of '… special transposing instrument (a form of contra perhaps?) or pitched to an even lower standard [than A=392 Hz]'.[48] The standing heights (distance from bottom of boot to top of

[48] White, 'The Early Bassoon Reed', note 82 p. 115 (parentheses are his).

bell on the assembled instrument) of the Leipzig Rottenburgh and the Roth bassoons are 1242 mm and 1257 respectively: 139 and 124 mm shorter than the one in the drawing. Because of the doubled bore this represents nearly twice as great a difference in total bore length.[49]

Two bassoons in this study are contenders for being the earliest known surviving French bassoons, they are one by Bizey in a private collection in Paris and the one stamped 'Dondeine' in the Bate Collection, Oxford. They stand at 1274.5 and 1309.5 mm respectively, so the Dondeine is still 71.5 mm shorter than the drawing's stated length. The longest bassoon in the study is an unstamped German style one in Schloss Elisabethenburg, Meiningen; it stands 1347 mm tall and seems designed to play at a pitch of around A-2, as are all the surviving Hotteterre traversi.[50]

The lengths of the individual joints can be calculated by scaling from the drawing; these are given in the table below alongside those of some comparable instruments.

	Standing length	Bell	Long	Boot	Wing	bore length	crook	reed	crook+reed
Croft-Murray	1381.0	325.5	656.0	394.6	631.3	2406.9	315.7	98.6	414.3
Meiningen	1347.0	347.0	557.0	443.0	506.0	2296.0			
Dondeine	1309.5	344.0	521.5	444.0	509.0	2262.5			
Bizey	1274.5	327.5	498.0	449.0	476.0	2199.5			
Stanesby	1265.0	320.0	502.0	443.0	485.0	2193.0			
Rottenburgh	1242.0	313.0	503.0	426.0	497.0	2165.0			
Talbot	1254.1	292.1	504.8	457.2	552.5	2263.8	352.5	46	

Table 3.2.1: Joint lengths in mm of the visible parts only, so ignoring tenons.
Standing Length is bell + long + boot. Bore length is bell + long + wing + 2x full length of boot, ignoring position of the septum window. Crook length is the visible part only.

The boot seems very short in comparison with the other three joints and with that of all of the other bassoons mentioned, while the long and wing joints are very long. Closer examination of the drawing reveals another length measurement '1p' with pointer to the boot - the only joint individually labelled in the drawing. One *pied* is 325 mm, which is a good deal shorter even than the calculated length so this calls into question the accuracy of both drawing and measurements.

[49] The difference is slightly less than twice because of the thickness of the plugs which make up part of the length of the boot but not part of the bore length.
[50] Using notation from Haynes, *HoPP*, this denotes a pitch around two semitones below A=440, see p. x. See also discussion of Meiningen instrument below under Type 1a.

Edward Croft-Murray suggested in his article that this has the appearance of a technical drawing prepared for engraving, where the annotated lengths constitute further technical detail. Clearly the instruments all existed at the same time for the artist to draw them. It may be intended to depict state-of-the-art instruments, in which case the designs are contemporaneous and were all in use at the time the picture was made. Alternately, it may depict one person's collection, or the instruments played by a group of colleagues, in which case although they may have all been in use, they are not necessarily equally up-to-date.

Several of the instruments depicted can be shown to correspond to surviving designs made by the Hotteterre family, and particularly those of the workshop of Jean I and his sons Jean ainé and Martin. The traverso is critical here as there are no known flutes of the depicted design except those made by one or another Hotteterre, or copies of a now-missing Hotteterre original. It seems possible to assume that they could all be played together and therefore worked at the same pitch. Going by the close correspondence of the transverse flute to known surviving originals, this pitch is likely to have been around A=392 Hz or a little lower.[51]

The latest possible date for these instruments to have been in normal use (as opposed to, say, use by nineteenth century antiquarians) is c. 1720. Giannini concludes that 'by the year 1720 the three-piece flute was rapidly being replaced by the four-piece ... which was already being played by leading French flautists'.[52] If they are being shown as the state-of-the-art instruments then the date would be earlier: circa 1690 to 1707 when Jacques Hotteterre's *Principes* was published. If the drawing is as late as 1720, then the depiction of the bassoon is unsurprising and coincides with those shown in a 1722 engraving by Tardieu;[53] if it is as early as 1690 then it is a second indication, along with the Simoneau/Marais, that the French bassoon was of the undecorated form this early, and perhaps had always been so.

One French illustration, however, contradicts the last suggestion: *Cæcilia de Lisorez, Vide, & audi* by André Bouys, exists in several mezzotint prints, dated 1704, with copies in the

[51] Haynes in *HoPP* lists the Hotteterre flute in Graz as pitched at A=385 Hz.
[52] Giannini, 'Jacques Hotteterre', p.384
[53] Nicolas Henri Tardieu's tableaux of *'Le Sacre de Louis XV'* show the *Douze Grandes Hautbois du Rois* at the festivities for the coronation of Louis XV in 1722, including members of the Hotteterre family playing bassoons. This is discussed under the later Type 2b French bassoons.

collection of Tony Bingham and in the Österreichische Nationalbibliothek.[54] It has something of the appearance of a genre work, showing a young woman in fashionable dress as St Cecilia in an allegory of seeing and hearing, however it is actually a portrait of Cécile de Lizoret, the daughter of an organist of Notre-Dame de Paris.[55] Her musicianship is referred to by a collection of instruments at the base of the composition: a harpsichord and bass viol (partly hidden behind the inner oval frame), and bassoon, oboe, recorder and flutes, plus organ pipes, a violin and bow all sprouting from behind a cartouche containing the work's title.

Fig 3.2.7. Detail from *Cæcilia de Lisorez, Vide & audi*, mezzotint by André Bouys, 1704. See Appendix 4 for full composition.

Here, unequivocally, is an ornately turned bassoon of type 1 (discussed in the next section), otherwise unknown outside the Netherlands and Germany.[56] Although it is made quite clear that this depicts a bell with a reverse-tapered bore, there is one quibble: the heavy beads below the top end of the bell look out of place, ugly, and quite unlike any known bassoon. This lack of accuracy is surprising given the good depictions here of flutes and a type A1 oboe, and Bouys's abilities as shown in his painting of La Barre and other musicians in the National Gallery, London.[57] So there is a suspicion that this engraving was made without the actual instrument in front of the artist – perhaps from

[54] reproduced in Haynes, *TEO*, p. 297, also at: http://www.bildarchivaustria.at/Pages/ThemenResult.aspx?p_iCollectionID=5090873&p_iSubKlassifikationID=11481426&p_iKlassifikationID=11472167&p_iGruppierungID=6&p_iPage=213&p_ItemID=1&p_eBildansicht=2

[55] Identified by Davitt Moroney in private communication between him and Tony Bingham. Bouys also painted Couperin who was contemporary with Cécile's father and Moroney says that 'they must have certainly known each other'. It is possible that Bouys later married Cécile, going by the self portrait with his wife in the *Ecole Nationale Supérieure des Beaux-Arts*, Paris: http://www.ensba.fr/ow2/catzarts/images/Est05337-18509.JPG

[56] The wing has a Dutch appearance, while the long joint and bell show more German features, these are discussed under Types 1a and 1b.

[57] André Bouys, *La Barre and other musicians*, National Gallery, London, NG 2081, previously attributed to Tenniers. The flutes in *Cæcilia* are very similar to the ivory one in that painting, they even look as though made of ivory here too.

inadequate or misinterpreted notebook sketches. The location of the original painting is unknown, so it is not possible to check whether the bassoon is similarly depiction there, but since Bouys is both painter and engraver (the print is signed 'A.Bouys pinx et sculp^t 1704') it can be reasonably assumed that they are the same (if indeed the instruments appeared in the painting at all; it is possible that the internal frame and cartouche are additions for the mezzotint series).

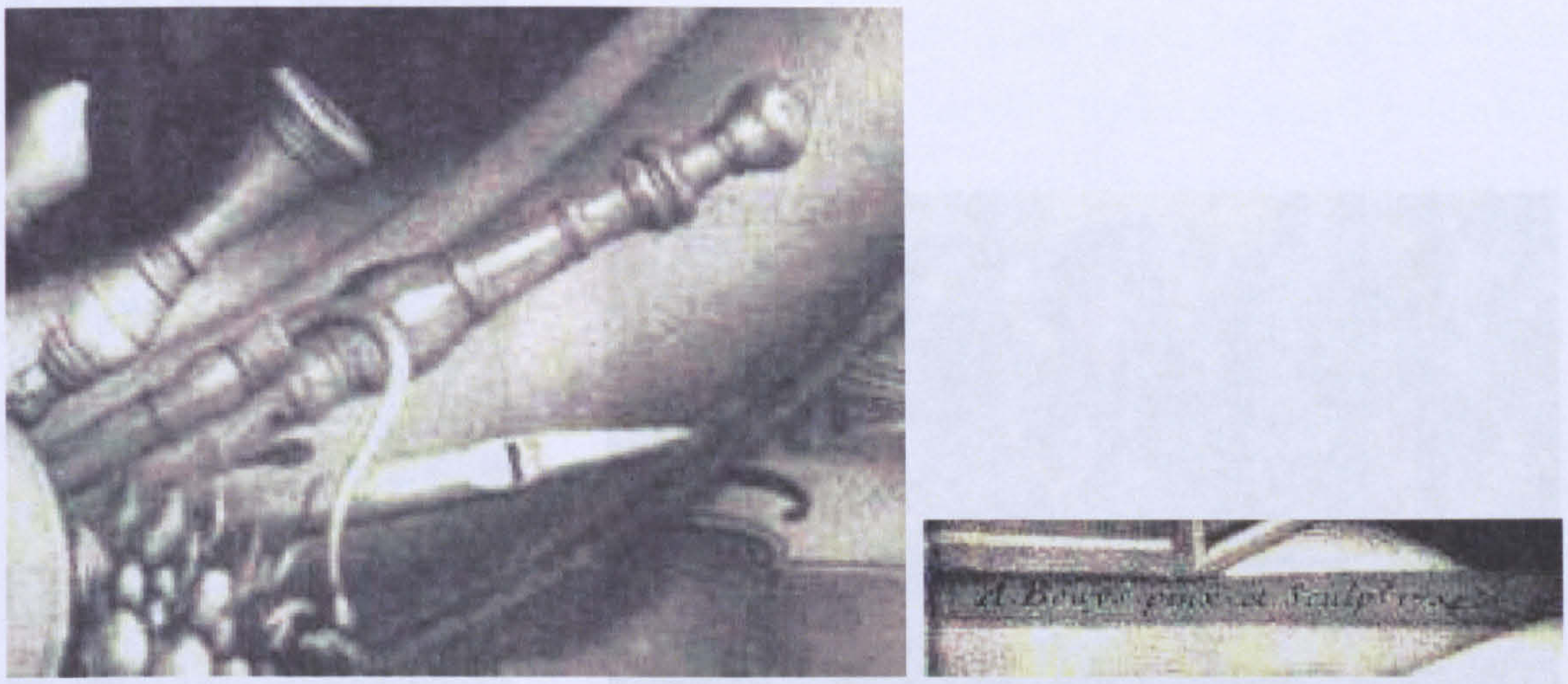

Fig 3.2.8. Closer details of the bassoon and the inscription 'A.Bouys pinx et sculp^t 1704'

Davitt Moroney has made a study of the musical portraits of Bouys and is of the opinion that this print series is made of a now lost painting.[58] It seems that Bouys had a wide range of contacts and patrons amongst the musicians of Paris, so should have had access to a wide range of instruments. It must, therefore, be acknowledged that either there were French made ornamentally turned bassoons, or that a Dutch or German bassoon was present in Paris in the early years of the eighteenth century. Perhaps it is in the association with Couperin that an explanation can be found; it was he who championed the introduction into French musical taste of the styles of Italy in particular, as expressed in the ten *Concerts* of his *Les Gouts Reunis*. Perhaps a visiting Italian bassoonist had brought this instrument with him to Paris? (Italian players of the early eighteenth century commonly used German-made bassoons; see under Kenigsperger in type 1b).

Watteau (1684-1721) gives another view of a plain style bassoon, unfortunately not including the top of the bell, in one of his several studies of musicians drawn in red and black chalk which also include players of Hotteterre style flutes.[59] This appears to be his

[58] See note 55 above.

only known drawing of a bassoon. His colleague Nicolas Lancret (1690-1743) also shows a plain style bassoon in his *Mademoiselle de Camargo Dancing* (1730), but that is rather late for this section.[60]

Fig 3.2.9.
Watteau *Le Joueur de Basson* (detail)

Fig 3.2.10.
Lancret *Mademoiselle de Camargo Dancing*, (detail, see Appendix 4)

James Talbot's manuscript (dated by Byrne to 1692-1695), [61] give detailed information about the sizes of the various parts of a four-piece, three-keyed 'French Basson', including bore and tonehole diameters, joint and crook lengths and how they fit together, but there is no illustration.[62]

It could be that Talbot described the work of a member of the Hotteterre family. Giannini points out that Jacques (5) Hotteterre was an oboist in the English court in 1675 and suggests that 'it seems evident that Jacques brought to London examples of Hotteterre

[59] 'Le Joueur de Basson', Berlin, Staatliche Museen, Kupferstichkabinett, illustrated in: Laurence Dreyfus, *Bach's Continuo Group* (Harvard: Harvard University Press, 1987), p. 112 Fig. 4-2.
[60] Nicolas Lancret, *Mademoiselle de Camargo Dancing*, oil on canvas, Wallace collection, London.
[61] Maurice Byrne, 'Pierre Jaillard, Peter Bressan', *GSJ*, 36 (1983), 2-28 (p.5).

instruments... [which] became the prototype and standard for English makers well into the eighteenth century'.[63]

White makes the case that the details '... appear to have been undertaken with the same thoroughness one expects of a master builder intent on recording the necessary data required to produce an instrument',[64] but Talbot does not tell us what it looks like, whether ornate or plainly turned. Some of the dimensions are given in Table 3.2.1 above for comparison with the Croft-Murray and other bassoons. It can be seen that this instrument is of rather different proportions from the others in the table, with a short bell, moderately long boot and long wing. While the standing height is rather short, the total bore length ranks third in the table and is very close to that of the Dondeine.

The full length of the crook he gives as 1foot, 3 1/2 inches (393.7 mm) which is longer than any known surviving crook.[65] With this and the reed extended by an additional staple or crook-let,[66] it is fairly certain that this instrument would have played at a low pitch, probably in the A-2 range.

The bore diameter measurements given can be converted as follows:

> Crook small end: 3.2mm, big end: 11.1mm.
>
> At top of wing: 15.9mm (that is the opening of the crook socket, we are not given the diameter of the narrowest part of the bore), at south end of wing: 17.5mm.
>
> Long joint south end: 25.4mm, north end: 33.3mm.
>
> Bell: 33.3mm.

As White points out, these also closely match the Dondeine, apart from the i.d. at the top of the wing.[67] The fact that the bore diameter at the top of the bell is the same as that of the long joint shows that the bell either has an essentially cylindrical bore or, again like the Dondeine, is chambered but returns to the starting diameter at the top end.

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[62] James Talbot, *Talbot Manuscript*, UK, Oxford, Christ Church Library (GB-Och Music MS 1187). The section discussed is transcribed in: Anthony Baines, 'James Talbot's Manuscript. (Christ Church Library Music MS 1187). I. Wind Instruments', *GSJ*, I (1948), 9-26. The bassoon details are on pp. 14-15.
[63] Giannini, 'Jacques Hotteterre', p.378.
[64] White, 'The Early Bassoon Reed', p.101
[65] White, ibid., p. 121, note 100. For comparison, the crook of the J.H. Eichentopf 'quartbass' is 413 mm long. This instrument is a quartbass at A+1, so if viewed as a 'concert' bassoon it would be at A-4, two semitones lower than the purported pitch of Talbot's at A=392 Hz.
[66] White, ibid., pp. 122-126. I suggest that Talbot got his numbers transposed when he gives 3/4 inch (19 mm) for distance that the crook is inserted into the wing 'well', and 7/8 inches for the insertion of crook into reed; these dimensions make more sense the other way around. This will make no difference to the playing length of the instrument.

At around the same time (1685), Richard Haka in Amsterdam was selling *his 'franse Esdorenhout dulsian Basson in 4 Stucken'* as part of a set of '*Fransche Hautbois*' to Johann Otto in Sweden,[68] but we will see later that although he acknowledges the French origin of the instrument, this was almost certainly turned in his own style which may have been entirely different from that of the French.

While there are pre-eighteenth century bassoons of Dutch and German manufacture by Haka and J.C. Denner surviving, the evidence from both of those makers and from England too, acknowledge the French origin of the bassoon.[69] It is unfortunate that the French themselves have been survived by so little evidence, so we do not know exactly how the four piece instrument came about, when that happened, nor how it looked when new. We cannot tell to what extent the little information we have is truly representative of what there was, or the extent to which the earliest surviving French instruments resemble the earliest four-piece bassoons.

The evidence can be summarised as follows:
Number of keys: The only evidence of the number of keys on the first French bassoons is from Talbot who described a three-keyed instrument. Holme illustrated three keys but on a bassoon that is possibly not fully formed. The Croft-Murray drawing shows the wrong side of the bassoon so it is not possible to tell. The bassoon in the Watteau drawing is rotated just too far to see if there is an Ab key.

Bell bore: Talbot's evidence of a cylindrical bell bore is not contradicted by Simoneau/Marais nor by Croft-Murray/Dupuis. Earlier slight evidence from Mersenne, de Larmessin and Holme suggests that this feature was retained from the bassoon's precursors. The earliest known, surviving French bassoons are two by Charles Bizey and another, stamped Dondeine, is sometimes cited as early French.[70] They are all plain-styled with four keys, and cylindrical or chambered-cylindrical bell bores. It might be argued that, although they existed contemporaneously, eventually the reverse-tapered bell

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[67] White, ibid., p.118 note 96. See the Dondeine bore graph in Appendix 3.
[68] See note 24 above.
[69] Those pieces of evidence are the Haka receipt for a '*franse... dulsian Basson in 4 Stucken*' (1685), the Denner and Schell letter requesting permission to make '*französischen musicalischen Instrumenta*' Hautbois' (1696), Randle Holme's 'double curtaille' associated with the 'ffrench hoboy', and Talbot's '*Basson*' (my underlining).
[70] Bizey was admitted to the guild of Master Musical Instrument Makers in Paris in 1716, that makes him contemporary with, for example, Stanesby Junior in London. Nothing more is known about Dondeine than this one bassoon, though Henk de Wit has pointed out that Dondeine is a common family name in the French speaking areas of Belgium; see White 'The Early Bassoon Reed', p.115, note 84.

superseded the cylindrical one; therefore, these instruments indicate that all French bells before them were typically cylindrical.

Turning style: There is no written evidence at all as to turning style. The one known French illustration of a bassoon proper, known to be pre-1700, is Marais/Symoneau of 1692, and it shows the plain style. The Croft-Murray drawing shows a French plain-style bassoon in association with three-piece flutes, but it could date from 1690 to as late as 1720. Bouys, soon after the turn of the century at 1704, shows an ornamented style. This might be an imported instrument on the grounds that the bell is clearly counter-tapered whereas the evidence suggests that French bells were cylindrically bored. Holme's drawing from the 1680s shows a partly decorative design but it may not be a fully formed bassoon and may or may not be French in origin. Talbot described a French bassoon present in England just as the baroque woodwinds were starting to be made there, and which may have served as the prototype for English made bassoons. The earliest known of these, by Thomas Stanesby, could conceivably have been made at the turn of the eighteenth century; it is of plain style. The Watteau bassoon is clearly plain-style but may be anywhere from 1700 to 1721. Tardieu is really too late to be used in this argument; by 1722 the plain style had taken over even in Germany.

Although the evidence is sketchy it seems probable that the first French bassoons proper were turned in plain-style, had a cylindrical bore in the bell and had just three keys.

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3.3 Type 1

3.3.1 Introduction to type 1

Type 1 bassoons are generally characterised as those with elaborate decorative turnery on the bell and wing joints, usually with a little on the long joint too. They are divided into two subgroups; further details of the defining characteristics are given below.
Since there are none surviving of Type 0, these are the forms of the earliest datable instruments that survive. Despite Bouys providing an early appearance of one of these in a French context, as far as can be told from the name stamps none of them are of French origin and all other indications are that this style was the province largely of Dutch and south German makers.[71]

In the context of other baroque woodwinds, it seems only natural that bassoons should be made with decorative turnings; the other woodwind types all have turned ornaments beyond the purely functional, in a fashion that seems to have originated with the chanter and drones of the *musette de cour* in the mid-seventeenth century. Nevertheless it seems distinctly probable that the French and English never applied those to their bassoons, and that there were early German makers outside of the southern regions who did not do so either. In that case it was the south German and/or Dutch makers themselves who developed this style of bassoon, applying their own ideas of ornament whilst acknowledging the instrument's origins in France.

While being unable to explain the French deficit in this matter, we can find evidence of a pre-existing decorative culture in southern German regions. In 'The Limewood Sculptors of Renaissance Germany', Michael Baxandall writes about ideas and conceptions of craftsmanship one and a half to two centuries earlier.[72] He links the crafts of wood-carving, calligraphy and Master-singing as practised in southern regions of Germany including Franconia (dominated by Nuremberg), through their florid styles. [73] Both the Mastersingers and the Modist calligraphers incorporated the term *Fioritur* or 'Flourish'; we recognise it in the various scripts we now call Gothic, and in music in a similar term of the Mastersingers'; *Coloratur* or 'Coloratura'. Baxandall says; 'the notion of a localised

[71] It should be borne in mind that Germany did not exist as a nation state at the period under discussion, but existed as a collection of Principalities, Bishoprics, city states and regions. There is also some evidence of the wider spread of the decorative style in the bassoon of M. Deper, thought to come from Vienna.
[72] Michael Baxandall, *The Limewood Sculptors of Renaissance Germany* (Yale: Yale University Press, 1980).
[73] Including Upper Rhine, Swabia, Franconia and Bavaria.

bravura flourish was very much of the period' and applies the term florid to the limewood carvers' sculptures too; 'it is characteristic of the sculpture to have local passages of heightened elaboration and skill'.[74]

He makes a further argument that around the turn of the fifteenth century a change began, moving from the idea of art/master-craftsmanship as working within established patterns, towards a greater emphasis on individuality not just of style but of design too. One example he gives is that of the Strassburg painters' guild proposing new statutes in 1516, when they included a clause relating to the masterpiece:

> Item, the candidate shall make his masterpiece an independently designed one, without using any model pattern, but rather out of his own intelligence and skill; for such a one as makes the masterpiece in this way is one who can also make others after it, which may be proper to him.[75]

And from the music world he cites the legendary example of the Mastersinger Nestler of Speyer and his champion Folz who wrote from Nuremberg:

> To write words to someone else's tune was like wearing only one shoe; the singer who wrote his own music and his own words really showed himself a Master...[76]

Baxandall argues that like the Strassburg painters and the Mastersingers, the better wood-sculptors too

> turned away from repetition of old patterns ... and began to create self-differentiating patterns of their own. What is more, the distinction between the outstanding man and the average producer as something not just of degree but of kind – the distinction on which, as has been said, the balance of his account depends – is inherent in the period's attitude to quality.[77]

Of course this is 150 years before the period now discussed, and it seems to have taken all that time plus the influence of the French baroque-turned instruments for these ideas to penetrate the German woodwind world. However the pre-baroque instruments made by, for example, Kynseker and J.C. Denner in Nuremberg, and by Hans Rauch von Schratt in Swabia do show a willingness to innovate in design and begin to display ornamental turning.[78] Nevertheless, Baxendall's arguments help us to understand one impetus behind

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[74] Baxandall, p.151
[75] translated Baxandall, p.123
[76] translated Baxandall, p.125
[77] ibid., p.127
[78] Denner's bass curtals all have a unique and decorative design of turned and pierced *gedackt* (covered) bells, while the remainder of the corpus is as plain as any other curtal (see *LoM* p.66). Schratt's columnar recorders show skilled turnery at each end of an otherwise plain cylinder, further garnished with engraved and pierced brass fittings (*LoM* p.35). Kynseker's wave-form recorder head joints are another example of unique personal design.

J.C. Denner's inventiveness. As a Nuremberg master-craftsman he was not merely free to apply his own-invented decorative style to the French woodwinds he wanted to make, but perhaps felt compelled to do so. The best makers would want to create their own patterns (of form and decoration), both to establish their mastery of the craft and by which their work could be known and recognised.

To borrow Baxandall's term, the 'period eye' valued the flourish and it is found demonstrated in widely varying crafts. It seems all the more natural that the turners should impart flourishes to the composition of their wind instruments, bassoons included. In a link with the calligraphers, the florid style even extends to their brand-stamps; the master's name is often presented in a scroll with curled or swirled ends.

Baxandall does warn though; 'However, the peculiar sense of the individual style was soon to be complicated by a new sense of collective and even national styles'.[79] It is argued below that there are enough distinguishing features to be able to separate Dutch from south German styles of Type 1 bassoon.

For the Dutch part, Bouterse states, of woodwinds in general;

> most Dutch *fluytenmakers* evidently made their instruments in a 'general baroque style' (a style which was probably developed in France, but adopted by woodwind makers in other countries), but that most of them introduced personal or even individualistic elements ... These elements pertain not only to the exterior of the instruments, but also to acoustically more important aspects (bore, position and shape of the tone holes). Consequently, the woodwind instruments made by Dutch craftsmen in the baroque period, not only display a great variety in design, materials, turned profiles and other external aspects; it is obvious that the makers also had a wide range of ideas about the desired sound of the instruments.[80]

The varieties of ornamental turnings found on these instruments have parallels with those on contemporary oboes as might be expected, but there are differences too. Cecil Adkins's 'Proportions and Architectural Motives...'[81] establishes a relationship between the classical orders of columns and the designs of oboes. He stresses the importance of the baluster in oboe turning design and shows how variations in its appearance can be linked to period and place of manufacture. In his appendix he illustrates moulding shapes also found in architecture and other design manuals.

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[79] ibid., p.127
[80] Bouterse, *DWIATM,* p.584.
[81] Adkins, 'Proportions'.

These analytical tools are useful here too, though the far smaller pool of instruments renders deductions about schools of design difficult or inappropriate.[82] Several of the standard moulding forms are also applied to bassoons.

The metaphor of the column is also appropriate, although without the stacked, turned joints that the oboe has, there is not so much scope for its application. The joints of the bassoon are to a greater extent separate elements; the enforced asymmetry of long joint aside wing, the épaule, and the un-turned boot preclude treatment as a classical imposed order of columns. Perhaps that is why the French and English gave up and made the whole instrument in plain-style. The south Germans and Dutch did their best though, and some of the terminology of the column and certainly the baluster can be used to analyse the forms of wing and bell joints.

The earliest datable illustration of a four-piece bassoon is an ornamentally turned one in a Dutch painting by Evald Collier, dated 1690 or possibly earlier. It is discussed at the end of this section. Because of this dating, and the fact that Haka was established as a woodwind instrument maker c. 1660, eighteen years before J.C. Denner, his form of Type 1 bassoon will be treated first and labelled Type 1a. This should not be taken as a statement that the Dutch preceded the Germans in bassoon making; that ordering is still not clear.

3.3.2 Type 1a

Instruments in this section: Haka, Remph, Rijkel, A. Eichentopf (contra), Sondershausen Mu2 (contra), Meiningen MJ17, HK·ICW·

The first five of these are grouped together by a very close similarity in outside form, both general design and details of turning, and by the distinguishing internal characteristic of a cylindrical or cylindro-expanding bell bore. Together these instruments suggest a link between Amsterdam where Haka and Rykel worked, and Thuringia where Eichentopf worked and where both the Mu2 contra and the Haka were used. The Remph was probably made in the same German region; its membership of this group may add a little

[82] There simply are not enough instruments to use the kind of analysis Adkins developed in his 'The German Oboe'.

information on this otherwise mysterious maker, and a suggestion for re-attribution is made below.

The other two instruments blur the boundary between this and Type 1b in opposite ways; HK·ICW· has the outer form of the group but a slight reverse taper in the bell while MJ17 has the appropriate bore shape but many external features of the 1b type.

It is tempting to call this a Dutch style, but because there is at least one of the core group that is definitely German made (Andreas Eichentopf) and possibly more (Remph) that title becomes confusing. Instead, if it needs a name it will be called after Haka as the earliest of the group's makers, the earliest known bassoon maker outside France, a known teacher of other makers, and therefore the apparent originator of this style. His bassoon, then, will be used as the archetype for this subtype and others of the group will be described in comparison to it.

Richard Haka

Haka was born in London sometime between 1635 and 1646, the son of a walking-stick maker. The family moved to Amsterdam in or before 1652 and Haka started to make woodwinds c. 1660. Nothing is known of where he got his training in woodwind making, but he presumably learned some turning from his father. He trained as apprentices C. Rykel, A. van Aardenberg and J. Steenbergen, all now recognised as important wind instrument makers.[83]

Waterhouse describes Haka as the 'founder and grandmaster of the Amsterdam woodwind instrument making school'.[84] Bouterse says that 'he was one of the first to make woodwind instruments in the new baroque style in the Netherlands and probably the first to systematically stamp them with his name',[85] and that 'there is consequently no evidence of a continuous tradition in double-reed woodwind instrument production prior to Richard Haka's activities'.[86]

He is also survived by pre-baroque instruments - recorders and *Deutsche Schalmeien*. The latter are described by Haynes as retaining some of the shawm's appearance while sharing

[83] Waterhouse, *NLI*, p. 156.
[84] ibid.
[85] Bouterse, *DWIATM*, p.14 (of the book part of this work).
[86] Ibid., p.419.

with the oboe a softer sound and lower pitch.[87] On the same receipt referred to earlier (see Type 0), on which the four piece bassoon is included in a set of *Fransche haubois*, he also lists a set of *Teutsche schalmeije* comprising thirteen boxwood descants, six boxwood 'middle-bass' and six maple dulcians. The surviving s*chalmeien* are shaped somewhat like narrower and more delicate versions of the renaissance shawm but it is not known what form those dulcians took.

Bouterse describes a very strong school of Dutch woodwind instrument making in the early eighteenth century and he lists twelve known bassoon makers in the first two generations of Dutch wind instrument makers. These include C. Rijkel and M. Parent, known to also have been bassoon players.[88] However there are now only two known surviving bassoons by makers from his list; one each by Richard Haka and his apprentice and nephew, Coenraad Rijkel.

The bassoon by Haka in the Schlossmuseum Sondershausen, Mu 6, still stands as 'the earliest datable, surviving baroque bassoon'[89] and its relatively recent discovery is documented in Heyde 1987[90] and Waterhouse 1988[91]. It is extensively described and photographed in Bouterse DWIATM.[92]

The characteristics of the exterior turning are shown on the following pages.

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[87] Haynes, *TEO*, p.174.
[88] Bouterse, *DWIATM*, p.180. Those makers are; Haka, J. de Jager, Parent, Rijkel, T. and J. Boekhout, Van Aardenberg, F. de Jager, Nieuwenhooven, A. and J. van Heerde, Terton, van Driel, H. Richters.
[89] Kopp, 'Emergence', p.80.
[90] Herbert Heyde, 'Contrabassoons in the 17th and early 18th Century', *GSJ*, 11 (1987), 24-36.
[91] William Waterhouse, 'A Newly Discovered 17th Century Bassoon by Haka', *Early Music* 16 (1988), 407-410.
[92] Bouterse, *DWIATM*, pp. 548-550, Appendix C No.38 1-3 and Pe01-Pe38 for comprehensive description, measurements and photographs.

Bell

There are three groups of turnings joined by a plain column:

A fat baluster surrounds the socket at the south end (a); a small bead (b) separates it from a narrow brass ferrule (c) that supports the actual opening. There is a flare (d) at the top of the baluster ended by a narrow fillet and a larger bead group (e).

It is reflected at the north end of the joint by an inverted baluster that curves right in towards the bore opening (f), flanked again by beads surrounding the opening (g) and a small group to the south (h). The flare of the south baluster is inverted to become an inward curve at the north baluster (i).

Between the two is a straight column, divided centrally by a large bead flanked by smaller beads – a kind of decorated astragal (j).

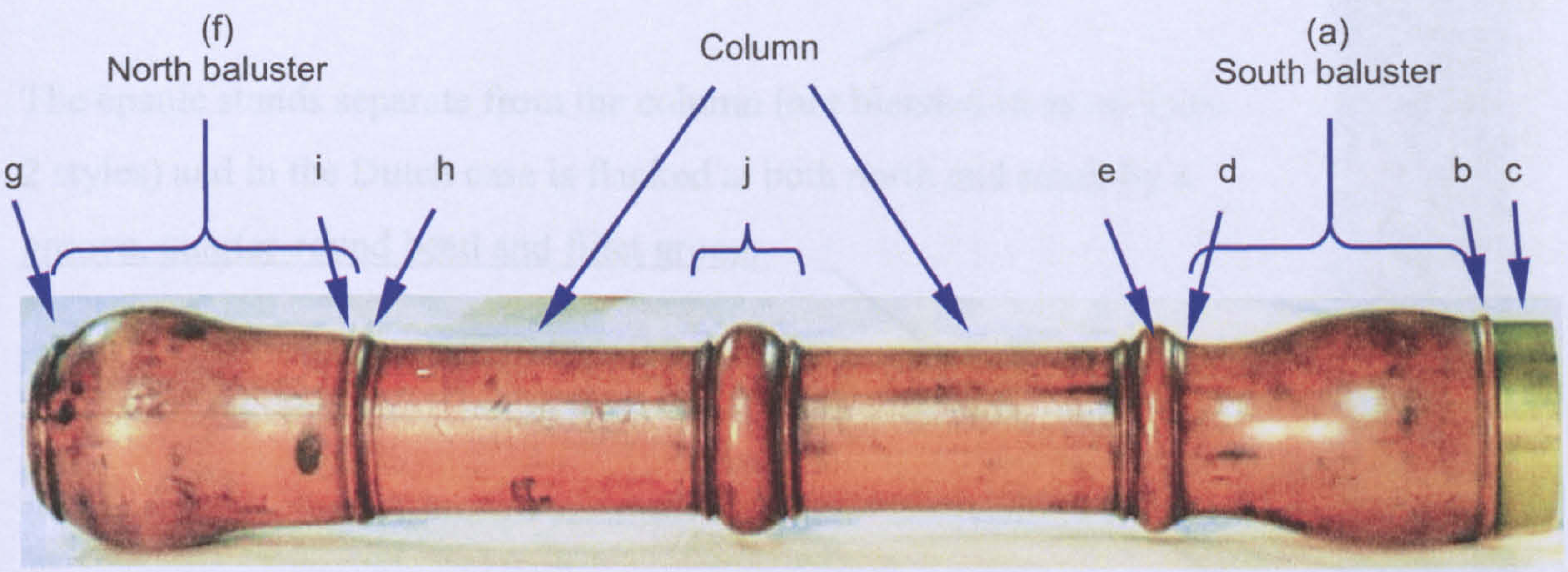


Fig 3.3.2.1. Haka bell

Wing

A rather short brass ferrule supports the opening (its length is less than its diameter).

An inverted baluster surrounds the crook socket much as on contemporary oboes.

The baluster again flares from the waist towards the southern terminal cluster of small beads, fillets and grooves.

The épaule stands separate from the column (not blended-in as on Type 2 styles) and in the Dutch case is flanked at both north and south by a groove, quarter-round bead and fillet group.

At the south end of the joint, abutting the tenon is a pedestal – a larger diameter cylinder, stepping down to the column diameter with a quarter-round corner and a couple of fillets.

Fig 3.3.2.2. Type 1a wing

(That by Rijkel is illustrated as a clearer photograph is available; the Haka is very similar)

Long joint

This is fully turned, i.e. without a raised, flat platform for the keys.

The top end of the tenon is rounded and fits to a rounded step in the bell socket. This rounding is unique to Haka.

A quarter-round bead is placed just below the tenon to butt onto the bell.

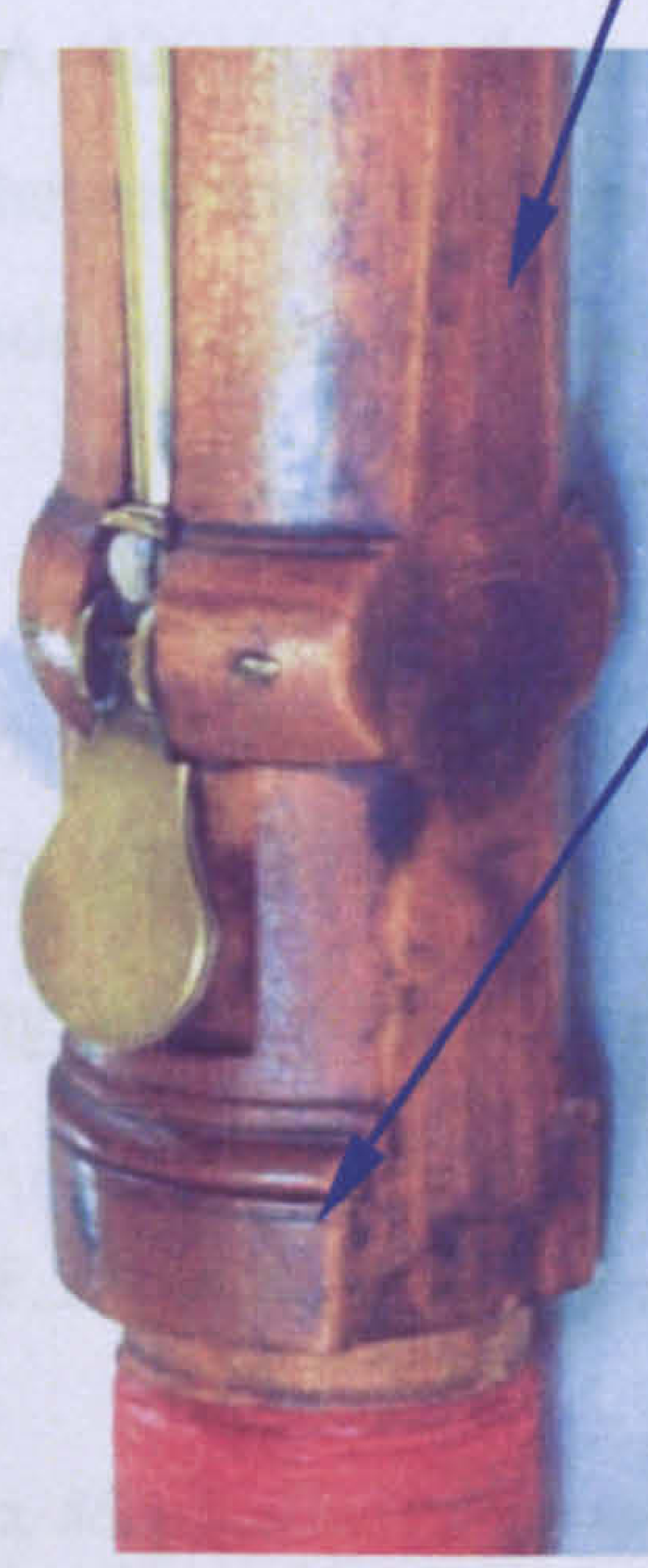
The Bb key flap is set a little way down from the top end on a cylindrical column with a narrow astragal placed just above it. (An astragal is a bead flanked by two fillets; this one is more clearly visible in the photo below left).

Keys are mounted in four large rounded beads flanked by small fillets.

Between the central two - the region of hole X - the diameter swells to make a barrel shape.

At the south end there is a pedestal much like that on the wing.

The pedestal and lower three key-mount beads are all planed-off to allow the wing to fit closely alongside and a large hollow is carved-out to accommodate the wing's baluster.



Figs 3.3.2.3. Haka long joint and details

Boot

This is a simple tapering joint; the oval cross section is quite slim. There are no blocks; the keys are mounted in brass saddles. The plug is the single, oval type.

Keywork

The key touches are made from relatively thin brass sheet (c. 1 mm) rolled into a U for the shank section. The touch sections are wider spread but still curved. The F touch is fish-tailed, the profile scalloped with sharp points a little like a holly leaf.[93] The flaps are spade (playing card) shaped, made from flat brass with axle tabs bent up. It is difficult to say whether the Haka was always 4-keyed. The present Ab key is not original, but it is not clear if it replaces an earlier one or was an entirely new addition. Some of the others of this type are 3-keyed, as discussed below.

Fig 3.3.2.4. Haka boot keys

Stamp

The Haka name is set in a scroll which turns up to the left and down to the right. This is illustrated and discussed further below.

The instrument is in very good preservational state; there are no signs of rot or damage in the bore, apart from the Ab key there are no major alterations or additions made in later times. The museum's documentation states that the Ab key and the current crook were made in 1985. It also gives the pitch as A=420Hz. Heyde states that the pitch is A=415Hz.[94] Bouterse agrees that with the current crook it plays well in-tune at A=415Hz but also says that Guntram Wolf has made a longer crook with which it plays well at A=392Hz.[95]

Waterhouse and others have commented on the resemblance between this instrument and the one illustrated in the painting '*Der Fagottspieler*' in the Suerdmont Museum, Aachen. This is discussed along with other iconography at the end of this section.

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[93] Waterhouse, 'Newly Discovered Haka', p.408, suggests that the touch may not be original. Heyde does not discuss the possibility.

[94] Heyde, 'Contrabassoons', p.25.

[95] Bouterse, *DWIATM*, Appendix C, *R. Haka-no. 38,* p.2. These comments indicate both the difficulties of specifying the playing pitches of bassoons missing their original crooks and reeds, and also the flexibility of bassoon tuning, whereby the one instrument can be set up to play 'satisfactorily' in two pitches a semitone apart. Just how satisfactory the tuning is at either of these pitches has not been thoroughly described.

In common with some other museums, the Schlossmuseum Sondershausen did not allow measurements to be taken since a previous researcher had already done so, but they did provide a copy of those measurements. Those for the wing are fairly comprehensive – enough to get a good idea of the profile – but those for other joints are less so; in diameter increments of 0.5mm. They are particularly inadequate in the boot and bell; the bell only has two points measured at one end and one at the other end. Consequently any subtleties will not have been detected so there may be a misleading impression of simplicity of bore design in this instrument. The museum did permit photographs to be taken though, some of these are presented together with the provided measurements in Appendix 3.

Bore

The bell bore is (as far as can be told from the few measurements) entirely cylindrical at 32.5mm. Despite the large upper baluster on the outside, there is no inner chamber.
The boot up bore is mostly cylindrical from the open (north) end through to hole VII then reduces steeply. The small bore is at a low taper angle that steepens just inside the socket.
The wing bore is not a straight taper but shows signs of having been made with several reamers. There is no cylindrical throat region; the main bore meets the crook socket at a sharp angle, with minimum diameter c. 9.4mm. This relatively small diameter is an indication that the bore is still in very good condition.

Coenraad Rijkel

Rijkel was born in Amsterdam c.1664 and died there in 1726. His mother was Haka's sister; his father was a key-maker.[96] The family moved briefly to London where his father stayed. Rijkel returned to Amsterdam in 1679 when aged around fifteen, to be apprenticed to his uncle in order to 'learn to make flutes and the other wind instruments he sells'.[97] He was also a bassoon player from a young age; 'after 1679, while Coenraad was still apprenticed to his uncle, his name occurs several times as a musician, notably as a bassoonist in the theatre. According to the ledgers of the Burgerweeshuis ... the sum of 51 guilders and 5 stivers had been paid to *Coenraad Reykel* for playing the bassoon 41 times up to and including December 30 1680'.[98] It is not clear whether this refers to the baroque

[96] Waterhouse, *NLI*, p.341. It is not clear whether this means musical instrument keys or lock keys. Bouterse, *DWIATM*, p. 86 says that his father was a tailor from London.
[97] Bouterse, *DWIATM*, p.86.
[98] ibid.

bassoon or curtal; Haynes suggests that the oboe may have appeared in Amsterdam (played by French musicians) in performances of Lully's operas from 1677, so Rijkel would have had to have been very quick off the mark to have been performing on the bassoon this early.

In or about 1705 he had his trade card printed, one of which survives in the Musikinstrumentenmuseum in Berlin.[99] This shows very prominently a bassoon, which, apart from being shown left-handed, displays all of the Haka characteristics described above. It also has the Ab key present next to the F key. The left-handedness is probably an engraving error.

He is survived by three recorders and two oboes, but at the time of publication of Young's *4900 Historical Woodwind Instruments* there were no known bassoons which, given the tradecard and references to his playing, was particularly frustrating.[100]

In early 2006, during the course of this study, an exciting new find was made; a previously unnoticed bassoon was identified in the Stedelijk Museum, Zwolle and found to bear Rijkel's stamp.[101] With thanks to help from Jan Bouterse I was privileged to be a party to the first measuring of the instrument along with woodwind instrument maker Peter van der Poel (largely due to the superiority of LMU's measuring system).

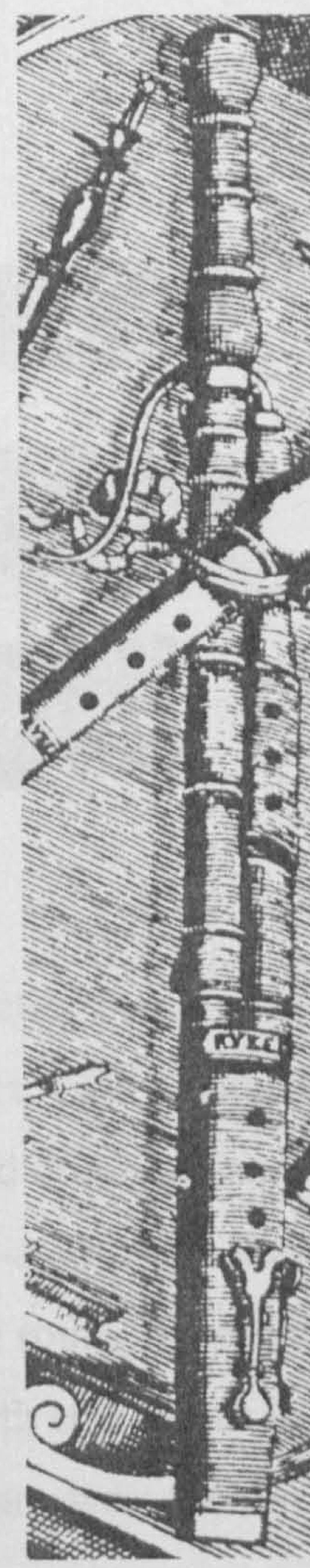


Fig 3.3.2.5. Bassoon from Rijkel's tradecard

Unfortunately the instrument is not in good condition. It has been used in a military context for the latter part of its playing life, around 150 years after its manufacture; there are inscriptions around the boot ferrules relating to this. The boot and upper end of the long joint have been heavily infested with woodworm, but the wing and remainder of the long joint are mostly free of them.The original bell is missing and a modern style one fitted (with the B hole left open). As this part is so much an identifying feature of the type,

[99] Reproduced in Bouterse,*DWAITM*, page Cd22; see also Appendix 4.

[100] Young, Philip T., *4900 Historical Woodwind Instruments* (London: Tony Bingham, 1993). Hereafter *HWI*.

[101] It had previously been labelled '*bass fluit pijp*' and resided in the reserve collection, in a box of donations from an estate.

that is a significant loss. There is a crook with it which cannot be the original; it has a cylindrical bore of around 11mm diameter, and at the reed end it is capped off with a plate into which a short section of smaller diameter brass tube is inserted to take the reed. With this and the ill-matched bell it must have been able to play only a few notes in tune, just some simple pedal notes for military marches perhaps.

Exterior

The outward appearance of the woodwork is very much like the Haka:

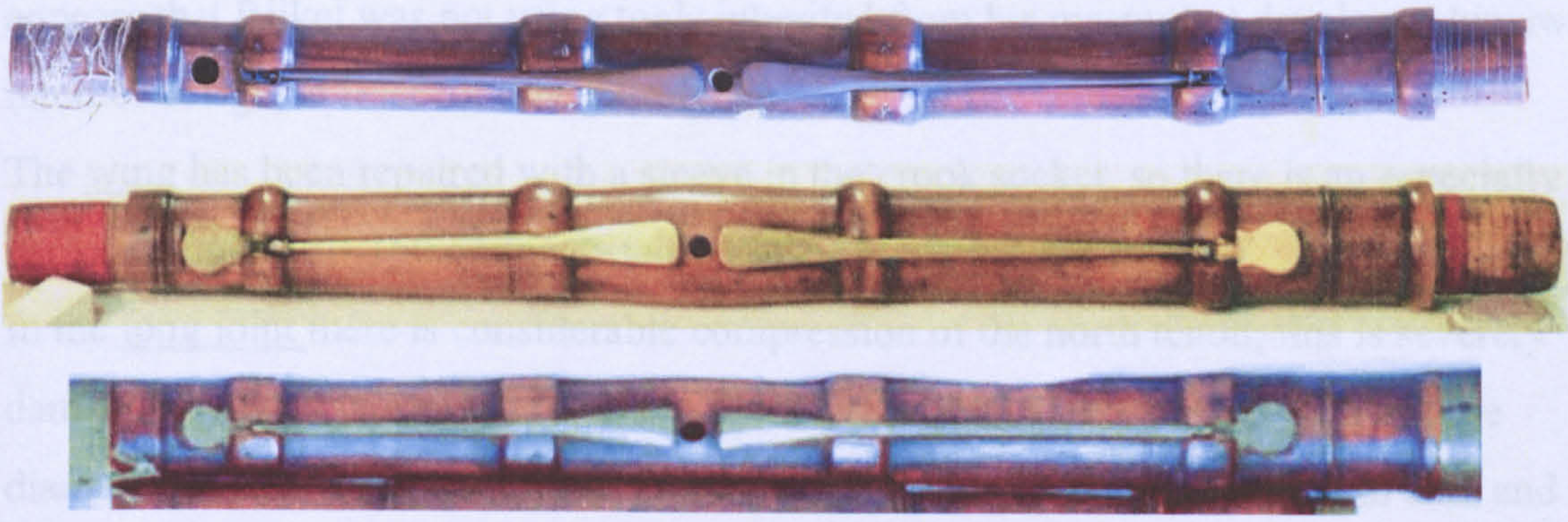


Fig 3.3.2.6. Long joints; Rijkel above, Haka centre, Remph below

The <u>long joint</u> has the small bead and short plain section above XI, barrelled centre section, and pedestal at the south end. It has similar hollows gouged out to fit the baluster and beads of the wing joint. The keys are the same construction of rolled thin brass sheet, with wider spread part for the touch; the flaps are also the same playing-card spade shape. The <u>wing</u> has the same turnings almost exactly: the same pedestal at the south, the same beads at the shoulders of the épaule, the same short brass ring at the north end. There is a lining in the crook socket; a typical repair for a rotted and worn away narrowest section of the bore.

The <u>boot keywork</u> however is quite different: The F key flap is trapezoidal with chamfered edges, it is mounted unusually with the axle beneath the key. The touch is different in shape from any others in type 1, and from that on Rijkel's tradecard, while still being constructed in the rolled thin sheet manner and retaining the double-lobed shape for use by either hand. There is no Ab key alongside so the double-handedness here is actually functional. On the back of the boot there is what at first appears to be an F# key, made in the same rolled-sheet manner, of a shape to match the long joint touches and mounted in a brass saddle. The tonehole is drilled into the small bore, however, so this is an Ab key in an unusual and innovative position. The touch is some distance away from Hole VIII so that hole cannot be closed at the same time as the key is operated.

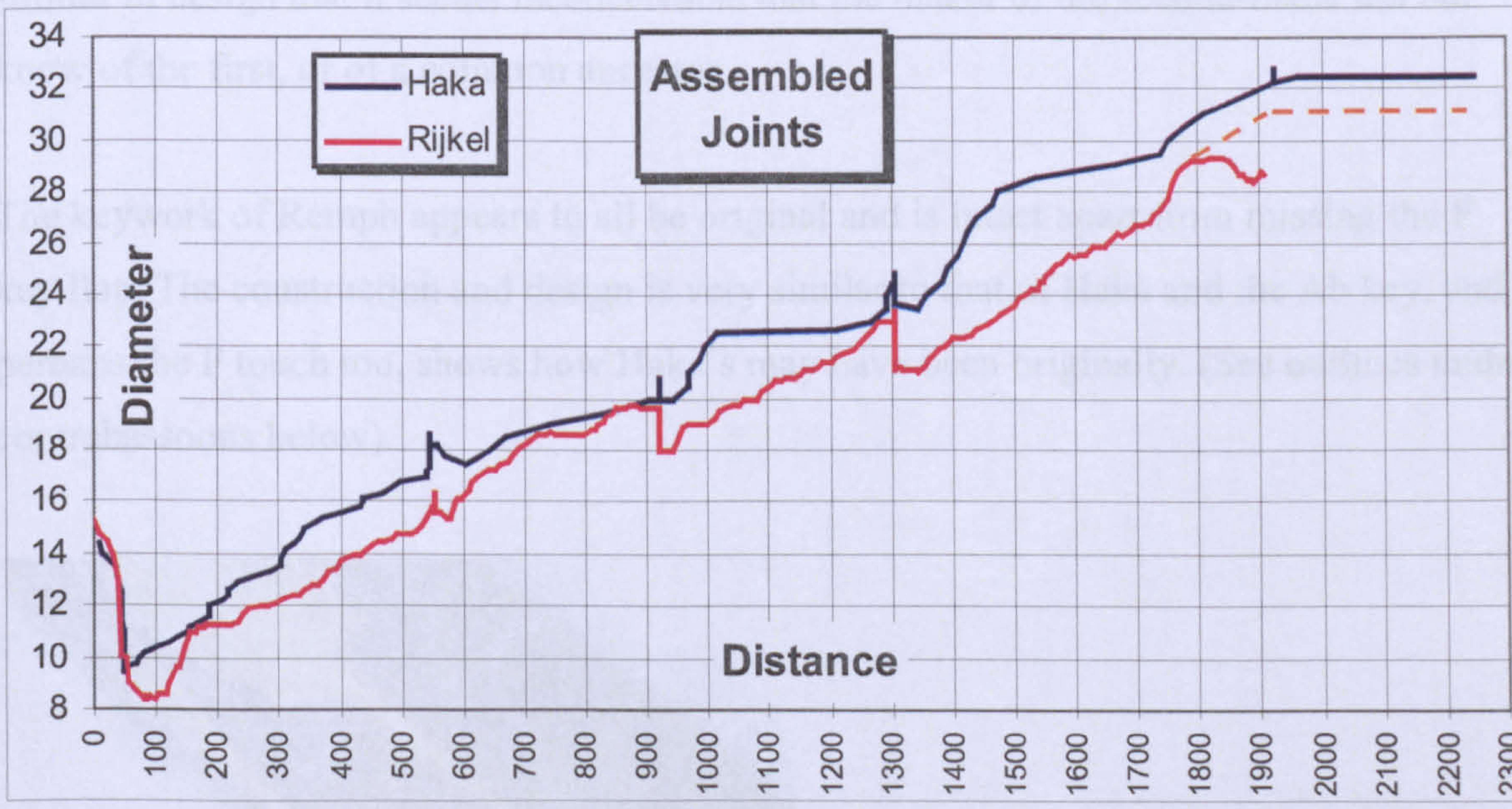
The name stamp is on the back of the boot, (Haka placed his on the front of his bassoon, under F key touch, and he put three fleur-de-lys on the back). The fact that it is stamped with Rijkel's own name dates it as post-1699, prior to which he had used Haka's stamp on his instruments.[102]

Bore

Despite the many similarities in outward form, on the inside the bore is significantly narrower than Haka in all except for the boot down bore, and of quite a different shape. It appears that Rijkel was not using tools inherited from his master but developed his own internal design, at least for this instrument.

The wing has been repaired with a sleeve in the crook socket, so there is an especially narrow throat at 50-150 on the distance scale of Graph 3.3.2.1 below.

In the long joint there is considerable compression of the north tenon; this is severely damaged by woodworm and the last 4-5mm have disappeared altogether. The bore diameter originally would probably have reached close to 31mm at the north end, and the bore of the original bell would probably have matched that.



Graph 3.3.2.1. Bore profiles of Rijkel versus Haka; suggested original bore at bell and top of long joint shown dashed

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102 See Bouterse, *DWIATM*, pp. 86-88 for full exposition of the argument between Haka and Rijkel, which resulted in Rijkel starting to stamp his own name on his instruments, rather than Haka's, whose workshop he had taken over.

S. Remph

This instrument is No. 1371 in the Musikinstrumenten museum der Universität, Leipzig. The similarities between Haka and Remph are obvious from the outside; all of the distinguishing features mentioned are present.

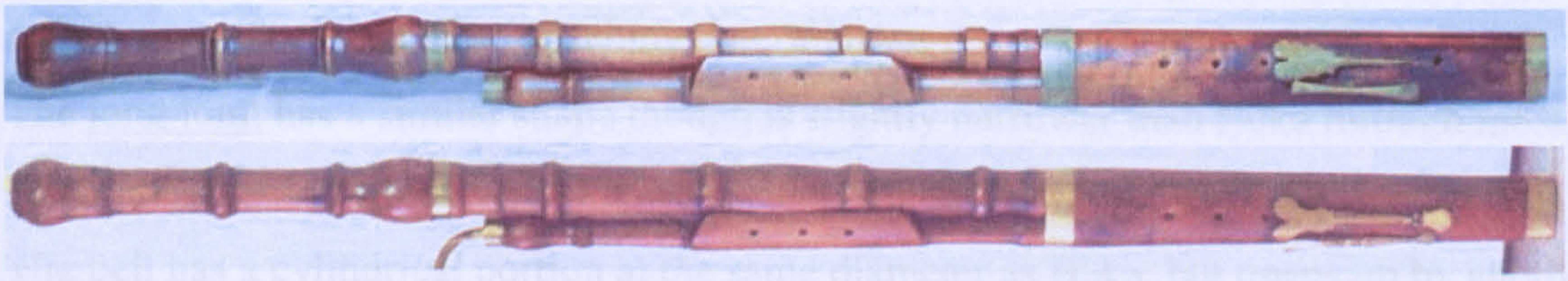


Fig 3.3.2.7. Remph above, Haka below

The only variation from the Haka pattern is in the long joint key-mount rings, which are here turned as flat-topped bands rather than half-round beads. The long joint is shown with Rijkel and Haka in Fig 3.3.2.6 above.

There is perhaps a slightly less proficient hand evident in all of the turning and finishing of this instrument, but it is only a matter of small degree. These two instruments are so similar in design that it seems inconceivable that the maker of the second-made did not know of the first, or of a common ancestor.

The keywork of Remph appears to all be original and is intact apart from missing the F key flap. The construction and design is very similar to that of Haka and the Ab key, and perhaps the F touch too, shows how Haka's may have been originally. (See outlines under contrabassoons below).

Fig 3.3.2.8. Remph boot keys

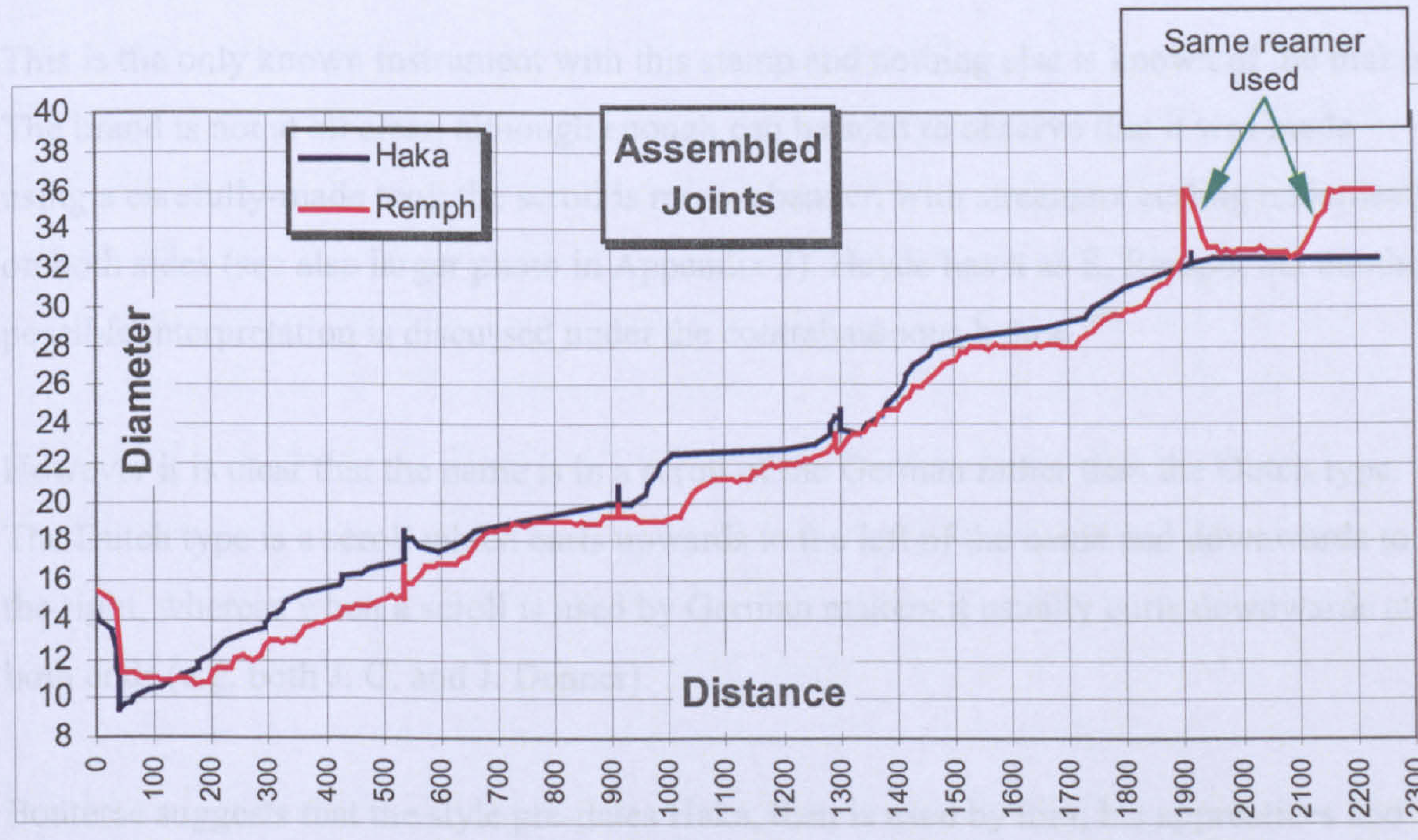
Bore

The bore, though, is significantly narrower than Haka through the wing and boot big side, matching more closely in the boot small and long joint where there is a close match.

The narrowest part of the wing bore - the throat (between 30-200 on the distance scale of Graph 3.3.2.2 below) - shows signs of being worn out and was probably significantly narrower originally, at least matching that of Haka.

The long joint has a similar shape though is slightly narrower than Haka through most of its length.

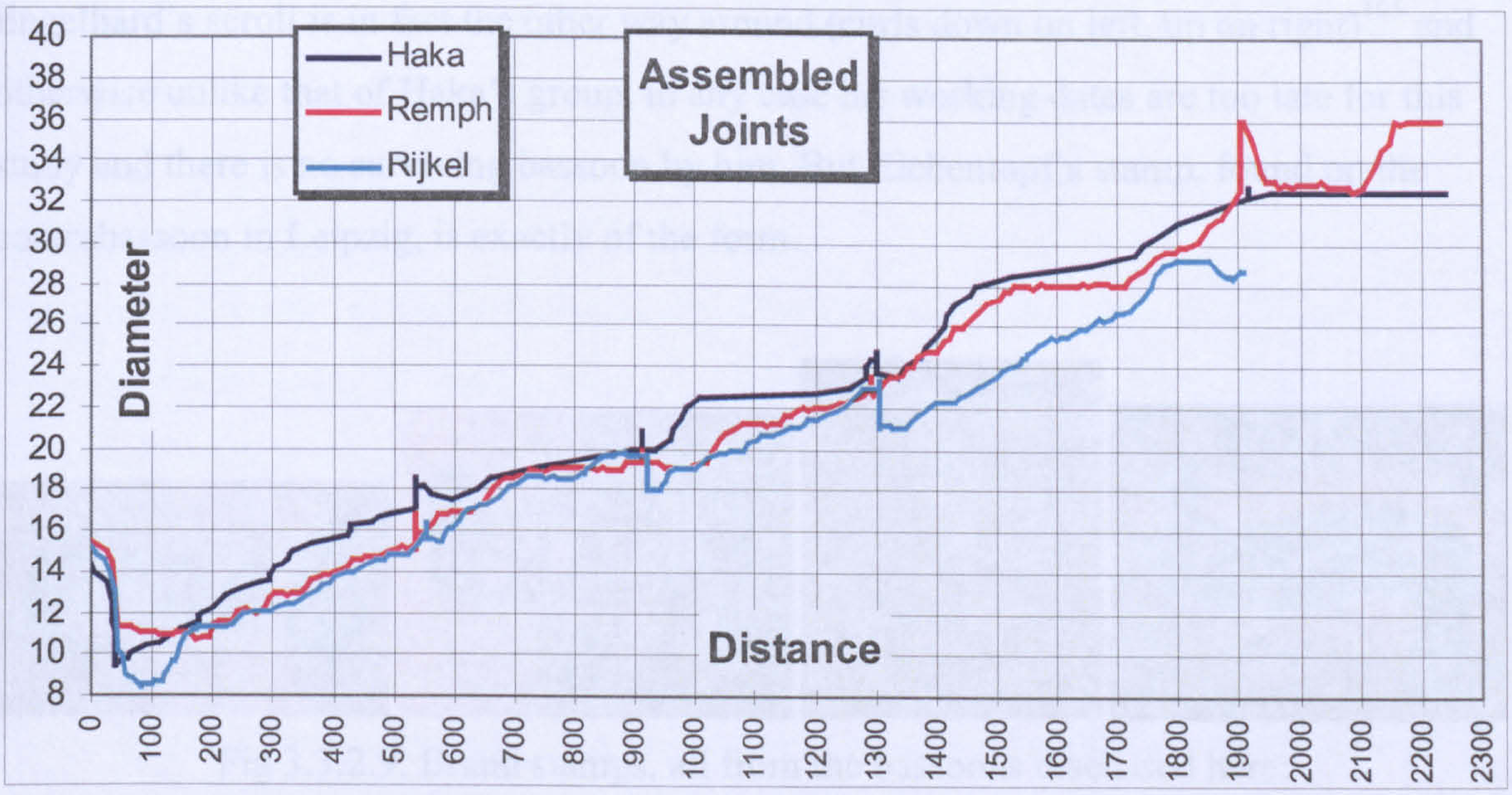
The bell has a cylindrical portion at the same diameter as Haka, but opens up by another 3mm in diameter for 70mm at the open end (starting at 2100 on the distance scale of Graph 3.3.2.2 below). The reamer or auger used to make that opening seems to have been used from the south end too, where the diameter steps up from the long joint, then reduces steeply to the cylindrical portion (this is clearer in the graphs in Appendix 3).



Graph 3.3.2.2. Haka and Remph bores compared.

This can be regarded as substantially the same design as Haka, but with a deliberate attempt to try something different in the wing and bell bores.

The Rijkel bore can now be seen to relate more closely to this bore profile than to Haka's, at least in the wing and boot joints, see graph below:



Graph 3.3.2.3. Haka, Remph and Rijkel bores compared

This is the only known instrument with this stamp and nothing else is known of the maker. The brand is not at all clear, although enough can be seen to observe that it was made using a carefully-made tool; the scroll is more a banner, with streamers curling underneath on both sides (see also larger photo in Appendix 3). Heyde has it as S. Remph, but another possible interpretation is discussed under the contrabassoons below.[103]

However it is clear that the name is in a scroll of the German rather than the Dutch type. The Dutch type is a scroll which curls upwards to the left of the name and downwards to the right, whereas when a scroll is used by German makers it usually curls downwards at both ends (e.g. both J. C. and J. Denner).

Bouterse suggests that the style pre-dates Haka, then is used by him, his apprentices and their followers. He illustrates several, along with non-scrolled stamps.[104] He also mentions two German makers who used the Dutch type: J. F. Engelhard and Andreas Eichentopf. It is not known whether the design came from the Netherlands to Germany or vice-versa, nor are the working links or influences between these makers understood, but this group of bassoons do add some interesting data to the issue.

[103] Herbert Heyde, 'Unpublished catalogue notes of double reed instruments', Musikinstrumenten museum der Karl Marx Universität, Leipzig.
[104] Bouterse, *DWIATM*, pp.32-33.

Engelhard's scroll is in fact the other way around (curls down on left, up on right)[105] and otherwise unlike that of Haka's group, in any case his working dates are too late for this study and there is no surviving bassoon by him. But Eichentopf's stamp, found on the contrabassoon in Leipzig, is exactly of the form.

Fig 3.3.2.9. Brand stamps, all from the bassoons discussed here:
S. Remph (?) (bell), R. Haka (bell), C. Rijkel (boot), A. Eichentopf (bell)

Two Contrabassoons

There are two baroque contrabassoons to be found in eastern Germany: one by Andreas Eichentopf is No. 3394 in the Musikinstrumenten Museum der Universität Leipzig, and an anonymous one is Mu2 in the Schloss- und Heimatmuseum Sondershausen, where it stands alongside the Haka bassoon (Mu6). These are described and discussed by Heyde in 'Contrabassoons in the 17th and Early 18th Century', in which he explains that the Eichentopf instrument was found in 1959 in Stolberg Castle, 15 Km north-east of Nordhausen in the Harz mountains, where it had presumably been used in the court orchestra of the Imperial Counts of Stolberg.[106] That is just 36 km from Sondershausen and finding two contrabassoons in such close proximity may seem surprising now; there are only two other known baroque contras in the world, one made by Stanesby Junior in London in 1739 the other by Anciutti in Milan in 1732. However Heyde also discusses several contrabass curtals and evidence for the existence of other contrabassoons in the regions of Thuringia and Saxony, stating that 'from 1700 onwards … double bassoons were in use at Leipzig, Weimar, Arnstadt and Meiningen'. He suggests that 'those great basses would … have played no small role between 1680 and 1730'.[107] There is the well-known example of Bach's St John's Passion (1723) calling for 'Bassono grosso'; however Heyde's mention of cantata 31 is an example of a misconception regarding transposing parts for a low pitch bassoon. This is discussed under the Meiningen bassoon MJ17 below.

[105] Waterhouse, *NLI*, p.107.
[106] Heyde, 'Contrabassoons'.
[107] ibid., p.34.

There is also iconographic evidence of a contra of this style in use, in a painting by François Xaver Verbeeck discussed at the end of this section.

Andreas Eichentopf

Andreas Eichentopf worked in Nordhausen, Thuringia where he was described as '*Pfeifenmacher*' when he was married and gained citizens' rights in 1690. There is no concrete information on his relationship to the Leipzig maker J. H. Eichentopf, though since the latter was born in Nordhausen, a connection seems likely.[108]

Exterior

This is an impressive instrument, and not just because of its massive size; it is made of highly figured maple, with ornate, florid engravings decorating both bands of the boot and a unique, elaborate F-key touch. As stated above it is clearly stamped with the maker's full name in a Dutch-type scroll and is the only known instrument with this stamp. In addition, amongst the florid engravings of the north boot ferrule is the inscription; 'ANDREAS EICHENTOPF IN NORTHAUSEN 1714'.

There are many resemblances to the Haka:

The bells are very similar as can be seen below, where the Eichentopf has been scaled down to the same length as Haka:

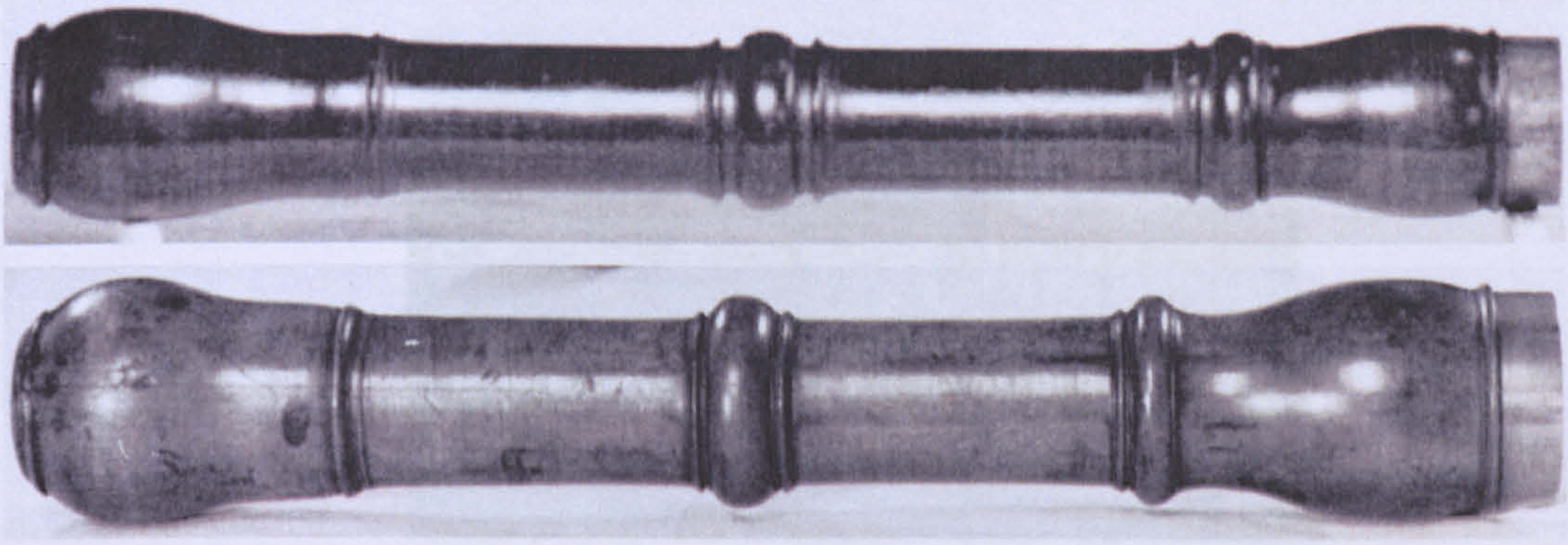


Fig 3.3.2.10. Bells scaled to same length; above, Eichentopf, below Haka

The wing joint is also similar, with a bead group separating the brass ferrule from the baluster, a triple group south of the baluster and there are beads at the north shoulder of the épaule. (As the épaule extends right to the south end of the wing, there is no room for

[108] Waterhouse, *NLI*, p.103.

another bead group or a pedestal there). The wing baluster has been partly cut away to fit against the long joint.

Fig 3.3.2.11. Eichentopf contrabassoon wing baluster

The <u>long joint</u> has been turned with the barrel-shaped central section surrounding hole X, but the barrelling has been planed away (along with the key-mount beads) for most of the circumference, to leave just a swelling around the hole itself:

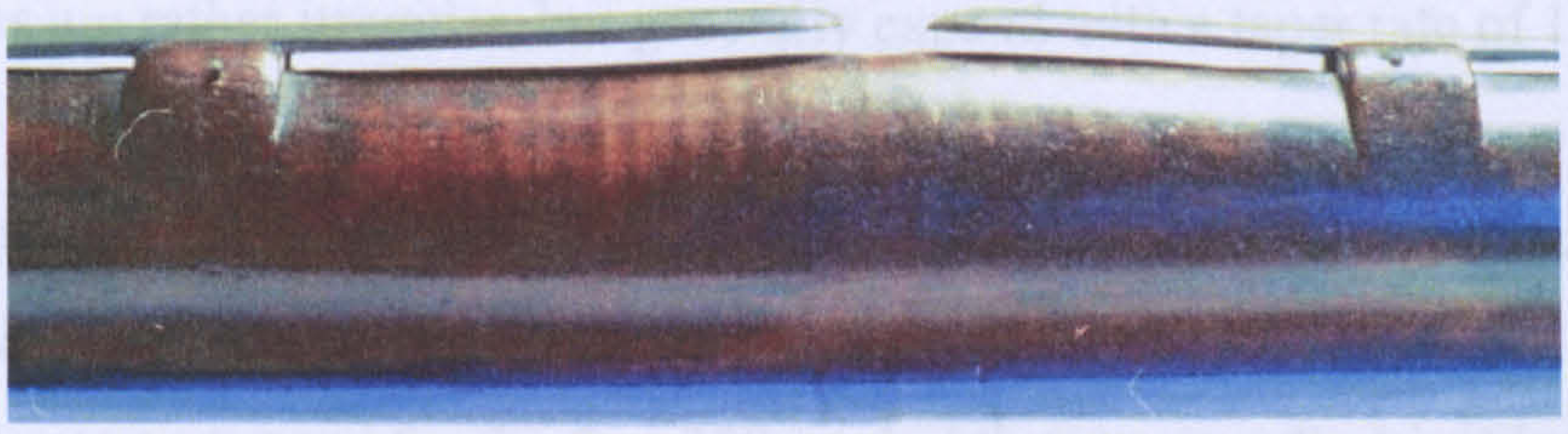


Fig 3.3.2.12. Eichentopf contrabassoon, centre of long joint

The placing of the Bb key is different; on the contra hole XI and the Bb flap are at the top of the joint, without the thin bead and extra column section above that Haka has:

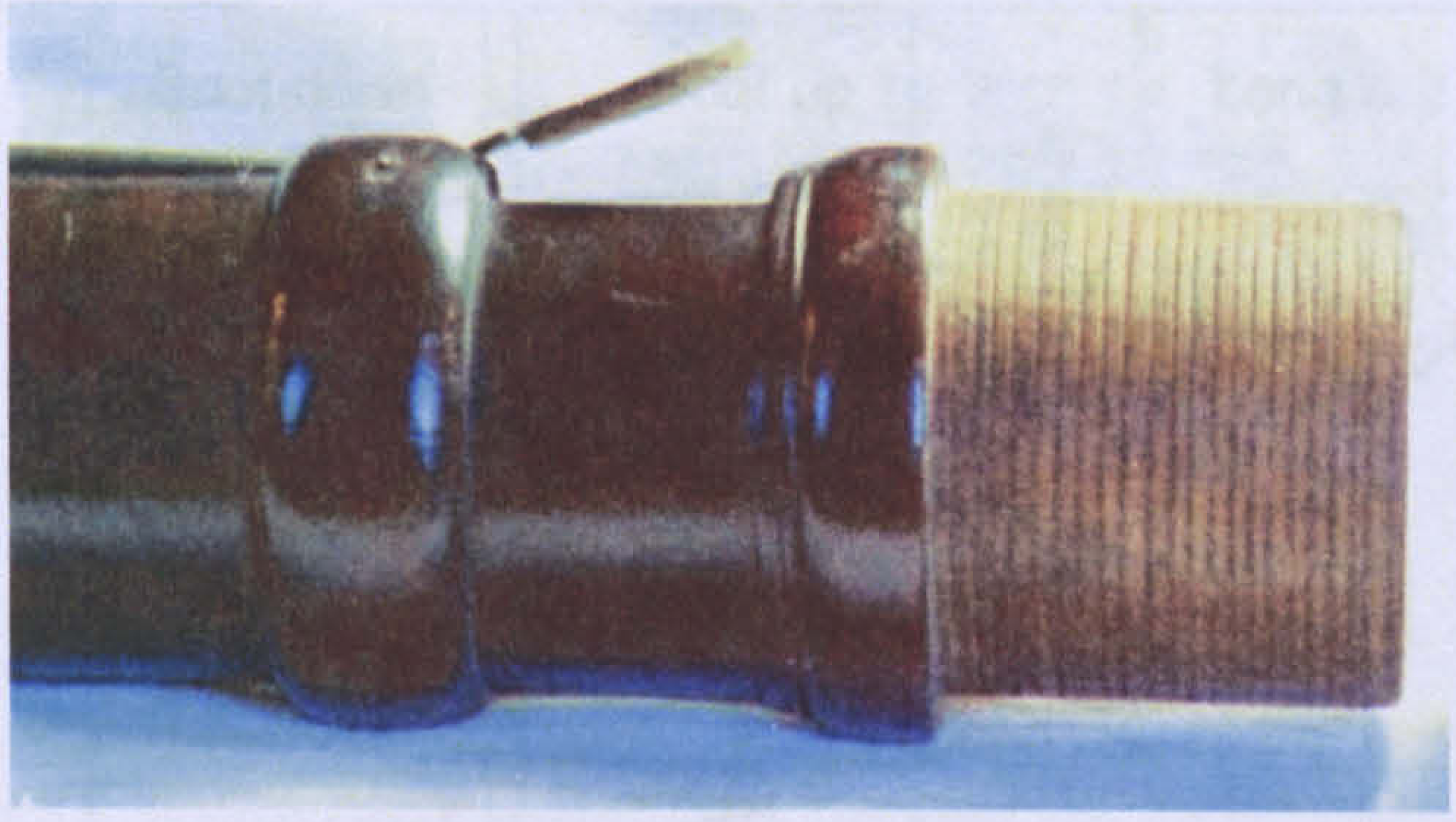


Fig 3.3.2.13. Eichentopf contrabassoon, top of long joint

There is no hollow gouged out to fit the wing's baluster, instead the baluster has been flattened off as shown above. There is a small pedestal at the south end of the long joint just like that on Haka, but no photo is available.

The <u>keywork</u> is also a little different from Haka; the three touches are more strongly constructed, of course, to span those long distances. So the long joint touches are of brass around 1.4mm thick, forged into a shallow curve on the top surface with parallel, vertical sides; there is no waist at the pivot position. The F touch is about 2.6mm thick, with just a slight cross-sectional curve and tabs for the pivots soldered on underneath. The profile of the F touch is an engraved and pierced, elaborated version of Haka's (see Fig. 3.3.2.17 below).

Bore

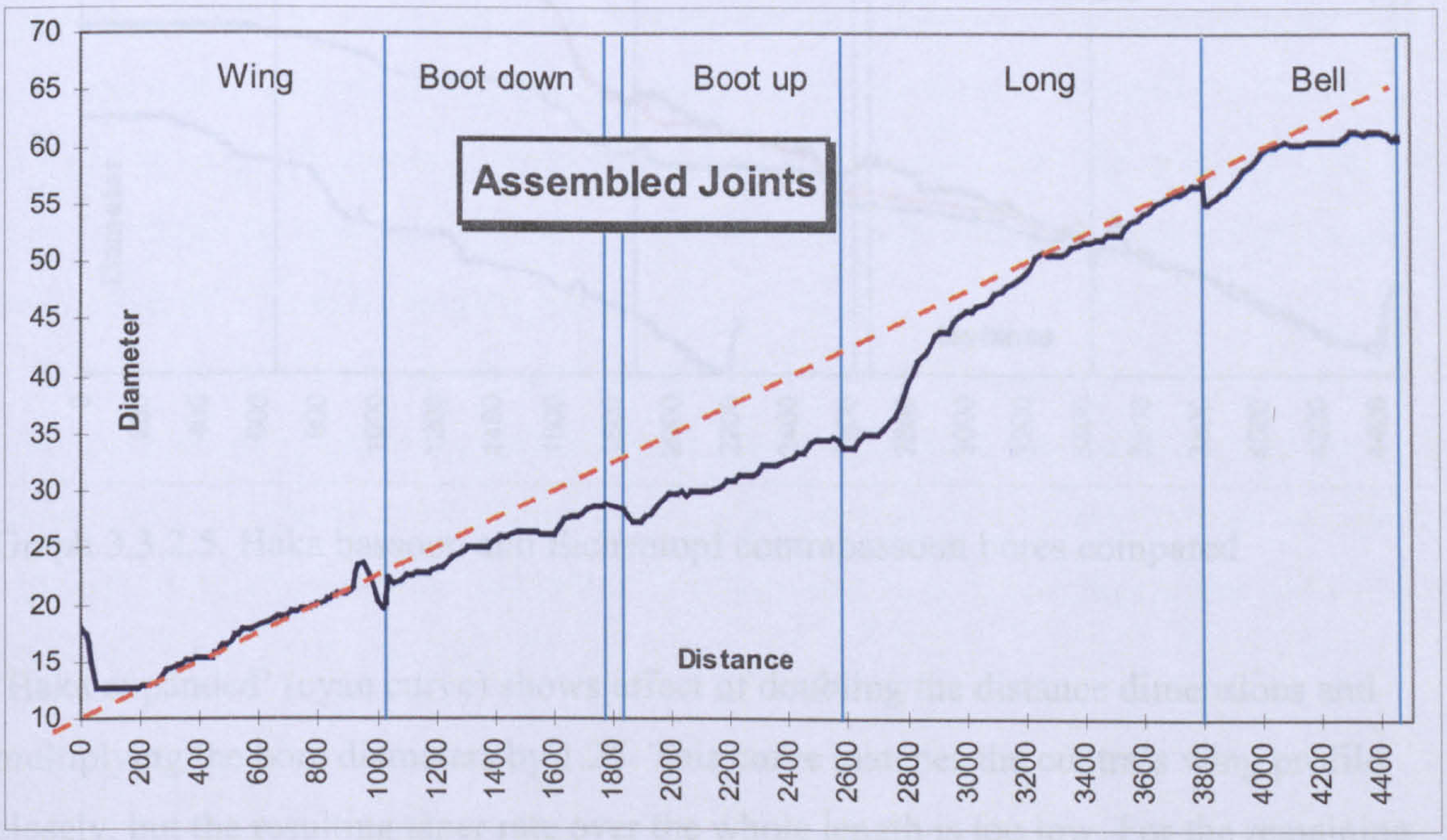
The graphs in Appendix 3 show that several reamers were used for each joint, but when the bore is viewed as a whole a fairly simple pattern emerges.

The wing has a cylindrical throat section for 180mm from the crook socket, then expands at a taper of 1 in 80 or .0125, shown as a dashed red line on Graph 3.3.2.4 below. At the upper half of the long joint, the bore again approximates the reference taper.

The boot bores are rather irregular, but generally expand with a taper rate of 1 in 100 or .01.

The long joint has a steeper section in its southern half, re-joining the reference taper at about the position of hole X.

The bell continues to expand for the first 250mm but then has a cylindrical bore, with just a little more opening at the top end. So in this it is consistent with the Haka/Remph style of bore.



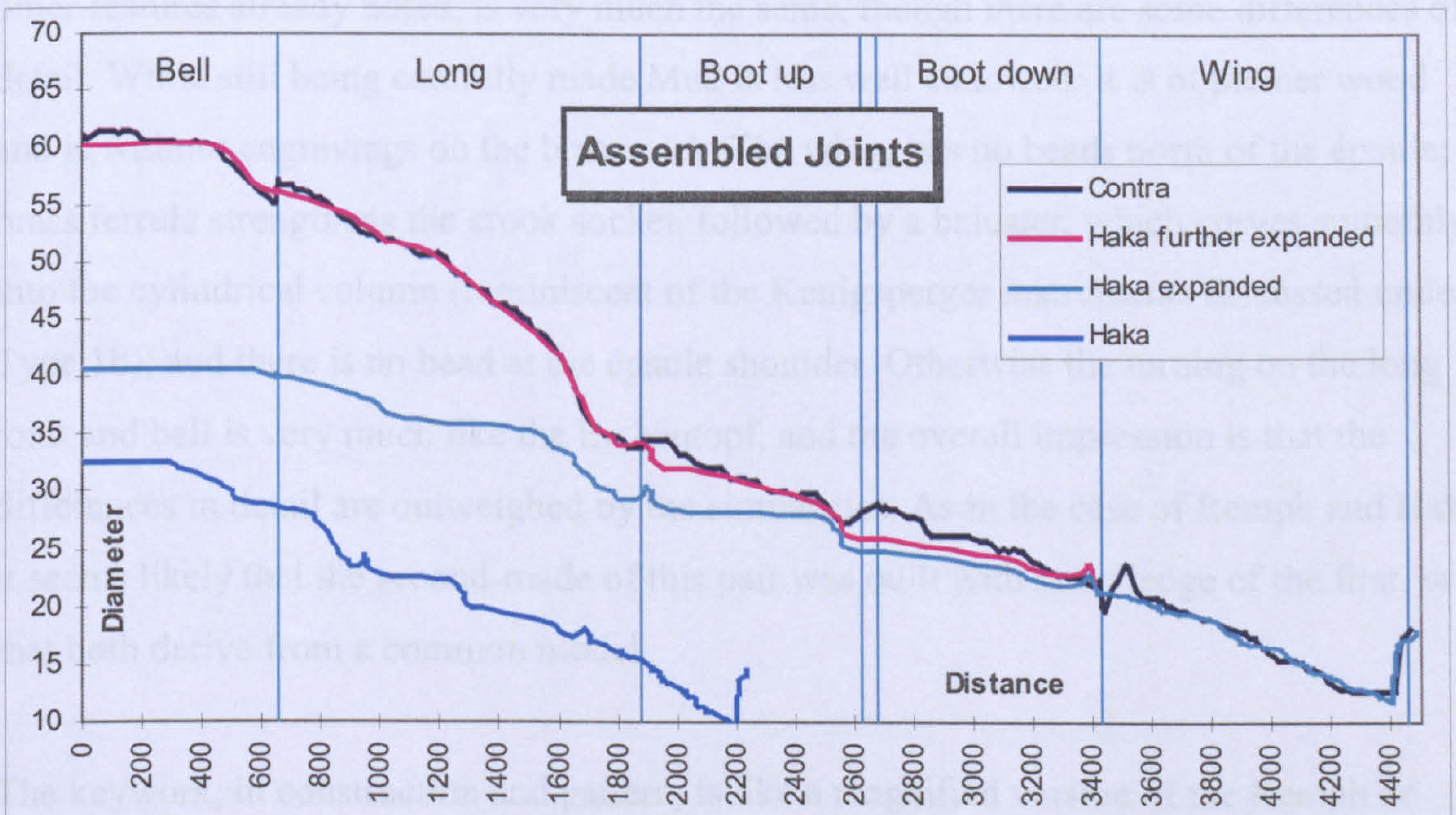
Graph 3.3.2.4. A. Eichentopf contrabassoon bore, with reference line of .0125 taper

The <u>joint lengths</u> are all very close to twice as long as those of the Haka bassoon:

	Haka	Contra	Proportion
Wing	537	1028	1.91
Boot	440	869	1.98
Long	617	1220	1.98
Bell	375	720	1.92
Total bore	2241	4460	1.99

Table 3.3.2.1. joint lengths of Haka and A. Eichentopf contrabassoon compared

This prompts an investigation into the relationship between the bores of these two instruments. If the bore profile of Haka is stretched by doubling the distance dimensions, then expanded by multiplying the diameter dimensions by 1.25, the profiles at the wing joints come to match very closely. The effect is most clearly seen if the bores are aligned at the bell end, so the following Graph 3.3.2.5 shows the bell to the left, with the scale counting from that end.



Graph 3.3.2.5. Haka bassoon and Eichentopf contrabassoon bores compared

'Haka expanded' (cyan curve) shows effect of doubling the distance dimensions and multiplying the bore diameters by 1.25. This curve matches the contra's wing profile closely, but the resulting taper rate over the whole length is too low. For the remaining joints (from 3400 to 0 on the distance scale), the diameters must be progressively increased, to stretch the cyan line upwards at the bell end, until the overall taper angle is more or less parallel to the original Haka. 'Haka further expanded' (pink curve) shows the effect of multiplying the bore diameters by increasing amounts: 1.25 through the wing, 1.3 through boot small bore to halfway along big bore, 1.4 from there to long joint. The long joint and bell diameters then multiplied by factors increasing to 1.85. The bore design of the contrabassoon can, in this way, be seen to derive from a concert bassoon of the Haka type, so there is a resemblance between the two in their internal designs as well as their external.

Anonymous Contrabassoon

Unfortunately it has not been possible to examine Sondershausen Mu2, although it was viewed on the occasion of the visit there to examine the Haka and others. Heyde illustrates it alongside the Haka; the resemblance between the two is obvious, particularly in the decorated but cylindrical bell.[109]

The resemblance to the Eichentopf is obvious too: the overall design, with long épaule and other features already noted, is very much the same, though there are some differences of detail. While still being carefully made Mu2 is less well endowed: it is of plainer wood and is without engravings on the brasswork. The wing, has no beads north of the épaule; a brass ferrule strengthens the crook socket, followed by a baluster, which curves smoothly into the cylindrical column (reminiscent of the Kenigsperger instruments discussed under Type 1b); and there is no bead at the épaule shoulder. Otherwise the turning on the long joint and bell is very much like the Eichentopf, and the overall impression is that the differences in detail are outweighed by the similarities. As in the case of Remph and Haka, it seems likely that the second-made of this pair was built with knowledge of the first, or that both derive from a common model.

The keywork, in construction and pattern, is like a magnified version of the Remph or Haka. The F key profiles are shown below, where the similarities are obvious with both Remph (the scalloped edges and rather close set lobes) and Haka (the central point and the square shoulders to the shank).

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[109] Heyde, 'Contrabassoons', Plate 1 and Herbert Heyde, *Musikinstrumentenbau 15-19 Jarhundert Kunst-Handwerk-Entwurf* (Wiesbaden: Breitkopf & Härtel, 1986), photo (bildtiel) 73. See also Appendix 3.

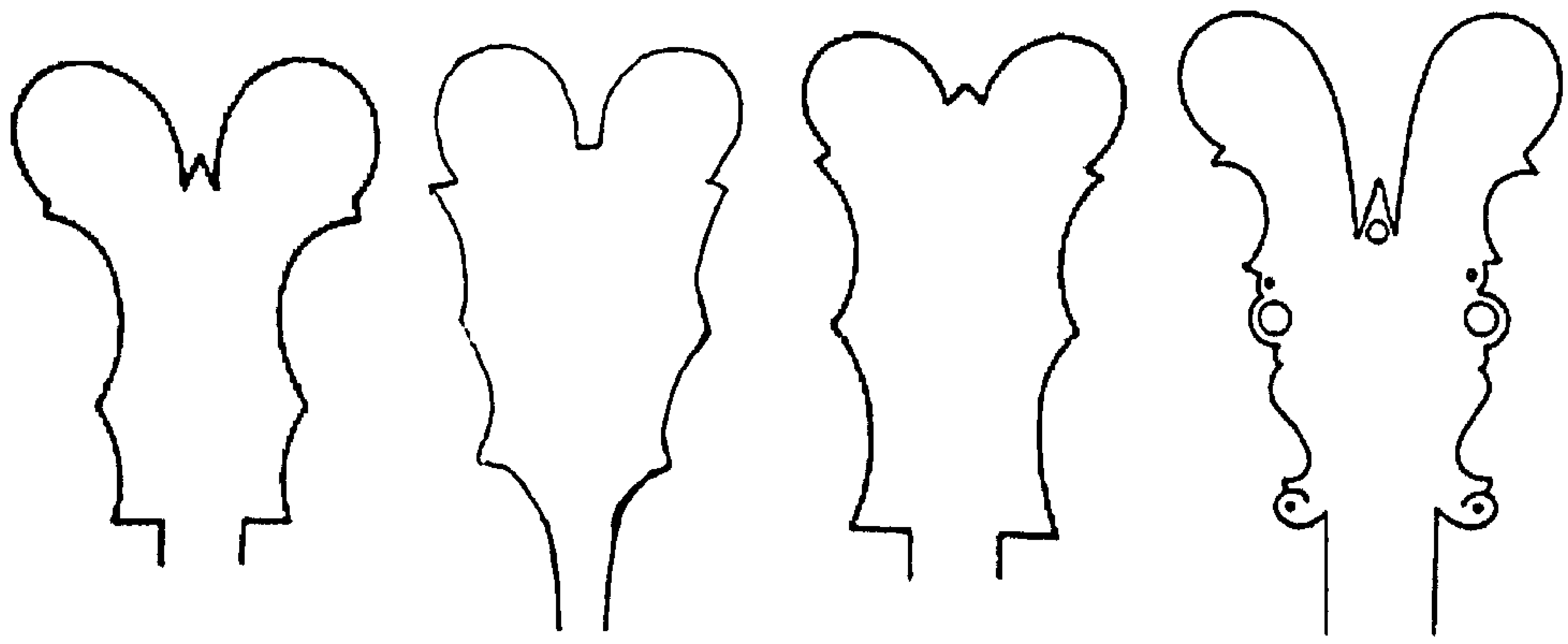


Fig 3.3.2.14. F-key profiles (not to scale), from left to right:
Haka, Remph, Sondershausen contrabassoon, A. Eichentopf contrabassoon[110]

Heyde gives some measurements of Mu2. The lengths match Eichentopf very closely but the bores have some differences: that at the wing throat can be accounted for as greater wear/degradation in Mu2, but at the top of the long joint the discrepancy is so great that a misprint must be suspected:

Lengths:	Up bores	Down bores	Wing	Boot	Long	Bell
Eichentopf	2677	1827	958	869	1088	720
Mu2	2684	1829	958	868	1086	728
Bore Diameters:	Wing	Boot small bore		Boot big bore		Long joint
	throat	north	south	south	north	north end
Eichentopf	12.7	22.0	28.6	27.3	34.6	56.8
Mu2	13.4	22.0	27.6	26.3	31.0	41.0

Table 3.3.2.2. Joint lengths and bore diameters of Eichentopf and Sondershausen Mu2 contrabassoons

Heyde states that the pitch is A=411Hz using the 782mm long crook which 'can ... be assumed to date from the period around 1901'.[111] The Eichentopf has a 756mm long crook with it that is also clearly not original.[112]

Heyde cautiously suggests that Mu2 was made by Eichentopf too, but also names Sebastian Kempe as another possibility. Kempe, an oboist in the Sondershausen court by

[110] 1,3 & 4 from Heyde, 'Contrabassoons', p.27.
[111] Heyde, 'Contrabassoons ', p.25; there is no explanation given for this date.
[112] The Eichentopf can be heard being played by Günter Angerhöfer, in company with other instruments from the Leipzig University collection (including a J.C. Denner bass curtal), on: Blechbläserensemble Ludwig Güttler Capella Fidicinia, '*Historische Instrumente der Leipziger Sammlung*' Musica Practica, Christophorus 74605, 1990. The recordings with contrabassoon were made in 1978.

1703, is recorded as the vendor of various woodwinds to the court on several occasions from 1717 onwards, though whether he was a maker or instrument dealer is not made clear.[113] No known instruments are stamped with his name.

In the absence of a stamp or any provenance, the only clues to authorship are stylistic ones; but Heyde's suggestion raises another prospect. The stamp on Remph is not at all clear; perhaps the name is S.KEMPE rather than S.REMPH. Attempts to see it more clearly were made with digital manipulation of the photographs of the one stamp (from the boot joint); some colour inversions, which seem to help a little, are given below. The first letter can be seen as an S at an angle from the vertical, with a faint (uncoloured) dot following. It cannot be denied that the second letter has a rounded top to it, but it could nevertheless be a K, with the serifs joining together at the top. EMP is reasonably clear. The last letter is almost missing, but the third photograph shows more clearly that while the vertical stroke is missing, the three horizontals of a serifed E are there, followed by a dot. So the stamp could well be: S·KEMPE·

Fig 3.3.2.15. Views of the Remph/Kempe stamp

If this is the case it is more likely that Kempe was a maker, although he may have been a dealer who put his stamp on instruments he supplied. If, for the sake of argument, we accept Kempe as the maker of the stamped bassoon, it still does not confirm that he made the Sondershausen contra, but it does add weight to the possibility. As a player at Sondershausen, he would have had access to the Haka bassoon to use as his model, and if he were capable of making a copy of the Haka then he would have been capable of copying a contra such as the Nordhausen/Stolberg Eichentopf too. The similarity in the F

113 Heyde, 'Contrabassoons', p.29.

keys of the Kempe/Remph bassoon and the Mu2 contra is striking, (see Fig 3.3.2.17 above), adding more weight to the argument.[114]

The resemblance between the Haka and the Eichentopf contra, even to the style of the name stamps, is also undeniable. It seems likely that there was some connection between these makers; perhaps Eichentopf travelled to Amsterdam to be trained by Haka, conceivably sponsored by the Imperial Counts of Stolberg or the Princes of Sondershausen. Nordhausen is just 21 km from Sondershausen, while Stolberg, where Eichentopf's contra was used, is another 15 km further north-east, so all four of these instruments – two strikingly similar contras and two strikingly similar bassoons - were used and/or made in very close proximity.

There is much suggestive evidence here but the full nature of the relationships is still elusive. A full examination, with bore measurements, of Mu2 would allow comparison with the bore of the Eichentopf, and better judgement of the instruments' stylistic affinities. As Heyde suggests, an investigation into the relationship between the Houses of Orange and of Schwarzburg may throw further light on the links between these instruments' makers.[115]

Meiningen MJ17

An anonymous 3-keyed bassoon is housed in the museum of Schloss Elisabethenberg in Meiningen, catalogue number MJ17. The original keywork is entirely missing and has recently been reconstructed.[116] It is made of a good piece of figured maple; the turning is confident, crisp and clearly the work of a skilled craftsman, while the bore is comparatively irregular. The bell bore appears to have been made entirely with turning tools rather than reamers.

Exterior

The instrument's design is individual while containing elements of the type 1a features. On the bell, the southern section surrounding the socket is very much the early-Dutch type baluster, with flare, quirk and bead group, and the north baluster, here enclosing a large

[114] It would be useful to check the invoices that mention Kempe, just in case the spelling there might rather be interpreted as Rempe, which would make a more solid case.
[115] Heyde, 'Contrabassoons', p.34.
[116] By Mona Lemel working for 'Schwenke and Segelke' in Bamberg, with careful consideration of contemporary styles.

hollowed-out chamber is also in keeping. Between these two, the design is unique to this instrument.

The long joint has neither the small bead and extra section north of hole XI, nor the pedestal at the south; neither is there a bulge around hole X. All of the four key-mount beads are rounded, of equal width with sharply-cut small beads on either side, instead of the usual fillets.

On the boot, remaining marks show that the F key was mounted between two blades of brass sunk into the wood on either side of the key. The missing key has been replaced by one of holly-leaf style.

The wing has beads immediately north and south of the épaule, but the crook socket baluster is smaller, and the brass ferrule longer than on the Dutch-style instruments. The absence of a pedestal at the south end, and on the long joint, may indicate that these joints have both been shortened. The south section of the wing, below the épaule especially, looks short; and when the instrument is assembled the épaule does not reach as far up as the bead for Bb key touch on the long joint, which is flattened to accommodate it. If the épaule is brought up to the indicated position on the long joint, it shows that the wing has been shortened by about 40mm.

The total bore length, with the wing restored, is 37mm longer than that of Haka and 48mm longer than Remph. This is the longest of all of the concert-sized bassoons examined, and it seems likely that it was intended to play at a low pitch of around A-2 (A=392 Hz).

Two of J. S. Bach's cantatas from Weimar (1708-1717), numbers 31 and 155 offer good examples of the integration of a low pitch bassoon into an existing higher pitched ensemble. The scores show the bassoon descending well below Bb1 to G1 and this might be taken to indicate that a contra- or quart-bass bassoon was required. However the *basson* part of Cantata 31 is written out a minor third higher than the other parts, indicating that the bassoon is pitched at that interval lower than the strings. This works if the bassoon is at the typical French cammerton (A-2, around A=392Hz), while the strings and singers are at the normal German chorton (A+1, around A=466Hz).[117] Then a scored low G1 becomes a fingered Bb1; the lowest note, newly available on the bassoon. The highest note is scored D4 so would be fingered F4; near the top of the range of the baroque bassoon, but perfectly achievable. Bach, as so often, exploits the full range of the instrument.

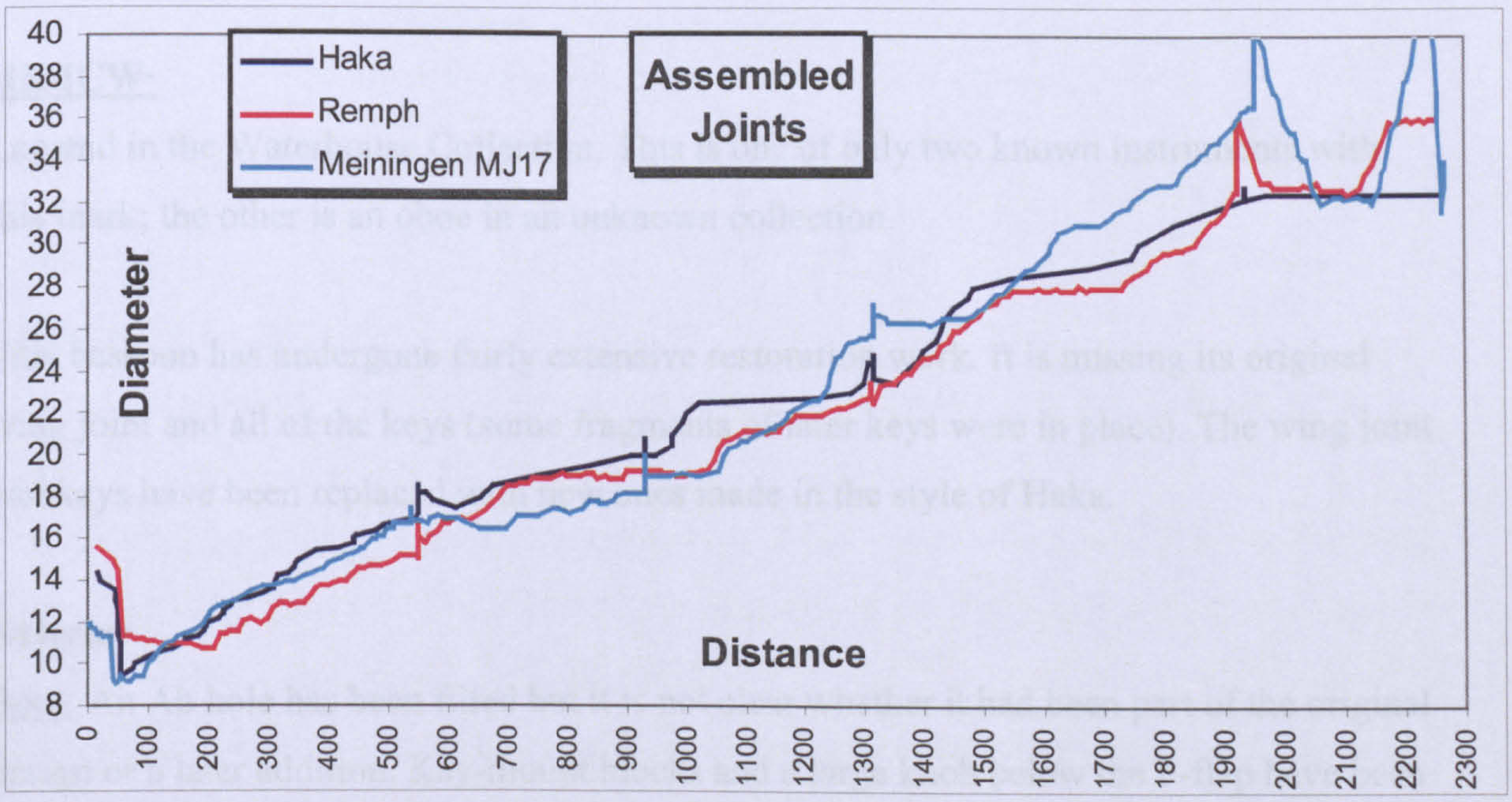
[117] The whole oboe section (there are three oboe parts plus taille plus bassoon) would no doubt have been at the same low pitch; low A3s in the scored oboe parts verify this.

Cantata 155's delightful bassoon obbligato in the aria *Du musst glauben, du must hoffen* with alto and tenor voices, includes three G1s in the score and several B1s which are ordinarily difficult to achieve (having to be lipped up from the Bb fingering), but transposed they are simple D2s. The highest note is again scored D4, fingered F4. As the bassoon part itself is missing it remains arguable that a contra was intended, or perhaps a quart-bass such as the J.H. Eichentopf one in Lübeck discussed in the next section. With a quartbass, the scored low Bs become fingered Ebs but the low Gs become fingered B naturals, so that interpretation is improbable.

Other Weimar cantatas have a part labelled *fagotto* written out in the same key as the strings, implying that that term was used for a curtal or *chorist fagott* at chorton pitch, while the term *bassono* was reserved for the new, French-pitched bassoon.[118]

In his list of places known to have had contrabassoons Heyde includes Meiningen, but without explaining his reasoning. If the evidence is scored notes for bassoon descending to, but not lower than G1, then perhaps it is this low-pitched bassoon that is the instrument behind that claim.

Bore



Graph 3.3.2.6. Meiningen versus Haka and Remph

[118] See Dreyfus, pp. 119-120.

The wing follows Haka reasonably closely though with significantly smaller narrowest point (8.75 x 9.2 mm).

The boot small bore is smaller than Haka, irregular but mainly cylindrical around 17mm diameter through the three fingerholes, then expanding slightly to 18mm.

The boot big bore and long joint both have a cylindrical section at their south end, matching Remph at first, then expanding steeply to the largest diameter of all the instruments measured (36.6mm at top of long joint).

The bell has an exaggerated version of the Remph shape: it starts at 40mm diameter, reduces in a steep reverse taper to a cylindrical portion the same size as the cylinders of Haka and Remph, then opens into a large chamber some 100mm long. This is the only instrument to combine the cylindrical bore in the bell with a chamber at the north end. There are spiral marks of turning tools (too deep to be from a reamer) along all these three sections, showing that the final shape was made entirely by hand-turning tools rather than reamers.

Crook: this is one of the few bassoons examined with a genuine-looking crook. Inside diameters are 11.0 to 4.2mm; length 345mm. Allowing for the difficulties of measuring crook bores, there appears to be a straight taper between the ends, with a taper rate of .0197 (approximately 1 in 51).

HK·ICW·

Located in the Waterhouse Collection. This is one of only two known instruments with this mark; the other is an oboe in an unknown collection.

This bassoon has undergone fairly extensive restoration work. It is missing its original wing joint and all of the keys (some fragments of later keys were in place). The wing joint and keys have been replaced with new ones made in the style of Haka.

Exterior

Boot: An Ab hole has been filled but it is not clear whether it had been part of the original design or a later addition. Key-mount blocks and a large knob below the F-flap have been added. If such blocks were present originally, this would be the only Type 1 instrument known to have them; all others have boot keys mounted in saddles or with other types of metal fittings.

Bell: The styling is very similar to Haka, slightly less delicately done. There is different turning in centre section though; here it is of smaller scale, more in the style of Denner. Long joint: This has the same bead and (shorter) parallel section above XI as Haka. A short pedestal at south suggests that the joint has been shortened there. Clean wood shows on the adjacent tenon and the incised thread grooves continue right to the end of the joint (see photograph below), suggesting that it has been shortened by 5 to 6 mm. There is no gouged-out hollow to fit the wing baluster, though the beads are cut away where needed. The barrelled swelling at hole X is present.

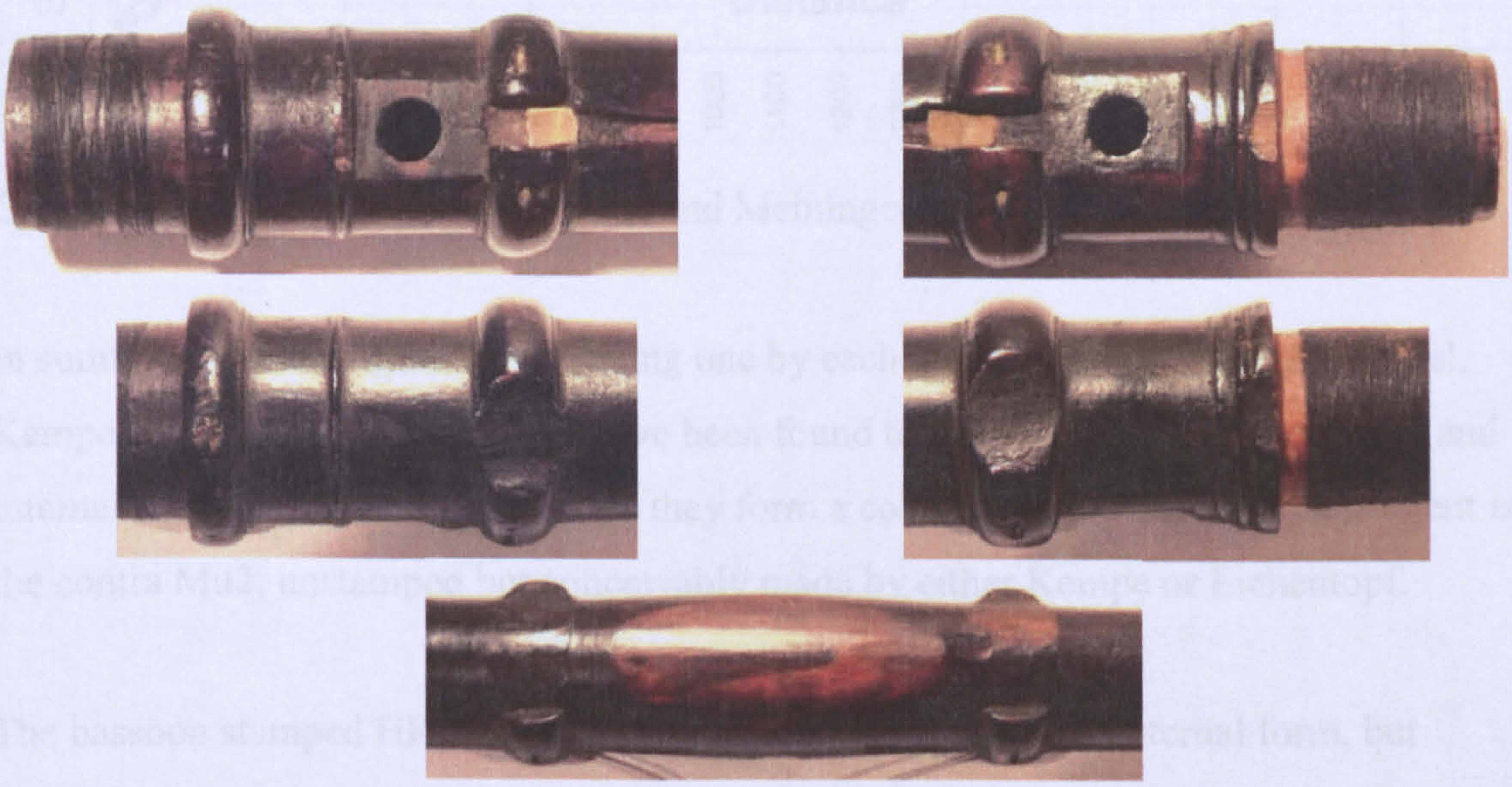


Fig 3.3.2.16. HK·ICW·. long joint: north end left, south end right, Centre section below showing barrelling and cut-away beads

Bore

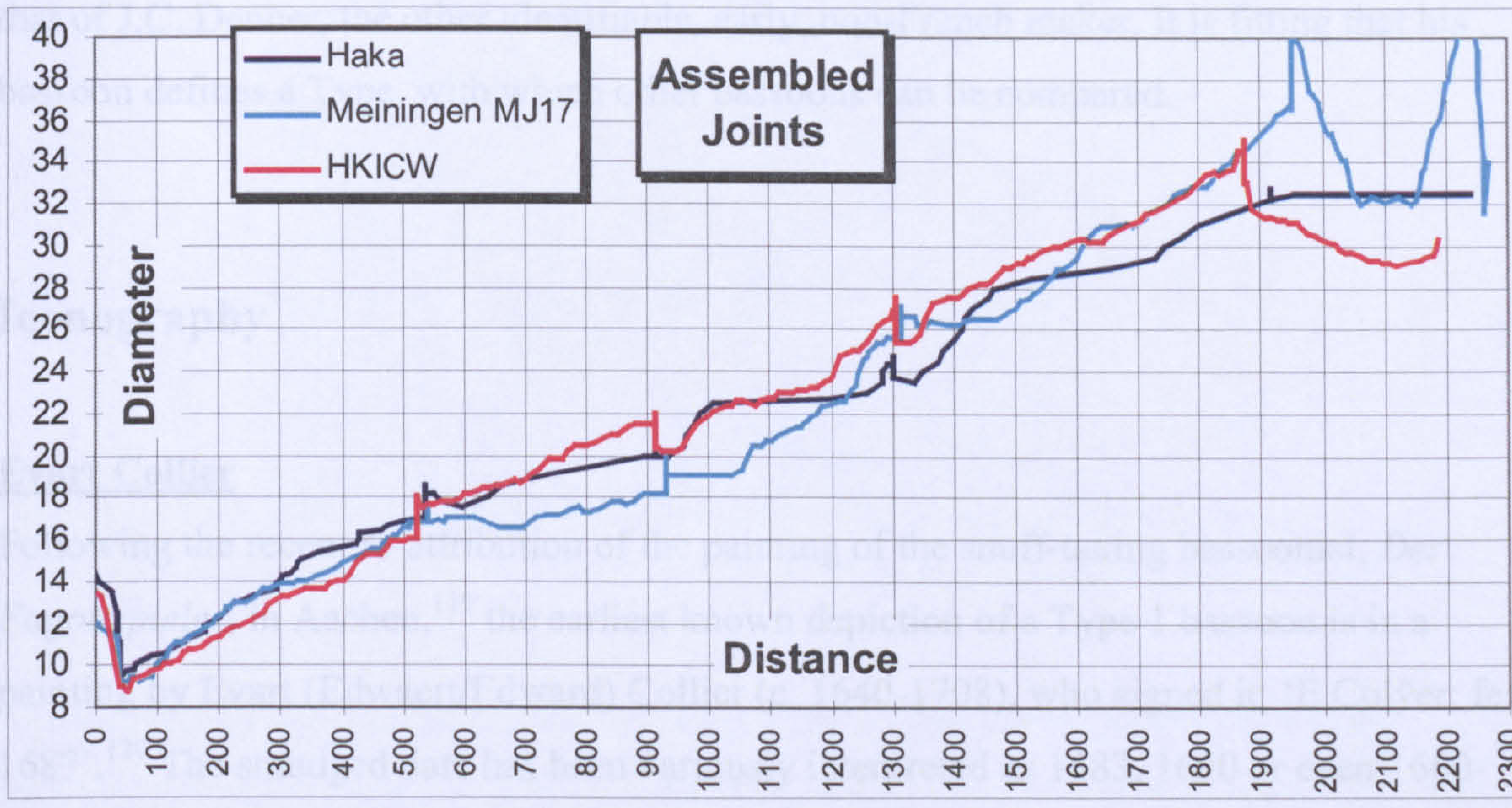
The wing is not original.

The boot small bore starts at Haka size but opens out to be larger than all others in this group.

The boot big bore can be seen as a combination of Haka and Meiningen; it is very close to the former at up-stream end (910 to 1120 on distance scale of Graph 3.3.2.7 below) and to the latter at down-stream end (1250 to 1300).

The long joint again has similarities to Meiningen, especially at the large end. It is shorter than all the other Type 1a bassoons.

The bell is of smaller diameter than all others in this group, with a mild reverse taper (of lesser angle than Denner's, for example), with a slight flare for 50-60mm at the open end.



Graph 3.3.2.7. HK·ICW·. versus Haka and Meiningen

In summary, five instruments, including one by each of the four makers Haka, Rijkel, Kempe/Remph and A. Eichentopf have been found to be closely related in external and internal forms and it is suggested that they form a coherent Type. The fifth instrument is the contra Mu2, unstamped but conceivably made by either Kempe or Eichentopf.

The bassoon stamped HK·ICW· fits most of the requirements of external form, but crucially, it has a reverse-tapered bell bore. Even so, the reverse taper is unlike that found on the Type 1b instruments, in that it has only a mild taper and it opens out a little again at the top end. Meiningen MJ17 has sections of bore in common with various members of this group, including a variation on the cylindrical bell; but its external design has more in common with the instruments of the next section – Type 1b. In fact it will be found to have much in common internally with the Deper bassoon in the next section.

It does not make sense to label the Type 'Dutch' as Andreas Eichentopf was German, Kempe/Remph seems likely to be German (though only by the evidence of his stamp's scroll) while HK·ICW· and the Meiningen instrument are of unknown origin. It remains useful, though, to recognise a type distinct from the Denner/German, even if there are not many exemplars and even though two instruments fit the type imperfectly. Haka is the earliest identifiable maker of the four-piece bassoon, though not the inventor of Type 0. He was, for Bouterse 'founder and grandmaster of the Dutch school', with a wide-reaching reputation (the provenance of the surviving bassoon being an example), and a wide influence on other makers. His design can be seen as distinct in several details from that of J.C. Denner, the other identifiable, early, non-French maker. It is fitting that his bassoon defines a Type, with which other bassoons can be compared.

Iconography

Evart Collier

Following the recent re-attribution of the painting of the snuff-taking bassoonist, *Der Fagottspieler*, in Aachen,[119] the earliest known depiction of a Type 1 bassoon is in a painting by Evart (Edwaert/Edward) Collier (c. 1640-1708), who signed it; 'E.Colÿer: fe: 168?'.[120] The smudged date has been variously interpreted as 1683, 1690 or even 1660-70.[121] Even the latest of these makes this the earliest known, dated illustration of the full four-piece bassoon, at least two years earlier than the Marais *Trios* (1692).

It shows the bell and top ends of wing and long joints of a type 1 bassoon protruding from behind a violin and other objects. Two other wind instruments are shown; a one-piece descant recorder or *hand-fluyt* of transitional form (between renaissance and baroque) and a two- (or three-) keyed oboe of Haynes' Type A3. There is an open music book but I am not aware of the music having been identified. See Appendix 4 for reproduction of this image and the following one in full.

[119] See discussion of this painting below for re-attribution reference.
[120] Nicolas S. Lander, Recorder Iconography (1996-2010) < http://www.recorderhomepage.net/art.html>, accessed 21-10-2010. Also: <http://www.christies.com/LotFinder> Lot 38 Sale 6202. Lander gives the following references: *Vanitas* (1690), 41 × 52 cm, Evert Collier (ca 1640 – 1708). Location unknown: auctioned Vroom, 1980 (nr. 196); auctioned by Christie's, 29 October 1999 (sold). Ref. Griffioen (pers. comm., 2003); Gabrius Data Bank (2002 - col.); Web site: The Great Bass Viol (2004 - col.).
[121] Christies Auctioneers <http://www.christies.com/LotFinder> Lot 38 Sale 6202, 20-10-1999. Accessed 21-10-2010. Christies' web page gives the details of the signature; 'signed and indistinctly dated (see Catalogue for details) 'E.Colijer: fe: 168?'' and the following provenance and dates: 'Anon. sale, Ruef, Munich, 17-20 November 1971, lot 2901/1, as dated 1683. Anon. sale, Lempertz, Cologne, 23-25 November 1978, lot 44. With J. Hoogsteder, The Hague, as dated 1690.' Also; 'We are grateful to Mr. Fred Meijer for confirming the attribution after examining the picture in person (letter 31 May 1999). He dates the picture to the 1660s or early 1670s.'

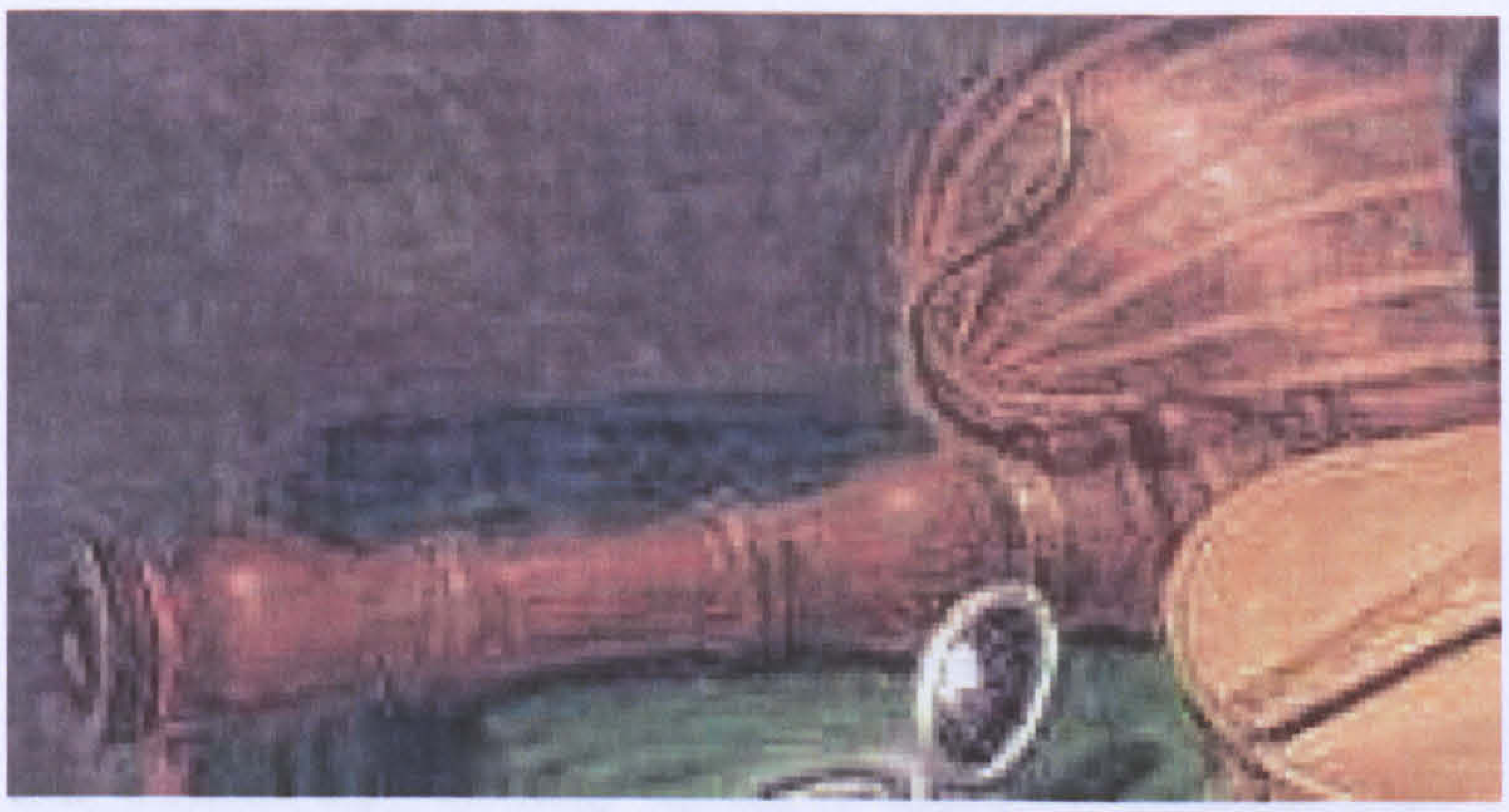


Fig 3.3.2.17. Detail from E. Collier *Vanitas* 1680-1690

The bell has an odd flare at the top end with a sharp edge to the flat end-face. This provides a narrow waist above the top baluster around which a red cord is tied. The flared part may be of different material – it appears to be horn or pewter coloured in this reproduction. There is no central bead group between the two balusters.
The baluster of the wing is shown, with beads above and below, and apparently no brass ferrule. The Bb key flap can just be seen placed Haka style a little way down from the top of the long joint, with a bead dividing the section in two. There is a relatively short crook shown though the perspective may have foreshortened this.

Collier uses the same bassoon again in a later *Vanitas*, though less of it is on view here. This one must have been painted after 1702 as it shows a copy of Gordon's 'Geographical Grammar', which was first published in that year.[122] That means it was painted in London, as Collier moved there in 1693. Along with the similarity of the pose, this in turn suggests that he was working from notebook drawings when depicting the bassoon here (it is not recorded whether he was a bassoon player who would have his own instrument to hand). The flare at the top of the bell has become more exaggerated, probably as a result of cumulated error when working from his secondary source. The bell's top is now a little cup with a very wide terminal bore, again looking as though made from different material. It is wider than the baluster bulge below – there is a faint suggestion here of the flare that Randle Holme drew at the top of his one-piece long/bell joint. The same cord is still present. The crook has the same short appearance.

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[122] Nicolas S. Lander, Recorder Iconography (1996-2010) < http://www.recorderhomepage.net/art.html>, accessed 21-10-2010. Lander's references: *Vanitas / A Miscellany of Musical Instruments* (after 1702), 97 × 123 cm, Evert Collier (ca 1640 – ? 1710). Location unknown: auctioned Galerie St Lucas, Vienna (1973). Ref. Crawford Sale, Christie's (11 October 1946); Galerie St Lucas, Vienna, Auction Catalogue (1973/4: 22); Rasmussen & Huene (1982: 35, Fig 11 - b&w – caption in error); Rijksbureau voor Kunsthistorische Documentatie.'

Fig 3.3.2.18. Detail from E. Collier
Vanitas / A Miscellany of Musical Instruments post 1702

Servaas de Konink

A very similar bassoon is shown on the title page of a set of trios by Servaas de Konink published in 1696 (artist/engraver unknown):

Fig 3.3.2.19. Title page of *Trios*, opus 1 by Servaas de Konink

It is shown left-handed, probably a simple engraving-reversal error. Despite the rather stretched appearance, the bell here has the same characteristics as those of Collier; a wide flare at the top and no central bead group on the column. There is no baluster depicted on the wing but beads can be discerned at the south edge of the épaule and there is a wider pedestal at the joint to the boot. The Bb key is again set down from the top of the long joint. This time the accompanying recorder is a fully formed baroque alto. The bells of this and the Collier bassoons are so similar, and of such unusual design (with the top flare and without the central bead group) that they suggest the possibility that both artists were working from the same source material – either a common instrument or a secondary source of illustrative material.

The mention above of Randle Holme spurs closer investigation. As previously noted that work was published in 1688, though the Book III material including the 'Double Curtaile' was in preparation for up to six years prior. Collier's *Vanitas* was painted at the very most two years later in 1690, but given the smudged date, these two works could be contemporary. De Konink's *Trios* show a bassoon of the same form as Collier, though published at least six years after the painting.

Digital manipulation was used to extract the bassoon from de Konink and to correct the elongating distortion (the boot thumbhole is now more circular for example). At the same time the Holme was stretched a little to alleviate it's squatness and to match the distance from bottom of boot to top of wing between the two instruments.

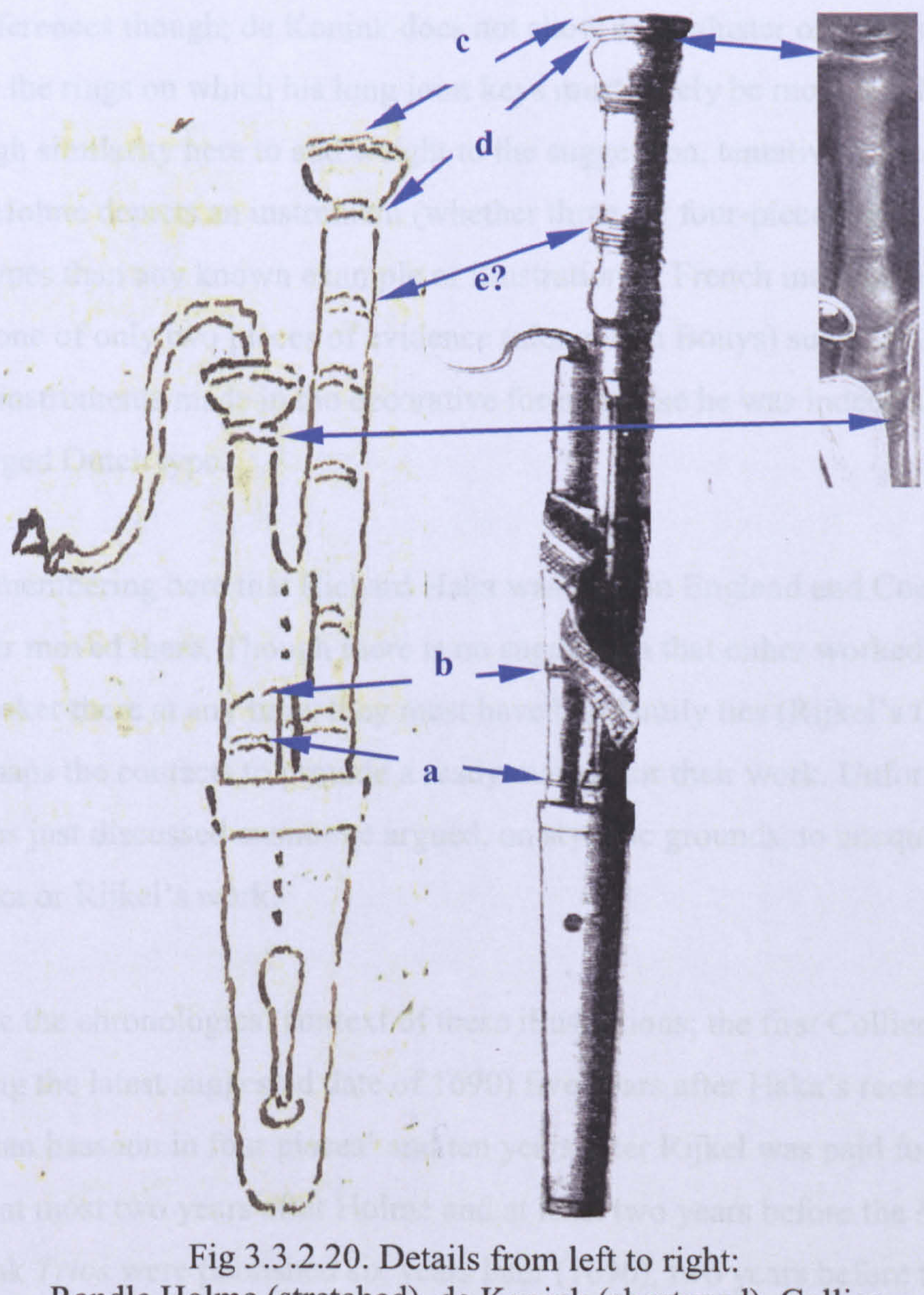

Fig 3.3.2.20. Details from left to right:
Randle Holme (stretched), de Konink (shortened), Collier

A little more can be learned about Holme from this:

a) The decorative ring depicted between the épaule and boot can now be seen to represent the Type 1a wing pedestal as also shown on de Konink.
b) The delineation of the south edge of the épaule matches the shoulder and beads shown on de Konink. These are also features typical of Dutch Type 1a instruments.
c) The wide flare at the top of the long/bell joint on Holme may be an attempt to show a similar form to that of de Konink.
d) The narrow neck (on Holme) matches that shown in the Colliers, where the red cord is tied.
e) The south baluster of de Konink's bell is not so prominent in this re-proportioned version (neither is it on the second Collier illustrated above); perhaps, after all, Holme has just left that off his drawing, and is meaning to depict a four-piece bassoon? Perhaps the fifth, decorative ring matches the lower baluster beads of the bell?

There are differences though; de Konink does not show any baluster or finial at the top of the wing, nor the rings on which his long joint keys must surely be mounted. However there is enough similarity here to add weight to the suggestion, tentatively made under Type 0, that Holme depicts an instrument (whether three- or four-piece) more in keeping with Dutch types than any known example or illustration of French instruments. He may be giving us one of only two pieces of evidence (along with Bouys) suggesting that there were French instruments made in the decorative form, or else he was indeed showing the already-diverged Dutch type.

It is worth remembering here that Richard Haka was born in England and Coenraad Rijkel's father moved there. Though there is no suggestion that either worked as an instrument maker there at any time, they must have had family ties (Rijkel's father for one) and perhaps the contacts to provide a ready market for their work. Unfortunately the three bassoons just discussed cannot be argued, on stylistic grounds, to unequivocally represent Haka or Rijkel's work.

To summarise the chronological context of these illustrations; the first Collier *Vanitas* was painted (taking the latest suggested date of 1690) five years after Haka's receipt for the 'French dulcian bassoon in four pieces' and ten years after Rijkel was paid for his bassoon playing. It is at most two years after Holme and at least two years before the Marais *Trios*. The de Konink *Trios* were published six years later (1696), two years before the Weigel copperplate *Pfeiffenmacher* (see under Type 1b) and eight years before the Bouys mezzotint. It was in the same year that J.C. Denner and Schell together petitioned the town council (*Rat*) for master's rights in order to build '*französischen musicalishen Instrumenta, so mainsten in Hautbois und Flaudadois bestehen*' (French musical instruments, mainly oboes and recorders).[123]

<u>*Der Fagottspieler;* Suermondt-Ludwig-Museum Aachen</u>

In the article describing the Haka bassoon cited above, Waterhouse points to that instrument's resemblance one in the painting *Der Fagottspieler* in the Suerdmont Museum, Aachen, then still ascribed to Harmen Hals. There has been some debate around this attribution, with organologists arguing that Hals died too early to have painted a bassoon of this form. White called for its re-attribution in a detailed argument in his 1988 thesis, partly on the grounds that '... the style of the bassoon ... has technical and decorative elements ... that are more in keeping with instruments from the last two decades of the seventeenth century than the period directly before Harmen Hal's death in 1669'.[124] It has now been re-attributed to *Nachahmer des Jan Steen* (Leiden 1626-1679) (imitator of Jan Steen) in the museum's catalogue [125] which rather diminishes its significance for establishing a close time frame.

White also sought 'a morphological identification of the bassoon' in the painting in his Appendix 3.[126] He identified various features of Dutch bassoons as found on the Haka (the Rijkel had not then been discovered) and suggested that these confirm a Dutch origin of the instrument in the painting. He then attempted to narrow the date range for the painting by comparing the form of the wing joint baluster to known Dutch oboes and proto-oboe *deutsche schalmeien* by Haka and Rykel. He concluded that the bassoon is Dutch (rather than German), post-dates Randle-Holme (1688) and is pre-eighteenth century. At least two-thirds of this conclusion is almost certainly correct – that it is Dutch and pre-eighteenth century - but since Haka made four-piece bassoons by 1685, it could pre-date Randle-Holme. Some of White's arguments are open to criticism. He made a comparison

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[123] Waterhouse, *NLI*, p.86.
[124] White, 'Early Bassoon Reed', Appendix 2: A call for a re-attribution of *Der Fagotspieler*, p.202.
[125] Suermondt-Ludwig-Museum Aachen: Bestandskatalog der Gemäldegalerie Niederlande von 1550 bis 1800, *ed. Thomas Fusenig (n.p.: Hirmer-Verlag, 2006): 248.*
[126] White, 'Early Bassoon Reed', Appendix 3: Towards a morphological identification of the bassoon in *Der Fagotspieler*, p.208.

of the bells of Haka and Denner in which he showed a bell chamber in both when there is none such in the Haka bell. The particular Denner bells he chose for comparison are ones which now may possibly be ascribed to one of the Denner sons rather than to Johann Christoph (he chose Berlin No.2969 and St Petersburg (Leningrad) No. 528; the attributions of these are discussed in the next section on Type 1b). Thus although his observations on the differences of turning of the south baluster are correct for the bell he illustrates, he failed to note that the bell of the other Berlin J.C. Denner, No. 2970, is similar to Haka in this respect. What does clearly distinguish the Berlin 2970 (and 2969) bell from Haka are the relative lengths; Haka is considerably longer, by 78mm, than Denner. This is a direct consequence of the cylindrical versus reverse-taper bore; the latter allows the bell to be significantly shorter. A comparison of bell lengths is made later at the end of the Type 1 section where the relative shortness of Denner bells can be seen, as well as their variety of turnings. The bell in the painting is also long and is not reverse-tapered.

Fig 3.3.2.20. Haka left, *Der Fagotspieler* (detail), right

White lamented the obscured central section of the long joint, which is barrel-shaped on Dutch instruments while it is straight on German ones. But there is another distinguishing feature of long joints on view – the low-set Bb flap with the narrow bead and short cylindrical section above. This is clear on the painting, though the section is short compared to that on Haka. On German Type 1b bassoons the Bb flap is set near the top of the joint, just below the topmost bead that abuts the bell.

Other differences are the more spherical baluster on the wing of the painted bassoon and its location relative to the long joint; the widest point is adjacent to the key-mount ring. As on the Haka there would have to be wood scooped out of the long joint to allow the close fit of these two joints. Both bell balusters of the painted bassoon appear fat and squat when placed alongside the Haka at a similar scale. The bassoon on show in *Der Fagotspieler*, then, does have several Dutch features as might be expected. It is carefully painted and is convincing in general appearance, proportion and in details rendered, so it is reasonable to conclude that the artist had a bassoon before him as he worked (i.e. he was not working from previous sketches or from another artist's work). In that case the model he was painting was similar to, but not exactly like this one by Haka.[127]

Fig 3.3.2.21. *Der Fagotspieler*

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[127] There is a Dutch-made oboe with such globular baluster turnings by C.V. Hallum, however he worked in the second half of the eighteenth century. See Susan E. Thompson, 'A One-keyed Flute Stamped CV/HALLUW', *GSJ,* 54 (2001), 124-142 (p.136).

François Xaver Henri Verbeeck (1686-1755)

A contrabassoon appears in a painting, of the same genre, by F.X. Verbeeck.[130] Although the wing joint and crook are certainly contra-sized, and the general appearance is very much like the Nordhausen and Sondershausen contras, the bell is too short. If this is not artistic license or excess foreshortening, then perhaps this instrument only descended to C1 rather than Bb; much as many of the existing contras of the classical period descend only to D1. That would make it a little more manageable, and the loss of the low Bb would be no great limitation. It has to be said that the ensemble illustrated is rather odd company for a contrabassoon to keep.

Fig 3.3.2.23. François Xaver Verbeeck (detail)

[129] Rijksbureau voor Kunsthistorische Documentatie website: < http://english.rkd.nl/Databases > (RKD images) artwork numbers 49870 and 16920 respectively. Accessed 25-10-2010.
[130] RKD images, artwork number 187907, Illustration number 0000180853. Accessed 25-10-2010.

3.3.3 Type 1b

Instruments in this section: J. C. Denner (3), J. Denner, M. Deper, Poznan 1376, Leipzig 1366, J. W. Kenigsperger (3), C. Schramme.

The 'b' designation is used primarily to distinguish those instruments with reverse taper in the bell bore. However other features are also associated with this distinction. The best-known maker in this group is J. C. Denner; using his design(s) as the archetype, the following comparisons with type 1a can be made:

Bell

A distinct taper is visible in the column, from wider base to narrower top end. The joint is shorter in proportion to the whole instrument when compared to type 1a, as a consequence of the reverse-tapered bore.

There is the same tri-partite form as in Type 1a:
An inverted baluster with associated beads terminates the northern, open end.
A symetrical bead group sits halfway along the plain column that links the two balusters
A baluster and beads at the south end surrounds the socket.

There is no flare at the south baluster; instead the curve cuts in as at the north.
Either, or both, of the balusters may be broken by a quirk and/or bead separating the convex and concave parts of the ogee curve.

Fig 3.3.3.1 Bell of J.C. Denner, Berlin 2969

Long joint

This is again fully turned.

The Bb key flap is set near the top of the joint; only a three-quarter round bead and fillet separates it from the tenon.

The keys are mounted in full, or partially shaved-off beads.

There is no barrelling in the centre section.

At south there is not always a pedestal, when there is it is in the form of a quarter-round bead, rather than the short column of the 1a type.

Fig 3.3.3.2. Long joint of J.C. Denner, Berlin 2969

Wing

On some instruments there is no brass ferrule but instead the wing terminates in the manner of a baroque oboe with a flared finial. When there is a ferrule it is usually greater in length than its diameter.

The baluster is more elongated than type 1a, and is usually without a flare below the waist.

The épaule again stands separate from the column, with a step at the shoulders but in this type there are no beads; the column runs straight into the shoulder on both sides.

There is usually no pedestal, but if present, is it is in the same form as that of the long joint.

Fig 3.3.3.3 Wing of J.C. Denner, Berlin 2969

Keys

The touches are not rolled but are made flatter than type 1a, of thicker stock with tabs for the axle either bent down in a sharp right angle or soldered on underneath. For the F key touch, the holly-leaf pattern is not used but rather a profile decorated with pierced holes, hooks and loops is preferred. It is still fish-tailed, as if for use by either hand. A large proportion of the 1b instruments are three-keyed (or were originally).

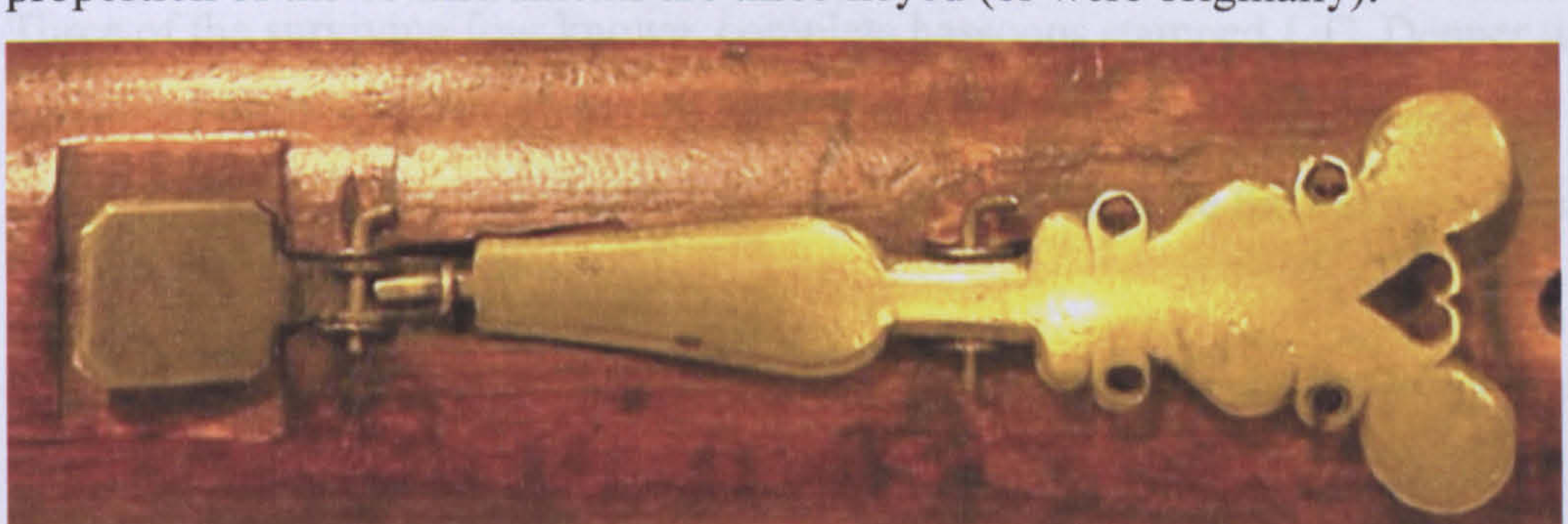

Fig 3.3.3.4 F key of J.C. Denner, Berlin 2969

Balthasar Van den Bossche (Antwerp 1681–1715)

Musical Reunion on a Terrace is signed by the artist and dated 1713; it was sold at Sotheby's, New York in October 1998, lot 7. A detail is reproduced in Stephan Perreau *Jan Dismas Zelenka* [128] where it is purported to show the composer and bass player Jan Dismas Zelenka with his double bass. Whether that is the case or not, the bassoon is demonstrably a Type 1a; by its long and un-tapered bell. The bassoonist is playing left-handed (with right hand uppermost).

Van den Bossche painted another bassoonist, or perhaps the same one twice, although this time he is right-handed. This similar 'musical gathering' genre painting was sold at Sotheby's, London in April 1997, lot 44.[129] Details from both are reproduced below.

Fig 3.3.2.22. Balthasar van den Bossche: two 'Musical Gatherings' (details), left dated 1713, right undated

[128] Stephan Perreau, *Jan Dismas Zelenka,* Collection Horizon, Bleu Nuit Editeur 2007.

Johann Christoph Denner

J. C. Denner was born in Leipzig in 1655, to a Nuremberger father from the guild of 'animal-call and horn turners' (*Wildruf und horn-dreher*). The family returned to Nuremberg in 1666 and Johann Christoph completed his apprenticeship and journeyman period, c.1678. He probably started making woodwinds in his own workshop soon after that, though he is first documented doing so in 1683. In 1696, together with Johann Schell, another *wildruf dreher*, though together calling themselves '*Haudbois, Haudadous und Fagothmacher*' (makers of oboe, recorder and curtal), he petitioned the guild council for master's rights in order to be able to build '*französischen musicalischen Instrumenta, so mainsten in Hautbois und Flaudadois bestehen*' (French musical instruments, mainly oboes and recorders).[132] He died in 1707, after having trained his two sons Jacob and Johann David.

He was, like Haka, one of the first outside France to make the new baroque woodwinds. Also like Haka, he is survived by instruments of the earlier, pre-baroque period, notably five bass curtals.[133] These and his early recorders are not entirely like their counterparts from earlier seventeenth century makers – they already show a little additional decoration in the turning. The curtals are all *gedact*: instead of a wide-open bell, there is a cover drilled with many small holes, which serves to reduce the volume and coarseness of the lower notes of the instrument. This indicates that they may all have been intended to be *chorist fagotten* that played with the choir and organ in church, rather than consort instruments.

Denner is very likely to be the subject of Weigel's copperplate of *Der Pfeiffenmacher* from his '*Ständebuch*' of 1698, showing the trades and crafts of late seventeenth century Nuremberg.[134] This illustration, and the argument regarding Denner, is discussed under Iconography at the end of this section.

Three of the surviving four known, complete bassoons stamped J. C. Denner were examined for this study: the two in Berlin numbers 2969 and 2970,[135] and one in Brussels number M427[136]. Not included in full measurements here are the instrument in St

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[132] Waterhouse, *NLI*, p.86. There were twelve members in five generations of the Denner family recorded as masters of the *Wildruf und Horndreher's* guild.
[133] Young, *HWI*, p.61.
[134] Weigel, *Abbildung*, IX/65.
[135] Musikinstrumenten-Museum des Staatlichen Instituts für Musikforschung Preussischer Kulturbesitz.
[136] Musée Instrumental.

Petersburg (Leningrad) No. 528,[137] and the fragments (boot and long joint) in Salzburg,[138] but several details of the former are obtained from Young's *The Look of Music.*[139]

All three of the studied bassoons are three-keyed but otherwise they differ from each other in a variety of ways. B2970 and B2969 at first glance have many similarities; they are both made of maple of similar colour, finish and condition; the keywork and the turning of the wings are very similar. Both are in very good condition, with little woodworm, no rot or broken parts visible. Closer examination reveals that the stamps are slightly different; both have 'I.C.DENNER' in a scroll 'D' with below, but B2969 has an additional 'I' below the D. According to Young referring to Kirnbaur and Heyde,[140] the stamp with D alone is that of Johann Christoph himself, while the stamp with I below D is that of his second son, Johann David, who inherited the workshop and the rights to the scrolled Denner stamp. The first son, Jacob, had by then set up on his own and used his own stamp (see below under J. Denner). This is by no means proven, but if correct it means that B2969 (and both St Petersburg 528 and Salzburg 15/2) are made by Johann David Denner. Brussels M427 is stamped like B2970, so by Young's argument they are the only two actually made by Johann Christoph and are the earliest datable German-made bassoons.

Fig 3.3.3.5 J.C. Denner stamps
left to right: M427, B2970, B2969, all from the long joints

The two groups are here treated separately, those stamped just J.C.DENNER/D first, and the issue of authorship is examined in terms of bassoon design. The relationship between the two groups is complicated though: there are many similarities both external and internal between the two Berlin instruments, while the two D stamped bassoons have

[137] Institute of Theatre, Music, and Cinematography.
[138] Museum Carolino Augusteum No. 15/2.
[139] Young, *LoM,* p. 68.
[140] Philip T. Young, Die Holzblasinstrumente im Oberösterreichisches Landesmuseum (Linz:1994), p.61.

many differences. Henceforward the first group (B2970 and M427) is referred to as stamped D, the second group (B2969, St P528, Salzburg 15/2) as stamped D/I.

Exterior of D-stamped instruments

The bells are almost exactly the same length (see Table 3.3.3.1 below), but of quite different turning. B2970 has a similar appearance to Haka, such that in fact if Haka's bell is reduced to the same length (the difference is 78mm) the similarity is made obvious; all of the features described as defining the Haka type are also found on B2970.

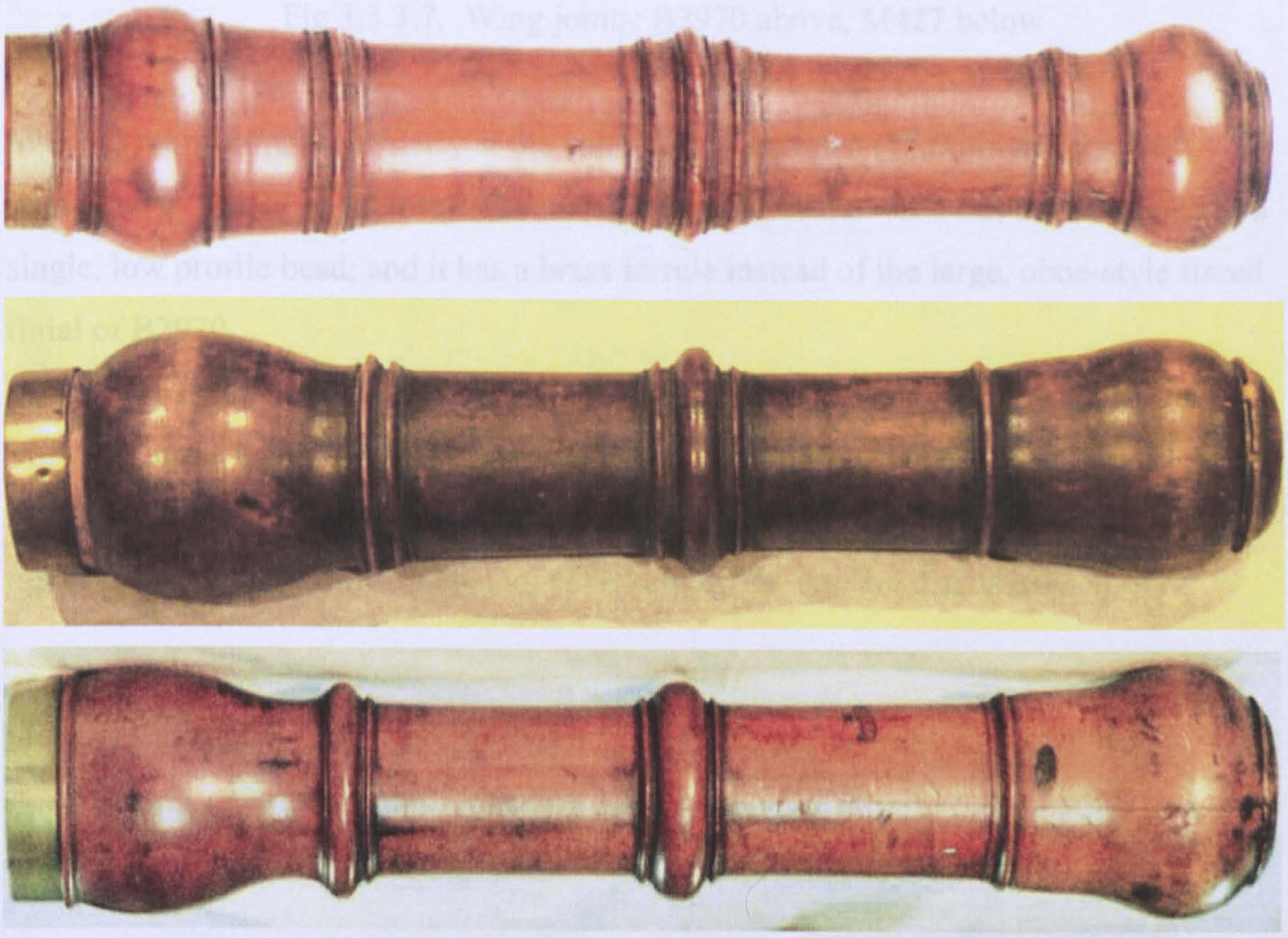


Fig 3.3.3.6. Bells: top M427, centre B2970, bottom Haka shortened (compressed) to the same length.

The significant differences between the B2970 and Haka bells, apart from length, are internal: Denner's has a reverse taper and a turned-out chamber at the north end. The M427 bell has a similar form internally to B2970, but the exterior turning at each end is quite different: extra beads break up the ogee curve of both balusters, while the central group is equally elaborate on both.

The wing joints are different too:

Fig 3.3.3.7. Wing joints: B2970 above, M427 below

M427 is more slim, particularly at the baluster and its waist (18.5mm at narrowest, compared to B2970's 24.8mm). The astragal just below the waist has been reduced to a single, low profile bead; and it has a brass ferrule instead of the large, oboe-style flared finial of B2970.

The long joints have more in common: neither has any pedestal at the south end (though M427 is damaged here, with a brass ring repair). At the north, the Bb flap is right at the top of the joint, just below the tenon. (The keys differ, and are discussed below).

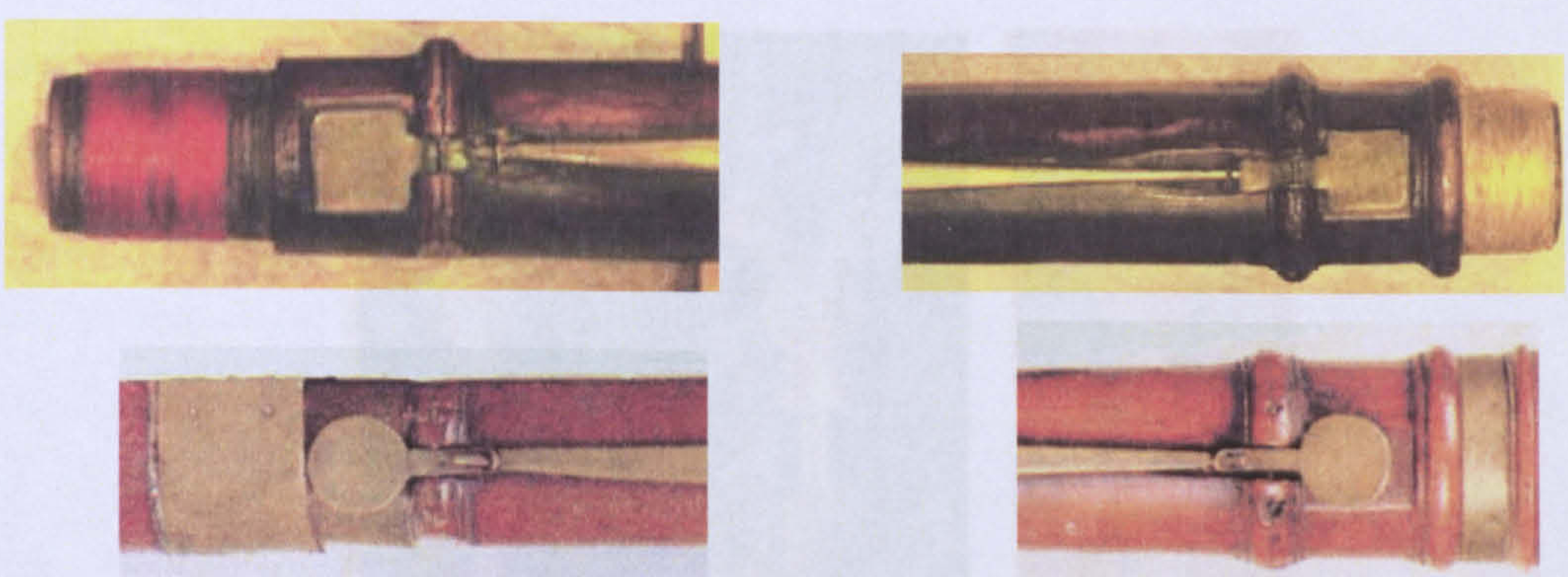


Fig 3.3.3.8. Denner long joints. Left: south ends, right: north ends
above: B2970, below: M427

M427 differs in having the lower three beads trimmed away entirely for about 70% of the circumference, leaving vestigial rings for mounting the keys with the usual brass pin, but an entirely smooth surface to the joint on the side away from the keys. The wing joint's épaule fits right up to that smooth surface, adding to the general slimness of this instrument. On B2970 the same three beads are only shaved off for about a third of their circumference, and then not right down to the column surface; consequently the épaule does not fit so closely (see Fig 3.3.3.9 below). Fig 3.3.3.10 shows the baluster touches against the side of the long joint – there is no gouged-out hollow as on the Haka. The épaule does not cover the third ring despite it being shaved off, and the finial does not quite reach up to the fourth ring; these are discussed below.

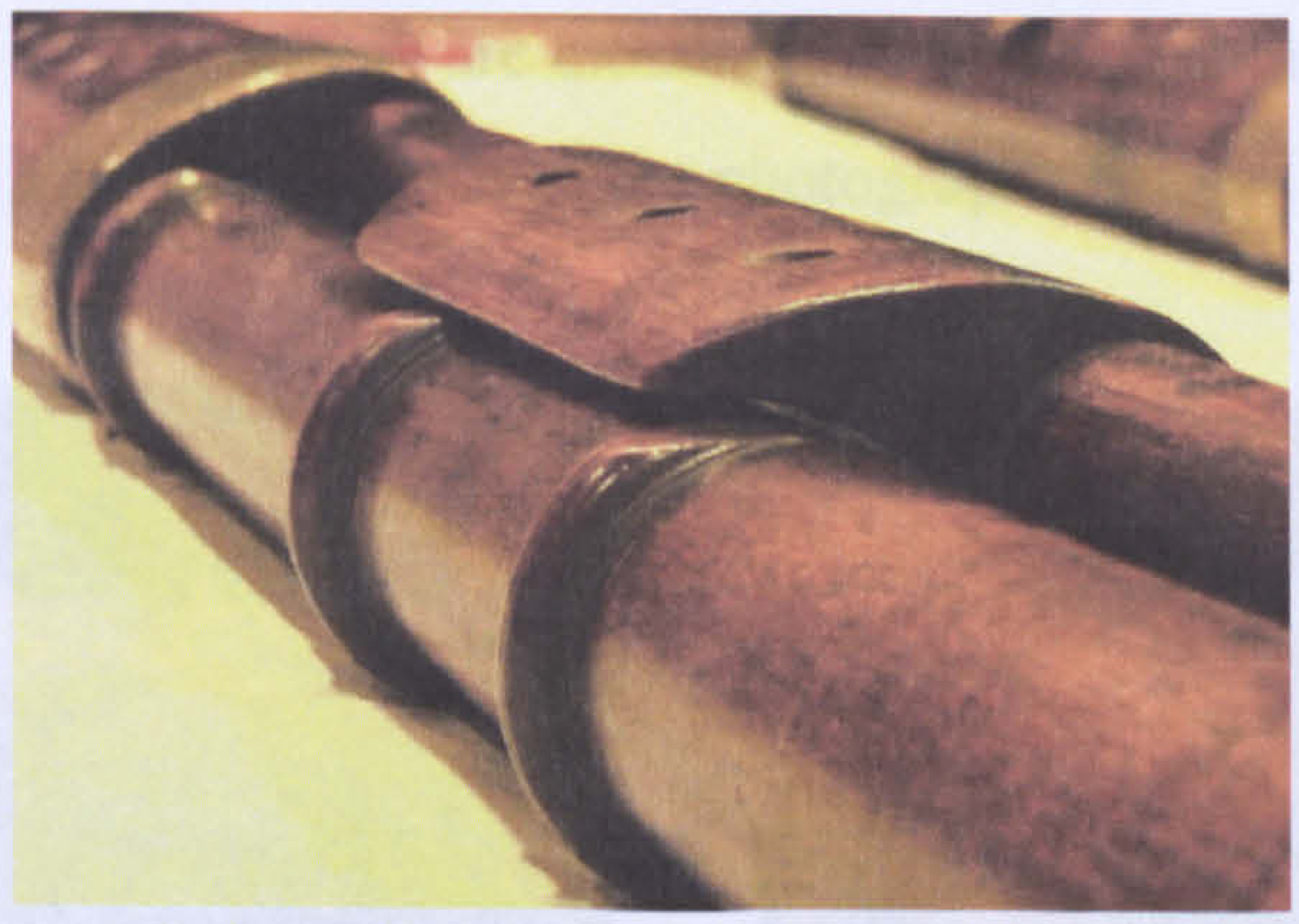


Fig 3.3.3.9. B2970 showing fit of wing against long joint

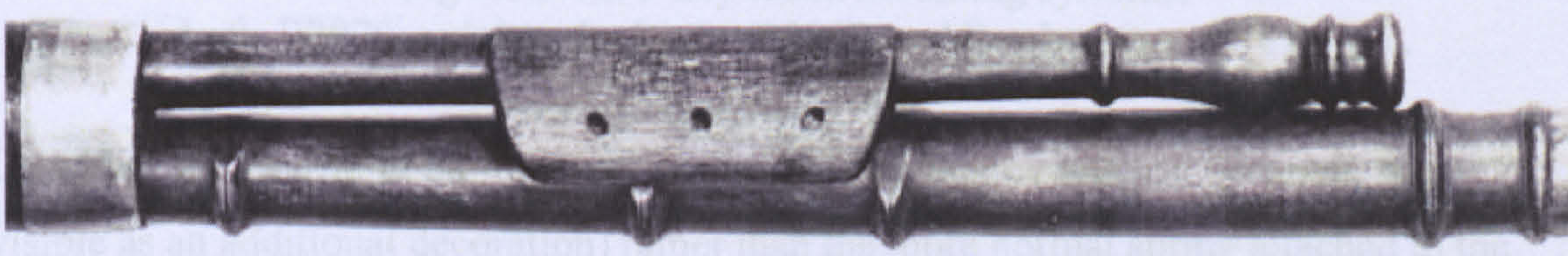


Fig 3.3.3.10. B2970 fit of wing against long joint.

Fig 3.3.3.11. F keys of J. C. Denner bassoons:
B2970 left, 2969 centre, M427 right

Keys: Fig 3.3.3.11 shows that despite other differences in the instruments, the F keys of the two Berlin bassoons are very much the same, but that of M427 is entirely different in shape. The key flaps on M427 are circular, rather than the corner-cut squares on B2970 (and B2969). The flaps are mounted differently too: here the axle passes beneath the key, which is very unusual for early eighteenth century bassoons, while the Berlin instruments both have the normal configuration, with the axle above the key.[141] Despite this difference, the F keys and flaps of both have the axle bent into a square inverted U to form a staple pressed into the wood. Those of 2969 are mounted in saddles and there is no obvious evidence that these are a later addition. See the photographs below.

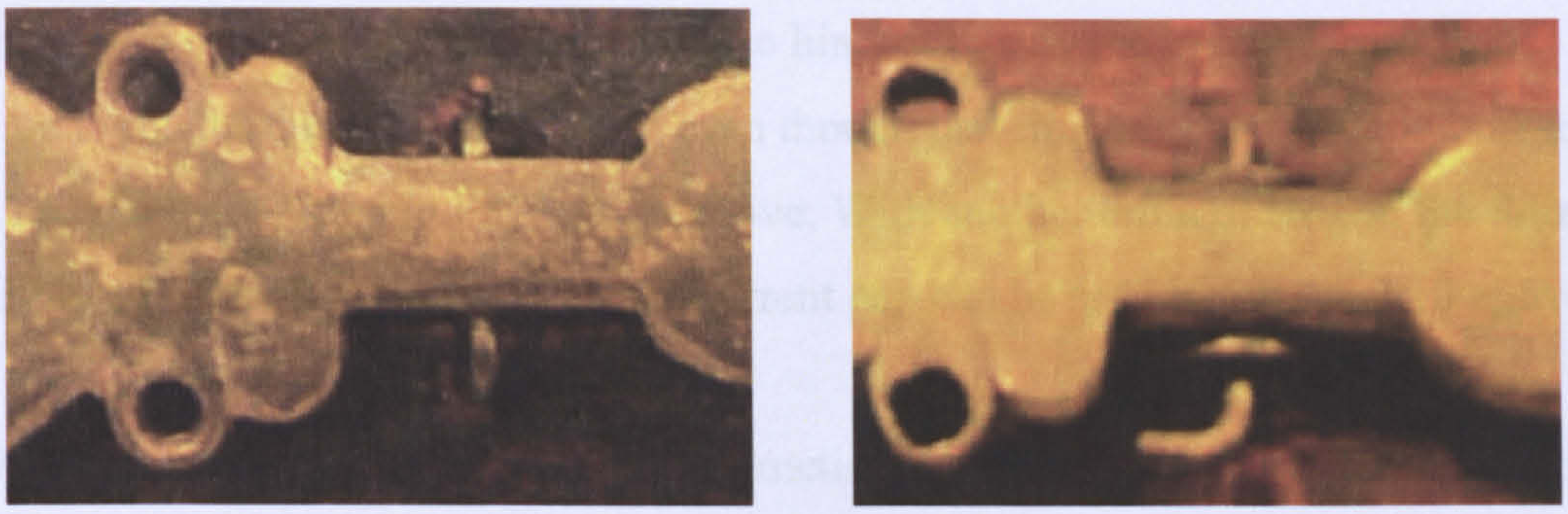


Fig 3.3.3.12. F key touch mounting systems:
Left: B2970; axle/staple. Right: B2969; saddle plus separate axle pin.

On M427 the springs of all three keys are riveted to the key touches (the rivet remaining visible as an additional decoration) rather than the more normal spring attached to the wood under the key on both Berlin instruments.

Brussels M427 and Berlin 2970, then, are of quite different appearance from each other but stand at almost exactly the same height when assembled (i.e. the distance from south end of the boot to north end of bell, called the Standing Height in table 3.3.3.1 below). However, their total bore lengths differ by 33mm, due mostly to the thicker plug in the bottom of the boot of B2970. M427 has the two-plug system and both are just 12mm thick; B2970, in contrast, has a single oval plug 24mm thick. B2969 has plug(s) 11mm thick but it was not possible to remove the bottom plate to find out if there are one or two.

The oval plug of B2970 may indicate a later intervention, perhaps to raise the pitch by replacing the original plugs with a thicker one, cutting away the septum between plugs to make it easier to cut the window a bit further north (common tactics used to raise the pitch). But it seems more likely that it might have been done to repair rotted wood: the plugs and septum here are particularly vulnerable to moisture flowing down the bore. The

[141] There are at least three other J.C. Denner instruments with this circular, under-axled flap. All three are in Linz *Oberösterreichisches Landesmuseum*; two bass recorders Mu 8 and Mu 9; and tenor oboe Mu 24.

window height is now 17mm which is rather less than the bore diameters of 21mm at this end of the boot, again indicating that the plug is too thick. If the plug was halved to 12mm thick that would add another 24mm to the total bore length (12mm in each bore).

The remaining 9mm difference can be accounted for in the unusually long tenon of B2970's wing joint (53mm compared to M427's 45mm – a difference of 8mm). The socket may have been deepened, and the tenon lengthened, as a way of shortening the bore length. The fit of wing against long joint also hints at this by the way the épaule does not reach up to the third key mounting ring even though that ring has been flattened off to make room for it, as seen in Fig 3.3.3.9, above. With another 8mm of length, the finial would just fit under the fourth ring – the current gap can be seen in Fig 3.3.3.10 above.

M427 has been used as the basis for reconstruction by several of today's makers for period instrument performances, including myself. My reconstructions are made to the same lengths, bore shapes and tonehole sizes as the original (according to the measurements given in Appendix 3), and with a crook 370mm long they play well in tune at A=415Hz. Some of the playing qualities are discussed in Chapter 4. Other makers have used Berlin 2970 as basis for reconstructions playing at A=415 Hz but I do not know how closely they keep to the dimensions of the original.

Bore

Examination of the individual bore profiles (in Appendix 3) of the Berlin instruments confirms the previous assessment of their good condition. Only the long joint of 2969 shows any great degree of ovality, though there is a little in both wing joints beyond hole III, and in 2970's long joint between X and XI.

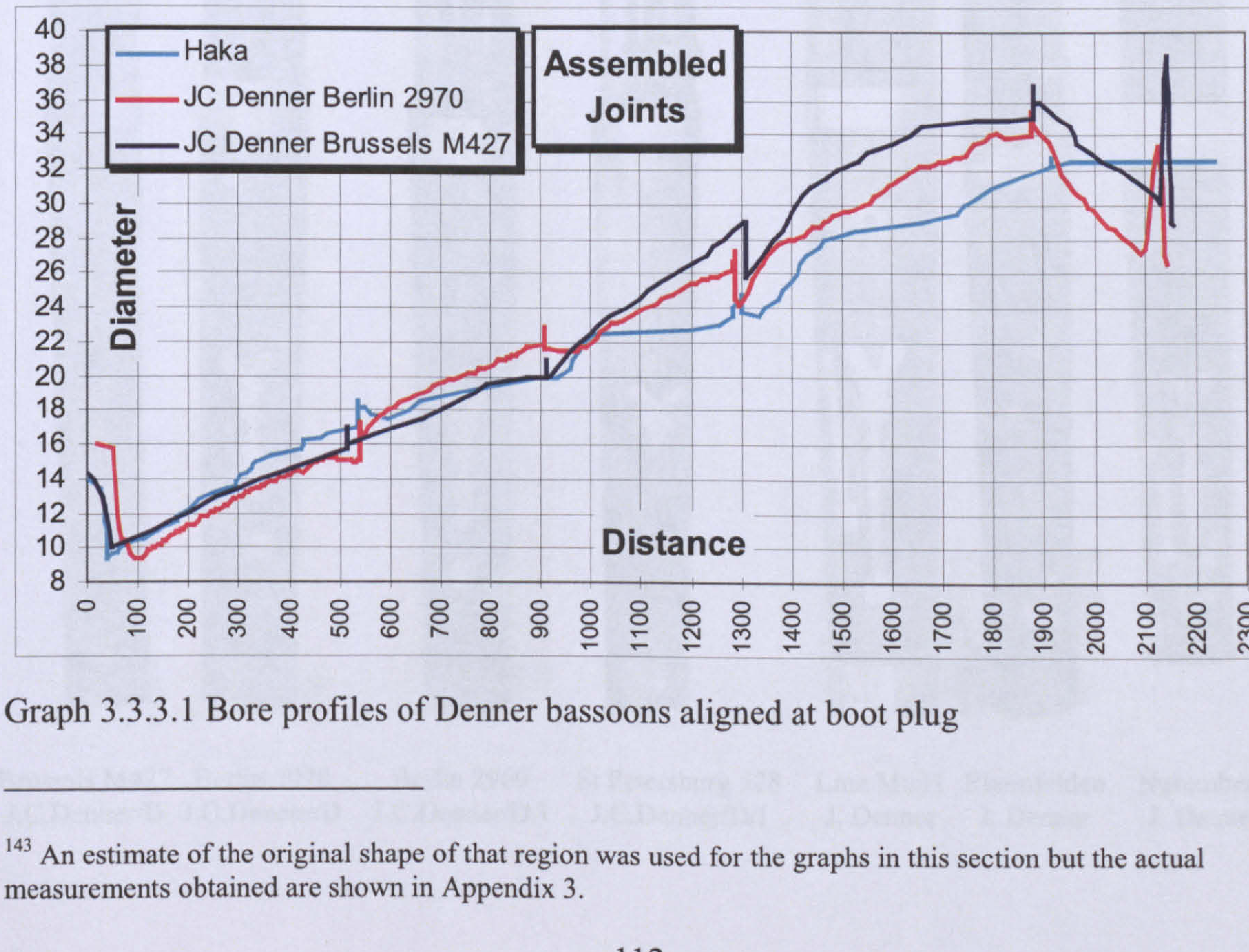
There is some tenon compression, especially at the long joint north tenon of 2970, where it is extreme.[142] There is also the appearance of compression at the south tenon, where the taper angle increases, resulting in a considerable step down in diameter from the boot up-bore to the long joint. However it is clearly shown in Graph 3.3.3.2 on p.116 that all three of the bassoons have this same large step, and in the case of the other two there is not such a change of taper, so it seems that the step is deliberate. The wing joints show some compression in their tenons, and it is difficult to tell whether some reduction of taper in

[142] The distortion has been removed from some of the graphs in this section for clarity but is shown clearly in the individual graphs in Appendix 3.

this region was intended or if all that is found there is due to distortion in this most vulnerable region. In the case of M427, there is a considerable degree of compression. This instrument was measured only with the disc system which rules out the possibility of measuring a chamber beyond a narrow opening, so the measuring disc that passes the south end diameter of 14mm only makes contact with the bore again 165mm further in.[143] In the case of B2970 the 60mm long cylindrical section at the wing tenon is unlikely to be intended; it is more likely that the reamer continued the taper straight, to around 16mm at the south end.

In Graph 3.3.3.1 below, the bore profiles of the two D-stamped bassoons are compared, with Haka displayed alongside for reference. Haka's down bore (wing and small boot bore) can be seen to be reasonably similar especially to M427, but his up bores are significantly narrower. Denner adopts steeper taper angles in the up bore, with larger volume, and a steeply counter-tapered bell whose opening diameter is about the same size as the top of the boot joint bore.

The two Denners also differ from each other. Compared with B2970, M427 is larger in the up bore (the bell plus long joint plus boot big bore). In the boot small bore it is narrower. The wing joints look a little different here but it is argued below that they appear more similar when aligned differently.



Graph 3.3.3.1 Bore profiles of Denner bassoons aligned at boot plug

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143 An estimate of the original shape of that region was used for the graphs in this section but the actual measurements obtained are shown in Appendix 3.

Fig 3.3.3.13. Denner bassoons compared (scales approximate).

Brussels M427	Berlin 2970	Berlin 2969	St Petersburg 528	Linz Mu33	Rheinfelden	Nuremberg
J.C.Denner/D	J.C.Denner/D	J.C.Denner/D/I	J.C.Denner/D/I	J. Denner	J. Denner	J. Denner

J.C. Denner/D/I

There are two indications that the bassoons stamped D/I form a separate group from those stamped D visible in Fig.3.3.3.13. Firstly, the turning style, particularly in the bell joints, and secondly the standing height.

The two D/I bells are of much the same design as each other, and they differ from the Haka-like B2970. The top baluster is more compressed in length, with a greater difference between the maximum diameter and that of the waist below. The central bead group is simpler; just a single large bead flanked by two fillets (a large astragal). The south baluster has the convex and concave portions divided; the convex becoming simply a large bead and the concave waist extended in length. At the south end of the long joint there is a small quarter-round pedestal bead to butt against the boot face. This is not matched on the wing, which as a whole remains very much the same design as that of B2970, apart from the épaule having more rounded corners and the whole being somewhat shorter.[144]

The table below compares the joints and assembled lengths of the five bassoons illustrated in Fig.3.3.3.13. (The details of J. Denner bassoons are included are for later reference).

		J.C.Denner/D		**J.C.Denner/D/I**		**J. Denner**	
		Brussels	Berlin	Berlin	St Petersburg	Linz	Nuremberg
		M 427	**B 2970**	**B 2969**	**528** [145]	**Mu 33**	**MI 128** [146]
Boot	OAL	446	446	422		435	425
	top to plug	434	422	410		420	
Wing	OAL	514.5	519	484		479	
	ex Tenon	476.5	466	437.5		439	461
Long	OAL	580	587.5	563		569	
	ex Tenon	515	517	480		500	513
Bell	OAL	297.5	297	294		50	282.5
Standing height		1258.5	1260	1196	1195	985	1220.5
Total Bore length		2157	2124	2031.5		1829	2076

Table 3.3.3.1 Joint lengths of Denner bassoons.
Standing height = south end of boot to top of bell.
Total Bore Length = top of wing to plug face + plug face to top of bell.

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[144] A third bassoon, MI 126, now lost, is photographed in Martin Kirnbauer, *Verzeichnis der Europäïschen Musikinstrumente im Germanischen Nationalmuseum Nürnberg: Band 2 Flöten und Rohrblattinstrumente bis 1750* (Germany: Florian Noetzel Verlag, 1994), p.173. It shares all of these features and is catalogued as stamped 'J.C.Denner' in a scroll, but no mention is made of initials beneath the scroll. The overall length is recorded as 1200mm, which matches the other two D/I bassoons closely.
[145] Data and photograph from Young, *LoM*, p.68.
[146] Data from Kirnbauer, *Verzeichnis*, pp. 174-175.

This makes clear the similarities in joint lengths of the two D bassoons, and shows that the D/I instruments are significantly shorter in all joints. The standing height of StP528 is almost exactly the same as B1969 and although it is unfortunate that there are not more details, the similarities of joint lengths can be seen in the scaled photographs in Fig.3.3.3.13.

The turning style of B2969 provides evidence that its shorter length is not due to having been cut down in later life. The bead at the top and pedestal at the bottom of the long joint are witnesses that that joint has not been shortened, and the trimming of the rings to accommodate the wing alongside shows that the wing has its original length too. The pedestal and lower two key-mount rings have been flattened on the wing side, as has the upper Bb flap mount ring (see photo below), but the third ring for Bb-key touch has not been flattened.

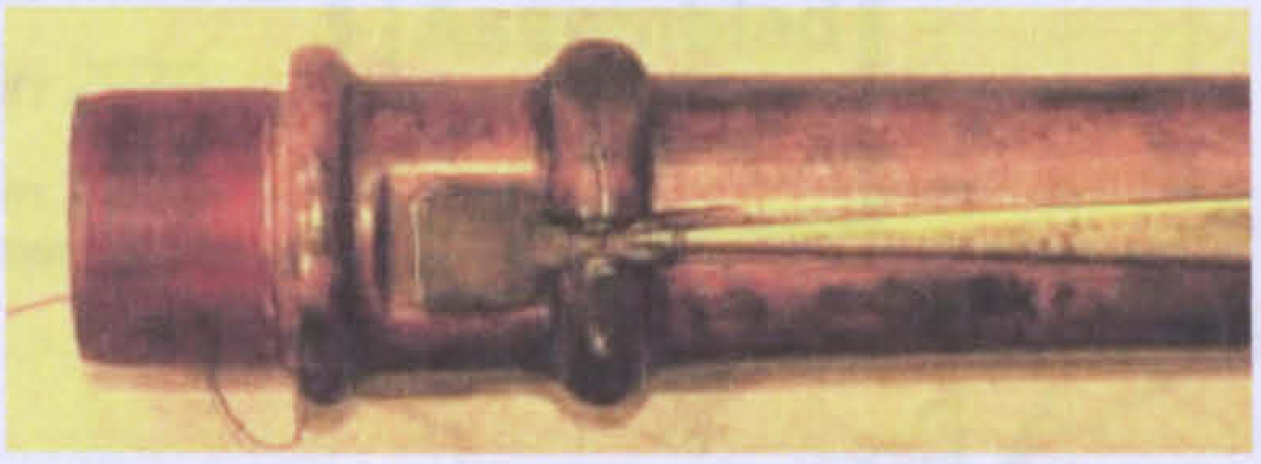


Fig 3.3.3.14. Berlin 2969 long joint north end showing flattening of fourth ring.

In the detail below the fit of the wing's épaule and finial against the long joint beads make clear why these flattenings are necessary. The fact that the Bb touch ring is not flattened proves that the épaule was never higher up the long joint than it is now, so neither wing nor long joint have been shortened.

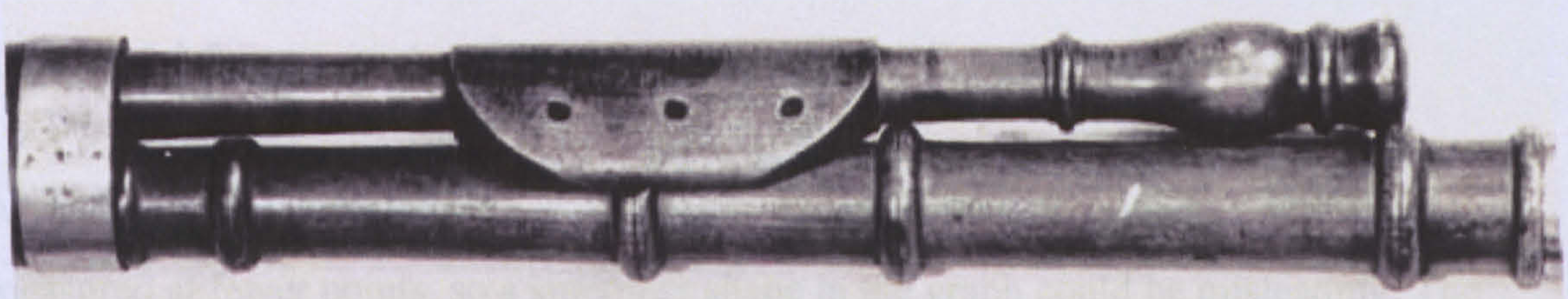


Fig 3.3.3.15. Berlin 2969 wing and long joints

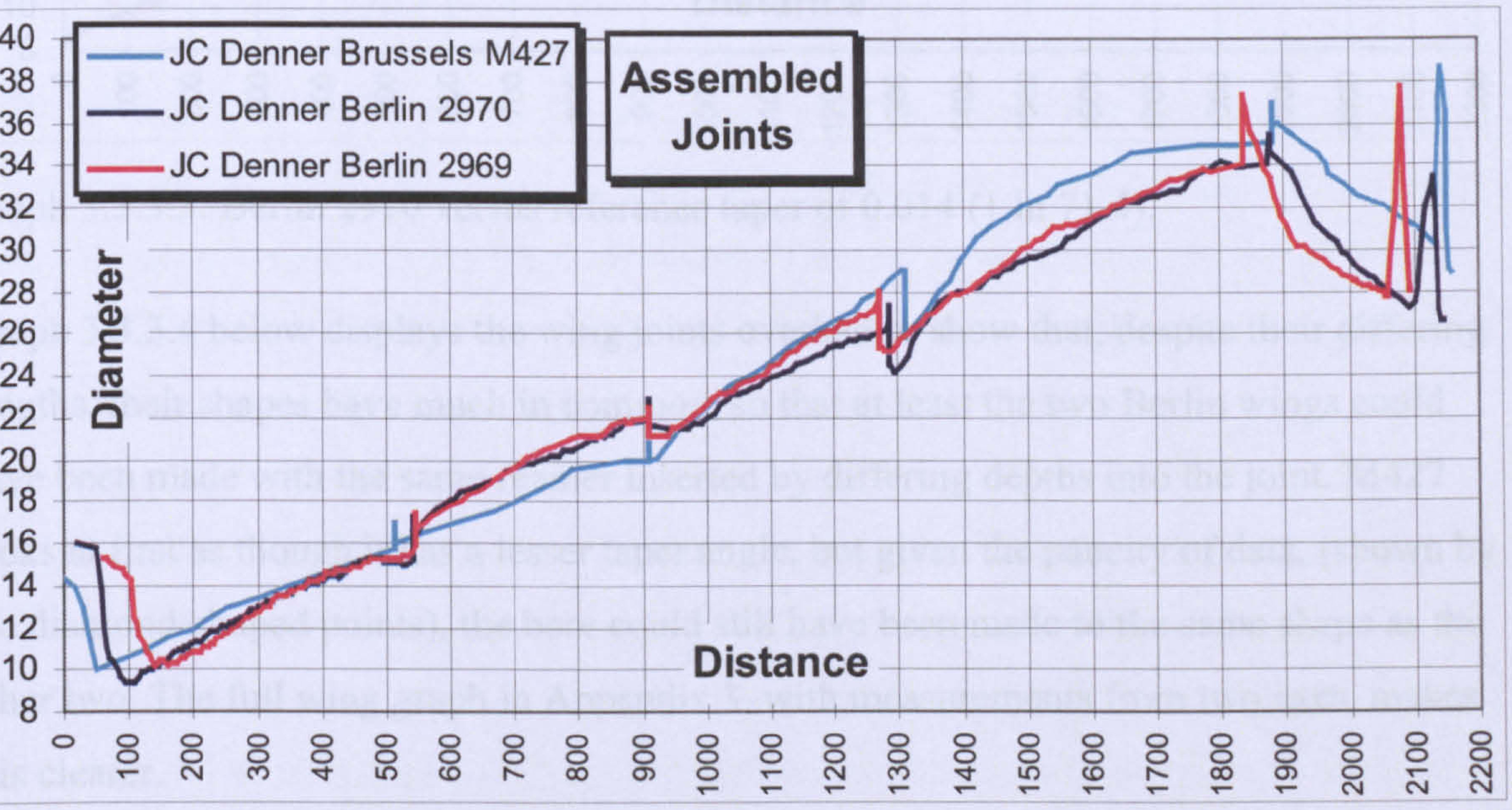
The situation is slightly different on the St Petersburg, as can be seen in Fig 3.3.3.13: the épaule does not reach quite up to the third key-ring and the finial does not reach the fourth ring, so perhaps this wing is a little shorter than B2969. Whether as a result of later intervention or made that way in the first place is not known.

With the corrections in bore length of B2970 discussed above, the two J. C. Denner/D bassoons are of similar total bore length, at around 2157mm, while those marked J. C.

Denner/D/I are apparently equal, at 125mm shorter. This indicates a difference in pitch intention, at least in this small sample, between the instruments of Johann Christoph and those of his son Johann David. The difference of 125mm could make a pitch difference of nearly 80 cents on the lowest note of the instrument; so if combined with a shorter crook (by about 20mm) a difference of a semitone could be readily achieved. Such a pitch difference is not necessarily a function of the time of manufacture, but may rather be due to pitch standard at the intended destinations of the instruments.

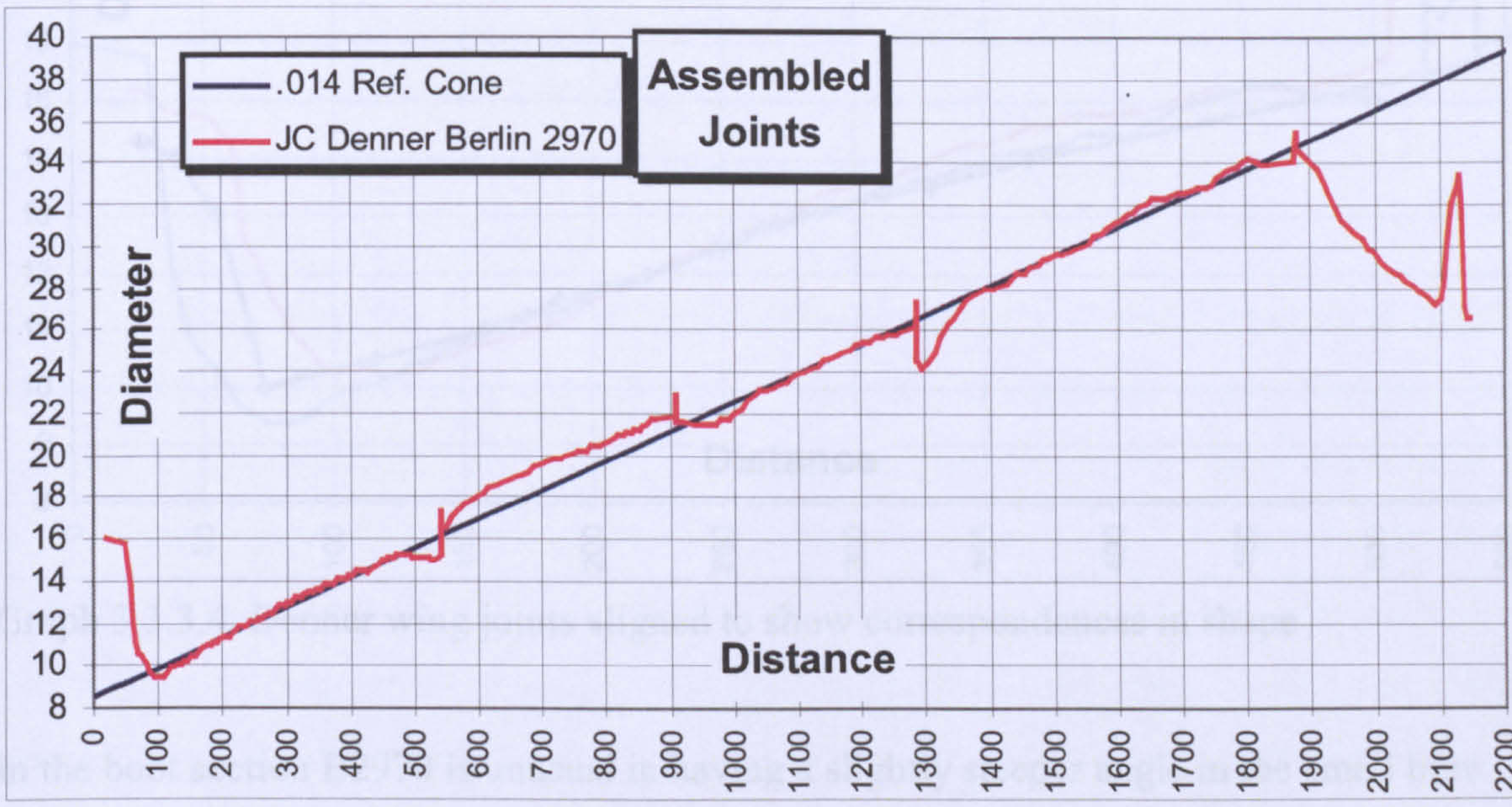
Bores

The complete bore graphs show that the two Berlin instruments are similar in shape though not in length, while the Brussels one is a different design with significantly narrower boot small bore and wider long and bell joints.



Graph 3.3.3.2 Bore graphs of J.C. Denner bassoons, aligned at boot plug face

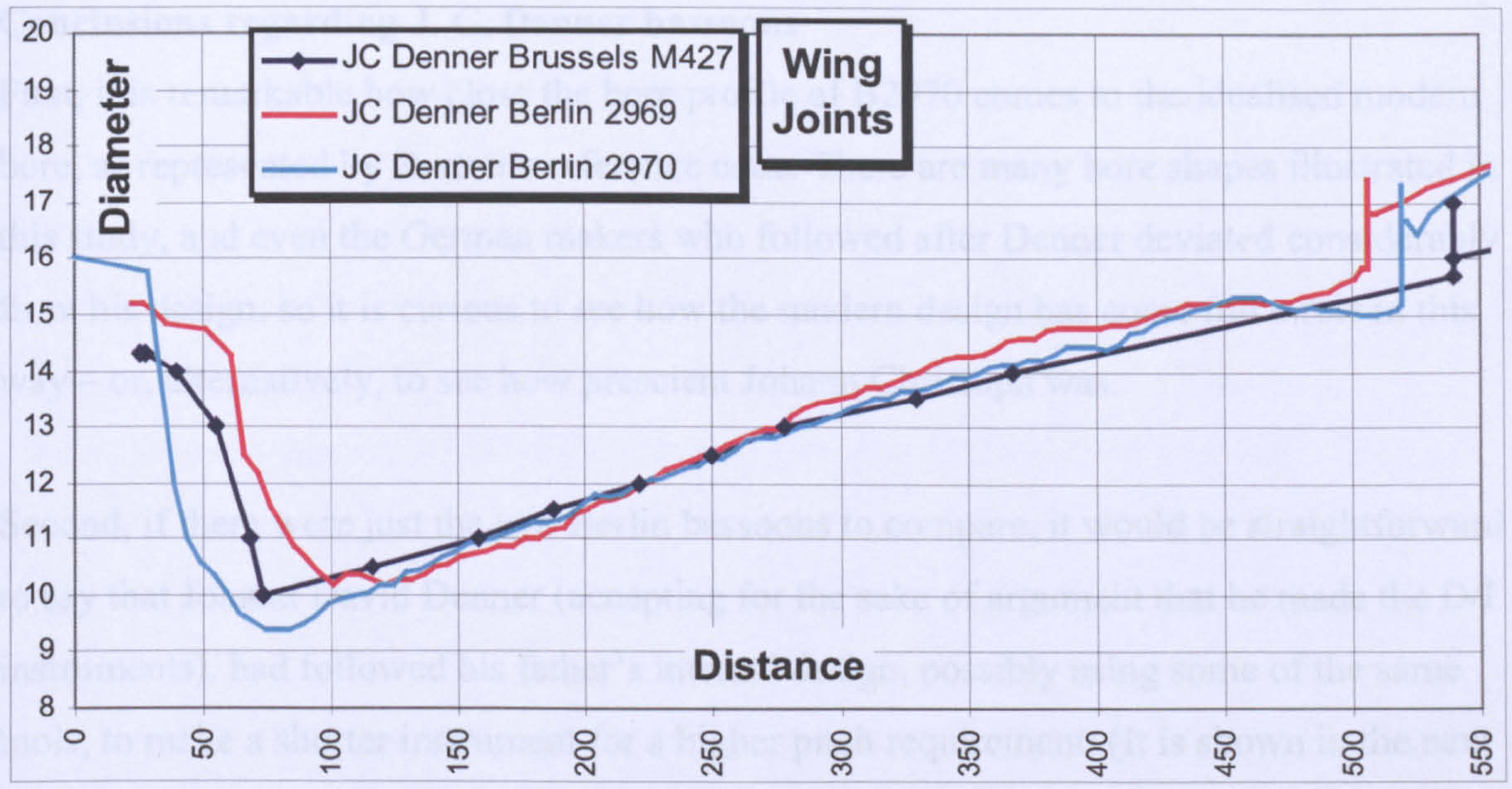
All three of the instruments have very regular profiles overall; however, M427 is measured at fewer points, so a smoother shape in the graph could be misleading. The Berlin instruments are measured in considerable detail though, and their bores can still readily be interpreted as a number of straight tapers and simple shapes. The wing joint is slightly convex, (bowed outwards from a single straight taper); the taper angle is slightly steeper from the throat and changes to slightly less of an angle from tonehole II to the south end. It has no further subtleties that would have required more than one reamer for the joint (plus one for the crook socket). The profile of B2970 in particular lies remarkably close to the reference cone that Burton uses to characterise the modern Heckel system bassoon bore.[147] Only the reverse taper bell deviates significantly from it; the boot small bore is larger in diameter but the same angle, and the narrow south end of the long joint also deviates a little:



Graph 3.3.3.3: Berlin 2970 versus reference taper of 0.014 (1 in 71.4).

Graph 3.3.3.4 below displays the wing joints overlaid to show that, despite their differing lengths, their shapes have much in common, so that at least the two Berlin wings could have been made with the same reamer inserted by differing depths into the joint. M427 looks at first as though it has a lesser taper angle, but given the paucity of data, (shown by the diamond-shaped points), the bore could still have been made to the same shape as the other two. The full wing graph in Appendix 3, with measurements from two axes, makes this clearer.

[147] Burton, 'Bassoon Bore Dimensions'. p.44.



Graph 3.3.3.4. Denner wing joints aligned to show correspondences in shape

In the boot section B2970 is unusual in having a slightly steeper angle in the small bore than in the big bore; in B2969 the angle of the big bore is increased, so that they are about equal, while in M427 both the big bore is steeper but the small bore is less steep. This latter configuration is by far the more common in any early bassoon, with the angle of the small bore being reduced even further in later instruments by other makers.

The Berlin long joints again show a good deal of similarity apart from the increased angle at south end of 2970 already discussed; but M427 is completely different, expanding rapidly to one of the largest diameters in this joint of all the instruments measured. All three of them have a noticeable step down in diameter where they join the boot up bore, and all three have a bell opening diameter approximately equal to that at the top of the boot, even though that value is different for each.

The bell chambers are somewhat mysterious: they are too small to make any acoustic difference. It would be difficult to regard them as more than a token gesture, were it not for an appreciation of the increased workload in the process of forming them. Perhaps they are there for some esthetical consideration rather than a tonal one, serving to render the bore surface invisible from the outside. Taken together with the rounded exterior at the bell opening, there is a distinct contrast with the curtal's open, flared bell; perhaps Denner intended to make an emphatic visual statement to announce the new, tamed and sweetened tonal qualities, in contrast to that expected to issue forth from a flared bell.

Conclusions regarding J. C. Denner bassoons

First, it is remarkable how close the bore profile of B2970 comes to the idealised modern bore, as represented by Burton's reference cone. There are many bore shapes illustrated in this study, and even the German makers who followed after Denner deviated considerably from his design, so it is curious to see how the modern design has come full circle in this way – or, alternatively, to see how prescient Johann Christoph was.

Second, if there were just the two Berlin bassoons to compare, it would be straightforward to say that Johann David Denner (accepting for the sake of argument that he made the D/I instruments), had followed his father's internal design, possibly using some of the same tools, to make a shorter instrument for a higher pitch requirement. (It is shown in the next section that his brother Jacob also used much the same bore profile). At the same time, David changed some of the exterior design, moving further away from the Haka-style bell turnings to establish his own version, but also re-introducing a pedestal bead at the bottom of long joint. He retained the exact key style of his father; they are so similar as to suggest that the same person made both sets. The St Petersburg bassoon is, as far as can be ascertained, of much the same design.

The existence of Brussels M427, however, complicates the picture. Made by Johann Christoph and apparently designed to play at the same pitch as B2970, it is, in comparison with that instrument, quite different in both turning and keywork, and uses different reamers for the bore (apart, possibly, from in the wing). The exterior design looks in some respects like a progression from B2970: it moves further away from the Haka-like bell (going even further than David in dividing the top baluster too); and streamlines the wing-to-long joint fit by trimming away 70% of the circumference of the three lower key-mount beads on the long joint, slimming the wing baluster and replacing the finial with a ferrule. If it is a later design though, David (along with Jacob), has followed his father's earlier acoustic design, and also rejected the streamlining of the exterior.

Jacob Denner

Three bassoons survive that are stamped by Johann Christoph's son Jacob. Only Mu33 in the Oberösterreichisches Landesmuseum, Linz was examined for this study. The other two are MI 128 in the Germanischen Nationalmuseum, Nuremberg, which is well documented in Martin Kirnbaur's catalogue, where photographs and bore graphs are included,[148] and No 1.1 in the Friktaler Museum, Rheinfelden, Switzerland.[149] Both the Linz and Rheinfelden instruments have type 1 decorative turning while the Nuremberg is of type 2 plain style.

Exterior

The Linz instrument is something of an enigma. There is only a stub of a <u>bell</u>; a baluster-turned ring of wood, with a narrow brass ferrule, a socket to fit the long joint tenon, and a 19mm long section of bore matching in diameter the north end of the long joint (though now very oval). It is either a sawn-off stub of a bell, or was made this way for obscure reasons. The top surface is smoothly finished, so has not been roughly hacked off (c.f. Poznan 1376); the proportions of the turning show that it is unlikely to be the remains of a full bell as the baluster is too short (see Fig. 3.3.3.16 below). The turning style matches that on the wing, but if it was made to this length there is no sense in the Bb key on the long joint; there is not enough bore length beyond hole XI for that key to serve any useful purpose.

The turning of the <u>wing</u> displays some of the features of type 1a (rather than 1b), with a pedestal at the south shoulder, beads at each end of the épaule and a flare at the south of the baluster ogee. There is no brass ring, but a large rounded bead terminates the north end, looking similar to the Berlin J.C. Denner wing joints but with the top finial removed. The crook socket and narrowest part of the bore have been re-built with a boxwood liner 53mm long. Young points out in the catalogue that the wing is unstamped and suggests that it is from another instrument.[150] However, of the four complete J.C. Denner bassoons, only one is stamped on the wing[151] and the only other J. Denner wing is also not stamped.[152] The wood and the stain of this joint are good matches with the other joints.

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[148] Kirnbauer, *Verzeichnis*, pp. 174-175.
[149] See Fig 3.3.3.13.
[150] Young, *Holzblasinstrumente,* pp.196-7.
[151] Berlin 2970, all are stamped on boot and long joints, none on the bell.
[152] Nuremburg GNM MI 128. The wing on the Rheinfelden bassoon is not original.

The <u>boot and long joints</u> give every appearance of being from a normal concert bassoon. The <u>long joint</u> is fully turned with rounded beads for key mounts. There is a pedestal at south end and a bulge at hole X, (both reminiscent of type 1a). These features also appear on the Rheinfelden bassoon (see Fig 3.3.3.12 above).

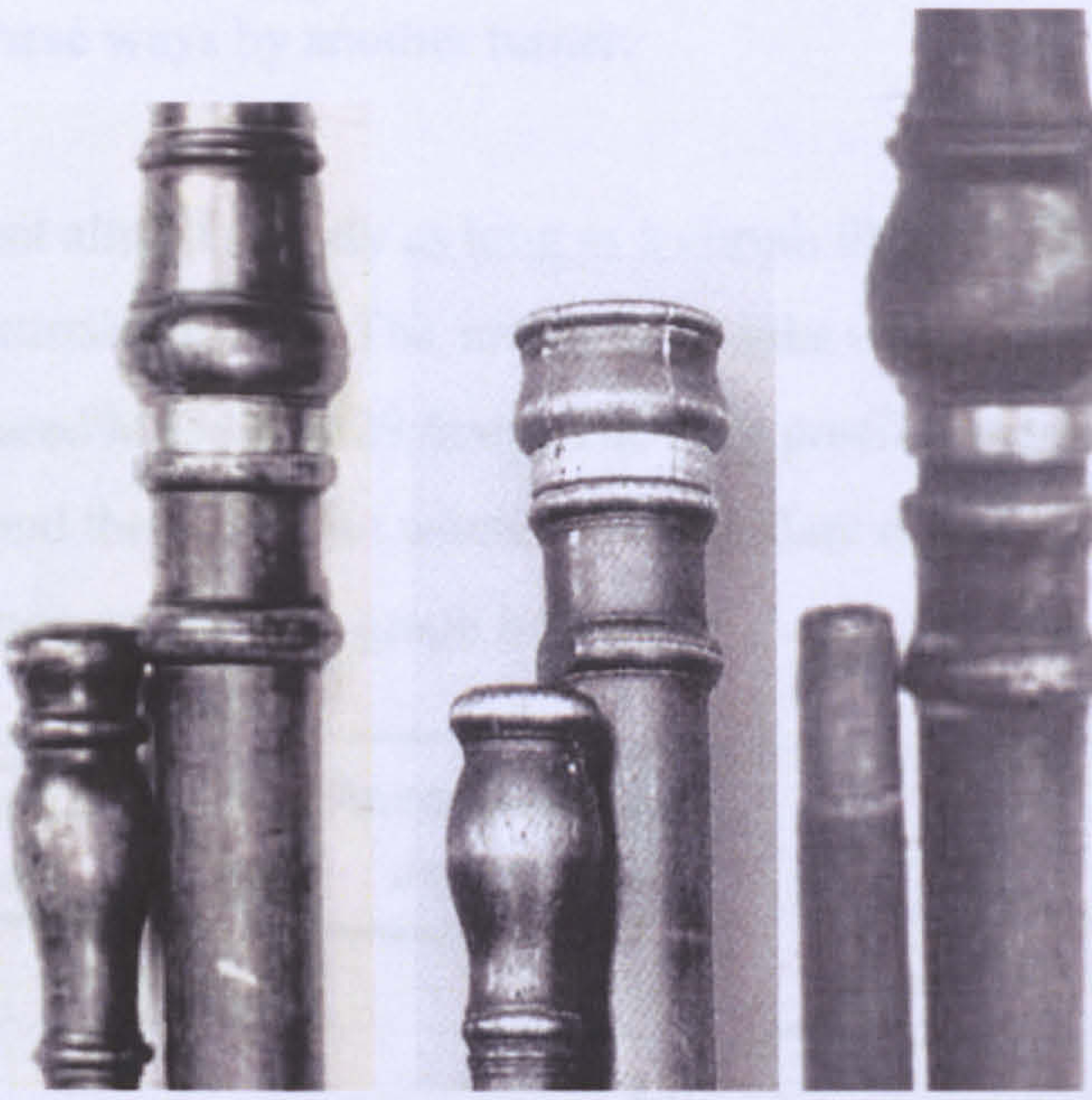


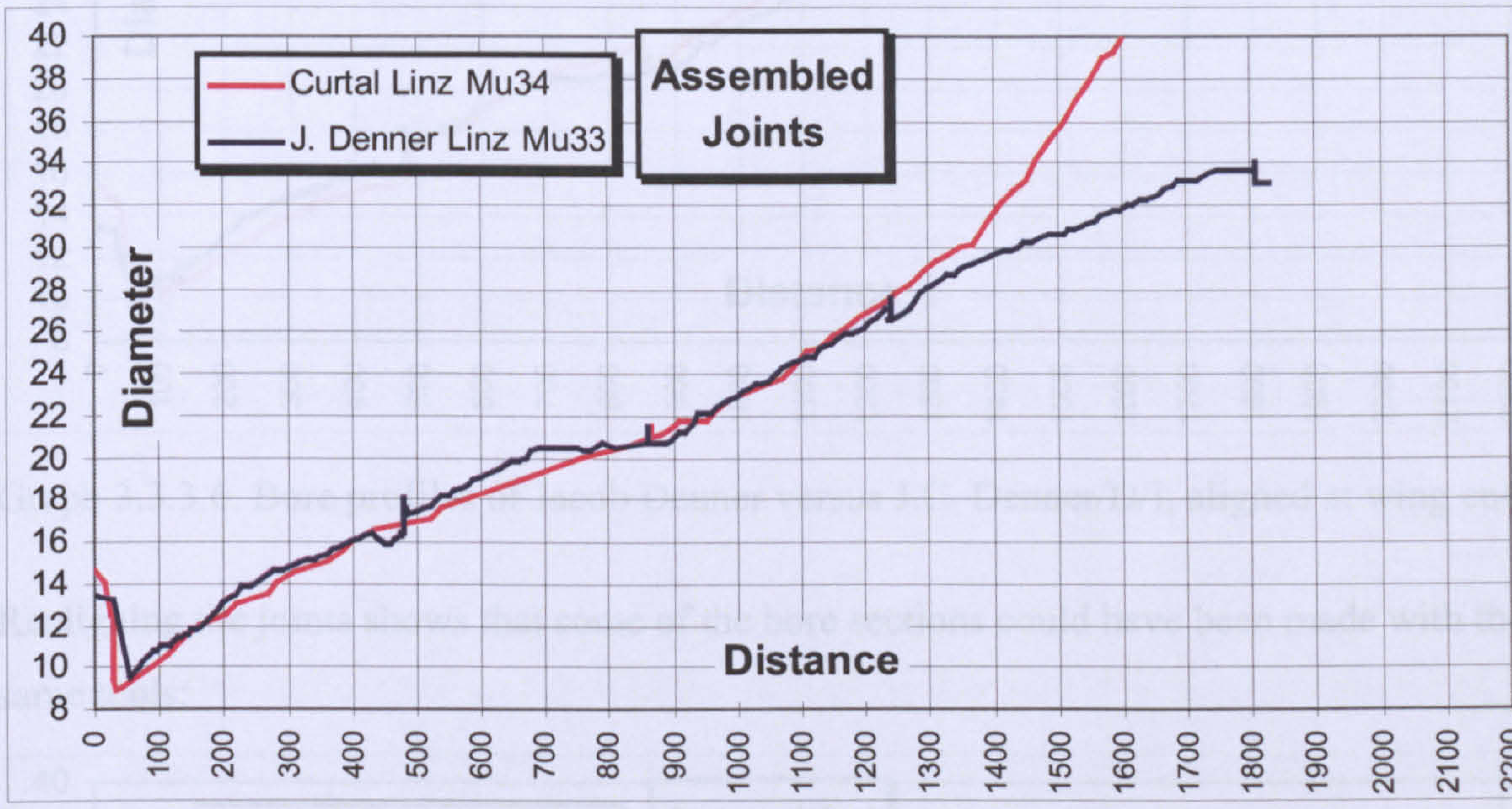
Fig 3.3.3.16.
Left: JC Denner/D/I B2969, centre: J Denner Linz, right: J. Denner Rheinfelden
Showing: a) that the bell stub of Mu33 is unlikely to have been part of a full bell and b) the wing top of Mu33 is similar in form to that of B2969 but with the flared finial above the baluster removed

There is a possible explanation for the construction of Mu33 in the company that it keeps. It is one of the 46 instruments gifted to the museum from Stift Kremsmünster in 1836, and 'possibly one of the '*11 Fagot*' in the Stift's 1739/1747 inventory'.[153] However the '*Fünf alte Fagote'* listed amongst the 1836 gifts to the museum are all accounted for as curtals still in the museum's collection. Perhaps the monks of the Stift had wanted to add another curtal to their collection as late as the mid-eighteenth century? A speculative and rather fanciful scenario is as follows: the monks may have asked one of the top makers of the day (many of their instruments are of the highest quality and they already had two bass recorders by J.C. Denner)[154] to supply them with another bass curtal. Jacob Denner was, perhaps, not making those old-fashioned things but was able, perhaps reluctantly, to supply them with an equivalent constructed in the modern way. He could have taken long and boot joints already made (complete with keywork), and then made a short wing joint (40mm shorter than Berlin 2970; 5mm shorter than Berlin 2969). Or perhaps he took a

[153] Young, *Holzblasinstrumente,* p. 197.
[154] Mu8 and Mu9. Note that Mu116 which is possibly by Jacob's brother David was not part of the Stift's collection.

ready-made wing and cut off the top finial to shorten it a little, requiring the insertion of the boxwood sleeve to re-build the crook socket and narrowest part of the bore. To cover the north tenon of the long joint he perhaps made the short ring decorated with turning to match the wing. It is also possible, of course, that the monks bought a complete bassoon and had it shortened in these ways by another turner.

The result is an instrument almost exactly as long as a curtal; 986mm when assembled, compared to 991mm of curtal Mu34.[155] The sounding lengths (total bore lengths) are even closer: 1829.2mm compared Mu34's 1829.5mm. The bore profiles are remarkably similar up to a point a little beyond the boot joint where the steep flare of the curtal bore starts (about 1360 on the distance scale of the graph below).



Graph 3.3.3.5. Bore profiles of Jacob Denner bassoon versus curtal Mu34

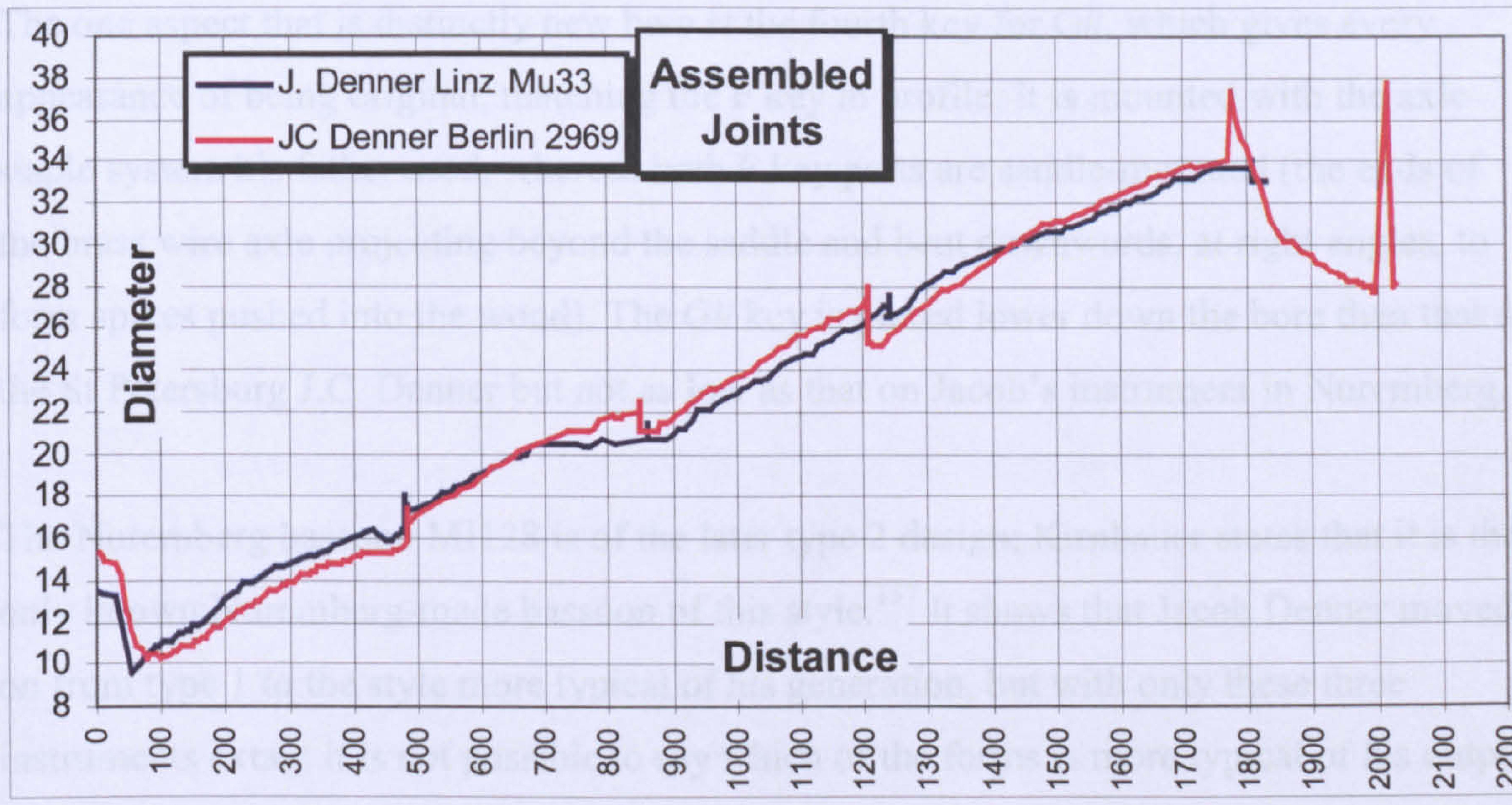
Three of the five bass curtals in the Linz collection are *gedact* meaning that their bell opening is covered, in these cases by a pierced brass cap.[156] This construction has the effect of reducing the 'brassiness' of, especially, the low notes of the instrument, which results from the steeply flared up-bore; thus it serves somewhat to even out and soften the tonal character. The lower taper angle in the long joint of this bassoon will have a similar effect, while the lack of the reverse tapered bell ensures that it will retain something of the open, raw curtal sound. The correspondance of bore with curtal Mu34 is presented not to

[155] Mu34 is one of the five bass curtals that came from Stift Kremsmünster. It is stamped with three 'silkworm moths' now thought to be the mark of the Bassano family.
[156] Mu32 has the option of a hinged pierced cover; it is a more decorated brother to Mu34 with the same stamp. The other two gedact basses are Mu29 and Mu30.

argue that Denner was aware of this design – though there is no reason why he should not have been – but as evidence that this bassoon could have operated as, and been used as, a curtal.

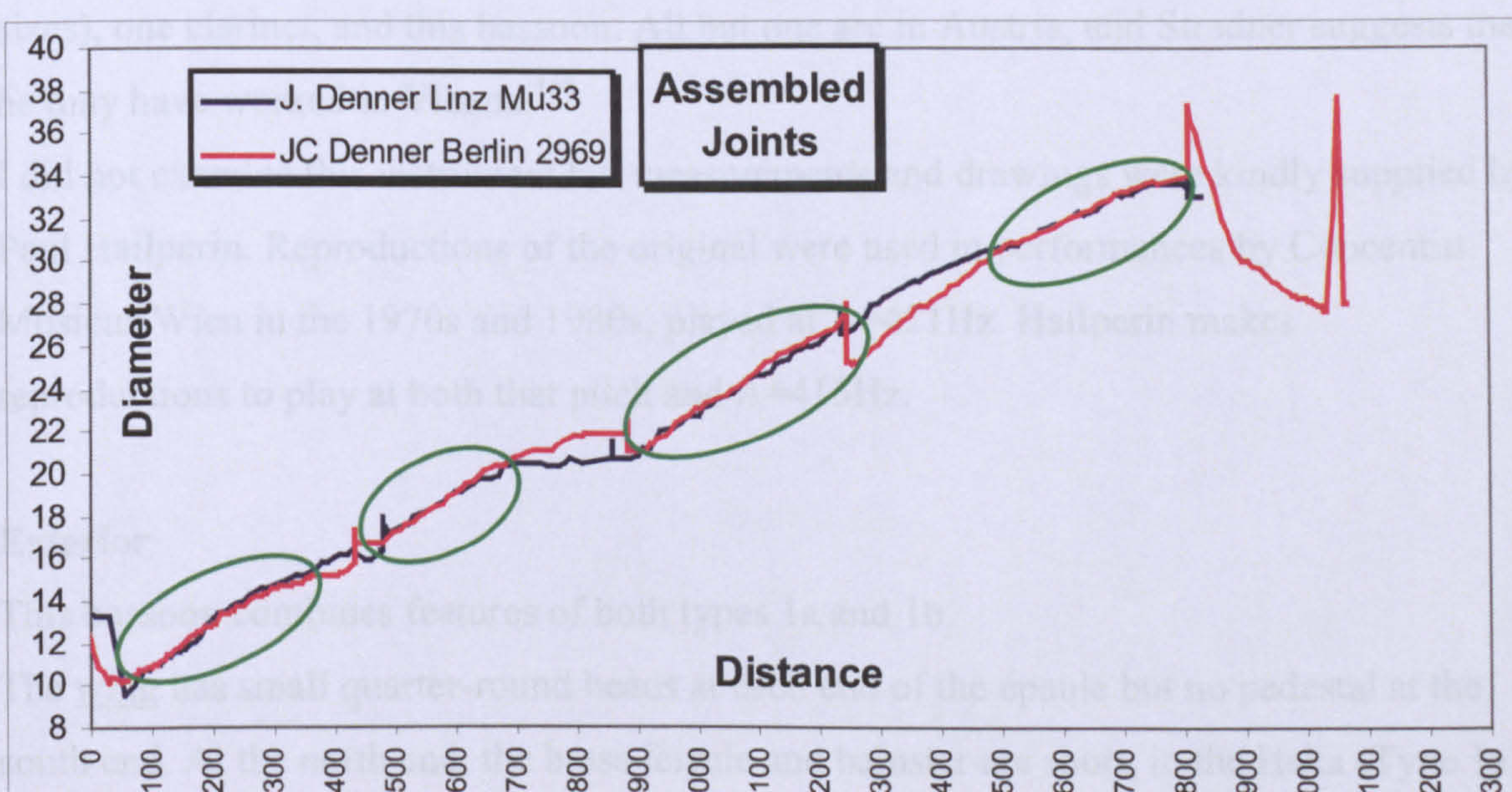
Bore

The bore is also close to at least one of his father's (or brother's) bassoon designs:



Graph 3.3.3.6. Bore profiles of Jacob Denner versus J.C. Denner/D/I, aligned at wing end

Realigning the joints shows that some of the bore sections could have been made with the same tools:



Graph 3.3.3.7. Bore profiles of Jacob Denner versus J.C. Denner/D/I, with the inter-joint distances of 2969 stretched to show matches in the bores of individual joints, (circled in green).

So this instrument looks as though it has been adapted to be usable as a bass curtal, whether by Jacob Denner or persons unknown. The bassoon design from which it is adapted is close enough in bore to Berlin 2969 to have been made with his father's (or brother's) tools, while the outside turning is, if anything, more archaic than surviving examples of his father's work.

The one aspect that is distinctly new here is the fourth key for G#, which gives every appearance of being original, matching the F key in profile. It is mounted with the axle-staple system his father used, whereas both F key parts are saddle-mounted (the ends of the brass wire axle projecting beyond the saddle and bent downwards, at right angles, to form spikes pushed into the wood). The G# key is placed lower down the bore than that of the St Petersburg J.C. Denner but not as low as that on Jacob's instrument in Nuremberg.

The Nuremberg bassoon MI128 is of the later type 2 design; Kirnbauer states that it is the only known Nuremberg-made bassoon of this style.[157] It shows that Jacob Denner moved on from type 1 to the style more typical of his generation, but with only these three instruments extant it is not possible to say which of the forms is more typical of his output.

M. Deper

Very little is known of this maker, who is survived by four oboes (one each of different sizes), one clarinet, and this bassoon. All but one are in Austria, and Stradner suggests that he may have worked in Vienna.[158]

I did not examine this instrument but measurements and drawings were kindly supplied by Paul Hailperin. Reproductions of the original were used in performances by Concentus Musicus Wien in the 1970s and 1980s, played at A=421Hz. Hailperin makes reproductions to play at both that pitch and A=415Hz.

Exterior

This bassoon combines features of both types 1a and 1b.

The wing has small quarter-round beads at each end of the épaule but no pedestal at the south end. At the north end, the brass ferrule and baluster are short, in the Haka (Type 1a)

[157] Kirnbaur, *Verseichnis,* p. 125.
[158] Stradner 1986 in Waterhouse, *NLI,* p.87.

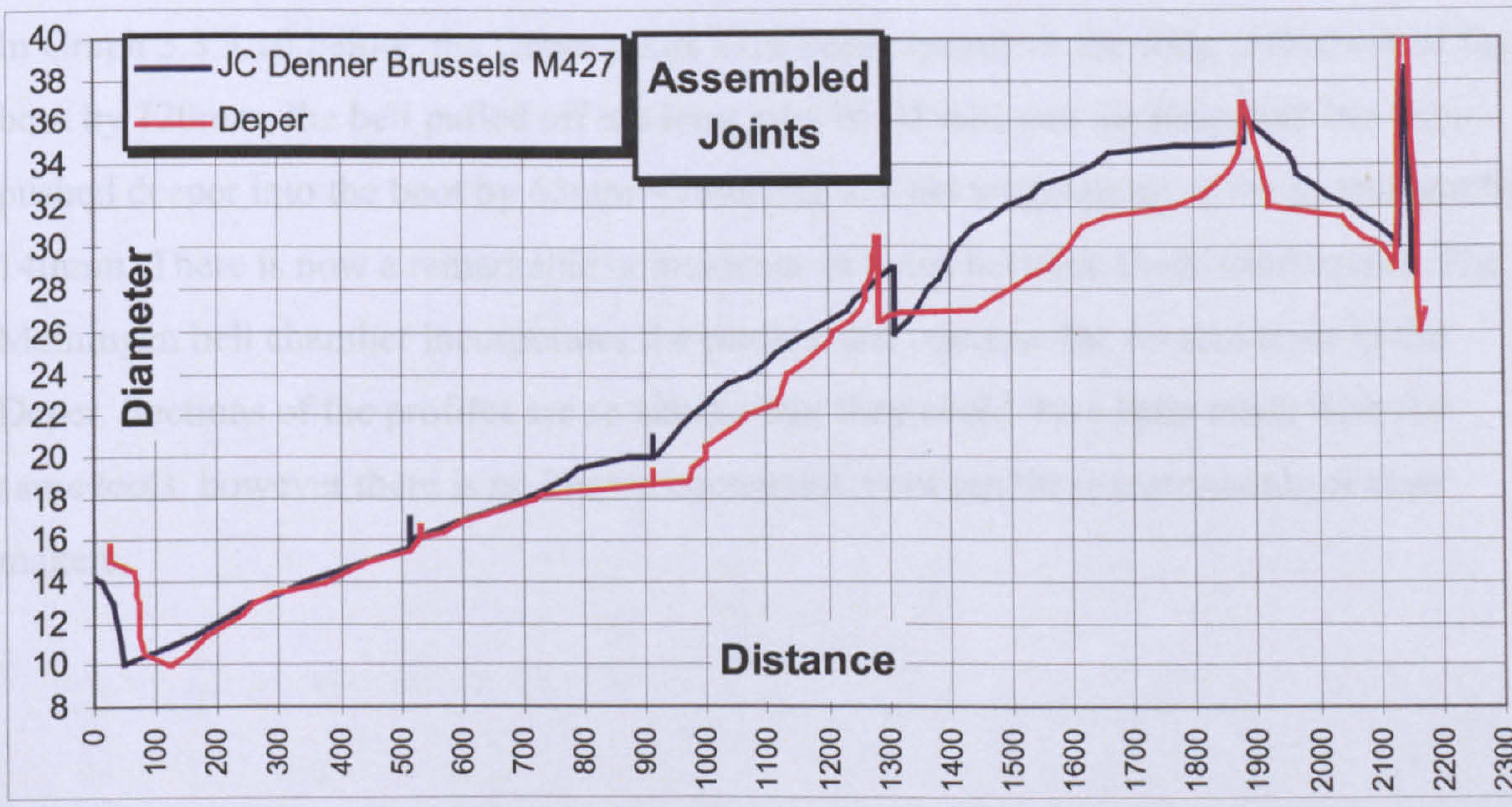
style; the baluster has a horn mount on the top half, with more beads than usual, but this is probably not original.

The <u>long joint</u> has hole XI set at the top, in the Type 1b manner, but with a slight bulge at X. At the south end the diameter is increased in the section below the D-flap mount with a bead just above the tenon making a subtle pedestal.

The <u>bell</u> is less flamboyant than most in type 1, with lower profiles to beads and balusters. It is more German than Dutch in style; the south baluster ogee is not flared but terminates to the north in a series of beads and fillets. The north end baluster is broken up with small beads while the central element is a single, wide astragal. An overall slight reverse taper reflects that of the bore. There is a bell chamber c. 35mm long.

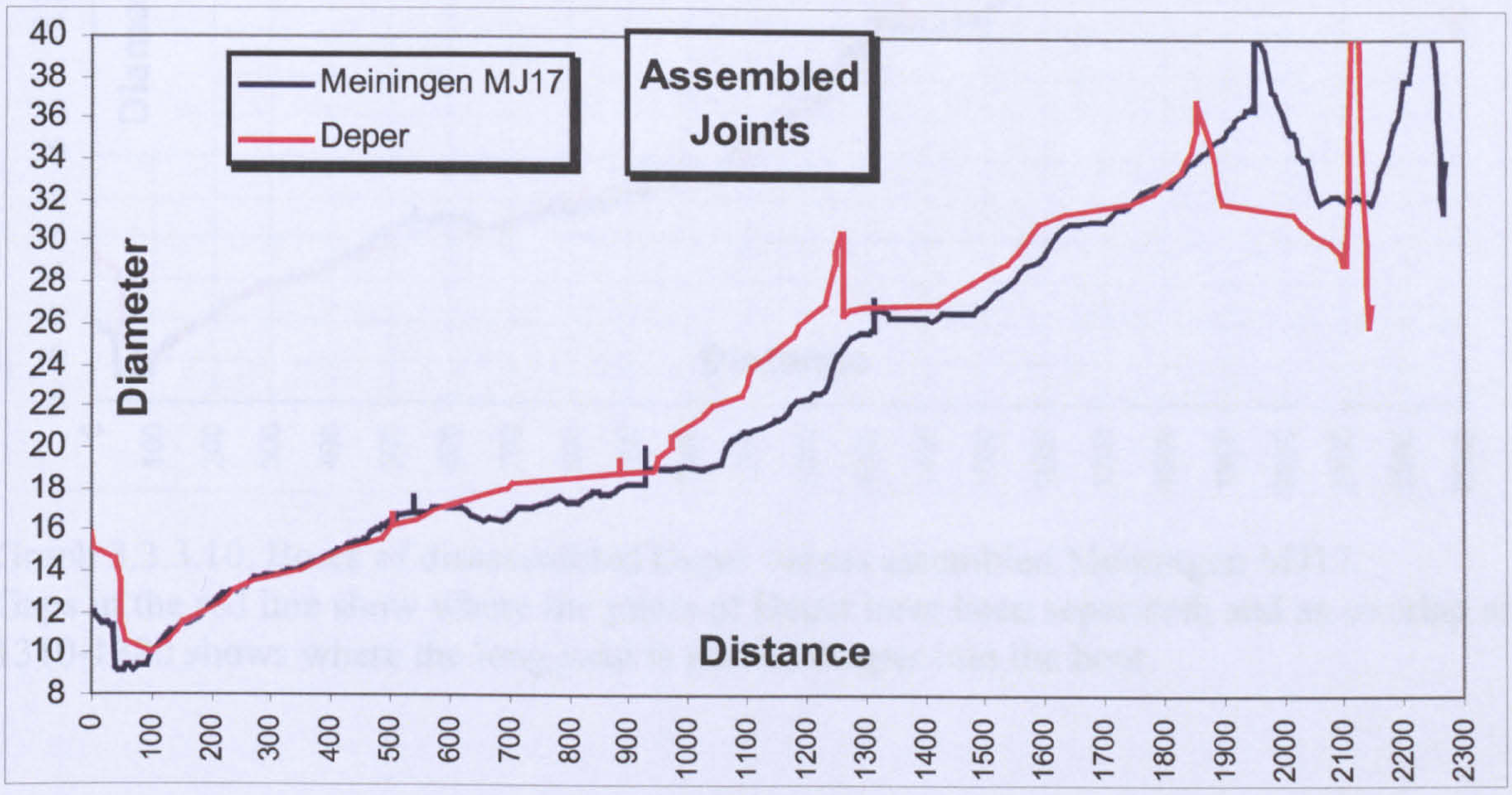
Bore

Noticeable features are the short flares in diameter at the top ends of both the boot up bore and the long joint. The one at top of boot (1230-1280 on the distance scale in Graph 3.3.3.8 below) is particularly short, and is immediately countered by a step down in size to the south end of the long joint. The flare at the top of the long joint (at 1800-1880) is also countered by a steep reverse taper in the bell, so these two features result effectively in two more chambers in the bore.



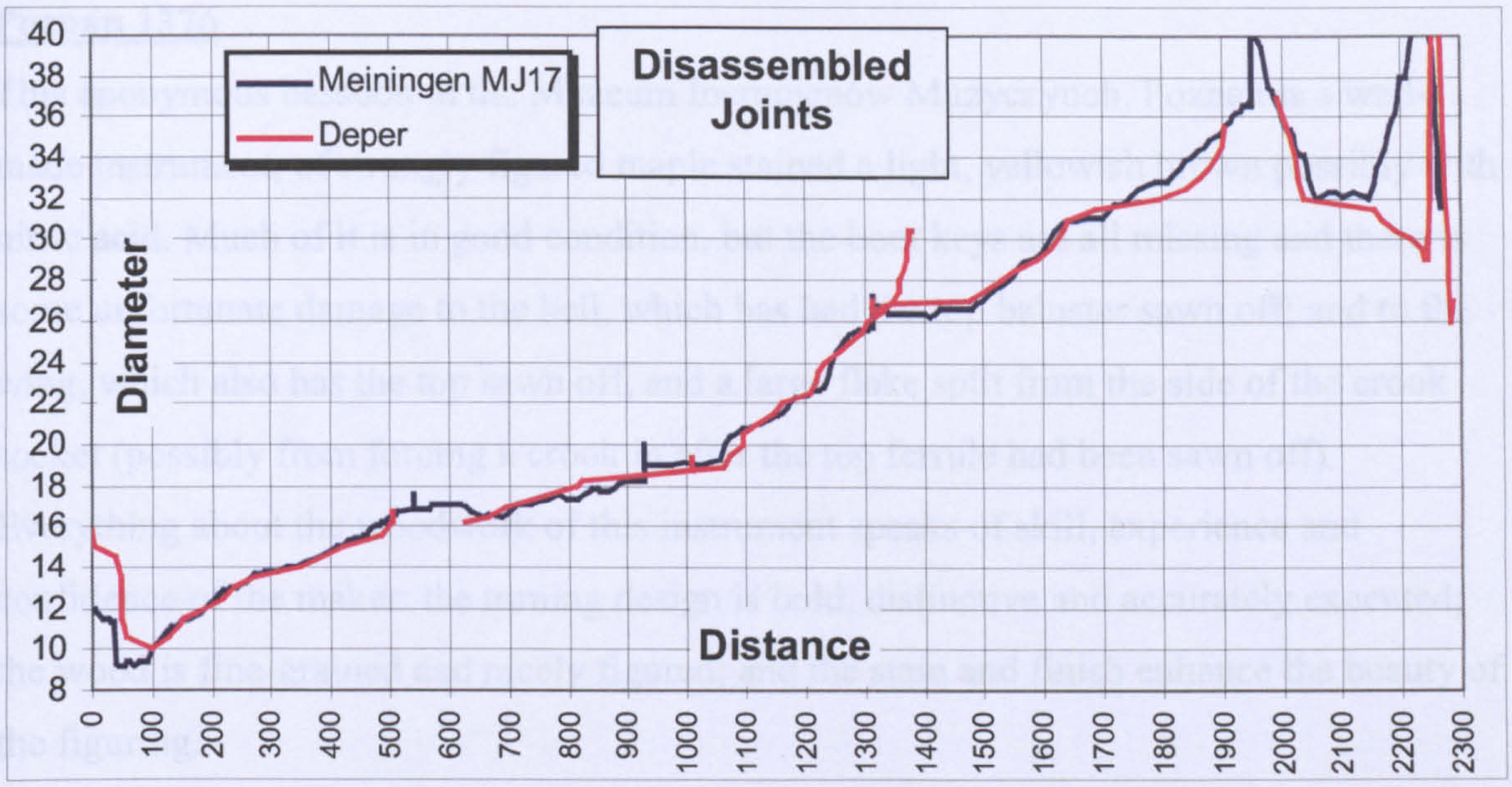
Graph 3.3.3.8. Deper versus Denner, aligned at the boot plug

The reverse taper in the bell puts this instrument into type 1b, but otherwise it shows some similarities particularly with Meiningen MJ17, where the wing joint bores match closely. The boot bores are of similar shape, though the Deper is wider.
The long joints are also close in shape, over the shorter length of the Deper.



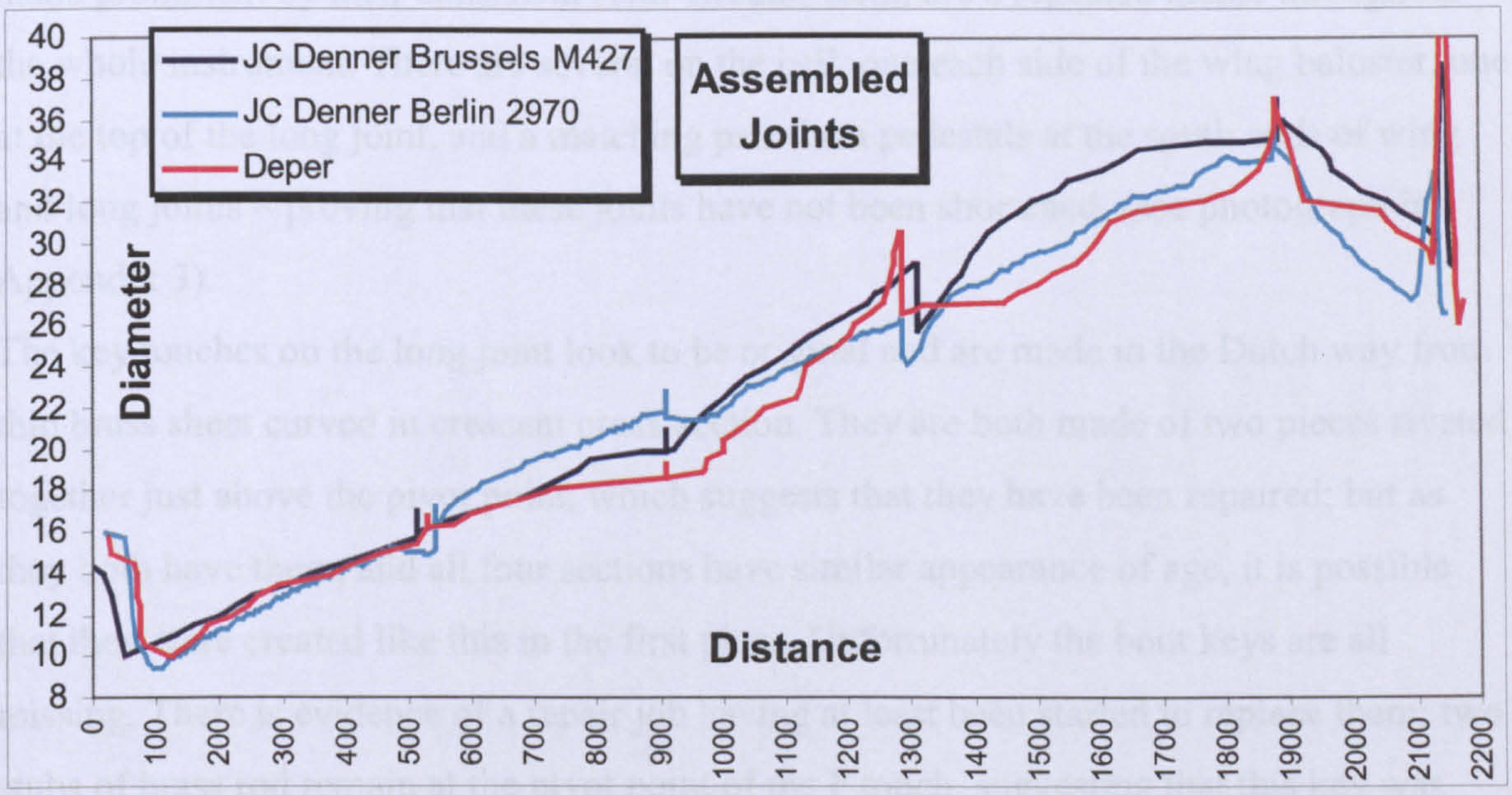
Graph 3.3.3.9. Bore graphs of Deper versus Meiningen MJ17, aligned at wing north end

If the graphs are realigned, it is possible to see the Meiningen instrument as an elongated version of the Deper (or, conversely, the Deper as a shortened version of the Meiningen). In Graph 3.3.3.10 below, the Deper joints have been separated; the wing pulled out of the boot by 120mm; the bell pulled off the long joint by 85mm; and the long joint has been pushed deeper into the boot by 65mm – resulting in a net lengthening of the instrument by 140mm. There is now a remarkable coincidence in bores between these instruments. The Meiningen bell chamber incorporates the portion that contains the reverse taper in the Deper. Sections of the profiles are so similar that they could have been made with the same tools, however there is no known connection between these instruments or their makers.



Graph 3.3.3.10. Bores of disassembled Deper versus assembled Meiningen MJ17. Gaps in the red line show where the joints of Deper have been separated; and an overlap at 1310-1380 shows where the long joint is pushed deeper into the boot.

There are some similarities with Denner instruments, especially in the small bores:



Graph 3.3.3.11. Deper versus J.C. Denner

Poznan 1376

This anonymous bassoon in the Muzeum Insrumenów Muzyczynch, Poznan is a well-made instrument, of strongly figured maple stained a light, yellowish brown possibly with nitric acid. Much of it is in good condition, but the boot keys are all missing and there is some unfortunate damage to the bell, which has had the top baluster sawn off; and to the wing, which also has the top sawn off, and a large flake split from the side of the crook socket (possibly from forcing a crook in after the top ferrule had been sawn off). Everything about the woodwork of this instrument speaks of skill, experience and confidence of the maker: the turning design is bold, distinctive and accurately executed; the wood is fine-grained and nicely figured; and the stain and finish enhance the beauty of the figuring.

Exterior

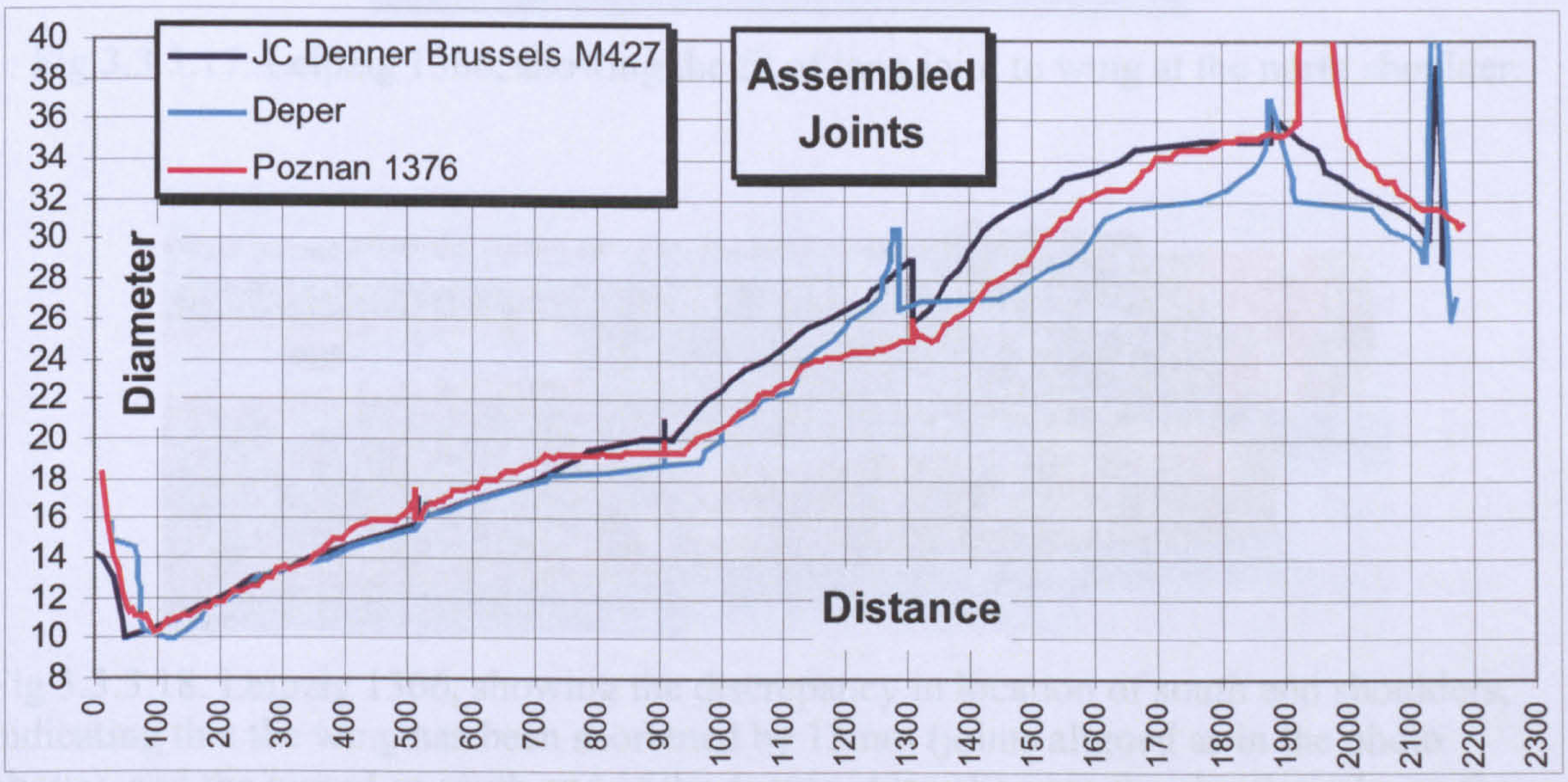
Despite the loss of the top section, the bell is of the usual tripartite design, but here the turner has broken up the waist section of each of the balusters with a further round-beaded astragal. It is at the northern of these that the bell has been sawn off. These small beads, made prominent by their consistent semi-circular form, are a repeated theme throughout the whole instrument. There are several on the bell, one each side of the wing baluster, one at the top of the long joint, and a matching pair form pedestals at the south ends of wing and long joints – proving that these joints have not been shortened, (see photograph in Appendix 3).

The key touches on the long joint look to be original and are made in the Dutch way from thin brass sheet curved in crescent cross-section. They are both made of two pieces riveted together just above the pivot point, which suggests that they have been repaired; but as they both have them, and all four sections have similar appearance of age, it is possible that they were created like this in the first place. Unfortunately the boot keys are all missing. There is evidence of a repair job having at least been started to replace them: two stubs of brass rod remain at the pivot point of the F touch, suggesting that this key was originally mounted with J.C. Denner/D-like axle-staple. Later, two flats have been chiselled across the joint at the pivot positions to enable new key-mounts to be fitted. There is no sign that saddles were let in to the surface, so it seems that this work was never finished. Remaining marks and pin-holes suggest that the G# hole is original rather than part of the re-fit scheme.

Quite why the bell should have been cut off is also unclear; it is not a very effective way to raise the pitch as it would only affect the bottom few notes of the instrument. Perhaps it was damaged in the same accident that broke the wing top end; one can imagine a fall on a hard floor cracking the thinned walls surrounding a bell chamber. But this draws attention to a distinct peculiarity of this instrument – its chamber is in the south end of the bell, just inside from the socket and extending for 60mm.

Bore

The bore is otherwise very much of the 1b type, and this is the instrument that comes next to the large internal diameter in long joint and bell, of the J.C. Denner M427. It also follows the Deper bore closely up to halfway along the boot big bore (1120 on distance scale in the graph below).



Graph 3.3.3.12. Bore profiles of Poznan 1376 versus Denner and Deper

Leipzig 1366

This anonymous bassoon in the Musikinstrumenten Museum der Universität, Leipzig, is a three-keyed bassoon of unusual design; again skilfully made of strongly figured wood. The bell is uniquely shaped, with a long sweeping waist broken by a normal astragal-bead group. Despite the high quality of turning, the removal of parts of the long joint key-mount beads to accommodate the wing has been crudely finished, with chisel marks still visible. However the Bb touch ring has been nicely cut at an angle that neatly accommodates the northern corner of the épaule. This also serves to show that the wing has been shortened: when the épaule shoulder is fitted up to this notch, there is a gap of 13mm between the north end of the tenon and the boot.

The north shoulder of the épaule is of normal form for the type, emerging sharply from the column, but the south shoulder is turned in a hollow curve, almost blending in with the column below. This is an intimation of one of the defining features of the next design type (Type 2); however this maker did not quite finish it off, but left a little step to the column below.

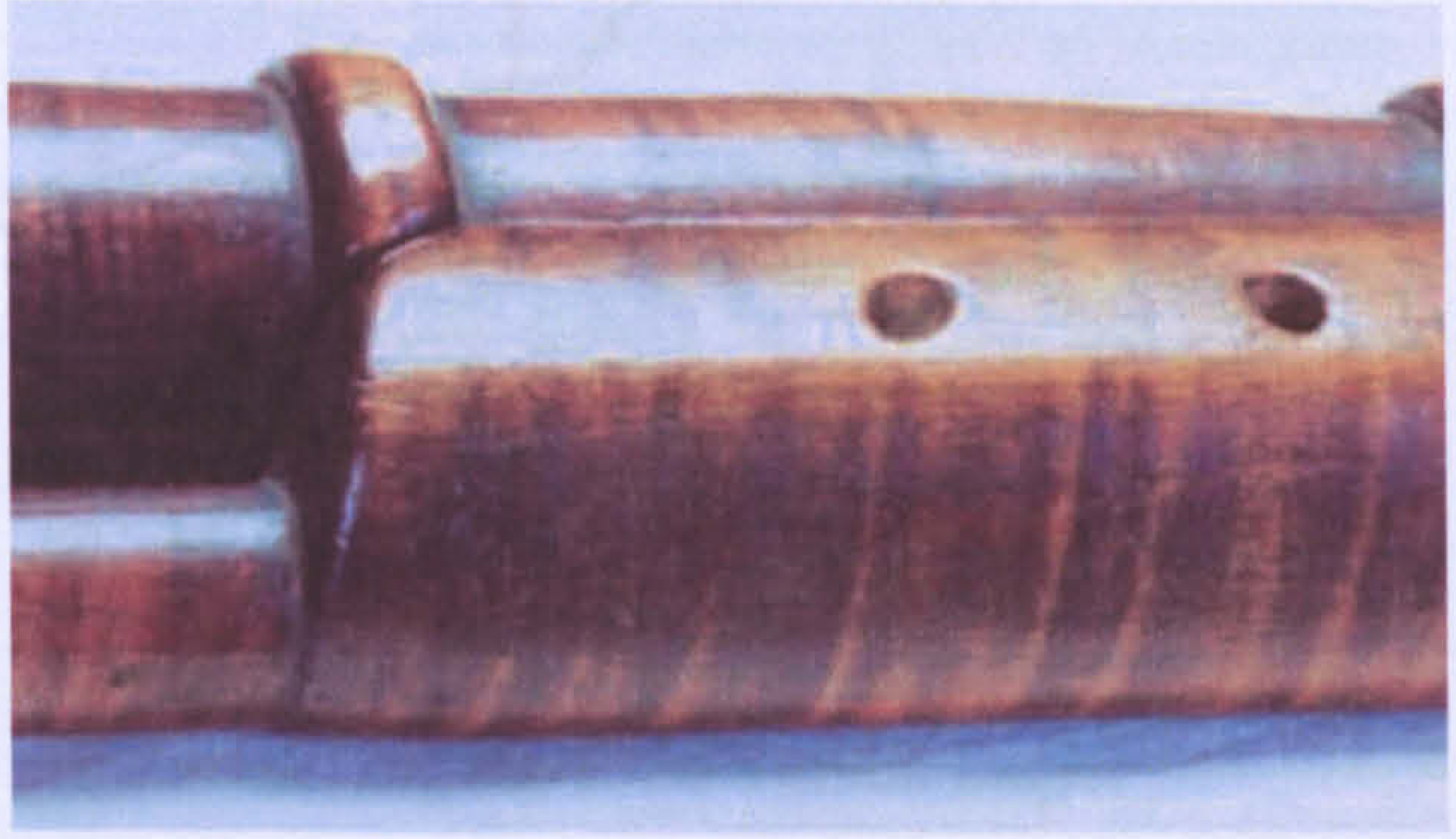


Fig 3.3.3.17. Leipzig 1366, showing the fit of long joint to wing at the north shoulder.

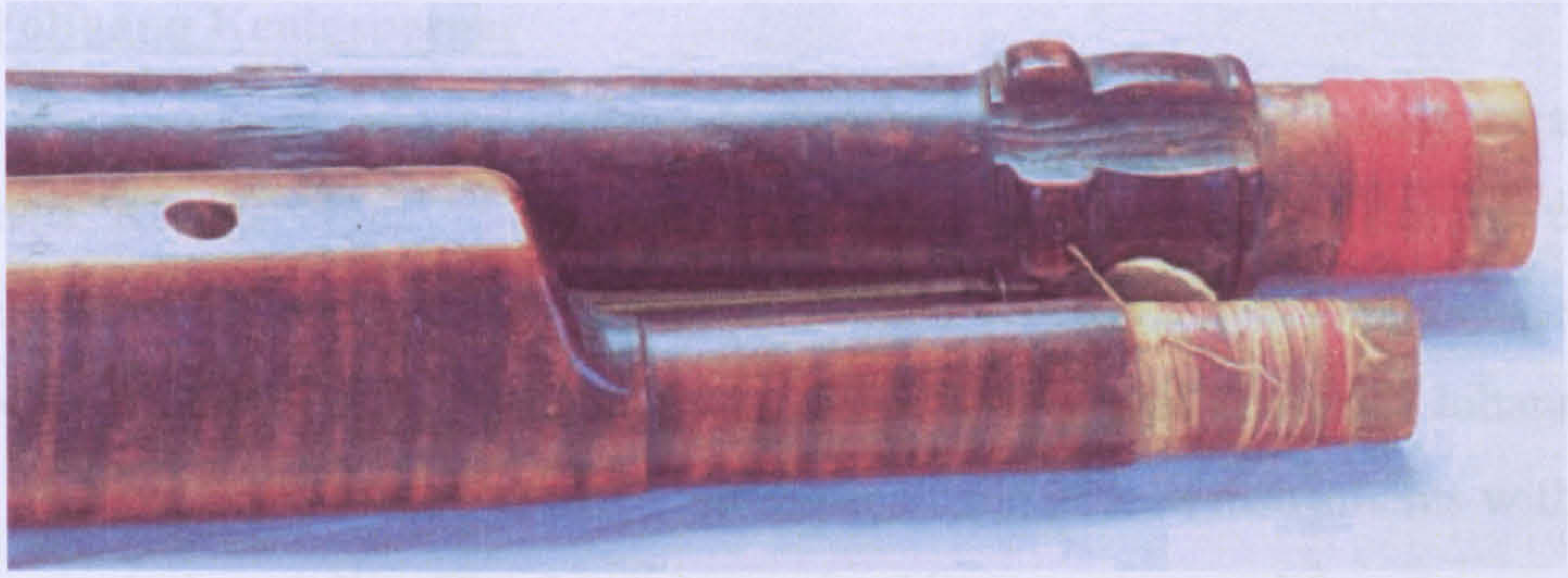
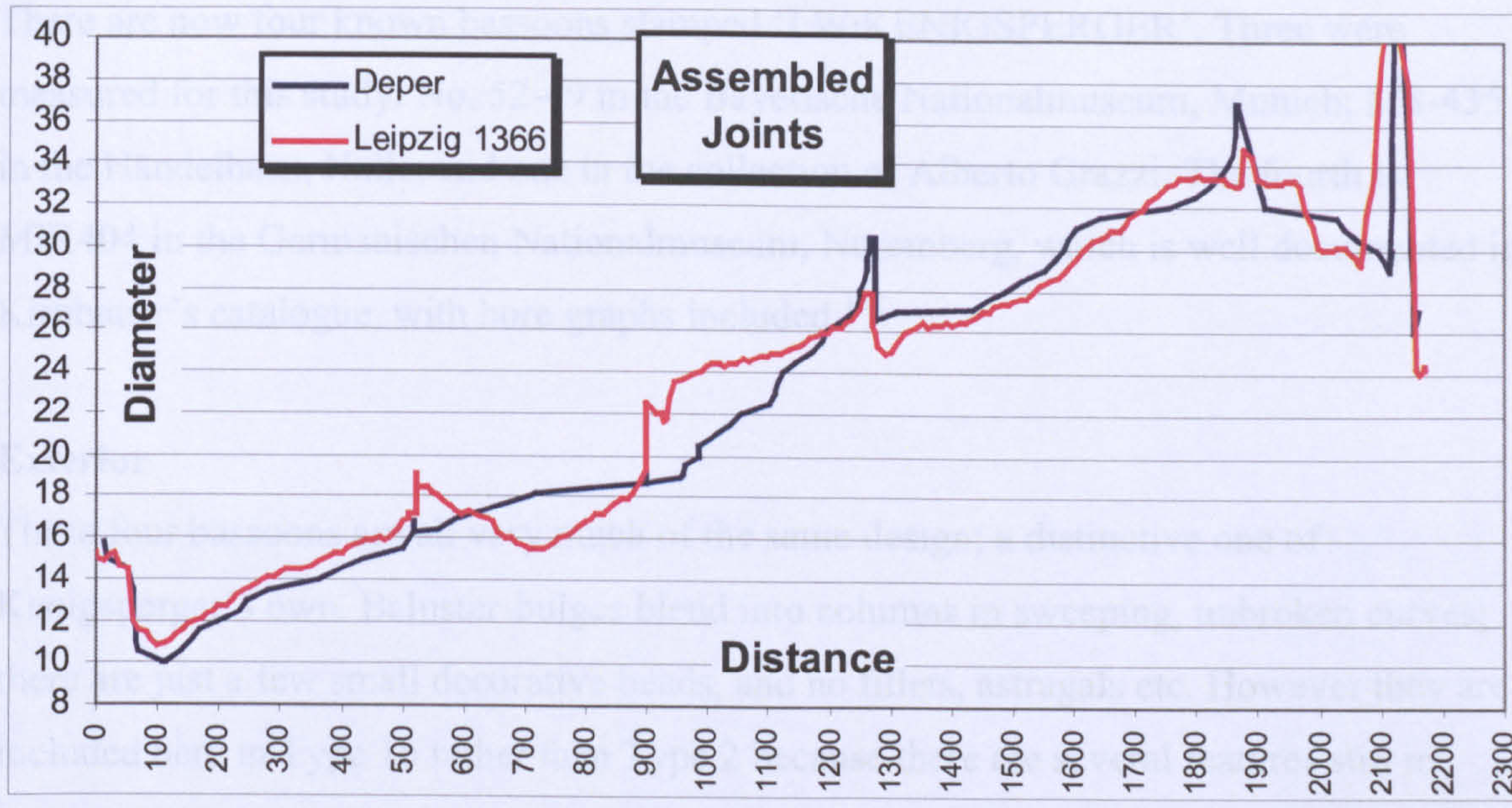


Fig 3.3.3.18. Leipzig 1366, showing the discrepancy in location of south end shoulders, indicating that the wing has been shortened by 13mm (joints aligned as in the photo above), and the turned-in south end of the épaule. Also showing the chisel marks on the long joint where the bead was removed, and gouge marks hollowing the pedestal

The wing top has the short ferrule and baluster of the Dutch style and hole XI is set some way down from the top of the long joint also in that style. The bell, however, has a reverse taper and a chamber 90mm long inside the large bulbous north end.

Bore

The bore is highly unusual in the boot joint: the small bore has an hour-glass shape, restricting in diameter from 18.4 to 15.5mm, then opening out again by the same amount. The two tapers are quite symmetrical and no doubt made with the one reamer inserted from each end. There is a step up to the big bore which then proceeds at a lower taper angle. The wing, long joint and bell are more conventional, and in them there is a distinct correspondence with the Deper design:



Graph 3.3.3.13. Bore graphs of Leipzig 1366 versus Deper

JohannWolfgang Kenigsperger

There are four known woodwind instrument-making members of the family usually referred to as 'Königsberger'.[159] The three from whom instruments still survive each spelt their family name differently on their stamps: Johann Wolfgang stamped his bassoons 'I·W·KENIGSPERGER' so I refer to him this way. Both he and his father Johann Andreas (stamped 'A·KINIGSPERGR') seem to have specialised in reed instruments with tenor oboes a particular speciality. The father is survived by one oboe and four tenors; Johann Wolfgang by one oboe, two oboes d'amore, three tenors and four bassoons, and also two recorders and one clarinet. His son Franz (stamped 'F·KONIGSPERGER') seems to have moved further into single reeds, being survived by one clarinet d'amore, one basset horn, and one bassoon.[160]

Johann Andreas was described as a bassoon player ('*Fagott Pfeiffer*') in 1699, when he arrived in Roding from Kirchenrohrbach, and again in a document of 1708. He died in Roding (120 Km east and a little south of Nuremberg) between 1753 and 1757. Johann Wolfgang's birth date is not known, but he died in Roding in 1752.[161]

159 Waterhouse, *NLI*, p. 211.
160 Young, *HWI*, pp. 129, 130, 139.
161 Waterhouse, *NLI*, p. 211.

There are now four known bassoons stamped 'I·W·KENIGSPERGER'. Three were measured for this study: No. 52-49 in the Bayerische Nationalmuseum, Munich; MS-435 in the Händelhaus, Halle; and one in the collection of Alberto Grazzi. The fourth is MIR404 in the Germanischen Nationalmuseum, Nuremberg, which is well documented in Kirnbauer's catalogue, with bore graphs included.[162]

Exterior

These four bassoons are all very much of the same design; a distinctive one of Kenigsperger's own. Baluster-bulges blend into columns in sweeping, unbroken curves; there are just a few small decorative beads, and no fillets, astragals etc. However they are included here in Type 1b rather than Type 2 because there are several features still in keeping with this type:

The épaule stands out as a separate section from the wing column, although the shoulders are not entirely 'hard'; that is, they are to some extent blended in to the column but by a very tight radius, and not the long gentle curve of later styles.

There is still an inverted-baluster like bulge at the top of the wing below a brass ferrule and tiny bead, though it blends without interruption into the column.

The long joint is fully turned; keys are mounted in turned beads, though these are cut away for 70% of the circumference to accommodate the wing and to make a smooth surface opposite the keys. At the top of this joint too, Kenigsperger has added a baluster–bulge, again terminated with a small bead to match the wing.

The bell has just a few very subtle beads at the north end, and one at the south, just above the ferrule; but the large bulbous north end, enclosing a bore chamber, fits with Type 1.

The apparent simplicity of this design is not an excuse for a lack of turning ability; these instruments are carefully and precisely made. It is noteworthy that both his oboes and tenor oboes, which follow the designs of his father Andreas, are at least as heavily decorated with skilled turnery as those of any of his contemporaries, perhaps even more so.[163] So Kenigsperger had invented his own variant bassoon design within the Type 1 tradition, while keeping to his father's designs for oboes. All four bassoons are of fine, highly figured maple; perhaps chosen to offset the simplicity of the turned form.

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[162] Kirnbauer, *Verzeichnis*, pp. 180-183.

[163] Photographs of a tenor oboe by J.W.K can be found in Young, *LoM*, p. 94 and one by J.A.K in Kirnbauer, *Verseichnis*, pp. 153-155.

Kenigsperger's skilled craftsmanship is demonstrated by his épaule design, which wraps around the long joint at the back as well as on the fingerhole side, closely fitting to the long joint for about a third of the circumference. The long joint key-mount rings are cut off sharply, to form small steps, so that the pronounced ridge on the back side of the wing butts against them. In all it is a very precise arrangement whereby the long joint and wing almost lock together when fitted into the boot.

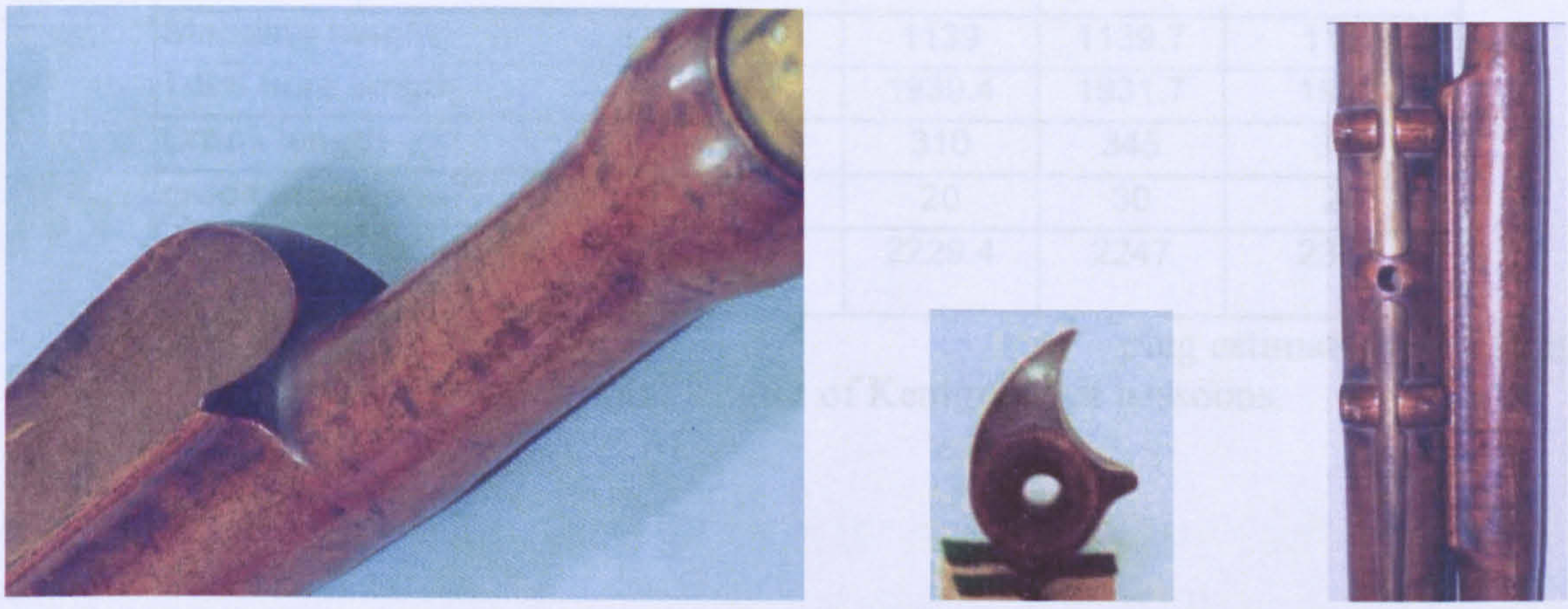


Fig 3.3.3.19. Händelhaus MS-435: Left: north épaule shoulder showing the small radius to the column and flush-trimming to the column on the opposite side, also the baluster and small bead below the ferrule. Middle: cross-section showing ridge on the back side. Right: how the épaule fits to the long joint when the bassoon is assembled

The keys, too, are well made. The flaps and F touch are shapes that he used on his oboes and that come from his father Andreas; [164] the long joint touches are a simple but elegant match.[165]

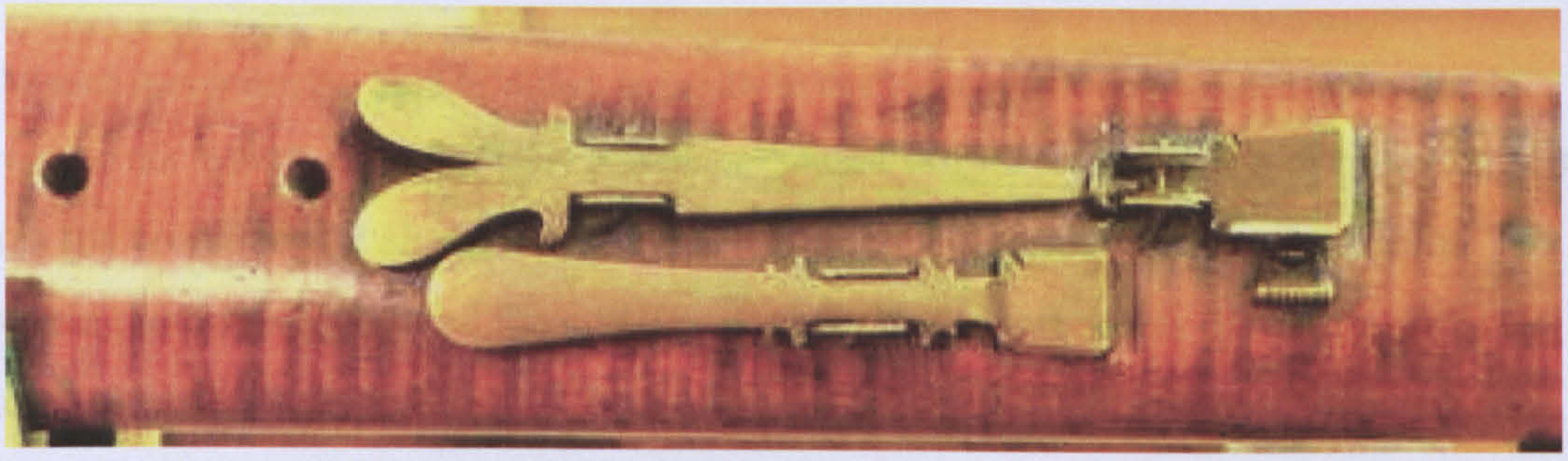


Fig 3.3.3.20. Boot keys of Grazzi Kenigsperger, the only one with an original G# key, showing the highly figured maple wood used for all of his bassoons

Another notable feature of these instruments is that they are all small in size, standing at just 1140mm high, compared to the Denners' 1260/1195mm.

[164] Type 'AK' in Young, *HWI*, p. xxxiii.

[165] The touch patterns are shown in Herbert Heyde, *Katalog zu den Sammlungen des Händel-Hauses in Halle* (Halle: Halle an der Saale, 1980), they are numbers 54 and 60 on p. 140.

		J.W. Kenigsperger			
		Halle	Munich	Grazzi	Nuremberg
		MS-435	52-49		MIR 404
Boot	OAL	402	398	404	406.5
	top to plug	381	388	387	388*
Wing	OAL	462	464	463.2	
	ex Tenon	423	422.6	422	421.5
Long	OAL	523	529	522.5	
	ex Tenon	457	460	455.7	456.5
Bell	OAL	284	281	280	326
Standing height		1143	1139	1139.7	1189
Total bore length		1926	1939.4	1931.7	1980*
Crook length			310	345	372
crook insertions[166]			20	30	25
Bore length including crook			2229.4	2247	2327*

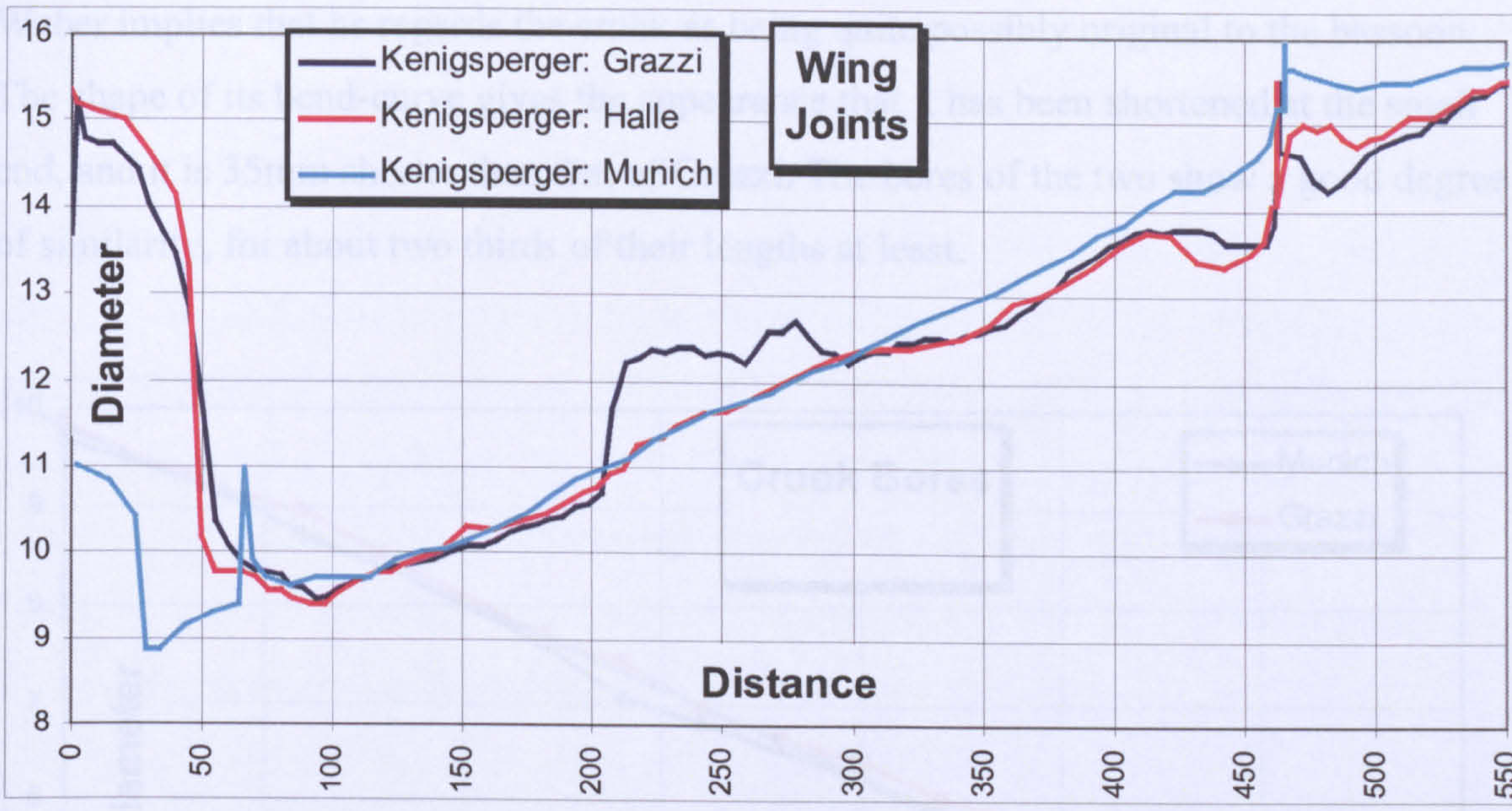
*plug estimated at 18.5 thick

Table 3.3.3.2. Joint lengths of Kenigsperger bassoons.

The Grazzi exemplar has an associated crook that is certainly old and could well be the instrument's original. It is 345mm long, and with it the bassoon plays at around A=460 Hz. The one in Munich also has a crook, of 310mm, but that may not be original or may not be in original condition; the toneholes of that instrument have been modified (discussed below), so the fact that that it too plays around A=460 Hz is misleading. The Nuremberg instrument has a possibly original crook all of 372mm, in addition to its elongated bell, but there is no report of the pitch at which it plays.

The Munich instrument has been modified, unusually in this instance to lower the pitch it plays at; an intervention not found in any of the other bassoons examined. An insert in the top of the wing joint makes the crook socket shallower, thus increasing the effective length of the joint. The measuring tool has registered the small gap where this insert meets the original socket-bottom, as can be seen in Graph 3.3.3.14 below (between 60-70 on the Distance scale):

[166] These are as the thread bindings currently present allow the crooks to fit into their sockets.



Graph 3.3.3.14. Bore profiles of Kenigsperger bassoon wing joints

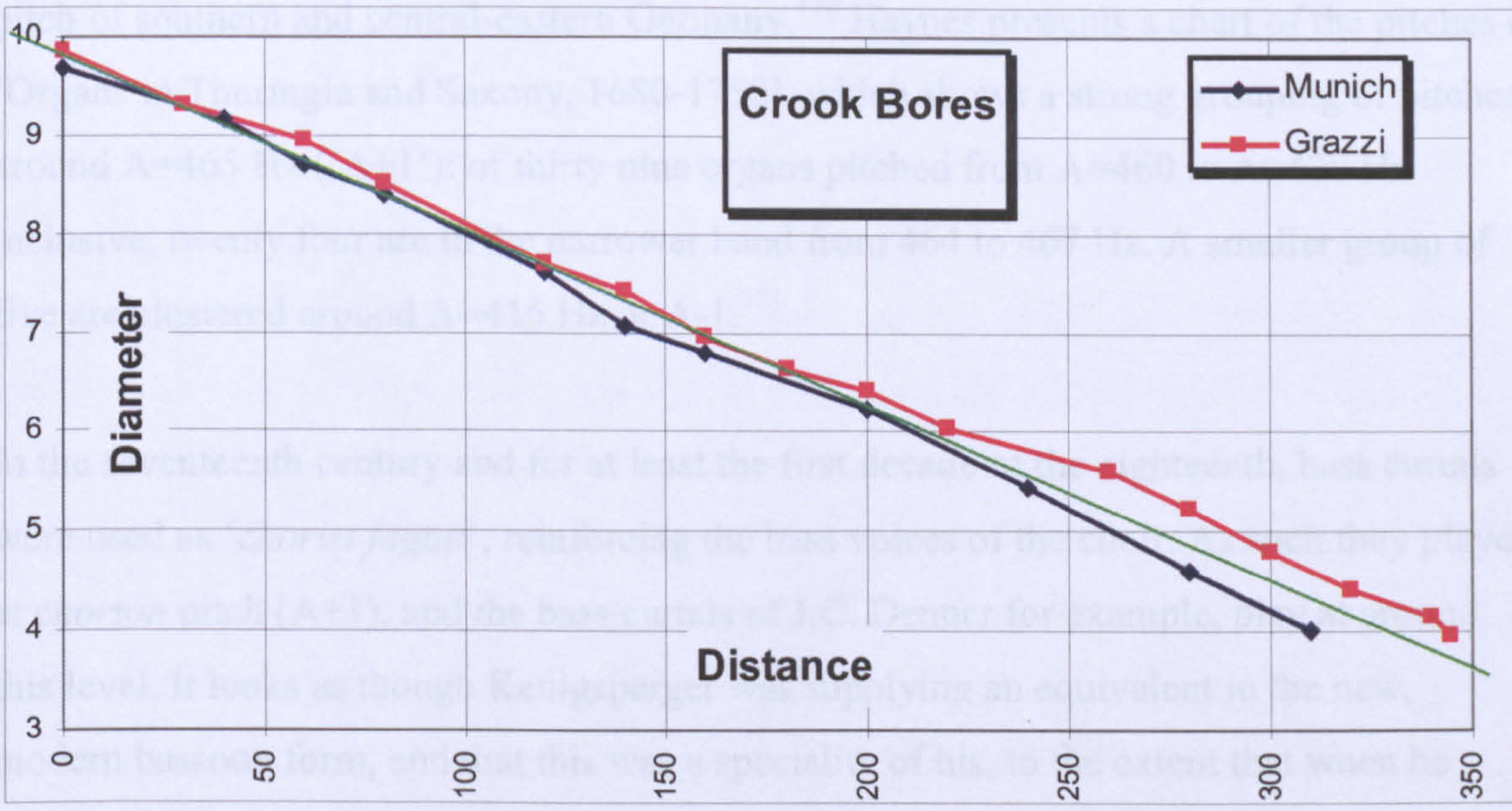
The graph also shows that the bore may have been re-reamed as it now forms an almost straight taper from the narrowest point to the south end (the right side on the graph) and there is very little shrinkage at the tenon.

The museum holds a report by Rainer Weber in which he describes three other interventions also designed to lower the pitch.[167] 1) The septum has been lengthened with a strip of iron to bring the window further south; the north edge is now 27mm from the south end of the boot. The septum was cut away northwards to make a strong mount for this strip. 2) The (replacement) oval wooden plug is only 8mm thick. 3) Some of the toneholes have been made smaller. Weber reports that in the current state the instrument plays at around A=460 Hz.

Toneholes II and IV have been filled (partially) and then re-drilled at different angles: II now very steeply southwards; and IV also heads south, whereas it was originally at about 0 degrees. The filling was not always complete, so that the measuring instrument used to locate the internal edges of toneholes has found the edges of both old and new holes. That is why the opening into the bore of tonehole II looks so long on the wing joint graph for this instrument.

[167] Rainer Weber, *Sie wünschten noch einen kurzen Bericht über den Zustand des Fagottes von Kenigsperger, Nr. 52-49*. Report in the files of Bayerische Nationalmuseum, Munich.

Weber implies that he regards the crook as being quite possibly original to the bassoon. The shape of its bend-curve gives the appearance that it has been shortened at the small end, and it is 35mm shorter than that of Grazzi. The bores of the two show a good degree of similarity, for about two thirds of their lengths at least.



Graph 3.3.3.15. Bore profiles of Kenigsperger crooks. Diameters are the mean of measurements made in two axes. The green reference line has a slope of .0176

It is evident that considerable efforts have been applied to the Munich instrument to lower the pitch, but that conversely the crook may have been shortened. It also has a G# key added, which, by its styling and placement, appears to have been made sometime after 1800.[168]

The Halle bassoon does not have a crook associated with it, and playing was not permitted.

The Nuremberg exemplar has a very long crook, of 372mm and, as previously mentioned, an elongated bell.[169] If the crook is original then these appear to be adaptations by Kenigsperger of his standard model, intended to lower the pitch. The difference in total bore length, including crook, between the Grazzi instrument and this one is about 80mm,

[168] The placing of the Ab tonehole below that of the F key is a distinctly later feature, likely to be from somewhere between 1800-1830.
[169] The bell is marked with Kenigsperger's always deeply impressed stamp, though is not made of the same highly figured wood.

enough to make a pitch difference of around 60 cents on the lowest note; rather less than a semitone.

Leaving aside the Nuremberg instrument for now, there are three bassoons all very much alike and all playing at around a semitone above modern pitch; this is around the *chorton* pitch of southern and central-eastern Germany.[170] Haynes presents a chart of the pitches of 'Organs in Thuringia and Saxony, 1680-1750', which shows a strong grouping of pitches around A=465 Hz ('A+1'): of thirty nine organs pitched from A=460 to A=470 Hz inclusive, twenty four are in the narrower band from 464 to 467 Hz. A smaller group of five are clustered around A=415 Hz or A-1.[171]

In the seventeenth century and for at least the first decade of the eighteenth, bass curtals were used as '*chorist fagott*', reinforcing the bass voices of the choir. As such they played at *chorton* pitch (A+1), and the bass curtals of J.C. Denner for example, play at around this level. It looks as though Kenigsperger was supplying an equivalent in the new, modern bassoon form, and that this was a speciality of his, to the extent that when he needed to make a lower pitch bassoon he simply extended his standard model by substituting a longer bell and crook.

Kenigsperger made other instruments at high pitch too. A total of seven tenor oboes made by father and son are listed by Young.[172] They fall into two distinct size groups: the total assembled lengths (excluding staples and reeds) of the first group range from 703.5mm to 715mm, (there are two by each maker in this group). The second group has one by each maker at 820mm long (with another, by Andreas at 795mm but this is altered or possibly an assemblage of parts of two different oboes).[173] That is two consistent groups differing in length by around 110mm which, on an instrument of this size, is enough to make a pitch difference of at least two semitones; the difference between A-1 and A+1. So it seems that both father and son made tenor oboes in two sizes to play at *chorton* and *cammerton* pitches.

[170] A photograph in the Waterhouse/Langwill collection shows one further bassoon standing alongside Nuremberg MIR404, but with a shorter bell looking like the three Kenigspergers measured here.
[171] Haynes, *HoPP,* p.403.
[172] Young, *HWI*, pp. 129-130.
[173] Young no. 4 (*HWI* p.130) was examined at Christie's auction house in 1988 as was Young no. 3 by J.W.K. See also the report on the sale: Graham Wells, 'Salerooms' *Early Music*, 15.3 (1988), 411-414, (p.411).

The provenance of the Grazzi instrument, which was said by the vendor to have previously belonged to an old Venetian family, suggests it may have been put to quite different use. If so it is a unique very exciting find. Bassoonists, especially players of 'period' instruments have long wondered what bassoons were being played in Venice in Vivaldi's time, for which his thirty-two concerti and many virtuosic chamber parts were written. The only Italian woodwind instrument maker of that time that we know about is J.M. Anciuti, who worked from before 1709 to after 1740 and is thought to be the first Italian to make the new baroque instruments. Although he is known to have worked in Milan, some of his instruments appear to have been made for Venice as they are stamped with St Mark's Lion.[174] However the only known surviving bassoon by him is a contrabassoon; a very interesting instrument, with a dragon's head for the bell and innovative keywork, but not much help in answering the Vivaldi question. Carlo Palanca (1688/90 to 1783) is another possibility, he was bassonist at the Royal Chapel of Turin from 1719-70. However the two bassoons of his that survive are both of later style.[175] It is known that there was a good deal of trade and cultural exchange between southern Germany and northern Italy at this time, so the suspicion is that Bavarian or Saxon instrument makers may well have supplied any bassoons that were played in Venice in Vivaldi's time.

However the Grazzi bassoon does not fulfil the preconceptions that have been built up in recent years for what such an instrument should be like. There have been many period instrument performances of Vivaldi's music at today's 'baroque pitch' standard of A=415Hz (A-1) but some evidence points to a higher performing pitch in Venice in his time. So recently some period instrument bands have played and recorded at A=440Hz (A+0), including performances of oboe and bassoon concerti.[176] The search has therefore been on for oboes, flutes, recorders and bassoons playing at this pitch, from which to make copies. The first three are relatively easily supplied amongst the works of Anciuti and Palanca, but the bassoons so far used seem based on more dubious origins. However this Kenigsperger is not going to fill the gap because it plays another semitone higher.

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[174] Waterhouse, *NLI*, p. 8.

[175] The Eb key on one looks original and more keys have been added to both. Palanca was active for such a long time that it is difficult to date the manufacture of his instruments with any accuracy.

[176] Sonatori de la Gioiosa Marca, Sergio Azzolini and Hans Peter Westerman, '*Vivaldi: Concerti per fagotto e oboe*' (Vivaldi Edition), Naïve B00027LD5M, August 17 2004.

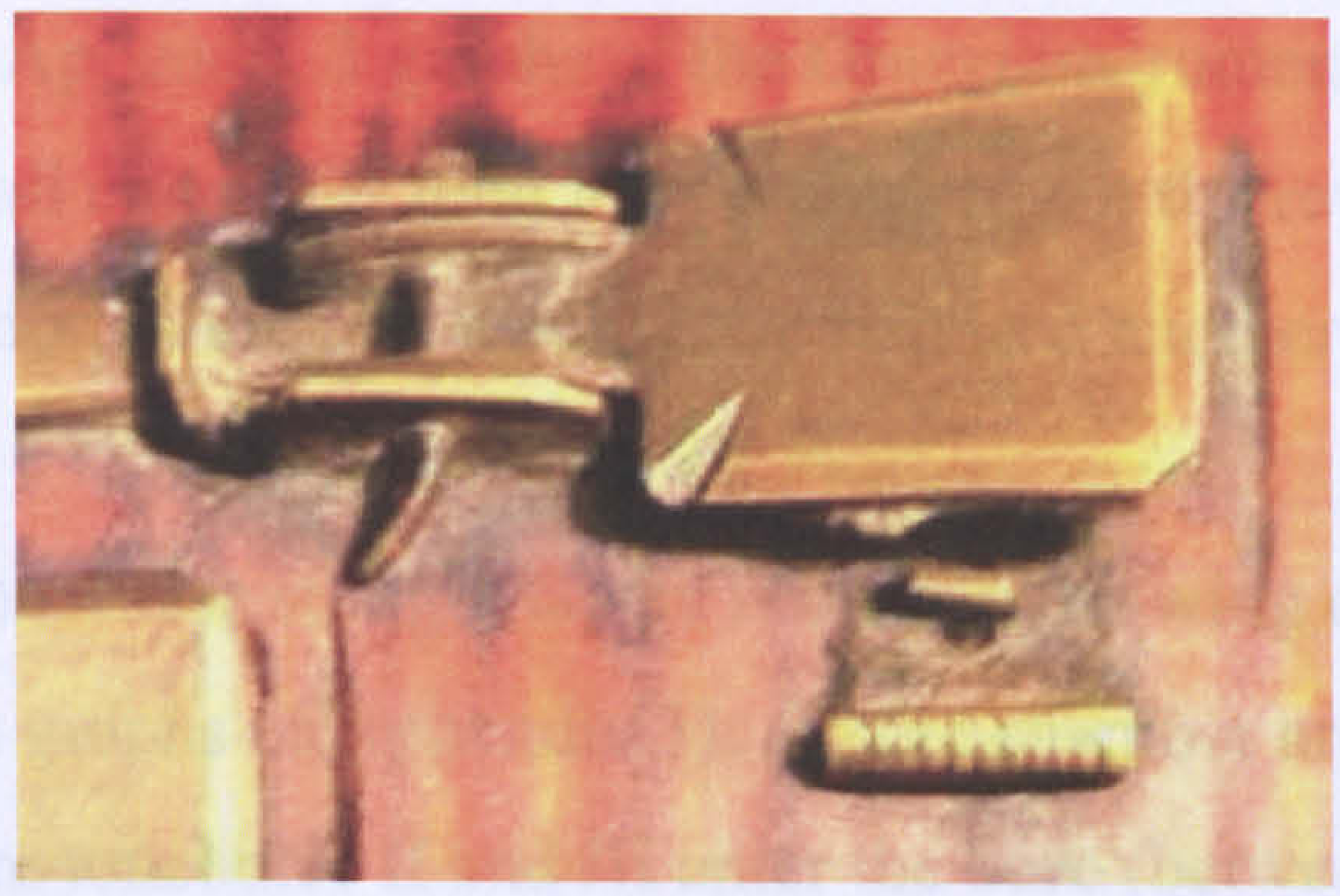
Haynes collates the evidence regarding playing pitches in Venice for the period in question. He states that 'Players of the new French woodwinds arrived in Venice by the 1690s against a backdrop of three pitch standards that had been common there:... A+1,... A+0, and... A-1 (and occasionally A-2)'.[177] He goes on to indicate that the prevailing church organ pitch in the early years of the eighteenth century was A+1, until Pietro Nacchini started to make and to retune organs lower, 'by about a semitone', in the 1740s. But in quoting J.C. Petit from 1740 he shows that, up to this time, the pitch of the opera and of chamber music was 'almost always' a whole tone lower (A-1).[178] Haynes writes that Italian-made woodwinds are found at both A+0 and A-1 with none mentioned at A+1, but it should be noted that the only woodwinds he considers for this work are recorders, flutes (traversos) and clarinets as the pitch of those are determinable with less equivocation than that of double reed instruments. His Graph 34 shows nine Anciuti instruments ranging from A=410 Hz to A=443 Hz.[179]

So there was certainly a Venetian role for this instrument as a *chorist fagott*, playing with the organ at A+1, but the question of whether it might have played the bassoon concerti remains a complex one. From Hayne's evidence, it would seem that a pitch of A-1 is at least as likely to be appropriate as A+0, perhaps more so; and that A+1 cannot be ruled out either, as it was still a prevalent pitch for both singers and instrumentalists.

Grazzi's instrument has three special features that distinguish it from the others by Kenigsperger. Firstly, it is the only one with an original G# key, (see Fig 3.3.3.20). This might be a sign that it was intended for more difficult musical parts than a *chorist fagott* would normally encounter; it might also indicate that this one is made later than the others.

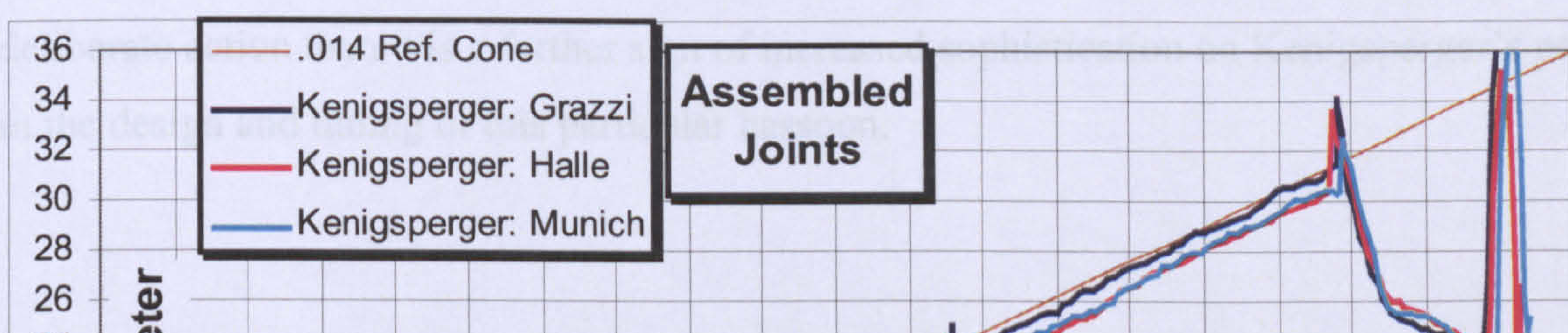
Secondly, there is a curious device for partially covering tonehole VII under the F key; a sliding tab of brass held down with a T-headed pin and having a knurled ridge to grip it by (visible in Fig 3.3.3.20, and more clearly in Fig 3.3.3.21 below). It enables the tuning of G2, G3 and perhaps more importantly the cross-fingered F#2 and F#3 to be adjusted and pre-set at a chosen position. Quite why this was thought to be necessary is not clear, but the device is carefully made, is still secure and allows an airtight seal of the F key.

[177] Haynes, *HoPP*, p.159.
[178] ibid., p.161 para. 2.
[179] Ibid., p.416. It is interesting to note that only three of these still remain in Italy; two recorders at A=413 and 425 Hz and one traverso at A=410 Hz .



3.3.3.21. Grazzi bassoon boot keys and mechanism for adjusting size of hole VII.

The third feature is in the bore of the wing joint. The bores of the three instruments measured are very much alike; each joint is remarkably close to a straight cone, with the long joint and wings being of very similar angle, while the boot small bore is less steep and the boot big bore a little steeper.[180] On Graph 3.3.3.16 below, the brown reference line of .014 slope helps to make this clear. This line also represents approximately the shape of the modern Heckel system bassoon.[181] It is remarkable how close Kenigsperger bassoons (like the Denner B2970) come to the twentieth century (ideal) design. Note, though, that the Kenigsperger crooks have a significantly steeper slope than this, around .0176, as shown in Graph 3.3.3.15.



Graph 3.3.3.16. Bore profiles of Kenigsperger bassoons with .014 taper rate reference.

180 The bores of the top and middle joints of the tenor oboe Young No. 3 are also approximately straight cones, though not matching the tapers found in the bassoons.

181 The Heckel system bassoon is often referred to as having a straight conical bore and if it did have then .014 would be the taper rate of that cone, however actual modern bassoons deviate to greater or lesser extent from this ideal as shown by both Christlieb and Burton.

Also apparent from the Appendix 3 graphs of the Grazzi instrument is how Kenigsperger could have used the small end of his long joint reamer to cut the reverse taper of the bell (though the steeper portion in the bell would have required another reamer).

One major deviation from these straight tapers is seen in the wing of the Grazzi instrument (Graph 3.3.3.14 and the graphs of Appendix 3): a large chamber around the centre of the wing in the region where toneholes II and III enter the bore (between 200 to 300 on the distance scale in the graphs above). The bore is irregular here, and there is greater diameter difference between the two axes measured than in the rest of the bore. Two possible explanations are proposed for this feature:

1) This part of the instrument is particularly susceptible to wetting, with condensation flowing down from the crook and out through the toneholes, so the wood gets softened and may be damaged by repeated wiping out.
2) A secondary reamer or a boring tool has been used to open out the bore Despite the roughness, the diameter in the transverse axis is fairly consistent around (12.3 to 12.4mm), so a parallel-sided reamer/auger with a rounded nose could have been inserted from the south end to make this shape, deliberately stopping just short of where hole I enters the bore.

Interventions of the latter type are discussed in Chapter 5. If this is the result of such deliberate action then it is a further sign of increased sophistication on Kenigsperger's part in the design and tuning of this particular bassoon.

C. Schramme

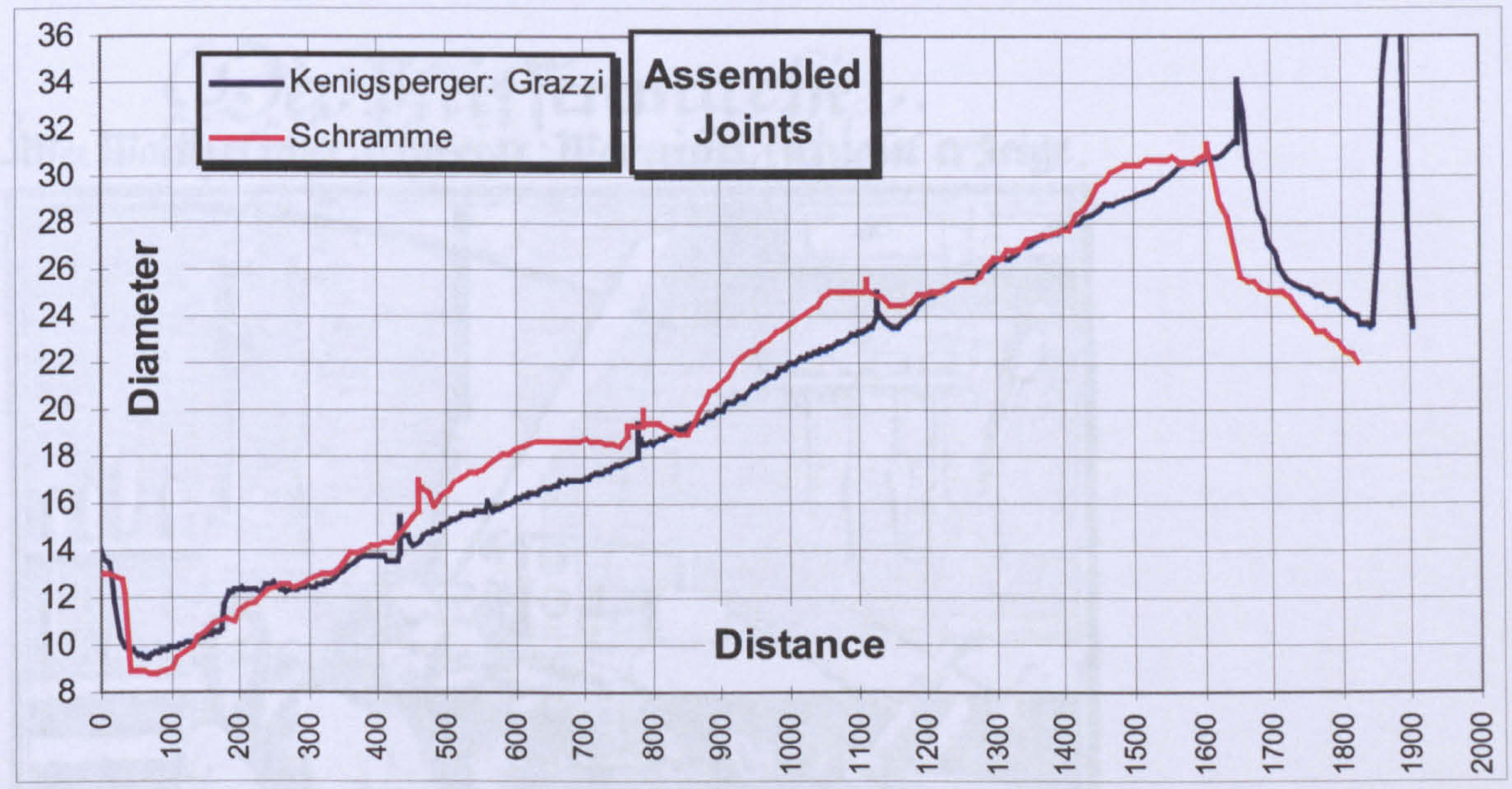
This maker is known only from this bassoon; No. 1374 in the Tschechisches Museum für Musik, Prague, and a bass recorder; No. 1929 in the same museum. The instrument is in very good condition; only the crook and the brass ferrule from the wing are missing.

Exterior

This is another small bassoon, even shorter than the Kenigspergers (standing heights 1046mm versus 1140mm). Like Kenigsperger, Schramme has made an effort to create a distinctive design within the established Type 1b format. However, he has taken the opposite direction, adding further turned decoration to the form by fluting most of the available straight column sections of the wing, long joint and bell, leaving plain only the parts on the long joint where the three toneholes are drilled. This is in addition to the usual beadings, which are made in a strong and confidant manner, though not with the greatest finesse. The wood, possibly pear, has been stained a strong red-brown. The three keys are wide and strong in the touches; the flaps are trapezoidal. The boot plug appears to be made of cedar as for recorder blocks. It is still tightly fitting and quite clearly the original as it is stamped across the plug and boot surface (see photo in Appendix 3).[182] The stamp itself (used on the plug and the joints) is of the reverse type from normal – a rectangular background is impressed into the wood leaving the letters upstanding (also shown in Appendix 3).

Bore

The bore is less regular than the Kenigspergers; the wing and long joints are in the same diameter range as Kenigsperger, but the boot joint bores are of greater volumes. The bell has the same severe reverse taper but in this case without the chamber, ending in a diameter equal to that about halfway up the boot up-bore.



Graph 3.3.3.17. Bore profiles; Kenigsperger versus Schramme, aligned at the boot plugs.

There is no surviving crook, but there was an opportunity to play the instrument using a short crook of 312mm made by Graham Lyndon-Jones. With this it played reasonably well in tune at around A=460 Hz once warmed up, so it is not a tenor as reported in *NLI* but another *chorton*-pitched instrument.[183]

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[182] When we saw this, Graham Lyndon-Jones and I commented on how we had never seen its like before, only to find that the very next instrument that was brought to us had the same. That was the bass curtal stamped with a monogram of AB in a shield. These two instruments are otherwise entirely unrelated.

[183] Waterhouse, *NLI*, p.362.

Iconography

<u>Johann Christoph Weigel and Georg Christoph Eimmart</u>

Weigel was born in Redwig, in Bohemia, in 1654, and died in Nuremberg in 1725. He lived and worked in various cities including Frankfurt, Vienna and Augsburg, then settled in Nuremberg as an engraver and publisher. He published two important illustrations of type 1 bassoons.

The first (already mentioned under J. C. Denner) is the illustration *Pfeiffenmacher* from his *Abbildung der Gemein-Nützlichen Haupt-Stände* (often referred to as his *Standebuch*), published in Regensburg 1698. This work depicts trades and tradespeople, researched at least partly in Nuremberg, devoting a page for each trade, with an illustration and a rhyming text.

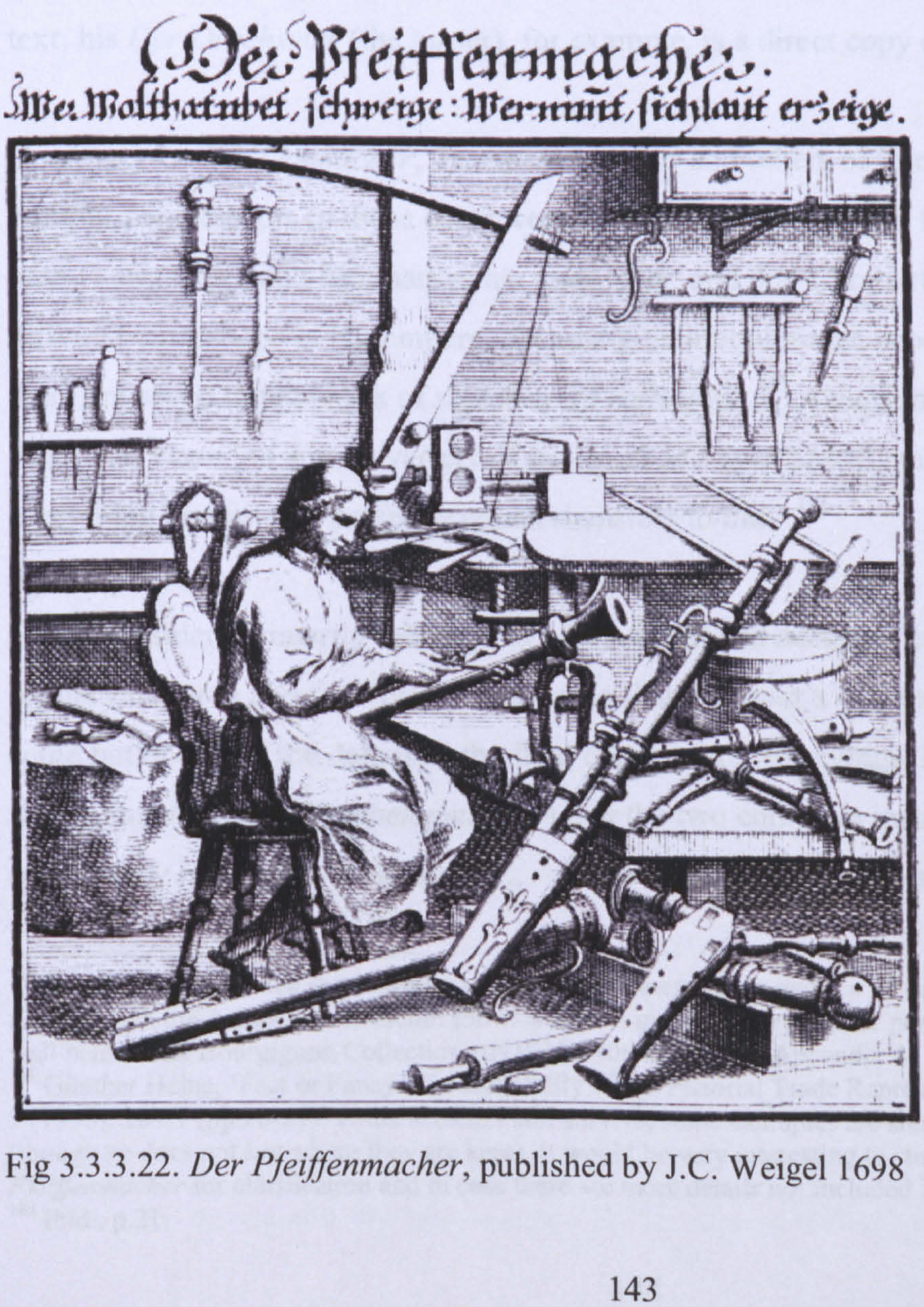

Fig 3.3.3.22. *Der Pfeiffenmacher*, published by J.C. Weigel 1698

We are shown a woodwind instrument maker at work in his workshop, surrounded by tools, equipment, and products of his trade. Dominating the latter is a fine, three-keyed bassoon of type 1. It is particularly interesting in this context because of the clues that the craftsman may be J. C. Denner himself.

Before conclusions are drawn from the wealth of detail here, it is important to understand the context of this illustration. These compositions are designed to depict the tools, products and processes of a trade in a single view, while having some artistic merit in their design; they are not meant to be a complete, life-like view, of photographic accuracy, of man and workshop.

Weigel's work as a whole has several predecessors, including Hans Sachs & Josh Amman, *Eygentliche Beschreibung Aller Stände auff Erden* (1568) and Jan & Caspar Luyken, *Het Menselyk Bedryf* (c. 1690); and the concept can be traced right back to classical times.[184] In several cases Weigel has borrowed directly from the Luykens brothers, including the text; his *Der Drechssler* (the turner), for example, is a direct copy of their *De Draaier*.

However, the *Pfeiffenmacher*, *Trompetenmacher* and others of interest here are original, without predecessors in those other works. Günther Heine reports that Weigel worked with Georg Christoph Eimmart as his researcher, and that Eimmart was sent to 110 different workshops in Nuremberg, sketching their equipment, processes and products; there are seven to ten pages of sketches for each trade.[185] According to Heine, Eimmart was 'well versed in a great variety of technical and mechanical matters, with the result that everything he saw was perfectly comprehensible to him'.[186]

Heine considers primarily the ways in which detail and accuracy can be lost between the primary research and final print, concluding that Eimmart's understanding is clear from some but not all of the details in the final copperplate engravings. Barclay complains of the Trumpet maker (*Trompetenmacher*) that the two complete instruments show '... a lack of accuracy in almost every respect ...' while several of the tools and instrument parts are

[184] Greek pots sometimes show similar scenes of craftsmen a their work; a 5th century BC Athenian red-figure cup in the Ashmolean Museum shows a helmet maker in very similar pose, with tools in a rack on the wall behind: Ex Bourgignon Collection AN1896-1908 G.267, see Appendix 4.
[185] Günther Heine, 'Fact or Fancy: The Reliability of old Pictorial Trade Representations', *Tools and Trades*, 9 (1996), 20-27 (pp.20-27). These sketches still survive, some examples are shown in Heine's article (though he does not say where they are kept). It would be very interesting to study those of the *Pfeiffenmacher* for clarification and in case there are more details not included in the engraving.
[186] Ibid., p.21

well rendered.[187] Although some errors are immediately evident, the woodwinds in the *Pfeiffenmacher* look fairly well drawn; several are readily recognisable.

The suggestion that this might be J. C. Denner arises firstly from the circumstances of Eimmart's research (i.e. that he examined Nuremberg workshops specifically), and secondly from some of the instruments shown. In 1698 Denner would have been 43 years old, his oldest son Jacob just 17, so not yet working independently. Although Denner was by no means the only woodwind maker in Nuremberg, he was probably the most celebrated, and at this date at the height of his abilities. The date is two years after he and Schell applied for rights to make the French wind instruments, so the presence in the illustration of both baroque and pre-baroque instruments also fits.

Of the instruments shown, the bass curtal on the floor at his feet is the most telling. It is viewed side-on, so no fingerholes are seen, but the two key-cover-boxes, with their pierced vent holes and protruding touches, are clear and in the correct positions. It has a form of *gedact* or covered bell, of which there exist several different constructions; but this particular one, with the flat-topped wooden cap, pierced with concentric circles of vent holes on the top surface (not seen), and a ring of further holes around the side edge, is unique to J. C. Denner. Four of his five surviving curtals are like that (the fifth one is missing its bell), and none of the same form are known from any other maker.

Behind the bassoon, lying horizontal on the table, is a typical baroque-form, three-piece recorder, of large size. If its proportions are correct relative to the bassoon, it is apparently about 800mm long, so too long for a tenor (c. 580-650mm). J.C. Denner is survived by many bass recorders; of the order of 900-1000mm long, they have a rounded top into which a crook fits. This might be one such, minus its crook (perhaps the crook is that shown hanging on the back wall); or it could just be a disproportionately drawn tenor. Unfortunately the view of where a key might be mounted, which would help its identification, is obstructed by the bassoon.

Lying crossways beneath that recorder is what may be another similar, but the large cylindrical barrel, with short cylindrical portion above that (disappearing under the recorder), may indicate a chalumeau. Doppelmayr reported that Denner produced

[187] Robert Barclay, *The Art of the Trumpet-Maker* (Oxford: Clarendon Press, 1992), p.75.

'improved chalumeaux',[188] and the one surviving example of his matches what can be seen here.[189]

In the same group there are two cornetti, none of which by Denner survive, but Weigel himself reported that he made them.[190] The one instrument that adds nothing to the Denner argument is the double recorder (*flute d'accord*); none made by Denner are known, nor is there any other reference to his having made them. Michel Parent of Amsterdam (1663-1710) claimed to be the inventor,[191] but there are also nine surviving stamped L.Walch, who was one of a large family of woodwind makers in Berchtesgaden.[192] These curious instruments have not been very much studied, but they do seem to have been popular in the eighteenth century and this one is displayed as prominently as the bassoon.[193]

The bassoon and *flute d'accord* may be displayed to the fore because the maker was particularly known for them, or because they are the most complicated and best prove the craftsman's skills. Perhaps they were also the newest designs, together representing the state of the art in woodwind instrument making.

The bassoon is certainly a complex piece of work, and this one is very much like those of the Denner family. Although the proportions are a little distorted, many key features have been faithfully rendered: there are the three groups of mouldings on the bell; and the long joint has prominent beads for mounting the keys (one missing just below the top one), not cut away but left whole, as per the Berlin J.C. Denner instruments. The wing's baluster is overly long, but nonetheless correctly shaped, with more beads below; the épaule overlaps only one long joint bead, just as on the Berlin Denners (the three fingerholes are just visible along the edge). The wing and long joint are shown the correct way around for a normal right-handed instrument and the boot has a large 'swallowtail' key on the centreline below the fingerholes, extending to near the bottom of the joint (so the instrument can still be played left-handed).

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[188] Doppelmayr, 1730 quoted in Waterhouse, *NLI*, p.86.
[189] Bayerischen National Museum Mu 136, illustrated in Albert Rice *The Baroque Clarinet* (Oxford: Clarendon Press 1992), p.30 and Young, *LoM*, p.26.
[190] Waterhouse, *NLI*, p.86.
[191] Waterhouse, *NLI*, p.292.
[192] Young, *HWI*, p.249.
[193] There is an error in the depiction here – the two lines of toneholes should be adjacent to make lateral pairs that can each be covered with one finger.

The main errors are: on the boot one fingerhole is missing and the key is somewhat fanciful; the central petal of this *fleur-de-lys* is too long, blocking the missing hole VI.[194] The crook at its very tip is re-curved upwards – an impossible playing position.

In summary: the curtal, bassoon, large recorder and chalumeau are all instruments that Denner made; surviving examples of his match the designs of those illustrated and his curtals do so exclusively. He is reported to have made cornetti, but not known to have made *flutes d'accord*. His contemporary and co-applicant to the Nuremberg *Rat*, Johann Schell, is survived by a large number of recorders (eighteen listed in *HWI*), but otherwise only one flute and three oboes; information on any other instruments he may have made is lacking. If it is supposed that a master craftsman is depicted, then of the other Nuremberg woodwind makers listed in *NLI*, only J. B. Gahn (made master in 1698) and three little known makers possibly fit the publication date: Felbinger, M. Herbst and J. P. Herbst.[195]

The *pfeiffenmacher* himself holds another belled instrument that is the least detailed or identifiable of the instruments illustrated. It might be an open-belled curtal, again side-on; however the large bead around the base of the bell is not seen on any existing curtal. Perhaps it is a renaissance style basset recorder or an alto shawm, the bead being one of the mounts for a fontanelle. The craftsman's pose is interesting anyway; he has the instrument braced against his midriff and resting on the vice, with his gaze intent upon the upper surface of the instrument where the fingerholes lie. He is delicately holding a slim tool in his right hand, ready for fine work: the implication is that he is at work tuning the instrument; carefully carrying out the subtle adjustments needed to make the difference between a decent instrument and a really good one. This critical work is the province of the master, even if an apprentice or journeyman has had a hand in the instruments' construction.

Weigel's second bassoon illustration, from his *Musicalisches Theatrum*, which Dr Alfred Berner estimates to have been published between 1715 and Weigel's death in 1725, is also now well known.[196] Although Weigel was the engraver and publisher, the original artist is,

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[194] These erroneous features give away another illustration as being, at least in part, copied from this one. That is '*Ein Pfeiffenmacher*', published by Martin Englebrecht, engraved by Michael Rössler, reproduced in Joppig, *The Oboe and Bassoon*, and at: http://lcweb2.loc.gov/diglib/ihas/loc.natlib.miller.0368/default.html.
[195] Waterhouse, *NLI*, p.473.
[196] Johann Christoph Weigel, *Musicalisches Theatrum*, Facsimile reprint, ed. by Alfred Berner. 'Documenta Musicologica, Erste Reihe: Druckschriften-Faksimiles, XXII.' (Cassel & Basel: Bärenreiter, London: Novello, 1961).

in this case, unknown. This is an even better depiction of a Denner style bassoon: the bell has the three groups of mouldings, but here in appropriate proportion on a reverse-tapered column. The long joint has all the beads in the correct places (note no pedestal beads on long or wing). The wing's épaule is correctly placed; the baluster is also appropriately proportioned, and a wooden finial (not a brass ferrule) tops it off. This is a carefully observed rendition; the only oddity being the player's left-handed holding position. The bassoon itself is the correct way around so this is not an accidental reversal by the engraver; it demonstrates one justification for the apparent reluctance of Denner to add the Ab key, to allow this ambidexterity. The oboe player and two recorder players in the series are also shown playing left-handed.

Fig 3.3.3.22: From *Musicalisches Theatrum*, engraved and published by Johann Christoph Weigel c. 1715-1725.

3.4 Type 2

3.4.1 Introduction

In section 3.2 Type 0, it was suggested that a plain-turned form of bassoon existed in France in the 1690s and that it had probably been the style of the first French four-part bassoons proper. It would not be surprising, then, to find that the plain style continued in use in France in the first decades of the eighteenth century, but our pursuit of this is frustrated again by an almost complete lack of examples. Only two bassoon makers in this study might fit the period and place: Bizey worked in Paris from 1716, so started a little later than the first English makers; and Dondeine – a French or Walloon sounding name, not definable as to place or time of origin - is represented by a single bassoon but nothing else is known of him.

However, it appears that the French style was directly passed on to the earliest English makers, who then established a consistent and enduring design style based on that inheritance.

Some of the first Dutch and German makers taking on the new French baroque instruments preferred to make their bassoons in elaborately turned styles of their own devising. In Germany this tendency seemed centred in Thuringia and Nuremberg, where it continued into the second generation. One Nuremberg maker known to have produced bassoons in both styles is Jacob Denner. In other regions of Germany, however, it seems that the ornamented form was never used, and that plain-style bassoons were made contemporaneously with the Nuremberg instruments. The German makers introduced some design characteristics of their own to the plain Type 2, which distinguish their bassoons from the English and the French.

Eventually the ornamental style fell out of favour altogether, as the focus of woodwind making moved from Nuremberg to the free-trade city of Leipzig. It seems that as the numbers of craftsmen taking on making the new woodwinds increased, they established themselves in *freistäde* (free cities), where craftsmen could set up workshops outside the strict controls of the guilds. Of the instrument makers that we now regard as important, either through the quality of their work, their known connections with music making, or their scale of production, more were established in Leipzig than in Nuremberg. However it is difficult to assess to what extent this impression might simply be due to accidents of survival.

The Dutch and Flemish also moved to plain styles, apparently following the French line more than the German though again there are very few examples to go by. Perhaps Thomas Boekhout (1666-c.1717) was announcing this change in style when in 1713 he advertised '*een nieuwe soort van Bassons*' (a new sort of bassoon), but unfortunately we do not have any made by him. [197] In this study only one Flemish instrument, by J.H. Rottenburgh, is examined.

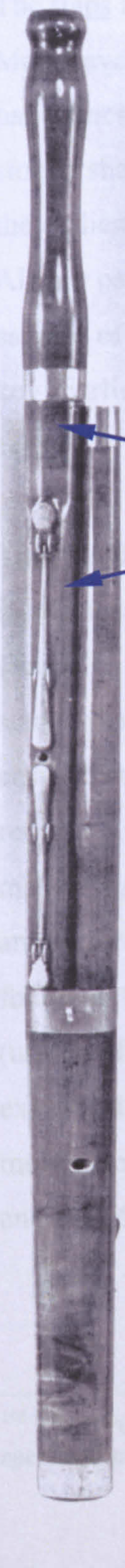
Even the earliest known Type 2 bassoons have the fourth key for G#/Ab. There is only one exception in this study: one of two bassoons by Roth, which is otherwise a curious mixture of styles (although probably German made, it is discussed under Type 2b, with the French and Flemish instruments). Apart from French instruments, the bell bore is always a reverse taper, and in Germany it often contains a chamber toward the north end. This plain-turned, four-keyed style of the baroque period is here called Type 2, but there are distinct, mainly national, subsets here called Type2a for the English, Type 2b for the French, and Type 2c for the German styles (the titles are not absolute as to maker's place of operation). In the classical period following, each of these three subtypes developed in different directions, in such ways that these national styles become more distinct.

[197] Bouterse, *DWIATM*, p.68.

3.4.2 Type 2a: English

Instruments in this section: T. Stanesby, Stanesby Junior, C. Gedney (x2), J.J Schuchart, Millhouse Newark, T. Cahusac.

English bassoon making from the beginning of the eighteenth century to the 1770s is bound by a very consistent design tradition, with several features adhered to by all English makers in contrast to their continental counterparts. This serves to make English bassoons instantly recognisable and distinguishable from continental models.



The features of this English form are:

The bell has a bulbous top of diameter not greater than the central bulge, and length usually around that of its diameter. There are no beads at the top, just a flat face.

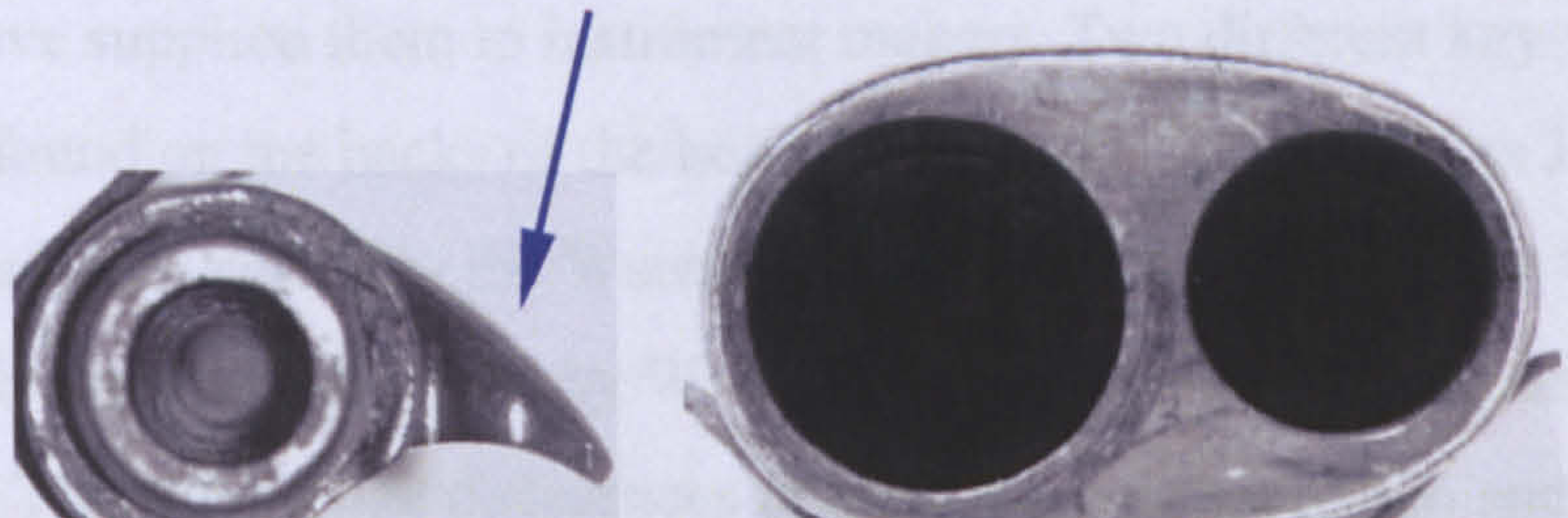
The bell column is not much larger in diameter than the maximum of the long joint.

The brass ferrules are flush-fitting and un-decorated.

The long joint is without beads at either end.

The platform is narrow, with soft corners to tangential, convex sides; simply blended into turned section at north and running right to tenon shoulder at south.

The wing is of simple form: in plan the épaule blends into the relatively stout diameters of the columns. In cross section the épaule is slim and rather delicate.



The boot is relatively slim, with egg-shaped cross section at the north end.

Fig 3.4.2.1. Views of English bassoons. From left: Stanesby Junior back view; épaule cross section; boot end; Millhouse Newark front view.

The keys of all English makers apart from Thomas Stanesby are of a consistent pattern; many of them on instruments by Cahusac, the Milhouses, Stanesby Junior and Gedney, appear to have been made by the same workshop.

The common features of these keys are:

The F, Bb and D key touches and the Ab key are made from sheet rolled into an inverted U cross-section for rigidity; the touch ends are more spread, as are the pad ends of the simple keys. The shanks of two-part keys are rolled fully into a tube at the narrow end.

The flaps are made from thicker, flat sheet, with tabs bent up or soldered on.

Most have a fish- or swallow-tailed F key, as if for use by either hand, despite the handedness being forced by the Ab key. The swallowtail keys have a standard and rather simple shape (Fig. 3.4.2.3 below). Single-sided F keys of similar construction also appear; the earliest is on the Stanesby Junior.

All key parts are mounted in brass saddles screwed down into mortises in the wood. The saddles of the F, Bb and D touches have a tapered channel to fit the tapered shank of the key. Earlier models have a wire pin for the axle, which was later succeeded by a threaded screw.

The rolled key construction is, of course, not new; it is found on the Haka-type instruments discussed under Type 1a. The D and Bb levers of those instruments are quite similar to the English, though the touch ends tend to be cut off more squarely. The standardised shapes and thicker material (about 1.2mm) of the English keys make them easily distinguishable. They appear to have been cold-forged using prepared formers, requiring special skills and tooling, so it is perhaps to be expected that a specialist key maker might have supplied them to instrument makers. Two different key-makers' stamps are sometimes found on the backs of the keys. One is 'I.H.' (identified as John Hale), found on the Gedney bassoon in the Waterhouse collection; and the other 'G', (unidentified), is found on bassoons by W. Milhouse and others, but not on any of those examined here. There are slight differences in form between these two and the 'G' type is more common, though some keys of that design (for example on the Horniman Gedney and the Millhouse Newark) are not stamped.[198]

[198] The attributions of instruments marked 'MILLHOUSE NEWARK' and other variations of 'MILHOUSE...' to specific members of the Milhouse family are not certain. See page 178 for further discussion.

Fig 3.4.2.2. Long joint key from Millhouse Newark, front and back.

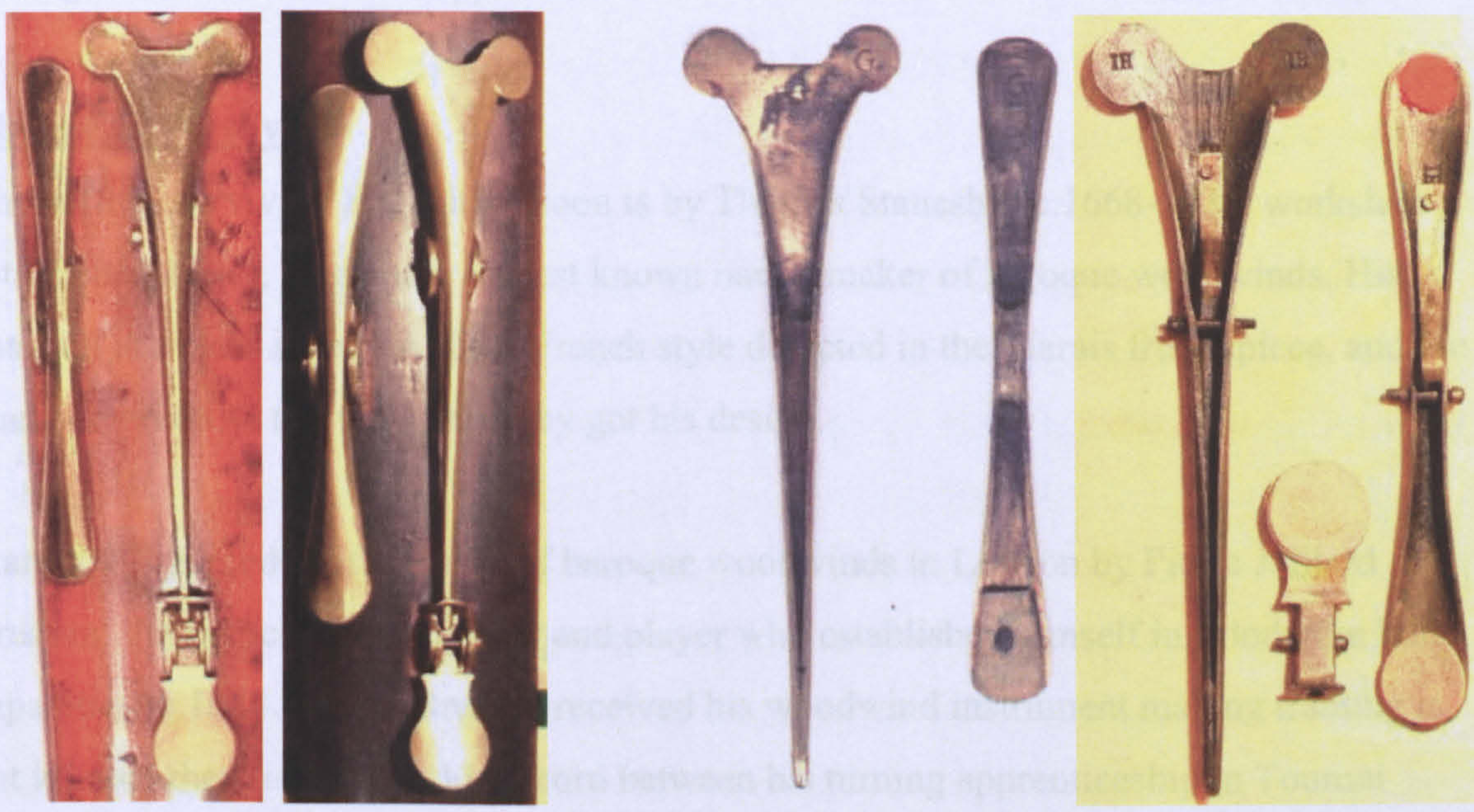


Fig 3.4.2.3. Boot keys;
Front views: Millhouse Newark and Gedney. Back views showing stamps; from anonymous bassoon left, and from Gedney right, stamped IH (for John Hale).

Overall, the English bassoon design is modest and unostentatious; the makers certainly did not use their instruments as vehicles for showing off their turning skills - if they wanted to do that they saved it for their oboes and recorders. The key profiles are restrained too: even the name stamps of the first English makers are modest affairs of consistent style; from Bressan (no bassoons surviving, see below) onwards they all use their surname, sometimes preceded by initials, in an uppercase, serifed font (rather like Garamond), arranged in a crescent and usually with LONDON (or NEWARK in the case of Millhouse) on a parallel line below. There are no scrolls or curlicues, just a small star or rose in the cases of Stanesby and Bressan; but otherwise no crowns, swords, flowerpots or others of the symbols loved by the continental makers.

In analysing the designs of English treble recorders, some made by the same English makers discussed here, Eric Halfpenny observed a similar conformity of design. He found that '... so closely do these English recorders tally in their outward appearance that they might all have been fashioned by the same hand and with the same tools'.[199]

The bassoon form was not entirely static, though, and some subtle threads of development can be traced through the examples examined here. In addition to the bassoon by Thomas Stanesby there is one by his son Thomas Stanesby Junior (hereafter Stanesby Jnr), and two by the latter's apprentice Caleb Gedney, so it is possible to trace bassoon making through three generations of master-apprentice.

Thomas Stanesby

The earliest surviving English bassoon is by Thomas Stanesby (c.1668-1734, workshop established 1691), England's earliest known native maker of baroque woodwinds. His bassoon is a clear inheritor of the French style depicted in the Marais frontispiece, and the question arises as to where Stanesby got his design.

Stanesby is preceded as a maker of baroque woodwinds in London by Pierre Jaillard Bressan, the French-trained maker and player who established himself in London in both capacities in 1688. Where Bressan received his woodwind instrument making training is not known; there is a gap in his record between his turning apprenticeship in Tournai (1678-80) and his arrival in London, but it is assumed that this took place in Paris.[200] Talbot cites Bressan as the maker, owner, or authority for the information on the tenor and bass recorders, flute, oboe, and tenor oboe described in his manuscript, but the bassoon maker's name is not given, although 'Mr Finger' was to have provided the fingering chart.[201] Bressan was one of the five 'Hoboys' who accompanied William III on his trip to Holland in May 1691, and as Byrne points out, that group would have been a consort including oboes, a tenor oboe and bassoon, thus there is a possibility that Bressan was the

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[199] Eric Halfpenny 'The English Baroque Treble Recorder', *GSJ*, 9 (1956), 82-90 (p.89).
[200] Byrne, 'Pierre Jaillard, Peter Bressan', pp.2-28.
[201] Baines, 'James Talbot's Manuscript', p. 14. Mr Finger may have been Gottfried (Godfrey) Finger, composer from Moravia who came to London to work for James II until 1702. He is not known as a bassoon player but his many chamber works include a suite for violin solo with two bassoons, strings and continuo in F major.

bassoonist.[202] The inventory of Bressan's effects at his death included three bassoons, which can be presumed to have been of his own making, so it is most regrettable that none survive.[203]

Talbot also cites a John Ashbury as the maker of the said tenor oboe. Although no instruments by him are known to survive, an example of his trade card is in the Bagford Collection of the British Museum. On it he describes himself as maker of '... all sorts of Wind Musical Instruments vizt. Flutes, Hautboys, Bassoons etc' amongst several other items.[204] Halfpenny suggests the date of 1698 for this card, when Ashbury opened his premises in St Peter's Court, St Martin's Lane, and certainly not later than 1702.[205]

Stanesby's co-apprentice under Thomas Garrett, Joseph Bradbury, is survived by oboes and recorders but no bassoons. There is no indication that their master included wind instrument making in his turning practice and it is therefore not clear where Stanesby and Bradbury gained this specialised knowledge. Halfpenny speculated that they might have had some further training from Bressan, concluding: 'it is unlikely indeed that the comparatively new craft of making these high-precision jointed woodwind instruments in this country should have sprung from more than one root. That root, it seems, was Bressan...'.[206] However, since that was written, Giannini has clarified the situation with regard to Jacques(5) Hottetere. She points out that Jacques(5) Hotteterre was an oboist in the English court in 1675 and suggests that 'it seems evident that Jacques brought to London examples of Hotteterre instruments... [which] became the prototype and standard for English makers well into the eighteenth century'.[207] In that case Hotteterre preceded Bressan in London by thirteen years. It is not suggested that Jacques was making instruments here, but it may be that he brought with him instruments that provided the models for Stanesby, and even for Bressan. It may well be he who first introduced French bassoons to England, including the one measured and described by Talbot.

The three years between Bressan's arrival in London and Stanesby setting up his own workshop in 1691 seem perhaps to be too short a time for Stanesby to have got to know

[202] Byrne, 'Pierre Jaillard, Peter Bressan', p. 5.
[203] Waterhouse, *NLI*, p.44.
[204] Waterhouse, *NLI*, p. 11.
[205] Eric Halfpenny, 'Biographical Notices of the English Woodwind-making School, c.1650-1750' *GSJ*, 12 (1959), 44-52 (p.45).
[206] Halfpenny 'English Baroque Treble Recorder', p.89.
[207] Giannini, 'Jaques Hotteterre', p.378.

him, and to have learned from him all of the requisite skills for woodwind making. On the other hand there is no indication either way as to whether, when Stanesby established himself in Stonecutter Street in 1691, he was already a 'flutemaker' or just a general turner; he may have continued to learn the particulars of instrument making while at first practising other aspects of turning. Note that this starting date is one year earlier than the publication of Marais' *Pieces en Trios*.[208]

Exterior

There is only one bassoon surviving by Thomas Stanesby, in the Waterhouse collection. Its wing joint is stamped by his son, Stanesby Jnr. The bell and long joint design might have been taken straight off the Marais/Simoneau frontispiece; it has the distinctive, large bulb as the bell terminal and the south end of the bell continues at the same diameter as the top of the long joint, the two separated by the flush brass ferrule. The bell bore is reverse-tapered so if the very earliest French bassoons had a cylindrical bell bore, either that had changed by the time they were introduced to London or the change was made in London, possibly by Stanesby himself.

In comparison with the bassoon in the Croft-Murray chalk drawing (see Type 0), the Stanesby instrument has the same simple shape of long joint, with no beads at the top or bottom. Stanesby's long joint keys, mounted in saddles on a narrow platform, have much the same simple shape as those in the drawing, and the flaps are spade-shaped too (Young's pattern U)[209].

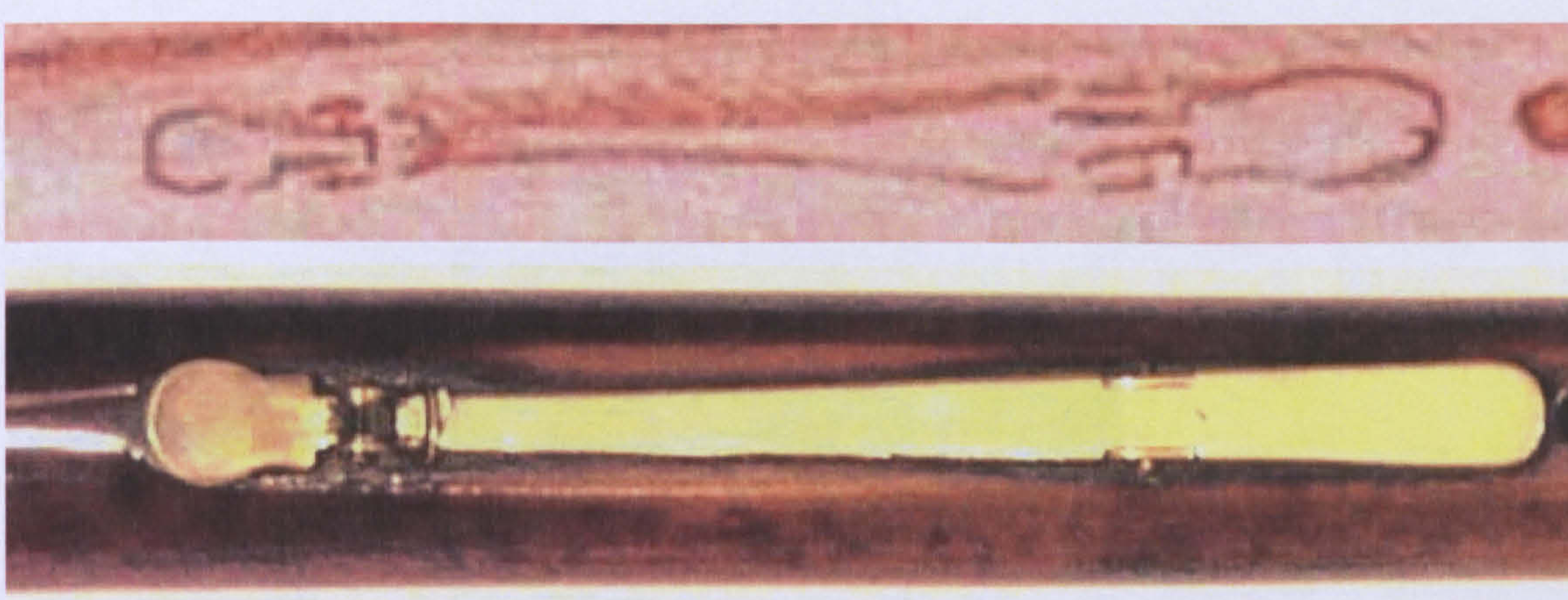
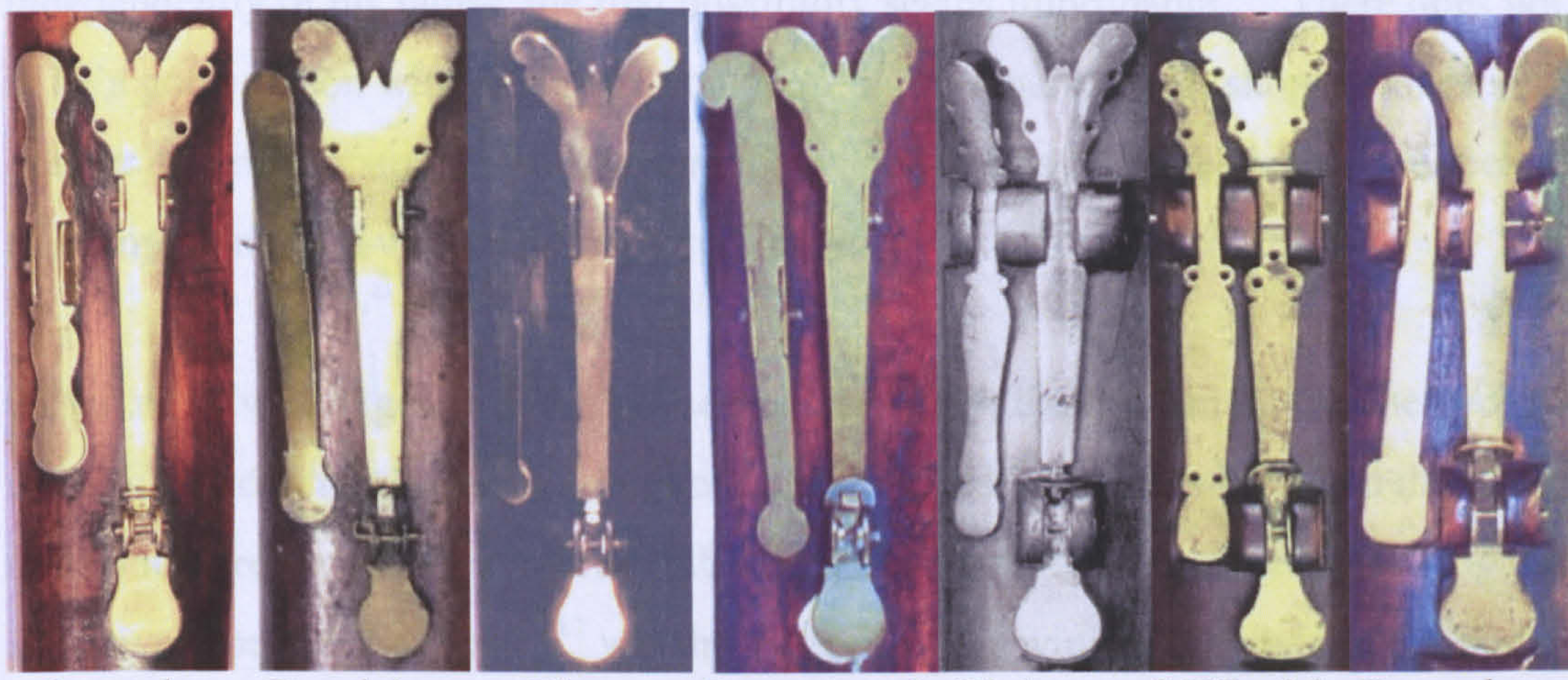


Fig 3.4.2.4. Bb keys. Above: Croft-Murray drawing; below: T. Stanesby, also showing the platform blending into the turned section to left of key.

[208] Eric Halfpenny, 'Stanesby, Major and Minor', *Music and Letters*, 34 (1953), 41-47 (p. 44). There is further documentation of both Stanesbys' lives, as far as they are known, in several articles by Halfpenny and by Byrne in GSJ: Halfpenny, 'Biographical Notices'; Halfpenny, 'Further Light on the Stanesby Family', *GSJ*, 13 (1960), 59-69; Maurice Byrne, 'More on Stanesby Junior', *GSJ*, 45, (1992), 115-122.
[209] Young, *HWI*, p. xxxiii.

This keywork is not of the standard English form described at the start of this section; it is made from flat sheet brass, with tabs soldered or bent at sharp right angles. All keys are mounted in brass saddles, with pin rather than screw-threaded axles.

Unfortunately the drawing does not show the F key; Stanesby has one of a pattern that is found, with variations, on Type 2 bassoons from all across the continent. All are probably derived from a French original, but the one French instrument here, the Bizey, does not represent that origin - it is the least alike of all of those shown below:



Stanesby Dondeine Bizey Rottenburgh Eichentopf Wietfelt Poerschman

Fig 3.4.2.5. F keys on various Type 2 bassoons.

It is curious that despite all using variants of the same F key design, each of the makers had his own idea for the Ab key. Stanesby's is one of the more carefully designed, with a profile that nicely compliments the F. Unlike most of the others, it is symmetrical in length about the axle, a characteristic which was to become a feature of the standard English Ab key.

Fig 3.4.2.6. T. Stanesby boot keys

The woodwork design establishes the standard to be followed by all other English makers, although it may itself have been prefigured by a design of Bressan's or even of the Hotteterres'. The keys retain the form of this French influence, and it was a later maker who introduced the construction and shapes that became the standard English forms.

The wing joint is clearly stamped 'STANESBY IUNIOR', for which there are three possible explanations: the instrument is the result of collaboration between father and son; the wing was provided by the Stanesby Jnr to replace a worn-out original, presumably after T. Stanesby had ceased making instruments; or the wing from another bassoon was substituted by an owner for a damaged or lost original.

If, as seems likely, Stanesby Jnr started using his own stamp only once he worked independently of his father, the first possibility seems improbable.[210] There does not seem to be a good reason why father and son, working in separate workshops (though only quarter of a mile apart), should have made separate parts of one bassoon, and feel obliged to stamp them each with their respective marks.

Of the next two suggestions the last seems less likely; the instrument has the appearance of having had a long working life - both the wing and long joints have had their south-end tenons repaired with inserted brass tubes, suggesting that they had been used together intensively before the repair,[211] which implies that the wing was a good enough match for the rest of the instrument to make a working whole. It is likely that the wing was made specifically for this instrument and that the bassoon as a whole would have been adjusted to work properly with this arrangement; whether that was when it was new or as a refit is of secondary importance.

Some curious damage to the bell gives a little insight into the circumstances of its working life; a deep burn mark near the top end has been partly cleaned up and sealed with varnish. One can imagine a church-band player sitting in a candle-lit loft resting the bassoon across his knee while not playing, and not paying attention as the bell reaches to the candle of the player next to him...

[210] Halfpenny argues that this may well have been as soon as he completed his apprenticeship in 1713, and that he set up his workshop in Temple Exchange at that time. Halfpenny, 'Further Light on the Stanesby Family', pp. 60-61.
[211] Whether the repair was successful enough to allow much more playing afterwards is not clear.

Fig 3.4.2.7. T. Stanesby bell with burn mark.

Bore

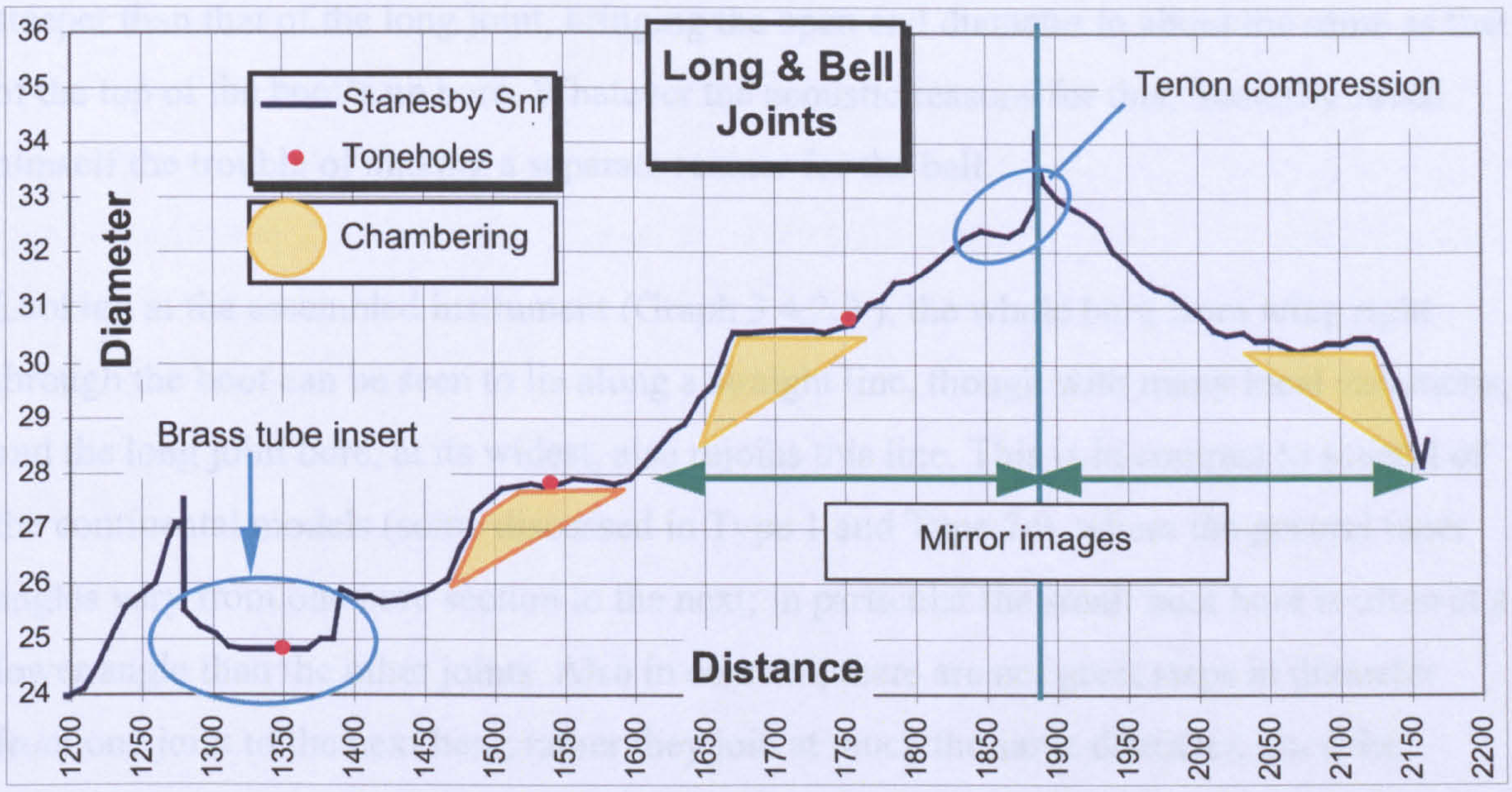
The whole instrument has been much used, to the point where it has suffered rot in both ends of the wing and at the south end of the long joint. The south tenons of both joints have had pieces of brass tubing, 110mm long, inserted as a repair. These are both fitted into sockets bored into the joints, so that there is original wood surrounding them on the outside; the joint lengths do not appear to have been altered. As is evident from the graphs, the bore of the wing tube is too large and the long joint tube bore is too narrow.

At the north end of the <u>wing</u>, the crook socket is lined with a wooden sleeve 85mm long, (the bore graph shows a little jump where this ends). The remaining bore in this joint shows little difference between dimensions in the two axes, indicating that it is in reasonably good condition. A slight increase in the tonehole axis dimension between holes I and II indicates some wear in this region, which gets well wetted during playing. Greater irregularity in the <u>small boot bore</u>, around holes V and VI, again, corresponds to a region of severe wetting during playing.

In the <u>long joint</u> there are again several irregular patches, but the original reamed shape can be readily discerned.

The <u>bell</u> shows an interesting deviation from a simple taper, with a sharp contraction at the north end. This appears to be made with two reamers, the first forming a simple taper through the whole length of the bell, the second being cylindrical (around 30.4mm diameter), with a rounded nose, which widens the bore near the north end but stops from going all the way through. (see Graph 3.4.2.1). This can be seen as a more cautious version of the bell chambers seen in German instruments, not opening to such a large diameter.

The same two reamers also appear to have been used to shape the top end of the long joint; in the following graph the bell bore shape is a mirror image of the long bore (making allowance for the tenon compression at the top of the long joint) from 1600 on the distance scale, mirrored about the vertical green line which is placed at the junction between the two.



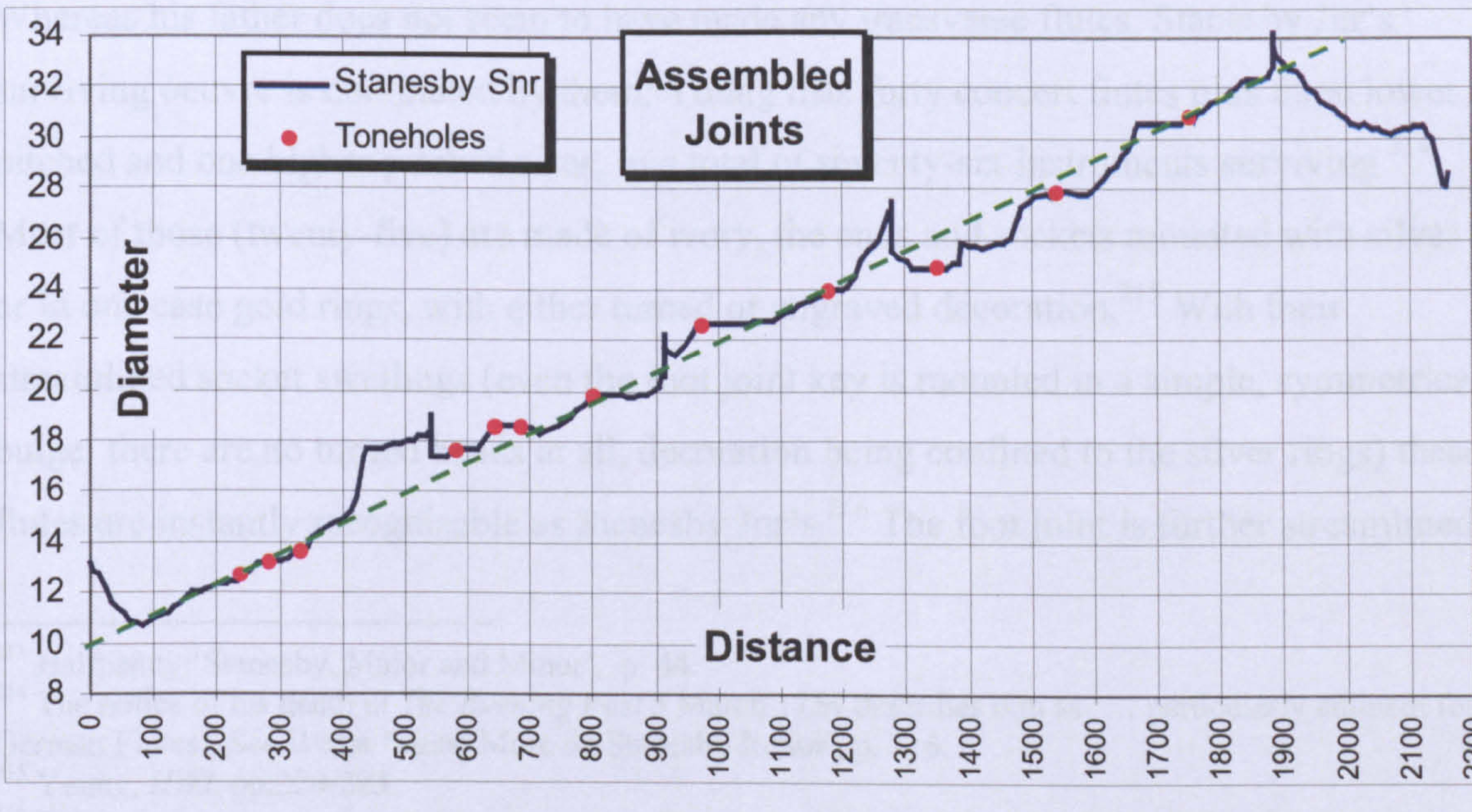
Graph 3.4.2.1. Long joint and bell bores of T. Stanesby.

The remainder of the long joint heading southwards (leftwards on the graph), is made of two cylindrical portions: one, just under 28mm diameter (between 1500-1600 on distance scale) and the other from 1450 to the south end where there is now a brass tube around 24.8mm diameter, but would probably have been around 25.4mm (one inch) originally. The positions of the cylindrical portions in relation to the toneholes shows that parallel-sided, round-nosed augers were used to help to tune the notes that vent through these holes.

Opening out the bore in the region of - or upstream (closer to the reed) of - a tonehole has the effect of sharpening the note for which that hole is the primary vent. Therefore, the essentially cylindrical (but now damaged) section to 1450 on the distance scale, and the two chambered deviations from a straight taper between 1470-1600 and 1600-1750 (marked with shading) would serve to sharpen E2, D2 and C2 respectively. Sharpening the note in this way allows the toneholes to be kept smaller, which might be desired in order to control the strength of sound radiating from them. If the tuning had been adjusted simply by opening the toneholes the notes may have become too strident and out of balance with others. Thus these particular chambers can be seen as a way of balancing the tone quality and dynamic range with the tuning of the lowest notes.

The chamber in the bell does the same thing for tuning the lowest note (Bb1), without widening the bell opening. The angle of the reverse taper here reflects that of the long joint, this is in contrast to most of the Type 1b instruments, where the bell's taper is steeper than that of the long joint, bringing the open end diameter to about the same as that of the top of the boot's up bore. Whatever the acoustic reasons for this, Stanesby saved himself the trouble of making a separate reamer for the bell.

Looking at the assembled instrument (Graph 3.4.2.2), the whole bore from wing right through the boot can be seen to lie along a straight line, though with many local variations, and the long joint bore, at its widest, also rejoins this line. This is in contrast to several of the continental models (some discussed in Type 1 and Type 2c), where the general taper angles vary from one bore section to the next; in particular the small boot bore is often at a lower angle than the other joints. Also in contrast, there are not great steps in diameter from one joint to the next here; rather they join at much the same diameter, once the damage and brass tube inserts are taken into account. The reference line (shown green dashed) on the graph below has a taper rate of 0.012, which is relatively low.[212]



Graph 3.4.2.2. Bore of whole bassoon with dashed reference line of .012 taper (c.1 in 83)

[212] The general taper angle of the modern Heckel system bassoon, as used by Burton for his reference cone, is c. 0.014 or 1 in 71.4. See Burton, 'Bassoon Bore Dimensions', p.44.

Thomas Stanesby Junior

Stanesby Jnr, born in 1692, was apprenticed to his father 1706-1713, established his own workshop by 1715, gained freedom of the Turners' Company in 1728, was elected Master of the Turners' Company 1739 and 1740, and took Caleb Gedney as his apprentice in 1741. He died in 1754, aged 62. Although he is the next earliest English maker from whom a bassoon survives, the instrument itself is dated 1747, so may be later than the one survivor from J. J. Schuchart's hand (see under Schuchart below). He is also survived by a contra-bassoon in the National Museum of Ireland, Dublin. It is dated 1739, thanks to the practice that Stanesby Jnr seems to have instigated – fortunately followed by two other makers in this study, but not Schuchart - of stamping the date and city of manufacture on the boot joint, below the F key.

That even Stanesby Jnr conformed to the English standard bassoon is noteworthy, since it is evident that he sought to establish his own distinctive design principles in his other woodwinds. Halfpenny observes that '... instruments by Stanesby Jnr ... show, by their small deviations from accepted practice, an inventive and unconventional mind'.[213]

Whereas his father does not seem to have made any transverse flutes, Stanesby Jnr's surviving oeuvre is dominated by them: Young lists forty concert flutes plus three lower pitched and one higher pitched sizes, in a total of seventy-six instruments surviving.[214] Most of those (twenty-five) are made of ivory, the ends and sockets mounted with silver or in one case gold rings, with either turned or engraved decoration.[215] With their streamlined socket swellings (even the foot joint key is mounted in a simple, symmetrical bulge; there are no turned beads at all, decoration being confined to the silver rings) these flutes are instantly recognisable as Stanesby Jnr's.[216] The foot joint is further streamlined

[213] Halfpenny 'Stanesby, Major and Minor', p. 44.
[214] The notice of his death in *The Evening Post* 5 March 1754 describes him as '... particularly eminent for German Flutes'. See Byrne 'Some More on Stanesby Junior', p. 116.
[215] Young, *HWI*, pp.220-223.
[216] This is in contrast to flutes of contemporary German and Dutch makers who always had beads at the socket end and usually separated the baluster surrounding the socket from the main column of the joint with a delicate astragal. The other well known significant contrast to almost every other flute maker was Stanesby's joining of the first two joints with the tenon on the head and socket in the left hand joint. Early three-piece flutes had a separate double-socket piece, often of ivory, to join tenons on head and mid joint. When the mid joint was divided in two it also came time to incorporate the socket into one or other joint. Bressan was one of the first to have to make that decision; he made flutes in both three and four-piece construction. His flute in the Victoria and Albert Museum is one of the earliest existing four-piece flutes and it has the tenon on the head, so it seems that he went one way while every other maker apart from Stanesby went the other; an indication perhaps of the influence that he had on Stanesby. Stanesby did use the conventional form on at least one flute for which he made several *corps de rechange*, but most of his flutes seem to have been made at one pitch only. An ivory flute by Bizey in the Horniman Museum has similar

Footnote continued on next page.

by having the key-flap let into a square mortise surrounding the tonehole, so that when closed the key surface is flush with the ivory and only the touch emerges.[217]

Although he made recorders and oboes in conventional forms, at times he also applied the new design ideas to those woodwinds too; on several recorders he discards the usual flared foot and uses instead the same shapes as his flute foot joints. The illustrated example is a particularly fine, decorated recorder sold at Christies in 1985. On other wooden recorders he uses the slightly different style of his wooden flutes.[218] There is no acoustic reason for having the flared foot shape (the bore inside is much smaller than the outside diameter and decreases towards the south end), and Stanesby's design requires a significantly smaller piece of wood or ivory, so he can be seen to be rationalising design – perhaps for reasons of economy - as well as unifying across different woodwinds.

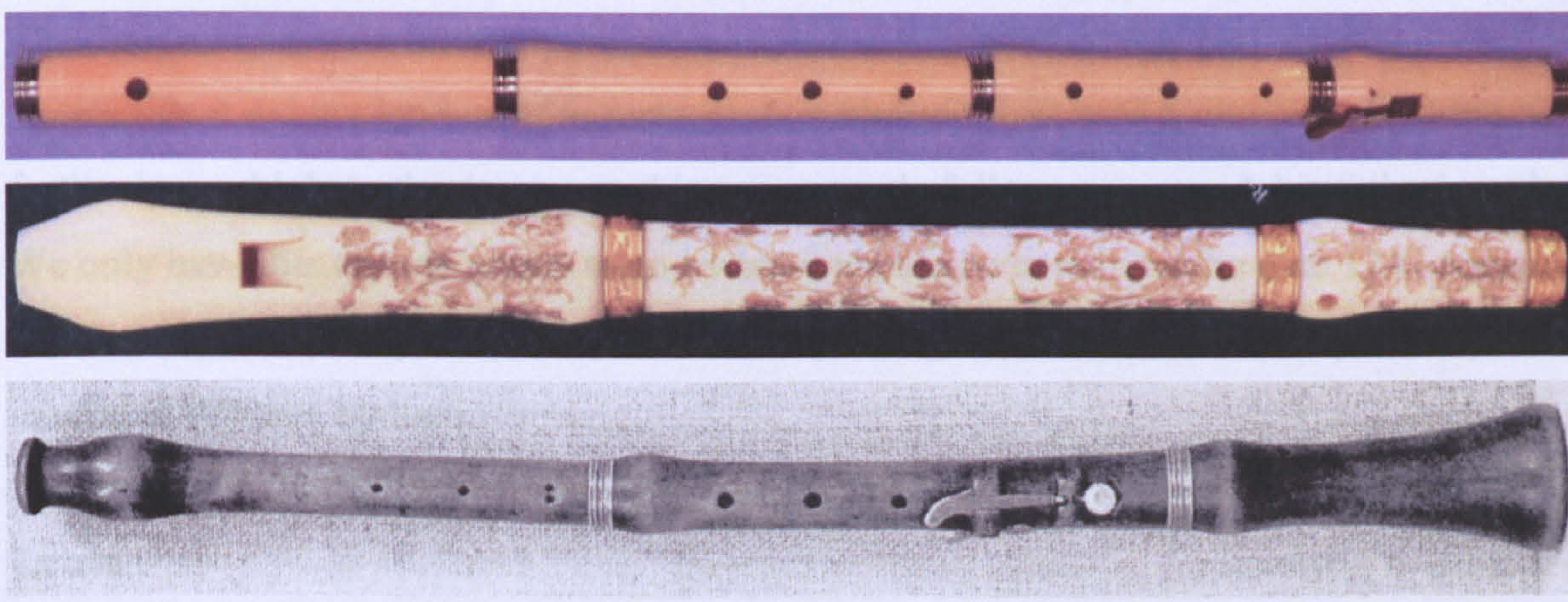


Fig 3.4.2.8. Flute, Recorder and Oboe by Stanesby Jnr. Top; sold at Sothebys 1987, middle; sold at Christies 1985, bottom; Bate Collection, Oxford

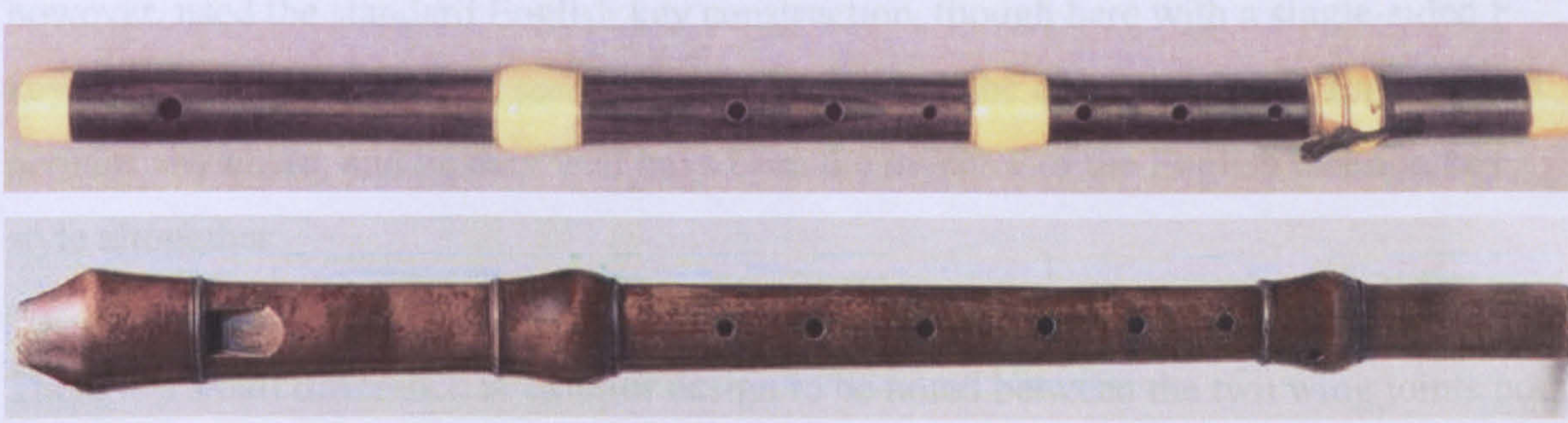


Fig 3.4.2.9. Wooden flute and recorder of similar styling by Stanesby Jnr, flute sold at Sothebys 1987, recorder Metropolitan Museum of Art, New York, No. 1982.390

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smooth lines and silver rings. It has a socket in the head joint but bizarrely also a socket in the south end of the left-hand joint; the right-hand is the joint with two tenons. Who influenced whom in this matter is yet to be decided.

[217] His wooden flutes are different, usually with large ivory mounts with finely turned beads, but also use the flush-set key and the tenon on the head joint.

[218] For example the alto recorder in the Metropolitan Museum of Art, New York, No. 1982.390.

The oboe by him in the Bate Collection, Oxford (used by Haynes as the archetype for his Type B),[219] has the same smooth, symmetrical swellings at the sockets, with decoration confined to the silver rings as on the flutes; he has even removed all beads from the bell, and at the opposite end, the top has a large, symmetrical bulge that Haynes suggests resembles the bell of his bassoon.[220] The mountings for the keys could not be reworked to a form similar to the flutes', but Stanesby streamlined them as much as possible, by trimming away unnecessary parts of the rings to leave minimal, rounded blocks. He also rationalised the C key to a single-sided design, and of course there is only the one Eb key, to match - both of which changes he is at least a very early adopter, if not the originator. Oboe historians have a tendency to see this as the precursor of the 'straight-top' Type C, but that is to ignore the connection with flute and recorder design.

The design of bassoon Stanesby Junior inherited from his father was perhaps already so simple that it did not lend itself to further rationalisation. It is hard to imagine anything further he could do to the design, so this one example follows very much his father's style. We only have this sample of one to go by but it should be noted that the date 1747 comes from late in his active period, if he had had other design intentions he would probably have applied them by then.[221]

Exterior

The turning and shaping of the wooden parts are very much like those of his father's bassoon, with just a slightly less spherical globe at the top of the bell. Stanesby Jnr has, however, used the standard English key construction, though here with a single-sided F key. In adopting the latter he seems to have been, as on the oboe, the first in England and perhaps anywhere; and he may well have been the inventor of the English bassoon key style altogether.

There is a small difference in exterior design to be noted between the two wing joints both made by Stanesby Jnr. The épaules are slightly different, with the shoulders of the T.

[219] Haynes, *TEO*, p. 83.
[220] Ibid.
[221] The instrument is also stamped 'Muraeus' on the long joint. Muraeus was son-in-law and successor to J.J. Schuchart, for whom he worked from c. 1755, after the latter separated from his son Charles. Perhaps Muraeus repaired or re-sold this bassoon at some time and felt that qualified him to stamp his mark upon it. See David Lasocki, 'New Light on Eighteenth-Century English Woodwind Makers from Newspaper Advertisements', *GSJ*, 63 (2010), 73-142 (pp. 91-92).

Stanesby being more sloping and having more rounded corners, and the feather edge is curved. On the Stanesby Jnr the edge is straighter, the corners getting more square. This sets off a trend that can be traced through other makers' works and is discussed further later.

A noticeable feature of the boot joint is the line of fingerholes offset from the centreline. This seems to be an arrangement to accommodate a player with small hands; the thumb-hole (VIII) is also offset to the same side. It is possible that the F key had to be made especially extended too, so was made single sided for simplicity at the same time.

The instrument is not only stamped and dated by Stanesby Jnr but also has a coat of arms engraved on the upper ferrule of the boot, with the inscription 'Ex Dono R. Jenison, Arm. 1747'. Halfpenny informs that 'the coat armour is that of the Jenison family of Elswick and Walworth, Co. Durham, the only possible member of which is Ralph (1696-1758), Master of the Buckhounds to George II, and sometime M.P. for Newport, Isle of Wight and for Northumberland'.[222] Thus the first owner of this instrument was a gentleman amateur with small hands, not a professional musician.

Bore

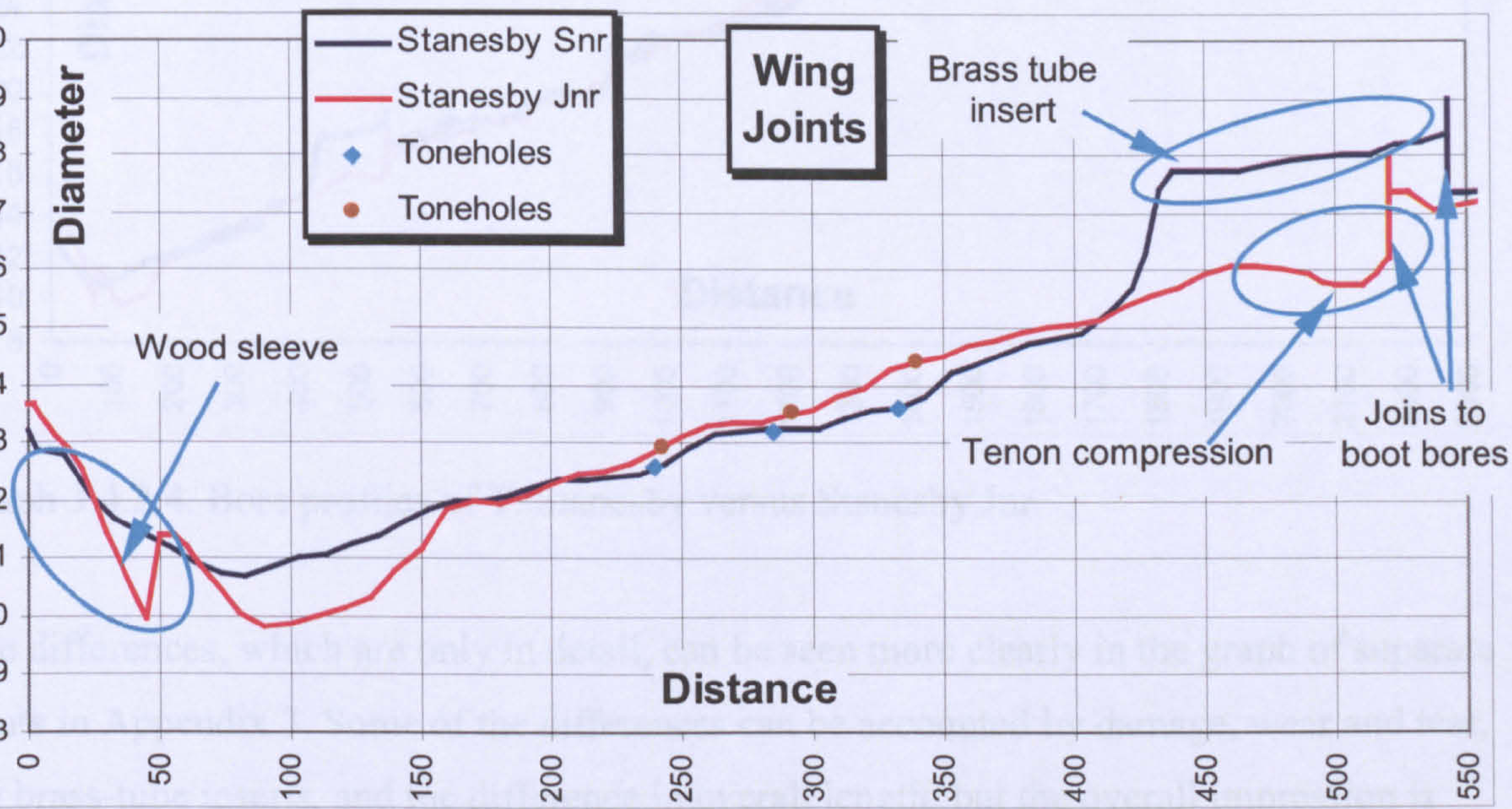
See Appendix 3 for graphs of individual joints and assembled bore. This bore has a simple and regular appearance overall. It is in good condition so there are only small irregularities caused by damage.

The wing joint is, as usual, the worst off. Again a sleeve (45mm long) has been put into the crook socket to reduce its worn-out diameter. Its extent and poor fit can easily be seen as a large saw-tooth in the bore graph (see Graph 3.4.2.3 below). There is also some obvious compression in the tenon at the other end of the joint (from zero to sixty on the distance scale).

When compared with the wing from the T. Stanesby there is a good match in the central section and similar reamer shapes can be discerned (see below and the Bore Profiles Graph in Appendix 3, p.437, which has both bassoons overlaid). If the joints are aligned at the north end as shown below, a distinct constricting section at the throat of the Stanesby

[222] Halfpenny, 'Further Light on the Stanesby Family', p.67.

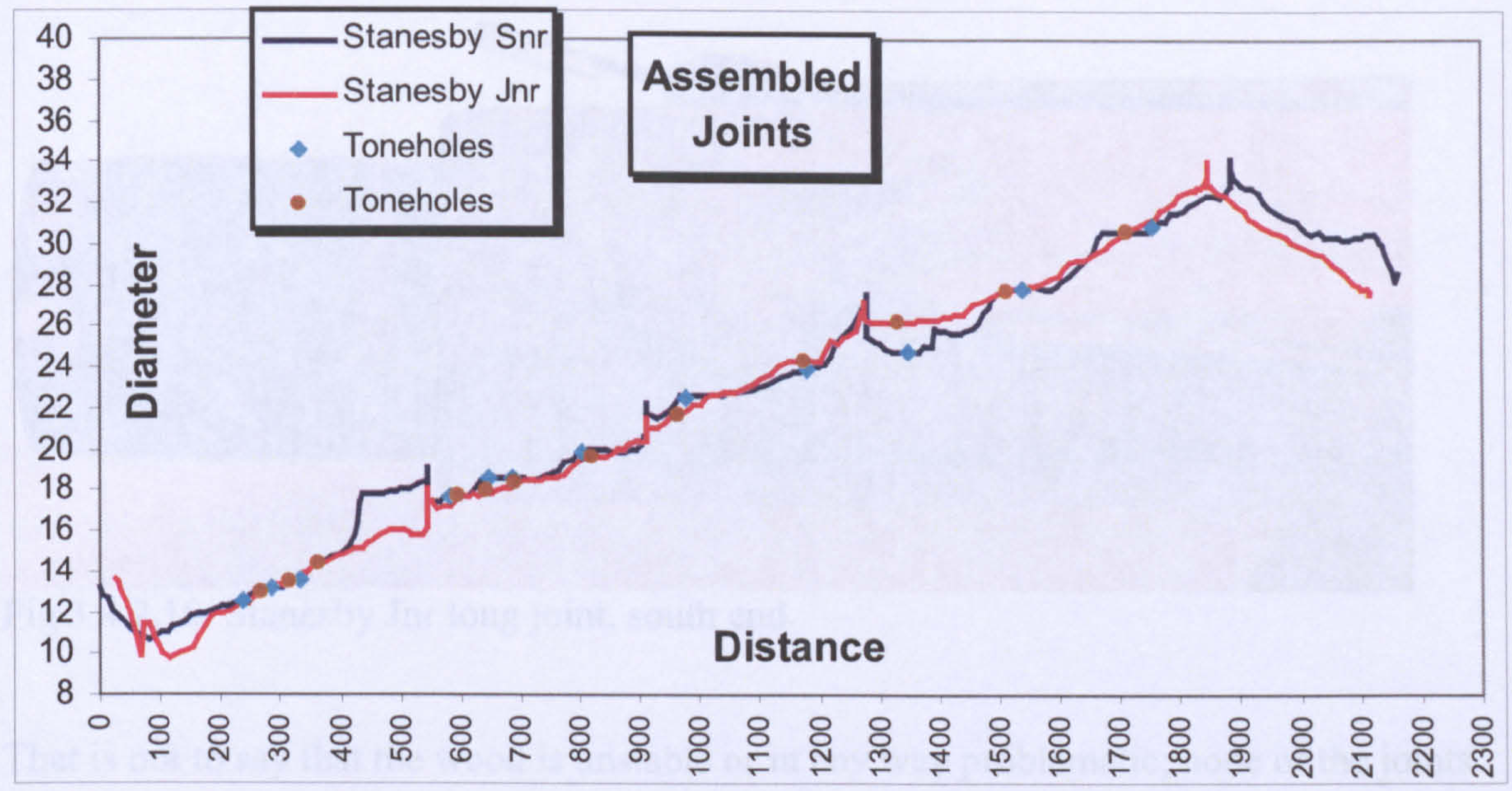
Jnr shows up. A steeper angle from throat to the main taper, shows that the joint cannot have been reamed right through with a single straight-tapered reamer. It is possible that the T. Stanesby also was originally of this shape but that is has been worn away with repeated wetting and wiping out.



Graph 3.4.2.3. Wing joints made by Stanesby Junior

These two joints are, of course, made by the same person so it is to be expected that they might be similar. Once damage is accounted for, the only significant difference is in the lengths and the placing of the fingerholes. The replacement for T. Stanesby's wing is significantly longer (23mm) which might be a further indication that it was not simply taken from another Stanesby Jnr bassoon but was made especially for that instrument. That the fingerholes are placed a little further up (closer to the crook) with hole I being significantly larger in diameter, implies that a longer crook is needed to balance the tuning of this instrument at a lower pitch than the Stanesby Jnr. The assembled instrument will have a greater distance between right- and left-hand fingerhole groups.

It is clear that there is a great deal of similarity between the two instruments, which are shown below with the joints aligned at the boot plugs. The differences in length of the wing and long joints show up, as does the general correspondence in bore dimensions and shape.



Graph 3.4.2.4. Bore profiles of T. Stanesby versus Stanesby Jnr

The differences, which are only in detail, can be seen more clearly in the graph of separate joints in Appendix 3. Some of the differences can be accounted by damage, wear and tear, the brass-tube inserts, and the difference in overall length; but the overall impression is that Stanesby Jnr has simplified the design to some extent. In particular, he did not find it necessary to ream out the previously discussed steps/chambers in the long joint and bell; he made the long joint shorter from the south end, bringing its toneholes closer to the reed end, and the near-cylindrical portion of bore at the south is wider too. These two alterations appear to have achieved the tone/tuning balance of the lowest notes, without the bore chambering that his father applied.

Despite the excellent craftsmanship of these two makers, and in contrast to their smaller instruments, the quality of the wood used in the bassoons does not seem to have been of obvious concern to them. The pieces of maple (no doubt English sycamore: *Acer Pseudoplatanus*) from which they were made are by no means straight-, even- or particularly fine-grained. This timber would have been easily available in large, straight trunks, but these joints look as though they are made from small or at least unevenly grown trees, with swirled and twisted grain patterns, knots, and open faults, as here in the long joint:[223]

[223] The colourings of this, and of the Millhouse Newark bassoon discussed later, are not as originally made but are the result of a thorough cleaning and re-finishing

Fig 3.4.2.10. Stanesby Jnr long joint, south end.

That is not to say that the wood is unstable or in any way problematic; none of the joints of either bassoon is seriously warped, nor have the knots and other faults opened up to cause leaks during what were apparently long working lives, so the quality is by no means inadequate, but straight, even grain was evidently not a priority. In some places, such as on the back of Stanesby Jnr's boot joint, the wild grain produces spectacular effects (see Appendix 3), quite different from the regular ripple of the Kenigspergers discussed earlier, though it is not clear how visible these would have been under the original dark stain.

Playing Qualities

It is rare to have an opportunity to play or hear played wind instruments of this age, and rarer still to be able to test them at any length, but William Waterhouse's stated intention was always that his instruments were to be known through playing, as well as by their appearance.

The Stanesby Jnr's better condition made it easier to set up and less problematic to play. Three different players of high professional standing tried it in the summer of 2009, one even performing the Fasch sonata to an invited audience as part of the 2009 I.D.R.S. conference. Although each used the reeds that they were accustomed to for their own reproduction instruments of various designs, all were able to make it play satisfactorily, and all commented favourably on its qualities.

One of the players commented:

> '[The Stanesby Jnr] was perhaps the best original I had ever tried and worked beautifully as it was - I was a little higher than 415 (maybe about 420) and everything worked - low e flats and f sharps included, as well as simple fingering for b flat. It had a wonderful homogeneous and warm sound, not a huge sound but very appealing.' [224]

The performer of the Fasch commented that he had to use a different approach to get the best sound and response; rather than trying to push the sound out, he felt he had to 'let go', and allow the sound to build in the instrument itself (I paraphrase, in equally un-scientific and musicianly terms).[225]

The Thomas Stanesby is, unfortunately, too damaged to put into good working order, so it was not possible to give it a fair trial.

The Stanesby Jnr contrabassoon in the National Museum of Ireland, Dublin, was not measured for this study. It is a full double-sized bassoon, like the A. Eichentopf discussed above, but is in the same English style as Stanesby's concert bassoon. It is dated 1739 on the boot, in the Stanesby manner, so was made eight years earlier than his concert bassoon. In a full account of the information to be found surrounding its manufacture and use, Halfpenny dismisses Burney's claim that Handel ordered it made some twelve years earlier for the coronation of George II, but does not entirely dismiss the possibility of Handel's involvement in some way; perhaps, having seen and heard German contrabassoons in his Thuringian youth, Handel had a hand in persuading Stanesby to build it.[226] Handel certainly used it; first in L'Allegro (1740) but perhaps more famously in the Fireworks Music (1749). A reproduction of the instrument made by Graham and Maggie Lyndon-Jones and Paul White, played by David Chatterton, has been heard in several reconstructed performances of this piece since the Albert Hall Proms of 1992.

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[224] Peter Whelan, private correspondence 6/8/2010, after playing in August 2009.
[225] Comments made by Lyndon Watts during 'Musical Instruments from the William Waterhouse Collection' day 26/7/2009, part of the IDRS Congress 2009. This has an interesting parallel to playing styles of early flutes, where there is contrast between the earlier flutes with small, circular embouchure and relatively large head bore (such as Stanesby Junior's) which give the player the impression that the flute's own resonances must be coaxed into action, and later, continental flutes with smaller head bore and larger embouchure, where the player feels a more powerful sound can be 'blown out' of the instrument.
[226] Halfpenny, 'Stanesby, Major and Minor', pp. 41-47.

Caleb Gedney

Caleb Gedney was born in London in 1729, the son of a tobacconist. He was apprenticed to Stanesby Jnr from 1741, and on his master's death in 1754 he inherited all of his tools and took over the business in the same premises.[227] There are two bassoons surviving of his, one in the Horniman Museum, London, No. 14.5.47 and one in the Waterhouse Collection.

The Gedney bassoon in the Waterhouse Collection is six-keyed, so strictly speaking is outside the range of this study, but provides an opportunity to trace bassoon design through a third generation of master-apprenticeship. It shows that the design started by Thomas Stanesby is little changed in this third generation, in contrast to German makers of the same period, who changed their masters' designs considerably. It is in very well preserved condition, though rather dried-out, with little patina and the appearance of not having been used much.

Exterior

Gedney has followed his master's lead and date-stamped this instrument 1768, on the boot below the F key. The design is in the English standard pattern; the bell terminal is as large and symmetrical as T. Stanesby's, though a little more angular. The keys are stamped I.H. (so are made by John Hale); they are boldly formed and traditional at the same time. The long joint platform is wider than the Stanesbys', and there is a flat section, chiselled at 45 degrees, to form the platform for the Eb key. The wing's épaule protrudes from the column at a rather sharp angle and the feather edge is dead straight. The shoulders do not have the clean-cut surfaces of the later Milhouses though, indeed, there are various indications that although confidently constructed, not so much care has been taken on this example. Toneholes under the keys, for example, are rather roughly cut, and their edges have not been smoothed off.

Bore

In the light of the knowledge that he inherited Stanesby's tools it is particularly interesting that many tool marks are visible in the bores of this bassoon.

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[227] Waterhouse, *NLI*, p.130. Stanesby Junior's will is PROB 11/807, 2 March 1754, www.nationalarchives.gov.uk

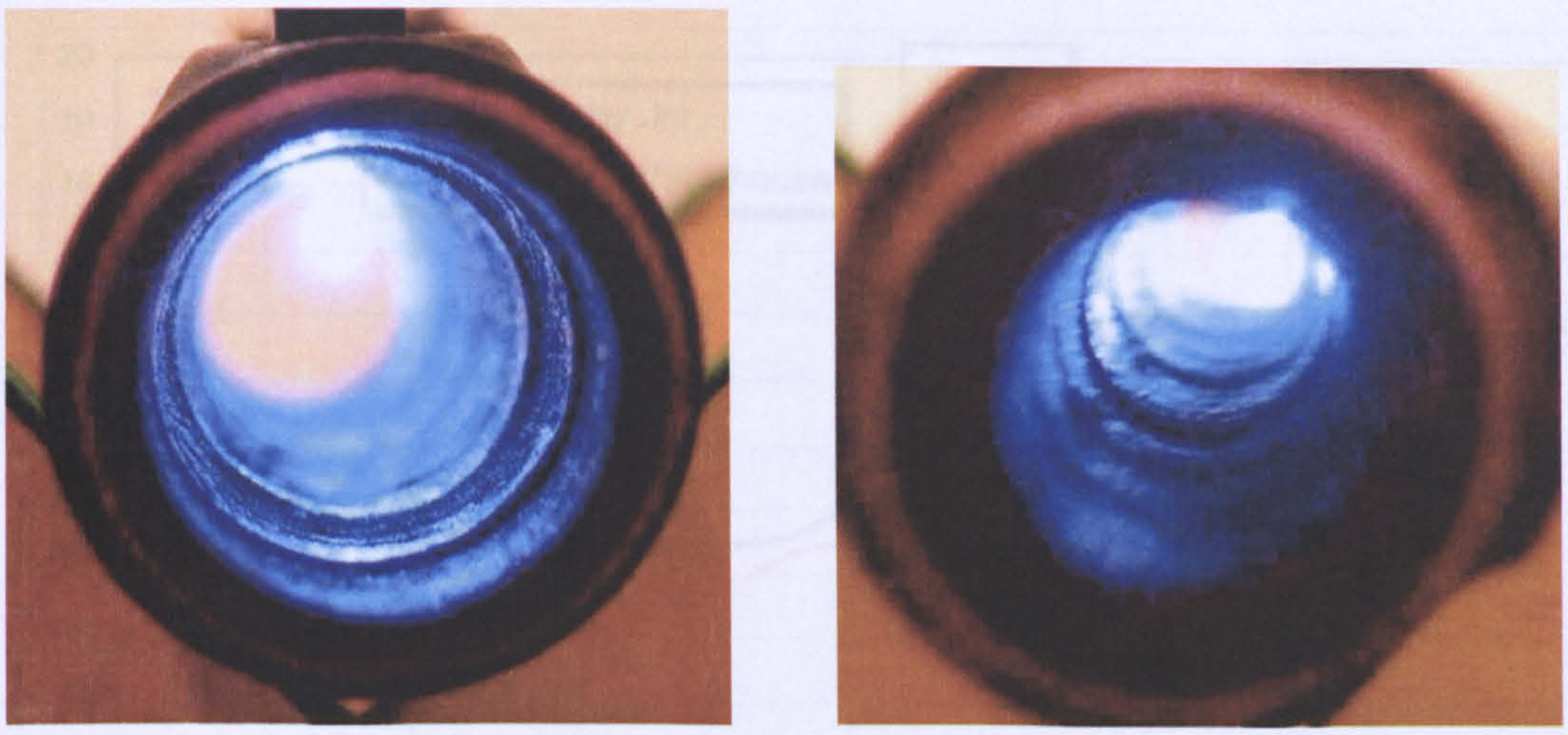
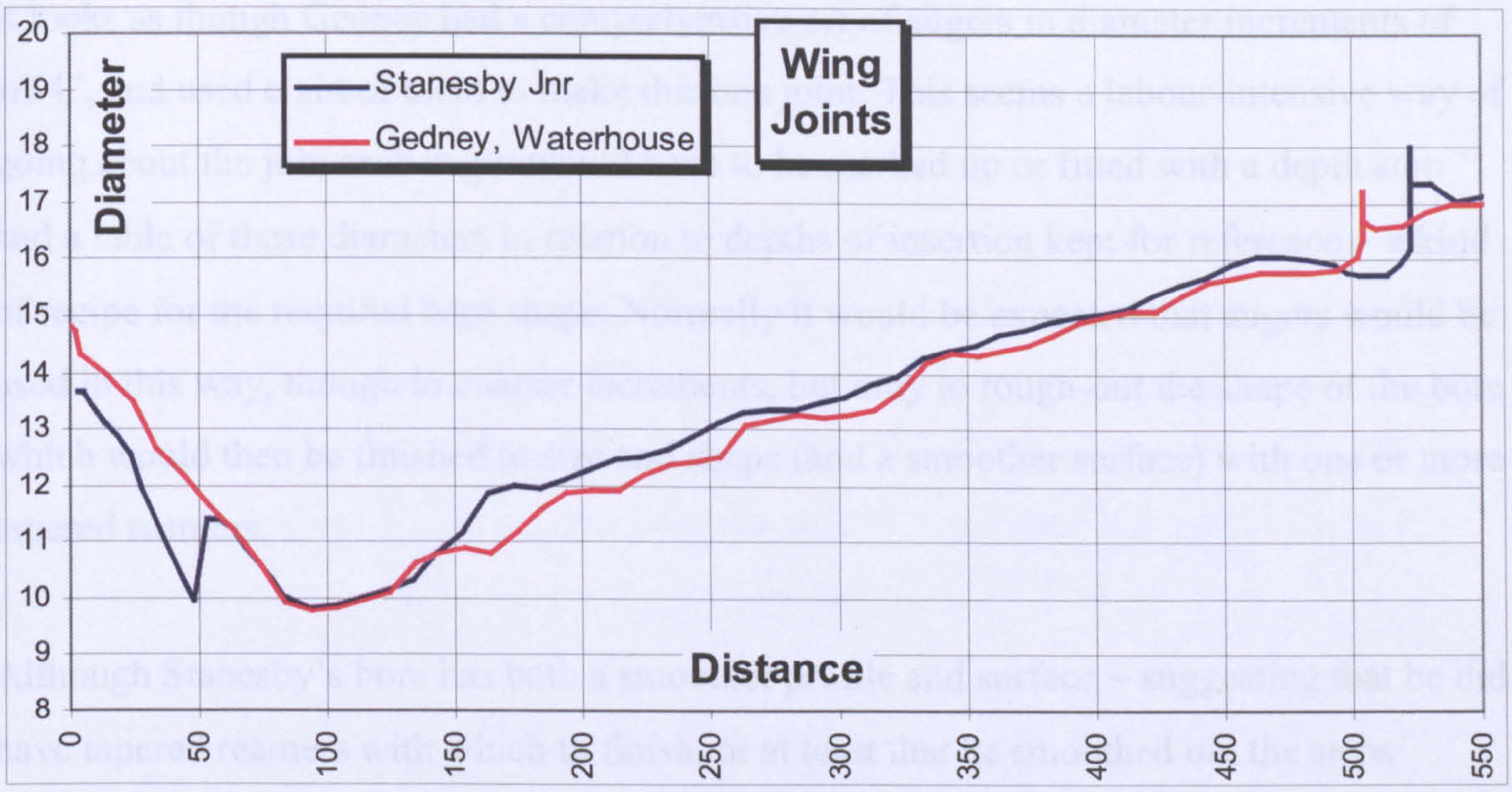


Fig 3.4.2.11. Reamer marks in bores of Gedney bassoon, left; long joint, right; wing

Restricted depth of focus limits the range visible in these photographs (Fig 3.4.2.11), but several more steps along the lengths of both joints are visible to the naked eye. These also show up clearly as steps in the bore graphs, whereas the Stanesby Jnr looked significantly smoother and simpler; so the question arises as to whether the same tools were used for both instruments.

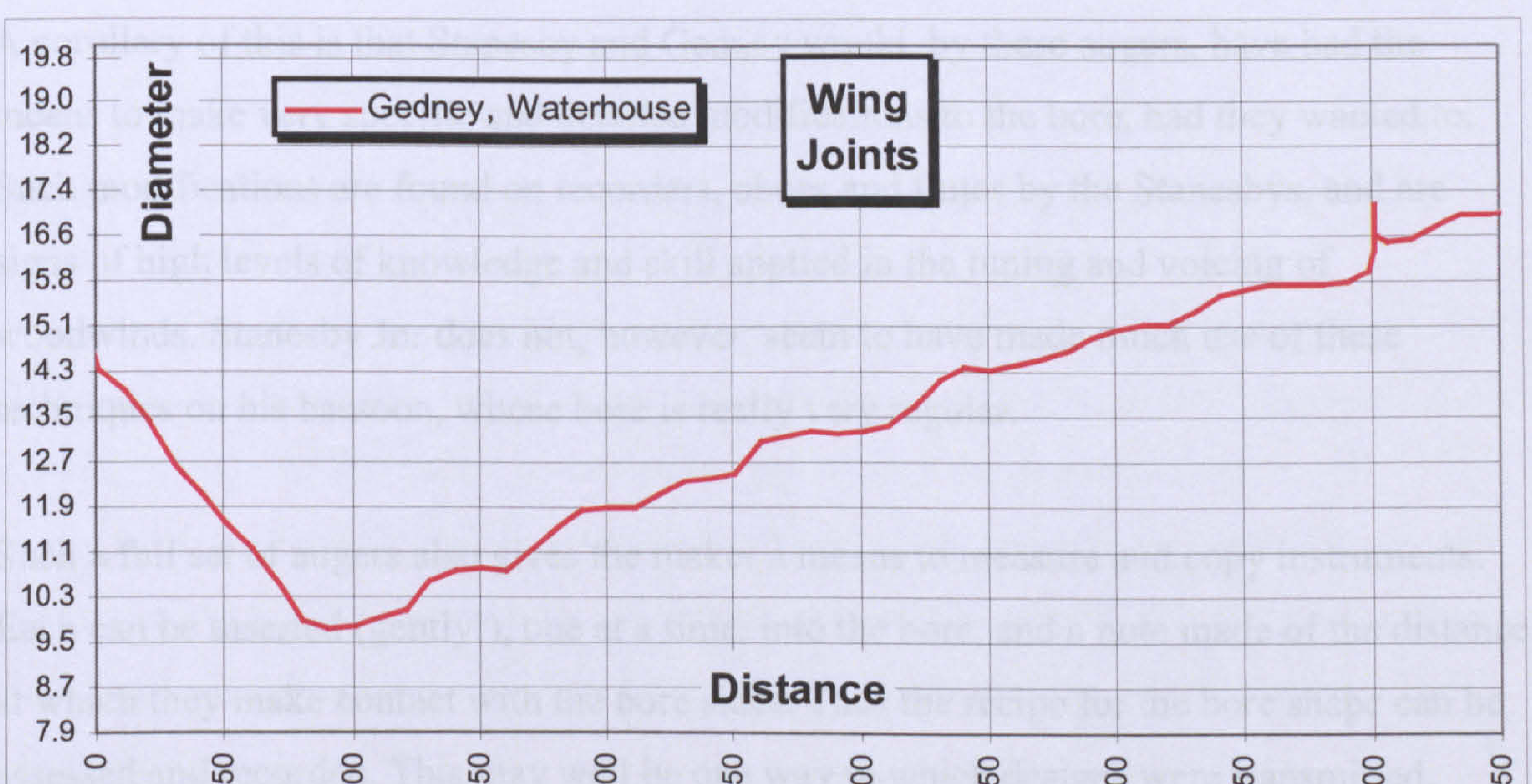
In Graph 3.4.2.5, in which the two wing joints are overlaid (aligned at top end; the crook sockets are on the left), it can be seen that Gedney has used a series of augers in increments of diameter to approach the same shape of bore as Stanesby made. The 'steps' are characterised by a section of constant diameter (horizontal line), with a steeper slope to smaller diameter, as if made by a parallel-sided auger with a rounded or sloping nose. If one imagines the augers being inserted into the joint from the right, then some reach right up to Stanesby's line, while others fall short, although their individual shapes are closely matched between the two bassoons.[228] A good example lies between 150 and 200 on the distance scale, where a 12mm diameter step in Gedney's bore lies some 20 to 30mm to the right of the same step in the Stanesby. Between 200 and 250 distance a subtler step at 12.3mm diameter is slightly less out of alignment, as is another one between 250-300, at around 13.2mm diameter. The throats (the narrowest section) match almost exactly.

[228] Readers unfamiliar with these concepts should refer to Chapter 2, section 2.3, where bore-shaping processes are described



Graph 3.4.2.5. Wing bores of Stanesby Jnr versus Gedney

Gedney's steps appear to be fairly regularly spaced in their diameters and when checked against inch sizes there is a good correspondence. In Graph 3.4.2.6 below, the diameter scale is in millimetre equivalents of 1/32nd inch increments; several of the bore steps fall right on these and others lie halfway between, i.e. on 1/64th inch sizes (1/64" = 0.397mm).[229]



Graph 3.4.2.6. Wing bore of Gedney bassoon; diameter axis in 1/32nds of an inch (mm equivalents)

[229] The English inch was standardised in 1588 and not again until 1754. Both of those standards were essentially the same as the current 1" = 25.4mm.

It looks as though Gedney had a comprehensive set of augers in diameter increments of 1/64", and used eight of them to make this one joint. This seems a labour-intensive way of going about the job; each auger would have to be marked up or fitted with a depth stop and a table of those diameters in relation to depths of insertion kept for reference – a kind of recipe for the required bore shape. Normally it would be expected that augers would be used in this way, though in coarser increments, but only to rough-out the shape of the bore which would then be finished to size and shape (and a smoother surface) with one or more tapered reamers.

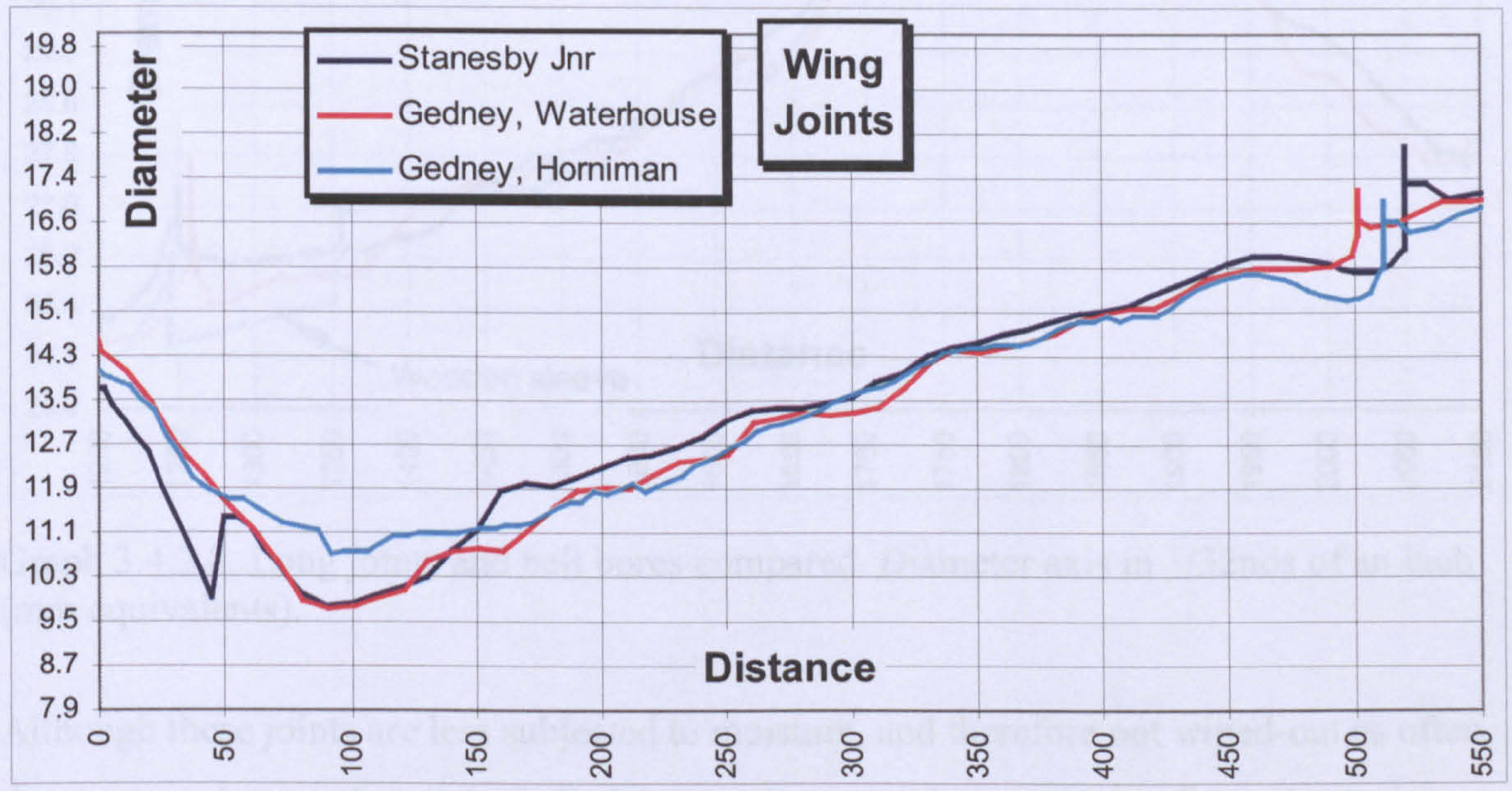
Although Stanesby's bore has both a smoother profile and surface – suggesting that he did have tapered reamers with which to finish, or at least that he smoothed out the steps somehow – it does show some of the same step shapes as Gedney's. When pointed to by Gedney's steps, small bumps in his bore, which might have been ignored as random irregularities, take on greater significance. It appears that Stanesby used the same set of augers as Gedney but took more care to smooth out the steps after boring – either with tapered reamers or by other means – in a manner consistent with the greater care that he seems generally to have taken (as with toneholes, mentioned above). The un-smoothed, stepped bore is even more obvious in Gedney's long joint discussed below.

A corollary of this is that Stanesby and Gedney would, by these augers, have had the means to make very specific and detailed modifications to the bore, had they wanted to. Such modifications are found on recorders, oboes and flutes by the Stanesbys, and are signs of high levels of knowledge and skill applied in the tuning and voicing of woodwinds. Stanesby Jnr does not, however, seem to have made much use of these techniques on his bassoon, whose bore is really very regular.

Such a full set of augers also gives the maker a means to measure and copy instruments. Each can be inserted (gently!), one at a time, into the bore, and a note made of the distance at which they make contact with the bore sides. Thus the recipe for the bore shape can be assessed and recorded. This may well be one way in which designs were transmitted.

It is also possible that some of the smoothing of the Stanesby was due to the steps having been worn away with use and repeated cleaning out. The second Gedney bassoon measured here, the four-keyed example dated 1765, in the Horniman Museum, London, No. 14.5.47, shows signs of having been used much more than the Waterhouse Gedney, so the idea of wear smoothing out the bore can be examined.[230]

Graph 3.4.2.7 shows the wing bores of all three compared: the Horniman instrument is somewhere between the Stanesby and the Waterhouse Gedney for stepped-ness, so the smoothing out may have been the result of greater use. The throat (centred around 100mm on the distance scale) is about a millimetre larger in diameter than the others - a good sign of wear from repeated soaking and wiping. Some of the steps are still visible inside the joint (see the photograph of wing end-on in Appendix 3).

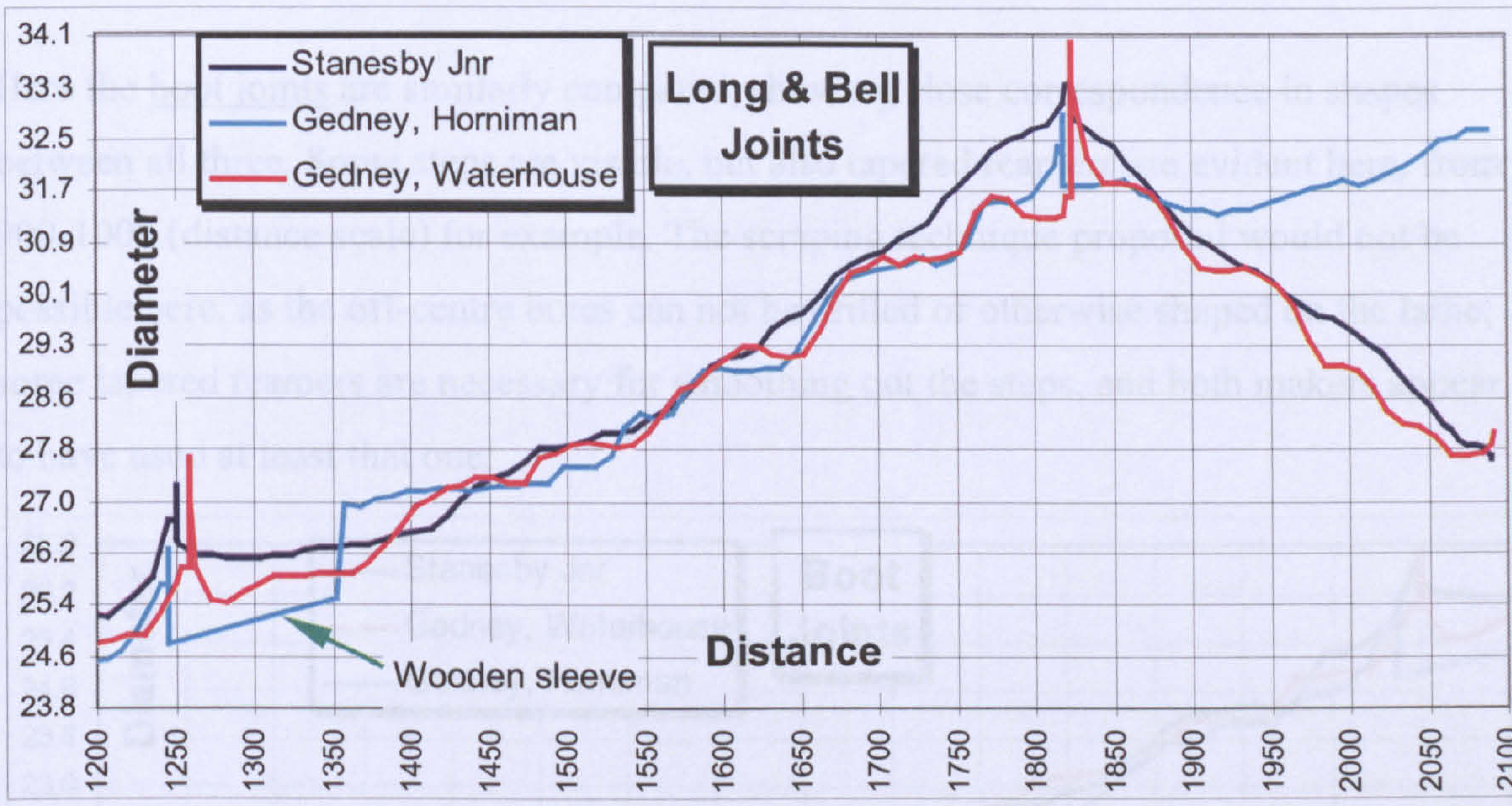


Graph 3.4.2.7. Wing bores compared; diameter axis in mm equivalents of 1/32"

Steps are more marked on the other joints, where damage from wetting and wiping is less of an issue. Correspondences of shapes and diameters can be seen below in Graph 3.4.2.8, where the long and bell joints are compared, again with the diameter scale in 1/32" equivalents. Some of the steps in the two Gedneys match very closely, while others, still corresponding to 1/64" increments of diameter, are possibly made with different augers. Both Gedneys approach the Stanesby profile, apart from one step that falls short at the north end.

[230] The keys are not the John Hale design of the Waterhouse Gedney but a little more delicate as on the Milhouse instruments discussed next. It has a single sided F key again of slightly different design to that on Stanesby Junior's.

The bell of the Horniman Gedney (cyan line) is a replacement taken from another bassoon by unknown maker, and the south end of the long joint, to the left on this graph, has a long sleeve and tenon fitted to replace a broken/rotted section (evident between 1250 - 1350 on the distance scale here). It has been made with a bore a little too narrow, but nevertheless probably served well enough to extend the active life of this well-worn instrument.

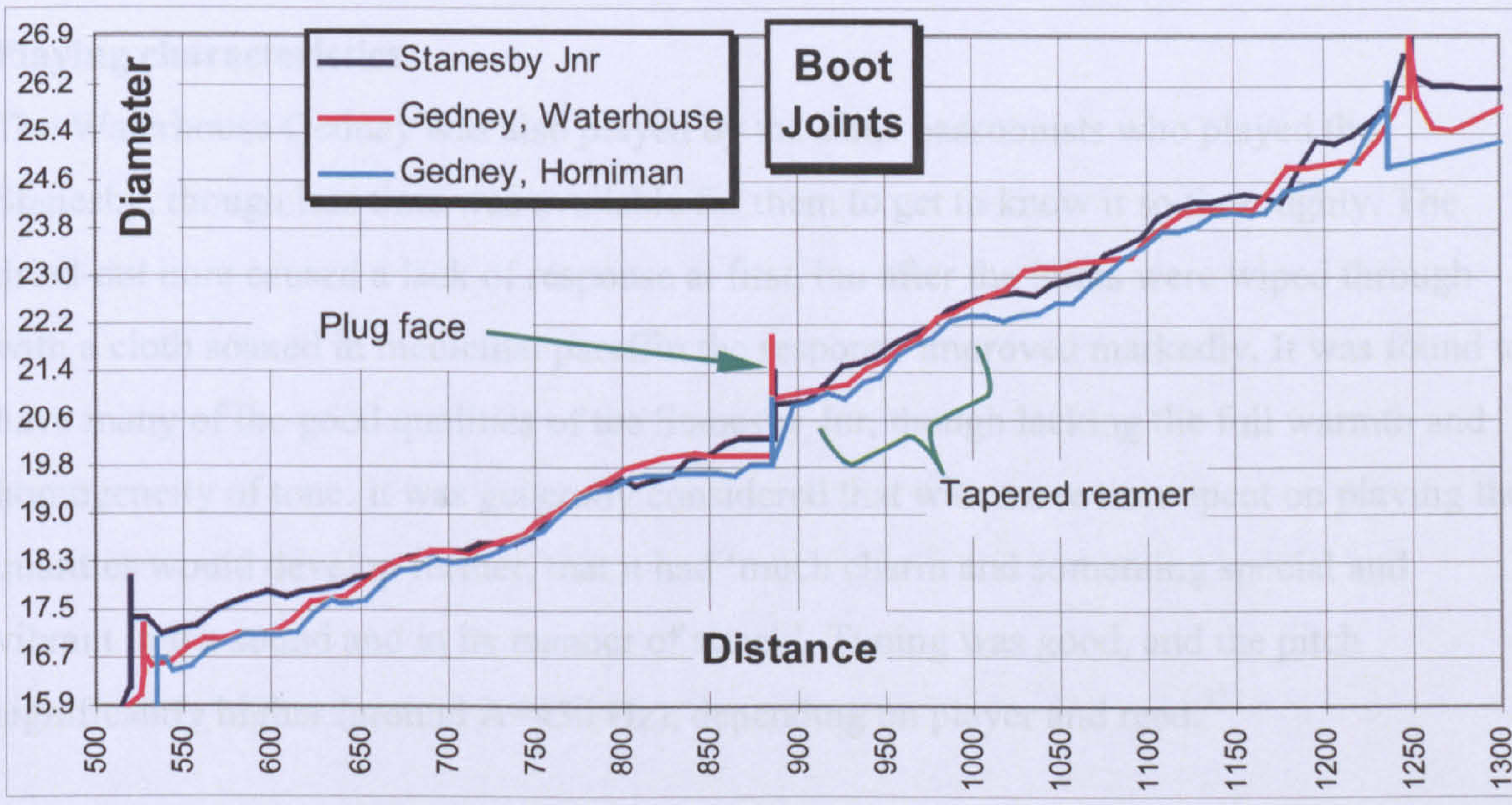


Graph 3.4.2.8. Long joints and bell bores compared. Diameter axis in 1/32nds of an inch (mm equivalents).

Although these joints are less subjected to moisture, and therefore not wiped-out as often, the steps are just as clear in both Gedneys, so it can not be argued that Stanesby Jnr's bassoon has a smoother bore shape only through wear. As such steps could not readily have been smoothed out with abrasives, especially when they are far from either end of the joint, it is likely that Staneby Jnr's smoother tapered shape was created with tapered reamers; but why, in that case, did Gedney not use them? And why are there subtle bumps in Stanesby's wing bore that closely match Gedney's steps?

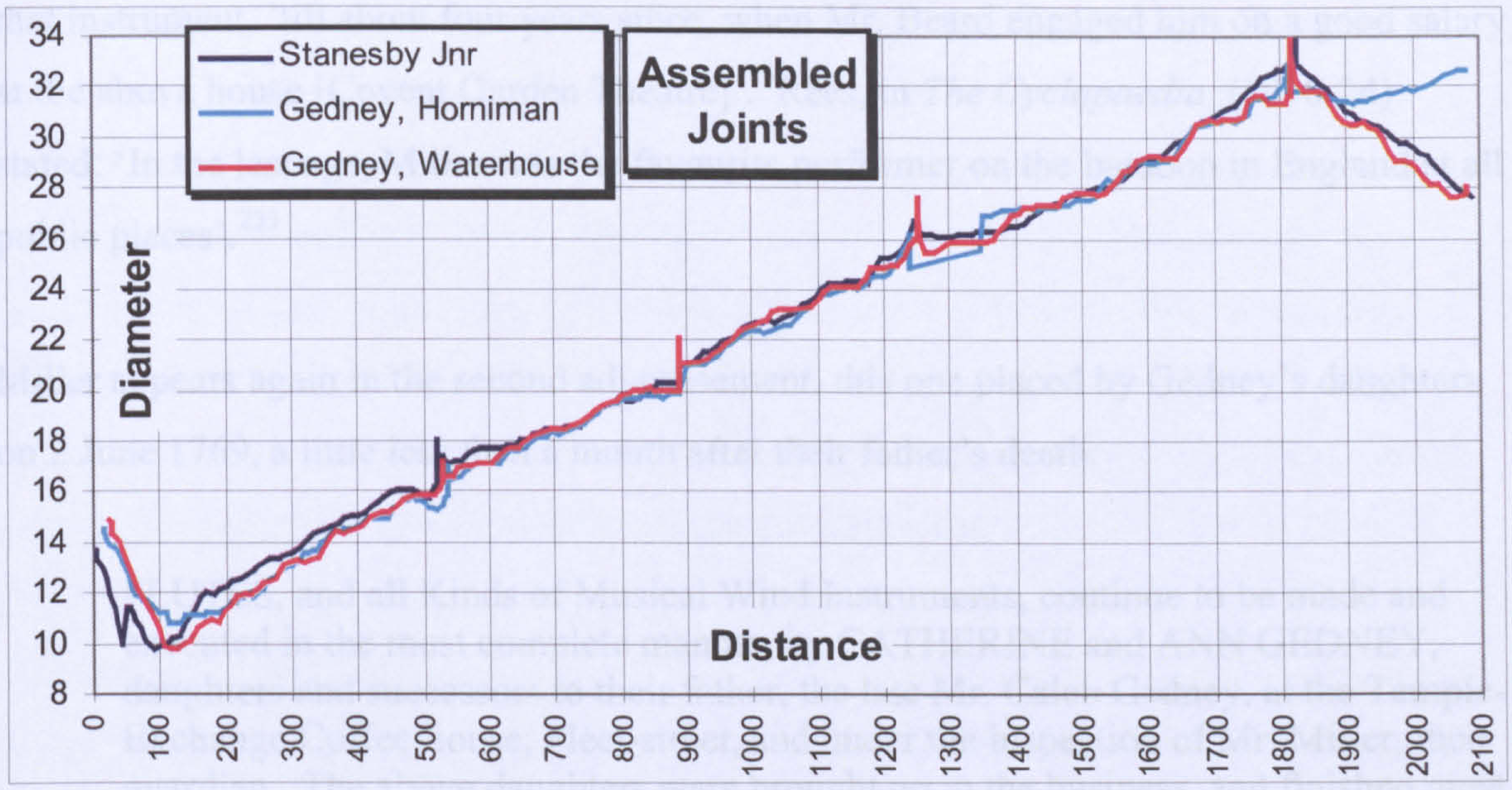
Perhaps between 1747 and 1765 (the dates of Stanesby Jnr's and Gedney's earlier bassoon respectively) the tapered reamers had worn out or been lost, and Gedney had to do the best he could with augers only. Another possibility is that Stanesby never had tapered reamers for the wing, long and bell joints. He could have bored out those joints with multiple augers, in the same way as Gedney, and then used the side edge of one of the smaller augers to scrape down the side of the bore, while still turning the joint in the lathe. By this method he could cut away the corners of the steps, being careful not to scrape further than the limits defined by his bored distances. This technique could work well in the long joint and bell, but would be difficult in the narrower wing; scraping with the thinner, more flexible auger would be more difficult to control, and viewing down the narrow bore while cutting would be impossible. At the same time, this bore is the most critical as to dimensions, so caution would be needed not to go too far; hence, it is proposed, some of the initial auger marks are left behind in the Stanesby Jnr.

Here the boot joints are similarly compared, showing close correspondence in shapes between all three. Some steps are visible, but also tapered reamers are evident here, from 900-1000 (distance scale) for example. The scraping technique proposed would not be possible here, as the off-centre bores can not be drilled or otherwise shaped on the lathe; some tapered reamers are necessary for smoothing out the steps, and both makers appear to have used at least that one.



Graph 3.4.2.9. Boot joint bores compared, down bore to left, up bore to right, Diameter axis in 1/32nds of an inch (mm equivalents).

Finally, below (Graph 3.4.2.10) are the complete assembled bores of all three bassoons, aligned at the boot plugs. At this scale the steps are less striking than the overall similarity of the two makers' instruments. It is clear that Gedney has kept to the design of his master and was almost certainly using some of the same tools, though with rather less technical finesse in finishing. (The apparent gross differences at the wing here are due to different alignment of the joint ends, because the Stanesby is longer overall than the Gedneys).



Graph 3.4.2.10. Complete bores compared, aligned at boot plugs

Playing characteristics

The Waterhouse Gedney was also played by the same bassoonists who played the Stanesby, though less time was available for them to get to know it so thoroughly. The dried-out bore caused a lack of response at first, but after the joints were wiped through with a cloth soaked in medicinal paraffin the response improved markedly. It was found to have many of the good qualities of the Stanesby Jnr, though lacking the full warmth and homogeneity of tone. It was generally considered that with more time spent on playing the qualities would develop further, that it had 'much charm and something special and vibrant in the sound and in its manner of attack'. Tuning was good, and the pitch significantly higher (around A=430 Hz), depending on player and reed.[231]

David Lasocki's recent survey of the appearances of English woodwind makers in eighteenth-century newspapers has revealed two important advertisements by and about Gedney.[232] The first, placed by Gedney on 21 November 1754, in which he listed all the instruments he made, stated that he '…greatly excels any other Maker, viz. in Bassoons, approv'd on and recommended by Mr. Millar, and other eminent Masters on that Instrument…'. Lasocki identifies the latter as John Miller, bassoonist at Covent Garden Theatre, and quotes an obituary stating that 'He was for many years reckoned the best performer on the bassoon, and always presided at the Italian operas, as the principal on

[231] Peter Whelan, private correspondence 6/8/2010, following playing August 2009.
[232] Lasocki, 'New Light', pp. 95-96.

that instrument, 'till about four years since, when Mr. Beard engaged him on a good salary at the above house [Covent Garden Theatre]'. Rees, in *The Cyclopaedia* (1810-24) stated: 'In the last age, Miller was the favourite performer on the bassoon in England at all public places'.[233]

Miller appears again in the second advertisement, this one placed by Gedney's daughters on 2 June 1769, a little less than a month after their father's death:

> FLUTES, and all Kinds of Musical Wind Instruments, continue to be made and executed in the most complete manner, by CATHERINE and ANN GEDNEY, daughters and successors to their father, the late Mr. Caleb Gedney, at the Temple-Exchange Coffee-house, Fleet-street, and under the inspection of Mr. Miller, their guardian. The above daughters were brought up in the business, and finished most of the instruments for some years, in their father's life time. Gentlemen favouring them with their commands, will be most thankfully acknowledged, and punctually executed by their obedient servants, CATHERINE and ANN GEDNEY.[234]

It is all too easy to ignore women's activities in trades because of their invisibility in the records, so it is interesting to learn that these two young women were fully trained in instrument-making and had presumably been essential to Gedney's business, which should, perhaps, now be called the Gedney family workshop. These are, of course, the same two daughters who were the cause of Stanesby Jnr's caveat in leaving his tools to Gedney in his will: that he should first marry their mother. They were aged 17 and 20 at the time of this advertisement, hence the reference to Mr Miller as their guardian.

We also learn from the advertisements that Gedney regarded bassoon making as a speciality of his, and that he had as a colleague John Miller, a bassoonist of high standing, to help in testing them and recommending them to potential clients. The friendship with Miller was strong enough for Gedney to make him guardian of his daughters, and Miller continued to test the bassoons (and possibly other woodwinds) for them after their father's death.

As Catherine and Ann, trained woodwind instrument makers, had been finishing 'most of' Gedney's instruments for 'some years' before 1769, the Waterhouse bassoon (1768)

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[233]Abraham Rees, *The Cyclopaedia or Universal Dictionary of the Arts,* (London, 1810-24), quoted in Lyndsay Langwill, *The Bassoon and Contrabassoon* (London: Ernest Benn, 1965), p.39. He also gives a very similar quote from Jones, *Encyclo. Londoniensis* (1797-) on p.176.
[234] Lasocki, 'New Light', p.95.

would probably at least have been finished, and perhaps entirely made, by the two daughters. That the Horniman Bassoon (1765) may have been finished by Gedney himself, might explain the difference in quality of stain and finish. It might also explain the different key-makers: Gedney may have made the keys for the Horniman bassoon himself, but his daughters bought those for the Waterhouse bassoon from John Hale, who worked a quarter of a mile west, down the Strand. That both of these bassoons would probably have been tested and approved by a highly competent player indicates that the stepped bore is perfectly adequate for a high-quality bassoon.

Johann Just Schuchart

There is one surviving bassoon by Schuchart; sold at Sothebys on 22 May 1980, it is now in Japan, unfortunately out of reach of this study. The Sothebys catalogue has good photographs of front and back views (reproduced in Appendix 3) which show that it too conforms to the English type. According to the following argument, it can be dated to between 1741 and 1753.

Schuchart, like Bressan, was an immigrant to London who seems to have started making woodwinds as soon as he arrived (c.1720), and Byrne suggests that he may have first worked for Bressan before setting up on his own around 1729.[235] His earlier stamp was: JuJ SCHUCHART.[236] Byrne suggests that the stamp found on this bassoon: SCHUCHART (without initials) was used from the time his son Charles came to work with him, around 1741.[237] Charles and he separated their businesses around 1753, from when Johann-Just may have used the stamp: SCHUCHART SNR. Charles later trained and/or worked with, first Collier and then John Hale (the maker of bassoon keys). Muraeus (mentioned above in note 219 under Stanesby Junior) must have come to work for J. J. Schuchart after the separation from Charles.

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235 Maurice Byrne 'The Cahusacs and Hallet', *GSJ*, 41 (1988), 24-31 (p.25) and Maurice Byrne 'Schuchart and the Extended Foot-joint', *GSJ*, 18 (1965) 7-13.

236 The small u between initials is a kind of hyphen; in this way it resembles Bressan's: PuI BRESSAN

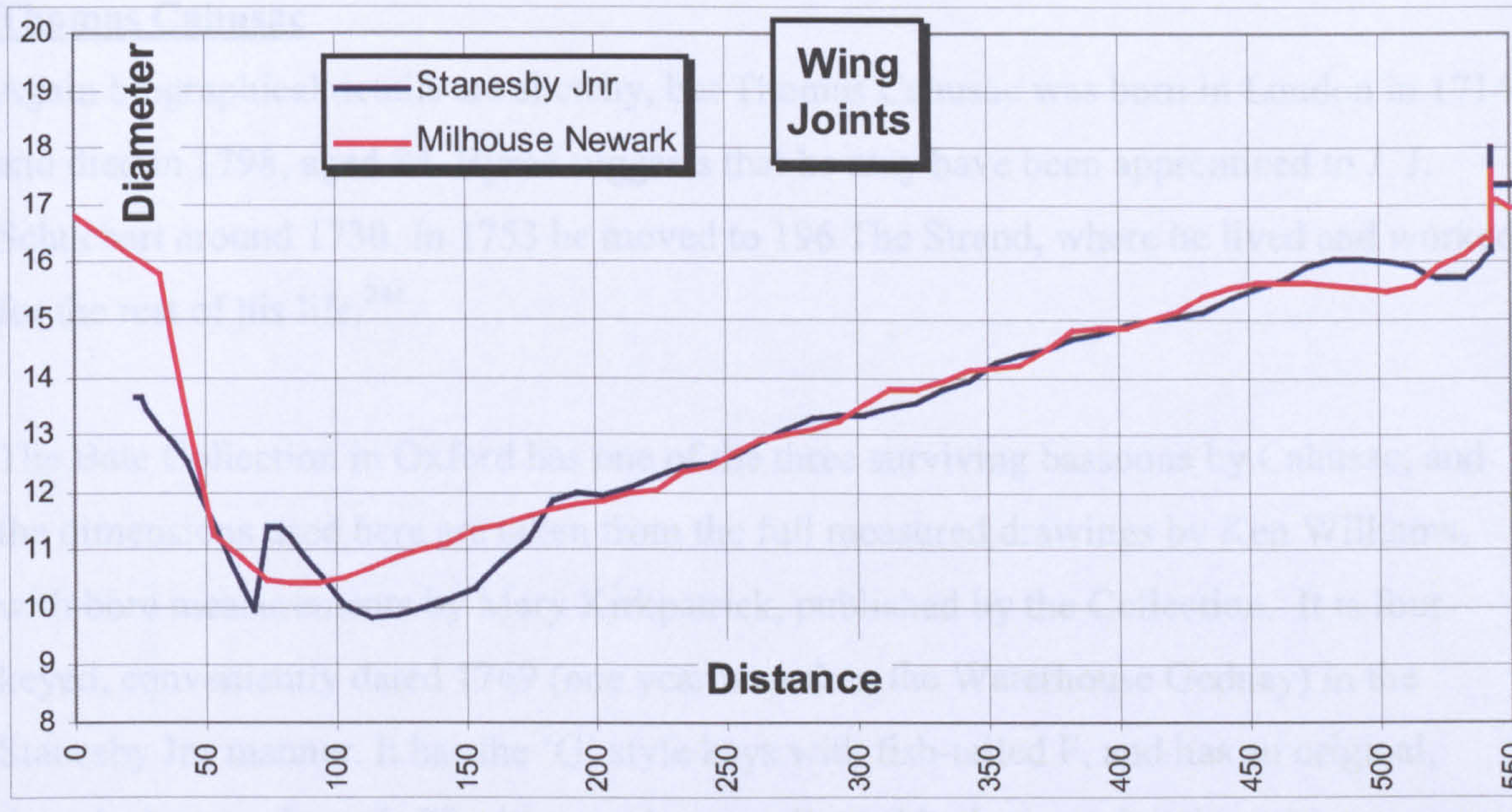
237 Maurice Byrne 'Schuchart', p. 9.

Richard Millhouse

The next bassoon, another from the Waterhouse collection, is stamped MILLHOUSE NEWARK, which is understood to be the mark of the first of several woodwind makers from this family: Richard (1), who was born in Newark 1724 and died there in 1775.[238] His father was a carpenter but it is not known to whom Richard was apprenticed; it can be inferred that he completed his apprenticeship around 1742-44, about the same time that Gedney started his apprenticeship with Stanesby Jnr. He was listed as 'turner' at his marriage in 1753, but there is no indication as to where he got his training in woodwind instrument making. Young lists just a vox humana and three bassoons with this stamp.[239] The stamp MILHOUSE NEWARK (one L), which is found on many more instruments including eleven straight-top oboes, is thought to be that of one of Richard's sons. Although Millhouse stamped his name on the boot below the F key in the Stanesby manner he did not put the date there.[240]

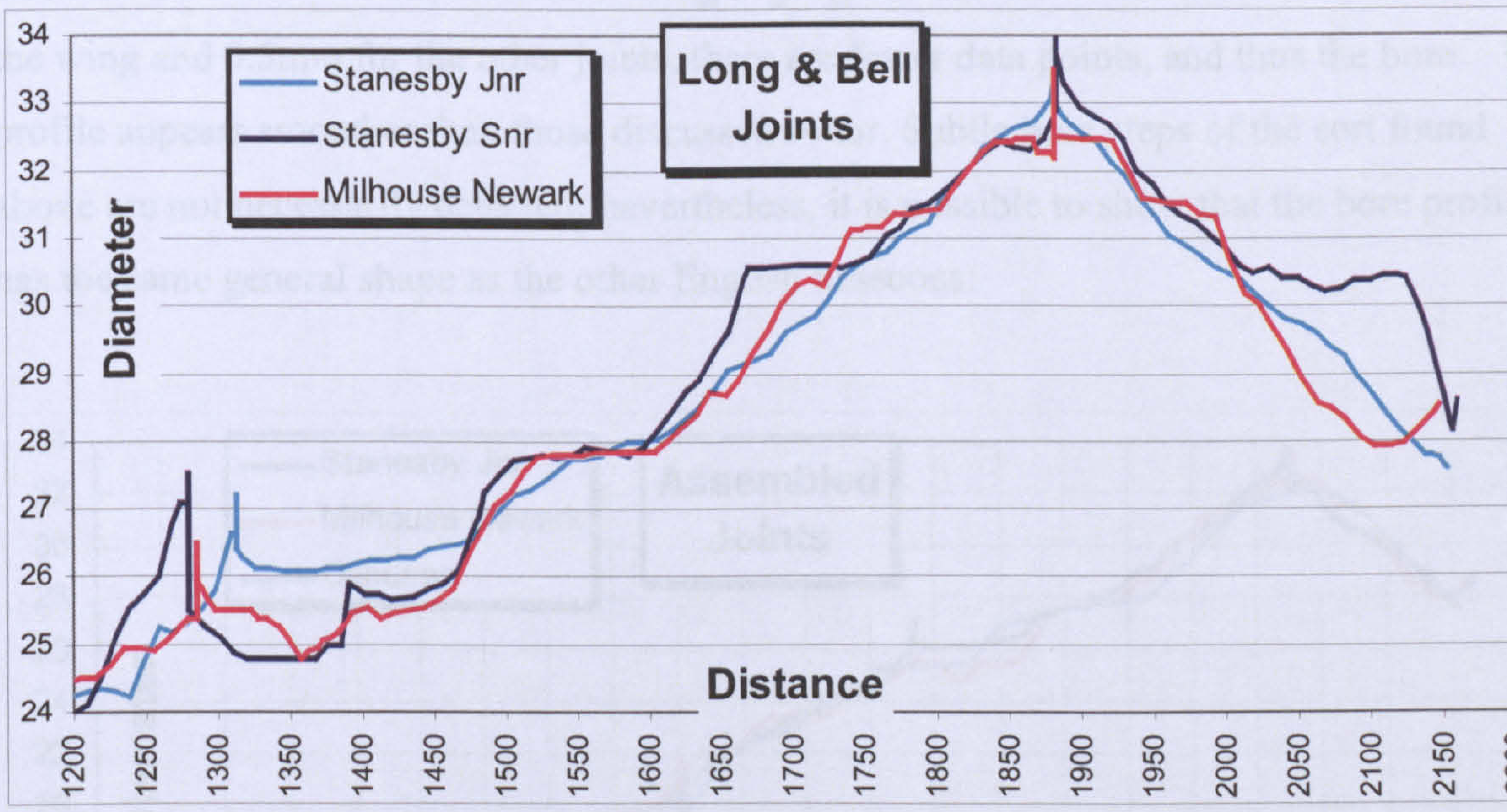
This is a four-keyed bassoon with keys of the same style as those stamped 'G' in fig 3.4.2.3 at the start of this section, though these are not stamped. The whole instrument displays all of the characteristics of the English type. It has been refinished in recent times in the same manner as the Stanesby Jnr. The bore shape is also similar to the preceding instruments, so it is possible to identify that as typically English too. The wing joint matches the Stanesby Jnr taper angle precisely but without the constriction at the throat:

[238] Waterhouse, *NLI*, p.264. Adkins disagrees that only instruments marked MILLHOUSE were made by Richard (1), but not that those so marked can be ascribed to him. This bassoon certainly appears to be from the period of Richard (1)'s activity; it would be extremely old-fashioned if made by either of his sons, even given the conservative nature of English bassoon design. See Cecil Adkins, 'William Milhouse and the English Classical Oboe', *JAMIS,* 22 (1996), 42-88 (p. 47), and: Lasocki, 'New Light', pp.80 & 83.
[239] Young, *HWI*, pp. 158-9.
[240] Though there is one bassoon with the same name stamp dated 1763 in the Sheffield City Museum. Young, *HWI*, p.158.



Graph 3.4.2.11. Wing joint profiles, Stanesby Jnr versus Millhouse Newark

In the long joint and bell there is more resemblance to Thomas Stanesby, with some of the same auger-steps again apparent and a similarly narrow south end:



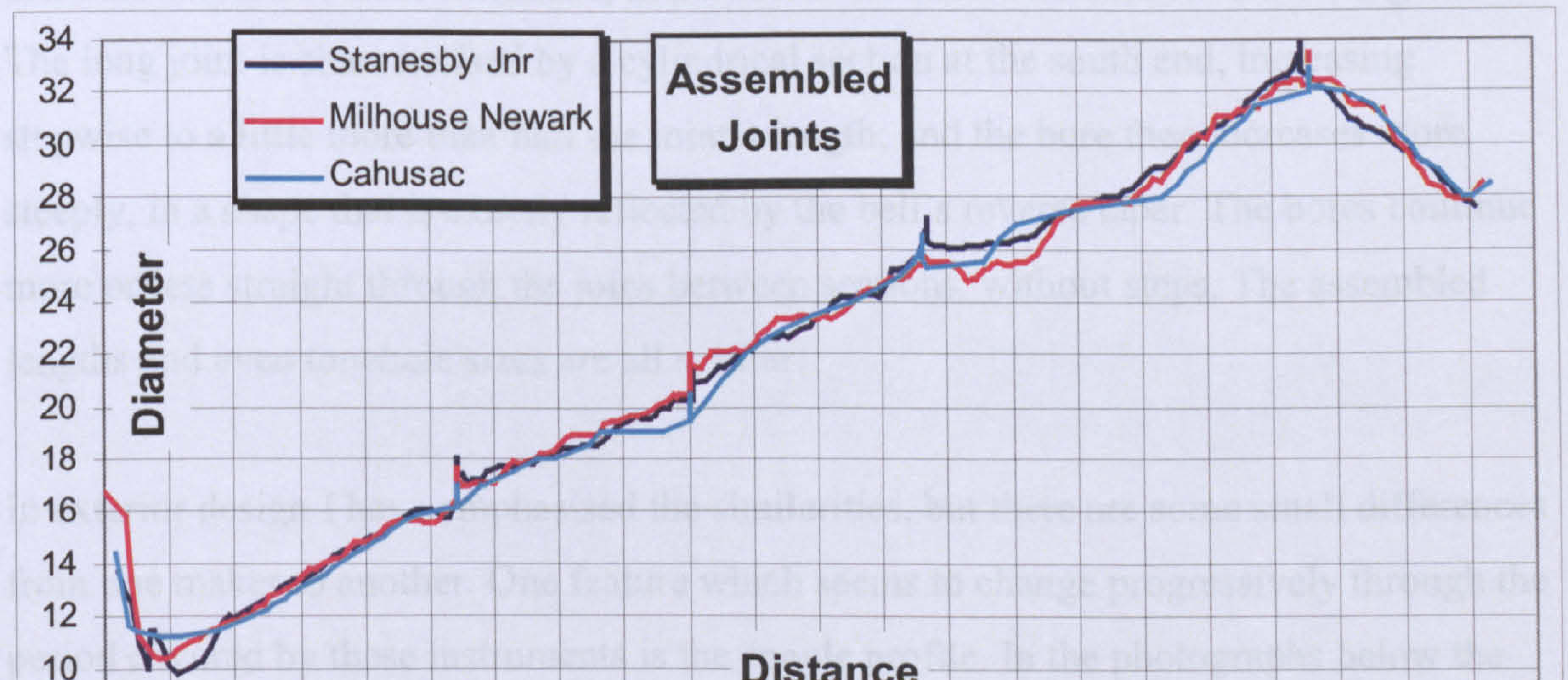
Graph 3.4.2.12. Long joint and Bell profiles, Stanesbys versus Millhouse

Thomas Cahusac

Again biographical details are sketchy, but Thomas Cahusac was born in London in 1714 and died in 1798, aged 84. Byrne suggests that he may have been apprenticed to J. J. Schuchart around 1730. In 1753 he moved to 196 The Strand, where he lived and worked for the rest of his life.[241]

The Bate Collection in Oxford has one of the three surviving bassoons by Cahusac, and the dimensions used here are taken from the full measured drawings by Ken Williams, with bore measurements by Mary Kirkpatrick, published by the Collection. It is four-keyed, conveniently dated 1769 (one year later than the Waterhouse Gedney) in the Stanesby Jnr manner. It has the 'G' style keys with fish-tailed F, and has an original, though shortened crook. The bassoon has a well-used look, a good patina with considerable wear around the fingerholes. The top of the wing joint has a brass sleeve 43mm long inserted to line the crook socket.

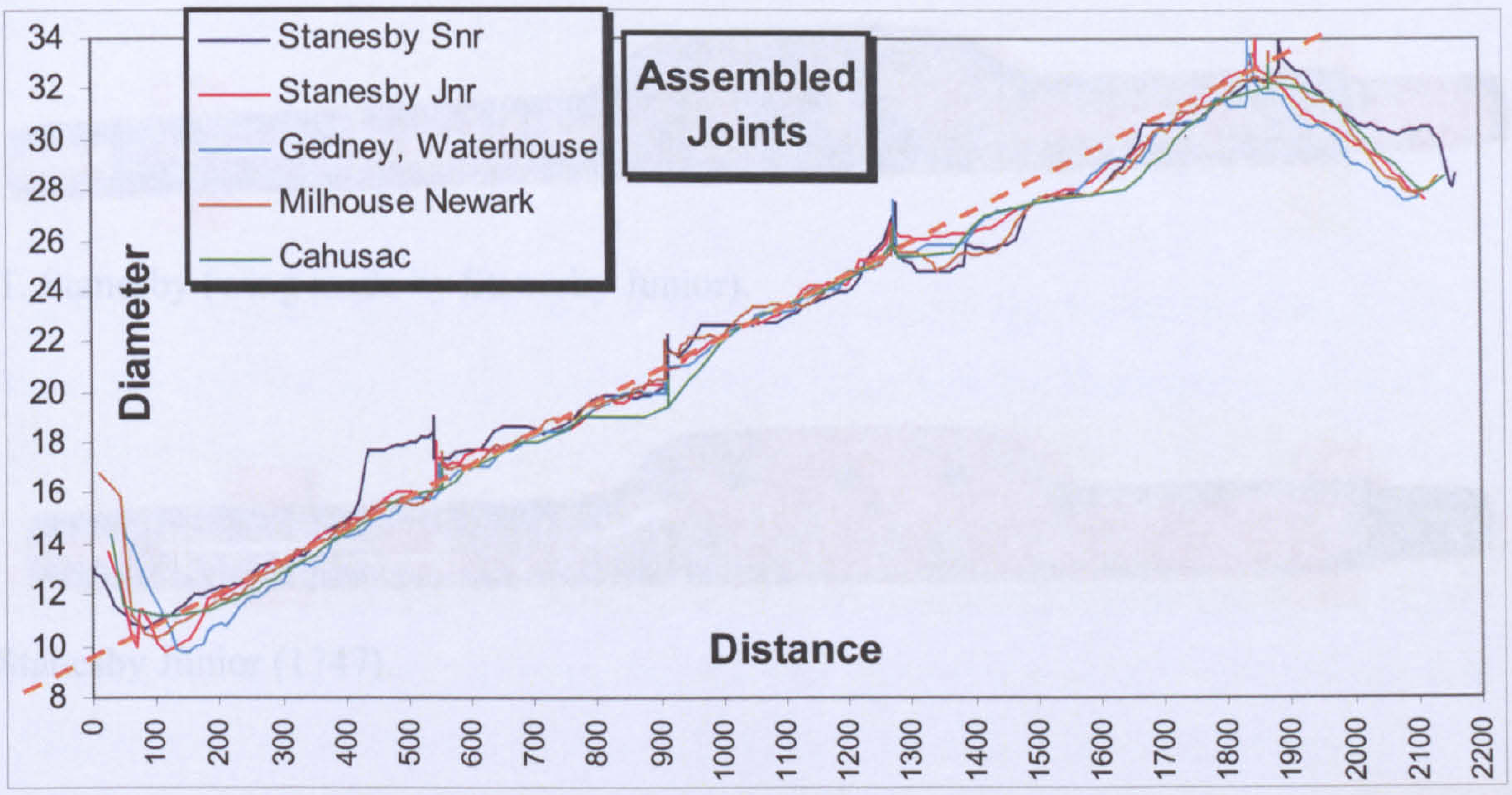
Because the bore has been measured using T-gauges, in diameter increments of 0.2mm for the wing and 0.5mm for the other joints, there are fewer data points, and thus the bore profile appears smoother than those discussed so far. Subtle bore steps of the sort found above are not necessarily detected; nevertheless, it is possible to show that the bore profile has the same general shape as the other English bassoons:



Graph 3.4.2.13. Assembled bores of three English bassoons

241 Waterhouse, *NLI*, pp.54-55.

The collected view of five bassoons below (Graph 3.4.2.14) shows just how tight an envelope all of the bore designs fit into:



Graph 3.4.2.14. Bores of five English bassoons, with reference line of 0.0125 slope

The bores of the first three sections lie close to a straight line of .0125 (1 in 80 slope), and this line continues up to intersect the junction of long joint and bell. Closer examination shows the wing and boot up bores to be slightly steeper, around .0145; and, of course, there are important local variations, in particular the short constriction at the wing's throat. The long joint is characterised by a cylindrical section at the south end, increasing stepwise to a little more than half the joint's length; and the bore then increases more steeply, in a shape that is exactly reflected by the bell's reverse taper. The bores continue more or less straight through the joins between sections, without steps. The assembled lengths and even tonehole sizes are all similar.

In exterior design I have emphasised the similarities, but there are some small differences from one maker to another. One feature which seems to change progressively through the period covered by these instruments is the épaule profile. In the photographs below the oldest wing has a rounded profile; the shoulders are at a low angle to the column and the corners to the feather-edge are rounded, the edge itself is a little curved. Proceeding down the page, the edge becomes straighter, the corners sharper, and the shoulders make a greater angle to the column. The last wing from a Type 3 (English classical) bassoon, shows where this trend was heading: the shoulders are cleanly and elegantly cut in a sweeping concave, with sharp corners to a straight feather-edge, in keeping with the immaculate, gallant, styling and craftsmanship of the whole bassoon.

Fig 3.4.2.12. English bassoon wing joints

T. Stanesby (wing made by Stanesby Junior).

Stanesby Junior (1747).

Caleb Gedney (1769).

Richard Millhouse (Newark).

William Milhouse (337 Oxford Street).

This discussion has spanned three generations of English makers:

1st generation: Thomas Stanesby.

2nd generation: Stanesby Jnr, J.J. Schuchart.

3rd generation: Gedney, T. Cahusac, R. Millhouse.

The instruments examined range in date from c. 1710 to 1769, a period that covers a significant change in musical demands, yet it has been found that their bassoon designs have a great deal in common. Other English woodwinds, especially oboes, changed their form in this time; the recorder declined drastically in popularity, while the flute rose, but the bassoon's form, in outer shape, keywork, toneholes and bore hardly changed. It also remained, distinctly different from French, German and Dutch models, and grew more so as this period progressed.

The English makers shared in a pool of taste and of knowledge, but the method of transmission of that knowledge is not known. A happy and free sharing of information seems to be ruled out by comments on a trade card of Stanesby Jnr's which survives in the British Library: '...my Father, or Self, never taught, or employ'd any other Person, in the finishing part of any Instrument whatsoever'. [242] Of course this was before he had taken on Gedney as apprentice; Halfpenny suggests that the card was probably made at the time of his Freedom of the Turners' Company in 1728.[243] Gedney, in his turn, advertised immediately after his master's death, stating that he had been Stanesby's only apprentice and that his master had '...in his life-time communicated to him [Gedney] the only true Method of finishing all Sorts of those Instruments in the compleatest Manner and to the utmost Perfection'.[244]

The ability to prepare the parts of woodwind instruments - by boring, socketing, turning, even drilling toneholes and reaming - would not be beyond the skills of a well-trained, determined and intelligent turner. However both of those advertisements, and that of Gedney's daughters previously cited, make reference to the 'finishing' of instruments, which woodwind makers would recognise as the tuning and voicing - the skilled work that turns a tube of wood into a musical instrument and the fine adjustments to response and tuning that distinguish a top-rate instrument from an ordinary one. This specialist knowledge would certainly not be part of a general turner's training, and going by Stanesby Jnr's comments, was jealously guarded outside of the master-apprentice relationship.

[242] Waterhouse, *NLI*, p. 381
[243] Eric Halfpenny, 'Further Light on the Stanesby Family', pp.61-62.
[244] The Public Advertiser 12 March 1754; Waterhouse, *NLI*, p.130

It is not even known how these makers recorded their designs and critical dimensions, but two small clues are considered here. One comes from a newspaper notice of 1756, in which Charles Schuchart made a claim for his father having been the first to make a flute with C-foot joint in England.[245] In it he said '...my father has at his House in Angel-Court, Windmill-Street, the Pattern of one which he made above thirty Years ago' [my emphasis]. This pattern was possibly a plan on paper but it could conceivably mean a three-dimensional pattern, a master model. A second, earlier, clue bolsters that suggestion: Thomas Stanesby (Senior), in his will of 1734 wrote: 'I give to my son Thomas Stanesby all my pattern instruments with all my working tools and a seal ring' [my emphasis].[246] This wording certainly seems to imply that he kept master models to refer to and work from. Nothing of either sort (paper plan or master model) for any woodwind instrument from any maker is known to have survived from the eighteenth century, though it may be that the patterns were instruments made in the normal way and chosen, perhaps as particularly good examples, to act as models. In that case we would be unable now to recognise them as distinct from any other finished instrument.

Not all design-making was by simple copying; of course there were innovators too, and again there are indications that the two Stanesbys were inventive makers. Recent research by Jem Berry on T. Stanesby's oboes demonstrates that he worked to high precision when shaping the bores, and used subtle techniques of bore adjustment to refine their tuning and response.[247] I have argued above that Stanesby Jnr was a thoughtful and innovative maker, and further evidence comes in a statement by Sir John Hawkins that he was '...a diligent peruser both of Mersennus and Kircher...', and that he made a 'short bassoon or Cervelat' from Mersenne.[248] Thus he was able to read Latin (and perhaps French) and was curious enough to try making an instrument of archaic type (a cylindrically bored racket, rather than the baroque, step bored versions made by Bizey, Denner and Wijne) from information found in an eighty-year-old book.

The advertisement of Gedney also refers to 'his said Master's Mathematical Calculation', implying not only an ability with mathematics but also the possession of some rules

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245 Byrne, 'Schuchart', p.7.

246 12 September 1734, PROB 11/667, www.nationalarchives.gov.uk.

247 Berry and Jones, 'Oboes by Thomas Stanesby Sr'..: Bores and Perturbations' *Making the British Sound,* GSJ and HBS Conference, Edinburgh, Sept 2009; and 'Oboes by Thomas Stanesby Sr.: possible acoustic function of bore perturbations in the baroque oboe', paper presented at the Musical Acoustics Network: Wind Instrument Acoustics Symposium, Edinburgh, Sept 2009.

applicable to instrument design - perhaps of proportions for the laying out of joint lengths and tonehole placements, recorder windway dimensions, etc - beyond simple records of the critical dimensions for various instruments.

It seems, in any case, that we can thank both Jacques Hotteterre and Bressan for bringing to London the new French instruments, the instrument making skills, and possibly the knowledge required to make the French bassoon. Other makers in London, Thomas Stanesby and Johann Schuchart in the first instance, acquired that knowledge either through formal training or in some other way. From there the knowledge was passed down through master-apprenticeships but there is little evidence that it was spread through collegial relationships between makers.

This discussion of affairs in London leaves unanswered the question of how provincial makers learned their trade. Richard Millhouse is not recorded as having spent enough time in London to have studied woodwind making, although his sons later moved there to establish successful businesses. A large provincial market was not entirely filled by London makers, and there existed provincial makers too of whom we know little.[249] One such was John Blockley of Ullesthorpe, Leicestershire (c.1735-1798), and an account of his abilities suggests another way of learning to make woodwinds. He was described posthumously as 'a very ingenious mechanic; by natural genius, without any instruction from others, he acquired the art of making musical wind instruments with great elegance and taste'.[250]

One consideration not so far discussed is the question who these bassoons were made for? It is all too easy for us today to think just of orchestral and solo repertoire, and that our instruments must be designed to be playable at the extremes of virtuosity; but a much larger eighteenth-century market would have been military and church bands throughout the country. The musical demands on players and instruments in these were rather less exacting and the demand for novelty in design also less than in fashionable London. The amateur market was important too, as evidenced by the first owner of the Stanesby Jnr

[248] 'Hawkins' History of Music', Book XIII, Ch. CXXVI, quoted in Eric Halfpenny, 'Stanesby, Major and Minor', p. 44.
[249] See Mathew Dart, 'A Newly Discovered English Bassoon by Sinderby', in *Celebrating Double Reeds: A Festschrift for William Waterhouse and Philip Bate*, ed. by Terry B. Ewell (U.S.A: The International Double Reed Society, 2009), pp. 159-168.
[250] John Nichols (ed), *History and Antiquities of the County of Leicester*, (London: 1813), quoted in Waterhouse, *NLI*, p.35.

bassoon. The first English tutor for the oboe appeared in 1695 and many more followed, though the amateur bassoonist was less well catered for - the earliest known English bassoon tutor was published c. 1770, by Longman and Broderip. Fingering charts are to be found interleaved in earlier volumes; from 1730 in *Musica Bellicosa or Warlike Music, being a Choice Collection of Sixty-eight Marches and Trumpet-tunes,* but without instructions for playing the instrument.[251] The English design as apparently established by the Stanesbys was demonstrably good enough for all the markets it had to satisfy.

The fact that only one style of bassoon was being made in the country should not be taken to imply that only one style was being played there. Foreign players were working in London right through the period, and some of them doubtless brought instruments with them.[252] In a letter of 24 January 1711, Louis Rousselet wrote from London to his friend Julien Bernier in Paris to ask him to obtain a pair of bassoons. Rousselet, one of several French oboists working in London, was the son of Jean, a Parisian maker and player of wind instruments and Bernier was a flautist at the Opéra in Paris: [253]

> I beseech you, in your spare time to please stop chez M. Ripert [sic] to have him make two bassoons, one right-handed, and one left-handed, for two of my friends who play in the Opera here with two oboes made by master Colin Hotteterre. But it is necessary that he has the kindness to make them the same model that he made them before, that is to say, that the foot-joint be larger on the bottom and that it be about ¼ tone higher than those that he presently makes, and send me please the price of everything. Finally, that one will have the money reach you by way of a merchant to whom you will have the kindness to have them brought in order to send them to Amsterdam to another merchant who will be so kind as to send them here. As you know, M. Ripert does not finish the bassoons. Have the kindness to try them yourself, because it is for persons who know how to draw out of them all that one must when they are in their hands. It is necessary that the bassoons and the oboes be the same pitch we play here, almost ¼ tone higher than the pitch of the Opéra in Paris. [254]

In addition to the insight into the international trade of instruments there are several things to be learnt about instrument making from this letter:

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[251] See Eric Halfpenny, 'The Earliest English Bassoon Tutor', *GSJ*, 17 (1964), 103-105 (p.103); and Mathew Dart, 'Early English Bassoon Fingering Charts 1690-1801' (unpublished HND dissertation, London College of Furniture, 1985).
[252] See David Lasocki, 'The French hautboy in England, 1673-1730', *Early Music*, 16.3 (August 1998), 339-357.
[253] Waterhouse, *NLI*, pp.336 and 338.
[254] Translation from Tula Giannini, *Great Flute Makers of France: The Lot and Godfroy families, 1650-1900*, (London: Tony Bingham, 1993), p.45.

1) The bassoons being ordered were four-keyed; otherwise there would be no need to distinguish right- and left-handed versions.
2) The pitch in London was around a quartertone higher than that at the Paris Opéra. That puts it at about A=408 Hz, which is the pitch often ascribed to recorders and flutes made by Bressan and the Stanesbys.
3) The oboists were playing in London on French-made oboes. Although they were by one of the Hotteterre family, Rousselet was not sending to the same maker for the bassoons.
4) These are to differ from Rippert's standard model both in pitch and, somewhat mysteriously, in that the 'foot joint be larger on the bottom'. In French the boot joint is similarly the *culasse,* but there does not seem to be any sense in making that bigger. Perhaps he is using flute and (occasionally) oboe players' parlance, using foot to mean the section at the farthest end of the instrument (the bell). In that case it could be an instruction to make a reverse-tapered bell as opposed to one with cylindrical bore (wider at the bottom than at the top). If so, the Parisian maker is being asked to adapt his design to fit the prevailing style of the London market. This difference of design is discussed more in the section on French instruments.
5) 'M. Rippert does not finish the bassoons', and yet Bernier is asked to test them to ensure they are fit for skilled professional players. Giannini takes this to mean that Rippert did not finish them until the customer came to try them – that he finished them to suit the customer's playing style.[255]

In the article on French oboists cited above (note 52), Lasocki discusses the letter and concludes that the oboists in question were Kytch and Galliard.[256] That is the J.E. Galliard who wrote 'Six Sonatas for the Bassoon or Violoncello with a Thorough Bass for the Harpsichord' published in London by Walsh, and for whom Handel wrote a florid obbligato in *Teseo* - a skilled player indeed, who would 'know how to draw out of them all that one must'.[257]

Another reference to bassoon playing in London, identifies another French player but shows that English players, too, were holding their own (though we do not know whose

[255] Ibid., p.36.
[256] Lasocki, 'French Hautboy in England', p. 348.
[257] Ibid. NB Lasocki and Giannini disagree over the date, Lasocki saying January 1712 and Giannini 1711. Giannini shows that the letter itself is dated 1711 but was included in a document of *partage* of 1712. The date makes a difference to whom the oboists might have been as Galliard took the place of John Loeillet in 1711. Rousselet had been a member of the same band until 1707.

instruments they were playing on). In '*An Universal History of Arts and Sciences* by the Chevalier Dennis de Coetlogon MD, London 1745, the Chevalier wrote:

> The best *Bassoon* I ever heard was one Le Breton, Bassoon of our Lady at *Paris,* who invented a Counter-tenor to the *Bassoon.* The next to him is a Bassoon in the Guards of his *Britannick* Majesty; and next to him one De Ricourt a *Frenchman,* who is Bassoon at the Theatre in *Drury-Lane,* who is one of the best Hautboys in *Europe* and plays extremely well on the *German* flute. [258]

Byrne surmises that the Guardsman may be John Miller – who later became advisor to the Gedneys.

Iconography

There is pictorial evidence for foreign-made bassoons in England too. The illustrations in Fig 3.4.2.13 below show Type 1 bassoons in use in English settings; all the evidence of English-made bassoons indicates that these instruments must have been imports.

Fig 3.4.2.13 Detail from Johann Sebastian Muller after Samuel Wale, *Vauxhall Gardens showing the grand walk at the entrance of the garden and the orchestra with musick playing* (c. 1751). Victoria and Albert Museum no. W.27BB-1947

[258]Byrne, 'Le Breton and the Counter Tenor Bassoon', p. 115.

Fig 3.4.2.14. From the title page of an English music tutor; the clothing sets the scene in England circa 1730[259]

Edward Collier

The late Edward Croft-Murray supplied another piece of pictorial evidence, also now in the possession of his widow, Jill Croft-Murray. It is an unsigned painting attributed by Croft-Murray to the same Edward (Edwaert) Collier discussed under Type 1a, but from the period when he lived in London, from 1693 until his death in 1708. In a wide format, it shows a carpet-covered tabletop displaying various instruments and music. A bassoon is shown full length, diagonally across the table; it is black with silver keys, ferrules and crook, and is left-handed. Parts of the instrument are hidden by a violin and two baroque style alto recorders, of dark-stained wood with ivory mounts, which lie across it. Behind the bassoon is a guitar with decorative purfling and a parchment rosette. A violon-cello stands to the side of the table, visible only by its neck and scroll.

There are two open books of manuscript music and two printed books showing their title pages. One, the *Violino Primo* part of *A Collection of Ayres / Compos'd for the ... and upon other occasions / by the late Mr Henry Purcell,* the other *[A] Collection of the*

[259] Simon Rickard, private correspondence.

Newest Songs.... to which is added / A Collection of Airs Composed for Two Flutes by Several / The Fifth Book.

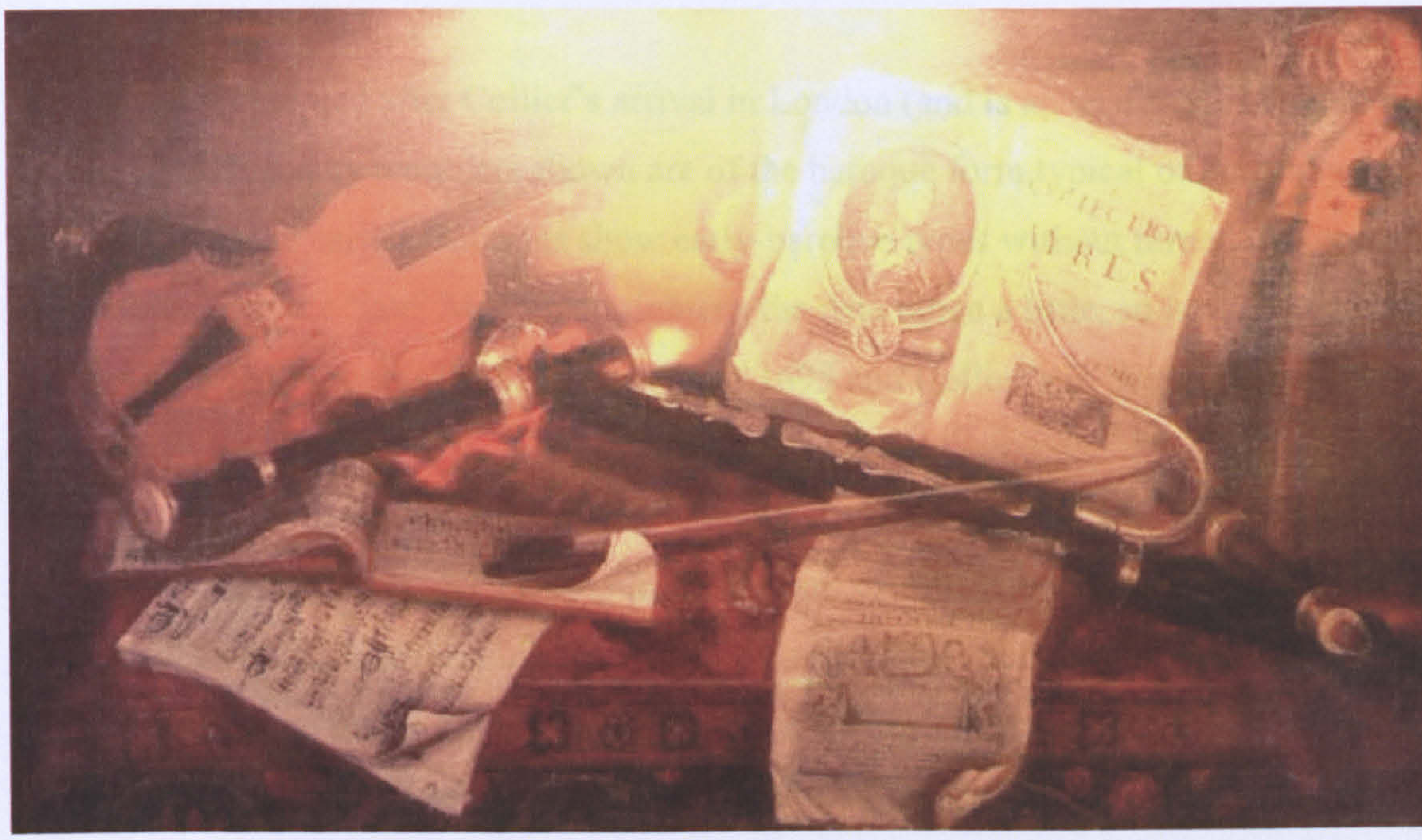

Fig 3.4.2.15. Edward Collier; Croft-Murray collection

The *Newest Songs* has a little picture of a group of musicians, with what might have been a bassoon player on the left but turns out to be, in keeping with the work's title, a group of recorder players. The legend in the cartouche says 'Lessons for the Recorder' and the player on the left has a crook-blown bass:

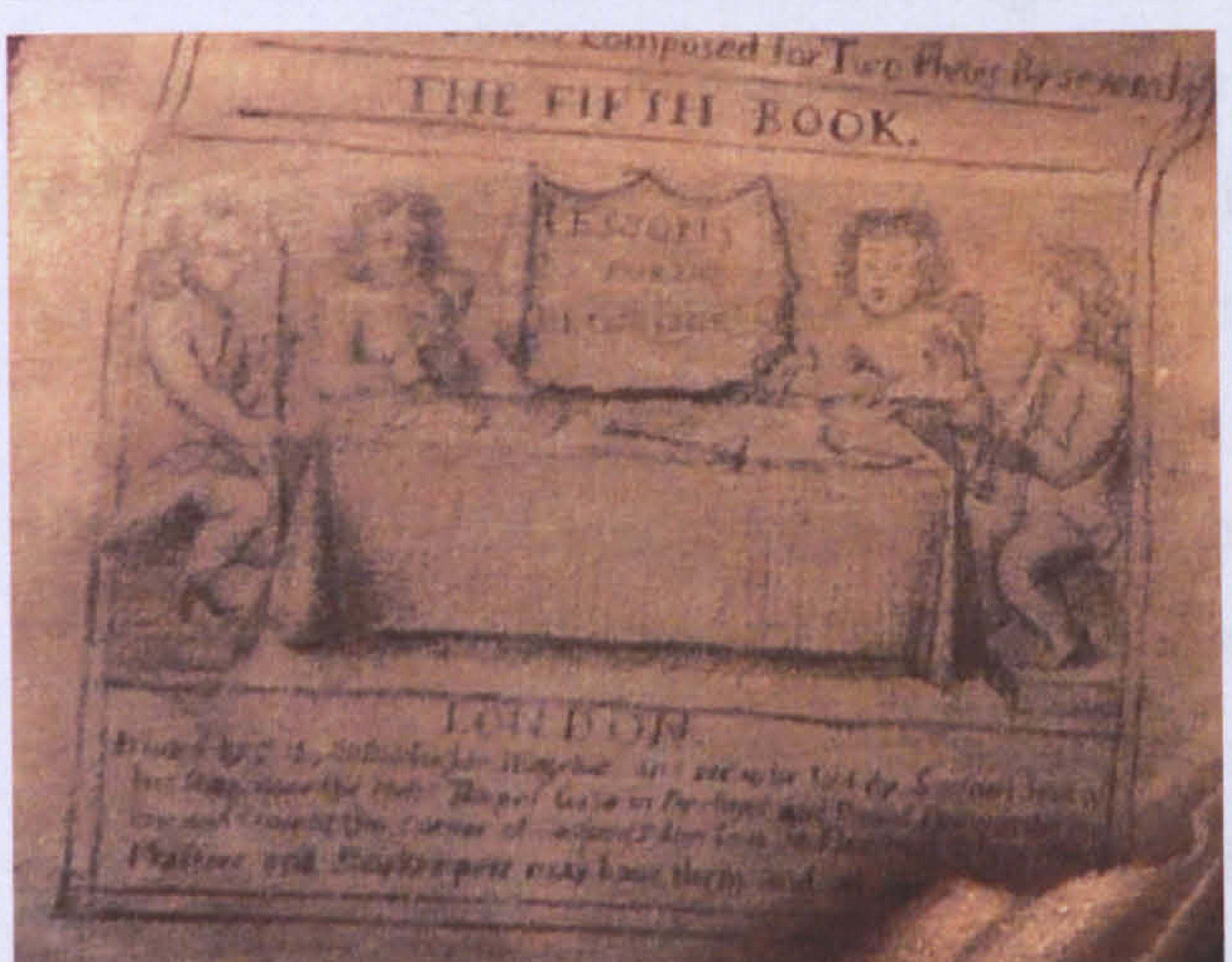

Fig 3.4.2.16. Detail of *Newest Songs* from Edward Collier

It is from John Hudgebut's *A Vade Mecum* of 1679, and the actual engraving is reproduced in 'The Cambridge Companion to the Recorder', where it is discussed by

David Lasocki.[260] It is a tutor for the new French baroque recorder, claimed by its author to be 'the first Essay of this kind'. It is noticeable that the copy portrayed in the painting is well worn and dog-eared.

This is clearly painted after Collier's arrival in London (and is an example of how in his London paintings any recorders shown are of the baroque form typical of Stanesby and Bressan while the earlier paintings show early-baroque types without turned decoration). The reference to the 'late' Mr Purcell tightens the date range a little, so it must have been painted between Purcell's death in November 1695 and Collier's in September 1708.

The bassoon shown is a gentleman's model with silver fittings and a handsome dark colour. Its lies face down, so the long joint keys are visible, and while they are of familiar shapes, they are not like those on any known bassoon. The touch part is like that on a Hotteterre tenor recorder, but also found on oboe Eb keys from Netherlands, France and Germany. The elongated-onion shaped part on the other side of the pivot is not seen on known bassoons, but the key as a whole is not entirely unlike that on the J. C. Denner in Brussels. Apart from Denner's, most long joint keys are rather plain; perhaps these are made more ornate for the 'gentleman's model'.

The bell has a small crown; its ferrule is narrow, has a rolled-in edge at the southern extreme, and a bead on the northern edge. The wing and boot ferrules also have beads at each end. Such ferrules are found on one surviving instrument, the Gottlieb Wietfelt in the Waterhouse collection. The wing and bell ferrules are very similar, though the crown on the Wietfelt is more substantial than the painted one (see Figs 3.4.2.17 and 18 below).

The date range for the painting does not fit with the working life of Gottlieb Wietfelt (1706-1768), but does fit that of his father Harmen (1669-p.1727).[261] The Harmen Wietfelt bassoon in the Horniman Museum does not have the same elaborate brasswork, but it is evident that Gottlieb otherwise followed his father's design very closely (see discussion of these instruments under Type 2c). It is quite possible that Harmen too made special

[260] David Lasocki, 'Instruction Books from c1500 to the Present Day', in *The Cambridge Companion to the Recorder*, ed. John Mansfield Thompson (Cambridge, Cambridge University Press, 1995), pp. 119-135 (p.1260). Thanks too to Nicholas Lander and Debra Pring for this information in private correspondence.
[261] Coincidentally it matches almost exactly the period from J. C. Denner's letter asking permission to make the French baroque instruments through to his death, so shows a German plain-style bassoon contemporary with Denner's ornamental style.

models for the luxury market. Both of the Wietfelt bassoons have some English provenance.

Fig 3.4.2.17. E. Collier, detail showing the wing ferrule and bell.

Fig 3.4.2.18.Gottlieb Wietfelt bell and wing ferrules above, bell below.

The 1720 inventory of James Brydges, first Duke of Chandos's musical instruments at Cannons included 'a basson made by H. Wietzfell';[262] perhaps it was used in the band for *Acis and Galatea*, the Chandos Anthems, and other works the Duke commissioned from Handel.

[262] Waterhouse, *NLI*, p.429.

3.4.3 Type 2b: French/Flemish

Instruments in this section: C. Bizey, Dondeine, J.H. Rottenburgh, J.F. Roth (2).

Despite the illustration on Marais' Trios and the resemblance of the English bassoons to that depiction, the surviving French instruments are not quite of that form. Instead they resemble the illustration in Diderot and D'Alembert's *Encyclopédie* from sixty years later, at least in the bell design.[263] That bell has, instead of the globular top end of Marais, a large bead, delineated by a groove (quirk) below, and a fillet above. Otherwise there are similarities with the English: there is the same smooth wing and simple long joint, with all keys mounted in saddles.

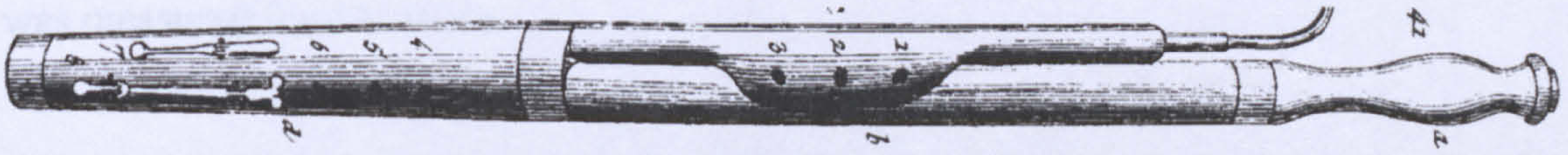

Fig 3.4.3.1. *Basson* from Diderot and D'Alemebert's *Encyclopédie*

There are also instruments in this group by a Flemish maker, a presumed Walloon, and a presumed German. Nevertheless, this baroque style can be seen to be a precursor to the more clearly definable French Classical style, as demonstrated by the works of Prudent and Porthaux.

<u>Charles Bizey</u>

Bizey's birth date is unknown, and his death can only be pinned down to between 1752-58.[264] He was received into the guild of Master Musical Instrument Makers in Paris in 1716, which makes him almost exactly contemporary with Stanesby Junior, (who completed his apprenticeship in 1715 and died in 1754). In around 1745 Bizey moved his workshop to rue Dauphine and at that address established a dynasty of woodwind makers ultimately comprising himself, his apprentice Prudent Thierot and Prudent's successor/brother-in-law Dominique Porthaux; with close associations with woodwind makers Christophe Delusse and Paul Villars.[265] All of the rue Dauphine three are mentioned in Ozi's '*Méthode Nouvelle et Raisonnée pour le Basson*'; Bizey and Prudent as makers of the '*Basson Ancienne*', and Porthaux as a maker of bassoons as good as

[263] Denis Diderot and Jean-Baptiste le Rond d'Alembert, *Encylcopédie ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers*, (Paris, 1751), Lutherie plate IX.
[264] Waterhouse, *NLI*, p.34.
[265] Tula Giannini, 'A French Dynasty of Master Woodwind Makers Revealed, Bizey Prudent and Porthaux, their Workshop in Paris, rue Dauphine, St. André des Arts, ca 1745-1812: New Archival Documents', AMIS Newsletter, (February 1998).

Ozi's favourite, Keller, and '*vrai sur le modele du mien*'.[266] Both Prudent (as he stamped his instruments) and Porthaux are survived by relatively large numbers of bassoons: ten and twenty-two respectively, and for the latter at least, they seem to comprise the main part of his output.[267]

There are two known bassoons by Charles Bizey. One is in the *Beethovenhaus* in Bonn, but it has been sadly treated in its past life, with long and wing joints shortened at both ends. A report by Rainer Weber on his conservation work in 1992 is included in '*Zur Restaurierung von Holzblasinstrumenten…*'.[268] Recently a further boot joint signed by Bizey has been found; it is in the collection of bassoonist J. Papasergio. Neither of these was measured for this study.

The other bassoon is in a private collection in France, and only one instrument maker has been allowed access to it. That was Olivier Cottet, who kindly supplied me with a copy of his measurements and a sketch drawing. The measurements are not as detailed as those for other instruments here, but are enough to be useful in drawing up the bore profile and making comparisons to others. Only very limited tonehole data was provided.

Exterior

It is not possible to say from this data whether the joints have been shortened; the wing joint seems a little short at 521.7mm though the long joint's 600mm is convincing enough. A photograph was found in the Waterhouse archives, it is reproduced in Appendix 3. As far as can be seen the *Beethovenhaus* and this instrument are (or were before shortening), similar in design of both woodwork and keys.

<u>Bell:</u> The maximum diameter is at the large, rounded terminal bead; the column and intermediate swelling are both a few millimetres less. There is a single flat fillet at the top end. The wide brass ferrule is flush with the column and just a little larger than the top of the long joint.

<u>Wing:</u> The épaule extends to north and south well beyond the fingerhole group, leaving a

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266 Etienne Ozi, *Méthode Nouvelle et Raisonnée pour le Basson*, (Paris: 1787). *Article II^me* and fingering chart 1.

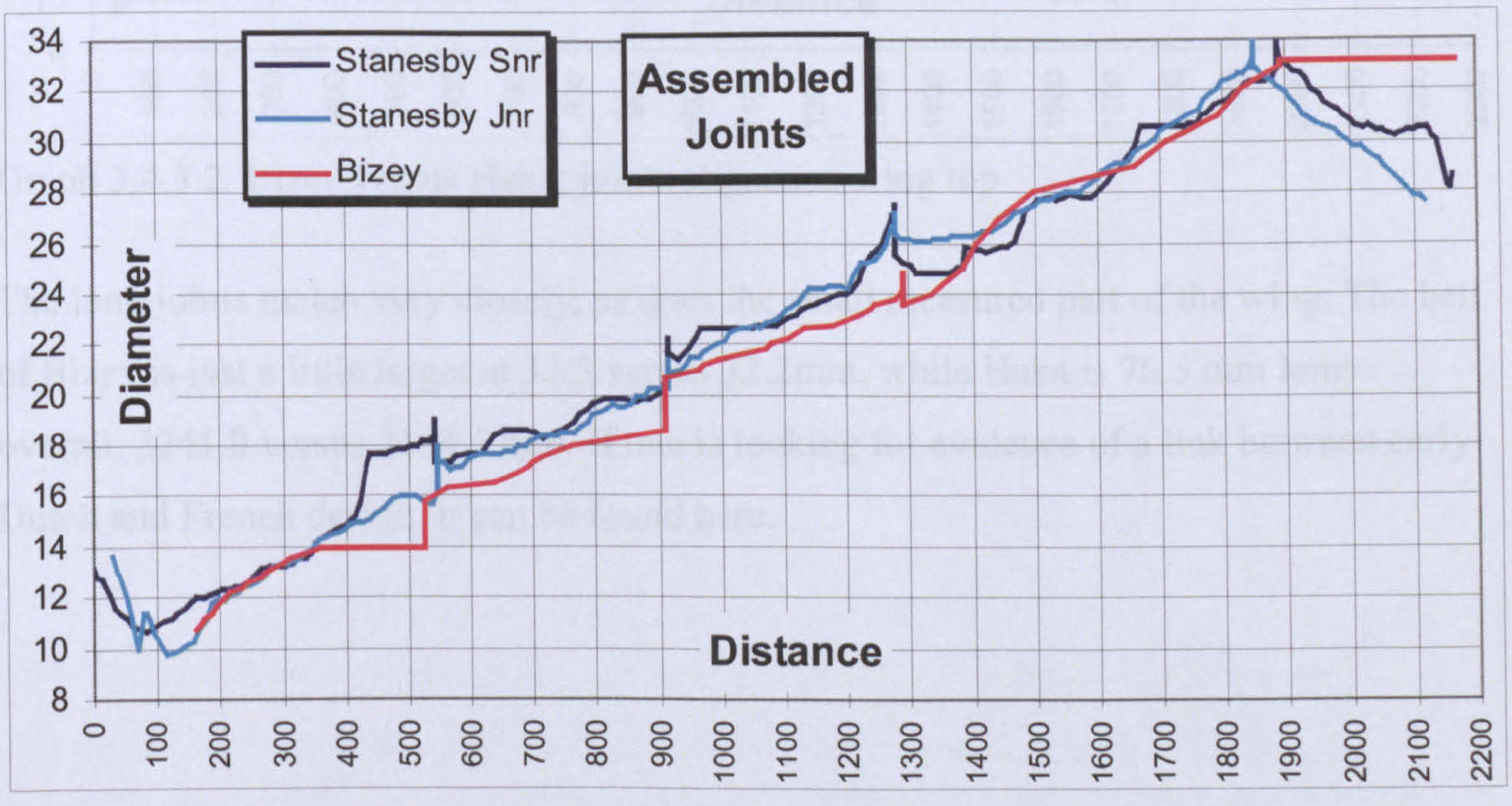
267 Prudent's bassoons are known to many players today, as his design was widely reproduced for use as baroque bassoons (despite the originals dating from the second half of the eighteenth century, and all having at least five keys).

268 Rainer Weber, *Zur Restaurierung von Holzblasinstrumenten aus der Sammlung von Dr. Josef Zimmermann im Bonner Beethoven-Haus* (Celle: Moeck Verlag + Musikinstrumentenwerk, 1993), pp. 131-141.

short column of only c. 40mm between it and the tenon (boot). The wing ferrule is of smaller outside diameter than the wooden column below it; this design feature continued to appear on bassoons by several French makers into the nineteenth century.
Long joint: The cross section is similar to the English style; there is a narrow platform of low profile blended into the circumference of the joint. There is an Eb key on the thumb side of the joint; from the sketch it appears to have an appropriate profile but it surely cannot be original given Bizey's dates.
Boot: The F key shape is, as noted in the previous section, a variation of a type that is something of an international standard.[269] The Ab uses the simple shape of the long joint touches, with a nearly circular pad-cover.
Bell: The shape fits well with the illustration in Diderot, and with that in Tardieu's '*Les Festins Royal*', as does the long épaule (see Figs 3.4.3.5 and 6 below).
Keys: All are mounted in brass saddles with wire axles.

Bore

The measurements are particularly limited in the wing joint, where compression of the tenon has precluded measuring a large section. In the graphs below this causes the appearance of a horizontal line indicating a cylindrical bore (14mm diameter, at 350 to 520 on the distance scale in the graph below), but actually there is no data for that section. There are no measurements of the crook socket from the north either, so the bore profile starts from a point 160mm in from the top of the wing. The plot below makes the comparison with the two Stanesby instruments:

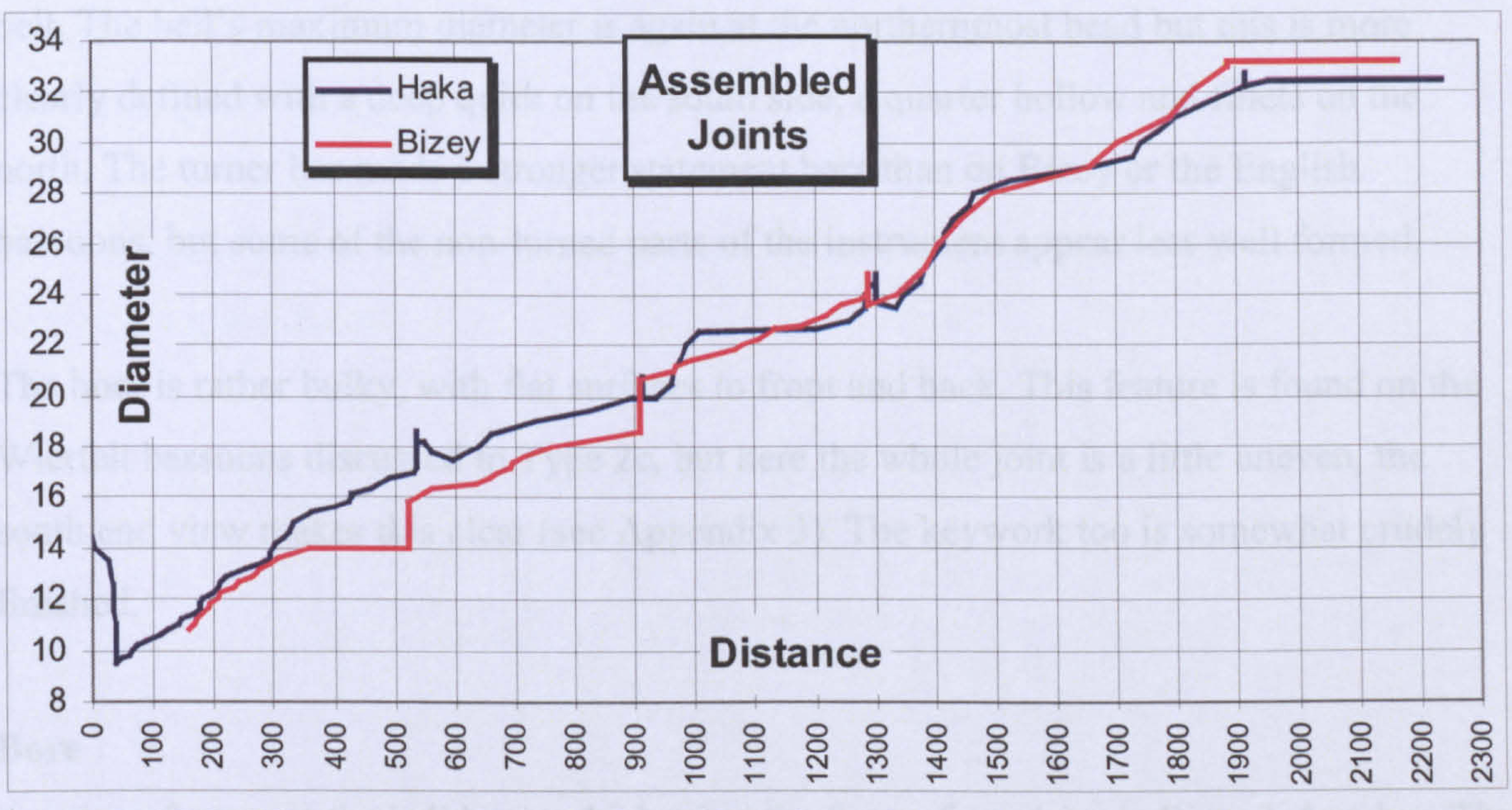


Graph 3.4.3.1. Bizey versus Stanesby father and son, aligned at the boot plugs

[269] See Fig 3.4.2.5.

The portion of wing joint that has been measured matches very closely that of Stanesby Jnr; the throat region of the Bizey is almost certainly worn away and would have had a narrower diameter originally, so could have matched Stanesby Jnr there too. The Bizey boot bores are both narrower than both Stanesbys, by somewhat less than a millimetre; the small bore is of the same general angle, the big bore a little lower in angle so that the long joint starts at a smaller diameter too. Apart from this narrow start, the long joint is of similar size and angle to the Stanesbys, with the shape from 1400 on somewhat similar to Stanesby Junior. The overall length is similar to that of the T. Stanesby (Bizey 2164.5 versus Stanesby 2161mm).

The cylindrical bell bore makes a distinct contrast to the English bassoons. To make a comparison with another cylindrical-bell instrument, here it is compared to the Haka:



Graph 3.4.3.2. Bizey versus Haka, joints aligned at wing top

The long joints match very closely, as does the small measured part of the wing. The bell of Bizey is just a little larger at 33.5 versus 32.2mm, while Haka is 76.5 mm longer overall: 2241.0 versus 2164.5 mm. If one is looking for evidence of a link between early Dutch and French design, it can be found here.

Dondeine

Henk de Wit suggests that it is a Walloon name; otherwise nothing is known about this maker.[270] This instrument has been mentioned under type 0, mainly because it has been put forward as a possible early French-type bassoon.

Exterior

There are several similarities with the Bizey such as the simple, bead-less long joint and the long épaule. It has the same simple shaped long joint keys and flaps; here the F key profile is closer to the Stanesby and the international standard than Bizey is (see Fig 3.4.2.5). All keys are again mounted in saddles.

The bell, however, is somewhat different; the column is fatter than the brass ferrule, which consequently appears to squeeze the diameter down to that of the long joint like a too-tight belt. The bell's maximum diameter is again at the northernmost bead but this is more clearly defined with a deep quirk on the south side, a quarter hollow and fillets on the north. The turner has made a stronger statement here than on Bizey or the English bassoons, but some of the non-turned parts of the instrument appear less well formed.

The boot is rather bulky, with flat surfaces to front and back. This feature is found on the Wietfelt bassoons discussed in Type 2c, but here the whole joint is a little uneven, the south end view makes this clear (see Appendix 3). The keywork too is somewhat crudely finished.

Bore

A unique feature is the bell bore, which takes the form of one long hollowed chamber. The minimum diameters at each end are close to those of the Haka and Bizey cylinders, with the terminal opening about the same diameter as the top of the long joint. The hollowing adds another 5 mm to the maximum diameter and must have been made by turning out the whole length of bore on the lathe. The joint is very oval as can be seen in the difference between maximum and minimum bore diameters.

The bore as a whole, has been constructed in way not seen until now, from several cylindrical sections connected by steep tapers. This can be best appreciated on the

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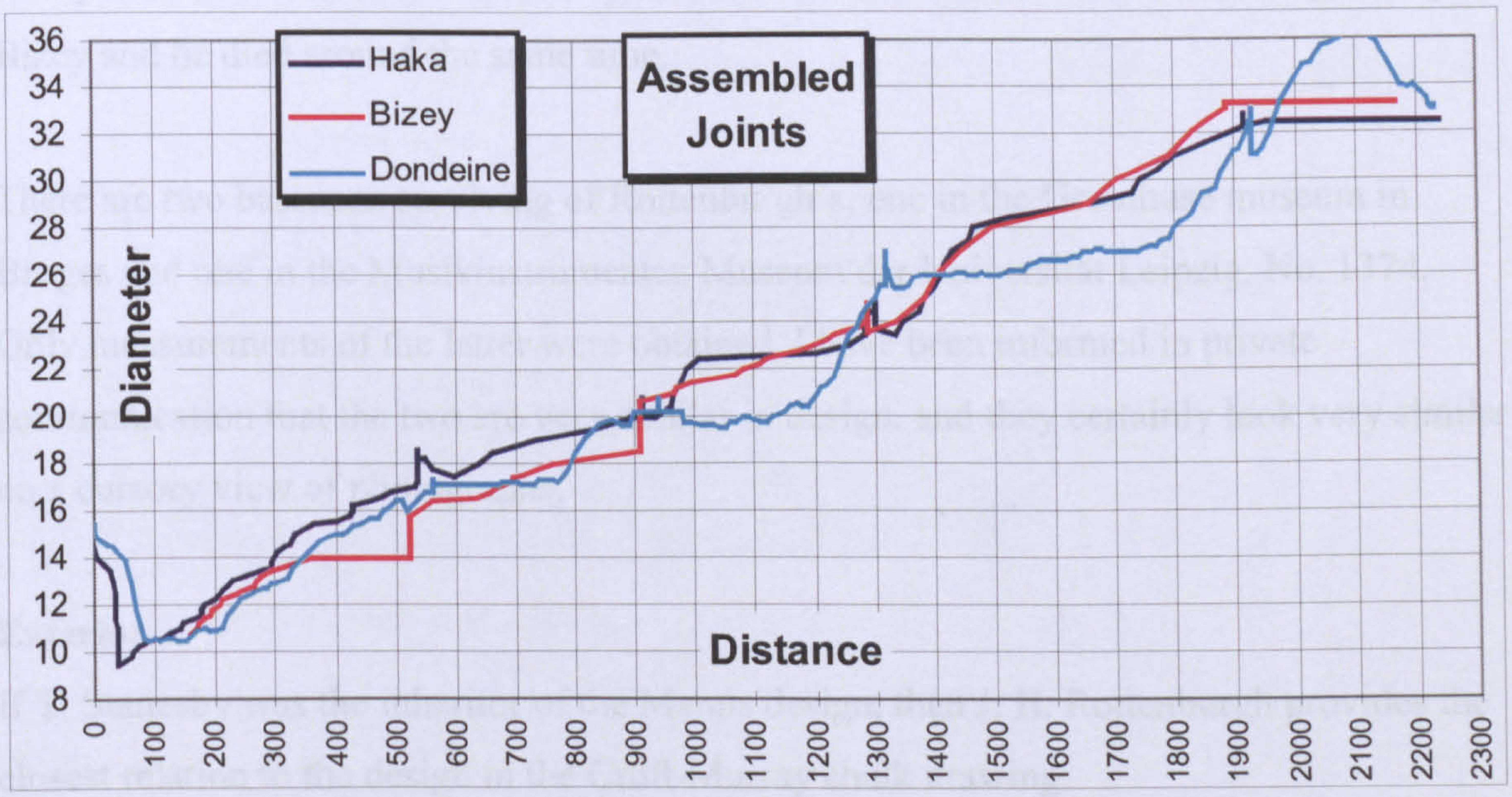
[270] Henk de Wit has pointed out that Dondeine is a common family name in the French speaking areas of Belgium. See White, 'The Early Bassoon Reed', p.115, note 84.

Assembled Joints chart in Appendix 3. The two boot bores and the long joint all have an essentially cylindrical section extending for more than half the length of the joint from the reed end. The wing joint also has a long cylindrical throat of some 100mm before opening up in one slightly convex taper.

These may be signs that the maker had a rather limited array of bore-forming tools at his disposal, which fits with the somewhat amateurish features noted. However the extensive cylindrical portions also serve to create a lower pitch than in a constantly expanding bore of the same length. This is explained in Chapter 4 Acoustics. If the maker had intended to produce a particularly low-pitched instrument this would have been a way to achieve that without overly increasing the size, weight and manageability of the whole.

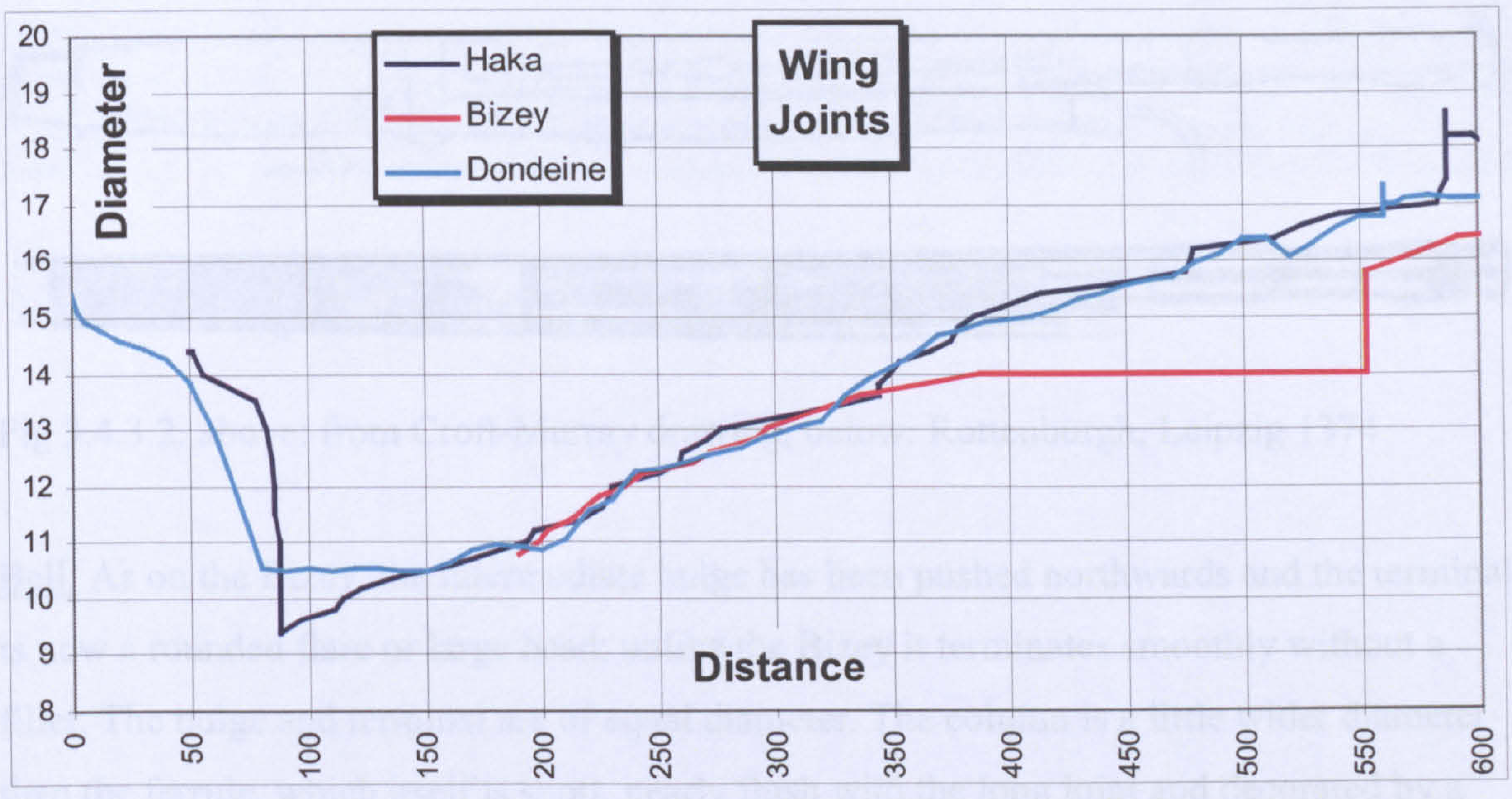
This instrument has been used as the model for reconstructions made to play at A=392Hz, though I do not know if any modifications to the dimensions of the original were made, nor the length of the crook used.

The contrast with the more-or-less constantly expanding bores of Bizey and Haka can be seen in the graph below:



Grah 3.4.3.3. Dondeine versus Bizey and Haka.

Although the wing joint taper can be seen to follow that of the Haka if it is realigned:



Graph 3.4.3.4. Wing joint bores of Dondeine, Haka and Bizey.

J.H. Rottenburgh

Joannes Hyacinthus Rottenburgh was born in Brussels in 1672 and was active there from c. 1700; he died in 1756 but may have retired in 1735.[271] This makes his starting date nearly a decade later than T. Stanesby and a decade and a half earlier than Bizey, though Bizey and he died around the same time.

There are two bassoons surviving of Rottenburgh's, one in the Gruuthuse museum in Bruges and one in the Musikinstrumenten Museum der Universität Leipzig, No. 1374. Only measurements of the latter were obtained. I have been informed in private communication that the two are very similar in design, and they certainly look very similar on a cursory view of photographs.

Exterior

If T. Stanesby was the inheritor of the Marais design, then J. H. Rottenburgh provides the closest relation to the design in the Croft-Murray chalk drawing:

[271] Waterhouse, *NLI*, p.337.

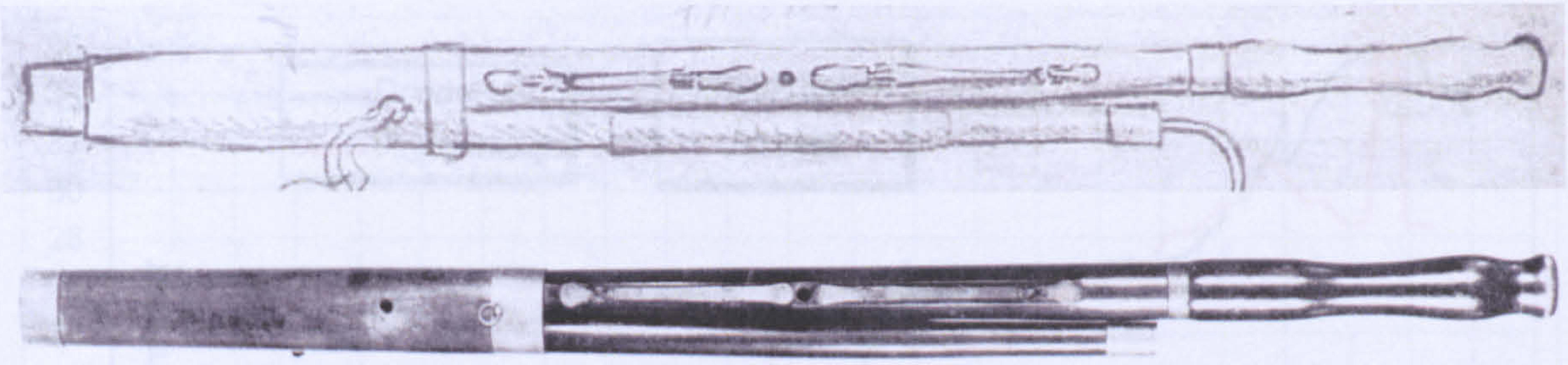


Fig 3.4.3.2. above: from Croft-Murray drawing, below: Rottenburgh, Leipzig 1374

Bell: As on the Bizey, the intermediate bulge has been pushed northwards and the terminal is now a rounded flare or large bead; unlike the Bizey it terminates smoothly without a fillet. The bulge and terminal are of equal diameter. The column is a little wider diameter than the ferrule, which itself is short, nearly flush with the long joint and decorated by a couple of engraved grooves.

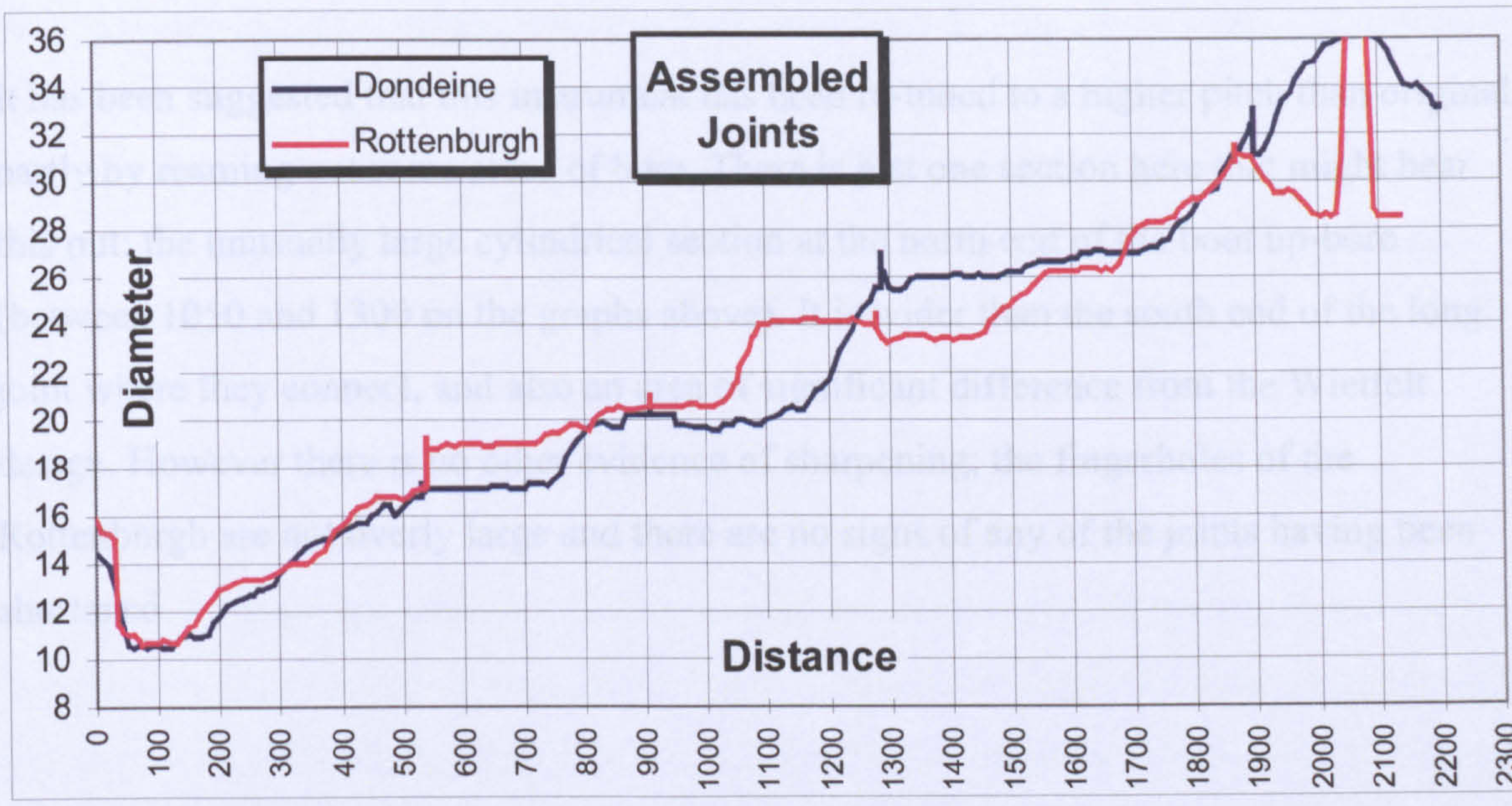
Wing: Again the épaule is long, with a slender cross section. In this case, the joint is hollowed on the back side all the way up to the ferrule at the top, to make a very close fit with the long joint.

Keys: The long joint keys are of the now-familiar simple shapes with spade-shaped flaps. The F key also familiar from Stanesby, and Bizey, (see Fig 3.4.2.5 and below). It has to be said that the Ab key does not match the F key well either in aesthetics or in ergonomics; it does not fit well against the side of the F and it is a little awkward to move the finger from one to the other. However there are no other suggestions that it is not original and the one on the Brugges bassoon is very similar.

Fig 3.4.3.3. Boot keys of Rottenburgh

Bore

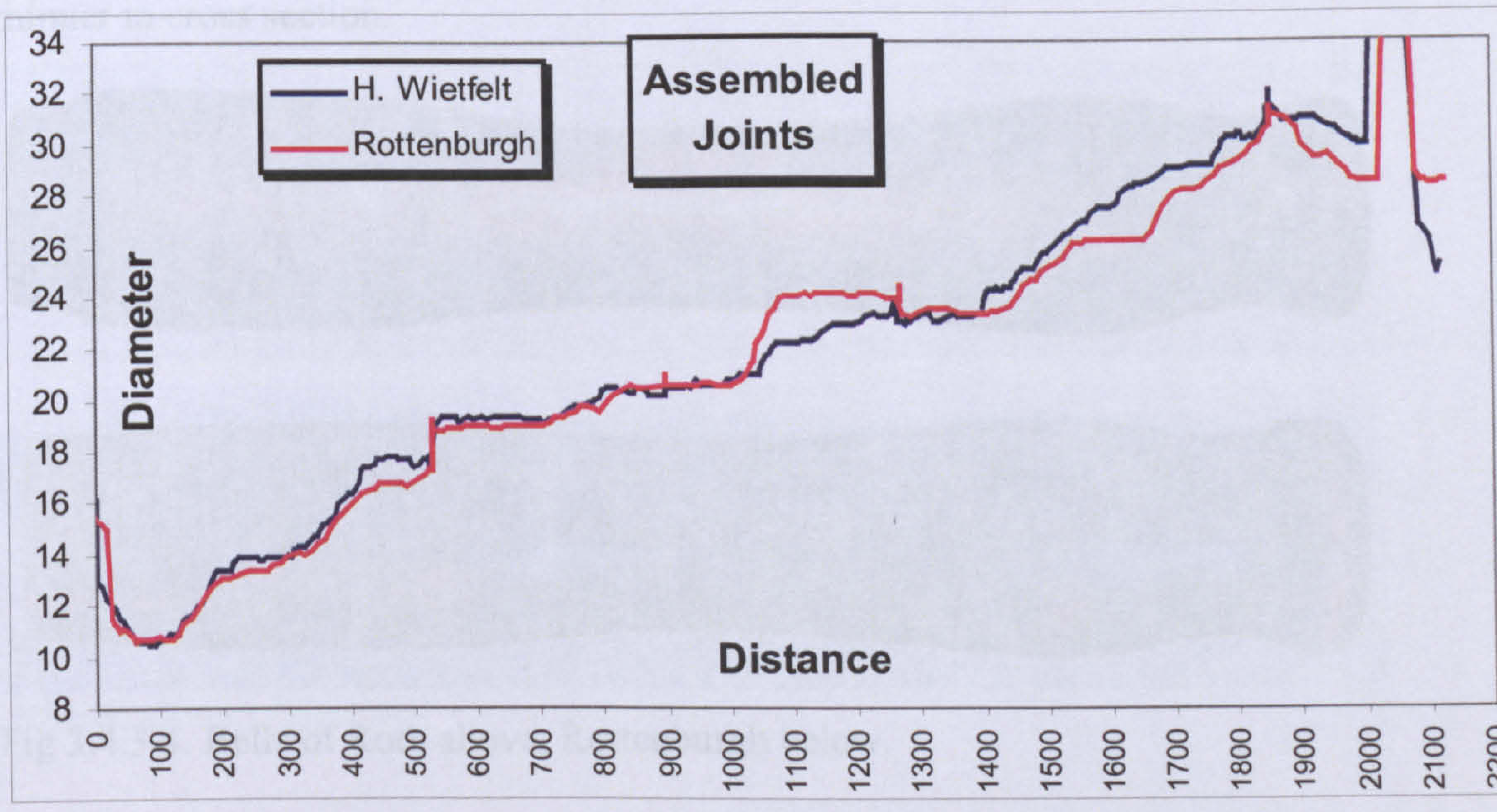
Here again is a stepwise expansion through the bore after the wing, though the dimensions of the steps are somewhat different from those of the Dondeine.



Graph 3.4.3.5. Rottenburgh versus Dondeine

There is a contracting bell with chamber, but this is different on two counts from those found in German Type 1b instruments. Firstly the chamber is deep-set into the bell; the northernmost edge being 40mm from the top of the bell, while the chambers in Type 1b instruments are usually only a few millimetres from the top edge. Secondly the reverse taper does not contract down as far as on Type 1bs but is closer to the English configuration in that the taper angle reflects that of the long joint and the terminal opening diameter is about that of halfway up the long joint, or slightly larger in this case.

In fact this bore shape has a great deal in common with a German instrument to be discussed in the next section:



Graph 3.4.3.6. Rottenburgh versus Harmen Wietfelt

It has been suggested that this instrument has been re-tuned to a higher pitch than original, partly by reaming out some areas of bore. There is just one section here that might bear this out: the unusually large cylindrical section at the north end of the boot up-bore (between 1050 and 1300 on the graphs above). It is wider than the south end of the long joint where they connect, and also an area of significant difference from the Wietfelt design. However there is no other evidence of sharpening; the fingerholes of the Rottenburgh are not overly large and there are no signs of any of the joints having been shortened.

J. F. Roth

There are two bassoons stamped 'I·F·ROTH'; the first discussed is Mu 129 in the Oberösterreichisches Landesmuseum, Linz. Roth was almost certainly a German maker but this instrument is included here because of the close resemblance of its exterior design to that of the Rottenburgh. The stamp has the initial R below the name in the manner typical of a German master's mark (see Appendix 3); otherwise nothing is known about the maker. Apart from this bassoon, he is survived by one tenor oboe and one other bassoon of unique type, discussed below.

Exterior

The bell and long joint have all of the noted external features of the Rottenburgh. The wing is much alike too, though rather slimmer in the north column and the épaule is even thinner in cross section.

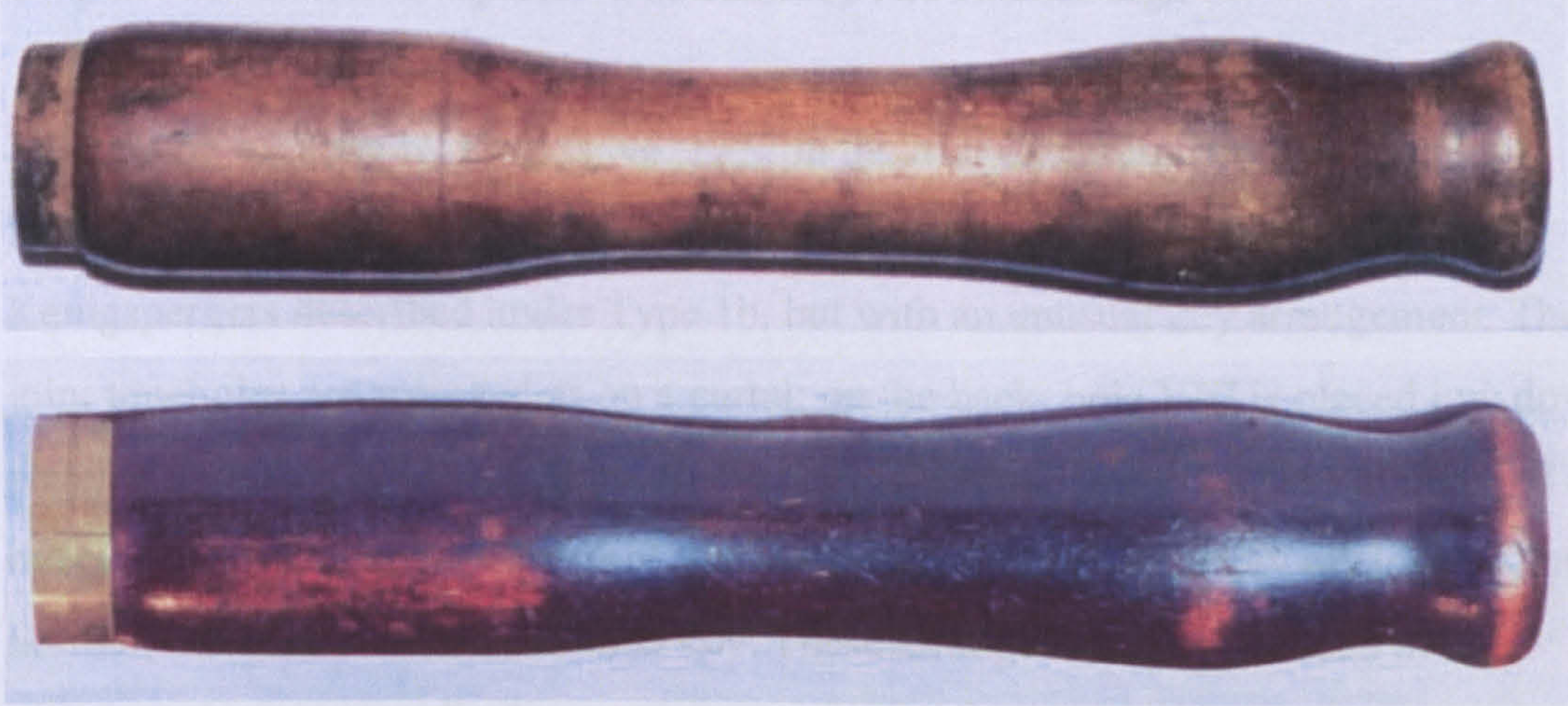
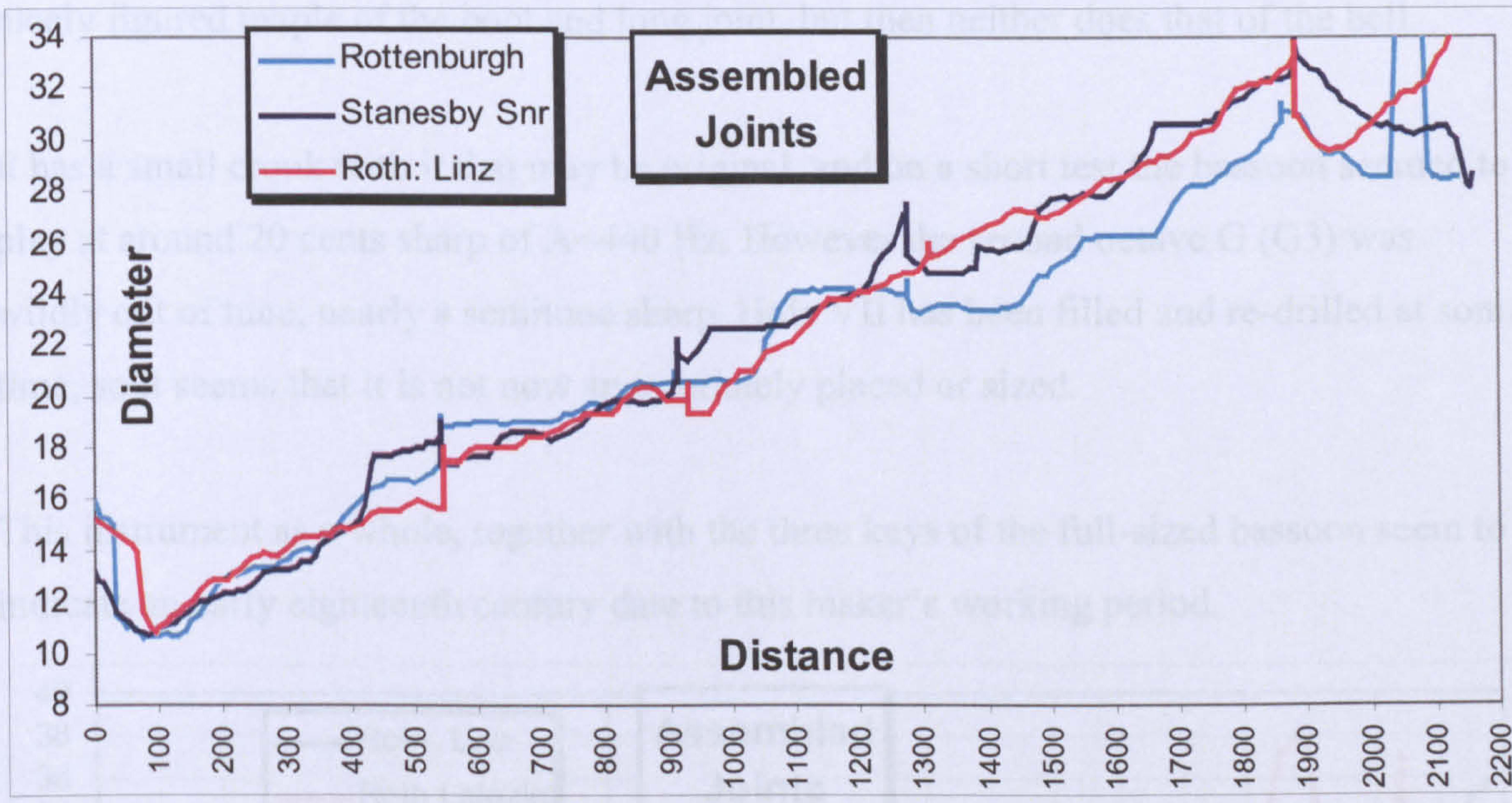


Fig 3.4.3.4. Bells of Roth above, Rottenburgh below.

The keywork though is rather different: This is the only known Type 2 bassoon with just three keys. They are particularly well made and finished; cleanly cut bevels decorate the edges of the long key touches and elements of the F key profile. The latter is a unique design. All keys are mounted between pairs of flat brass tabs sunk into the wood, rather than saddles.

Bore

This retains the continuously expanding type of bore (apart from the bell), so is quite unlike the Rottenburgh internally. It has more in common with T. Stanesby as shown in the graph below. The bell is unusual, having a reverse taper for the first third of its length but then rapidly flaring to the top. No other Type 2 bassoon has a bell like this; it is not seen elsewhere until flared bells appear on classical instruments.



Graph 3.4.3.7. Roth compared to T. Stanesby and Rottenburgh

The second bassoon by Roth is No. 1372 in the Musikinstrumenten Museum der Universität Leipzig. It is a small, high-pitched instrument of similar size to the Kenigspergers described under Type 1b, but with an unusual key arrangement. The boot joint toneholes are arranged as on a curtal; on the back; hole VIII is placed low down and covered by a key, hole IX is high up the boot. The right thumb closes hole IX and also operates the key. On the long joint hole X is open and there is a key to close XI for Bb as normal, but of course there is no D key. These arrangements can be seen in the photographs in Appendix 3.

Exterior and Bore

The bell has elements of type 1 design: a rounded top that contains a reverse taper and, in this case, two chambers, one at each end – the bore again appears to have been turned out rather than reamed.

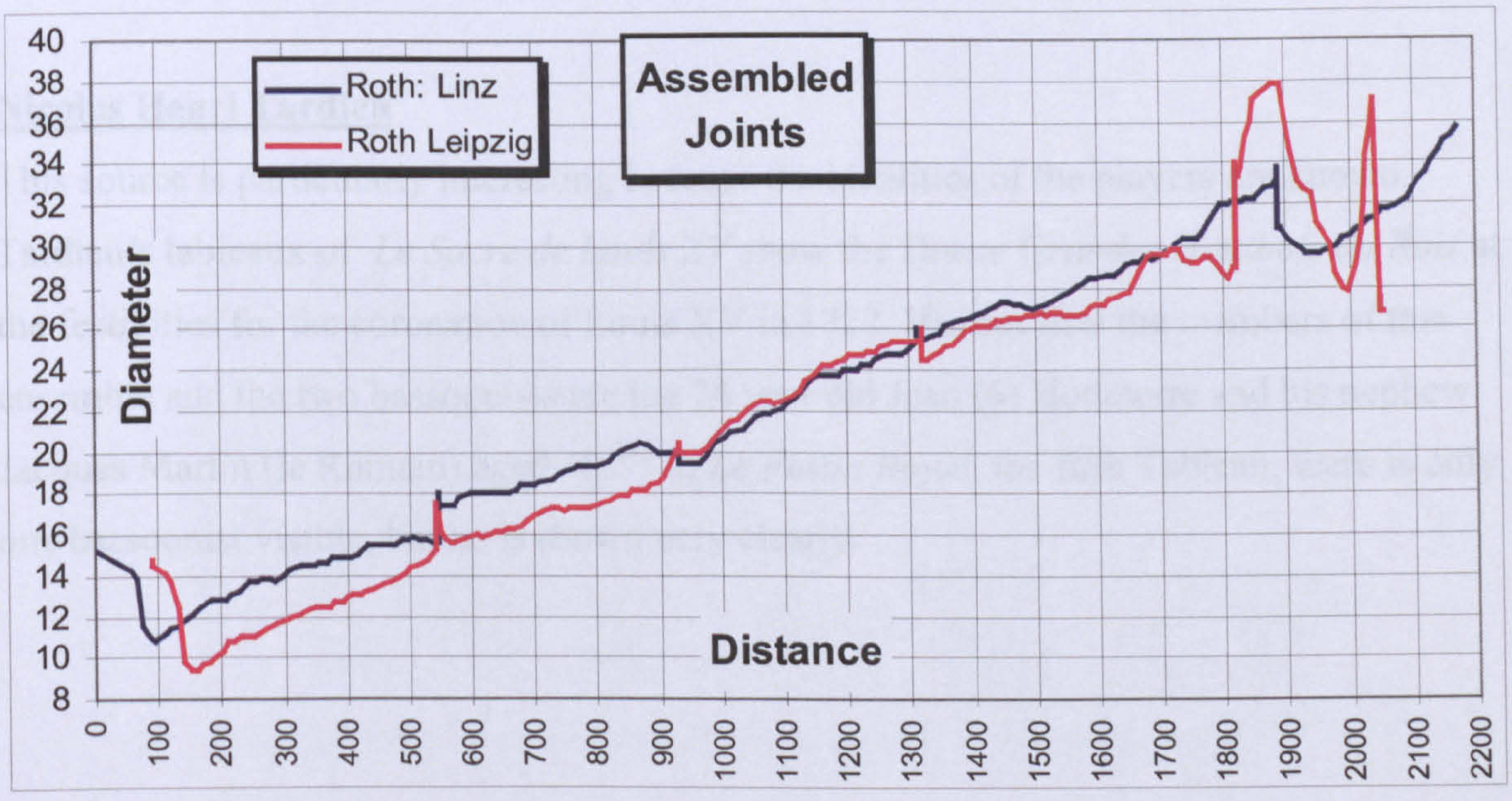
The long joint keys are mounted in trimmed, turned rings and there are a series of turned beads at the north end.

Curiously the boot joint is virtually the same length on both instruments (431 versus 436mm), and the boot up bores match in profile (see Graph 3.4.3.8 below).

Young said that the wing is not original, but it is very similar in external design (though smaller) to that of the Linz instrument.[272] Both wings are hollowed to fit against the long joint all the way from the south end to the ferrule and they both have the gouge marks left un-smoothed. It is true that the wood of the Leipzig bassoon's wing does not match the nicely figured maple of the boot and long joint, but then neither does that of the bell.

It has a small crook with it that may be original, and on a short test the bassoon seemed to play at around 20 cents sharp of A=440 Hz. However the second octave G (G3) was wildly out of tune, nearly a semitone sharp. Hole VII has been filled and re-drilled at some time, so it seems that it is not now appropriately placed or sized.

This instrument as a whole, together with the three keys of the full-sized bassoon seem to indicate an early eighteenth century date to this maker's working period.



Graph 3.4.3.8. Two bassoons by I. F. Roth

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[272] Young, *HWI*, P.190.

Summary of Type 2b

Within this group there is some unity of external design, with some similarities to the English form; notably the simple long joint, smooth contours to bell, and keys all mounted in saddles. Some subtle but distinguishing features are the long épaule, fat bell column pinched in by the ferrule, narrower terminal bead on the bell (rather than the globe form), keys made of flat brass sheet (rather than the rolled form). These are also shown in several iconographical sources (see below).

This small group contains a variety of bore designs. The Bizey has the cylindrical bell bore that, it is suspected, the earliest (Type 0) instruments had. The Dondeine has a chambered-out version of the same. Rottenburgh has contracting bell of similar extent to Stanesby, but he adds a large, deep-set chamber.

The Bizey has a continuously expanding bore (apart from bell), similar to the supposedly French derived Stanesby. Roth also follows this form though with an unusual bell bore. Dondeine and Rottenburgh both have a stepwise bore with several cylindrical sections, particularly in the boot bores.

Iconography

Nicolas Henri Tardieu

This source is particularly interesting because the identities of the players are known. Tardieu's tableaux of *Le Sacre de Louis XV* show the *Douze Grandes Hautbois du Rois* at the festivities for the coronation of Louis XV in 1722. Haynes lists the members of this ensemble and the two bassoonists are the 74 year old Jean (6) Hotteterre and his nephew Jacques Martin (le Romain) aged 48.[273] In *Le Festin Royal*, the fifth Tableau, there is only one bassoonist visible, but he is shown very clearly:

[273] Haynes, *TEO*, p. 294 where all the members of the band are listed. This Jean (6) is the son of Louis I, of the L/Hotteterre workshop stamp. Jacques Martin is the author of *Principes de la Flute Traversiere*.

Fig 3.4.3.5. Detail from Nicolas Henri Tardieu *Le Sacre de Louis XV*, fifth tableau *Le Festin Royal*[274]

There is a good front view of a bassoon above the boot joint and it is in keeping with the external features of instruments in this section as summarised above. The bell shape has the fat column, long central waist and bead at the top. The wing joint has a long épaule, in this case stretching for most of the length of the joint.

The fourth tableau of the series shows two bassoonists, but only the bells and crooks of their instruments can be seen:

Fig 3.4.3.6. Detail from the fourth Tableau of the same series[275]

[274] Haynes, *TEO*, p. 54.
[275] Ibid., p.61.

Also interesting are the 'swags' at the border of the *Festin Royal* tableau; these have not been reproduced elsewhere, but include two with bassoons and two with oboes. The bassoons are shown below.[276]

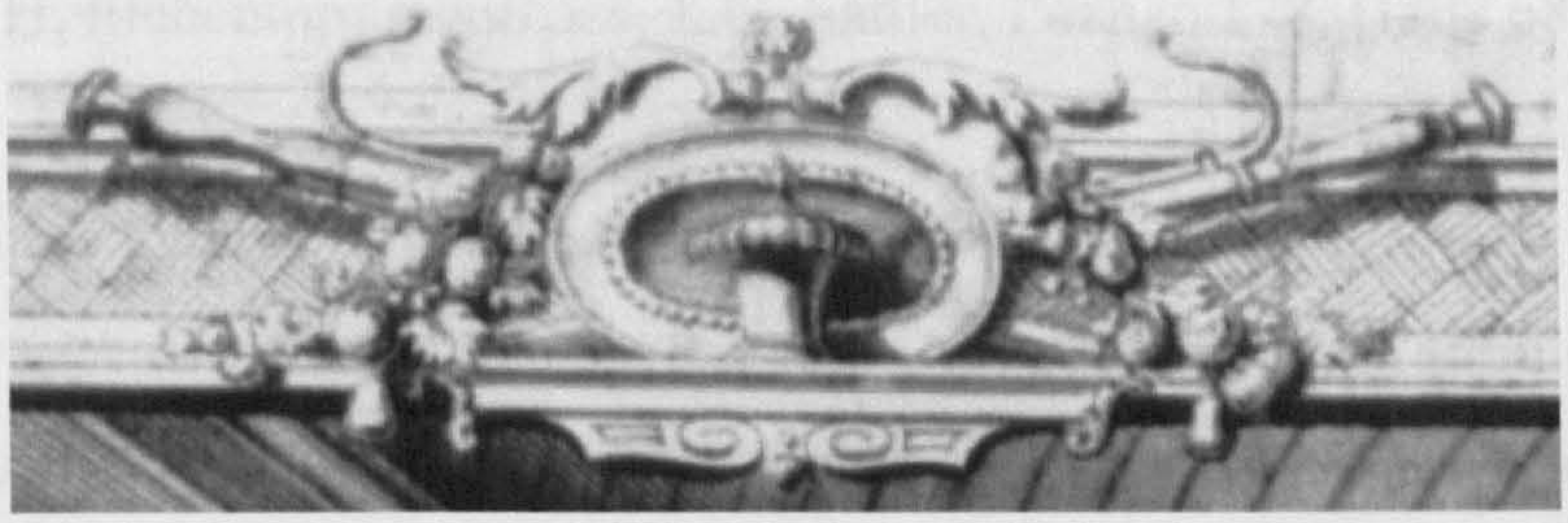

Fig 3.4.3.7. Swags from the border of the *Le Festin Royal*

The views of the bassoon bells have become somewhat distorted here, but the presence of beads at the top of the wings and the bottom of the bells seems to be indicated so perhaps the quantity of ornament on early French bassoons is not a simple matter. There is a rather alarming appearance of a hole in the bell at bottom right, sixty years before it was to become common on German bassoons, and it never appeared in French ones at all. Closer examination of the print is necessary to make sure that this is not just a dirt-spot. See Appendix 4 for the full composition.

[276] With thanks to Tony Bingham for the scan of his copy of the work, from which these details are taken.

3.4.4 Type 2c: German

Instruments in this section: H. Wietfelt, G. Wietfelt, J. Scherer, J. H. Eichentopf, J. Poerschman, J. H. Eichentopf quartbass, J. G. Sattler, Poznan 178, Halle 684.

It is easy to assume that the ornamentally turned Type 1 preceded the plain style in Germany but it appears that that was not the case. Although the plain form did subsequently out-live the ornamental, it looks as though it was introduced to some areas of Germany (by makers outside of Nuremberg and the influence of its guilds) contemporaneously with the ornamental form. This seems to confirm that the plain style already existed outside of Germany and adds weight to the suspicion that the French bassoon was always of plain form. In turn this causes the ornamental form to appear to have been very much localised in place and time. There is only one maker represented by surviving instruments in both forms, that is Jacob Denner as already mentioned.

The German makers who did not turn the ornate decorations on the bell and top of the wing, and adopted the smooth shouldered épaule and plain bell did, however, introduce a few characteristics that serve to delineate German bassoons from all others of the same period. The first of these is a brass crown at the top of the bell which seems to have been almost universally adopted by German makers, though styles of crown differ widely; from plain brass ring to elaborately fretted, pierced, engraved and even with turned-in decoration.[277] Most of the makers continued to hollow out a chamber in the bell. German makers appear to have been the only ones to continue to mount the keys in vestigial beads or blocks on the long joint; all of the bassoons studied in this section have (or originally had) them, whether the joint is fully turned or has a platform.[278] When there is a platform it is usually wider and more clearly defined than on French and English bassoons and has the integral blocks for the keys standing on top. The Type 2c makers introduced blocks on the boot joint too, where they are usually found together with a knob below the F flap, intended to protect that from getting caught in clothing. All of these are integral to the body of the boot, which must be carved and shaped around them. This can be a good deal more work than a simple tapered-oval boot with keys mounted in saddles.[279]

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[277] Exceptions without crowns are those by H. Wietfelt and by Roth (whose bassoons are in any case, types 2b and 1b).

[278] The Poerschman in Leipzig originally had keys in blocks but now has new keys mounted in saddles.

[279] This configuration continued to the next generation too, with bassoons by J. F. Grundmann, both. Grenser, and even J. H. Grenser having these features. On some of these the elements are carved with a great

(Footnote continues on next page)

Harmen and Gottlieb Wietfelt

There are five generations of wind instrument makers in the Wietfelt family, with three bassoons surviving in total. Two of them are studied here: one by the second generation Harmen (1669-p.1727) now in the Horniman Museum, London[280] and one probably by his son Philipp Gottlieb (1706-1768, hereafter referred to as Gottlieb), in the Waterhouse collection.[281] The third bassoon is by Eric, nephew of Harmen; it is in the Museum für Hamburgische Geschichte and was not examined.

These have already been mentioned in the English section in relation to the Croft-Murray Collier painting and the records of the Duke of Chandos (see section Type 2a English), which both show that Wietfelt instruments were imported into England during their working lives. In fact these two bassoons both have some English provenance.

Waterhouse quotes Gerber saying that Harmen Wietfelt was 'famed far and wide for his oboes and bassoons ... still alive in 1727... his father and his brother Johann follow the same trade but by far do not approach him in skill' [282] So we learn that Harmen was a second generation woodwind maker, which implies that he was making instruments right from the end of his apprenticeship c. 1687, although he may not have worked independently of his father until later. That is nine years before J.C. Denner's letter asking permission to make the French woodwinds. Because of this early starting date it is not possible to say that the Type 2 bassoon followed after Type 1 in Germany, but rather it appears that they may both have been made at the same time in different parts of the country.

It has already been demonstrated that there is a remarkable similarity in bore design between the H. Wietfelt and the Rottenburgh (though the external designs of the two are quite different). It is not possible yet to know if there was a direct influence from one to the other, or how either of them came to this design. Rottenburgh was just three years younger than Wietfelt but he apparently was not established as a woodwind maker until c.

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degree of finesse, with decorated edging to long joint platform and another little platform on the boot for the F flap between the axle block and the protective knob.

[280] Ex Boosey and Hawkes collection.

[281] Waterhouse, in *NLI* p.429, ascribes the bassoon marked G. Wietfeld to Philipp Gottlieb (6), the grandson of Harmen (2). The early-baroque appearance and similarity to the bassoon of Harmen's suggests it is more likely that it was made by Philipp Gottlieb (4), the son of Harmen and father of Philip Gottlieb (6).

[282] Ernst Ludwig Gerber, *Historisch-biographisches Lexikon der Tonkünstler,* 1790 quoted in Waterhouse, *NLI*, p.429.

1700 when he was 28 years old, so presumably Wietfelt's early career start gives him precedence here. For his part, Philipp Gottflieb (4) was described on his marriage in 1738 as 'musical instrument maker of wide fame'.[283]

A reference that shows the influence of this family's bassoon designs is cited in *NLI* under C.W. Sattler: a bill from C.W. Sattler dated 1788 for a large number of woodwind instruments lists 38 bassoons '*Wittfelder mit der Dis Klap*' (Wietfelt model with low D# key), some with three, two or one 'corps de rechanges' wing joints, also 32 '*ordinere Fagot*', presumably standard model bassoons.[284] It is not possible to say which member of this rather extended woodwind instrument making family is referred to. The D#/Eb key makes it beyond the range of this study, and the date of 1788 probably indicates a family member one or two generations later than the Philipp Gottlieb discussed here. His son, also named Philipp Gottlieb (1743 – 1793), described as '*Instrumenten-Macher, Brauer*' (instrument maker and brewer), is a likely candidate.[285] The reference shows again the influence of the family and indicates at least a local pioneering application of the Eb key.

For such a highly regarded and extended family there are not many instruments (known of) remaining; just these two bassoons plus one by Harmen's nephew Erich, one oboe and one clarinet.[286]

Exterior

The two Wietfeld bassoons examined are fundamentally similar, with a few differences of detail, most of which show that Gottlieb's is made with more luxurious fittings, while Harmen's appears by comparison to be a more workman-like instrument. The following contrasting features can all be seen in the photographs in Appendix 3. Harmen's bell has no crown, instead a small bit of turned beading just above the neck, while Gottlieb's has an elaborately fretted and engraved crown that wraps right into the bore. The bell ferrule on Gottlieb's also wraps around the end of the joint, covering the end-grain. Each brass ferrule on Gottlieb's has turned or rolled beads decorating the edges while Harmen's are plain. These ferrules and crowns of Gottlieb's show the application of advanced

[283] Waterhouse, *NLI*, p. 429.
[284] Waterhouse, *NLI*, p.345.
[285] Ibid.
[286] Young, *HWI*, p.256. The oboe is stamped Gottlieb Wietfelt with bell stamped Hirschtein, the clarinet stamped G. Wietfelt.

metalworking skills and equipment.[287] He either had training in metalwork (and owned equipment) well beyond that which a wood turner might be expected to pick up, or another craftsman at least partially made these components for him. Harmen's long joint has beads turned at the top end just below the tenon to match it to the bell's diameter; Gottlieb's has none. The keys are more decorative on Gottlieb's than on Harmen's, though construction from heavy gauge brass sheet is the same. Harmen's has a single sided F key; Gottlieb's is a variation on the common form, as shown in Fig 3.4.2.5. Harmen's has sections rather brutally chiselled out of boot and long joint to allow a smaller hand to reach around, and to provide a better grip to support the weight.

Common external features:

a) They both have the long épaule of the French (discussed in previous section).
b) Both have all their keys mounted in wooden blocks or bosses, with a protective knob below both the F and D key flaps.
c) They are both rather massively constructed, particularly the boots which both have flat front and back faces (as on Dondeine).
d) The bell ferrules are flush with the bell column, unlike the French instruments that pinch in, even though the diameter there is somewhat larger than the top of the long joint.

These Wietfelt models then, have the long épaule, flat-faced boot and general bell shape similar to Dondeine and Bizey, but are definitely German in their block-mounted keys, large, prominent platform, bell crown (Gottlieb) and long joint beads (Harmen).

Bore and toneholes

They both have particularly steeply angled fingerholes in the wing joints, Gottlieb's hole IV is also steeply angled. The resulting spread of the holes where they meet the bore is shown in the table below, it can be seen that Gottlieb achieved a wider spread at the bore for a slightly closer grouping at the surface than both of the other makers:

[287] The compound curves in each piece were probably made using a rolling mill, in which a plain cylinder of brass is pinched between steel rollers, one convex and the other hollowed to match, and the material gradually compressed and stretched into shape. Alternately the job could be done by spinning, whereby annealed brass can be forced into compound curves while turning on the lathe, using rounded-ended tools and a good deal of leverage. In either case the in-curving top end of the crown would have to be created first with the crown mounted on a mandrel rather than the bell itself. Then the top plate would be soldered on, the crown put back on the bell and the diameter of the brass reduced around the bell's neck by careful hammering until the crown is held fast to the wood. Small nails through each petal complete the job and add to the decoration.

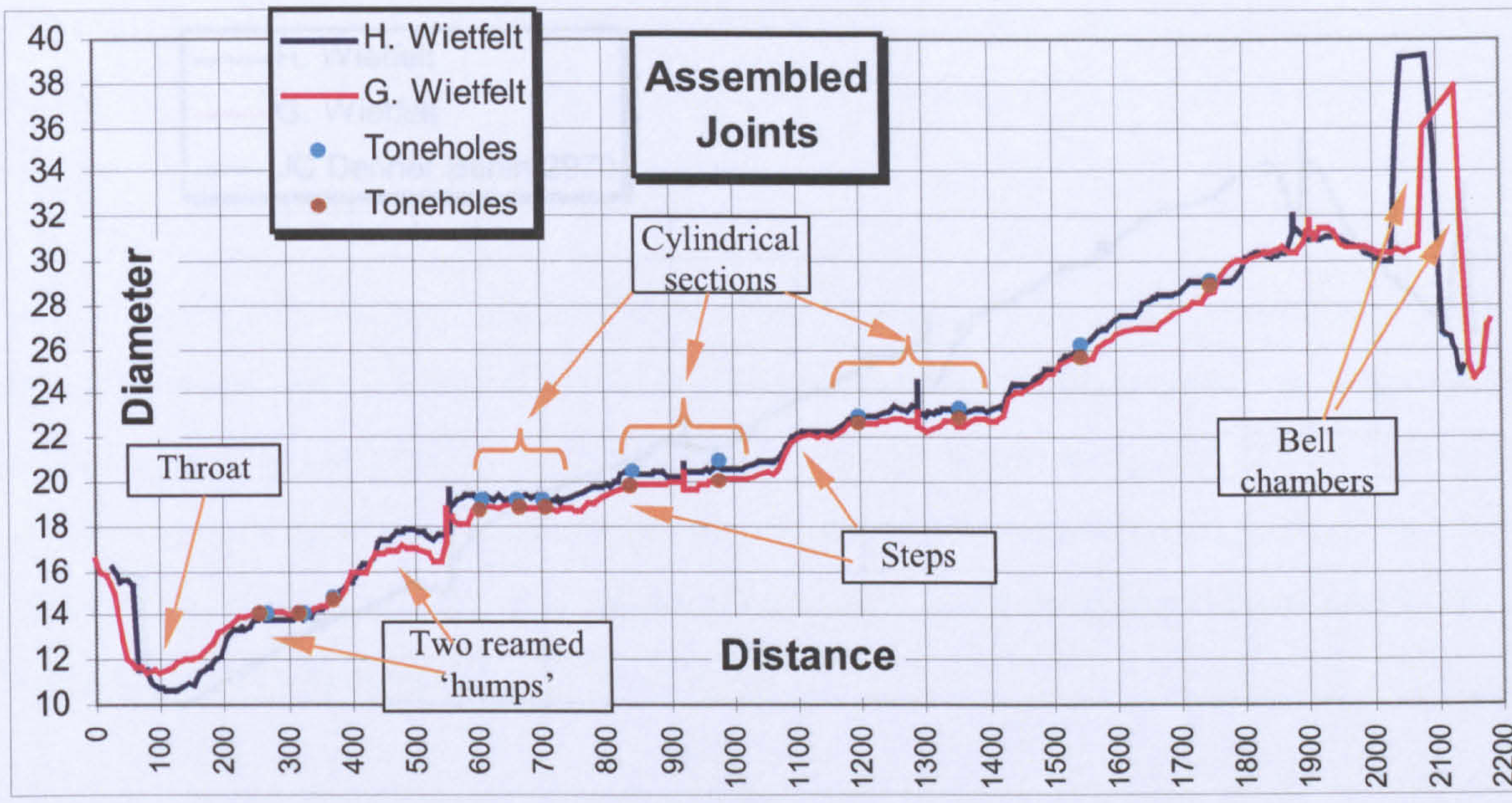
	Wing: holes I to III		Boot: holes IV to VI	
	On surface	At bore	On surface	At bore
Rottenburgh	83	107	79	96
H. Wietfelt	78	105	78	96
G.Wietfelt	75	116	77	107

Table 3.4.4.1. Spread of fingerholes on wing and boot

The long joint toneholes on Harmen's are very large: XI is greater than 16mm, X just a little less at 15.2 x 15.9 mm. The boot holes are a little larger than on Gottlieb's too, and the septum window is very wide; the north edge has been cut further up the bore than its original position. These are all signs of an attempt to sharpen the pitch of the instrument, and there is an F# key added on the back of the boot that indicates an extended working life into the late eighteenth century at least, which probably required a rise in pitch. However there are no indications of joints having been shortened.

Gottlieb's bassoon is longer than Harmen's in all joints except the boot, resulting in a difference of 67 mm in the total bore lengths. A little can be learned here about the techniques of making instruments for slightly different pitch standards. In order to make a longer instrument, Gottlieb has taken Harmen's wing design and extended it at the tenon end; the positions of the wing holes and throat remain the same relative to the top of the joint while the distance between them and the boot has been extended. At the other end of the instrument the long joint toneholes still align, showing that that joint has been extended (relative to Harmen's) just at the top end beyond the holes. The bell has been made a little longer too. The complex boot design (more difficult to modify) has been kept the same.

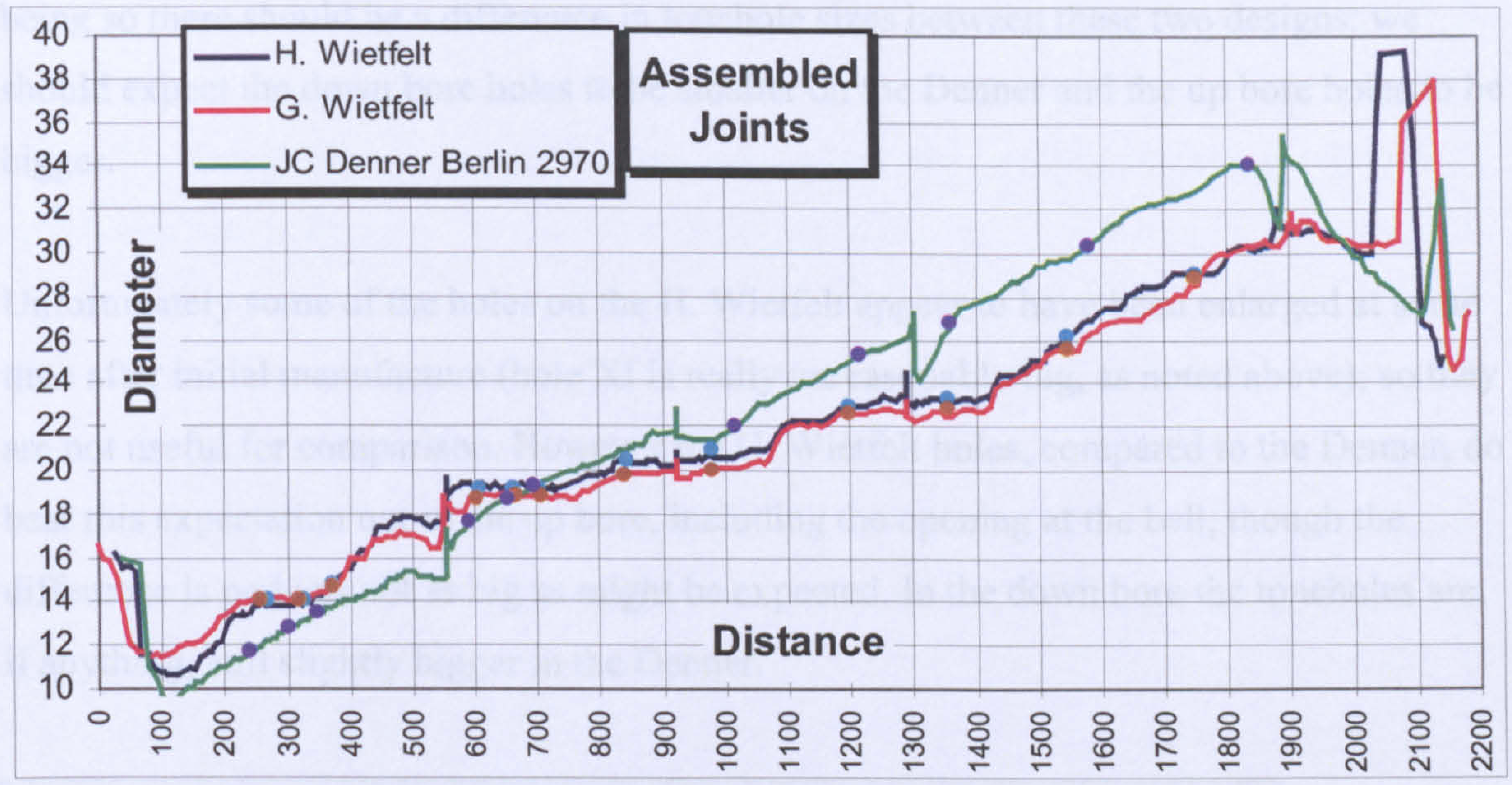
Otherwise the bores of both of the Wietfelts are similar enough to have been made with the same set of tools. The remarkable similarity with the Rottenburgh has already been noted.



Graph 3.4.4.1. Harmen versus Gottlieb Wietfelt bore profiles, aligned at boot plugs.

Although the shapes are much the same, there are some differences in diameter, with Gottlieb being a little narrower in most of the bore. This could be due to differences in shrinkage of the instruments or it may be deliberate. The opposite is the case in the wing throat where the greater diameter is probably due to greater degradation in Gottlieb's wing. The minimum diameter there of 11.2 mm is wide compared to all of the other bassoons studied and it is unlikely that it was originally made to that dimension. They both have a large chamber in the bell, followed by a steep contraction to the opening, bringing the diameter back down nearly to that of the north end of the boot. This is in contrast to the Rottenburgh and the English style; it is a reminder of the Type 1b form where the steep reverse taper throughout the bells led to a similarly constricted opening.

Otherwise this design is significantly different from Type 1b; comparison with J.C. Denner shows by just how much:



Graph 3.4.4.2. Type 1b compared: J.C. Denner versus Harmen & Gottlieb Wietfelts, aligned at boot plugs

In particular the bore through the boot joint is at a lower angle in the Wietfelts, expanding by only about 4 mm from top of the small bore to top of the big bore (from 550 to 1300 on the distance scale of graph above). It is cylindrical through holes IV to VI in the small bore and in other sections too. The Denner expands some 9.5 mm through the same two bores. This lower expansion rate through the boot brings the diameter of the long joint down by around 2 mm overall compared to Denner, while the wing bore is larger. Thus the overall expansion rate of the whole bore is less in the Wietfelts than in the Denner.

The difference in the spread of the toneholes is also striking: on the graph above the bores are all aligned at the boot plug which is at c. 920 on the distance scale; to the left of that is the down bore and to the right, the up bore. Holes I, II and III are higher up the wing joint (further to the left on the graph) on the Denner; IV, V and VI are a little higher too, while the up bore holes are all spread further towards the bell (further to the right on the graph).

The Denner is thought to be designed to play at c. A=415 Hz with a crook 370 mm long.[288] The Denner and H. Wietfelt are close to the same total bore length; 2124 versus 2117 mm; while the G. Wietfelt is longer at 2184 mm. The G. Wietfeld plays somewhat lower with its original crook (see below at the end of the Wietfelt section), so the H. Wietfelt, being a little shorter, might be expected to play at close to A=415 Hz too. That

[288] It is similar in length and tonehole dimensions to the Brussels Denner, which has been used by several makers as a model for copies without major modifications playing at 415 Hz.

being so there should be a difference in tonehole sizes between these two designs: we should expect the down bore holes to be smaller on the Denner and the up bore holes to be bigger.

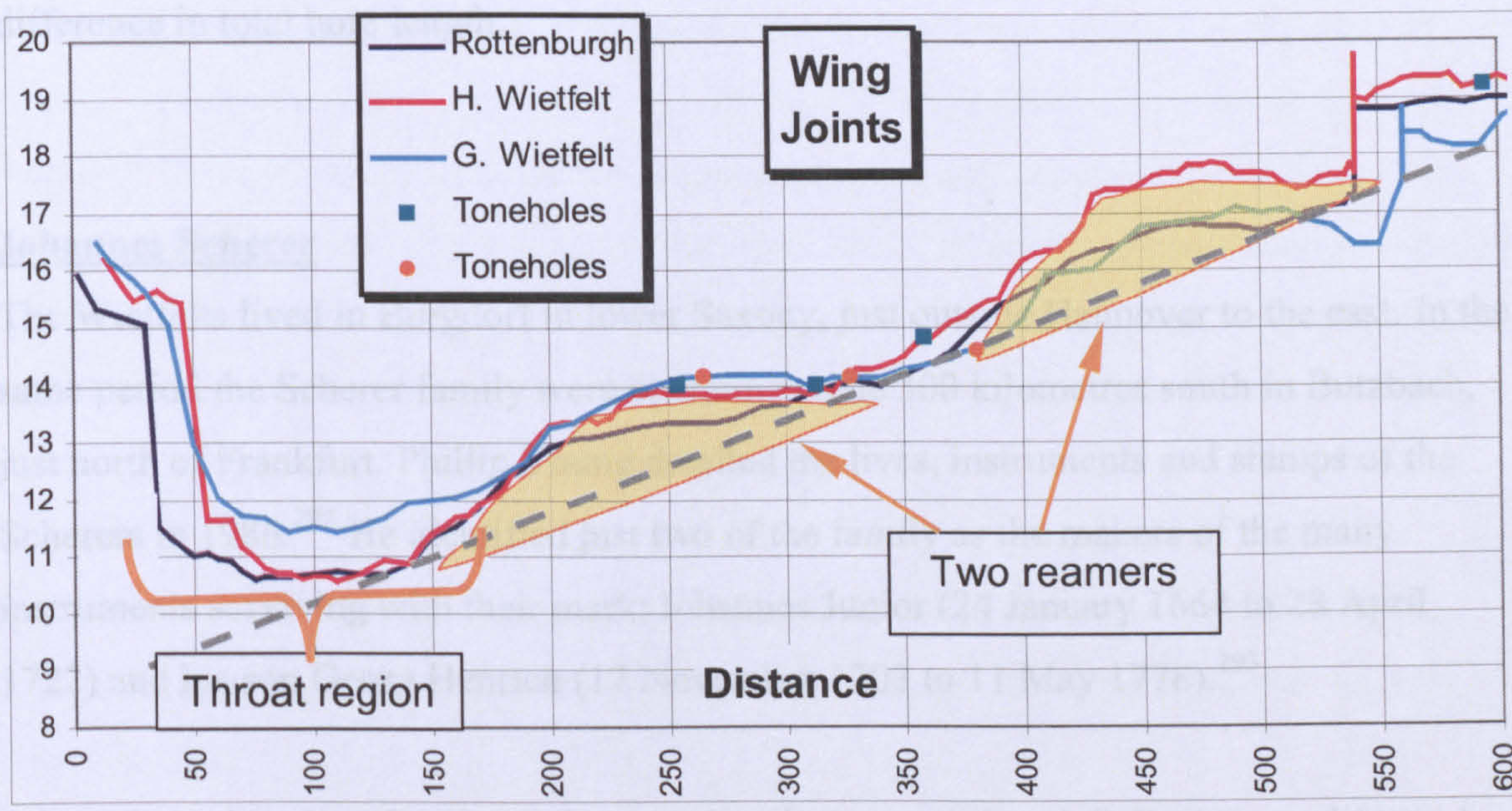
Unfortunately some of the holes on the H. Wietfelt appear to have been enlarged at some time after initial manufacture (hole XI is really unreasonably big, as noted above); so they are not useful for comparison. However the G. Wietfelt holes, compared to the Denner, do bear this expectation out in the up bore, including the opening at the bell, though the difference is perhaps not as big as might be expected. In the down bore the toneholes are, if anything, still slightly bigger in the Denner.

Tonehole	Diameters		
	J.C. Denner	H. Wietfelt	G. Wietfelt
I	5.4	5.0	4.2
II	5.3	5.5	5.2
III	5.4	4.9	4.8
IV	7.0	7.0	6.1
V	6.3	7.0	6.3
VI	5.4	5.9	5.6
VII	12.0	9.5	8.0
VIII	9.6	10.8	8.7
IX	12.4	11.6	11.9
X	11.4	15.6	11.3
XI	13.3	16.5	10.6
bell opening	26.5	24.9	24.6
	Distances		
hole I to top of wing	204	241	255
difference from Denner		37	51
hole XI to top of bell	322	394	433
difference from Denner		72	111
crook length	370		335
difference from Denner			-35

Table 3.4.4.2. Tonehole sizes and placings compared

There are two factors to explain this: firstly the Denner bassoon works with a crook 35 mm longer than the original crook of the G. Wietfelt (370 mm[289] versus 335 mm). This mostly makes up for the shorter distance of the holes to the top of the wing. Secondly, the lower taper angles of the bores in the Wietfelts, and particularly the cylindrical sections, serve to lower the pitch significantly. This effect is discussed in Chapter 4, section 4.5. So, in contrast to Denner, Wietfelt has designed a bassoon to play at about the same pitch but with a shorter crook and smaller toneholes (including bell opening), by using a lower angle, stepwise bore.

The wing no longer has an essentially straight taper (as in Denner), but is now made with two humps – opened out areas – from the south tenon to below hole III, and in the region of hole I, as if made by two separate reamers. There is around 100 mm of near-cylindrical section at the throat (between 50 to 150 on the graph below).[290] The wing shapes can be more closely seen on the graph below:



Graph 3.4.4.3. Wing joints compared: H & G Wietfelt versus Rottenburgh with reference taper of 0.016 (dashed line)

The crook associated with the Gottlieb Wietfelt that has every appearance of being the original.[291] It is 335 mm long and its bore is essentially a straight taper of about .02 gradient, or 1 in 50. This is steeper than that of the wing, as characterised by the grey line on the graph above, of taper rate 0.016 (1 in 62.5). A plot of the crook bore is included on the bore graphs in Appendix 3.

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[289] Again this is based on copies of Brussels M427.

[290] See also Chapter 2, Fig 2.3.10 for diagram of reamers making this shape of bore.

[291] A letter from Sydney Selznick to the 'British Museum of Arts' dated 21-1-1949 in the Waterhouse collection shows that it has been associated with the instrument during the previous two ownerships.

Its bend shape is similar to that of other early crooks in having a low reed-to-wing angle. That is to say, to the player, the reed points downwards steeply, forcing a playing position unfamiliar to today's players, with the bassoon either tucked tight up under the armpit, or held high before the player with left hand at shoulder height. This playing position is illustrated in the Watteau drawing, fig 3.2.9 on page 54. The bend shape is met several more times with other bassoons, for example the Scherer in NewYork, the Eichentopf Quartbass, and the Grazzi Kenigsperger.

With this crook the instrument plays at around A=405Hz, depending on the reed used. It has a solid, well-focused sound, though tuning is rather wayward. Note that the bassoon is longer than the Harmen Wietfelt in all joints except the boot, adding up to 67 mm difference in total bore length.

Johannes Scherer

The Wietfelts lived in Burgdorf in lower Saxony, just outside Hannover to the east. In the same period the Scherer family were operating some 300 kilometres south in Butzbach, just north of Frankfurt. Phillip Young detailed the lives, instruments and stamps of the Scherers in 1986.[292] He identified just two of the family as the makers of the many instruments surviving with their mark: Johannes Junior (24 January 1664 to 28 April 1722) and his son Georg Henrich (17 November 1703 to 11 May 1778).[293]

Johannes Junior, therefore, was almost a decade younger than J.C. Denner, and around half a decade older than both T. Stanesby, and H. Wietfelt. However, until his father's death in 1707 he was listed only as a turner (*drechsler*); the first reference to him as *Drechsler und Pfeiffenmacher* was in 1711.[294] So although he trained as a turner under his father, and must have completed his apprenticeship around 1682 (aged 18), he may not have been making woodwinds until much later.[295] Georg Heinrich Scherer is contemporary with Gottlieb Wietfelt (1706-1768).

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[292] Phillip Young, 'The Scherers of Butzbach', *GSJ*, 39 (1986), 112-124.
[293] In *HWI*, Young lists 70 instruments stamped Scherer: pp. 207-210.
[294] Ibid., p.114.
[295] The year that his father died, 1707, is the same that both J. C. Denner and Haka died, and is eleven years after Denner's letter asking permission to make the new French woodwinds.

Young was unable to determine who made which instrument from the variety of Scherer stamps found on them, apart from two of the bassoons; see below. There has been no further clarification since that article was written.

There are four bassoons and five octave bassoons listed in Young's *HWI*, another bassoon (missing its wing) is in a private collection in Germany.[296] None of the concert bassoons were examined for this study, but measurements and drawings of those in New York (No. 89.4.886, Metropolitan Museum of Art) and Zurich (No. 106, Museum Bellerive) were kindly supplied by Leslie Ross, and of that in The Hague (Ea 62-X-1952, Gemeentemuseum), by John Hanchet.

The Zurich and Hague bassoons are the only two Scherer instruments (of any sort) to include an initial on their brand; are both stamped 'I·SCHERER' in a German-style scroll.[297] This indicates that these two bassoons were made by Johannes Jnr before his death in 1722. The New York bassoon has 'BUTZBACH' stamped into the bottom end of the boot; it is the only Scherer instrument to have this, and was the clue that led Young to find the family's place of birth and work activity.

Exterior

The New York and Zurich bassoons are made of boxwood, as is that in the Bachhaus, Eisenach; the Hague instrument and the one in private hands are both made of highly figured maple.

The <u>bell</u> of the Hague bassoon is said to be not original.[298] It looks exactly like that of the G. Wietfelt discussed above; it has the same pierced and engraved crown which wraps right into bore in the same way, same ferrule also wrapping around the joint end, and the same decorative beads on ferrule. The bore shape, analysed below, corroborates this attribution. Both the New York and the Zurich bells have brass crowns, with fretted and turned-in decorations on both the sides and faces. They both have a distinctive flat top with a rather sharp corner.[299]

The New York and Zurich instruments both have <u>crooks</u> that look likely to be original. The New York instrument has a particularly distinctive <u>wing joint</u>; the épaule extends for most of its length and just the ferrule at the top and the tenon at the bottom are turned.

[296] Young, *HWI*, p.210.

[297] The brands are not both made with the same stamp however; there are slight differences.

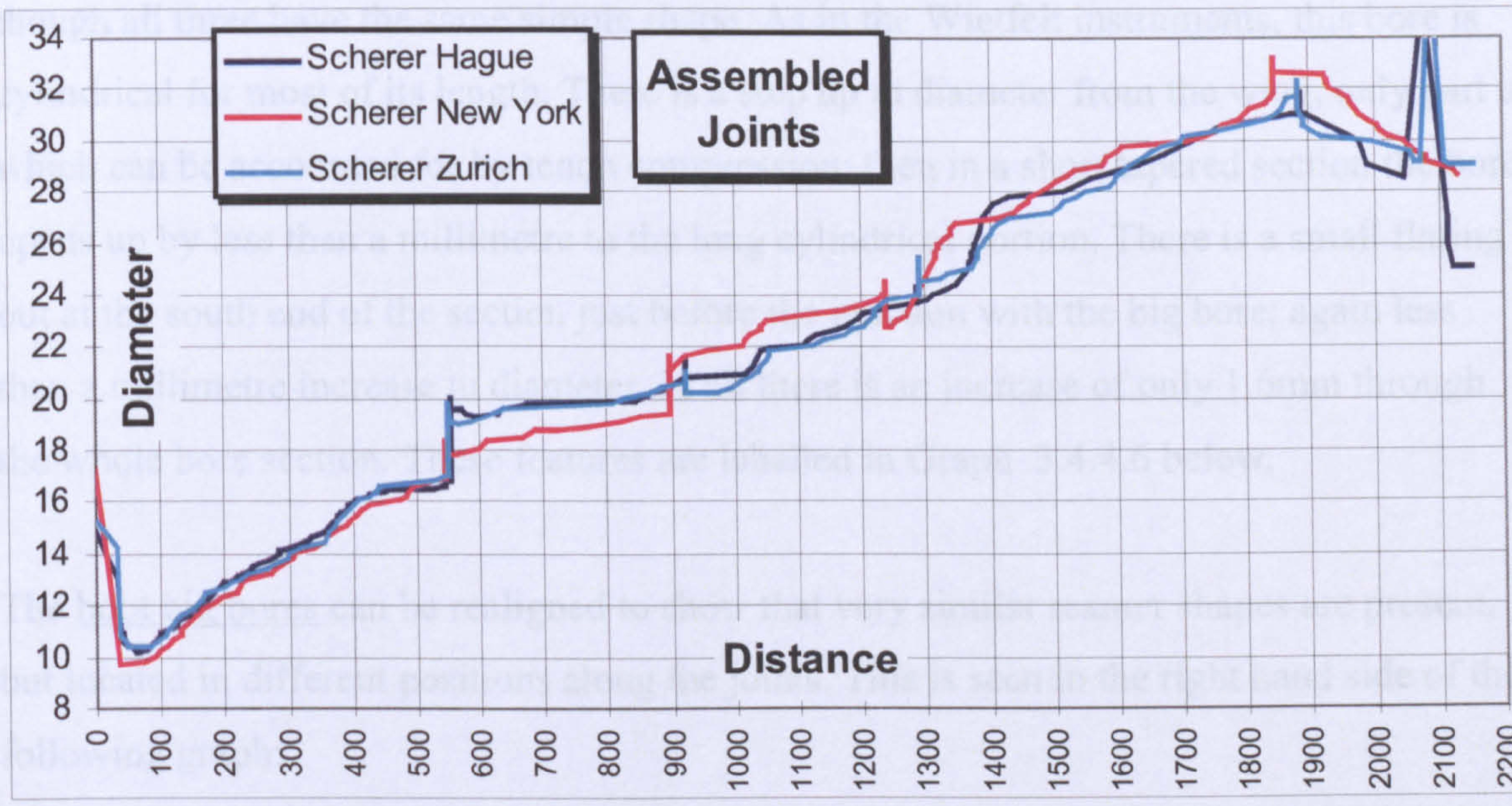
[298] John Hanchet, quoted in Young, *HWI*, p.210

[299] This is reminiscent of the bell top ends shown in the Collier paintings discussed under Type 1a Dutch.

Its boot joint is bulky and boxy, with flat faces; similar to those of the Wietfelts. Those of the other two are less bulky and oval in cross section.

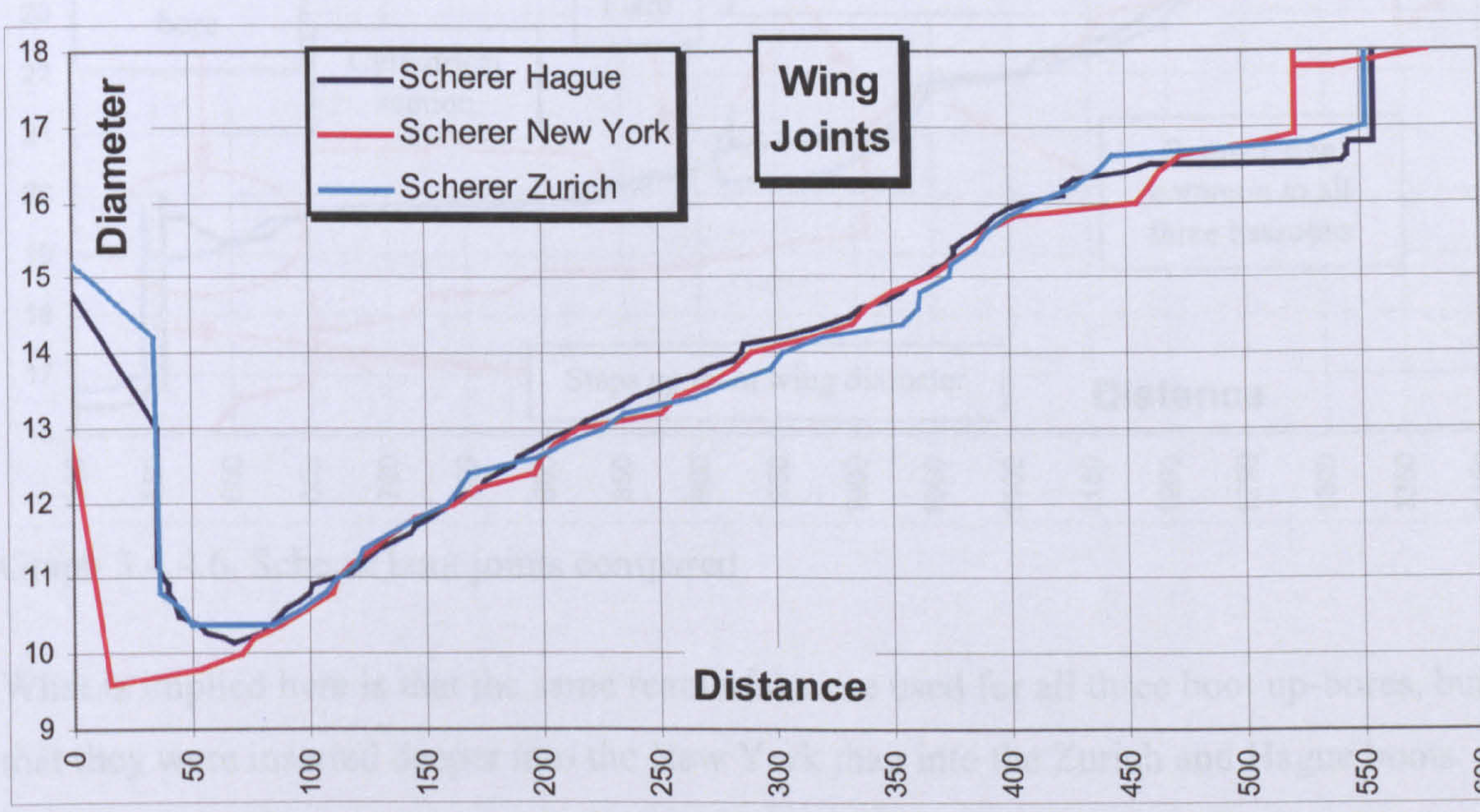
Bore

At first viewing there is close correspondence between the Hague and Zurich instruments, while the New York one is somewhat different from both:



Graph 3.4.4.4. Scherer bores aligned at top of wing

Several of the apparent differences of the New York bore appear less so once joints are realigned. The wing bores are in any case very close; here they are aligned to show this:



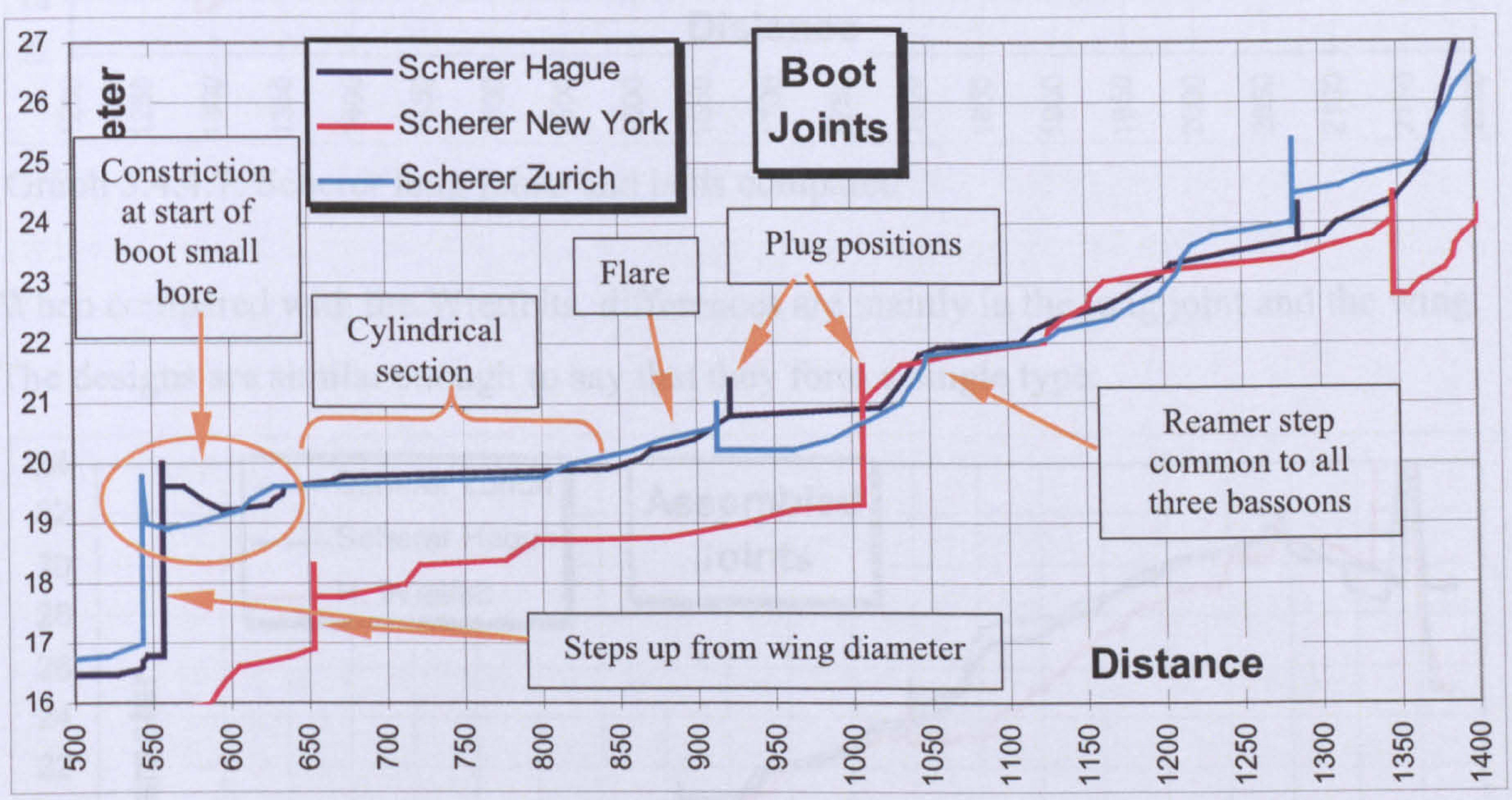
Graph 3.4.4.5. Scherer wing joints compared

They all have a with rather more subtly curved taper than the Wietfelt/Rottenburgh wings: two curved sections are still discernible on the Zurich profile (cyan line above); first from

100 to 350 on distance scale; second from 350 to the end of the joint; while the other two might almost comprise a single, sweeping curve. In the New York (red line), there is a small step just inside the tenon; between 450 and 520 on the graph. New York has a significantly narrower throat than the other two: 9.6mm versus the Hague's 10.2 mm.

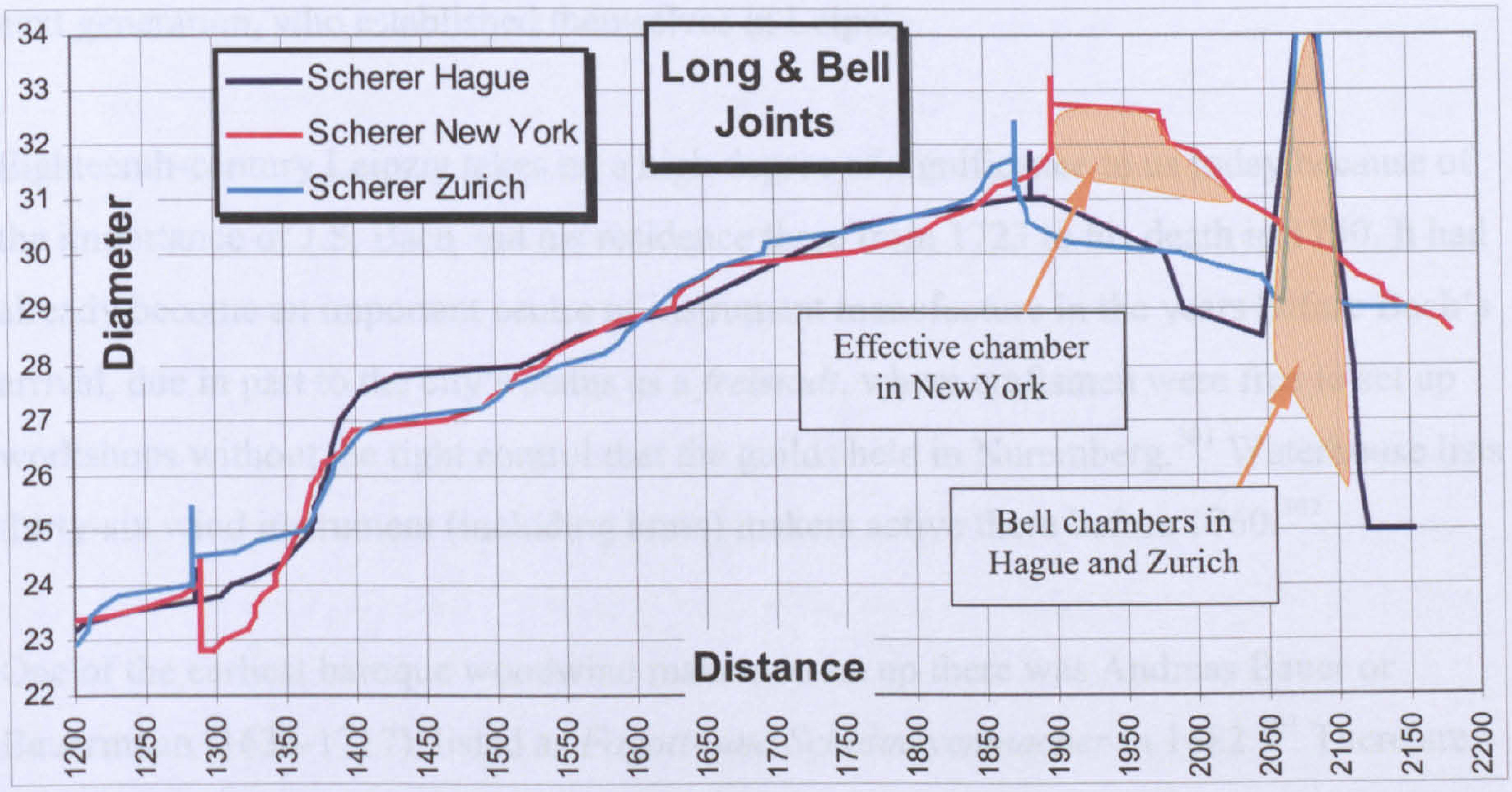
The <u>boot small bore</u> is unequivocally narrower in the New York bassoon, by 1 mm, though all three have the same simple shape. As in the Wietfelt instruments, this bore is cylindrical for most of its length. There is a step up in diameter from the wing, only part of which can be accounted for by tenon compression; then in a short tapered section the bore opens up by less than a millimetre to the long cylindrical portion. There is a small flaring out at the south end of the section just before the junction with the big bore; again less than a millimetre increase in diameter. In all there is an increase of only 1.6mm through the whole bore section. These features are labelled in Graph 3.4.4.6 below.

The <u>boot big bores</u> can be realigned to show that very similar reamer shapes are present, but located in different positions along the joints. This is seen in the right hand side of the following graph:



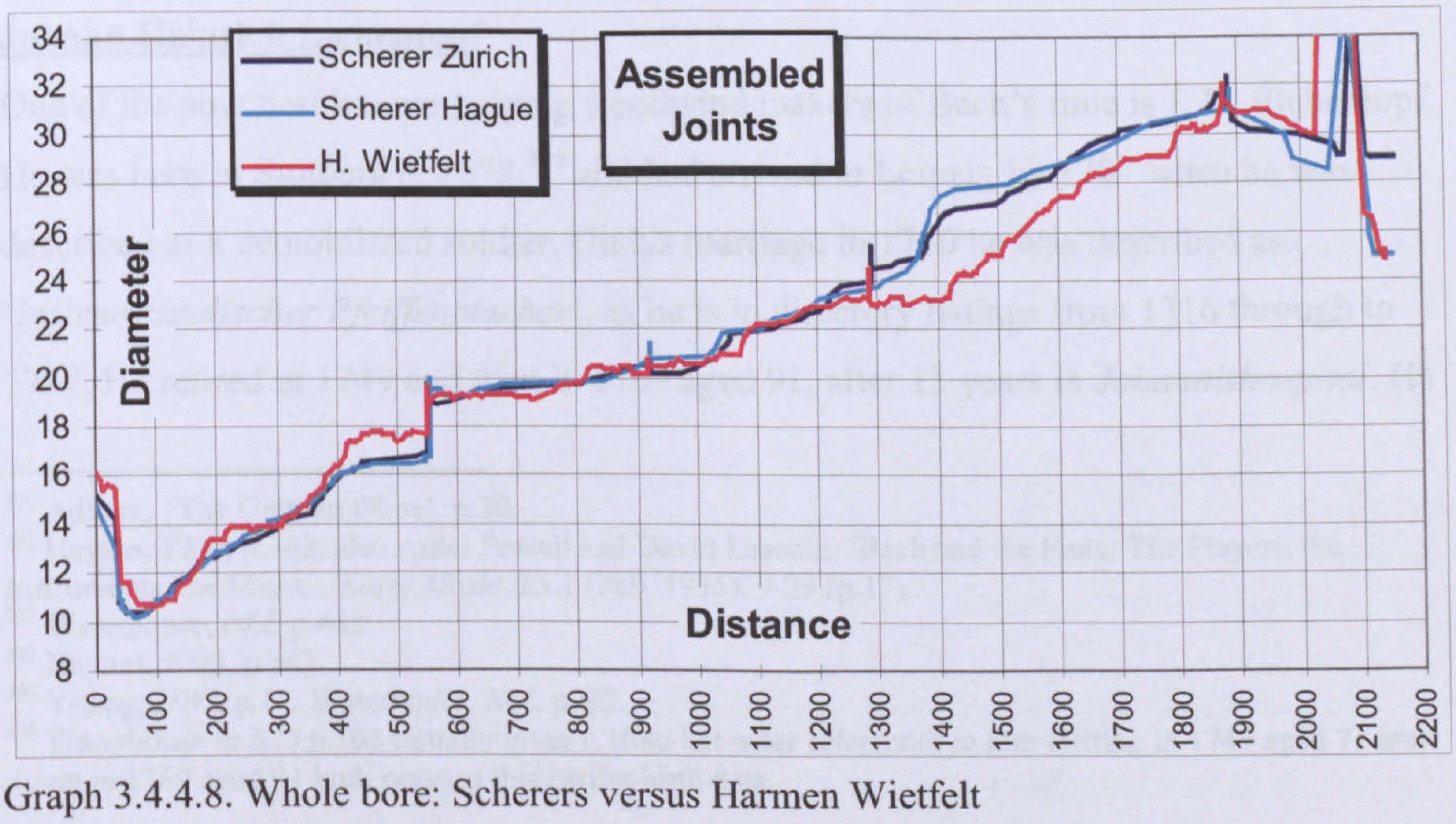
Graph 3.4.4.6. Scherer boot joints compared

What is implied here is that the same reamer(s) were used for all three boot up-bores, but that they were inserted deeper into the New York than into the Zurich and Hague boots. The <u>long joints</u> have much in common, while the <u>bells</u> are all different. The Hague (replacement) bell has a chamber and steep reverse taper in the manner of the Wietfelts discussed above, a further suggestion of its possible origin with that family. Scherer's own bell on the Zurich instrument also has a chamber but there is less constriction of diameter, in the manner of the Rottenburgh and English bassoons previously discussed. The chamber is set deep into the bell with its northern edge 46mm from the opening; again this is similar to the Rottenburgh. The New York bell is different again in that there is no chamber. The taper is somewhat steeper than Zurich but due to the larger starting diameter, the terminal opening is a similar size. The step up in diameter from the long joint effectively creates a small chamber at the south end of the bell.



Graph 3.4.4.7. Scherer long joints and bells compared

When compared with the Wietfelts, differences are mainly in the long joint and the wing. The designs are similar enough to say that they form a single type:



Graph 3.4.4.8. Whole bore: Scherers versus Harmen Wietfelt

In his study of the turning styles of eighteenth century German oboes, Cecil Adkins does not include the Wietfelts (there are not enough surviving examples), nor does he use examples by the Scherers.[300] He states that 'the style of their [Nuremberg makers; the Denners and Oberlenders] oboes was influential throughout South Germany, as may be seen in the instruments of ... the Scherers of Butzbach...'. However the bassoon case is quite different; it is evident that the Scherers and Wietfelts were not at all influenced by the Nuremberg makers' bassoon designs. What is more, these craftsmen from outside of Nuremberg appear to have had the greater influence, in bassoon design terms, over the next generation, who established themselves in Leipzig.

Eighteenth-century Leipzig takes on a high degree of significance to us today because of the importance of J.S. Bach and his residence there from 1723 to his death in 1750. It had already become an important centre of instrument manufacture in the years before Bach's arrival, due in part to the city's status as a *freistadt*, where craftsmen were free to set up workshops without the tight control that the guilds held in Nuremberg.[301] Waterhouse lists thirty-six wind instrument (including brass) makers active there before 1760.[302]

One of the earliest baroque woodwind makers to set up there was Andreas Bauer or Bauermann (1636-1717), listed as *Fagott- und Schalmeyenmacher* in 1682.[303] There are no known instruments by him, though a basset recorder and a bass dulcian have been attributed on the basis of (two different) stamps with monograms of AB.[304] The known surviving Leipzig wind instruments come from the next generation of makers.

Johann Heinrich Eichentopf

One of the now best known Leipzig woodwind makers of Bach's time is J. H. Eichentopf. He was born in Stolberg c. 1678,[305] and had arrived in Leipzig by 1707 when he was described as a demobilized soldier. On his marriage in 1710 he was described as '*Instrumentalischer Pfeiffenmacher*', as he is in directory listings from 1716 through to 1757. He retired in 1749 and died in 1769 aged 91, after 13 years in *Johannishospital*. He

[300] Adkins, 'The German Oboe', p.20.
[301] Haynes, *TEO*, p.363; also Ardal Powell and David Lasocki, 'Bach and the Flute: The Players, the Instruments, the Music', *Early Music*, 23.1 (Feb. 1995), 9-29 (p.17).
[302] Waterhouse, *NLI*, p.463.
[303] Haynes, *TEO*, p.362.
[304] Young, *HWI*, p.14, Waterhouse, *NLI*, p. 22.
[305] Waterhouse in *NLI* p.103 initially gives c.1686 but other references to him retiring in 1749 aged 71 and dying in 1769 aged 91 both point to this earlier birth date.

was also a maker of brass instruments; a pair of horns can be seen in the Prague Tschechisches Museum für Musik, another horn in the Munich Deutsches Museum, and a trombone in Bremen. There is a hint that he made stringed instruments too; a viola was listed in the 1773 inventory of the Cöthen Hofkapelle.[306]

Eichentopf was evidently thoroughly immersed in the milieu of musical instrument making and playing in the city. Among the godparents to his eight children were: C.S. Scheinhardt, brass instrument maker; the wife of Johann Poerschman, woodwind maker; Michael Hirchstein; instrument dealer;[307] Caspar Gleditsch, oboe player. The godfather of Eichentopf's granddaughter was J. C. Hoffmann, a well-known stringed instrument maker with direct links to Bach. Eichentopf himself was godfather to one of Johann Poerschman's children.[308] Poerschman was also an important woodwind maker, and player of oboe and bassoon, he is discussed further below.

These friendships further suggest a connection to Bach: Caspar Gleditsch was employed by the city as *Kunstgeiger* from 1712 and promoted to *Stadtpfeifer* in 1719. Haynes states that he was Bach's principal oboist and 'one of the most remarkable players in the history of the oboe', and that 'Bach probably wrote more solos for Gleditsch than for any other musician except himself', (some 193 oboe solos).[309] Hoffmann was one of Bach's closest friends and bequeathed him a valuable lute, worth as much as a small harpsichord.[310] He was said by Gerber to have been commissioned by Bach to make a Viola Pomposa, an instrument that Bach invented c. 1724.[311]

Similarly Eichentopf himself is said to have been asked by Bach to make an oboe da caccia,[312] though Haynes says that Gleditsch had 'evidently been playing the oboe da caccia at least a year before Bach arrived in Leipzig in 1723, which was why Bach could immediately begin writing solos for the instrument'. Nevertheless, Haynes also says that

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306 Waterhouse, *NLI*, p.104.
307 Hirchstein was an instrument dealer whose stamp has been found on several woodwinds including a recently discovered bassoon. He may have commissioned instruments directly from makers, branding them himself. This may help explain why there are so many Leipzig woodwind makers from whom no identifiable instruments survive. See note 281, p. 210.
308 Waterhouse, *NLI*, p.103.
309 Haynes, *TEO*, pp. 364-365.
310 Dreyfus, p.171. Hoffmann is famous now mainly for his lutes. Gleditsch is said to have composed 12 partitas for lute; see Dreyfus p. 257 note 73.
311 Ibid., p. 174 quoting Ernst Ludwig, Gerber *Historisch-biographisches Lexikon der Tonkünstler,* 1790.
312 Waterhouse, *NLI*, p.104.

Eichentopf could have invented it and that in any case it 'seems to have been a speciality of Saxony and Poland'.[313]

There was a similar situation with the oboe d'amore, whose short but intense useful life seems to have centred on, or begun in Leipzig.[314] Most of the Leipzig woodwind makers from whom any instruments survive are represented by at least one d'amore, but Eichentopf is survived by ten, far more than any other maker. So it seems that even if he was not the inventor, he certainly rode the wave of interest in that instrument.

Otherwise Eichentopf's surviving woodwinds are: two well-known and much reproduced oboes da caccia with brass bells, very reminiscent of the bells on his horns;[315] just two standard oboes; two altos and one tenor recorder; and an ivory flute thought to be one of the earliest four-piece flutes.[316] There are four bassoons: two concert sized; MI-127 in the Germanisches Nationalmuseum, Nuremberg and Mu35 in the Oberösterreichisches Landesmuseum, Linz; one quart-bass in St Annen Museum, Lübeck (No. 1893/63) and one high octave in Händelhaus Museum, Halle (MS-522).

The concert bassoon in Nuremberg was not examined for this study but it is said to be substantially similar in bore and tonehole configurations to the one in Linz.[317] It is documented in Kirnbauer's catalogue, with photographs though without bore graphs.[318]

Exteriors

a) The Nuremberg instrument is of maple while the Linz is boxwood (though see later).
b) The Linz has slightly more elaborate brasswork: F and Ab keys with decorative drilled holes; boot ferrule with multiple engraved lines; and the bell crown has a plate covering the top surface of the bell while Nuremberg's is a simpler band around the circumference with no top plate.
c) The Linz long joint has a platform, while that of the Nuremberg is fully turned.

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[313] Haynes, *TEO*, p.381.
[314] Haynes, *TEO*, p.368 and on p. 370 Haynes points out that two thirds of its repertoire was written between 1717 and 1730, almost all the remainder between 1730 and 1760.
[315] Although brass-belled da caccias are familiar today thanks to the many copies made of Eichentopf's, the majority of surviving da caccias by other makers actually have wooden bells.
[316] Young, *HWI*, pp.67-69 and Ardal Powell, 'The Eichentopf Flute: The Earliest Surviving Four-Joint Traverso?' trans by Powell of article in *Tibia* (Jan 1995), 343-50, http://www.flutehistory.com/Resources/Documents/eichentopf.php3.
[317] Leslie Ross private communication; she has measured both instruments.

d) The Nuremberg has the boot keys mounted in saddles while the Linz has integral blocks.

e) The long joint platform might be thought to indicate that the Linz was made later than the Nuremberg, but the boot key saddles on the Nuremberg seem to contradict this.

f) Both instruments are in very good condition with no major damage or alterations. They are both said to play at somewhat under A=415 Hz.[319]

g) They have been used as the basis of reconstructions by several modern makers: made to play at A=415 with some modifications to raise the pitch, greater or smaller depending on the maker. At least one maker also offers a version modified to play at A=392 Hz.

It is a simple but well balanced design, more similar to Wietfelt than to the Scherers, though with a little more elegance and balance despite the simpler brasswork. The boot is not so boxy, but rather more slim and oval in cross section; the bell joins the long joint at the same diameter (rather like the English model). The F key design is familiar from Bizey, Stanesby and Rottenburgh (see Fig. 3.4.2.5).

On the Linz instrument the boot joint blocks are carefully cut, and slimmed down to the minimum necessary; the protective knob below the F flap is delicately formed. The wood it is made from is listed as boxwood in the catalogue and elsewhere, and is certainly the colour of acid-stained box, with the smooth surface also expected of that timber. However Leslie Ross has questioned the wood type on two grounds that I do not dispute: it is rather light in weight and the wood of all joints is remarkably free of knots, concealed rot or faults of any kind, which are very hard to avoid in boxwood.[320] Neither she nor I are able to find a better suggestion of what wood it might be however, so for now the conclusion must be that Eichentopf found a remarkably large, clean, though low-density piece of boxwood. It has also been a stable piece of wood; the joints are still reasonably straight and the bore is very close to circular in cross section in the wing, long and bell joints, less so in the boot. It must have been well-seasoned before use and during the making process.

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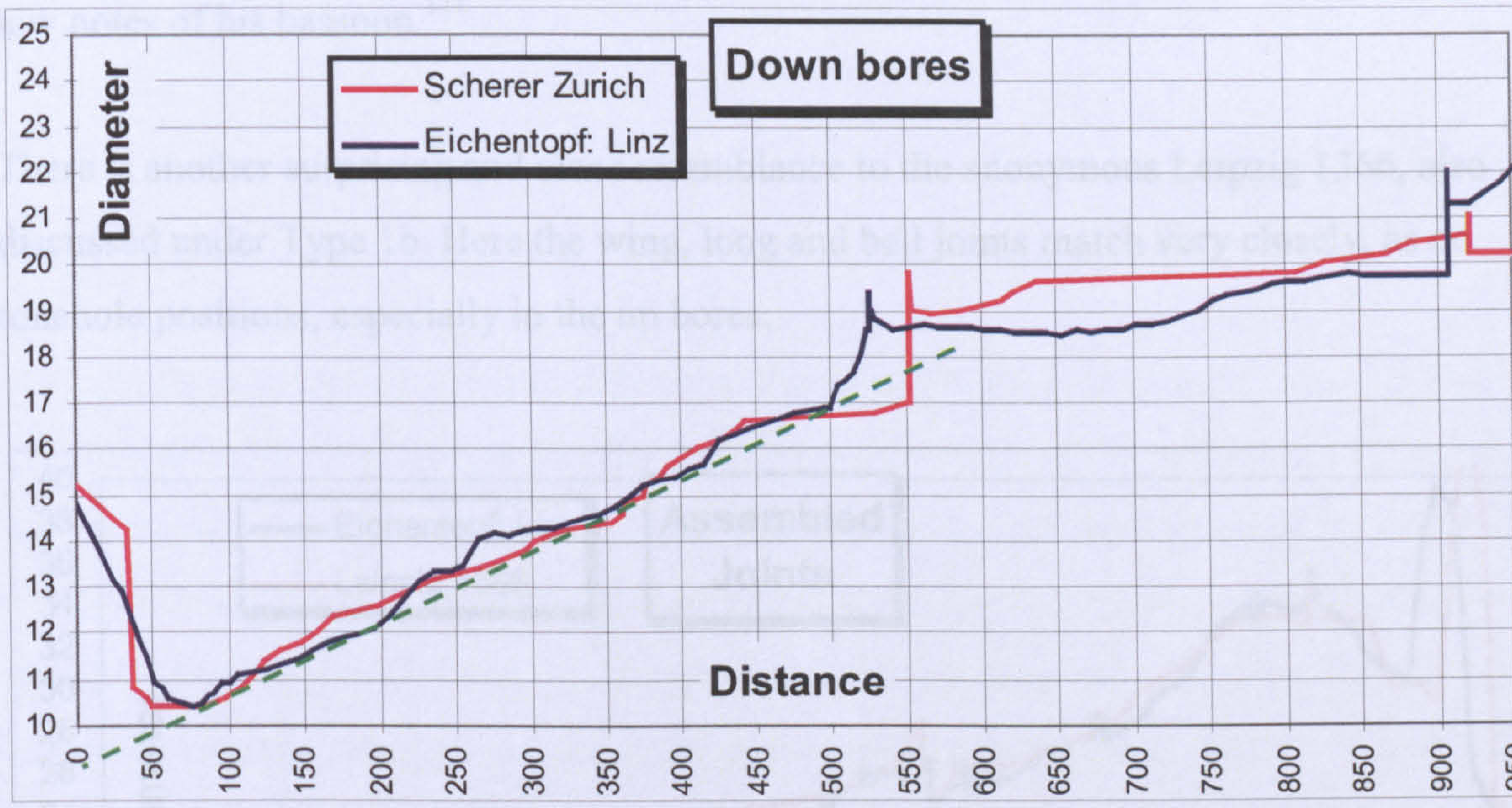
318 Kirnbauer, *Verseichnis,* pp.178-179.

319 Dependng on player and setup. Notes in the Nuremberg museum files record that Marc Vallon played the bassoon in 1986 at pitch around A=417 Hz. L. Ross in private correspondence says that they are lower than A=415 Hz.

320 Private communications.

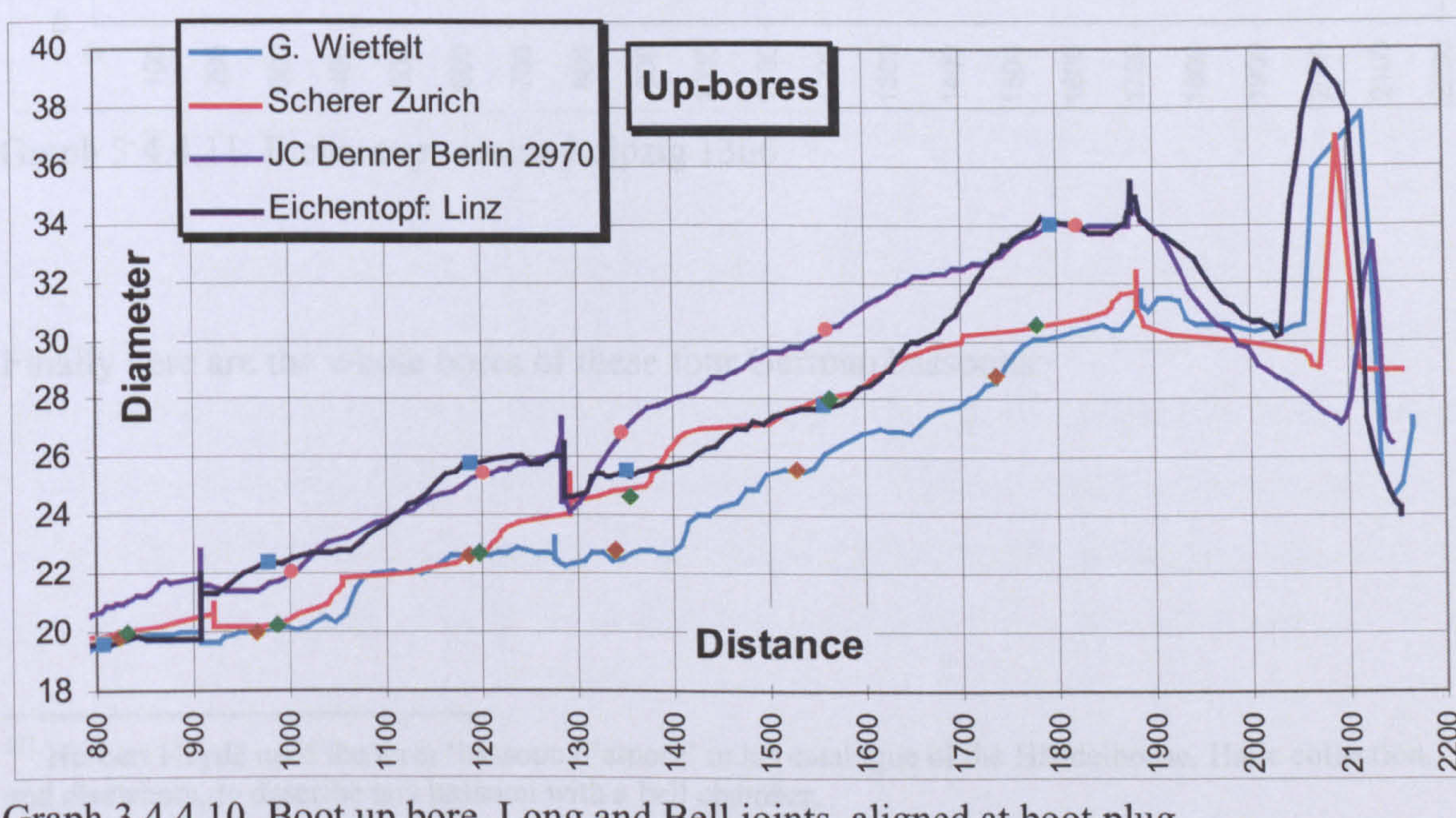
Bore

The wing joint follows the same general angle as Scherer though differing in details; it does not have the cylindrical throat section but passes from crook socket to bore rather sharply. It does not have the two-humped shape, but can be interpreted as a straight line with small modifications, as shown by the green reference line on the graph below. The boot small bore also has a long cylindrical portion, but here it starts from the north (wing) end and proceeds through the fingerhole section before beginning a slow expansion of only one millimetre through to the south end.



Graph 3.4.4.9. Wing and small boot bores of J. Scherer and J.H. Eichentopf. Reference line has slope of 0.016, or 1 in 62.5

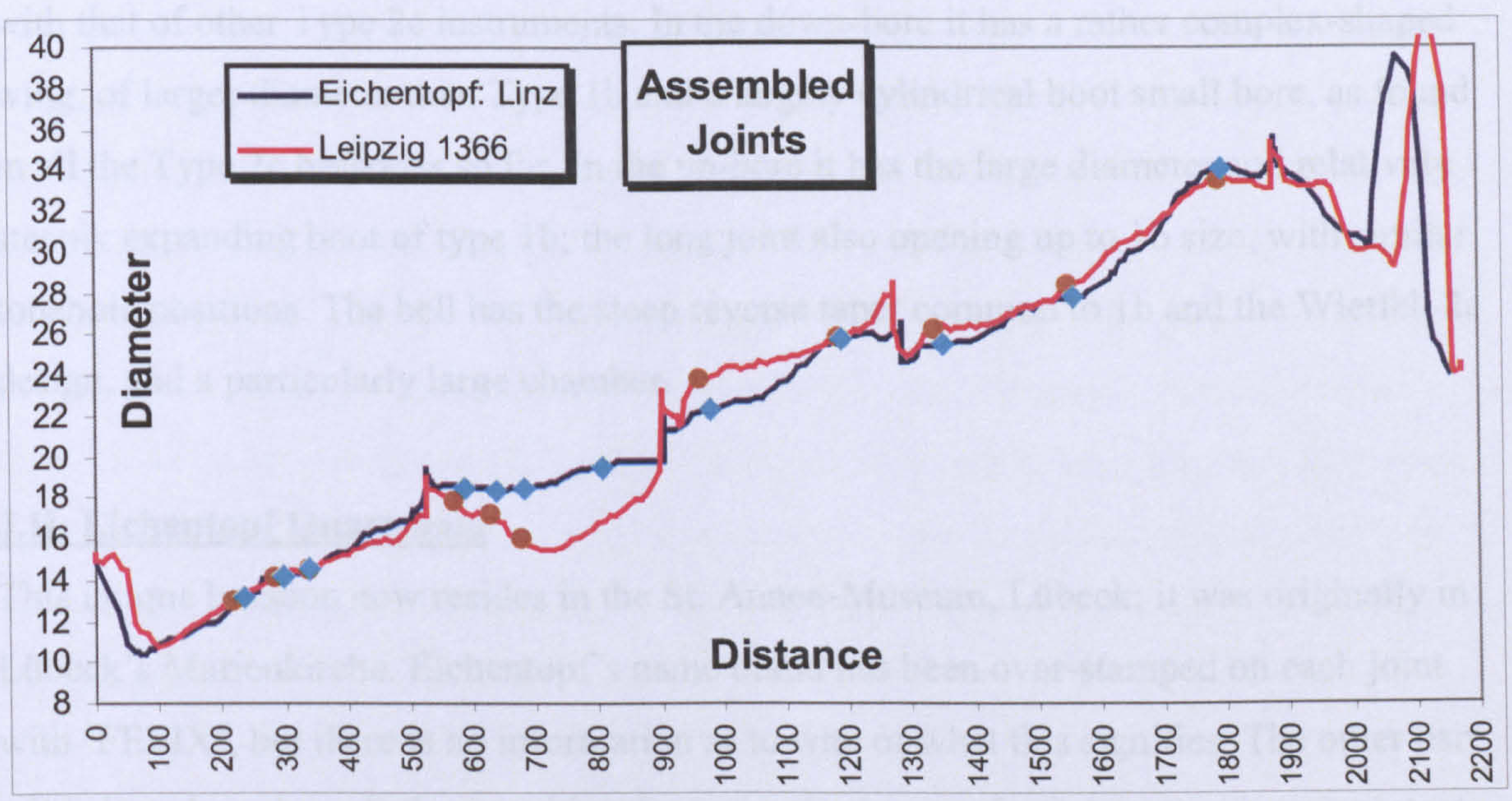
After that the bores diverge considerably, and a different, rather surprising, match can be found with J.C. Denner (Berlin 2970):



Graph 3.4.4.10. Boot up bore, Long and Bell joints, aligned at boot plug

Here the Eichentopf matches J.C. Denner through the boot up-bore, and in the long joint is a combination of Scherer in its southern reaches and Denner at the northern end. The tonehole spread in the long joint has more in common with Denner than Wietfelt, while Scherer is in-between. In the bell, Eichentopf has the biggest chamber of all and the steep reverse taper of Wietfelt; the opening diameter being about the same as that of the south end of the long joint. Perhaps, in this large bell chamber, Eichentopf reflects his interest in the oboe d'amore; it may be that he intended something of the same tone quality in the low notes of his bassoon.[321]

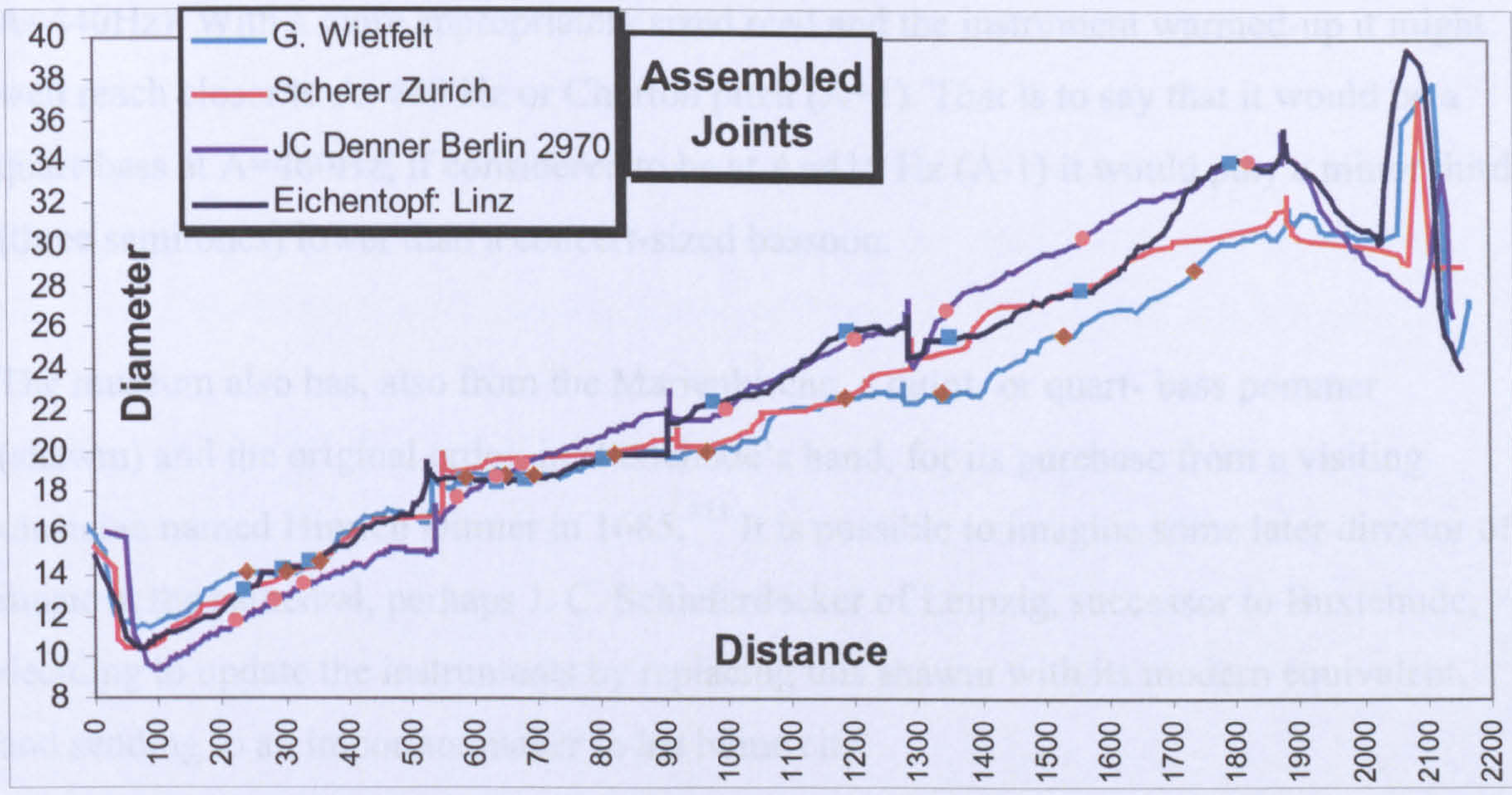
There is another surprising and close resemblance to the anonymous Leipzig 1366, also discussed under Type 1b. Here the wing, long and bell joints match very closely, as do tonehole positions, especially in the up bores:



Graph 3.4.4.11. Eichentopf versus Leipzig 1366

Finally here are the whole bores of these four German bassoons:

[321] Herbert Heyde used the term 'bassoon d'amore' in his catalogue of the Händelhouse, Halle collection, and elsewhere, to describe any bassoon with a bell chamber.



Graph 3.4.4.12. Scherer, Wietfelt, Denner and Eichentopf compared

In summary: the Eichentopf bore appears to combine elements of both the Type 1b form with that of other Type 2c instruments. In the down-bore it has a rather complex-shaped wing, of larger diameter than Type 1b and a largely cylindrical boot small bore, as found in all the Type 2c bassoons so far. In the up-bore it has the large diameter and relatively steeply expanding boot of type 1b; the long joint also opening up to 1b size, with similar tonehole positions. The bell has the steep reverse taper common to 1b and the Wietfelt 2c design, and a particularly large chamber.

<u>J.H. Eichentopf Quart-bass</u>

This unique bassoon now resides in the St. Annen-Museum, Lübeck; it was originally in Lübeck's Marienkirche. Eichentopf's name brand has been over-stamped on each joint with 'FELIX', but there is no information as to who or what this signifies. The other part of his brand mark – a little pot with oak sprays (*Eichen-topf* = Oak-pot) – remains intact.

It stands 1.59m high, compared to the Linz concert bassoon's 1.26m, and the Andreas Eichentopf contrabassoon's 2.68m. It is immediately apparent from those figures that it is not big enough to be pitched a full fourth lower than Eichentopf's concert bassoon. There was an opportunity to play it for a short time, but only with a contrabassoon reed and without time to warm it up properly.[322] With these limitations the tuning was not good, but the results were enough to establish a pitch at around A=455 Hz (50 cents sharp of

[322] Dr Althöfer, director of the museum, kindly allowed for it to be played for a short time.

A=440Hz). With a more appropriately sized reed and the instrument warmed-up it might well reach closer to A=460 Hz or Chorton pitch (A+1). That is to say that it would be a quart-bass at A=460Hz; if considered to be at A=415 Hz (A-1) it would play a minor third (three semitones) lower than a concert-sized bassoon.

The museum also has, also from the Marienkirche, a quint- or quart- bass pommer (shawm) and the original order, in Buxtehude's hand, for its purchase from a visiting musician named Hinrich Ditmer in 1685.[323] It is possible to imagine some later director of music at the cathedral, perhaps J. C. Schieferdecker of Leipzig, successor to Buxtehude, deciding to update the instruments by replacing this shawm with its modern equivalent, and sending to an important maker in his home city.

The problem with this pleasing scenario is that the pitches cannot be made to match. Herbert Myers wrote, in a letter to the Hautboy Research group, his findings that the pommer seems intended to play as a quint-bass at an extra-high-pitch *hoche chorton*: nearly a whole tone above modern pitch (A+2); around A=490Hz.[324] He points out that this was the pitch of Buxtehude's organ in the cathedral.[325] It could alternatively be seen as a quart-bass at modern pitch (A+0), but there are historical indications that pommers were made at quint-bass size but not quart-bass.[326] The bassoon's pitch does not fit into either of these levels; it does not seem likely that it could play another whole semitone higher, even with a shorter reed and warming-up; so the relationship between the bassoon and the pommer remains something of a mystery for now. The museum also possesses three cornetti; two at A+2 and one at A+1.[327] The pitch of the latter, therefore, agrees with the bassoon.

Examinations of the joint lengths and bore profile show that in order to fulfil this commission, Eichentopf extended his standard bassoon design, making some new reamers but re-using at least one of his existing bassoon reamers. This is in contrast to the relationship noted between the Haka and the Andreas Eichentopf contrabassoon.

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[323] Kerala J. Snyder, *Dieterich Buxtehude, Organist in Lübeck*, pp. 375 and 476, quoted by H. Myers in correspondence with the Hautboy Research List 30/05/03.
[324] Herbert Myers 'Re: High pitch bassoons & light weight ww's', hautboyresearch@yahoogroups.com, 30 May 2003. Myers further suggests that the pommer was probably originally made to play at A+1, but was modified to fit the Lübeck pitch of A+2.
[325] see also Haynes, *HoPP*, p.230; he states that the organ was measured in 1851 as being at A= c. 487 Hz.
[326] In the same correspondence Myers states that 'Praetorius mentions the existence of both quart- and quint-bass curtals, but only the quint-bass Pommer'.
[327] Haynes, *HoPP*, p.156 note 134.

Exterior

The <u>wing</u> is normal Type 2 form, very plain with a brass ferrule at the crook socket.

The <u>boot keys</u> are mounted in brass saddles. They are a unique and pleasing design within the Type 2 tradition. The Ab touch nestles closely against the F touch; see Fig 3.4.4.1 below.

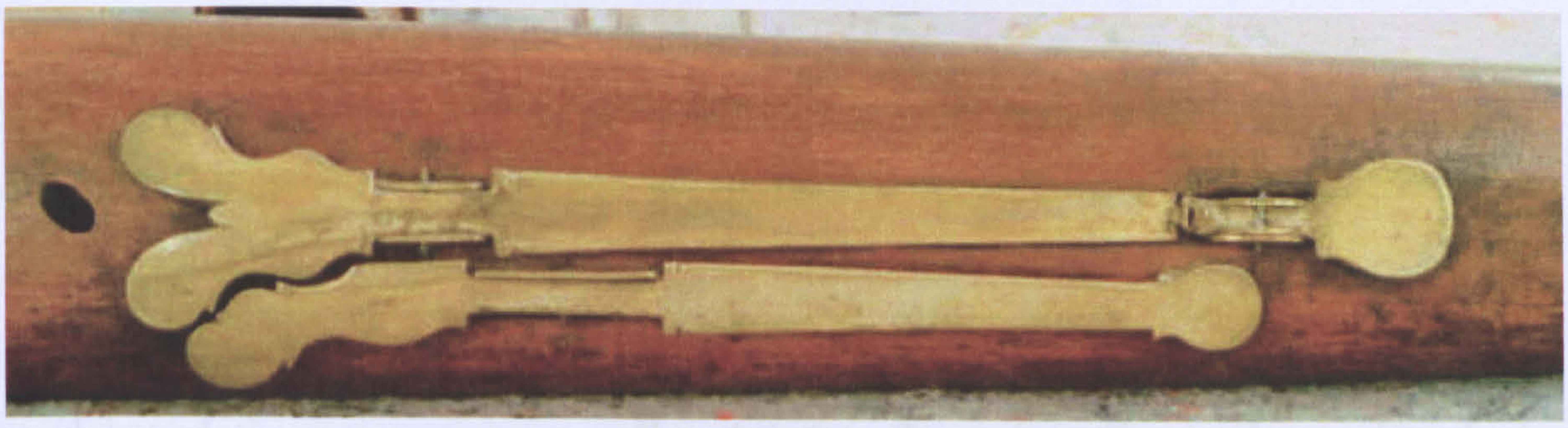


Fig 3.4.4.1. Eichentopf quartbass boot keys

The <u>long joint</u> is fully turned with the keys mounted in vestigial rings which are carved away entirely on the other side of the joint. It has a bead and two fillets abutting the tenon at the north end that are common to many type 2s of Saxon origin. These are also found on Eichentopf's high octave bassoon but not on either of his concert bassoons.

The <u>bell</u> has the elements of the Type 2c norm, but small beads and quirks separate them in order to break up the longer expanse. There is a well-made crown with fretted edges and plate across the flat north face; incised lines decorate both face and sides.

The <u>crook</u> is 413mm long and the bend shape results in a relatively low reed-to-wing angle.

Bore

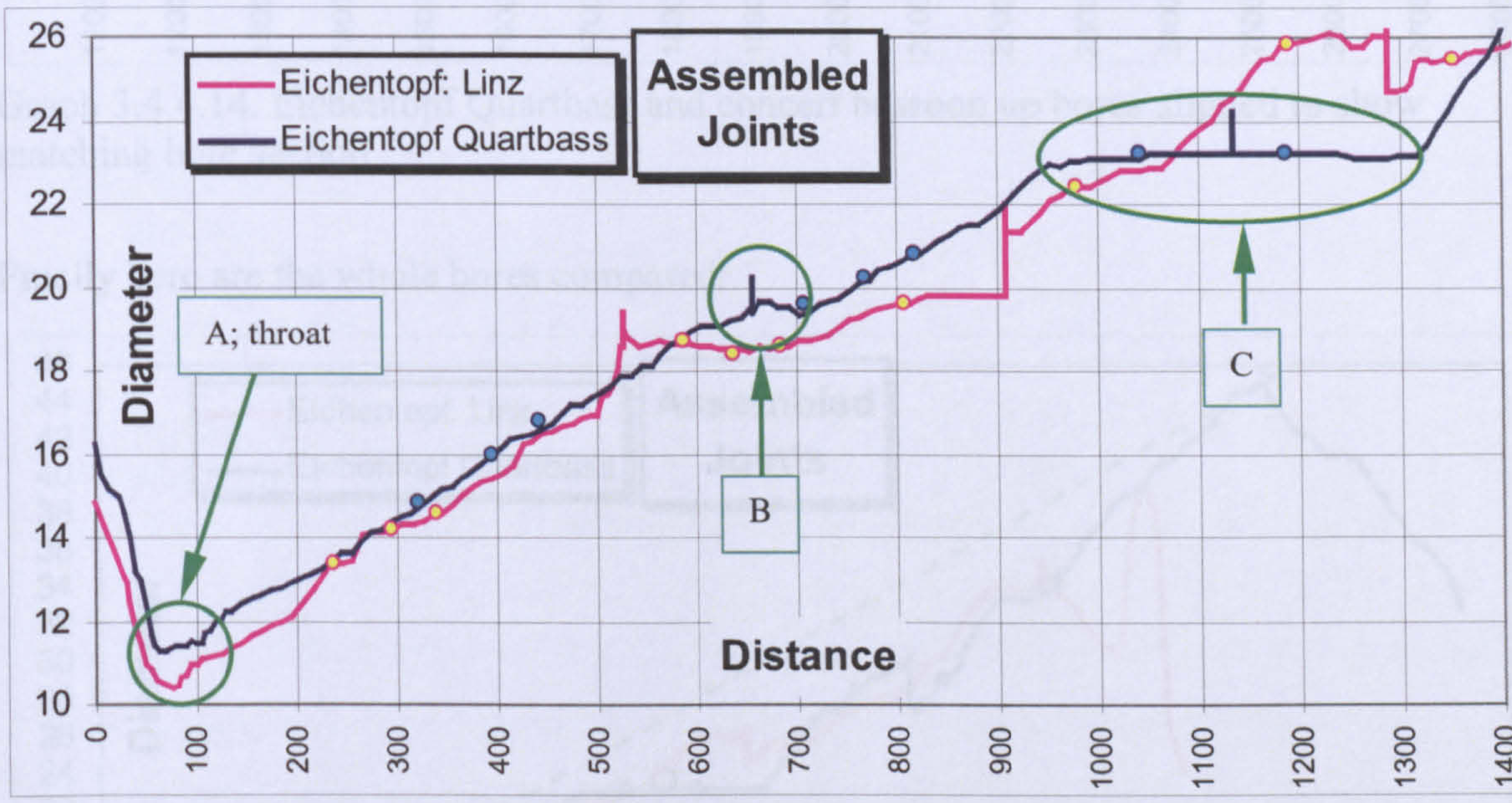
The <u>down bore</u> as a whole, including the crook, is made of simple straight tapers and cylinders (see graphs in Appendix 3).

The <u>crook</u> bore measurements lie very close to a straight cone of 1 in 48 or 0.021 slope.

The <u>wing</u> has very little distortion: the measurements in two axes are almost the same so the cross section is almost circular. The profile is very regular; a straight taper through the main part (1 in 65 or 0.0154), which is fairly close to the main taper of the concert bassoon's wing. There is a throat section (A in Graph 3.4.4.13 below) around 60mm long between crook socket and main taper that is rather more distorted, with a difference between the two axes of up to 0.7 mm. As explained previously this region gets very wet and the wood is then susceptible to rot or simply being worn when the joint is cleaned, and more will wear away along the track the condensed water takes. If the main taper originally continued to intersect the crook socket with a sharp corner, then the narrowest point would have been close to 10.8mm.

In the boot small bore there is a short quasi-cylindrical section continuing at the same diameter as the wing, up to hole IV (B in graph); then another straight taper of slightly lower angle than that of the wing (0.013 or 1 in 77); followed by a long cylindrical section of 23.2mm diameter towards the boot plug.

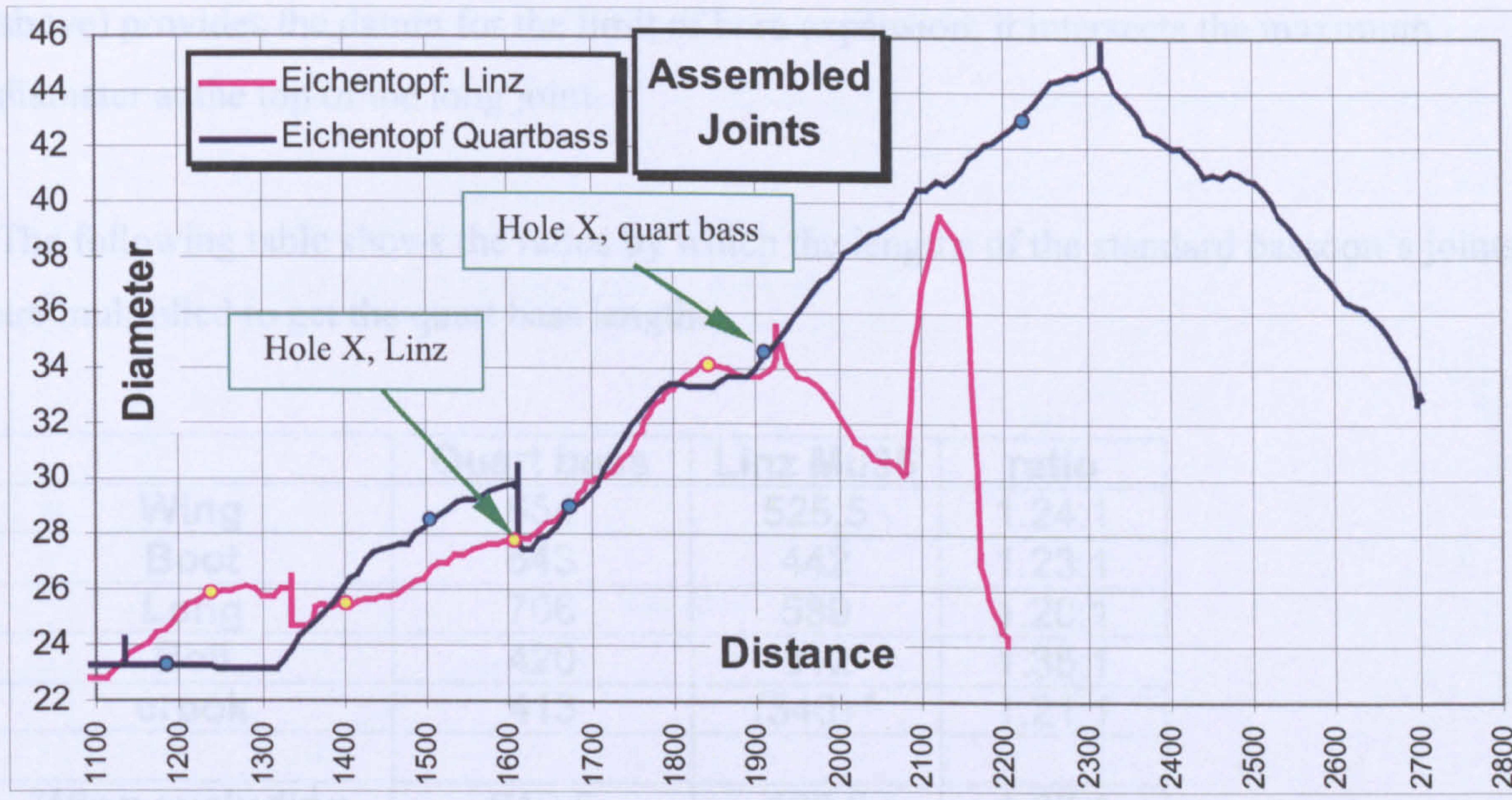
The cylindrical section continues at the same diameter through the south end of the boot big bore (C in graph), then the tapers get steeper and rather more complicated.



Graph 3.4.4.13. Comparison of Eichentopf Quartbass and concert bassoon down bores; aligned at top of wing

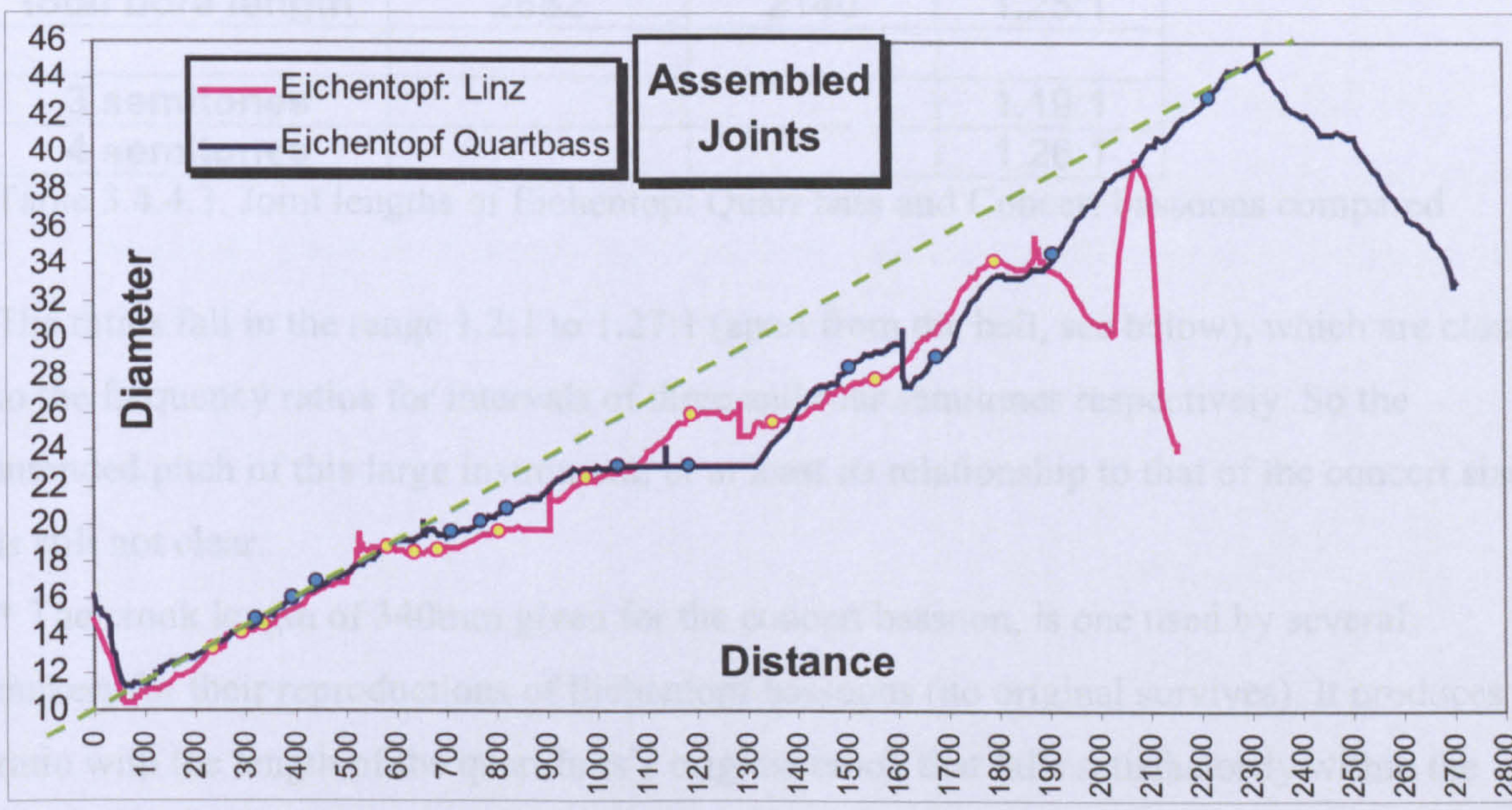
At least one part of the more irregular up bore can be seen to have been formed using one of the standard bassoon's reamers. The lower part of the quartbass's long joint, up to hole X, exactly matches the upper part, from hole X upwards, of the standard bassoon (between 1600-1900 in Graph 3.4.4.14 below). Eichentopf would have had to extend the shank of the reamer, in order to reach down into the quartbass's joint.

The long joint from X upwards needed a new reamer, or more likely two; the bore is slightly irregular and not quite a straight taper, but it is mirrored in the bell bore, so it looks as though the new reamer(s) Eichentopf had to make had at least two uses. There is no chamber in the bell.



Graph 3.4.4.14. Eichentopf Quartbass and concert bassoon up bores aligned to show matching bore section

Finally here are the whole bores compared:



Graph 3.4.4.15. Eichentopf Quartbass and concert bassoons aligned at top of wing, with reference taper of 0.015

It can now be seen that in order to make a lower pitched bassoon Eichentopf has taken his standard model, extended the bore from the long joint's north end, and redistributed the greater length amongst the various joints. The wing keeps the same basic taper but is extended in length. The boot has the normal lower angle in the small bore, and the big bore is steep in keeping with Eichentopf's adherence to the Type 1 form of up-bore. The two boot bores are joined together by a simple cylindrical section at their south ends. A straight line drawn through the wing (slope .015, shown by the dashed line on the graph above) provides the datum for the limit of bore expansion; it intersects the maximum diameter at the top of the long joint.

The following table shows the ratios by which the lengths of the standard bassoon's joints are multiplied to get the quart bass lengths:

	Quart bass	Linz Mu35	ratio
Wing	654	525.5	1.24:1
Boot	543	442	1.23:1
Long	706	589	1.20:1
Bell	420	312	1.35:1
crook	413	(340) *	1.21:1
Wing excluding tenon	612.5	482.5	1.27:1
Long excluding tenons	626.5	509	1.23:1
total bore length	2682	2140	1.25:1
3 semitones			1.19:1
4 semitones			1.26:1

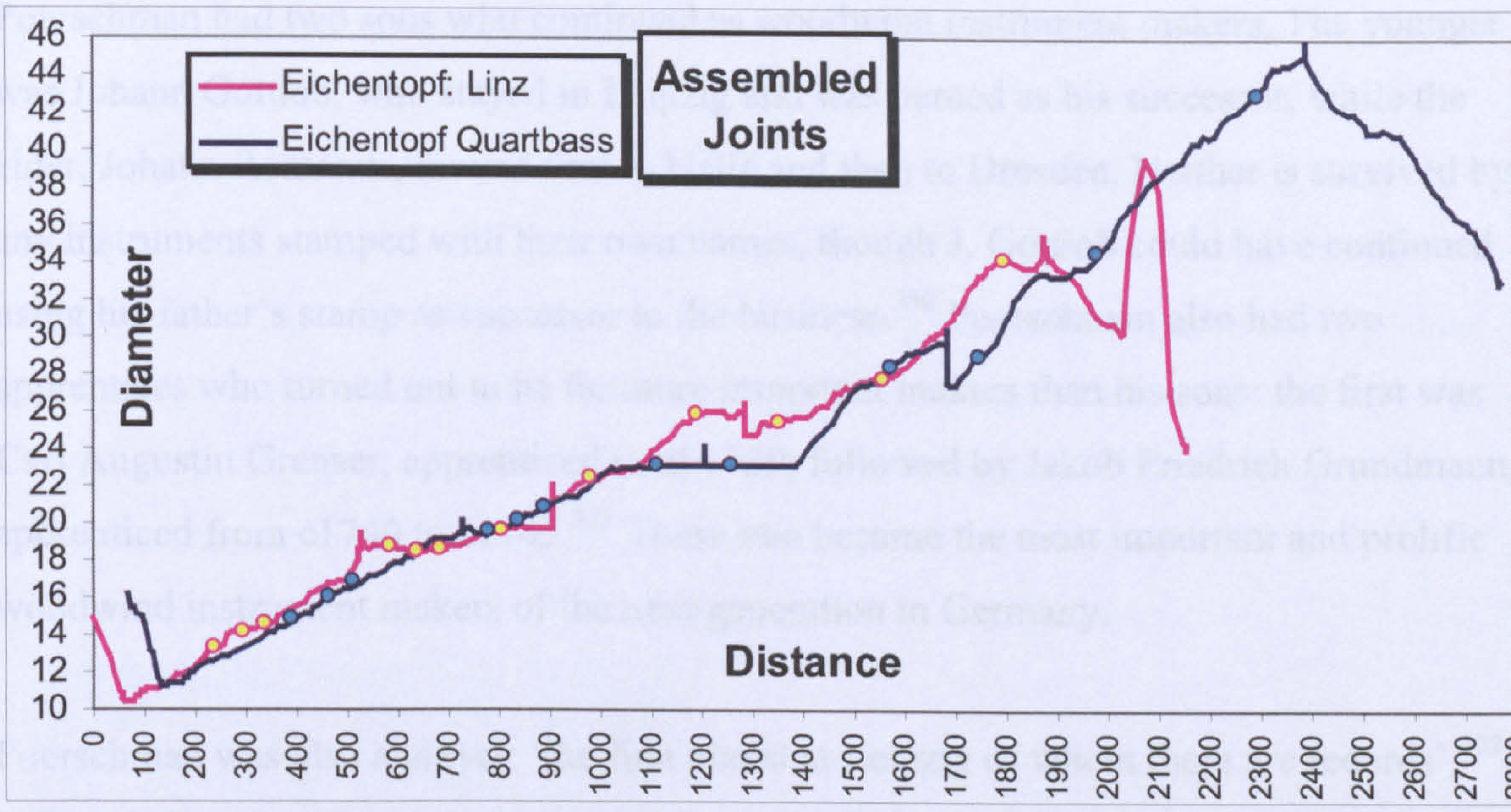
Table 3.4.4.3. Joint lengths of Eichentopf Quart bass and Concert bassoons compared

The ratios fall in the range 1.2:1 to 1.27:1 (apart from the bell, see below), which are close to the frequency ratios for intervals of three and four semitones respectively. So the intended pitch of this large instrument, or at least its relationship to that of the concert size, is still not clear.

* The crook length of 340mm given for the concert bassoon, is one used by several makers for their reproductions of Eichentopf bassoons (no original survives). It produces a ratio with the length of the quart bass's original crook that falls satisfactorily within the range of the other joints.

The bell is longer than need be to fit these ratios, perhaps because the concert bassoon's bell is of a compromise length, designed to make both B1 and Bb1 possible by lipping up or down, while for the purposes that this larger instrument would be put to, a solid Bb (sounding F1 when used as a quartbass at A+1) would be more useful.

When the bores are aligned at the crook tip (small end), the alignment of toneholes is only approximate. The six fingerholes would not be expected to align in any mathematical way as they still have to be reachable by normal fingers, but toneholes controlled by keys can in theory be placed wherever they need to be. It seems that Eichentopf, having decided on the lengths of the joints, has simply placed the toneholes in the normal positions on those joints, without particular regard to a strict relationship to the transposition interval ratios.



Graph 3.4.4.16. Quartbass and concert bassoons aligned at the tip of their crooks (crooks themselves not shown).

It looks as though this design could be adapted to play at a pitch of anywhere between three to four semitones lower than the concert bassoon. The final tuning within that range could be made by tonehole adjustments to suit the particular requirements of the customer. An alternative interpretation is that most parts were made somewhat longer than needed for a minor third pitch difference, in order to allow the toneholes to be made a little larger for a brighter tone quality.

Johann Poerschman

Johann Poerschman was born in Wittenberg circa 1680. On marrying in 1708 he was '*Instrumenten & Pfeifenmacher in Leipzig*', where he died in 1757.[328] The godparenthood links with Eichentopf have already been mentioned, and other godparents of Poerschman's children include: Christian Noack, another woodwind maker;[329] Caspar Gleditsch mentioned above; and the same J.C. Hoffmann also previously mentioned. From 1721 the Poerschman family shared a house with Hoffmann. It is evident then, that not only were Poerschman and Eichentopf exact contemporaries as woodwind makers in Leipzig, but they were also friends, and had several other friends and colleagues in common.

[328] Waterhouse, *NLI*, pp. 305-306.
[329] c. 1682-1724, survived only by one oboe d'amore now in Prague.

Unlike Eichentopf, of whom nothing is known of any apprentices, assistants or successors, Poerschman had two sons who continued as woodwind instrument makers. The younger was Johann Gottlob, who stayed in Leipzig and was named as his successor, while the elder, Johann Romanus, moved first to Halle and then to Dresden. Neither is survived by any instruments stamped with their own names, though J. Gottlob could have continued using his father's stamp as successor to the business.[330] Poerschman also had two apprentices who turned out to be far more important makers than his sons: the first was Carl Augustin Grenser, apprenticed until 1739; followed by Jakob Friedrich Grundmann, apprenticed from c1740 to c1745.[331] These two became the most important and prolific woodwind instrument makers of the next generation in Germany.

Poerschman was also a player: 'the first oboist at Leipzig of whom there are records',[332] and more importantly for our purposes, first bassoonist in the *Grosse Conzert*, from its inception in 1746 to 1748.[333] By this time he was aged 60; there do not appear to be records of his playing between these instances.

Poerschman is less well known than Eichentopf today, partly because there are fewer of his instruments surviving. There is one alto recorder, and two flutes of non-standard sizes: an alto in A and a tenor in F. Of double-reed instruments, there are no standard oboes, two oboes d'amore (one is missing its bell),[334] and two bassoons: one in Leipzig (No. 1384 in the Musikinstrumenten Museum der Universität) and one in Prague (No. 1375E in the Tschechisches Museum für Musik).

[330] Waterhouse, *NLI*, pp. 305-6.
[331] Ibid., pp. 145 and 305-6.
[332] Haynes, *TEO*, p.362, no dates are given.
[333] Ibid., p.431. The *Grosse Conzert-Gesellschafft* was established in the mid-1740s in competition with, or as successor to the various *Collegia Musicum* that enhanced public music activity in Leipzig from the beginning of the century. An early Collegium was set up by Teleman c. 1701, later directed by M. Hoffman and J.S. Bach. J.F. Fasch established another in 1720. They consisted of university students and other players, could muster large forces (forty players in Teleman's case), performed in coffee houses, wine cellars and the open air. They acted as a reservoir of musicians from which both Teleman and Bach drew when additional forces were needed in their positions at the New Church and St Thomas's respectively. The *Grosse Conzert* eventually metamorphosed into the Leipzig Gewandhaus Orchestra. See: Andreas Glöckner, 'Bach's Leipziger Collegium musicum und seine Vorgeschichte', *Die Welt der Bach-Kantaten Vol. 2 J. S. Bachs weltliche Kantaten,* ed C. Wolff and T. Koopman, (Leipzig, Metzler/Bärenreiter, 1997), pp. 105-117, trans Thomas Braatz at http://www.bach-cantatas.com/Articles/Collegium-Musicum%5BBraatz%5D.htm
[334] Young, *HWI*, p.179. The listed fragmentary oboe in Poznan is now identified as the top and middle joints of an oboe d'amore.

It is curious, but no more than coincidence, that like Eichentopf, Poerschman is survived by one bassoon of boxwood (Leipzig) and one of maple (Prague). In further parallels, the box Poerschman has a platform on the long joint, while the maple one is fully turned. The box one also has a more elaborate crown on the bell; the twelve three-lobed 'leaves' around the circumference have a raised bead and incised lines across each (made by turning the brass after mounting on the instrument), and a soldered on plate covers the top face of the bell, also with turned in decoration. That of the maple is more simply made from a single twelve-petalled disc of brass, applied to the face of the bell, and the petals wrapped around the bead. Both are pinned to the bell with a small nail through each petal, the nail heads adding a further decorative note.

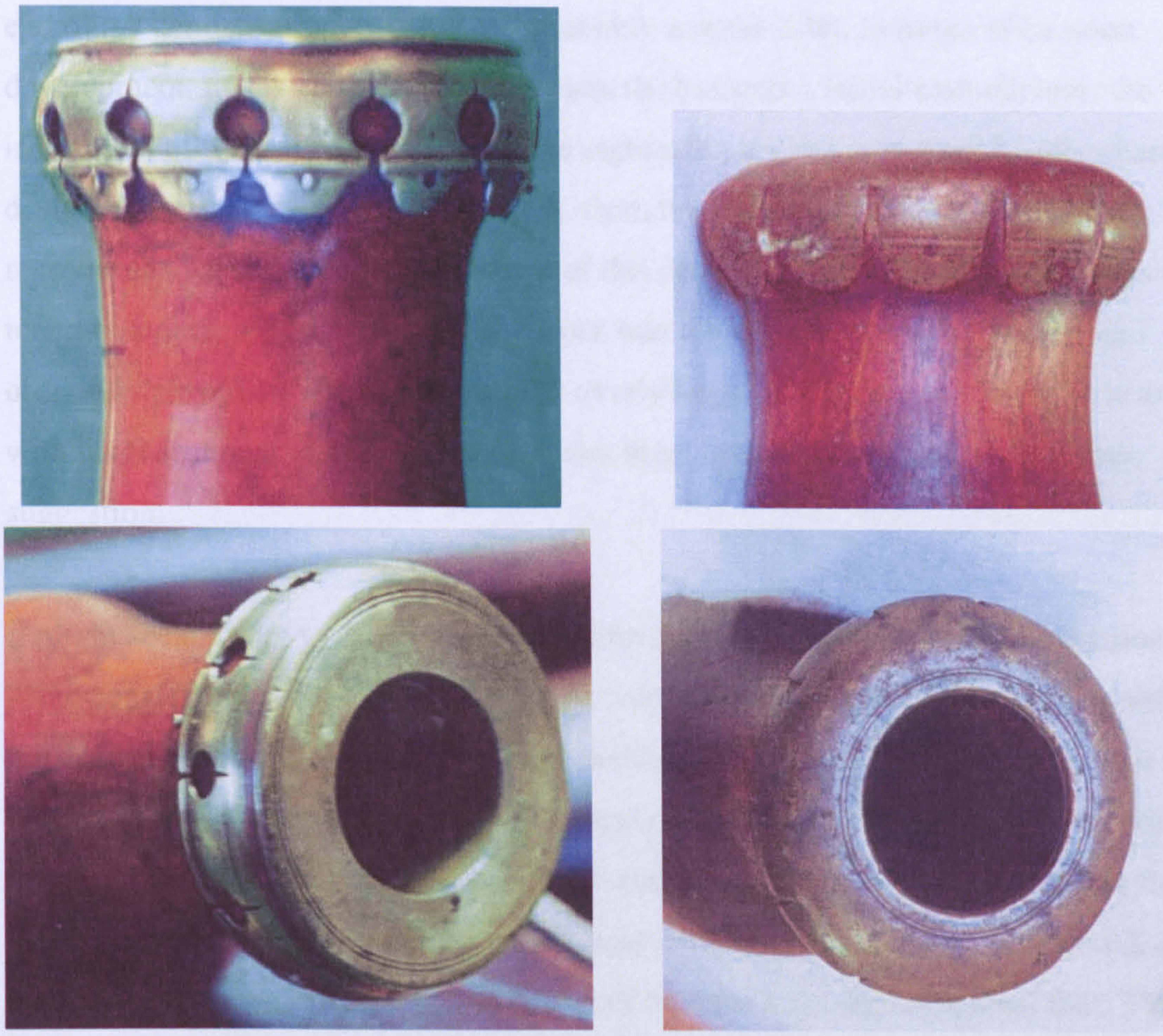


Fig 3.4.4.2. Bell crowns on Poerschman bassoons; left Leipzig, right Prague

Both makers, then, made a model with more opulent fittings in boxwood and a more workaday model of maple. The choice of boxwood is significant; it is difficult to find in good quality in such large pieces and probably was even in the eighteenth century, and therefore was probably more expensive than maple, as it is now. In addition it is considerably harder work to bore and shape, especially bassoon-sized pieces, with manually powered lathe, chisel and plane. The use here, then, indicates a considered choice, and implies a confidence in design achieved through a considerable degree of practice.

It is not possible to say if the keys of the Leipzig were also more elaborate, as that bassoon has had a complete renovation sometime in the late eighteenth or early nineteenth century. The original four keys were replaced by a new set, augmented with an Eb key on the long joint, F# on the boot, and an octave speaker key on the wing. The new keys are all mounted in brass saddles but there are marks on the boot that indicate there had originally been block mounts, – as still remain on the Prague bassoon – all removed during the re-fit.

The style and number of the new keys indicate that this work was carried out towards the end of the century at the earliest, and probably around 1800. In terms of bassoon development, this is considerably later than the bassoon's initial manufacture; the instrument of the last two decades of the eighteenth century was significantly changed in design, tonal character, range, and pitch, from that of the early part of the century. It is reasonable to assume that in the course of this complete re-fit, the instrument was also re-tuned to a pitch useful at the time the work was done; higher than the pitch it had originally played at. The toneholes look overly large, and a rather short crook is associated with the instrument that may date from this time, both of which corroborate this suggestion.

It might seem easier to adapt an old instrument rather than make or buy a new one, but some considerable effort would need to be applied to get a satisfactory, well tuned and musically successful result, with a high likelihood of failure. This may imply that the instrument was thought to have significant good qualities before modification, which justified the work required to bring it up to date. The converse explanation: that the old instrument had become worthless so it would not matter if the experiment failed, is also possible, but the workmanship and design of the new keys argues against that. They are elegantly fashioned, well constructed and fitted; the effort expended indicates an intention to produce an instrument of quality. Care was also taken in the removal of the original key-mount blocks on both the long and boot joints; all surfaces have been carefully smoothed off, and the whole instrument must have been re-stained, as the surface is of uniform colouring.

There is evidence that the joints have not been much shortened:
The bell has a crown at the north end and the socket (south end) does not appear modified.
The long joint has intact beads abutting the north tenon, and at the south, the platform for the toneholes is complete; with a short but not unreasonable distance (4.7 mm) from the end of the platform to the tenon shoulder.
The boot does not appear to have been shortened either; the brass rings are intact. However the septum may have been cut northwards by 4mm and thicker plugs fitted – a way of shortening the bore without changing the length of the joint. The socket for the wing seems to have been made deeper, which may have been in preparation for turning material away from the wing so that the tenon would fit further into the socket. The socket is now 5.8 mm deeper than the tenon length.
The wing may have been shortened by 4.2 mm at the tenon – there is slight evidence that the shoulder has been turned back by this amount. If so, however, the south end of the tenon has also been cut off rather than allowing it to fill the extended socket. As it stands, the whole wing is still 2mm longer than that of the Eichentopf.

Heyde's assertion that the whole wing bore is lined with rosewood is seen to be incorrect; it is only the crook socket that has had this treatment.[335] The concern remains that the bore may have been modified during these updating works, however comparisons with the Prague bassoon set out below make it is possible to argue that this has not happened.

The Prague instrument also is not in pristine condition:
The wing joint is not the original one and is not stamped by Poerschman; there is also a significant miss-match in colour. The remaining three original joints are substantially complete though, with all keys and brass rings present; just the boot plugs and crook are missing.
The keys are rather simple but robustly made, and are mounted in wooden blocks with a large triangular knob beneath the F key flap. The F key touch fits the universal design style identified in Fig 3.4.2.5.
The long joint is damaged at the south end and it is possible this joint has been shortened a little: the tenon here is shorter than its corresponding socket by 6.1 mm; however, the whole joint is still 4.5mm longer than that of the Leipzig instrument.

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[335] Phillip T. Young, *Loan Exhibition of Historic Double Reed Instruments* (Victoria B. C.: University of Victoria, 1988), p.57 and Herbert Heyde, 'Catalogue notes of double reed instruments', unpublished, Musikinstrumenten museum der Karl Marx Universität, Leipzig.

The wood of the three original joints is in a poor, dry state; in particular there is some degradation in the bores of the boot, resulting in longitudinal crevasses.
The bottom end of the boot must have rotted fairly severely, as the section below the window has been replaced by a wooden plate, c.15mm thick. This is drilled with holes for the two plugs, and is held on with two iron nails and the brass ferrule, which has been hammered to wrap over the edges of the end face. See Fig 3.4.4.3 below:

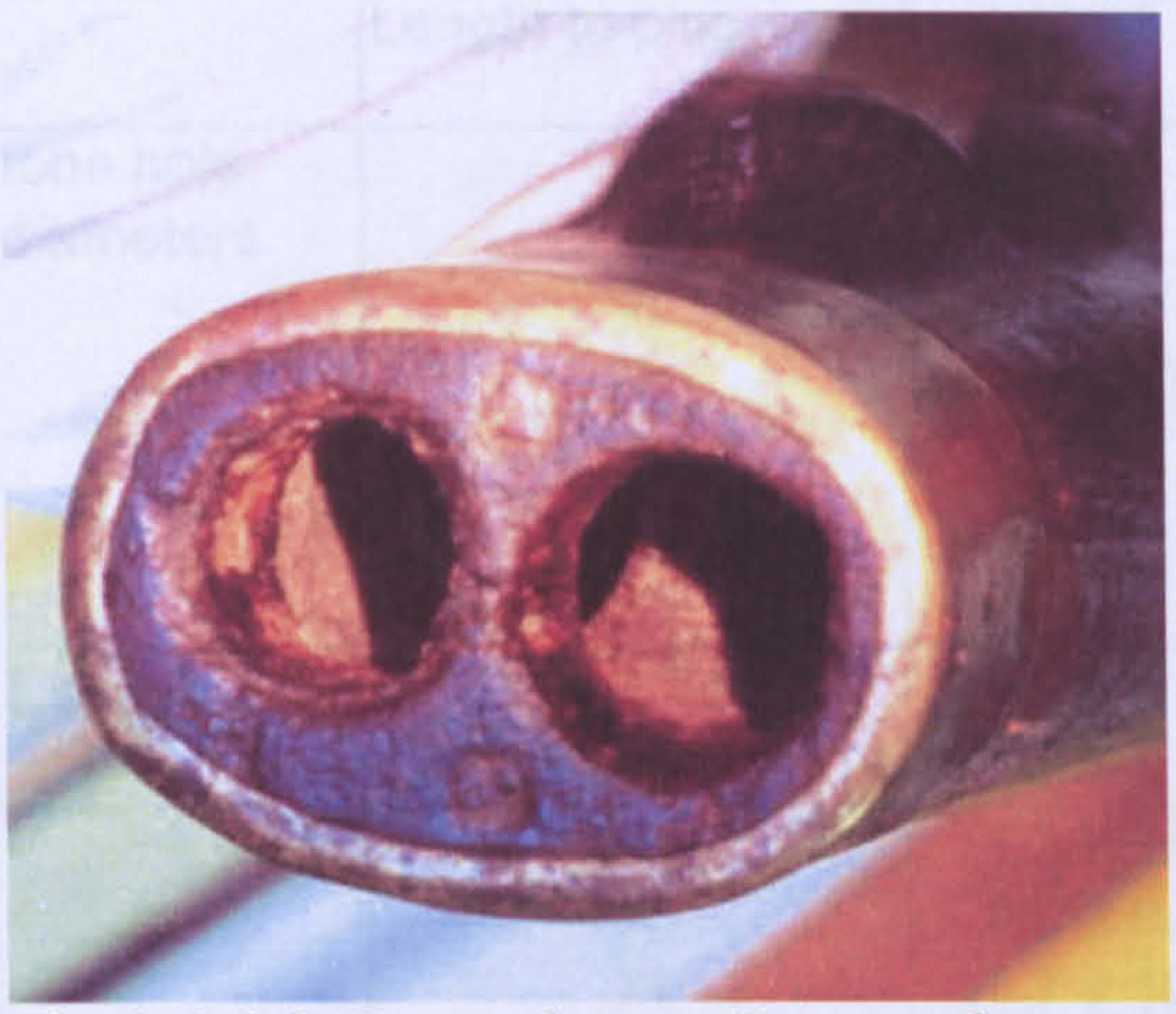


Fig 3.4.4.3. Poerschman, Prague: boot south end

This suggests that the septum at the north edge of the window could have been damaged too, and subsequently cut further north into sound wood; it is now 41mm from the south end of the joint and the window is 26mm north to south, which is rather larger than the bore diameter of 20mm here.

Apart from the replacement wing there does not appear to have been substantial modification from the original design. The wing joint is, however, 12.7 mm shorter than that of Leipzig, and its bore design indicates a c.1770 date for this joint (see discussion under Sattler below). It may have been part of an up-dating of this bassoon rather than a straightforward replacement for lost or damaged original, though done at an earlier time than the re-fit of the Leipzig Poerschman. Therefore the instrument may also have been re-tuned to a higher pitch than originally made. The boot toneholes do not look as if they have been modified; a comparison with those of Leipzig shows them to be considerably smaller; but the long joint holes IX and XI are very large.

		Prague	Leipzig	Eichentopf Linz
Wing	OAL*	514.5	527.5	525.5
	Excluding tenon	470.0	482.7	482.5
tone hole diameters	I	4.5	6.6	5.6
	II	5.2	6.85	5.6
	III	4.8	6.4	5.7
Boot	OAL	425.5	422.0	442.0
	Length to plug	410.5	401.5	425.0
tone hole diameters	IV	7.45	8.4	6.4
	V	7.0	8.7	6.4
	VI	6.6	6.9	5.6
	Ab	6.1x5.3	5.6	5.1
	VII	8.5	9.3	8.8
	VIII	9.45	9.7	9.0
Long	OAL	592.5	590.2	589
	Excluding tenons	505.5	501.0	509
	IX	13.9 x 14.2		8.7 x 8.9
	X	9.0 x 9.5	10.6 x 11	8.0 x 8.2
	XI	11.7 x 12.3	10.1 x 10.65	?
Bell	OAL	283.0	279.0	312
Totals	**assembled bore length**	2053.5	2043.7	2139.5
	excluding wing	1583.5	1561.0	1657.0

*OAL = Overall Length

Table 3.4.4.4. Poerschman bassoon dimensions compared (all dimensions mm)

Bores

Comparing the two wing joints:

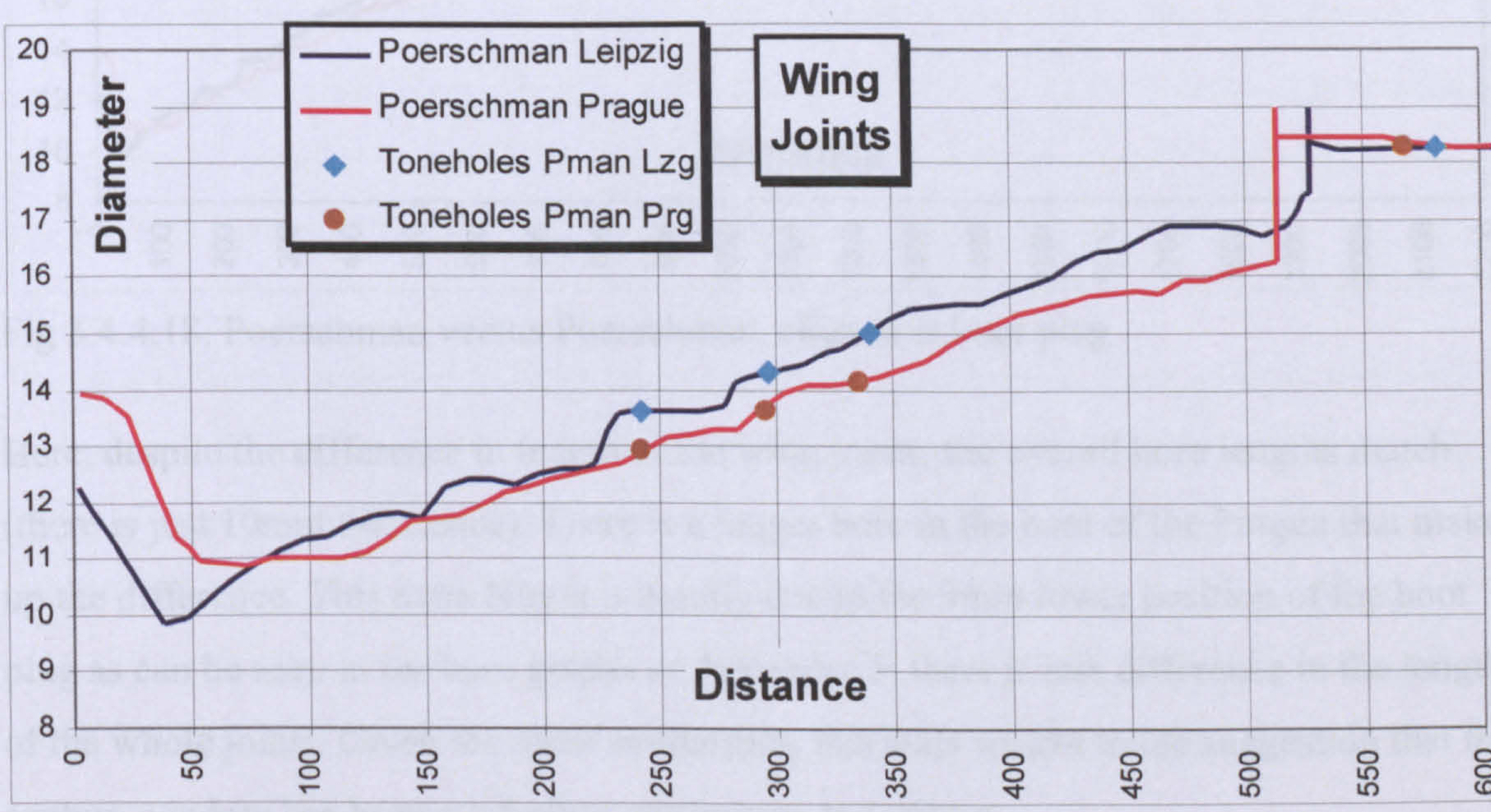


Fig 3.4.4.17. Poerschman wing joints aligned at north end

Several differences are notable: the Prague wing is shorter, narrower overall (the difference looks greater if the joints are aligned at the south end), and has a c. 70 mm long throat section of 11 mm diameter (between 50 to 120 on the distance scale; this may have been created by degradation and wear). The Leipzig wing has no such cylindrical throat; the crook socket meets the bore at a fairly sharp corner. The rosewood lining is 27 mm long; there is actually a 2mm gap before the bore begins, not shown on the graph above. Leipzig's fingerholes are a little more widely spread; the holes I line up but Leipzig's hole III lies 4 mm further down the joint. Further detailed analysis of the Leipzig wing bore is presented in Chapter 5; suffice it to say here that the Prague wing is different enough to be able to suggest that it was probably not made by Poerschman nor to his specific design. It may have been made for this bassoon by another craftsman, to that maker's design, or it may have been taken from another bassoon again by a different maker (see further discussion under Sattler below). In either case it is probably close enough to have made a reasonably satisfactory, working instrument.

Comparing the two complete bores, aligned at the top of the boot plug:

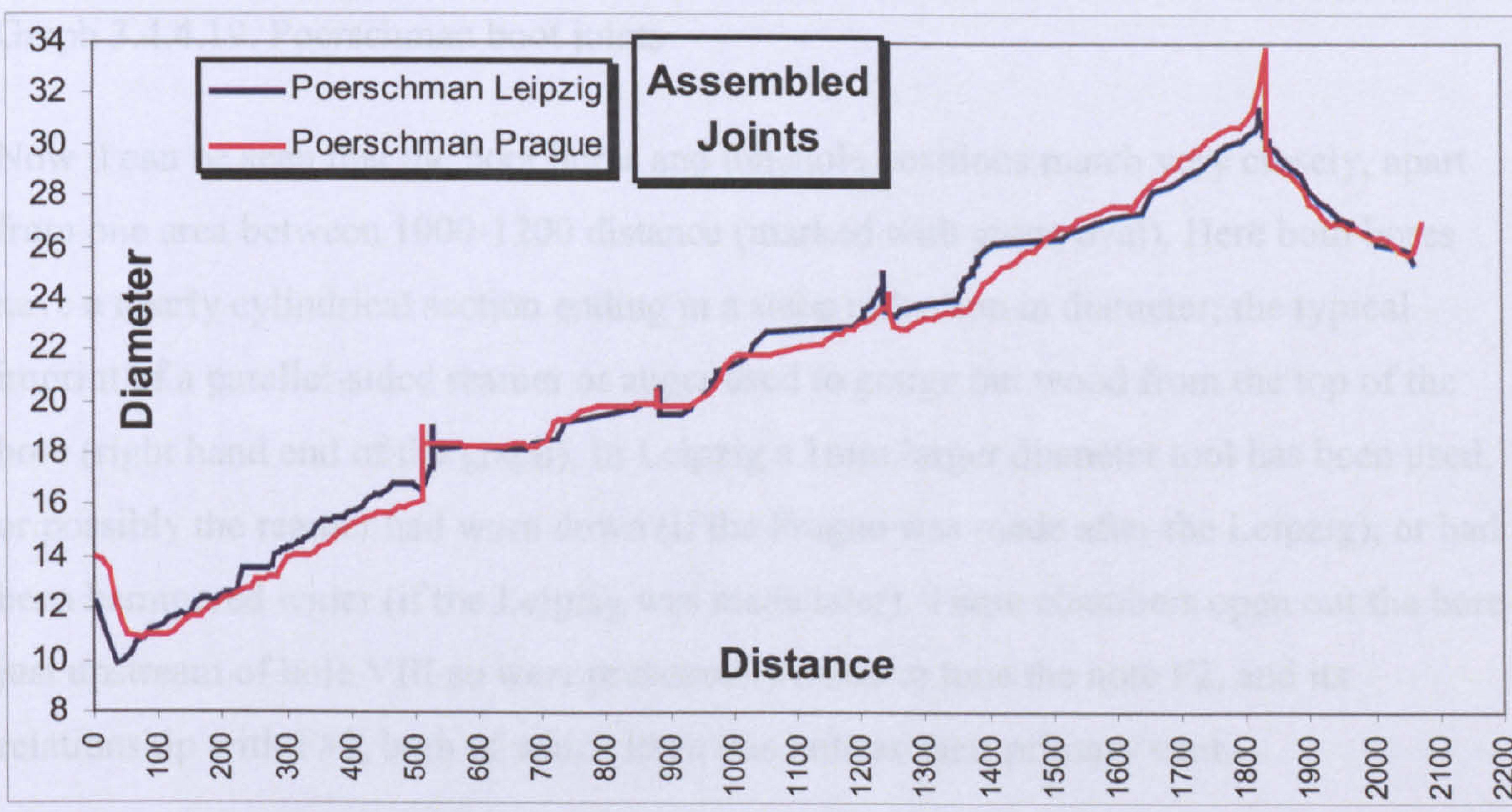
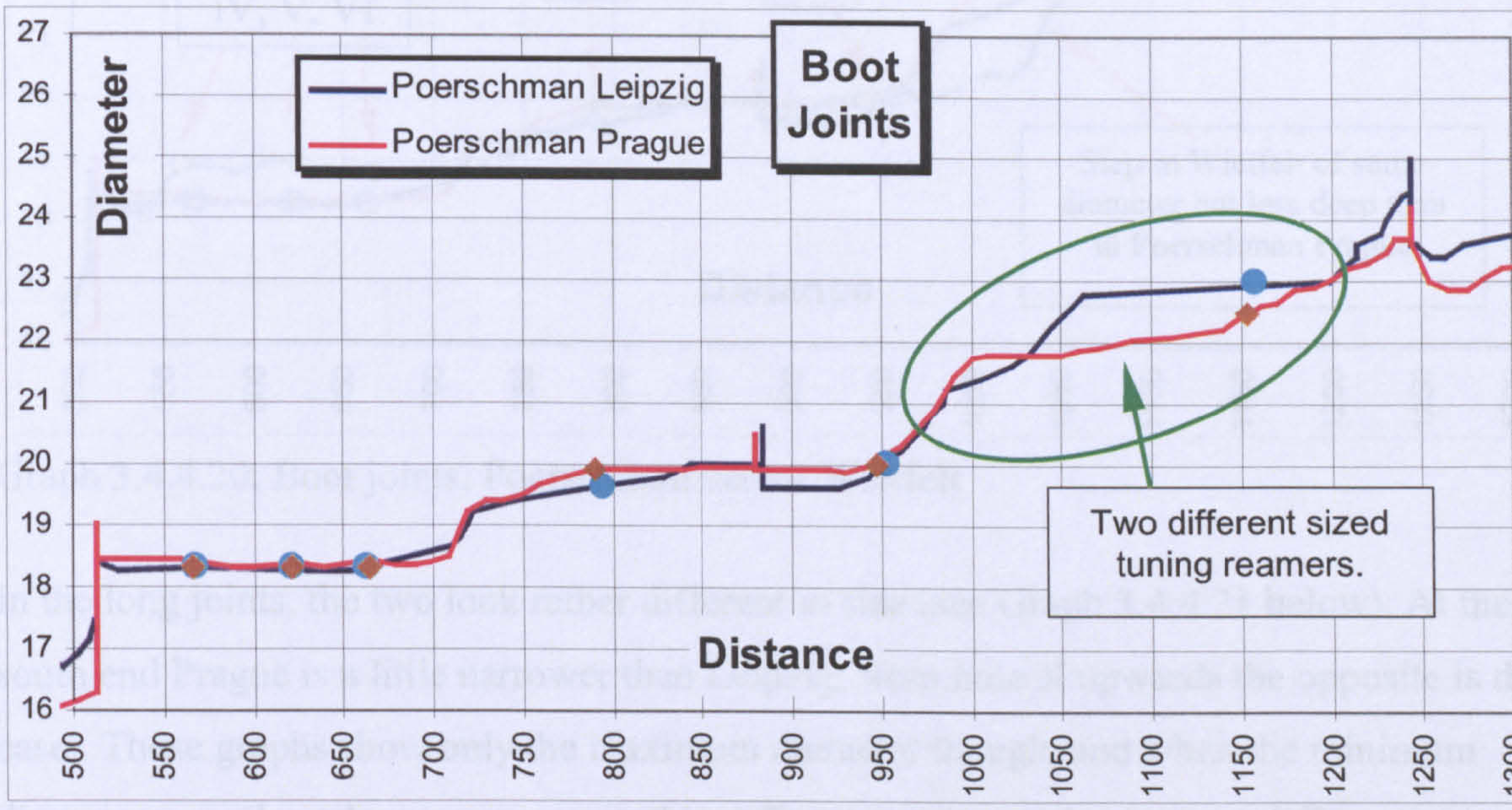


Fig 3.4.4.18. Poerschman versus Poerschman, aligned at boot plug

Here, despite the difference in length of the wing joints, the overall bore lengths match (there is just 10mm difference). There is a longer bore in the boot of the Prague that makes up the difference. This extra length is mainly due to the 9mm lower position of the boot plug as can be seen in the bore graphs of Appendix 3; there is less difference in the lengths of the whole joints. Given the other similarities, this adds weight to the suggestion that the septum window has been cut further northwards in Leipzig.

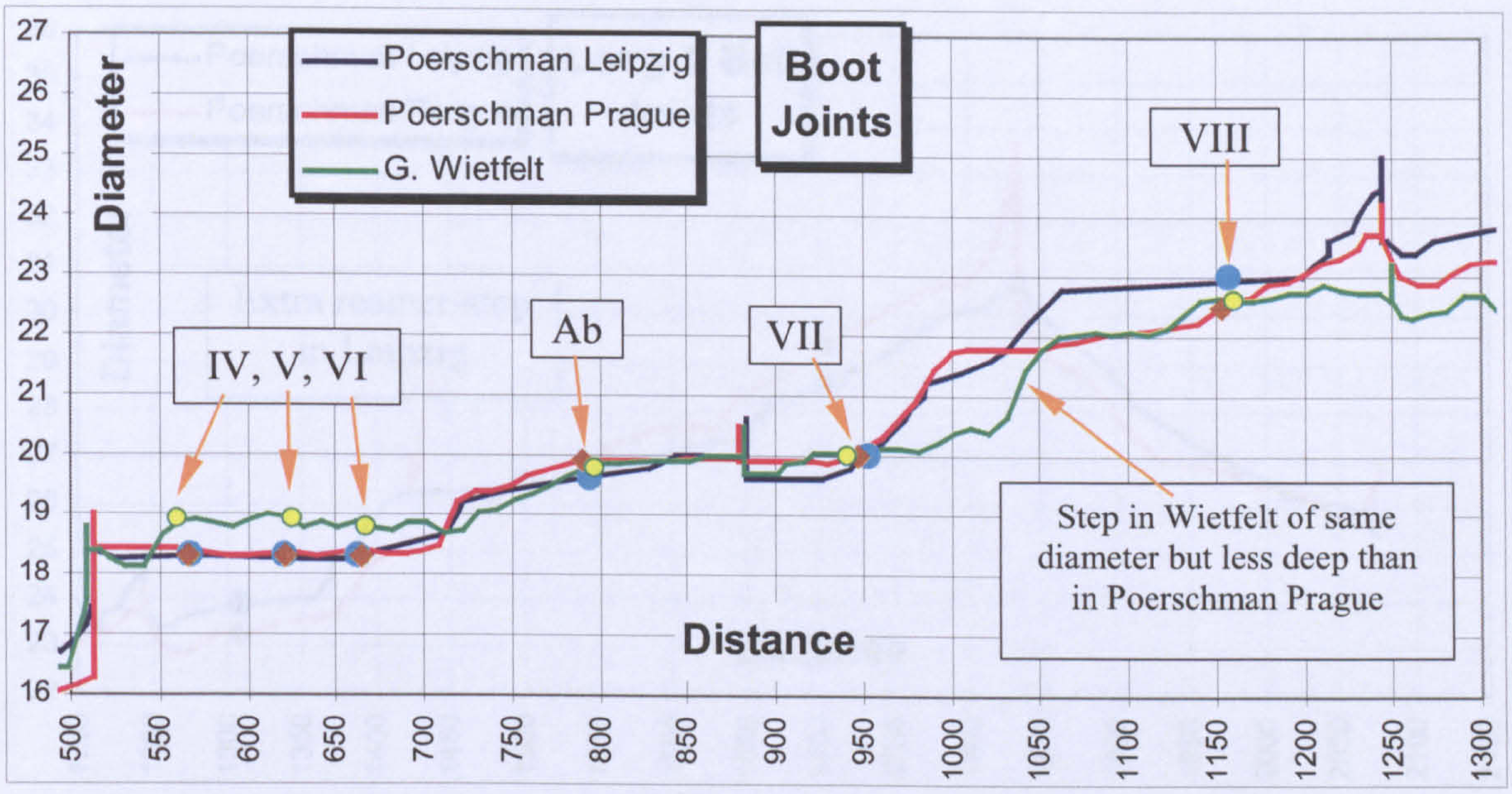
In the following graphs, for ease of comparison, that disparity has been eliminated by adding 9mm length on either side of the boot plug (marked at c. 860 on the distance scale above).



Graph 3.4.4.19. Poerschman boot joints

Now it can be seen that the boot bores and tonehole positions match very closely, apart from one area between 1000-1200 distance (marked with green oval). Here both bores have a nearly cylindrical section ending in a steep reduction in diameter; the typical imprint of a parallel-sided reamer or auger used to gouge out wood from the top of the bore (right hand end of the graph). In Leipzig a 1mm larger diameter tool has been used, or possibly the reamer had worn down (if the Prague was made after the Leipzig), or had been hammered wider (if the Leipzig was made later). These chambers open out the bore just upstream of hole VIII so were presumably made to tune the note F2, and its relationship with F#3, both of which have this hole as their primary vent.

The shapes here are related to those of Rottenburgh and Wietfelt, with a stepwise increase in diameter via a series of cylindrical sections. Poerschman, like Eichentopf, has a straight cylinder through holes IV-VI, without the little constriction at the start of the boot small bore. In contrast to Wietfelt, Poerschman has not drilled those same three fingerholes at such a steep angle, resulting in less of a spread where they meet the bore; otherwise the toneholes are placed very similarly. These features can be seen in the graph below:



Graph 3.4.4.20. Boot joints; Poerschman versus Wietfelt

In the long joints, the two look rather different in size (see Graph 3.4.4.21 below). At the south end Prague is a little narrower than Leipzig; from hole X upwards the opposite is the case. These graphs show only the maximum diameter though, and when the minimum diameters are also taken into account, this difference seems to be due to a differential in shrinkage between boxwood (Leipzig) and maple (Prague). This is discussed further in Chapter 5.

As in the boot big bore, Leipzig has one area which looks as though it has been reamed further than Prague was: between 1350-1500 on the graph 3.4.4.21 below. That same shape was seen in the Rottenburgh and the Scherers, and is probably the result of efforts to tune the low D2 (which vents from hole X immediately downstream from this feature). These two patches of extra reaming may have been later interventions – part of the effort to raise the pitch during the key re-fit episode – but it is also possible that they were made by Poerschman himself, perhaps applying some newly acquired knowledge to a later-made instrument (see also the discussion of the note D2 in section 5.3).

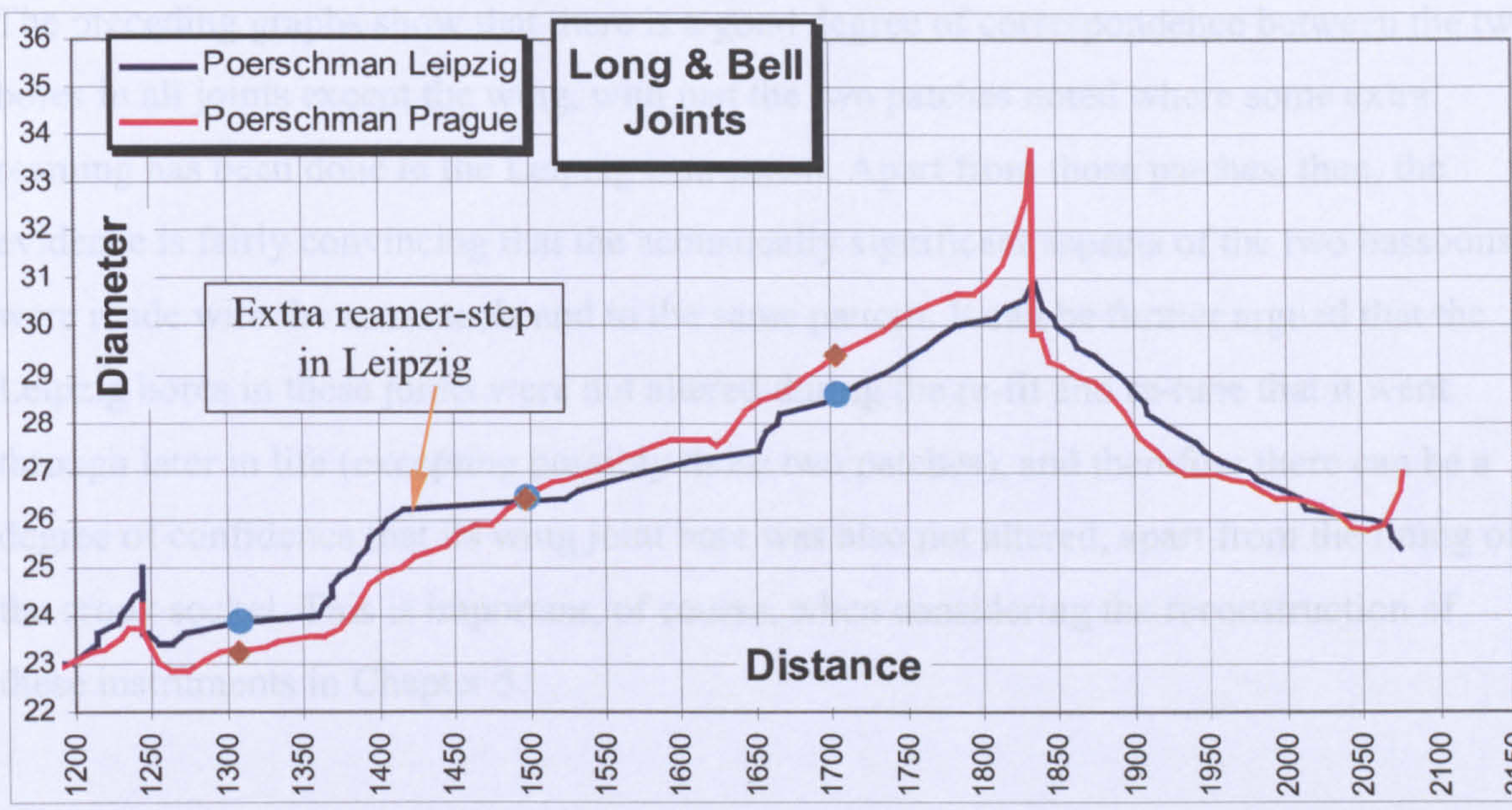


Fig 3.4.4.21. Poerschman long and bell joints

There is a short flare at the top of the Prague long joint which is just an internal rounding-off of the bore. This steps right down to a slightly more constricted bell. Both bells are essentially the same: slightly steeper in taper than the long joints, with terminal opening diameter a little less than that at hole X. The Prague also has the terminal corner of the bell rounded off, which is why a small flare appears right at the end.

The bells are without a chamber in contrast to almost all of the German bassoons so far discussed; the graph below shows just how much smaller the volume of these bells is in comparison to Eichentopf and Wietfelt, while their openings are a little larger.

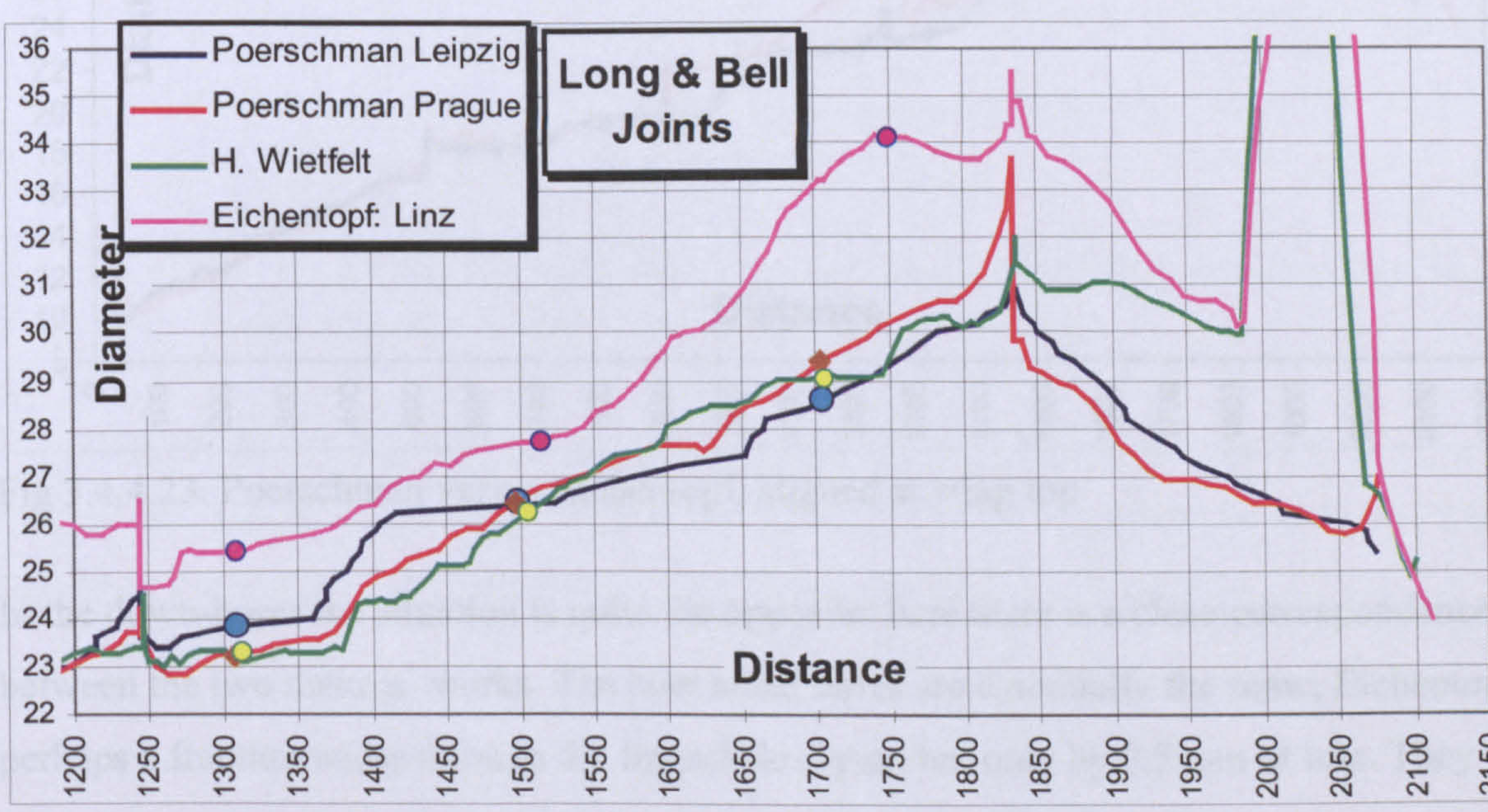


Fig 3.4.4.22. Long joints and bells; Poerschman versus Wietfelt and Eichentopf.

The preceding graphs show that there is a good degree of correspondence between the two bores in all joints except the wing, with just the two patches noted where some extra reaming has been done to the Leipzig instrument. Apart from those patches, then, the evidence is fairly convincing that the acoustically significant aspects of the two bassoons were made with the same tools and to the same pattern. It can be further argued that the Leipzig bores in these joints were not altered during the re-fit and re-tune that it went through later in life (excepting possibly those two patches), and therefore there can be a degree of confidence that its wing joint bore was also not altered, apart from the lining of the crook socket. This is important, of course, when considering the reconstruction of these instruments in Chapter 5.

Poerschman versus Eichentopf

As previously noted Eichentopf uses up-bore sections that have more in common with Type 1 bassoons than with any of the German Type 2c instruments studied. Poerschman, however, couples the small diameter long joint common to most Type 2cs with a uniquely low capacity, chamberless bell, to form perhaps the most extreme contrast to Eichentopf of all.

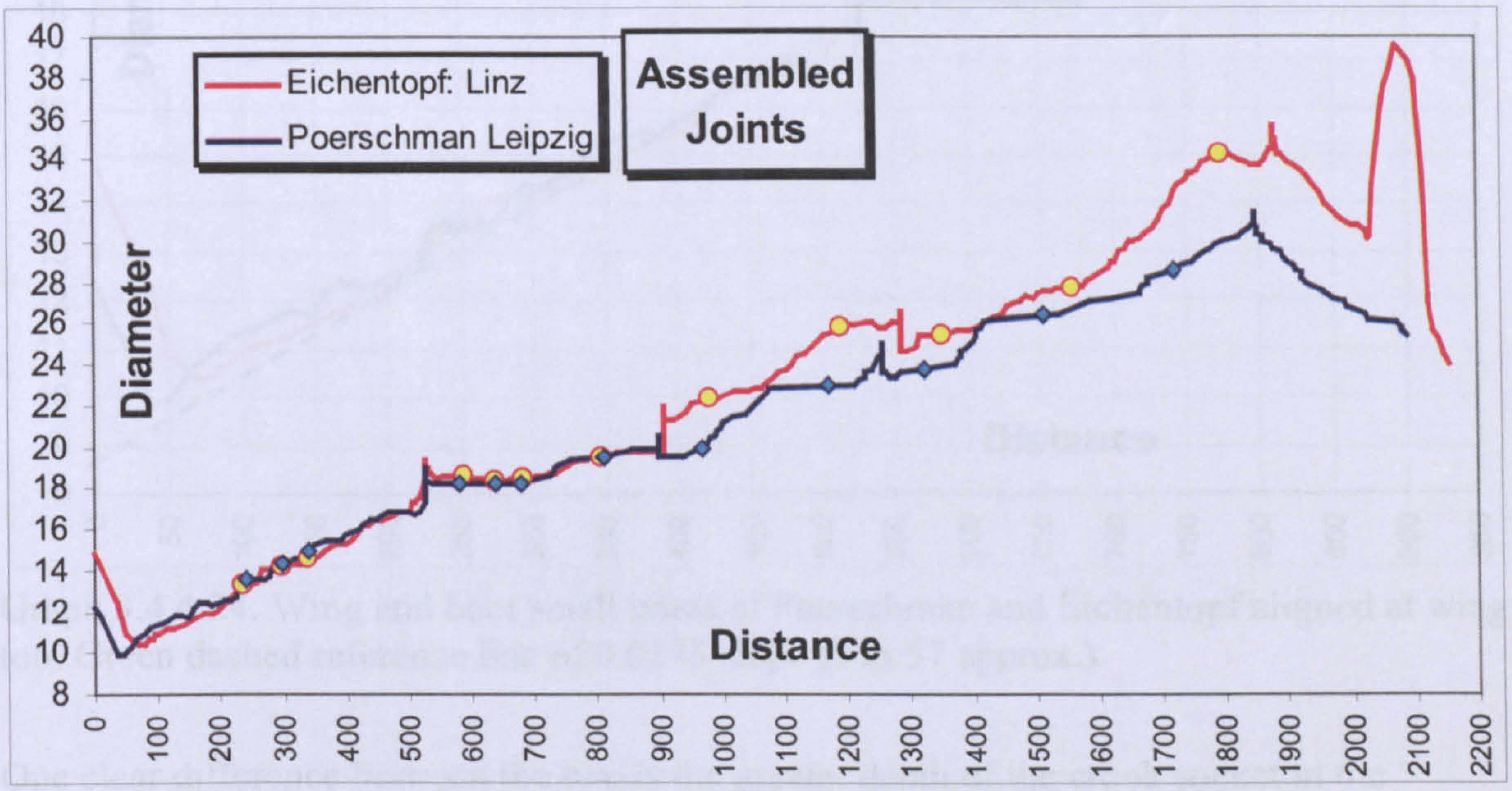
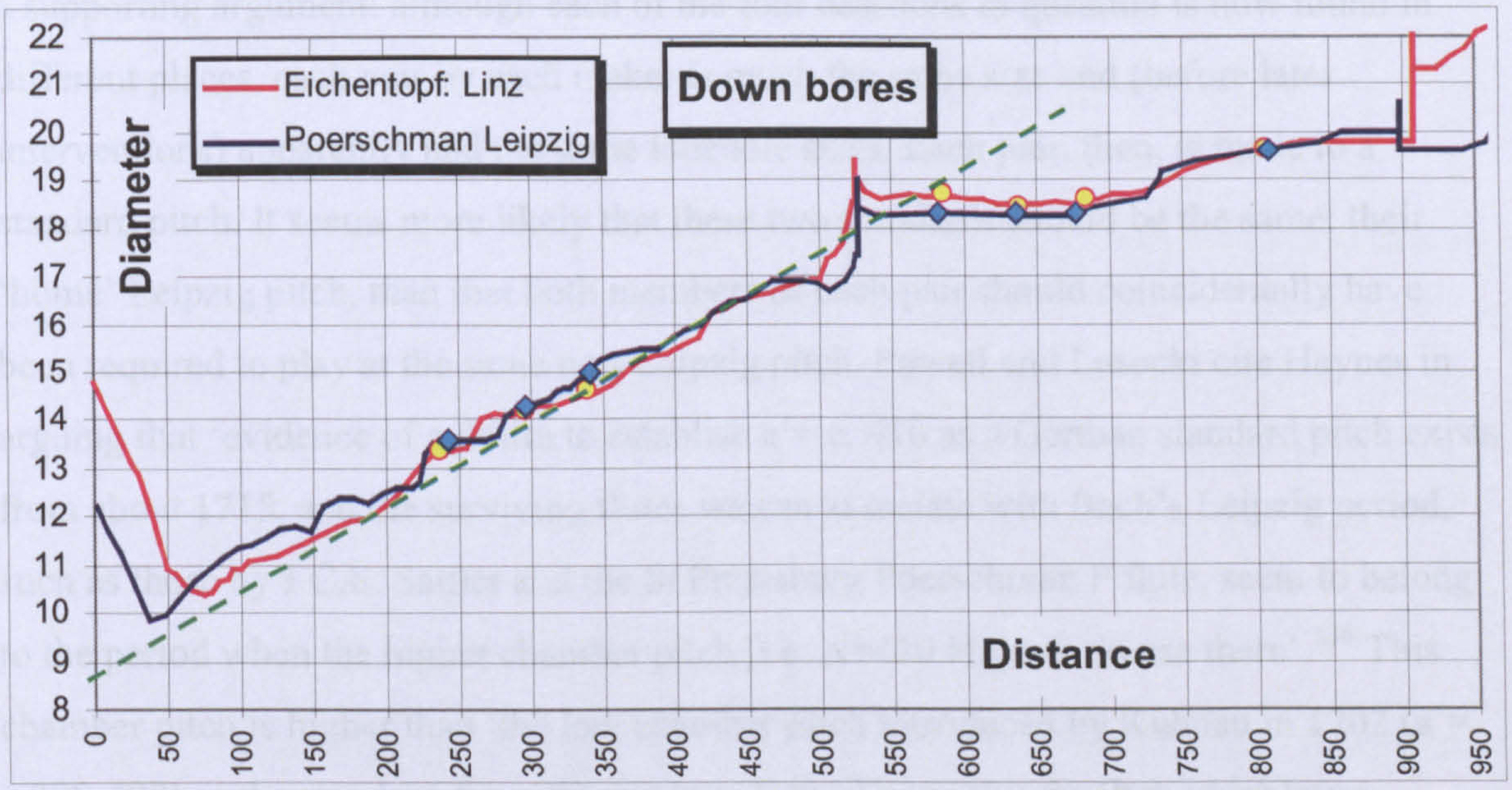


Fig 3.4.4.23. Poerschman versus Eichentopf, aligned at wing top

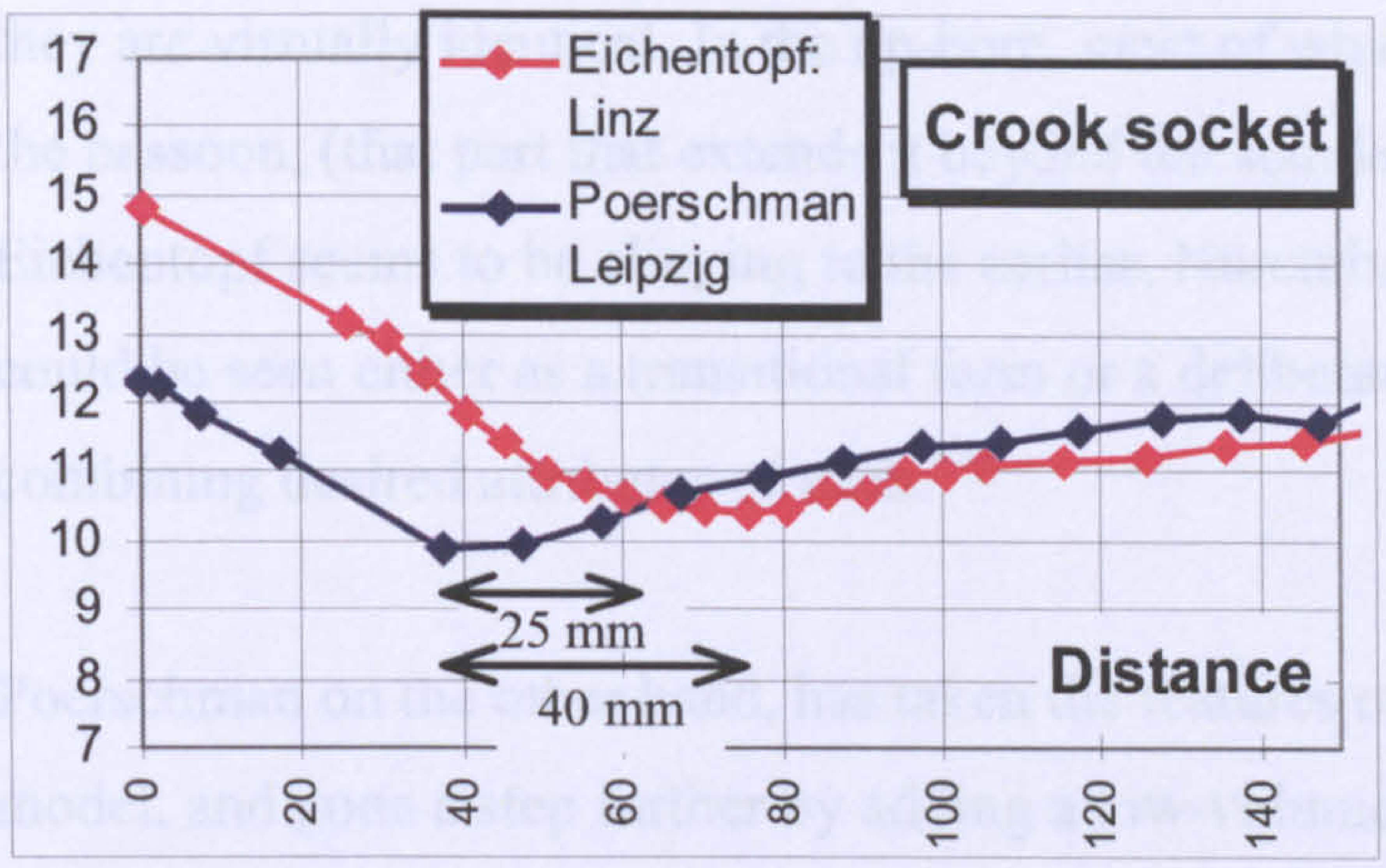
In the down-bores the situation is quite the opposite; here there is a close correspondence between the two makers' works. The boot small bores are essentially the same, Eichentopf perhaps a fraction wider through the fingerhole region but only by 0.5 mm or less. They both open out by little more than a millimetre just beyond hole VI and continue in a second cylindrical section to the plug.

In the wing joints there are similarities too, although they both appear rather irregular at first. The green dashed line superimposed on the graph below has a slope of .0175, and it is argued in Chapter 5 that this characterises the initial shape of the Poerschman wing, which is then modified by several small reamers. The same might be said of the Eichentopf wing, just that the modifications are in slightly different places. They both have little steps at, or between, holes I and II, then there is rather different treatment between the throat and hole I. Neither has a cylindrical throat section. If these two can be seen as modified straight cones then they contrast firstly with the Wietfelt/Rottenburgh wing pattern, which as previously shown is contrived of two prominent curved sections and a cylindrical throat, and secondly with the simpler Denner pattern constructed of one main taper plus a secondary constriction at the throat.



Graph 3.4.4.24. Wing and boot small bores of Poerschman and Eichentopf aligned at wing top. Green dashed reference line of 0.0175 slope (1 in 57 approx.)

One clear difference between the two is the greater depth of the crook socket in the Eichentopf. This is a little difficult to define: narrowest point to narrowest point is 40 mm but start of throat to start of throat is c. 25 mm (see Graph 3.4.4.25 below).



Graph 3.4.4.25. Detail of crook sockets

The socket of Poerschman has been narrowed with that rosewood liner, but the depth of the socket was not altered. If these instruments are to play at the same pitch then there will have to be some differences either in crook length or in tonehole sizes or both.

The assumption that they should play at the same pitch is a bold one to make, but there is a supporting argument: although each of the four bassoons in question is now found in different places, each pair by each maker is much the same size and (before later interventions) apparently had the same tonehole sizes. Each pair, then, is made to a standard pitch. It seems more likely that these two standards should be the same: their 'home' Leipzig pitch, than that both members of each pair should coincidentally have been required to play at the same non-Leipzig pitch. Powell and Lasocki cite Haynes in arguing that 'evidence of a desire to establish a'= c. 410 as a German standard pitch exists from about 1715, and the surviving flutes we can associate with Bach's Leipzig period, such as those by J.C.E. Sattler and the St Petersburg Poerschman F flute, seem to belong to the period when the higher chamber pitch [i.e. A=410 Hz] was in use there'.[336] This chamber pitch is higher than 'the low chamber pitch introduced by Kuhnau in 1702 (a'= c.388-400) as the standard for performances in the Thomaskirche [but which] was probably not in general use there after c.1720'.[337]

In conclusion: there is a curious situation between these two woodwind making colleagues; their bassoon designs are half similar and half quite different. In the wing bores they are similar to each other in using a modified straight taper, and this also distinguishes them from some other German Type 2c bassoons. In the boot small bore

[336] Powell and Lasocki, 'Bach and the Flute', p.18.
[337] Ibid., pp.17-18.

they are virtually identical. In the up-bore, most of which is the extension component of the bassoon, (that part that extends it beyond the standard seven-fingerhole woodwind), Eichentopf seems to be clinging to the earlier, Nuremberg based, Type 1 model. This could be seen either as a transitional form or a deliberate attempt to reconcile the two; combining desired attributes of each.[338]

Poerschman on the other hand, has taken the features of the non-Nuremberg, Type 2 model, and gone a step further by adding a low-volume, chamber-free bell. Remembering that Poerschman was also a professional player and that it was he who trained the two most important German makers of the next generation, these differences could be interpreted as Poerschman pushing the design forward. Perhaps this was a way in which he and Eichentopf managed their friendly competition; by providing substantially different instruments.[339]

Johann Gottfried Sattler

One further bassoon known to be from Leipzig was studied: No. 1369 in the Musikinstrumenten Museum der Universität, Leipzig. It is stamped 'Sattler' and is therefore from another large family of wind instrument, and later brass instrument makers, whose relationships and attributions are difficult to untangle.[340] Young has this one tentatively listed under Johann Cornelius Sattler (c. 1691-1739) but in the light of several design features it would appear to have been made later than the 1730s and therefore more likely to be by Johann Gottfried Sattler (c. 1707-1755).[341]

Exterior

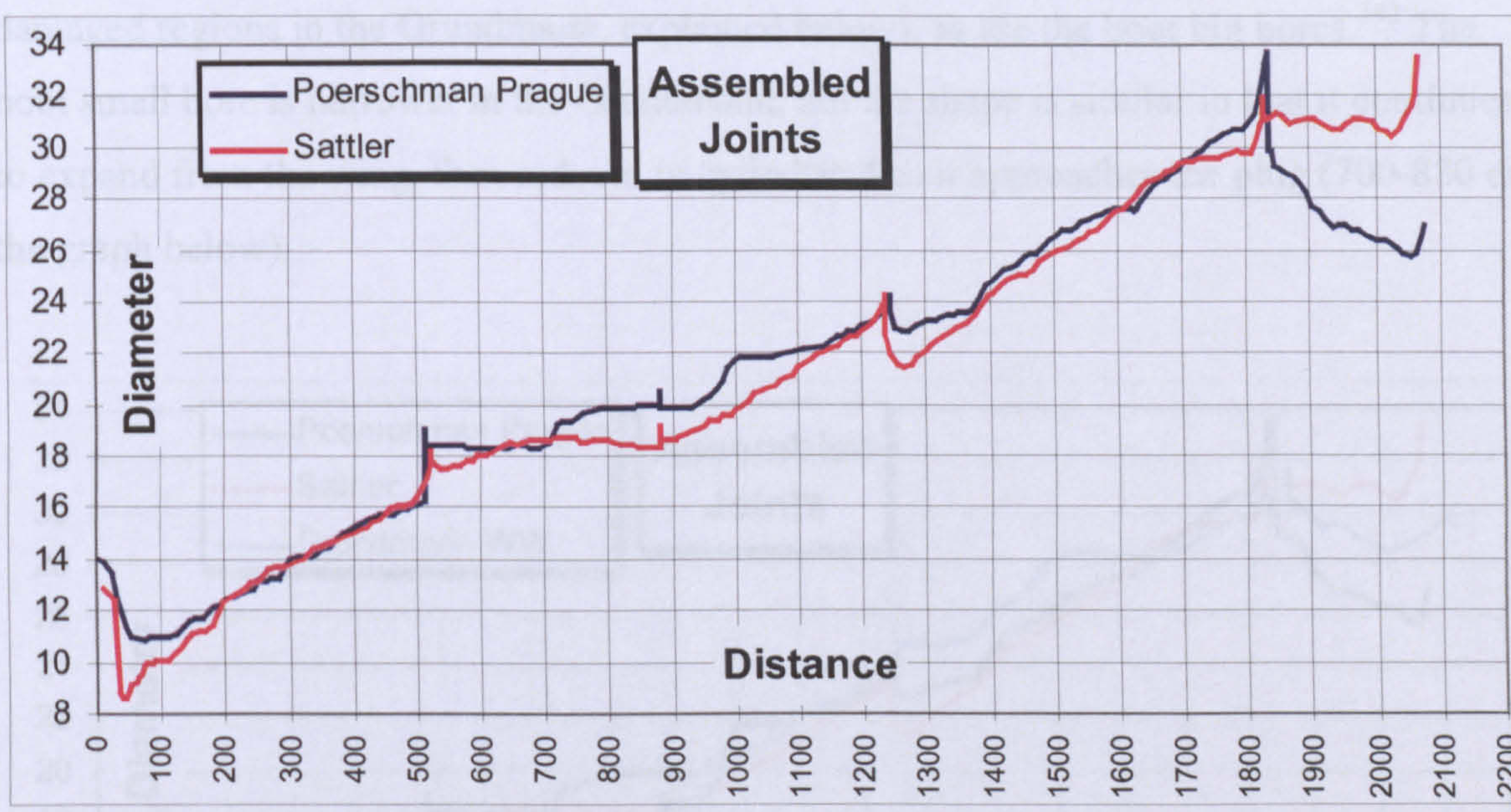
It has several of the typical Leipzig features: a brass crown with twelve triple-lobed leaves but otherwise rather simply made; the bead-and-two-fillets at the top of the long joint; keys mounted in blocks on the long joint.

[338] In 'The Eichentopf Flute' Ardal Powell demonstrates that the one surviving traverso by Eichentopf is one of the earliest known 4-piece flutes. Like other early 4-piece flutes it retains the long head joint typical of 3-piece flutes; this was a short-lasting arrangement and is now seen as a transitional form. In a similar way this bassoon design could be seen as transitional between Type 1 and Type 2 formats.
[339] It would be interesting to hear from other researchers about how their other instruments compare; there are extant alto recorders and oboes d'amore by each.
[340] Waterhouse, *NLI*, p. 345.
[341] Young, *HWI*, p. 197.

On the boot the keys are mounted between brass plates set in slots cut into the wood. The F flap is missing, and the F touch is probably not original; it looks as though made to match the profile of the Ab key, but by someone not a bassoon player as its straight form, without fishtail or sideways bend, is not reachable when the instrument is held in playing position. There are remaining signs that an octave key had been added on the wing, and later removed.

Bore

The bore has a rather simple shape, largely without signs of multiple reamers and tinkering with bore profile that the preceding instruments show. It is also rather narrow and short; a little shorter than Poerschman and even narrower in places. When compared with the Poerschman in Prague there is an interesting match with that instrument's non-original wing joint.



Graph 3.4.4.26. Sattler versus Poerschman

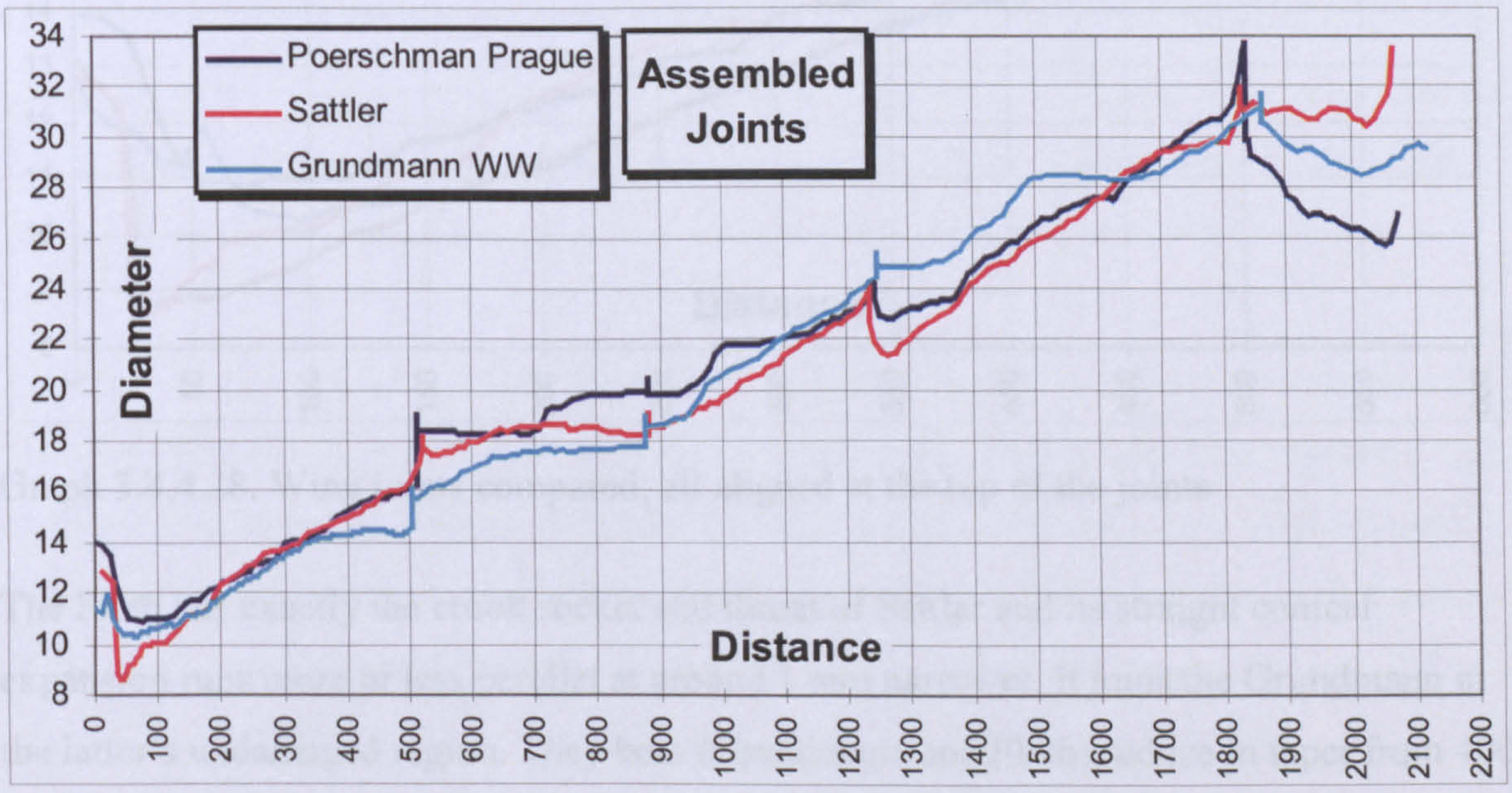
The wing on the Prague Poerschman is significantly narrower than the real Poerschman wing on his Leipzig bassoon (see Poerschman section above), and this one by Sattler matches it for the most part. However the Sattler has a much narrower throat (from 40-200 on the Distance scale above) with a rather step-wise expansion until it meets the Poerschman profile. The wide throat of the Prague wing suggests that it is damaged; it could well have matched the profile of the Sattler originally.

The boot small bore continues to expand through the fingerhole region (500-700 on distance scale) rather than having a cylindrical portion here, that being saved for the following section from 700 to the plug. This shape becomes significant when the next generation of makers is discussed (see below).

The boot up bore is a simple conical expansion up to a similar diameter as the Poerschman, and the long joint more or less follows Poerschman too, though with a step down in diameter where it meets the boot.

The bell bore is roughly finished: it is now nearly cylindrical and this may have been the result of rather crudely executed later alteration; it probably had a reverse taper originally. There is a hole drilled in the bell at 132 mm from the south end; it too is crudely cut, and is probably also a later modification.

The narrow wing and boot small bore (in comparison to Poerschman and other type 2c instruments) suggest that this is a later design and might have something in common with the next generation's designs. When placed alongside the bore of a bassoon by J. F. Grundmann, this suspicion is confirmed; the wing joint bores are a close fit (apart from damaged regions in the Grundmann, explained below), as are the boot big bores.[342] The boot small bore is narrower in the Grundmann, but the shape is similar in that it continues to expand from the wing, then reduces to cylindrical as it approaches the plug (700-880 on the graph below).

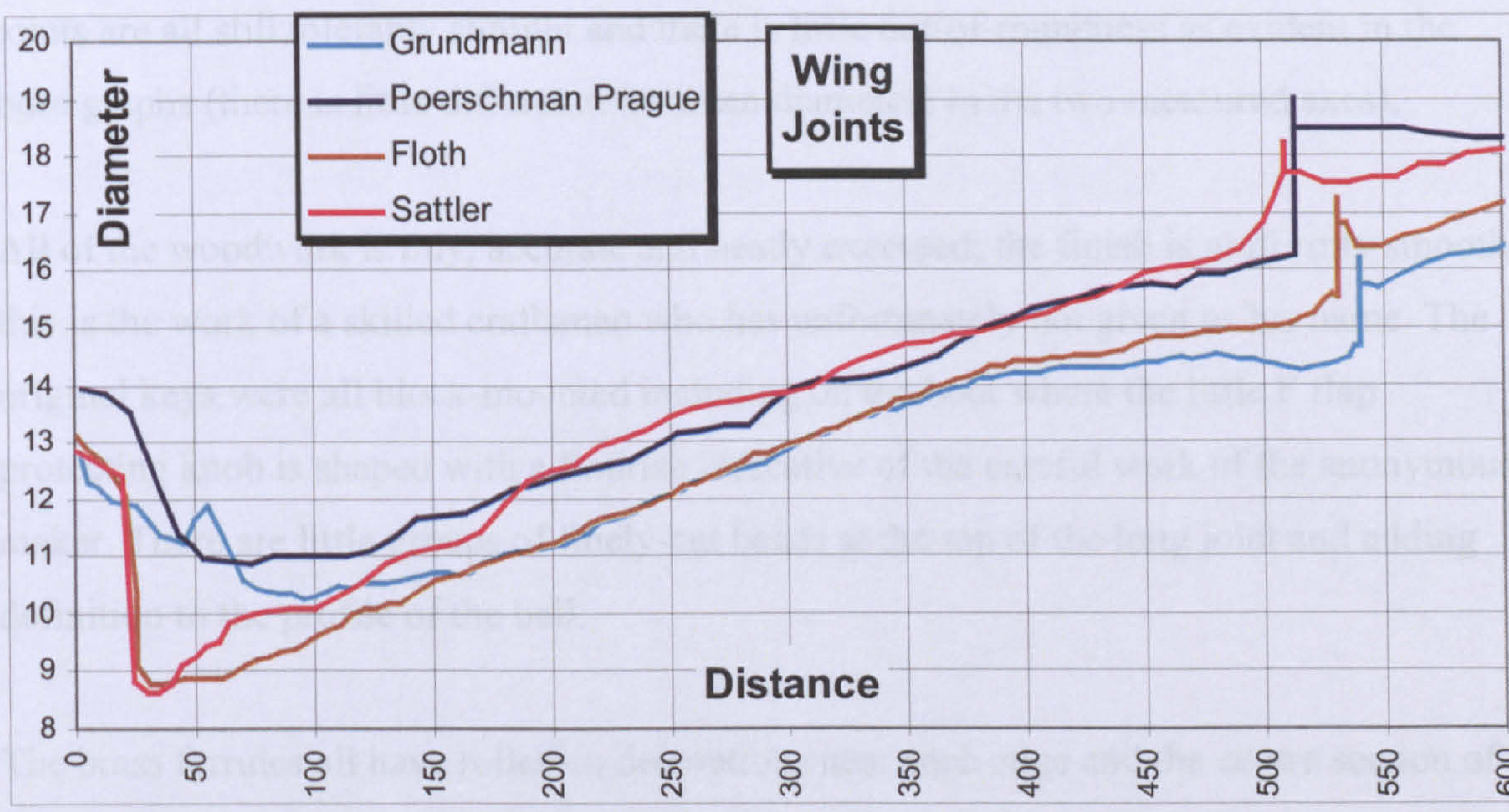


Graph 3.4.4.27. Grundmann versus Sattler and Poerschman; aligned at boot plug

[342] The Grundmann bassoon discussed here is in the Waterhouse Collection; it is stamped with the date 1792.

Grundmann's long joint is significantly different; he has expanded the bore in the lower half (1250-1600 on graph above), effectively lowering the taper angle of the whole section. Sattler is much closer to Poerschman here. The bell is halfway between Poerschman and the altered form of Sattler; this perhaps gives an indication of the thinking behind that modification to Sattler's work in an attempt to update it.

In the wing joint it should first be recognised that the Grundmann has some compression in the tenon (450-500 on distance scale in graph below) and the throat is seriously damaged so is a good deal wider than it should be (50-150). Once these are taken into account the bore is still a little narrower than, and probably had a similar sized throat to Sattler. In the following graph the wing of Floth, Grundmann's apprentice, has been added; it is in better condition and is probably close to the shape that Grundmann had originally:



Graph 3.4.4.28. Wing joints compared; all aligned at the top of the joints

The Floth has exactly the crook socket and throat of Sattler and its straight conical expansion runs more or less parallel at around 1 mm narrower. It joins the Grundmann in the latter's undamaged region. They both (Grundmann and Floth) reduce in taper from 400 to the tenon end. Both Grundmann and Floth are significantly longer than the other two (27 and 20mm longer than Poerschman respectively). These later instruments are designed to work with shorter crooks than the earlier ones, and the narrow throat implies a small diameter crook too; not greater than 9mm diameter at the big end.

In conclusion, the Sattler has something of the appearance of being a halfway step between Poerschman's designs and those of Grundmann in the classical generation. This adds weight to the suspicion that it is by the second generation Johann Gottfried Sattler rather than by his father, Johann Cornelius, or his sons: Johann Gottfried II (1731-1807), and Carl Wilhelm (1738-1788); though it also appears to have been modified around the time of those sons. It also helps to illuminate the anonymous wing joint associated with the Prague Poerschman, which now appears to be somewhat later than Poerschman himself; it could even conceivably have been made by, or in the workshop of, this same Sattler.

Anonymous, Poznan 178

No. 178 in the Muzeum Insrumenów Muzyczynch, Poznan, is another boxwood instrument. It is made of a beautifully figured, fine and straight-grained piece of wood; not entirely blemish free but very nearly. Again this piece must have been well seasoned; the joints are all still tolerably straight and there is little out-of-roundness as evident in the bore graphs (there is little difference between diameters in the two measured axes).

All of the woodwork is tidy, accurate and neatly executed; the finish is uniformly smooth; this is the work of a skilled craftsman who has unfortunately not given us his name. The original keys were all block-mounted including on the boot where the little F flap protecting knob is shaped with a flourish indicative of the careful work of the anonymous maker. There are little groups of finely-cut beads at the top of the long joint and adding definition to the profile of the bell.

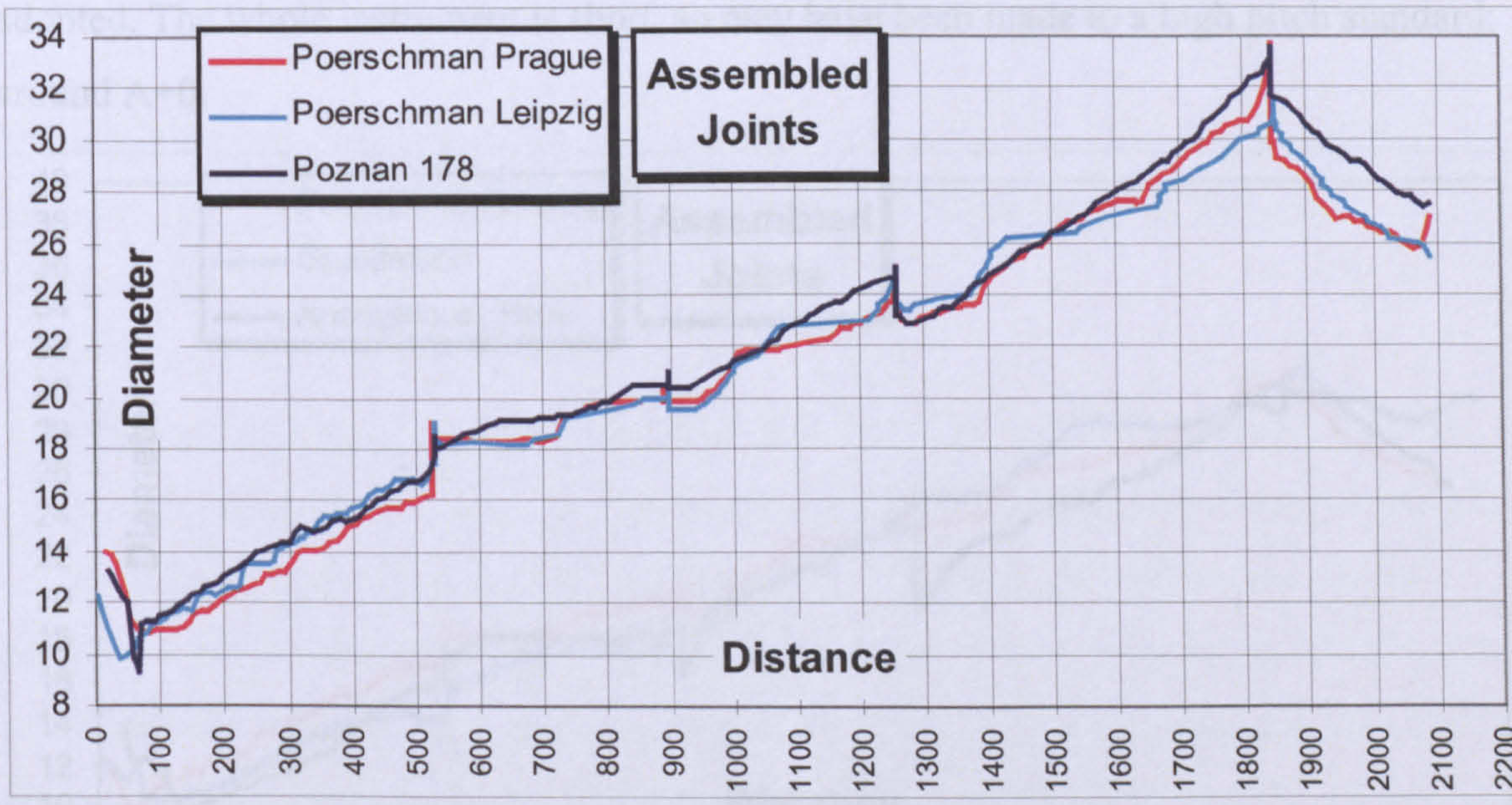
The brass ferrules all have rolled-in decorations near each edge and the centre section of the wing ferrule has been filed into flat facets which might look a little like a machine nut, except that there are nine faces. A lug for mounting a music lyre has been soldered onto one of the faces. There is a crown on the bell of the more sophisticated type, with turned decorations on sides and faceplate.

As with the Leipzig Poerschman, this bassoon has been thought worthy of a comprehensive up-dating in the early nineteenth century. The original four keys have been replaced by a well-made new set with several additions; for Eb on the long joint, F# and Bb on the boot, C# and high A (octave key) on the wing. These are the accoutrements of a bassoon of later than 1800; the Bb key pushes the date to circa1810. Unlike the case of the

Leipzig Poerschman, all the original key mounting blocks have been retained. Two toneholes have been relocated with longer new keys to reach them; Ab has been moved from the normal position next to the F flap-mounting block to 57mm further down the boot. This is again in keeping with a date in the first decade of the nineteenth century. Rather less explicable is the moving of the low C tone hole under the Bb key; this has been moved northwards, again by 57mm. A longer key touch has been provided which passes through the old flap mount to a new saddle screwed on to hold the flap.

The wing has probably been shortened; it is now only 509mm long. It has a brass sleeve forming the crook socket and the first 14mm of the bore; this is soldered to a circular plate, which is screwed to the top face of the wing. The bore section is much narrower than the bore in the wood, as can easily be seen in the graph in Appendix 3. The wing joint has probably been shortened at this end by around 30mm; the bore would originally have continued the taper down to around 9.8mm at the throat.

The long joint may have been shortened a little at the north end but it can only have been by a few millimetres as there are intact beads abutting the tenon. At the south end the grooves for holding the thread stop some distance from the end, showing that that has not been shortened.



Graph 3.4.4.29. Poznan 178 versus Poerschman, aligned at boot plugs

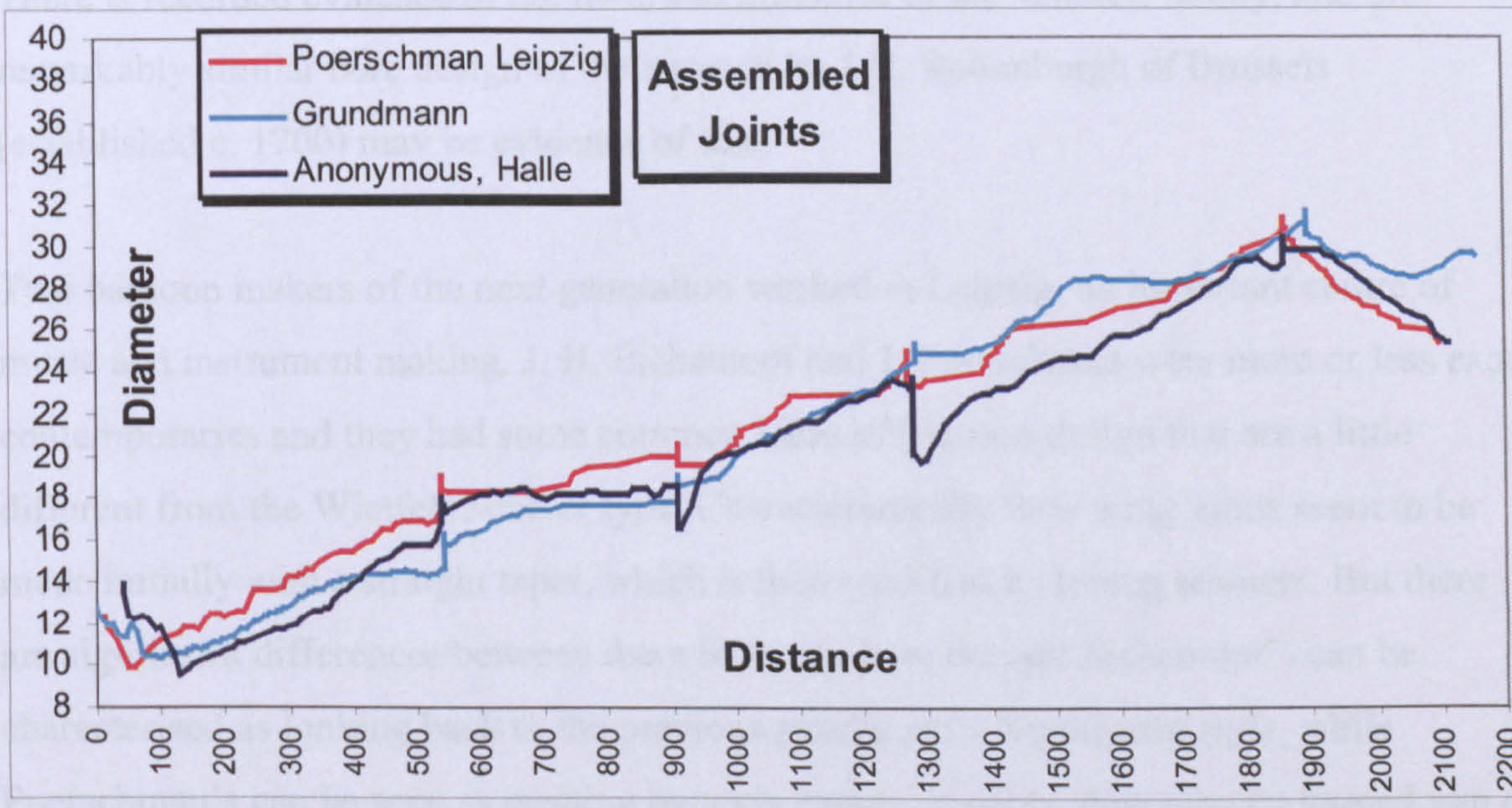
The bore is a fairly simple shape, with each section composed of one or more straight-taper sections. The boot small bore expands through the fingerhole region, as in the later instruments previously discussed. The overall size and shape of the bore lies fairly close to those of Poerschman, though without the complexities. Joint lengths are also very similar apart from the shortened wing.

Anonymous, Händelhouse Museum, Halle, MS-684

This is a well preserved instrument with some unique design features. It is again tidily made, of nicely figured (quilted) maple, though it is stained dark. One immediately obvious feature is that the épaule has square corners; this is not just laziness on the part of the maker though, as he has taken the trouble to make the section wrap around the long joint a little on the back as well (previously seen on the Kenigsperger instruments, and also found on the later Grundmann).

The blocks on the boot are all nicely designed and executed, as are the keys. The flaps are a variant of Young's type H with a curved front edge.[343] The bell crown is just a simple flat-profiled ring, but it has been carefully mounted with the edges rolled over to ensure it will not come loose. There are no beads at the top of the long joint.

The bore is particularly narrow in the wing, indicating a late eighteenth century date of manufacture, however it is included in this study as it has just four keys. The long joint is also narrow but the mildly flaring bell of the classical period designs has not been adopted. The whole instrument is short, so may have been made to a high pitch standard; around A+0.



Graph 3.4.4.30. Halle MS-684 versus Grundmann and Poerschman; bores aligned at the boot plugs

343 Young, *HWI*, p.xxxiii.

Conclusions on German Type 2c

The earliest instrument in this section is probably that of Harmen Wietfelt, who was probably making woodwinds marked with his own stamp from 1687 onwards. This bassoon could, therefore, be contemporary with elaborately turned examples such as those of J. C. Denner and his sons. Thus the ornamental Type 1 cannot be said necessarily to pre-date plain-style bassoons; they seem to have coexisted in different German states. Harmen's son Gottlieb continued to use the same design as his father to a significantly later date (from 1724 onwards).

Johann Scherer (1664-1722) completed his turning apprenticeship a few years earlier than Harmen Wietfelt but it is not clear when he started making woodwinds. Thus he was approximately contemporary with Wietfelt but cannot hold prior claim to bassoon making. They worked in different German states, in towns 300 kilometers apart. Their bassoon designs are similar but not exactly the same, and together they differ significantly from Type 1. The wing bore is more complex with its profile composed of two curved humps and a cylindrical throat. The boot bores are also complex; expanding stepwise in a series of cylindrical sections, resulting in the whole bore having a lower taper angle (than those of type 1). The bells all have a large chamber but Wietfelt has a significantly more restricted opening than Scherer.

There is recorded evidence of the fame and influence of the Wietfelt family, and the remarkably similar bore design of the bassoon by J.H. Rottenburgh of Brussels (established c. 1700) may be evidence of this.

Two bassoon makers of the next generation worked in Leipzig, an important centre of music and instrument making. J. H. Eichentopf and J. Poerschman were more or less exact contemporaries and they had some common ideas of bassoon design that are a little different from the Wietfelt/Scherer type. Characteristically their wing joints seem to be made initially with a straight taper, which is then modified by tuning reamers. But there are significant differences between them in the up-bore design; Eichentopf's can be characterised as looking back to the previous generation's Nuremberg style, while Poerschman's can be seen as pushing bassoon design onwards. Poerschman trained two of the most important figures in the next generation of woodwind instrument makers, who in their turn made significant changes to their master's design to establish the Dresden classical bassoon.