La Cetra Cornuta : the horned lyre of the Christian World

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CHAPTER 6 - Building and Playing: Principles and Practice

6.1 Introduction Regarding the mechanics of the sounding cetra, there can be no substitute for practical testing and doing. I have therefore elected to have four instruments built which together reflect the questions and conclusions of the theoretical part of the study. Although it is in common use everywhere today in the field of early music, I would not choose to use the term "reconstruction" to describe each instrument that has been built. For me, this would imply that there was a pre-existing physical artifact from which sections or parts were missing, for example, which could be rebuilt. Sadly, there are no known existing examples of the instrument which is been the focus of this study, although it is possible that an existing one built in the year 1462 (?) may have survived, at least until the early 20th century (see **CE 28**).

6.1.1 Authenticity What is an "authentic" cetra? During the 1970's and 1980's, it was fashionable to discuss authenticity in so-called early music performance. Like all words, "authenticity" requires a context to define its meaning. In those decades, the term was often employed to describe the instruments used in a concert performance, or the musical style of the performers. For the late Renaissance and Baroque periods, surviving instruments in museums were copied (or original old instruments were purchased), and the greater the resemblance to the original, the more authentic it was considered. The further back in time one searched, the fewer the instruments became that still existed. Original, un-altered instruments from the 16th century are extremely rare, but before this they are effectively unheard of. Any performer who wish to tackle music before the 16th century had to procure a modern-built instrument. The more precisely such an instrument resembled the same type as found in music iconography sources, the more "authentic" it was considered to be.

But because music is far more about ideas, communication, and social ritual than it is about the external form of a chordophone, its number of strings, or even its precise sound color, this "authentic approach" to early instruments has become less and less viable, as did

the use of the word “authentic” itself. An early music performance of 2018 may not be said to be a “reconstruction” of a performance which happened in 1448. It is a modern art form which has been inspired by the interpretation of historical documents relating to the performance which happened in 1448. Nothing is being re-created or created again; a new form is simply being presented within a totally different cultural and aesthetic context.

The absurdity of the concept of authenticity in modern performance can perhaps be illustrated with an example from our own lifetime. If we wish to re-create, say, the music of the Beatles, it is possible to buy the same guitars and amplifiers which they used in their performances. We can go to a vintage clothing store, buy the same jeans and sport the same hairstyle. We can find singers with the same voice ranges, colors and accents (maybe if we are really lucky we can convince the two surviving Beatles, Paul and Ringo, to perform with us themselves). All the tools for an authentic performance have been procured.

Yet the social rituals within which the Beatles performed their music are long gone and will never happen in that way again. The topics upon which the songs commented are no longer relevant in the same sense, and the melodies do not fall upon the same ears. The performer and the recipient of the performance, the audience, have both changed irretrievably. Even when the original performer, Paul McCartney, sings *Yesterday* in 2018, it is not a reconstruction of a performance in 1966. It is music of 2018.

So a cetra constructed in 2018 is not an “authentic reconstruction”, but rather a new interpretation of historical data. The instruments which I ordered to be built have been made, in a sense, in the same spirit as the Humanist cetre of the Quattrocento in just this sense: they are new creations inspired by a careful study of iconographical resources and critical thought concerning the possibilities of the interpretation of these sources.

To what extent do the iconographical resources provide reliable information about the structure and use of musical instruments of the past? The question was addressed in a

publication of 1974 by Emanuel Winternitz.[1] This author was well qualified to give an answer, for he was both the curator of a large collection of historical musical instruments, at the Metropolitan Museum in New York, and an art historian with access to thousands of visual sources within his place of employment; he did not have to walk far to compare the two fields of data. His article concluded with a plea for increased cooperation "between historians of the figurative arts and of music" in order to better understand the histories of both, but especially of musical instruments.[2] At no time in his writings does Winternitz hint at any interest in modern practical performance of so-called Early Music, and there is no acknowledgement of any kind of a contemporary trend to actually try and play these instruments in serious concerts for classical music audiences, as a necessary part of a deeper understanding of how music may have sounded and functioned in the Renaissance. In this regard, the present dissertation challenges Winternitz's position, for its most central premise is that, just as a tool is defined only by practical use, a musical instrument must be used to be understood. It must be played and used for human expression and communication. In the case of the cetra, in order to be used today, it must first be constructed.[3]

6.1.2 Choice of models The models for the four cetre were chosen for a variety of different reasons, in total eight. The first reason was the relative degree of realism presented by the source, within a variety of source types. I purposely chose four different mediums of depiction: stone carving, fresco wall or ceiling painting, intarsia wood inlay

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[1] Winternitz 1974.

[2] Winternitz 1979, 233.

[3] With many images, such as a depiction of a Renaissance lute, we may be confident that an actual instrument, known and cultivated by a particular society, is being represented. It may be rendered with greater or lesser technical skill and with greater or lesser attention to specific details of construction, but because multiple examples exist as visual images in medieval and Renaissance art, and multiple real instruments have survived as a museum pieces, we accept as a fact that Renaissance musicians did in fact play lutes. With other instruments, such as the cetra, a body of consistent visual representations survives, whereas corresponding three-dimensional wooden instruments do not, at least before the mid 16th century. As with the lute, we may be confident that the cetra existed as a real instrument during the periods when artists were drawing it.

and illuminated miniature, to try and explore how the limitations of each medium could be managed and interpreted. The second point was to try and cover a wide span of time, which could mean anywhere between 1100 and 1530. A third criterium was to explore both known constructional types, i.e., carved and built-up construction. A fourth theme to be explored in these chordophones was that of fret configuration, diatonic versus chromatic. A fifth topic was the question of tuning, and a sixth criterium looked at general size, large(r) versus small(er). The seventh set of questions revolved around string material, gut versus metal, while the eighth topic was concerned with accessibility to historical data about repertoire. All of these aspects were taken together into consideration before finalizing my orders.I decided that it would be necessary to have four instruments built, to cover a representative cross-section of the sources listed in **Chapter 3**. The earliest would come from c. 1260-1300, while the latest would be associated with years around 1500. This period covers two of the three distinct cetra styles, the Franciscan and Humanist.

6.1.3 Repertoire / Musical function I was admittedly less interested in the Romanesque type of cetra because there is hardly a known repertory to speak of for it. The repertory for the pre-13th c. instrument probably consisted of the accompaniment of monophonic Latin song (for there is no pre-13th c. source for vernacular song in Italy) and playing dance tunes, of which nothing survives. The situation improves in the 13th c., which sees the advent of the *lauda* or devotional monophonic song in Latin and Italian. Sources of 13th-c. Italian dance music do not survive, although melodies could perhaps be adapted, or imagined, as simple dance music from this period.

Things improve markedly in the 14th c. in terms of new possibilities regarding repertoire for the cetra, thanks to the rise of a notational system for mensural music. Song forms of all kinds open up as possibilities for accompaniment with the cetra, including both monophonic and polyphonic types. A smattering of dance music from the 14th c. has also survived, featuring simpler dances such as *saltarello* and *trotto*, practiced by all levels of society, and the *bassadanza*, the primary social dance form at the Italian courts. The simpler monophonic dances could certainly have been performed on the cetra, although some of them require chromatic notes on the fingerboard such as c# and f#. The 15th c.

meanwhile sees yet more repertoire chances for the cetra, with much of its 14th-c. musical functions still intact, plus new chances in the repertory of improvised epic singing. *Ottave rime* and *strambotti* would both have been candidates for cetra accompaniment, and in the last quarter of the century and first decades of the next, the *frottola* would often have been heard sung to the tones of the cetra.

Finally, it was clear that the four cetre should not be built by the same maker but by different ones, to obtain somewhat more diversity of interpretation for the group. It goes without saying that each instrument represents the beginning of a process, a process which by definition requires building multiple versions of the same instrument, in order to "iron out the bugs", as they say. Within the time span and financial budget of the present project, this has not been possible. Rather, each of the four instruments which has been built provides a necessary and viable *Ausgangspunkt*, point of departure. Because the designer and the builder, for two of the instruments, have been two different people, elements of compromise in the final results are unavoidable; this would also have been the case had I been able to do the building work myself. To a great extent, however, these four instruments reflect the conclusions reached in this study.

The task of constructing an instrument based purely on a visual image from half a millennium ago may seem like a daunting one. To undertake it, we must have a certain amount of confidence that we can understand the interpretation of the artist who created the visual work. The case of the cetra is greatly aided by the case of the lute. The latter happens to be one of the most commonly depicted musical instruments of the Middle Ages and Renaissance, and it also happens to have survived in physical form, at least in examples datable to the mid 16th century. From these existing specimens, we have learned to read lute iconography in order to understand important aspects of structure, playing technique and musical context. In addition, there are unique surviving examples of the citole and the gittern, two medieval instrument types which share common features with the lute. For example, all of these instruments were constructed with the soundboard made of spruce or other conifer (the same type of wood was used for the soundboards of

surviving Byzantine *pandurae*). We can therefore be confident that the sound board of the cetra in the 13th c. was made from the same type of wood.

This is but one dimension of historical data, however. Our construction of wood must also acknowledge aesthetics. Renaissance culture was completely absorbed with and dependent upon mathematical proportion as the source of ultimate beauty and truth. The design of any object or artifact within that culture was conceived in terms of proportion. Woodworking was done by hand and the objects produced by it had an organic aspect only perceivable to the eyes of a post-Industrial-Age observer. How the wood was finished, decorated and colored must also come into play as an expression of aesthetic. Decoration and color is heavily linked with symbolism, and in the case of the Humanist cetra, for example, the symbols used are often connected with Apollo. A carved head might be a young woman representing a Muse of Apollo, or it could be a lion, wolf, or dog, as the types found on the three-headed monster typically placed under Apollo's feet in Renaissance images of the god.

Each new cetra will be used to interpret musical sources of a specific time and place, and with each cultural setting comes historical information about the repertories practiced in that setting. The instrument must serve its documented musical purpose, and any apparently contradictory data gleaned from music iconography will have to be resolved or accounted for in light of the known musical function. Accurate fret placement in a visual image was not a high priority for any artist depicting a cetra before the later 15th c., and a modern observer who expects otherwise will quickly come to a state of perplexity. Similarly, if we know that 14th-c. *lauda* melodies were popularly sung among the laity, and that they rarely require chromatic pitches (*musica ficta*), then this information may influence our choice of fret system for a corresponding cetra.

We may go further with our *lauda* example. **CE 43** is one of a total of two Catalog Entries showing music notation in close proximity with a cetra. **Pl. 122** shows a page with music notation for an anonymous 2v-setting c. 1500 of *Verbum caro factum est*, a popular *lauda* of

the period, while **Pl. 123** gives a transcription of the piece:

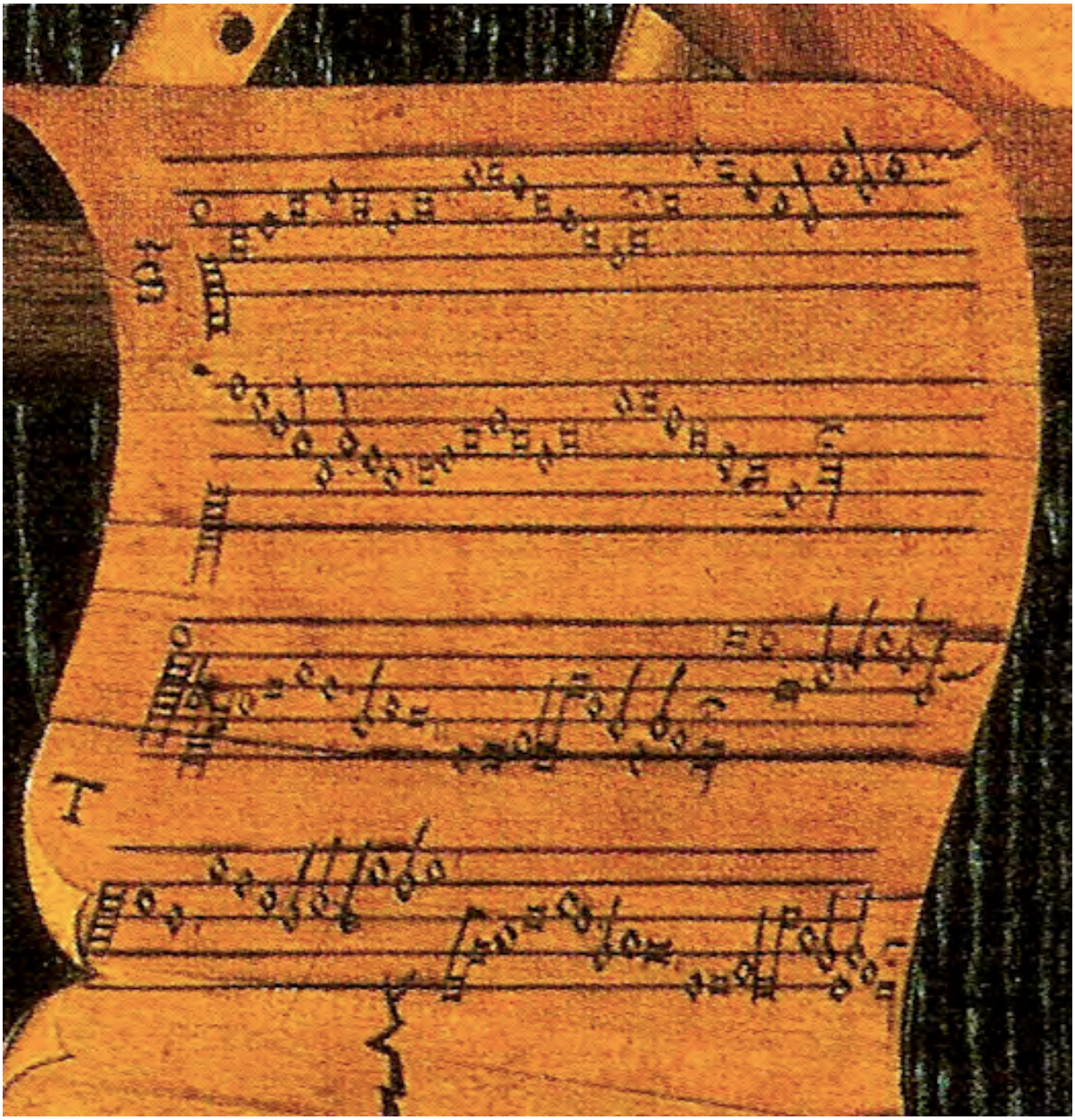

Plate 122: Siena, Abbazia di Monte Oliveto Maggiore, Choir Stall 10 (Fra Giovanni da Verona), page with music notation of 2v-composition.

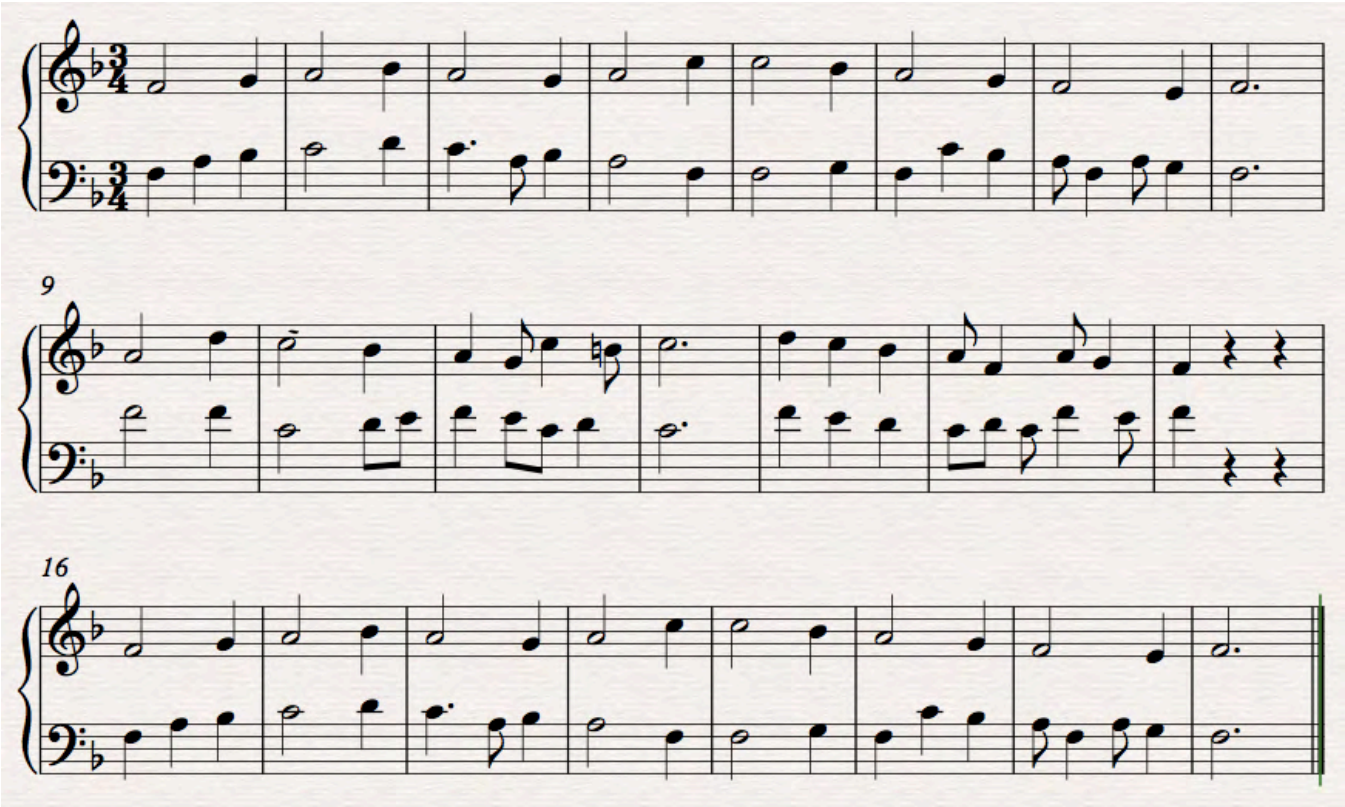

Plate 123: Transcription of Plate 122, (Siena, Abbazia di Monte Oliveto Maggiore, *Verbum caro factum est*, composer unknown).

Plate 124 reproduces a detail from the *intarsia* at Santa Maria in Organo (**CE 36**), a page with music notation of an unknown 3v-piece.

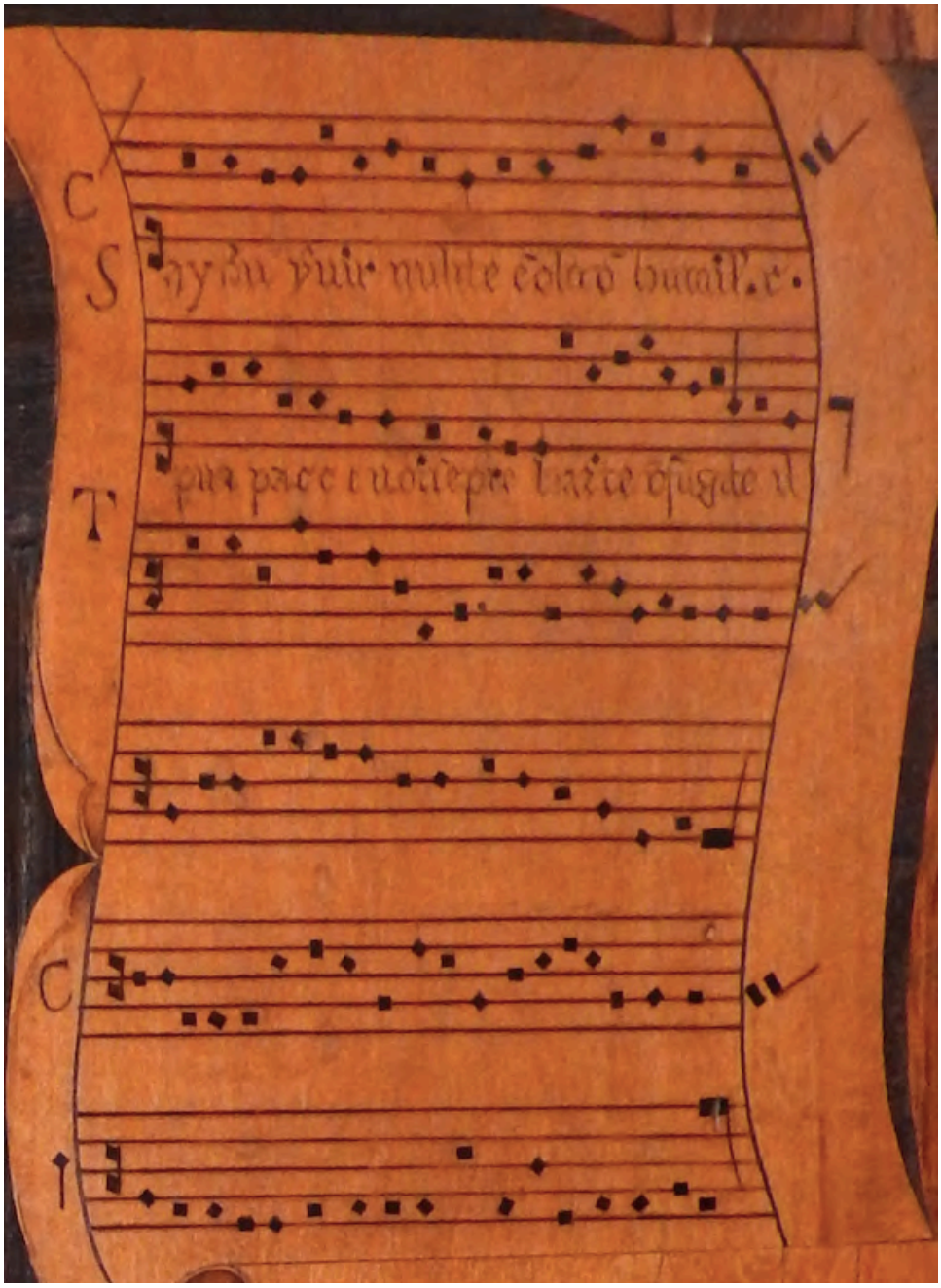

Plate 124: Verona, Santa Maria in Organo, Choir Stall (Fra Giovanni da Verona) with *intarsia* containing cetra and page with music notation of 3v-composition.

According to Elena Bugini, the page with music notation in the Verona *intarsia* was heavily restored by Francesco Ferrario between 1943 and 1946.[4] The result is musically incoherent and un-transcribable, although the restorer(s) - if indeed Ferrario - seems to have been looking at a three-part piece in triple rhythm and in the key of F. The contratenor voice shows stylistic characteristics of an earlier period than the date ascribed to the *intarsia* (1494-1499), with a so-called Burgundian octave leap movement at the final cadence, usually associated with polyphonic music from the first half of the 15th century. The text given in the uppermost staves on the page remains a puzzle, offering no clues as to which text, poem or piece it might be.[5]

The first reason for the presence of these works in the choir stall *intarsie* is the symbolism of the cetra as an instrument of the Psalms, as the instrument of David and songs of praise. It would be logical to assume that the cetra was commonly used c. 1500 to accompany *laude* or devotional songs which were sung by all levels of society. Was the two-part *Verbum caro* of the Monte Oliveto panel played on the cetra around 1500?

The answer depends upon what one understands as the cetra used in the practical performance. It is highly unlikely that the songs were played on the diatonic cetra as a polyphonic intabulation typical of solo lute arrangements during this period, for the physical structure of the instrument, including the open string tuning and fret configuration, did not allow this possibility for 2v-counterpoint in correct Franco-Flemish style. The cetra, in contrast to the lute, was an unlikely tool for demonstrating technical prowess or musical virtuosity. It symbolized the humility of St. Francis and the joy of being able to praise God through melodic utterance.

Playing one of the two voice parts of the intarsia's *Verbum caro* was well within the practical scope of the diatonic instrument. While usually enhancing or supporting a sung melody, the cetra could also deliver an autonomous instrumental rendering of a well-

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4 Bugini 2011, 84.

5 Bugini 2011, 84.

known tune, both monophonically and monophonically enhanced; the latter might be a way to call the limited polyphonic techniques available on the instrument, if the player had the required skill. But we might say that its function in performance was as much through its associative identity - more, in some cases - with piety, humility and musical simplicity than with its acoustic support for the voice and presence in sound.

If, on the other hand, the cetra had chromatic frets and used a tuning such as the adapted Boethius tuning #1 given in **Chapter 4**, something closer to diminution playing could be achieved. By "diminution playing" I mean the playing of a superius or cantus part in a filled-out fashion with fast-moving note values, as played on a Renaissance lute, for example.

In other words, what becomes musically possible on one of the instruments I have had built, say, for example, the cetra built after **CE 33**, may or may not demonstrate anything about how that type of instrument was used in late 15th-c. culture. A number of features come together in the **CE 33** image:

- The **frets** look to me more like a chromatic system than a diatonic, and I have presented my arguments for this interpretation in **Chapter 4**, but ultimately, I cannot be 100% sure that the artist was painting chromatic frets, or whether he himself knew enough about them to even distinguish between chromatic and diatonic.
- The **number of strings** would have been either four, five or six pairs, with a small chance of one or two pairs being in octaves. I chose six pairs because there are some sources from this period with 12 tuning pegs, but in fact I have no way to be sure at all.
- The **tuning of the strings** is based on the premise that the unique authoritative contemporary source for the tuning of the cetra in this period has been unreliable, either because we do not understand his Latin usage, or he was unwittingly conveying incorrect information. My assumptions might be erroneous; in any case I have no conclusive proof that the instrument was ever tuned in the way that I am using it.
- The normal **plectrum type** may have been far stiffer and more inflexible than what I know from playing the lute (using a thin ostrich feather which is quite flexible), in which case it may not have been possible to play very fast notes.

If, despite my best efforts, I have not made the most objective choices for each of the features named above, then I may end up with a kind of Frankenstein cetra upon which I can play music which would have been inconceivable and strange to a practitioner of Humanist culture. This obviously has not been my intention. The performance results should fall in line with the data examined and not be at odds with it. The music-making done upon these cetre must follow everything I know about musical aesthetics in the Middle Ages and Renaissance. But, to be clear, the act of deciding what it is, having it constructed and how to play it and use it musically are all acts of a kind of informed faith regarding the cetra.

An existing instrument from Bologna well captures the musical spirit of the cetra: the so-called *violeta* of S. Caterina de' Vigri (Appendix I, Ex. 20).[6] It served the devotional music of the saint, accompanying pious songs of praise which she and her congregation would have sung. The instrument's excessively small size and bowed playing technique gave it a shrill, penetrating sound which carried well in the open air and in crowd situations, such as processions on Feast days. We cannot know the technical level of the playing of the saint, but it seems highly unlikely that she displayed the kind of virtuosity associated with a courtly musician like the lutenist Pietrobono of Ferrara.[7]

The musical function of the cetra was not limited to accompanying *lauda* singing. According to Tinctoris, it was used to provide music for popular (or "rustic") dancing. It is less easy to imagine a corpus of dance pieces than it is to visualize a repertory of *laude*, for the latter exists in Italian manuscript collections from the late Middle Ages. Monophonic lauda melodies were written down with their texts, although the musical notation is in many cases not mensural (i.e., the rhythmic structure is unclear). Polyphonic laude also exist which are rhythmically quite clear, for example, by known composers such as Jacopo da Bologna. But examples of dance music are rare, and the few we have seem to come out

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[6] Tiella 1975.

[7] For an account of Pietrobono's career in Ferrara, see Lockwood 1984.

of a courtly context. The most famous example is doubtless the so-called London Manuscript (London, British Library, Ms. Additional 29987), a collection very likely copied in Tuscany around 1400.[8]

The London manuscript is first and foremost a collection of polyphonic art songs, with works by the most famous Italian composers of the day. Many of these works are found in other manuscripts, but there are other types of compositions in this collection which are not secular songs and which are not found anywhere else. These include at least three different types of textless music, that is, music intended for instrumental performance, which in itself is an almost unheard-of genre to find in a source of music notation of the late Middle Ages.

The three categories of textless music found in the London manuscript are (1) four pieces to accompany the courtly dance form *bassadanza*, (2) seven melodies to accompany the type of dance known as the *ballo,* danced in courtly and popular contexts, and (3) eight examples of non-dance music for listening entertainment while attending a feast or other social engagement, called *istanpite*.[9] At first sight, any of these three categories would seem to be fair game to play on the cetra. The first and third categories however are primarily courtly music, and the *bassadanza* for example was typically accompanied by a standardized shawm ensemble which had no place for a cetra. The few records of *istanpita* performance report solo keyboard renditions. There is no mention in any historical record of a cetra performance for either type of courtly instrumental music.

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[8] See general information on this manuscript at https://www.diamm.ac.uk/sources/694/#/ (accessed 17.03.2018).

[9] Pieces in the first group are titled *Chançonete tedesche* ("German melodies for *bassadanza*"); in the second group, four pieces are titled *Saltarello*, one is *Trotto*, and there are two pairs which are usually treated as one composition each, *Lamento di Tristano-La rotta* and *La Manfredina-La rotta della Manfredina*; in the istanpite group, the titles are *Ghaetta*, *Chominciamento di gioia*, *Isabella*, *Tre fontane*, *Belicha*, *Parlamento*, *In pro*, *Principio di virtu*. For an edition with commentary, see Schima 1995. For a second edition making the unfounded - and by now widespread - claim that the *istanpite* are dance pieces, see McGee 1989.

Balli, on the other hand, included simpler, less refined dance types such as the round dance. These were enjoyed at all levels of society, and it is not difficult to imagine an outdoor social gathering with guests dancing to the sound of the cetra. So the existing dance tunes in this category from the London Manuscript can give us a start in playing dance music on the cetra.

In addition to *laude* and popular dances, the third kind of music was sometimes performed with a cetra: the singing of epic poetry and extended formulaic improvisations, combining extemporized texts with melody patterns. These performances were generally done by solo singers who accompanied themselves with a stringed instrument, either plucked or bowed. By the late 15th c., the instrument of choice for this kind of performance was the *lira da braccio*. A popular alternative to this *lira* was the cetra, which seems to have been preferred over the lute, probably because of the cetra's stronger association with Classical antiquity.

Such performances by *canterini* were hugely popular and were heard in a variety of settings, on street corners, feast days, civic ceremonies and in the private chambers of the most exalted courtly rulers. In these contexts, the cetra carried out important but modest musical duties, probably confined to strumming chords and playing simple, easy-listening melodic interludes to allow the voice a moment to rest.

As with the *lira da braccio*, the cetra accompaniments were not written down and do not survive in music notation.[10] It is possible however to study the many Italian song collections of the later 15th c. in order to understand the musical vocabulary that would have been used to accompany a melody. This is essentially a process in which the musical style is first absorbed and then adopted to the idiosyncrasies of a particular instrument, including its tuning configuration and fingerboard layout of possible notes available to be used. In the case of the cetra, there are markedly fewer possibilities then within instruments such as the lute, for example. Yet, as mentioned above, the presence of a cetra

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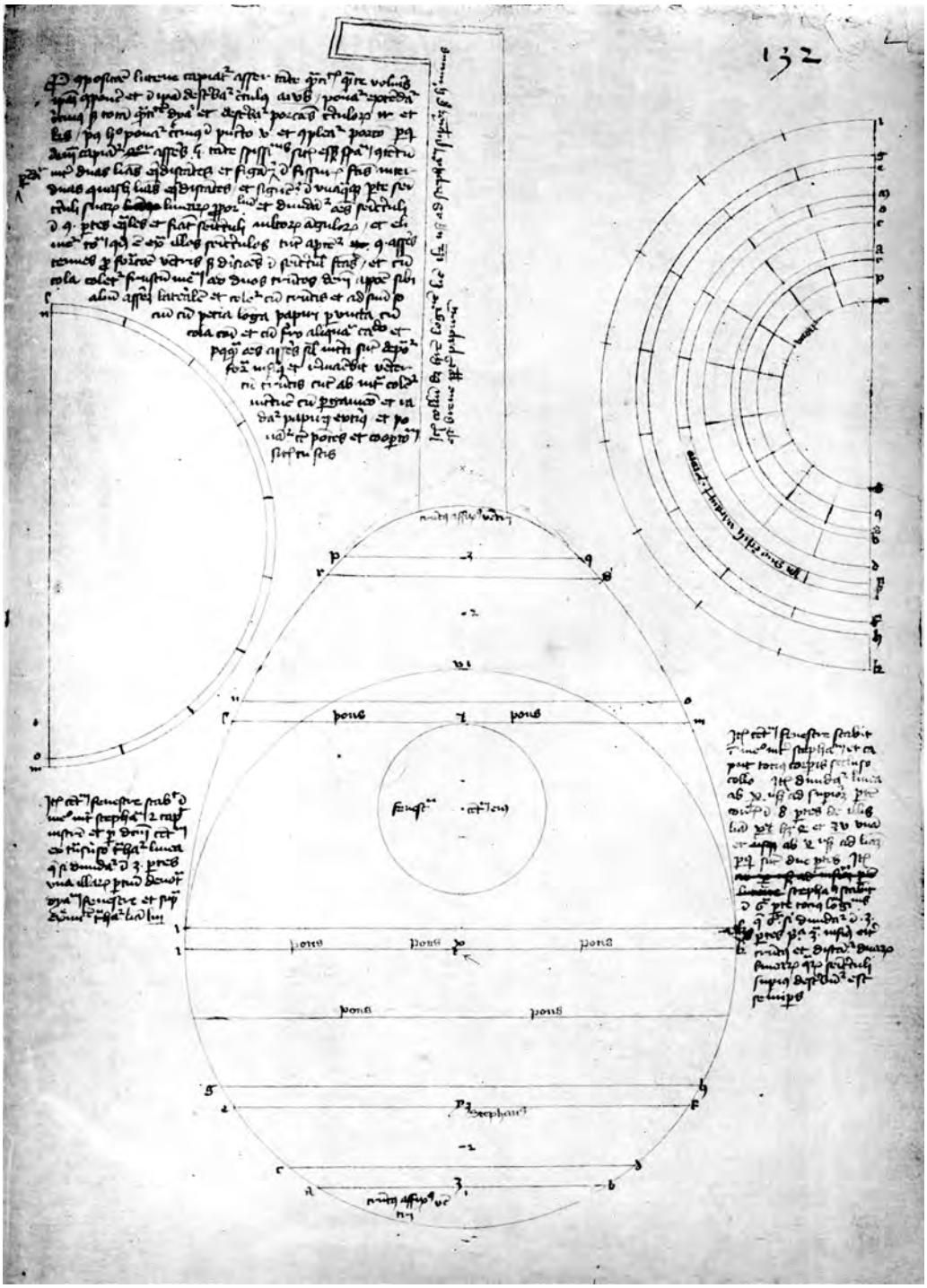
[10] Pes etc

brought a certain authority or credibility that the lute simply did not bring for this particular genre of musical performance.

In sum, our knowledge of the repertory of the cetra in the 14th and 15th c. is confined to the *lauda*, *ballo* and *strambotto* and other strophic song forms. Because all of these forms were central to Italian musical life, the cetra could always find a function to perform.

6.1.4 Drafting blueprints In order to build a cetra, a plan or drawing is needed. Light can be shed upon the mentality of 15th-c. instrument builders, thanks to a document written at the court of Burgundy c. 1440 This is the drawing of Henri Arnaut de Zwolle (**Pl. 125**):[11]

[11] Facsimile edition: Le Cerf 1932.



Pl. 125: Paris, Bibliothèque nationale, MS 7295, f. 132.

Although it is not of Italian origin, the drawing of De Zwolle conveys valuable universal information as to how instrument forms (like the form of any construction) were conceived, which also would have been well-known to Italian craftsmen. The principles of geometric construction of drawings, as applied to European painting, were nicely analyzed by art historian Charles Bouleau in 1963.[12] De Zwolle begins his drawing with a circle, a symbol of perfection. The diameter of the circle generates the form of the instrument and the placement of all parts (among others, rose, bridge, support bars under the sound board) using primary numbers in simple proportion. This produces a drawing of a lute which is - according to its geometry - concordant with itself or visually "in tune". Each builder or artist then makes his own version or variation upon the model, always keeping this one in the background. We have employed the same method for the constructed cetra, starting with a geometric drawing generated from simple proportions.

[12] Bouleau 1963.

6.2 Cetra #1: CE 33 (builder: Bruce Brook)

6.2.1 Geometry and Design:

My initial drawing for the Dai Libri cetra, **CE 33**, attempting to follow in the footsteps of De Zwolle, was generated as follows:

1. Begin with a circle.

2. To find the upper end of the body, take the diameter of the circle 2x (A - B in the drawing).

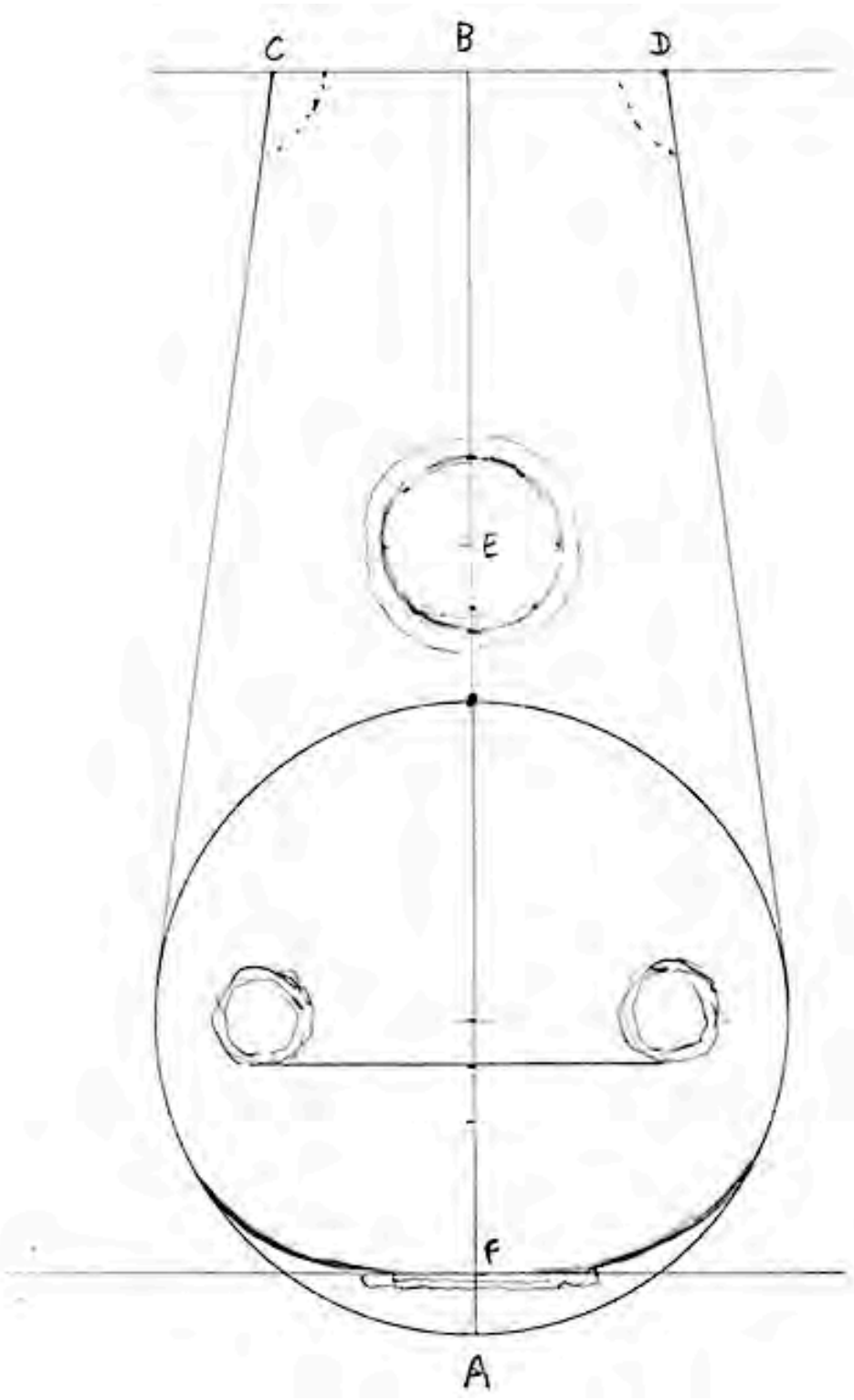
3. To get the angle of the sides, divide the diameter of the circle by the Golden Ratio (= approx. diameter x .62) and draw line C - D with B as the middle point.

4. To get the center of the rose, divide the diameter of the circle by 4 and draw this point at E.

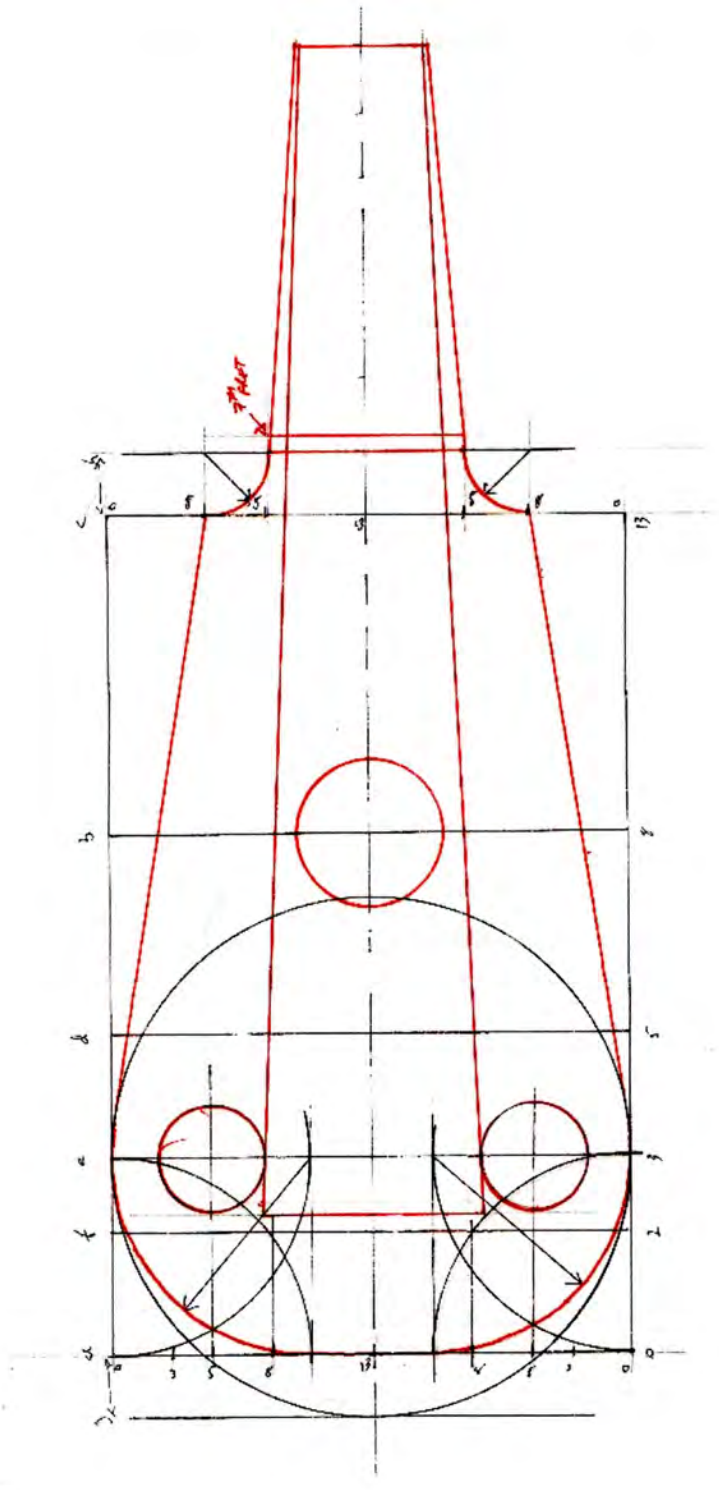
5. To get the diameter of the rose opening (without border), use one third of the body width at E.

6. To flatten the bottom of the instrument for where the comb / string-holder will go, divide the diameter of the circle by 10 and find letter F.

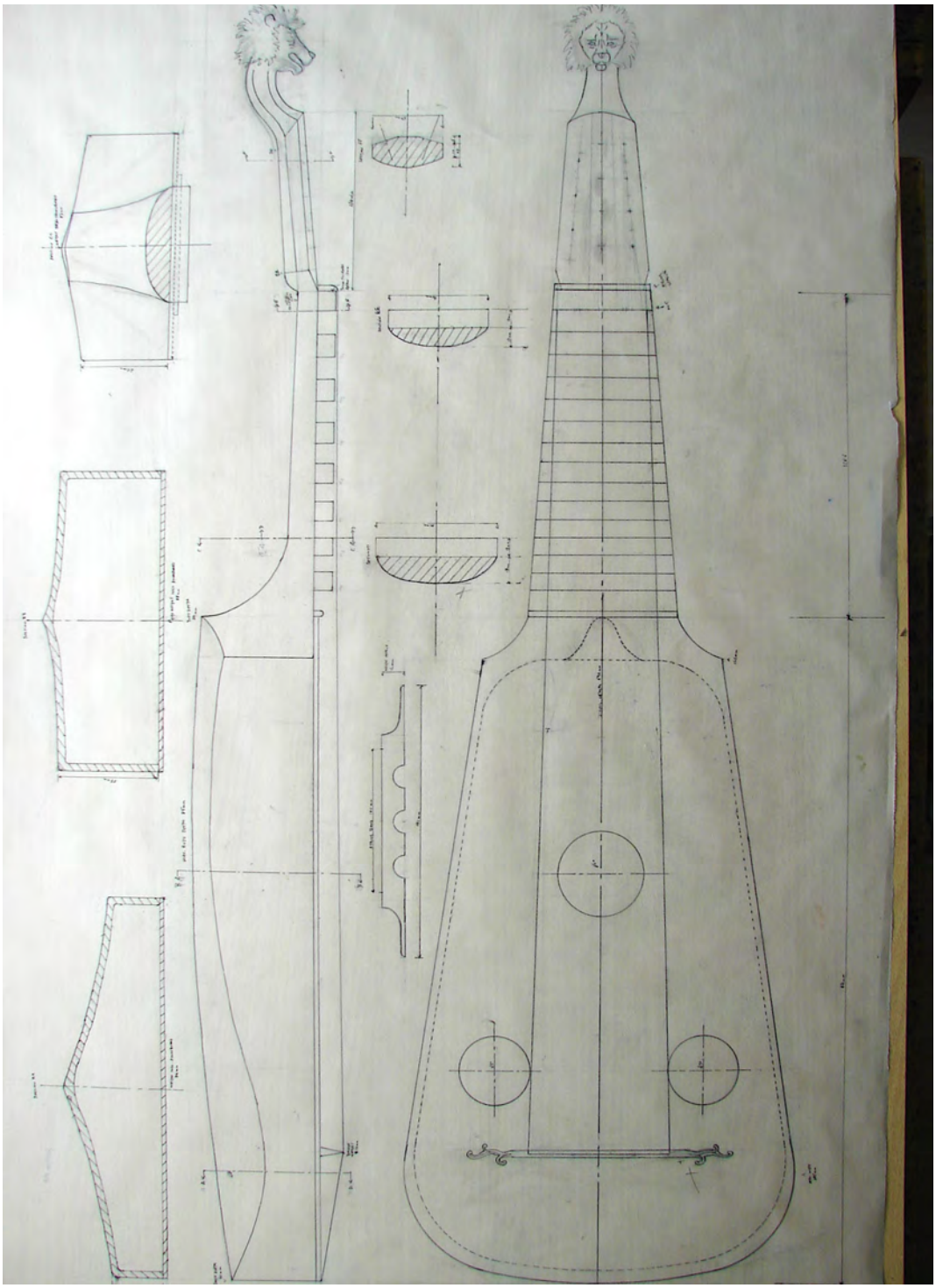
7. To find the bridge placement, take 1/6 of the length F - B.


C
B
D
E
F
A

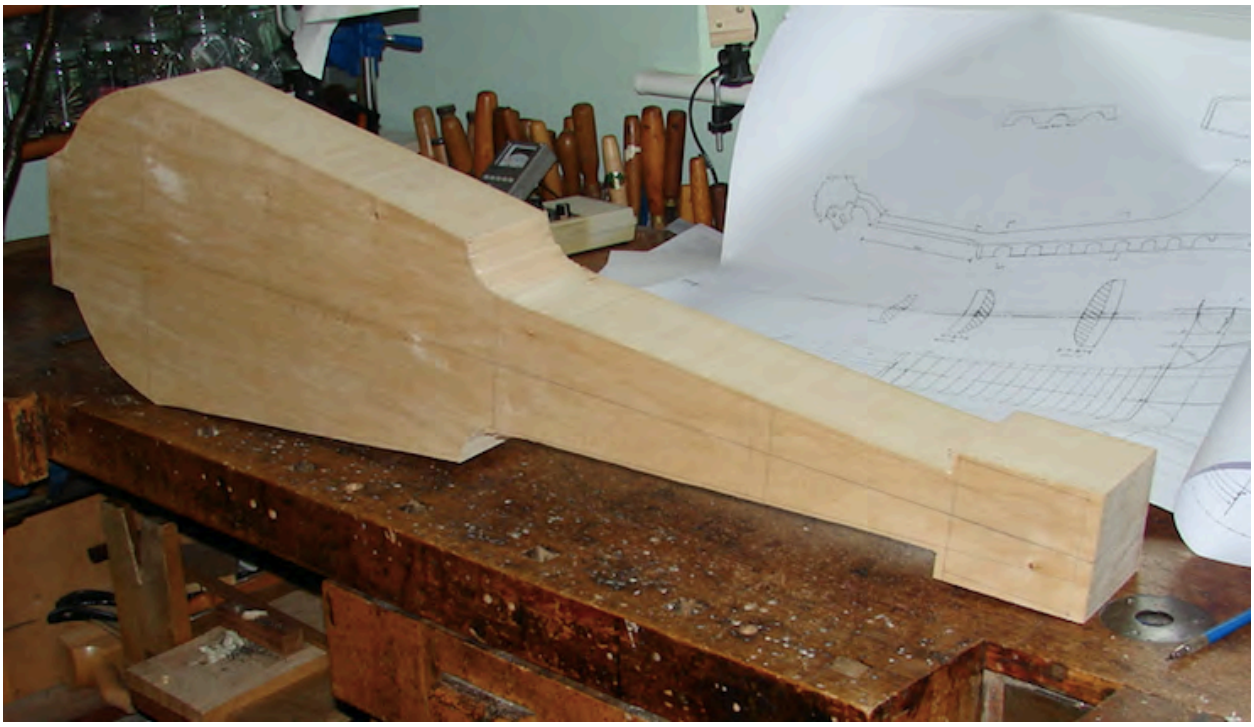
The drawing has thus been achieved by following the basic method outlined in De Zwolle: use a circle, simple proportions starting with the diameter (1:2, 1:3, 2:3 and others) and use the Golden Ratio. Bruce Brook then made a variation upon the plan:

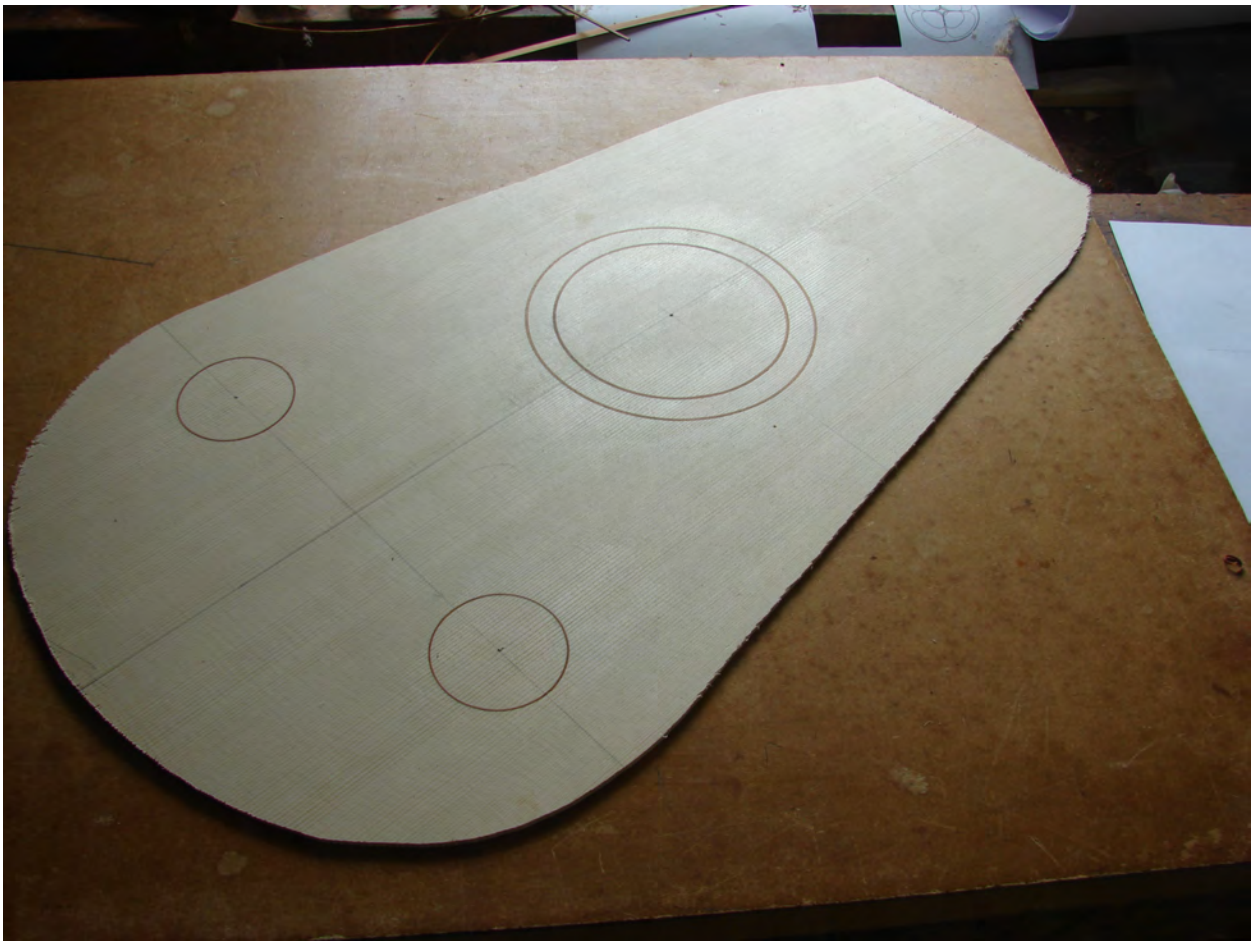


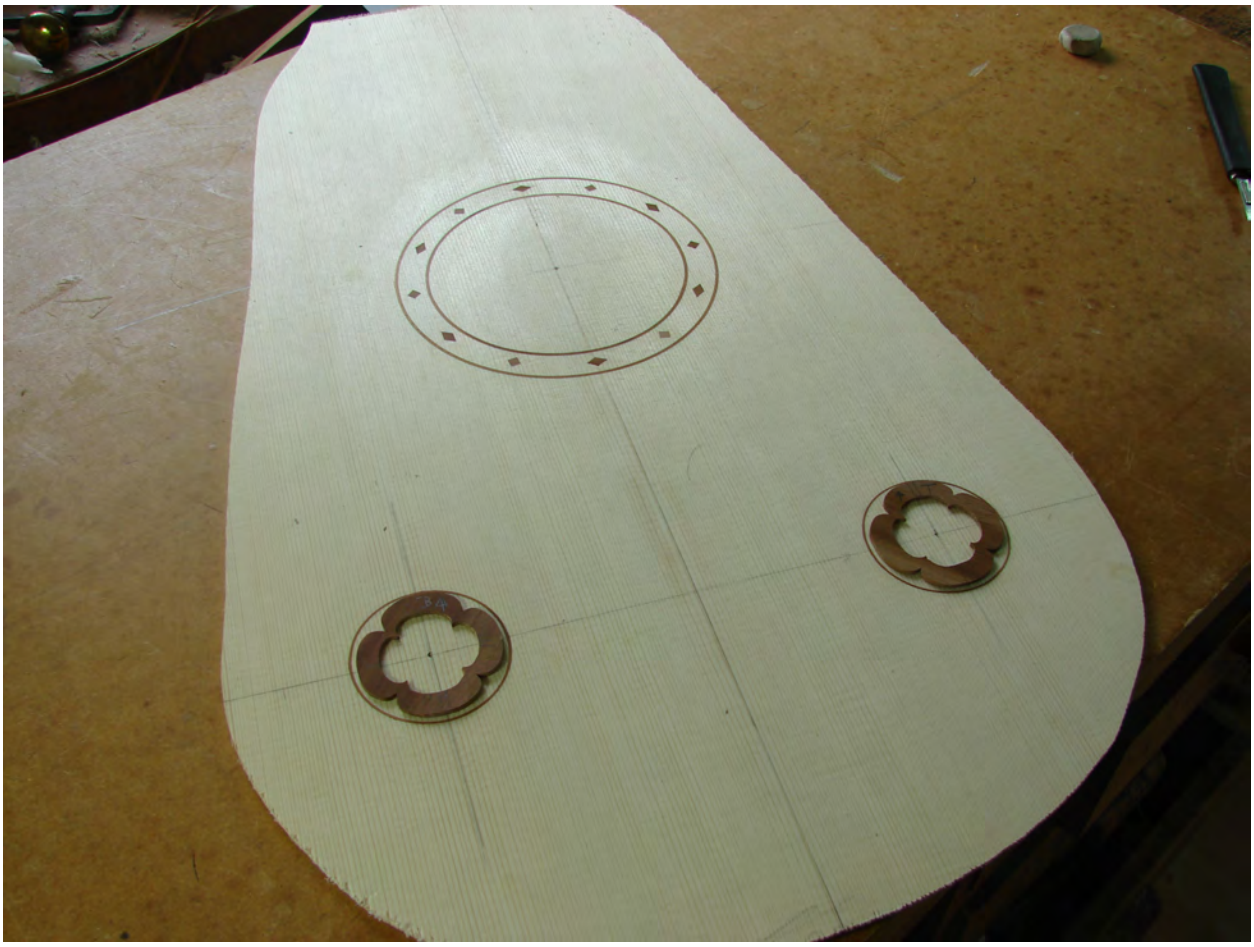
A full-scale plan was then the follow-up:



6.2.2 Woodworking Stages:







6.2.3 Practical Assessment of Instrument

Frets: This fingerboard proves that flat-topped frets work, by pressing down on the space in between, so that the block edge on the nut-side is the actual fret or stopping edge. This confirms the general accuracy of depictions that show flat-topped frets; there are no detailed depictions showing separated blocks where there is anything but flat-topped frets. If the blocks are joined, or if the fingerboard is of one-piece construction, then the frets can be scalloped.

This also confirms that frets can be carved out of the original block for the entire instrument. If the fret-tops are all of the same flat plane, then the height of the bridge can determine the sound quality, i.e., with a clearer well-defined sound, or if the player prefers, with a very slight buzzing sound. This constructed example furthermore demonstrates that frets - and by implication, on other instruments - are neither angled nor stair-step (i.e., of decreasing height). The string is stopped by pressing the finger down on the space behind the fret block. The back edge (facing the nut) of the block forms the actual fret. Depending on the skill of the luthier and the will of the player, the angle of the bridge can be raised or lowered to produce a mild buzzing sound analog to the sound of bray pins on a harp. This buzzing sound color may have been postulated the Classical kithara and reclaimed for the cetra; the prominent circles shown on many ancient instruments may have been thinly beaten metal discs, loosely fixed to the instrument to create a kind of snare or buzzing color when the string was plucked (see **Chapter 1**, 75). The wide cetra frets could achieve the same effect.

The spaces between frets on this cetra are almost too wide, and the stopping finger would have benefitted from a somewhat narrower spacing in order to provide more stability for the intonation. On the lower frets with the widest spaces between them, the tuning is a bit tricky. This could have been avoided if the spaces were narrowed slightly, and it would not have compromised the look of the original source.

Therefore: the string length and fret system (chromatic or diatonic), together with the width of the player's fingers, determines the maximum width manageable for the spaces. Depending on the real string length - which is impossible to determine from the sources - there will be a graphic fret configuration or "look" to the spacings which must reflect some aspects of what the artist was looking at or remembering.

Tuning: This instrument will be used with five and six courses. For the six-course tuning, the top four courses will use altered Boethius in D, with the lowest course a second below at C and the remaining course a fifth above C: C / G / D / E / a / d. For the five-course tuning, adapted Boethius #1 and adapted Tinctoris #8 (see **Chapter 4**) will give the top four courses, plus one tone lower for the fifth course. Transposed to G, these tunings are:

(Six course): F / C / G / A / d / g

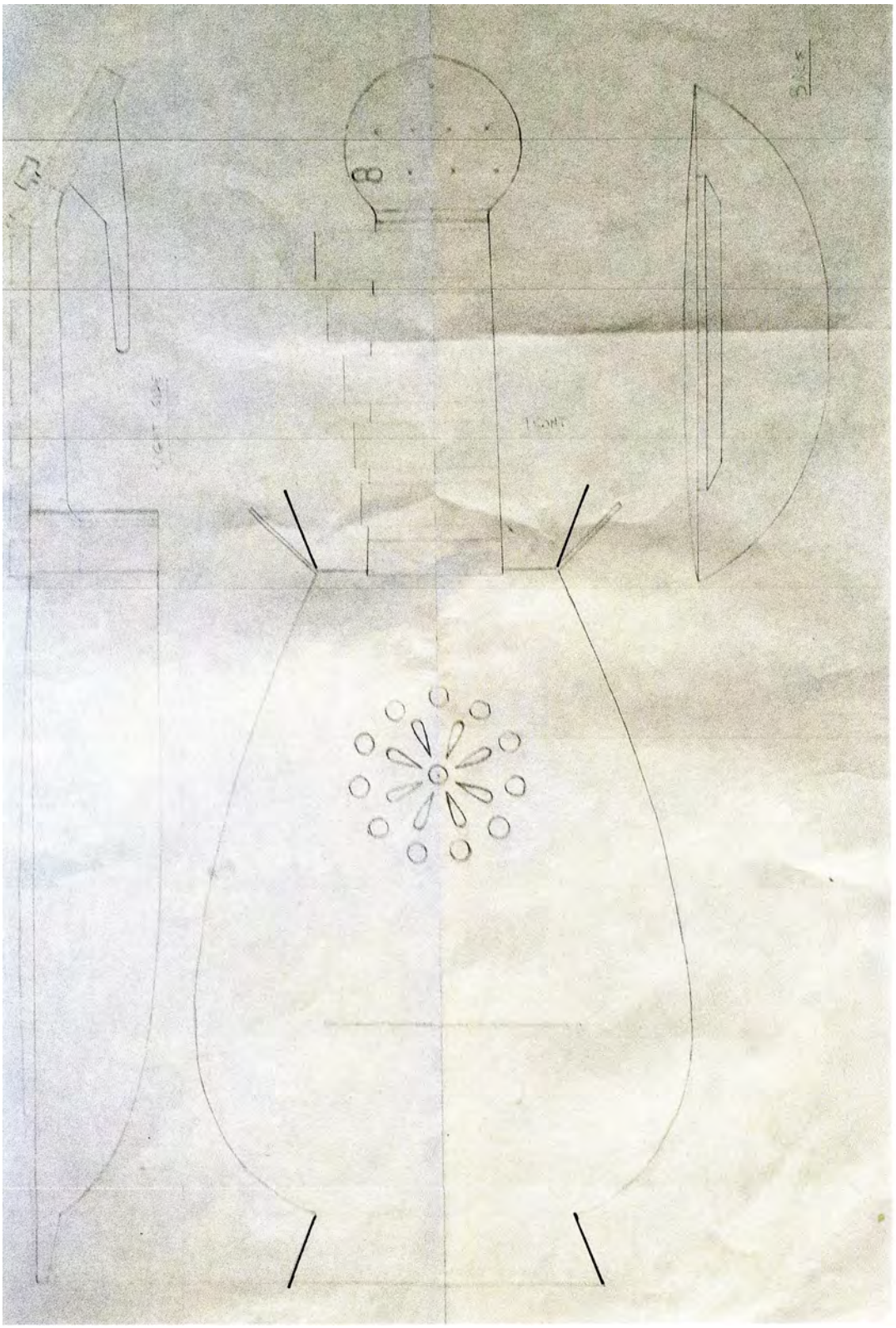
(Five course): F / G / A / d / g
F / G / A / d / e

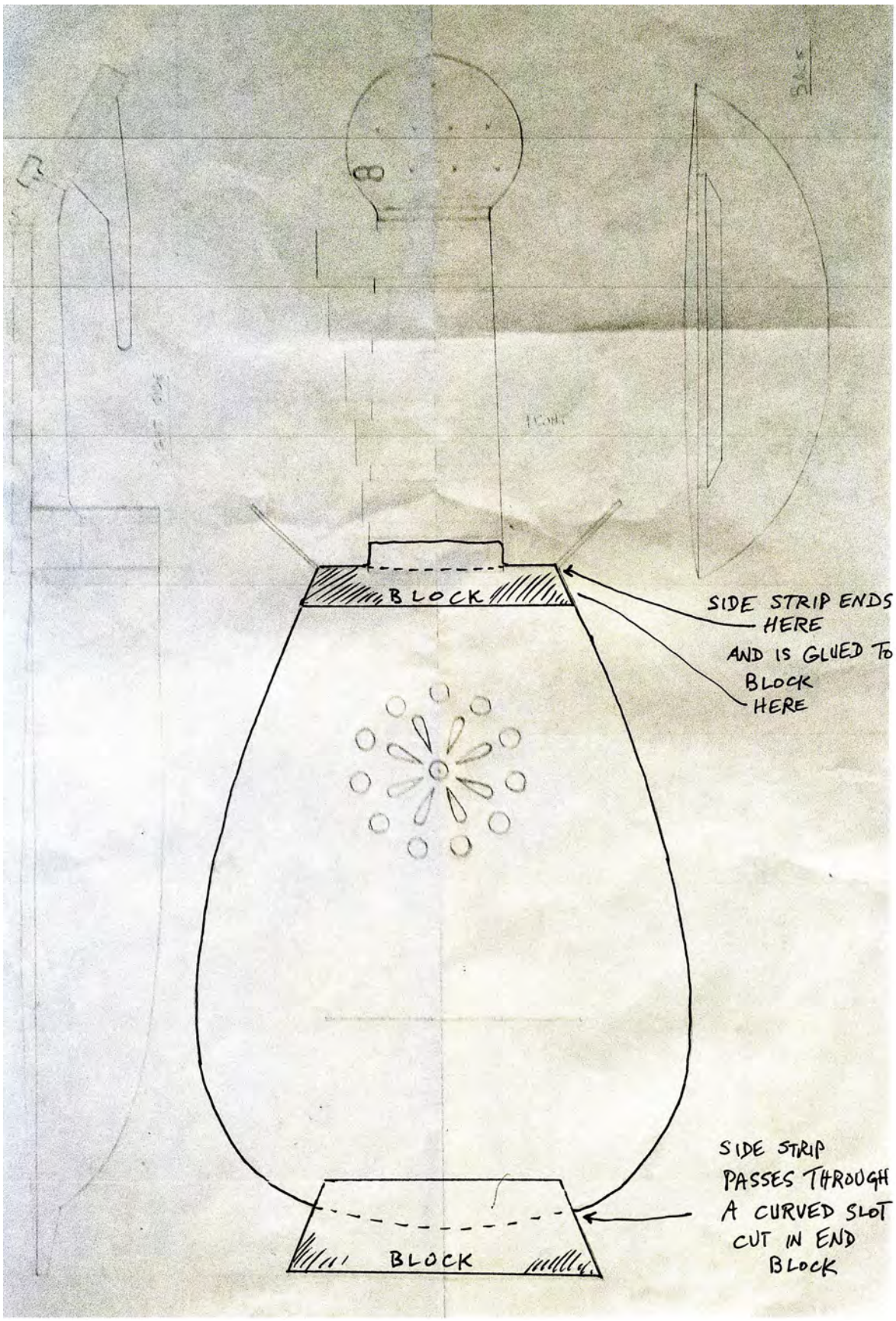
After a period of extensive playing of this instrument, I can now confirm that the use for diminution-style playing that was proposed earlier in the chapter will be possible, although not to the extent that it is on a lute. This comes as a great surprise, for I would not have expected that the kollopes-fret would allow rapidly articulated notes. Again, this musical possibility depends upon the tuning suggestions given above.

A second fact I can confirm is the superiority, in terms of tuning stability, of using one long metal string for both strings of a pair or course. This is a known system for stringing 16th-c. citterns, and it is achieved by attaching one end of the string to a peg, then passing the string over the bridge and around a metal pin projecting from the end of the body, and bringing the remainder of the string over the bridge and back up to the selected peg on the peg-head.

6.3 Cetra #2: CE 32 (builder: Luca Piccioni)

6.3.1 Geometry and Design:




BLOCK
SIDE STRIP ENDS HERE
AND IS GLUED TO BLOCK HERE
SIDE STRIP PASSES THROUGH A CURVED SLOT CUT IN END BLOCK
BLOCK

6.3.2 Woodworking Stages:

The concept used for the design of this instrument is that of built-up construction, which has been discussed in **Chapter 4**. There are three arguments for making this assumption regarding the construction method. Both sides of the instrument show quite clearly two holes, by which the sides were fastened to a mold. The second argument concerns the very thinly worked-horns, which look to have been glued to the neck block. The third argument is that the grain of the wood used in the inlay makes it clear that it is a different piece of wood than the neck itself, which has been attached to the block.

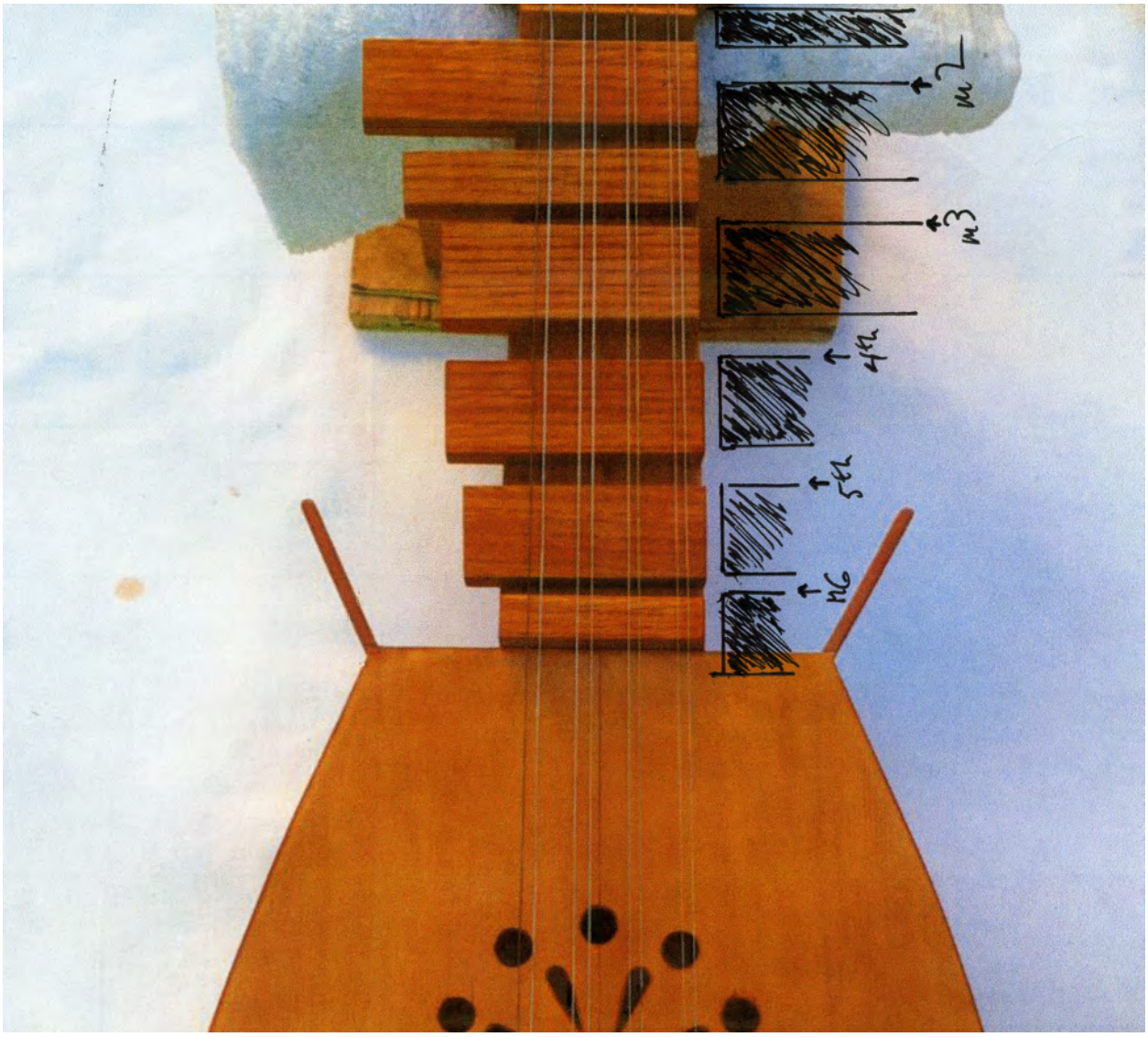
The process of construction unfolds as follows. First the sides are bent and attached to the mold, which contains a separate block at the bottom of the instrument which remains in the instrument to anchor the sides using wooden pins inserted in the holes shown in the *intarsia*. The sides are glued to the neck block (a block consisting of block and heel to support the neck) and then joined to the sides. The neck/peg-head piece is then seated and glued onto the heel of the neck block. The next step in the basic construction is to glue on the soundboard, and after this the block frets.

Earlier sources than **CE 32** of presumed constructed cetre seem to show that the neck block and horns are cut out of the same piece of wood (**CE 25**, **CE 34**). On **CE 32**, and other *intarsie*, the horns are very thin and may therefore have been attached separately to the neck block, as has been done on this construction.

There is one argument which might speak against the construction method just described. The back of the body at the end of the resonator might be interpreted as depicting a slightly rounded back. If one acccepted this argument, the resonator would first be carved out of a block of wood, without a neck. The neck block would then be joined to the resonator. None of the other Catalog entries provide similar information concerning the profile of the back. I have been unable thus far to find a 16th-c. example of this kind of construction, however it is theoretically possible. For this instrument, built-up construction has been used.

6.3.3 Practical Assessment of Instrument

After the construction was completed on this cetra, a re-evaluation of the fret configuration was undertaken (for a discussion of various theoretical aspects of the fret system on **CE 32**, see **Chapter 4**). The reason for this re-evaluation was that, in the depicted cetra in the *intarsia*, the width of the frets is more regular than they appear on the newly-constructed instrument. A possible way to keep a diatonic fret system, yet make the "look" of the fret sizes more like the original than is the case here, is shown in the following photo of the first constructed diatonic fret system (major 2nd, minor 3rd, 4th, 5th, major 6th):



Shown in the photo above, to the right of the frets, a new configuration has been drawn in, using the same intervals except substituting a minor 2nd for the major 2nd. This brings more of a graphic similarity to what is seen in the *intarsia*. The new proposal also included a widened nut, and a wider higher fret extending onto the sound-board. These proposals were drawn into the photo shown above, and corresponding changes were made on the instrument. The result is successful, offering both diatonic and chromatic pitches; the diatonic pitches are fretted on the spaces between blocks, while chromatic pitches may be fingered on the block surface using the nail of the left-hand finger.

This cetra is the most difficult "experiment" of the four instruments because, in addition to being the only built-up cetra of the four, it has other major problems of interpretation to be dealt with: are the frets diatonic or chromatic, and what is the tuning of the open strings? A further problem is the bridge, which seems to be too long and thin to support the downward pressure of the metal strings. This, however, is not a major problem, for if a similarly shaped modern construction collapsed (which it has not done), a more robust design could easily be substituted from other 15th-c. sources in the catalog.

The built-up construction method has been successful in creating a working instrument with resonance and volume. As a result of this experiment, it now becomes solidly plausible that this radically different method of instrument building for the cetra was being practiced many decades before the generally accepted proposal of the mid-16th century.[13]

In addition to the question of construction, the problems of fret disposition and open string tuning become acute when attempting to realize a concrete hands-on musical instrument based on **CE 32**. We shall now report about the first problem: the results of the newly proposed diatonic fret system addended to the photograph described above.

The main problem with the first version of the fret system is that it did not graphically resemble the Gubbio *intarsia* in a convincing way. The first thing that strikes the observer about the fingerboard of **CE 32** is the regularity of fret width and height; these remain - to a great extent - constant within all of the frets, while the only varying factors are the length of each fret and the amount of space between it and its neighbor. The question of fret length is not a problem, for each of the six frets clearly gets shorter in length going up the fingerboard.

The question of the distance between each fret is trickier. What is now clear is that the string length determines the uniform fret width, as clearly shown in **CE 32**, and that with a

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[13] See Chapter 4, section 4.1.

uniform fret width, the distances between the frets will decrease slightly between each fret progressing up the neck.

There must also be sufficient string clearance above the surface of the frets, in other words, the action of the strings must not be too low; if it is too low the string will buzz against the fret.

Unexpectedly, this newly constructed experiment showed something else: it is possible to play a note by pressing the finger directly on the block itself. This is, to my knowledge, a concept which has been neglected in modern research. Frets have always been seen as an either-or system; they are diatonic or they are chromatic. That is to say, the available catalog of pitches on a given instrument depends completely on whether the fret system is diatonic or chromatic, with no in-between possibility.

It turns out that there is an in-between possibility. With the "diatonic" frets inspired by **CE 32**, all pitches in fact are possible. Some are fretted by pressing the finger upon the space in between the blocks, while others are sounded by pressing the finger directly upon the block, near the edge. When the latter is done, pressing down by using the nail of the left hand finger gives a better result, in other words, the pitch speaks more clearly.

This, then, emerges as the hidden benefit of so-called diatonic flat-topped frets (they are also chromatic). We may thereby fittingly be reminded how difficult it is for the modern mind to enter the medieval mind: our analytical "diatonic versus chromatic" opposition was not an either/or situation at all.

There now remains only the question of tuning. The obvious first choice for this instrument is the one reported by Johannes Tinctoris (see **Chapter 4,** section on

tuning). The first thing to report is that there is absolutely no way to make practical sense of the traditional Tinctoris tuning. It serves neither melodic nor chordal play. Plucking a simple dance tune seems extraordinarily complicated and awkward, when compared, say, to using adjacent strings tuned in fourths (as on the lute or gittern). Chordal accompaniment for a vocal melody from this period would be also severely limited.

The tentative but unavoidable conclusion is that either our traditional reading of Tinctoris is not correct, or, it is correct but he is inadvertently transmitting faulty information.

Proposition 1: If Tinctoris is correct that the middle two of the four strings are a 4th apart, then either the Adapted Boethius # 1 (G - A - d - g) or Adapted Tinctoris #2 (G - A - d - e), both given in **Chapter 4**, would be logical tunings.

Proposition 2: If Tinctoris is unknowingly incorrect about the 4th, which actually should be a 5th, for example, then the Adapted Tinctoris # 1 (A - G - d - e) would be appropriate.

Argument for Proposition 1: this was linked to the Boethian cithara in the late 14th-c. Berkeley manuscript, as we saw in **Chapter 4**. It could also be a logical choice for an earlier cetra. The Adapted Tinctoris #2 (G - A - d - e), with the top course lowered a minor 3rd, might make more sense for the tensile strength of the metal strings, which is less tolerant than gut as a string material .

Argument for Proposition 2: this tuning (A - G - d - e) is very close to the main four strings of the 16th-c. cetra (B natural - G - d - e) and could therefore explain where the 16th-c. tuning came from.

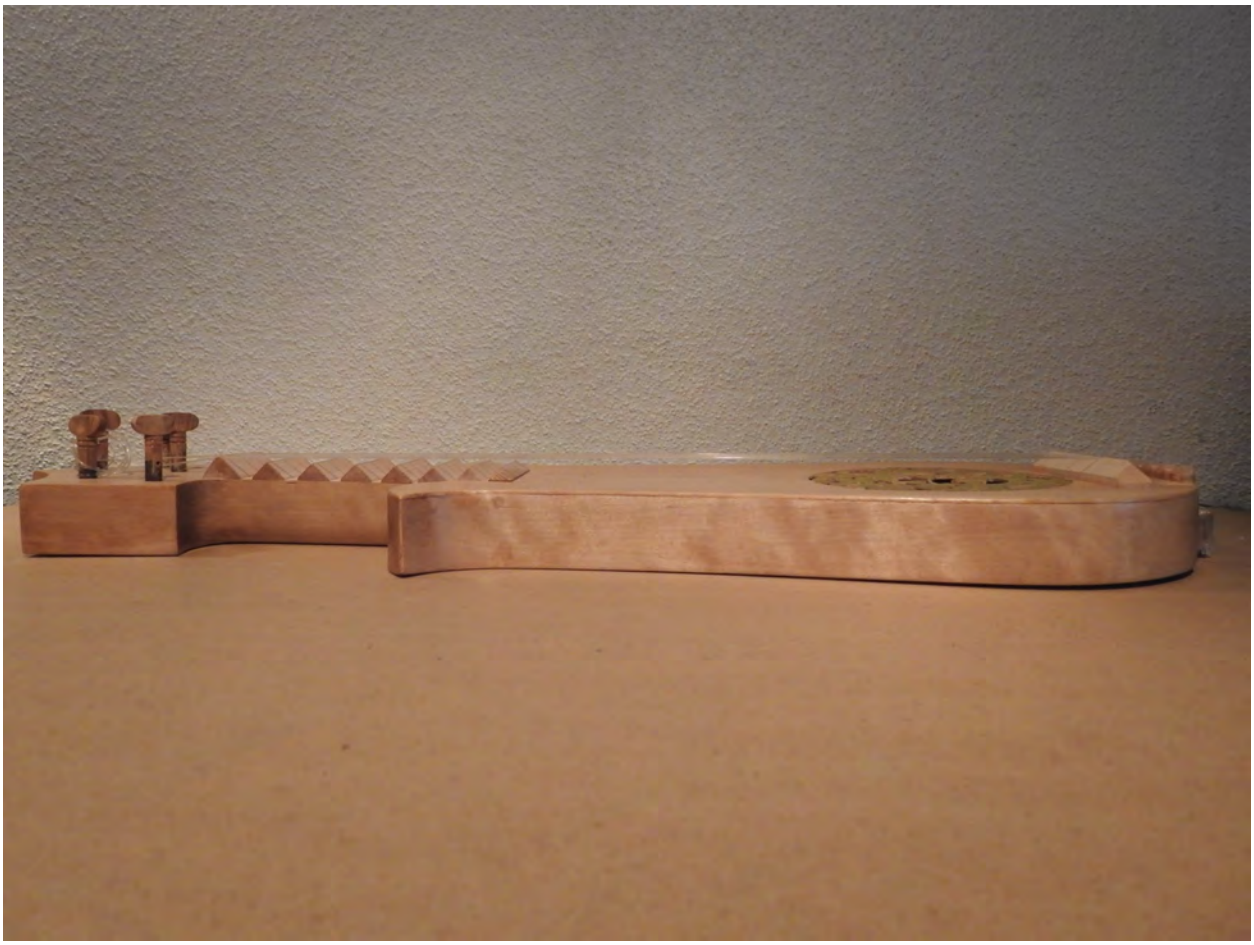
The tunings for this cetra will therefore be G - A - d - e and A - G - d - e as well as B natural - G - d - e.

6.4 Cetra #3: CE 15p (builder: Jacob Mariani)

6.4.1 Geometry and Design: Luthier Jacob Mariani conceived his own body shape design for this instrument, following the model given, **CE 15p**. The tulip shape, with prominent horns on the shoulders, was seen as a continuation of the 13th-c. shapes of the instruments featured in the Catalog. The body depth was determined to be slightly shallow. This would also provide a chance to see what the effect on the sound color might be as a result of the shallow depth. Given the dating of the fresco from the early 14th c., carved one-piece construction was considered to be the only feasible choice.

The cycle of **CE 15**, the quintessentially Franciscan Assisi group of sixteen cetre, displays certain details that are very similar to what is seen on images of vielles, in particular the peg head and stringing configuration. The latter typically includes a bordun string off the fingerboard, which is a shared characteristic with **CE 8**, **CE 10b** and possibly **CE 14**. The musical logic of such a bordun string is first and foremost to be able to access it by plucking with the thumb of the left-hand. On the vielle, the plucked sound brings a different, percussive color and adds another trick to the player's technical vocabulary. Rhythmic music would be the first to benefit from such a device, in particular of course, dance music. Other plucked instruments of the Middle Ages, for example, the lute or the gittern, are not seen with bordun strings, confirming that this was a specialty of the cetra at a certain period of its cultivation. Its presence demonstrates that the instrument was especially loved to accompany dancers, and perhaps that musicians who played the vielle and were used to the bordun also frequently played the cetra. The presence of this feature also would seem to offer further confirmation that the cetra was strung in gut, as is no evidence of a metal-strung bowed instrument of any kind during the period examined for this study.

6.4.2 Woodworking Stages:



6.4.3 Practical Assessment of Instrument

There are, in my opinion, two features in some of the Assisi cetra depictions which should not be taken 100% literally. These are the placement of the rose and the placement of the bridge. On most of the images from the cycle, the viewer does not see the bridge, which is covered by the arm or wrist or hand of the player. In one image, **15k**, the bridge is placed directly on the edge of the end of the body. If this placement were correct, any advantage from having a sound-board glued to the top of the resonator would be canceled, that is, the main purpose of the sound-board is to translate the energy caused by plucking the string, via the bridge, into moving this sound-board up and down in order to acoustically amplify the pitched sound. In order to accomplish this purpose, the bridge must be placed a sufficient distance from the edge where the sound-board is glued to the side of the instrument, otherwise there will be very little sound transmitted.

This is precisely what happened in the first experiments with the completed instrument. A muted, dull, tiny sound was produced, and it seemed obvious that in real life, the cetra never would have had its bridge placed in this position.

Similarly, the rose is placed too far back on the sound-board, occupying the space where a bridge would normally stand. In the case of this constructed instrument, it has been possible to continue experiments by placing the bridge over the middle of the rose, which does have one support bar underneath it, which prevents it from immediately collapsing under the pressure placed by the tightened strings upon the bridge. A real instrument would not have had its bridge placed in this position, for the bridge is the weakest part of the top. The conclusion from this experiments, therefore, is that a new sound board will have to be built with a different rose placement further towards the neck.

General size: is this size too big for this fret system, i.e., are the spaces between the frets too large? No, as long as the gut strings have a high tension, otherwise the fretting will be unstable with intonation. The neck and peg-head are too heavy, as there there is too much massive wood present in that part of the instrument. There is also a problem with the

higher frets: the fingers cannot reach above the 5th fret because of the large shoulders, they block the movement of the left hand. It is also a specific problem for the frets glued onto the sound-board: to take the trouble to glue frets onto the sound-board above the neck only makes sense if the frets are easily accessible to the left hand.

The front surface of the peg-head works well in terms of the angle; pegs are well-anchored and stable. The overall sound is good, with a positive presence, despite the shallow body-depth.

Stringing and tuning: this instrument will be used with three, four and five strings of gut (three strings on the fingerboard, tuned G - d - g; four strings on the fingerboard, tuned F - G - d - g; three strings plus off-fingerboard bordun, tuned d - G - d - g; four strings on the fingerboard, plus off-fingerboard bordun, tuned d - G - A - d - g).

6.5 Cetra #4: CE 8 (builder: Jacob Mariani)

6.5.1 Geometry and Design: As was the case with the previous instrument, Jacob Mariani conceived his own body shape design for this instrument, following the model given, **CE 8**. The tulip shape, with prominent horns on the shoulders, was seen as a continuation of the 13th-c. shapes of the instruments seen in the Catalog. The body depth was determined to be slightly deeper than the cetra constructed after the Assisi fresco. This would also provide a chance to see what the effect on the sound color might be as a result of the deeper depth. The sides of the body were to be strongly scalloped, as it was felt that this was the case on the sculpture.

The relatively early dating of c. 1260-1300 for this source allows us to be confident in assuming that carved one piece construction was used for this instrument. This meant that the body, neck and peg-head would all be carved out of the same block of wood, in this case a block of European maple.

Wood types that would have been used for cetra construction during this period were likely the same as those one or two centuries later on carved instruments, both bowed and plucked. In northern examples, the English citole from c. 1330 now housed at the British Museum was carved from one piece of boxwood, while the gittern in the collection of Wartburg Castle at Eisenach is made of one piece of maple (soundboards are of spruce, as with all examples given here).[14] Italian examples of necked chordophones are instruments probably best referred to as *violete*, including the violeta of S. Caterina de' Vigri and another specimen from the Untermeyer collection at the Metropolitan Museum in New York. The former is made of one piece of maple, the latter is boxwood.[15] While hardwoods such as these were often chosen, lime-wood and other softer woods were constructional options as well.

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[14] For a description of these instruments and the others mentioned above, see Crane 1972, 15-17.

[15] For the former, see Tiella 1975; for the latter, Crane 1972, 16.

6.5.2 Woodworking Stages:

After the body and peg-head were finished, the sound-board was glued on to the body. The frets were then added, in different stages of experimentation. For this purpose, the cetra was constructed with the possibility of exchanging fingerboards; the bridge and the nut can be lowered or raised (or replaced) to allow further fret experimentation. The photo below shows the instrument with three additional fingerboards.

The photo above shows four different fret systems which could be tested in turn. Attached to the instrument is a fretless fingerboard onto which flat-topped diatonic frets have been secured with double-sided tape (using this tape is a practical way to be able to move fret positions easily). Lying in front of the cetra on the table are three further possibilities. The fingerboard at the bottom has chromatic, flat-topped frets, while the one just above it features saw-toothed diatonic frets (i.e., the right-hand edge of each fret is slightly higher than the left-hand edge). Above this is a set of saw-toothed frets in chromatic configuration and Pythagorean tuning.[16]

The photos below show these alternate systems installed on this cetra.

[16] See the discussion on temperament in Chapter 4 (4.3.9).

Frets: Chromatic, Flat-topped, equal temperament.

(Chromatic, Flat-topped, equal temperament)

Frets: Diatonic, saw-toothed, equal temperament.

Frets: Diatonic, saw-toothed, equal temperament.

Frets: Chromatic, saw-toothed, Pythagorean temperament.

Frets: Chromatic, saw-toothed, Pythagorean temperament.

These alternative fret configuration models were constructed for comparative purposes and were extremely useful for fine tuning conclusions about how historical cetre worked. A fifth type was also tested but is not shown here, the "one-fret" system shown on certain examples from the Assisi cycle **CE 15**. These instruments appear to have only one fret (or what might be called a second bridge) approximately halfway along their string length. They represent a separate category of necked chordophones in medieval iconography which includes other instruments such as vielles and citoles showing the same device. They have hardly been mentioned in organological literature, doubtless because of a lack of historical documents specifiying their musical function. We may speculate that such instruments were effectively string drums, providing a rhythmic ambience appropriate to certain types of social ritual. With open strings possibly tuned in octaves and fifths, they produced a chordal carpet of sound which could be octavated according to the acoustic requirements. Their musical purpose had nothing to do with playing melodies, although they externally resembled instruments that usually did; they apparently fulfilled an important function in specific formal social occasions.

6.5.3 Practical Assessment of Instrument: The pegs, anchored on the curved surface of the peg-head, together with the thick shafts of the pegs, make it quite difficult to tune the gut strings. A flat surface for the front of the peg-head might produce a more stable surface to anchor the pegs, and this surface could be angled back at a somewhat sharper angle to avoid that pegs furthest away from the nut have no angle of string going down over nut to securely hold the string in the groove of the nut. These pegs would need a special tuning device, for example, a stick with a recessed hole at the bottom that could be placed over the handle of each peg for practical tuning function. The pegs look aesthetically too big in comparison to the size of the peg-head.

Neck/peg-head: there is too much wood on peg-head and neck, and the neck profile is to massive, that is, too hard for left hand to hold. Also it adds a ridiculous weight to that part of the cetra, making it unbalanced. As regards the body, the sides are perhaps too incurved in comparison to the sculpture.

Both the nut in the bridge are too massive and bulky. This is surely related to the medium of stone carving. Such a massive bridge does not effectively conduce string vibration to the sound-board. Also, it is not logical for the nut to be so large, it serves absolutely no purpose except to add unnecessary weight to the instrument. In this case then certain features on the instrument are clearly exaggeratedly large because of the medium of stone, and this must be compensated for when building the instrument. Stone sculpture compromises real proportions of details. Details may also be exaggerated for viewing from afar.

This instrument is from the second half of the 13th-century. It features, very prominently, a bordun string or strings, i.e., off the neck. The bordun is an important structural detail which links the cetra with the vielle. In the case of **CE 5**, a substantially earlier source, the cetra has no bordun, while the vielle next to it does. By the time of the Franciscan-era sources **CE 8, 10, 12, 14** and **15**, the bordun had become standardized. There were, however, two distinctly different versions of a cetra with a bordun: one with 12 strings, and one with three or four courses of strings, including the bordun.

The Antelami sculpture, **CE 5**, has a vielle and a cetra, as mentioned above. The vielle has three strings on the fingerboard and one bordun string. The cetra, meanwhile, has four strings on the fingerboard, which is considerably wider than its vielle counterpart. The wide-fingerboard trend will continue through the 13th c. and beyond, all the way into the 16th-century. It is a salient characteristic of this instrument.

An instrument with 12 strings clearly needs a wide fingerboard, whereas an instrument with four strings does not. **CE 5** is a stone carving, with four carved single strings. **CE 8** is also a stone carving, with no strings but with 12 carved pegs. Two other sources showing the same instrument with 12 strings are **CE 10** and **CE 12**, and these are frescoes where the medium does not presume constraints upon what is depicted, compared to stone carvings.

I therefore would suggest that such wide-necked cetra can be assumed, whether the artist chose to specify it or not, to have had multiple strings; meaning, double courses or in some

cases perhaps triple. Therefore, an instrument shown with 12 pegs could be taken to have a minimum of four triple courses, or five courses with 3×2 strings and 2×3 strings, or six courses of two strings each. These are the choices for a 12-stringed instrument, including this one of the Ferrara Duomo.

The fingerboard models that were tested have provided a hands-on opportunity to examine how different tunings work with them, and this in turn has fine-tuned ideas taken from the theoretical section of this work concerning the presence of the bordun on the Franciscan cetra.

A Parisian chordophone of the 13th c. with a bordun string was the vielle. Jerome of Moravia lists three different tunings for the instrument, starting with a vielle featuring a single bordun and two pairs of stoppable strings on the fingerboard: d / Gg / d'd'. This tuning is "re-entrant": as defined in **Chapter 4**, "re-entrant" indicates that string pitches do not consistently ascend (or descend) as one crosses the four strings moving from one side to the other. The bordun in Moravia's first tuning is a 5th higher than its neighbor string, even though it is the last string of the series. Vielle players had at least three things they could do with a bordun string: pluck it with the left-hand thumb for rhythmic accent, bow it, or use a ring worn on the thumb to change its pitch when bowed.

Moravia's second tuning, similar to the first but with all strings on the fingerboard (no bordun), is an expanded version of the first tuning, plus a top string a 4th higher than the highest string of Tuning 1: d / Gg / d' / g'. For a player who is familiar with the first tuning, this tuning brings access to more or less all pitches in *musica recta*, and many *musica ficta* pitches as well.[17] This tuning, when compared to the first, shows that some viellists wanted and needed to be able to play vocal-style single lines, to participate in polyphony in a contrapuntal way.

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[17] See Page 1986, 128-131, for a discussion of Moravia's tunings.

Of possible relevance for the Franciscan cetra, with its bordun, is Moravia's contemporary treatise describing the re-entrant tuning of the bordun. We should not dismiss the possibility that the Franciscan cetra already had a re-entrant tuning, providing the background for the later re-entrant cetra tuning without bordun (whether one interprets Tinctoris' cetra tuning as re-entrant, or does not find that meaning in his text; by Lanfranco (1533), the six-course cetra in any case has a re-entrant tuning).

The presence of the bordun string on the Franciscan cetra strongly suggests that the string material was gut, not metal.

To conclude this chapter, the practical playing of the four constructed cetre has demonstrated the way forward to further knowledge about this fascinating instrument. Hands-on "doing" will confirm or deny suppositions that have emerged from theoretical sources, or sources from the visual arts.