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Denzil Wraight wrote the first part. His text (in a similar form) was superseded by

'The *cimbalo cromatico* and other Italian string keyboard instruments with divided accidentals', Schweizer Jahrbuch für Musikwissenschaft Neue Folge 22 (2002), pp. 105-136.

This has also been superseded by a corrected text, which is updated as required, now published at:

<http://www.denzilwraight.com/ChecklistSplitSharps.pdf>

Christopher Stembridge wrote the second part, starting at p. 162.

Addendum:

Readers of the original PPR article will marvel that an article of a mere 33 pages could contain 6840 citations. In fact, it is the first two digits of the footnote numbers which are correct.

Italian split-keyboard instruments with fewer than nineteen divisions to the octave

Denzil Wraight

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Renaissance Keyboard Instruments

Italian Split-Keyed Instruments with Fewer than Nineteen Divisions to the Octave

Denzil Wraight and Christopher Stembridge

A Checklist of Surviving Italian String Keyboard Instruments with Split Sharps*

Examining Italian harpsichords and virginals with split sharps may shed some light on problems of interpretation in Italian Renaissance keyboard music. And compiling a list of these instruments presents us with many of the problems of divining the original state of Italian string keyboard instruments.

The instruments, since the time they were built, have been altered to keep up with changing taste. Apart from the accretions and alterations—which cloud our view of how these instruments were originally constructed—many of them are difficult to identify, since they were never signed by their makers. Inscriptions, too, have been altered or forged for pecuniary gain. If unsigned instruments could be identified, this would contribute much to our understanding. In my research I have subjected various techniques of identification and authentication to critical review, and often it was possible to identify unsigned work by a comparison of the mouldings.¹

*Mr. Wraight wrote this section, Mr. Stembridge the others (beginning with "Documentary Sources . . .")—Ed.

¹See Denzil Wraight, "The Identification and Authentication of Italian String Keyboard Instruments," *The Historical Harpsichord*, vol. 3, ed. Howard Schott (Stuyvesant, NY., 1992).

To illustrate the extent of the problem of identification, five of the seven instruments with split sharps listed by Hubbard² can now be shown to have had forged inscriptions. As a consequence, one of them, the so-called "1711 Centamin," can be confirmed as having been built in 1629 rather than in the 18th century. Here the forged date misled van der Meer into supposing that such instruments were manufactured over a longer period than was actually the case.³

In addition to the twelve Italian instruments (with fewer than nineteen divisions to the octave) mentioned by van der Meer, a further eight instruments are known (five virginals and three harpsichords), making a total of 20 Italian instruments, although two of these are doubtful cases. This list presents new attributions for ten instruments; the exact details of each identification will not be provided here.⁴

In the following list, quotation marks are used for forged or incorrect ascriptions. H = harpsichord, V = virginal.⁵ Numbers preceded with a "W" are part of my catalogue of signed and unsigned Italian instruments. The compasses given are the original ones, which may differ from the present ones and therefore are at variance with those of some publications. Only the notes additional to a normal octave are given.

The note placed at the front of the split sharps is usually the note that would be found there, i.e. *g#* at the front and *a^b* at the back. Similarly, in the short octave *D* and *E* appear in the position of *F#* and *G#* respectively, and are therefore placed at the front of split sharps.

²Frank Hubbard, *Three Centuries of Harpsichord Making* (Cambridge MA, 1967; 4/1972), 36.

³John H. van der Meer, "Partiell und vollständig enharmonische Saitenklaviere zwischen 1548 und 1711," *Das Musikinstrument* 36 (July 1987), 12-20.

⁴It will, however, be published in my forthcoming Ph.D. thesis. In many instances it is necessary to compare the mouldings from several instruments not mentioned here in order to establish an identification—a procedure that consumes too much space for the present purpose. Some instruments have *F#* and *G#* in the bass octave as the only split sharps, but these have not been listed here. However, I have attributed one such unsigned instrument to Poggi (Staatliches Institut für Musikforschung, Berlin, inventory no. 329), who is well represented in the list below.

⁵Following *Grove 6* an Italian "virginal" may be either rectangular or polygonal. Most, in fact, are rectangular, sometimes with one or two back corners "cut off."

Virginals

1. V: "Petrus Centamin 1711" = 1629 Bolconius

C/E - f''' + F#, G#, d#, a^b, d#', a^b'.

This is signed "Stefanus Bolcionius Pratensis 1629" on the reverse of the nameboard. Moulding comparisons also link this instrument to Bolcionius and confirm the correct reference of the signature.

Deutsches Museum, Munich, inventory no. 9231

2. V: "Viti de Trasuntinis 1601" = 1629 Bolconius

C/E - f''' + F#, G#, d#, a^b, d#', a^b', d#''.

This instrument is known to have been sold by Franciolini, and the faked signature presumably was his work. It has been identified as a Bolcionius on the basis of the mouldings. A date of 1629 can be seen on the case-front in ink above the keys and is presumably the date of manufacture.

Musée Instrumental, CNSM, Paris inventory no. 980. 2.x.

3. V: Stefanus Bolcionius 1641.

C/E - f''' + F#, G#, a^b, a^b'.

Henkel regards the signature as "probably forged,"⁶ but comparison with the genuine one from the "Petrus Centamin" virginal argues that it is original.

Musikinstrumenten-Museum, Universität Leipzig.

4. V: "Iannes Batt Boni de Cortona fecit Anno 1617" = Poggi

C/E - f''' + F#, G#, d#, a^b, d#', a^b'.

From a comparison of the mouldings with other instruments by Boni and Poggi it can be established that Francesco Poggi made this virginal c. 1600-1620 and that the inscription is a forgery.

Smithsonian Institution, Washington D. C. inventory no. 60.1392

⁶Hubert Henkel, *Kielinstrumente, Musikinstrumenten-Museum der Karl-Marx-Universität Leipzig*, vol. 2 (Leipzig, 1979), 112.

5. V: W451 unsigned = Poggi

C/E - f''' + F#, G#, d#, a^b, d##', a^b'

This has been identified as Poggi's work on the basis of moulding comparisons.

Musée Instrumental, Conservatoire Royale de Musique, Brussels, inventory no. 1596.

6. V: W440 unsigned = Poggi

C/E - f''' + F#, G#, d#, a^b, d##', a^b'

Comparisons of the cheek outline permit Poggi to be identified as the maker.

Musikmuseet, Stockholm.

7. V: W327 unsigned probably Poggi

C/E - f''' + F#, G#, d#, a^b, d##', a^b'

This is probably also an instrument from Poggi's workshop, judging from the keycheek outline and mouldings.

Russell Collection, Edinburgh inventory no. 45.

8. V: "Baffo 1581": probably Poggi

C/E - f''' + F#, G#, d#, a^b, d##', a^b'

Thomas Wess records that the original keyboard is missing, the present *C - f'''* having been made on the original keyframe, which still has the balance pin-holes of the original compass, revealing the position of the split sharps. Moulding and keycheek outlines suggest that Poggi was the maker.⁷

National Museums and Galleries on Merseyside, Liverpool.

⁷This identification was only possible due to the kind cooperation of Thomas Wess (who also supplied information on the original compass) in taking the necessary impressions. John Barnes also established the original compass some years ago (private communication).

Harpsichords

1. H: "Orazio Albana 1645" Boni 1619
 1 x 8' disposition
C/E - c''' + F#, G#, d#, a^b, d#', a^b', d#''.
 Although the nameboard is a genuine product of Albana's workshop, it does not belong to the instrument, which is dated and signed on the keyboard by Boni and has mouldings matching other Boni instruments.⁸
 Vizcaya Museum, Miami, Florida.

2. H: "1683/53 Girolamo Zenti" = Pasquino Querci fl. 1625
 1 x 8'
 The exact range of the original compass is uncertain since the soundboard suggests an original compass of 50 notes and the present keyboard has 6 split sharps, which, with an assumed *C/E - c'''* would require 51 notes. However, moulding comparisons show that the case and keyboard were both made by Querci, which makes it likely that this keyboard is original (if altered) and that the evidence of the keyboard must be preferred to that of the soundboard. Thus, the original compass was probably:

$$C/E - c''' + F#, G#, d#, a^b, d\#, a^{b'}$$
 The attribution to Zenti can be conclusively discounted.
 Musikinstrumenten-Museum, Universität Leipzig, inventory no. 75.

3. H: 1619 Giovanni Battista Boni
 1 x 8'
C/E - f''' + F#, G#, d#, a^b, d#', a^b', d#''
 Musée Instrumental, Conservatoire Royale de Musique, Brussels, inventory no. 1603.

⁸Impressions were kindly supplied by museum curator, Doris B. Littlefield.

4. H: W366, unsigned (not attributed)

2 x 8' or 1 x 8', 1 x 4'

From original construction markings on the baseboards a compass of:

C. D. E - c''' , d# , a^b , d##' , a^b' , d##''

can be inferred.⁹ Van der Meer's suggestion that the compass might have been *C/E - c'''* with *F#*, *G#*, and *d#*, *a^b*, *d##'*, *a^b'*, *d##''* involves the same number of notes, but is a less likely interpretation of the baseboard markings since it would imply that an *F#* or *D* was taken as the octave measure in the bass, whereas *f* notes are used throughout the instrument to mark the octaves, which was the practice in the 16th century. Furthermore, the bridge layout, as far as it can be reconstructed from traces on the soundboard, suggests a *C. D. E* - octave rather than a *C/E* one. The maker has not been identified, but it is the oldest surviving string keyboard instrument that originally had split sharps. It can be dated from the reign of Alfonso II of Ferrara (whose initials are on the nameboard) as having been made between 1559 and 1597, but there are indications that the inscription may have been altered (probably by the original maker) and therefore that it may have been made before 1559. The workmanship of the ebony and ivory intarsia arabesques on the cypress case is of exceptional quality. Kunstgewerbe Museum, Schloss Köpenick, Berlin, inventory no. 1883/718.

5. H: W325 Anon. c. 1620 (not attributed)

2 x 8'

C/E - f''' + F# , G# , d# , a^b , d##' , a^b' , d##''

The original keylevers have not survived, but the original compass has been reconstructed by John Barnes¹⁰ from the balance rail pinning. Russell Collection, Edinburgh, inventory no. 2.

⁹Denzil Wraight, "Neue Untersuchungen an italienischen Cembali," *Concerto* 3 (Feb. 1986), 28-38. See also D. Wraight, "Two Harpsichords by Giovanni Celestini," *Galpin Society Journal* 46 (1993), 120-36. Archive documents may help identify this instrument.

¹⁰John Barnes, "The Specious Uniformity of Italian Harpsichords," in *Keyboard Instruments: Studies in Keyboard Organology*, ed. Edwin M. Ripin (Edinburgh, 1971/1977), 1-10. An x-ray examination by Barnes of the balance rail after this article was written revealed the original balance pin-holes and removed any ambiguity about the compass.

6. H: Franciscus Marchionius 1666

2 x 8'

C/E - c''' + F#, G#, d#, a^b, d#', a^b', d#''Gift of Arthur Kohlenberg, 1961, now at Yale University Collection of Musical Instruments, inventory no. 331.¹¹

7. H: W500 unsigned. = Boni

1 x 8'

GG (or AA?) - c''' + F#, G#, d#, a^b, a#, d#', a^b', a#'

The exact tuning of the notes below C is hypothetical, but in view of the relatively short case length (1916mm), GG seems more likely than the FF suggested by Barnes.¹² Even GG as the bottom note would be unusually low for an Italian harpsichord of this type, but there is no indication from general design principles how this string should be tuned. Moulding comparisons make the attribution to Boni possible. The keyboard is unusual in having d# at the front of the split sharps, but other accidentals are placed in the normal fashion. Private ownership, Bristol, England.

8. H: unsigned "circa 1650"¹³
(not attributed)

2 x 8'

Van der Meer¹⁴ gives the same compass as the 1619 Boni, i.e.C/E - f''' + F#, G#, d#, a^b, d#', a^b', d#''.

Collezione degli strumenti musicali, Rome no. 2821.

¹¹This instrument has not been examined by the author, nor have the following also mentioned here: Rome nos. 2821, 1187, 2826, and W525.

¹²In Hellwig, F., "The Single-strung Italian Harpsichord," *Keyboard Instruments: Studies in Keyboard Organology 1500-1800*, ed. Edwin M. Ripin (Edinburgh, 1971), 31.

¹³See Luisa Cervelli, "Per un catalogo degli strumenti a tastiera," *Accademie e biblioteche d'Italia* 44 (1976), 321-22.

¹⁴Van der Meer's catalogue reference no. 1868 (see note 3) does not exist. It is probably no. 2821 since this has "165 . ." on a key and according to Cervelli (op. cit., note 13) the instrument originally had 52 notes.

9. H: W139 1630GA (not attributed)

2 x 8'

C/E - c''' + d#, a#, d#, a^b', a#', d#''

Collezione degli strumenti musicali, Rome no. 1187.

10. H: W525 unsigned.

Little information is available on this instrument. It has split sharps, but no details of the compass are known.¹⁵

Barbetta Restaurant, New York.

The following may originally not have had split sharps.

11. H: Stephanus Bolcionius 1627

Original disposition uncertain: 2 x 8' or 1 x 8'.

Barnes has suggested (see fn. 10) that this instrument was originally made with split sharps. I have re-examined the evidence,¹⁶ and believe that no decisive case can be made for an original compass with split sharps.

Russell Collection, Edinburgh, inventory no. 4.

12. H: 1670 Tollenari

2 x 8'

C - c''', D^b, d#, d^b, d#.

The keyboard is of recent date, as are substantial repairs to the case. The original compass can probably not be determined.

Württembergisches Landesmuseum, Stuttgart, inventory no. 9, 314.

¹⁵According to a communication of Stewart Pollens.

¹⁶Denzil Wraight, unpublished report (1991), for the Rhodes Bursary Fund and Russell Collection.

**Types of Compass for Instruments with
Fewer than 19 Notes per Octave**

Eight different compasses are represented:

C/E - c'''	+	F#, G#, d#, a ^b ,	d#', a ^b '		
C/E - c'''	+	F#, G#, d#, a ^b ,	d#', a ^b ,	d#''	
C/E - f'''	+	F#, G#, a ^b ,	a ^b '		
C/E - f'''	+	F#, G#, d#, a ^b ,	d#', a ^b '		
C/E - f'''	+	F#, G#, d#, a ^b ,	d#', a ^b ,	d#''	
C. D. E - c'''	+	d#, a ^b ,	d#', a ^b ,	d#''	
GG (?) - c'''	+	F#, G#, d#, a ^b ,	a#, d#', a ^b ,	a#'	
C/E - c'''	+	d#, a#, d#',	a ^b ,	a#', d#''	

It can be seen that the same sequence of split sharps occurs in both C/E - c''' and C/E - f''' instruments, for which reason one could simplify the scheme thus, and by analogy disregard the other starting notes:

1. F#, G#, d#, a^b, d#', a^b'
2. F#, G#, d#, d#', a^b', d#''
3. F#, G#, a^b, a^b'
4. d#, a#, d#', a^b', a#', d#''
5. F#, G#, d#, a^b, a#, d#', a^b', a#'

One can see that where accidentals are split, the short octave is usually filled out with F# and G#. Exceptions are found in the Rome no. 1187 and, on my interpretation, the Schloss Köpenick harpsichord. It is unusual in Italian instruments to find that only one note per octave is divided. Praetorius illustrates an apparently German or Flemish virginal where only the e^b notes are split,¹⁷ but this type of keyboard is not known among Italian instruments, although the 1641 Stefanus Bolcionius virginal is analogous in having split g# notes.

The various keyboard types are represented in the following numbers:

1. 7 instruments: 6 virginals and 1 harpsichord
2. 7 instruments: 1 virginal and 6 harpsichords
3. 1 virginal only
4. 1 harpsichord only
5. 1 harpsichord only

¹⁷Michael Praetorius, *Syntagma Musicum II, De Organographia* (Wolfenbüttel, 1619; facs. Kassel, 1958, 5/1980), Plate XIV.

Types 1 and 2 constitute the clear majority, and types 3 - 5 may be regarded as unusual. From these statistics it is clear that there is a correlation between type 1 and the virginals and type 2 and the harpsichords. However, all the virginals have a compass of *C/E - f'''* so it is possible that the absence of *d#'''* should be correlated with this compass and not with the instrument type. If this hypothesis were correct, one would expect to find among the *C/E - f'''* harpsichords that no *d#'''* keys were provided; this is not the case since half of the harpsichords with *d#'''* reach to *c'''*, and the other half to *f'''*. If any conclusion can be wrung out of such simple statistics, it is that virginals were not usually provided with *d#'''*. An explanation of this is presumably to be sought in the differing musical functions that harpsichords and virginals may have had.

Although the use of split keys in the organ is known from the latter half of the 15th century, the earliest surviving Italian string keyboard instrument which was originally made with split keys is the Schloss Köpenick harpsichord. If the attribution to Marchionius is correct, then 1666 is the date of the last surviving Italian string keyboard instrument with split keys to provide additional accidentals. Some later harpsichords have divided naturals, as for example the 1695 and 1702 Migliai harpsichords (see note 1, pp. 142-45). What had appeared in earlier writing to be the work of several different makers spread over about 100 years, can be seen, on closer examination, to have been mostly the work of three makers: Francesco Poggi, Stefano Bolcioni, and Giovanni Boni, who worked in Florence and built such instruments from about 1610-1640. These three makers constructed ten of the 23 instruments with split sharps, and it would not be surprising if some of the other unsigned work turned out to have been made by these makers. More exact dating may be possible of individual instruments after further work, but the period of greatest activity seems to have been from about 1610 to 1630. Judging from the surviving examples, the manufacture of instruments with additional accidentals appears to have been a significant part of their oeuvre, although it is impossible to say whether they were destined solely for customers in Florence or also further afield. Nevertheless, there is a strong presumption that this was a Florentine preoccupation since Querci apparently worked in Florence,¹⁸ and the anonymous harpsichord in the Russell Collection (W325) is probably also of Florentine origin. These instruments, with their provision of *d#* and *a^b*

¹⁸The name of his son, Vincenzo, is recorded in the Florentine guild records in Leto Puliti, "Cenni storici della vita del Ser.^{mo} Ferdinando dei Medici Granprincipe di Toscana e della origine del pianoforte," *Atti dell'Accademia del Real Istituto Musicale di Firenze* (1874), 168. See also the conclusions at the end of this article.

notes, extend the usefulness of a meantone temperament, but more complicated, fully chromatic harpsichords, to judge from the surviving examples, were something of a rarity, although always a focus of interest for the cognoscenti.¹⁹

*Documentary Sources of Italian String Keyboard Instruments with Split Semitones**

1. H: Domenico da Pesaro 1566

*C/E - a''(or C/E - g'' .a'')+ F#, G# and 6 or 7 chromatic split keys(?)*²⁰
2 x 8'

2. H: Anon. *ante* 1598

Range unknown. With split keys.²¹

¹⁹I would like to express my thanks to the following people for their assistance in various ways in enabling me to examine the instruments mentioned in this article: John Barnes, Dr. Hubert Henkel, Klaus Gernhardt, Dr. Florence Gétreau, Göran Grahn, Doris B. Littlefield, A. C. N. Mackenzie, Klaus Martius, Elizabeth McCullough, Dr. Nicolas Meeùs, Darryl Martin, Kenneth Mobbs, Dr. Grant O'Brien, Prof. Richard Rephann, Michel Robin, Martin-Christian Schmidt, Gary Sturm, Dr. Christian Väterlein, Thomas Wess, James Weaver, Felix Wolff. I am also obliged to Christopher Stenbridge for his helpful comments concerning the manuscript.

The "1617 Boni" virginal was examined with the financial assistance of the Rhodes Bursary Fund, which support is gratefully acknowledged.

* Christopher Stenbridge is the author of all that follows.

²⁰"Un Cimbalo di Domenico da Pesaro, levatore di cassa, a due registri principali unisoni . . . con tastatura . . . con i primi neri spezzati che servono di ottava al fafaut e gisolreut diesis che comincia in cisolfaut in sesta e finisce in alami con n. cinquanta tasti tra bianchi neri e spezzati," from a Florentine inventory of 1700 quoted in Vinicio Gai, *Gli strumenti musicali della corte medicea e il Museo del Conservatorio 'Luigi Cherubini' di Firenze* (Florence, 1969), 8.

²¹The following entries in two Ferrarese inventories of 1598, quoted by Elio Durante and Anna Martellotti, *Cronisteria del Concerto delle Dame Principalissime di Margherita Gonzaga d'Este* (Florence, 1979), 205 and 207 respectively, presumably refer to the same instrument: "2804. Un instrumento adorato con la tastadura tagliata da due registri, no. 1," "5

3. 4. Two Claviorgana, Anon. *ante* 1598
Range unknown. With split keys.²²
5. H: Boni. *ante* 1649
Range unknown. With the "third order."²³
6. V: Stefano Bolcioni *ante* 1654
Two spinets with five split semitones.²⁴
These could be similar to—indeed, one might be identical with—the second Bolcionius virginal listed above (see p. 3), which has the five split semitones, to give *d#*, *a^b*, *d#'*, *a^{b'}*, *d#''*.
7. H: Girolamo Zenti 1653
GG - c'''. With five split semitones in the middle of the keyboard.²⁵
2 x 8', tiorbino.

Un istromento a doi registri con i tasti tagliati depicta la cassa." This could be the extant instrument made for Alfonso II listed above (see note 9).

²²Cf. Durante and Martellotti, *Cronisteria* . . . , p. 208: "Un'istrumento con li semitoni tagliati . . . con il suo organo sotto, n. 1," and "Un'istrumento da li semitoni tagliati . . . con il suo organo sotto."

²³"Un cimbalo da sonare à tre ordine fatto dal Cortonese . . . ," cf. Christopher Stemberge, "The *Cimbalo cromatico* and Other Italian Keyboard Instruments with Nineteen or More Divisions to the Octave (Surviving Specimens and Documentary Evidence)," *Performance Practice Review* 6 (1993): 33-59 (p. 42, n. 24), where this harpsichord is listed as a possible *cimbalo cromatico*. However, the use of the term "tre ordine" need not necessarily mean that *all* the semitones were provided with split keys; cf. an organ of 1534 reported on below.

²⁴The following entry in a Florentine inventory is quoted in Frederick Hammond, "Musical Instruments at the Medici Court in the Mid-Seventeenth Century," *Analecta musicologica* 15 (1975): 202-19, see p. 204, "f.86r . . . Stefano Strumentaio Dua Spinette stauatr:e dalla Cassa con cinque semituoni spezzati."

²⁵Cf. Gai, *Gli strumenti* . . . Firenze, p. 7: "Un Cimbalo di Girolamo Zenti, non levatoro di cassa, a tre registri, cioè due principali unisoni e tiorbino, . . . e sua tastatura . . . con cinque spezzati nei neri di mezzo che comincia in gisolreut ottava stesa e finisce in cisolfaut con n. cinquanta nove tasti tra bianchi neri e spezzati . . ."

Italian Organs with Split Keys

The following list of 26 organs that are known to have had split keys is based partly on documentary evidence, partly on concrete evidence in extant instruments. In all cases, the split keys were removed, normally in the 18th century, sometimes earlier. (In one or two instances they have been reinstated where organs have been restored during the last two decades.)²⁶ In many cases the documentary evidence (mainly from contracts) is insufficient for it to be certain exactly which keys were split. Wherever possible the keyboard range is given, followed by the extra keys. When it is known which extra semitones were provided, but not how many or in which octaves, these are given in bold. The second line of each entry gives the name of the organ-builder who made the instruments or who added the split keys.

1468 **Cesena Cathedral**

Three semitones "with perfect thirds" added by Andrea Molighi da Sant'Angelo di Romagna.^{2726 1}

1480 **Lucca, S. Martino**

d[#], *a*^b (?)²⁸²⁷

²⁶ It would have been impossible to compile this list without the kind collaboration of Dr. Pier Paolo Donati of Florence, to whom the author is greatly indebted. Thanks are also tendered to Franco Colamarino, Oscar Mischiati, and Luigi Ferdinando Tagliavini, who have supplied invaluable information.

²⁷ "... et ipsis organis et in illis noviter adiungere et inmittere ac poner tres semitonos cum tertiis perfectis vocibus et tonis," quoted in Carlo Grigioni, "Maestri organari nella Romagna," *Melozzo da Forlì—Rassegna d'arte romagnola* (Forlì, 1937): 159. The extra keys may have been *d*[#] or, if *a*^b was previously available as an unsplit key, *g*[#]. See below for further discussion.

²⁸ "... la tersa del b quadro et la tersa del fa delle f et insieme cum li loro octavi uve saranno necessarij che si chiama lo supplemento," quoted in Luigi Nerici, *Storia della musica in Lucca* (Lucca, 1879): 143. Luigi F. Tagliavini has recently suggested that "la tersa del fa delle f" could mean *a*[#] rather than *a*^b in "Notes on Tuning Methods in Fifteenth-Century Italy," *Charles Brenton Fisk, Organ Builder—Essays in His Honor* (Easthampton, Mass., 1986), 191-99 (esp. 194).

1528-1531 Bologna, San Petronio

FF.GG.AA . a". Ab ab ab'.

Giovanni Battista Facchetti added split keys (and relevant pipes) to the organ originally made by Lorenzo da Prato, 1471-5. The plan to add four *ab*s and some *d*#s as well had to be modified for reasons of lack of space. The *ab*s were reinstated in 1982 when the organ was restored by Tamburini; at present the front half-keys play *ab*, the back ones *g*#, but there is no conclusive evidence that this was the original arrangement. The reconstruction was based on the supposition that da Prato's organ had *ab*s but no *g*#. ²⁹²⁸

1532 Bologna Cathedral

FF.GG.AA - g".a" (?)

Addition of three half "semitones" by Giovanni Battista Facchetti. ³⁰²⁹

1534 Arezzo Cathedral

CC - g".a". "the organ to have the third order."

New instrument by Luca da Cortona.

Present split keys: *Ab d# ab d##' ab' d##"*. These were reinstated in 1990 when the organ was restored by the Gabinetto Restauro Organi, Florence, under the direction of Pier Paolo Donati. As the organ had suffered several rebuilds over the centuries, little evidence remained to indicate the original placing of the split keys. The solution chosen seemed to be the most probable original arrangement. ³¹³

²⁹Cf. Oscar Mischiati, "Documenti sull'organaria padana rinascimentale—I: Giovanni Battista Facchetti," *L'Organo* 22 (1984), 23-160 (esp. 75-76). Also Oscar Mischiati, "Profilo storico e lineamenti del restauro," *Il restauro degli organi di S. Petroni*, ed. Andrea Emiliani (Bologna, 1979), 13-28: a photograph of the keyboard is on p. 27. The information concerning the positioning of the *g*#/ *ab* keys was communicated personally by Luigi F. Tagliavini. For a discussion of the possible earlier preference for *ab* over *g*#, see below.

³⁰Cf. Mischiati, "Documenti."

³¹Cf. Pier Paolo Donati, "Relazione di restauro," *L'organo della cattedrale di Arezzo*, ed. P. P. Donati and Renzo Giorgetti (Cortona, 1990), 27-29.

1544 Cremona CathedralFF.GG.AA - f". $D^b A^b d^b a^b d^b' a^b' d^b''$.Giovanni Battista Facchetti.³²⁴**1546 Florence Cathedral**CC/EE - f". $A^b d^\# a^b d^\# a^b'$.Bernardo di Argenta made this organ in 1546, probably with the split keys, but these may conceivably have been added later.³³⁵**ante 1563 Florence, S. Maria Novella**Range unknown. $d^b a^b$.³⁴⁶**1565 Mantua, Santa Barbara**FF.GG.AA - g". a". $D^\# A^b d^\# a^b d^\# a^b' d^\#''$.Graziadio Antegnati.³⁵⁷**1567 Florence Cathedral (additional second organ)**CC/EE - f". $A^b, d^\#, a^b, d^\#, a^b'$.³⁶⁸

³²"Sette 'dieses. . . super hemitonio vocis ut . . . altera super hemitonio vocis sol', cf. Oscar Mischiati, *Dispense accademia Pistoia* (1986), quoted in Donati, "Relazione," 28.

³³Documentary evidence suggests that the organ was made in 1546 with the split chromatic keys. It is possible that they were added later. They appear in a mid-17th-century drawing of the keyboard together with a drawing of the keyboard of the Zeffirini organ of 1567 (see below). Cf. Gabriele Giacomelli and Enzo Settesoldi, *Gli organi di Santa Maria del Fiore di Firenze: sette secoli di storia dal '300 al '900* (Florence, 1993).

³⁴" . . . nam apud Italos Diesibus utuntur in organis ad minus duabus in omni Diapason, altera inter a. Diatonicum & g. Chromaticum, & altera inter d. Diatonicum & c. Chromaticum . . . cuiusmodi organa ego saepe pulsavi Florentiae in monasterio . . . quod sancta Maria Novella nuncupatur.", Francesco de Salinas, *De musica libri septem* (Salamanca, 1577), 80. Salinas's words make it clear that the use of split keys in Italian organs was relatively common.

³⁵Apart from documentary evidence (cf. Mischiati, *L'organo della chiesa di San Marco a Milano* [Milan, 1975], 8) the extant chest and action of the organ show that the instrument was originally furnished with seven split chromatic keys for note numbers 9, 15, 21, 27, 33, 38, and 45 (numbers thus marked on the action, showing, in the cases of 15 and 27, that a^b was deemed to be paired with a rather than $g^\#$). Personal communication to the author from Oscar Mischiati.

³⁶See above (fn. 33). Documentary evidence is corroborated by the extant wind-chest of this instrument. Cf. Pier Paolo Donati, "Restauro e 'suono storico': nuove evidenze documentarie," *L'Organo* 24 (1986), 63-78 (73).

- 1571** **Florence, Santa Trînita**
 With the "third order."³⁷⁹
 Onofrio Zeffirini.
- 1593** **Palermo Cathedral**
C/E-c'''. With six split chromatic keys.³⁸¹⁰
 Raffaele la Valle.
- 1594** **Palermo, S. Martino delle Scale**
 With six split chromatic keys.³⁹¹¹
 Raffaele la Valle.
- 1596** **Bologna, San Petronio**
CC/EE - g", a". D#, A^b, d#.⁴⁰¹²
 Baldassare Malamini.
- ante 1598** **Ferrara, Castello Estense**
 Two claviorgana with some split keys (range and makers
 unknown).⁴¹³

³⁷" . . . di 7 registri, et più le sordine et tremolo et il terzo ordine," quoted in Bruno Frescucci, *Arte organaria nei secoli XV-XVI-XVII. La scuola cortonese*. 2nd ed. (Cortona, 1983), 112. Clearly "il terzo ordine" need not imply a complete set of split sharps: see above, **1543 Arezzo Cathedral**, where the term implied only *d#s* and *a^bs*.

³⁸" . . . e più sei semitoni partiti . . .," cf. Giuseppe Dispensa Zaccaria, *Organi e organari in Sicilia dal '400 al '900* (Palermo, 1988), 139.

³⁹" . . . sei semitoni spartiti del modo, e forma quali si hanno di fare all'organo piccolo di la maiori ecc^a di questa città." This presumably refers to the instrument listed in the previous entry. Cf. Zaccaria, *Organi . . . in Sicilia*, 141.

⁴⁰Cf. Mischiati, "Profilo storico . . .," 18, 20. A photograph of the keyboard of the Malamini organ appears on p. 31.

⁴¹These are listed above. See fn. 22.

1598-99 Rome, S. Giovanni in Laterano

FFF, GGG, AAA - f'''. *AA^b, D#, A^b, d#, a^b, d#', a^b'*.

Luca Blasi. The split keys were removed during the early 18th century or before. They were reconstructed when Bartolomeo Formentelli restored the organ in 1989. Although the instrument had been rebuilt in 1930 with Barker Lever action, the original windchest survived showing clear evidence of the extra semitones, which was corroborated by the numbering on pipes.⁴²¹⁴

ante 1604 Genoa Cathedral

Split keys in new organ.⁴³¹⁵

Giuseppe and Giovanni Angelo Vitani of Pavia.

1604 Mantua, S. Andrea

FF, GG, AA - g', a'.

Split semitones "as in the organ in Genoa Cathedral." Giuseppe and Giovanni Angelo Vitani of Pavia.⁴⁴¹⁶

1604 Verona, Accademia Filarmonica

C/E - c'''. Two split keys [in each octave?], being six in all.⁴⁵¹⁷

Bernardino Virchi.

1604/ 1611 Milan, S. Marco

FF - g', a'. Two split semitones added.

Costanzo Antegnati rebuilt the organ made by Leonhard of Salzburg. On this occasion he was to add split keys (in 1604) and the relevant pipes (in 1611).⁴⁶¹⁸⁴⁵

⁴²Personal communication to the author from Franco Colamarino.

⁴³Evidence deduced from the following entry.

⁴⁴"... di piedi dodeci ... tasti n.ro 50 ... i semitoni spezzati conforme all'organo fatto in domo di Genova per essi fratelli," quoted in Oscar Mischiati, "Documenti sull'organaria padana rinascimentale: Il Organari a Cremona," *L'Organo* 23 (1985, 59-237, cf. 212-13.

⁴⁵"... Item sia tenuto fare gli doi tasti scavezzi che saranno n° sei, si che detto organo, eccettuati gli sei scavezzi, ascenda al n° de quarantacinque tasti," quoted in Luigi Rognoni, "Organi e organari a Verona," in *La musica a Verona*, ed. Enrico Paganuzzi et al. (Verona, 1976), 444. It is possible that, since this was a short-octave instrument, the first two extra keys might have been for *F#* and *G#*, the others for *d#*, *a^b*, *d#'*, and *a^b'*.

⁴⁶"... Item spezara li tasti cioe le cane acio se possa sonare giustamente a uno tuono manco" (1604); "... Item sia tenuto far di novo le 18 canne per li doi tasti spezzati" (1611), quoted in Oscar Mischiati, *L'organo della chiesa di San Marco a Milano* (Milan, 1975), 30,

ante 1609 Lucca, Accademia di Tomaso Raffaelli*C/E - ? F#, G#, a^b, a#, d#*⁴⁷¹⁹

Andrea Lucchese.

1627 Rome, SS. Trinità dei Pellegrini*C/E(?) - c'''(?)* with three split chromatic keys (?)⁴⁸²⁰

Pompeo di Michelangelo Dedi.

1638 Caltanissetta, Chiesa Madre*C/E - c'''(?). d# a^b, a#, d#, a^b, a#'. d#''*⁴⁹²¹

Antonio Raffaele la Valle and son.

1639 Sciacca (Agrigento), Confraternity of S. Margherita*C/E - f'''*. *d#, a^b, a#, d^b [d#, a^b]*⁵⁰²²

Giacomo Sutera and nephew Vincenzo Monteleone.

1647 Finale Emilia, Chiesa del Rosario*C/E - c'''*. *d#, a^b, d#, a^b*⁵¹²³

Antonio Colonna.

33. It would appear that these two statements refer to the same operation and that Antegnati either did not complete the work before 1611 or that the pipes inserted were unsatisfactory.

⁴⁷"In Lucca nell'Accademia del Tomaso Raffaelli un Organo soave di canne lignee, fatto da Andrea Luchese, con gli tasti scavezzi in G. B. & E. negri appresso gli diesis in F. & G. Gravi, oltre il Mi, Re, Ut l'ottava di E. fa accidentale, stromento comendato da gli professori universalmente . . ." Adriano Banchieri, *Conclusioni nel Suono dell'Organo* (Bologna, 1615), 15.

⁴⁸"... la tastatura . . . sarà di tasti quarantotto computatoci li spezzati." Cf. Arnaldo Morelli, "L'organaro Pompeo Dedi e l'organo della SS. Trinità dei Pellegrini in Roma," *Amici dell'organo di Roma*, series II (1984), 63-68 (p. 64)

⁴⁹"octo tasti spezzati così della Valle ni habiano di fare setti che sarà lo 12. lo 17. lo 19. lo 24. lo 29. lo 31 e lo 36," quoted in Zaccaria, *Organi . . . in Sicilia*, 151.

⁵⁰"deci palmi . . . tasti numero cinquanta, separati li sei tasti rutti . . . li semitoni rutti, cioè lo dudici, la dicessetti, la dicinnovi, et la vintidui, et . . . [here part of the MS is missing] . . . nigri," quoted in Zaccaria, *Organi . . . in Sicilia*, 152.

⁵¹Clear traces of the former existence of these split keys are visible from the keyboard, action, and windchest. (Personal communication to the author from Pier Paolo Donati.)

1658 Rome, S. AgostinoCC - g', a'. D#, A^b, d#, a^b.⁵²²⁴

Giuseppe Catarinozzi & Giuseppe Testa.

1665 Trapani, Monastery of S. AndreaC/E - c'''. d#, a^b, d##, a^{b'} OR: a^b, d##, a^{b'}, d##''.⁵³²⁵

Antonio & Giuseppe de Simone, Francesco Romano.

* * *

Obviously there were many more organs (and harpsichords) than those listed above that had split chromatic keys; the time-span of two centuries and the fact that such instruments were found as far apart as Verona and Sicily may serve to give some idea of their proliferation. A further document with regard to a projected organ that was not, in the event, constructed is worth quoting, since it throws some light on the importance which at least one organ-maker, Baldassare Malamini, attached to the inclusion of split keys; it also suggests that not every one of his colleagues was happy to make such devices. In 1567 Malamini put forward a proposal to make an instrument for Ravenna Cathedral which was to include "all the split semitones which are of greatest importance."⁵⁴²⁶ It may be assumed that the semitones of "greatest importance" were d# and a^b, or perhaps d^b and a^{b'}; it is unlikely that Malamini meant that it was of greatest importance to include all five possible split-semitones. He then goes on to say that he believes that few organ-makers would be prepared to make such split semitones.

It has been suggested that there was a project to have a representative organ built in Saint Peter's, Rome, in the early 17th century, in the wake of Luca Blasi's masterpiece in S. Giovanni in Laterano. Blasi seems to have died in

⁵²"Una tastatura di faggio coperta di busso con semitoni de ebano n° 57 con quattro tasti spezzati," quoted in Arnaldo Morelli, "Organi e organari in S. Agostino à Roma, *Amici dell'organo di Roma*, series ii (1985), 74-81, cf. p. 76. Morelli presumes the four extra chromatic notes as above on the basis of the appearance of the front pipes.

⁵³"con quattro mezzi bassi [= tasti] sistemati in terza maggiore, con sua ottava del b mi, et a la mi re, con il b mollo seu terza minore del fefaut," quoted in Zaccaria, *Organi . . . in Sicilia . . .*, 154.

⁵⁴" . . . con tutti li mezi semitoni li quali sono di grandissima importanza e credo che su signoria trovi molti pochi li quali si vogliono obligare a fargli le deti mezisemitoni . . ." The document is quoted in full in Renato Casadio, "La cappella musicale della Cattedrale di Ravenna nel secolo XVI," *Note d'Archivio* 16 (1939), 148-79 (p. 173).

1605 or soon thereafter. There seems to have been a plan to invite the Sicilian Raffaele La Valle to Rome in order to build such an instrument, but he died in 1621 before he had a chance to travel to Rome.⁵⁵²⁷ Since Blasi's organ had split semitones (see above, under 1598-99) and since La Valle had made two instruments in Palermo with split semitones (see above, 1593, 1594), it is not at all unlikely that, had a large instrument been made for Saint Peter's, it would also have had split keys.⁵⁶²⁸

Unfortunately there is a lack of information on the situation in Naples, though it may perhaps be assumed that the presence of split keys in Sicily at a relatively late stage reflects their proliferation in Naples.

Conclusion

It may be assumed that the history of split keys for the provision of extra semitones began with Italian organs rather than harpsichords. The earliest reference (Cesena, 1468) does not appear to suggest that the addition of such keys was a completely new idea; thus the invention of the device could well be of an even earlier date.

From the surviving instruments and the documentary evidence it is clear that the most important pair of split keys was for $g\#$ and a^b . Every single Italian organ, harpsichord, or virginal for which there is conclusive evidence of the existence of specific split keys had $g\#$ s and a^b s.

⁵⁵Cf. Renato Lunelli, *L'arte organaria del rinascimento in Roma* (Florence, 1958), 85.

⁵⁶It is also worth remembering that Fabio Colonna's *Sambuca Lincea* was dedicated to the reigning pope, Paul V, and that Colonna used the dedication to express the hope that Saint Peter's might be furnished with an organ capable of playing enharmonic music.

The instruments listed in the above check-lists may be divided into five basic categories:

1. $g\#/a^b$ only. one organ (1528), one virginal (1641)
2. $g\#/a^b$ and $c\#/d^b$ 2 organs (1544 and ante 1563)
3. $g\#/a^b$ and $c\#/d^b$ 9 organs (1480, 1546, 1565, 1567, 1596, 1598-1599, 1647, 1658, 1665)
5 harpsichords (ante 1597, 1619 [x2], c. 1620, 1666 [?]) 5 virginals (all c. 1620-29)
4. $g\#/a^b$ and $c\#/d^b$ and $a\#/b^b$ 2 organs (ante 1609, 1638)
2 harpsichords (c. 1619, 1630)
5. $g\#/a^b$ and $c\#/d^b$ and $d\#/e^b$ and $a\#/b^b$ one organ only (1639)

The need for a^b in the context of church music of the 15th and 16th centuries is obvious. Without it, given a mean-tone temperament, f is the one natural key for which there is no corresponding minor third. Bermudo makes the point that very often choir directors want to perform music composed in the first mode in f , as it is too low for basses when pitched in d and too high for many trebles if pitched in g .⁵⁷²⁹ He then tells us that the organ(s) of the Royal Chapel in Granada had had, since the time of Velanúñez (beginning of the 16th century), both $g\#$ and a^b ; Bermudo does not mention split keys but goes on to say that there are many different ways of arranging this. The system in Granada was to have pipes for both $g\#$ and a^b only for the *flautado* stop (the equivalent of the Italian *principale*); the change being effected by a lever mechanism. He adds that, while it is also possible to have other conveniences, this is the most necessary one.⁵⁸³⁰

⁵⁷"Una de las grandes necessidades que los tañedores de capillas de canto de organo tiene: —es tañer el modo primero por Ffaut. Pot Gsolreut en muchas capillas non tiene— tiple para cantarlo: y si lo tañen por Dsolre: faltan los contras baxos," Juan Bermudo, *El Libro llamado Declaración de Instrumentos Musicales* (Osuna, 1555), f. 89v. (lib. iv, Cap. lii).

⁵⁸"Los organos de la capilla real de Granada lo tenían en el tiempo del musico Velañunez, y el que ahora tiene:—no es complido fa. Entre los muchas modos posibles . . . es uno, que en los sobre dichos organos se uso. Han de poner en la mistura delo flautado . . . dos caños; uno que forme fa, y otro mi . . . Quando le viniere al tañedor el modo primero a Ffaut . . . dexando lo flautado abierto, quitara los hierros de la tecla negra que esta entre Gsolreut y alamire y todos sus octavas: y en las mesmas teclas negras porna el otro hierro: el qual abrira el fa . . . Aunque en los organos otras habilidades se pueden hazer: la sobredicha es de major necessidad," Bermudo, *Declaración*, f. 89v. Since the extra chromatic keys were used for accompanying rather than playing solo, one might well have expected to find them playing only on the *principale* in Italian organs. There is, however, only one documented instance of

This becomes clear during his discussion of playing modes at transposed pitches. Bermudo draws the reader's attention to the fact that certain transpositions are not possible; in one case this is because of the lack of a $d\sharp$, in one case that of a a^b , and in as many as four cases the problem is the lack of an a^b . The fact that Bermudo states that the a^b is missing in the organs "that we have today" suggests the possibility that earlier instruments may have had a^b but not $g\sharp$.⁵⁹³¹

This last possibility, which was assumed in the case of the Lorenzo da Prato organ in Bologna,⁶⁰³² is of relevance to the earliest documented instance of split keys—those that were added to the organ of Cesena Cathedral in 1468 in order to provide perfect (i.e. major) thirds. Since, as the above survey has shown, no instrument is known to have had $d\sharp$ s unless it also had a^b s, there would appear to be two alternative likelihoods: either the organ already had split keys for $g\sharp/a^b$ and the additional keys were for $d\sharp$ s, or, if there were no pre-existing split keys, those added were for $g\sharp$ s (assuming that the original single keys played a^b).

In the case of the **Lucca 1480** reference, not only does it seem likely in the context of the other organs of the period that "la tersa del fa delle f means a^b ; the usage of the period suggests that, when referring to black keys, mi = sharp and fa = flat.⁶¹³³

this on a Florentine organ of 1649; this was a compromise solution as the decision to have split keys was made after the wind-chest had been constructed. See the letter dated 9th November 1649 from the organ-maker Antonio Colonna to Francesco Nigetti, quoted in Patrizio Barbieri, "Il cembalo onnicordo di Francesco Nigetti in due memorie inedite G. B. Doni (1647), B. Bresciano (1719)," *Rivista italiana di musicologia* 22 (1987), 34-113, see p. 67.

⁵⁹"Por Ffaut no se puede tañer primero en el organo que ahora tenemos: porque no tiene tecla negra para formar el fa." Bermudo, *Declaración*, f. 74v. This expression is not used by Bermudo when he is referring to the absence of $d\sharp$ or a^b . He does, however, use it on several occasions with reference to the absence of a^b on the clavichord (but see below, note 39).

⁶⁰See above.

⁶¹That this was not only Spanish usage (see the quotations from Bermudo above, esp. note 34) is clear; the use of "bfa" to mean b^b , "bmi" for b was international. The use of the natural (B-quadro) sign to mean a sharp is found occasionally in Italian keyboard music even in the 17th century. The normal sign for "cancelling" a flat was, of course, the sharp—meaning "mi instead of fa." But see above (fn. 28).

INSTRUMENTS WITH FEWER THAN 19 KEYS TO THE OCTAVE**TABLE SHOWING SPLIT KEYS AND KEYBOARD RANGE WHERE THE EVIDENCE IS CONCLUSIVE**

1) harpsichords and virginals

Anon. (<i>ante</i> 1597) (FERRARA)	[CDE (?) — $\underline{d}^{\#}$ — \underline{a}^b — $\underline{d}^{\#}$ — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{c}^{\#\#}$]
Bolcionius, Poggi (c. 1620, 1629) (FLORENCE)	[C/E— $\underline{F\#G\#}$ — $\underline{d}^{\#}$ — \underline{a}^b — $\underline{d}^{\#}$ — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{f}^{\#\#}$]
Anon., Boni, Bolcionius (1619, c. 1620, 1629) (FLORENCE; ROME)	[C/E— $\underline{F\#G\#}$ — $\underline{d}^{\#}$ — \underline{a}^b — $\underline{d}^{\#}$ — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{f}^{\#\#}$]
Boni (1619) (ROME)	[AA? — $\underline{F\#G\#}$ — $\underline{d}^{\#}$ — \underline{a}^b — $\underline{d}^{\#}$ — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{c}^{\#\#}$]
Boni (1619) (ROME) Marchionius (1666?)	[C/E— $\underline{F\#G\#}$ — $\underline{d}^{\#}$ — \underline{a}^b — $\underline{d}^{\#}$ — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{c}^{\#\#}$]
Anon. (1630)	[C/E — $\underline{d}^{\#}$ — $\underline{a}^{\#}$ — $\underline{d}^{\#\#}$ — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{c}^{\#\#}$]
Bolcionius (1641) (FLORENCE)	[C/E— $\underline{F\#G\#}$ — \underline{a}^b — $\underline{a}^{b\#}$ — $\underline{d}^{\#\#}$ — $\underline{f}^{\#\#}$]

TABLE SHOWING SPLIT KEYS AND KEYBOARD RANGE WHERE THE EVIDENCE IS CONCLUSIVE

2) Sixteenth-Century Organs

BOLOGNA (1528)	[FFF GGG AAA — AA ^b — A ^b — a ^b — g'a']
CREMONA (1544)	[FF GG AA — D ^b — A ^b — d ^b — a ^b — d ^{bi} — a ^{bi} — d ^{bi} — f'']
MANTUA (1565)	[FF GG AA — D [#] — A ^b — d [#] — a ^b — d [#] — a ^{bi} — d [#] — g''a'']
FLORENCE (1567)	[CC/EE — A ^b — d [#] — a ^b — d [#] — a ^{bi} — f'']
BOLOGNA (1596)	[CC/EE — D [#] — A ^b — d [#] — g''a'']
ROME (1598)	[FFF GGG AAA — AA ^b — D [#] — A ^b — d [#] — a ^b — d [#] — a ^{bi} — f'']

3) Seventeenth-Century Organs

CALTANISSETTA (1638)	[C/E] — $\bar{d}^{\#}$ — $\bar{a}^b \bar{a}^{\#}$ — $\bar{d}^{\#}$ — $\bar{a}^{b'} \bar{a}^{\#}$ — $\bar{d}^{\#\#}$ — c'''
SCIACCA (1639)	[C/E] — $\bar{d}^{\#}$ — $\bar{a}^b \bar{a}^{\#}$ — $\bar{d}^{b'}$ — $\bar{d}^{\#}$ — $\bar{a}^{b'}$ — f'''
FINALE EMILIA (1647)	[C/E] — $\bar{d}^{\#}$ — \bar{a}^b — $\bar{d}^{\#}$ — $\bar{a}^{b'}$ — c'''
ROME (1658)	[CC] — $\bar{D}^{\#}$ — \bar{A}^b — $\bar{d}^{\#}$ — \bar{a}^b — $g''a''$
TRAPANI (1665)	[C/E] — $\bar{d}^{\#}?$ — \bar{a}^b — $\bar{d}^{\#}$ — $\bar{a}^{b'}$ — $\bar{d}^{\#\#}?$ — c''' (either $d^{\#}$ or $d^{\#\#}$)

The fact that some organs (Cremona 1544, Florence ante 1563) had d^b (category 2, above) rather than the more widespread $d\#$ (category 3) may well be connected with the pitch of the instrument or the particular requirements for the choir (i.e. the pitches at which the different modes would best be sung).

The earliest noted appearance of $a\#$ is before 1609. Since this was in a chamber organ it was presumably for secular rather than liturgical use. In harpsichords $a\#$ is found from 1618, in church organs—at least according to available evidence (there may well have been earlier instances in Naples)—not until 1638. Thus this development is perhaps connected with trends in the newer secular and instrumental music.

The 1639 organ at Sciacca is unique in this survey, since between d and a' every chromatic key was split with the exception of the $f\#$.

It was also in Italy that the split key began to be discarded.⁶²³⁴ Elsewhere it survived for another two centuries.⁶³³⁵

Split keys do not appear to have been introduced in Italian clavichords, presumably because they were not used to accompany other instruments or singers.⁶⁴³⁶

It will be seen from Table 1 (see above) that there was considerable variation in the number of extra semitones inserted, just as the keyboard range varied, although there is not necessarily any connection between these two properties. Most striking is the fact that in no case are pitches higher than $d\#\#\prime\prime$ included (though on larger organs such as Mantua, it was not unusual to play on the octave stop solo one octave lower—i.e. at 8' pitch—so that

⁶²Cf. Stenbridge, "Music for *Cimbalo Cromatico*," p. 29, n. 85.

⁶³In 1766 in London Johannes Zumpe made a piano with all five black keys in each octave split—with the exception of the lowest notes—so that the front keys play sharps, the back ones flats. This instrument is preserved, though not in playing order, in the Schlossmuseum, Stuttgart. The 1684 Renatus Harris organ in the Temple Church in London apparently retained its split keys for $g\#/a^b$ and $d\#/e^b$ until 1879.

⁶⁴Cf. Bermudo, *Declaración*, ff. 89v-90r for an intriguing way of producing a^b on a fretted clavichord: assuming f and $g\#$ use the same strings, the player should hold down the f key, increasing the tension on the strings, so that when the $g\#$ key is depressed the sound produced will be sharp enough to make a good a^b .

effectively $d\#\prime\prime$ was available).⁶⁵³⁷This coincides with contemporary performance practice, which avoided playing above $d\prime\prime$ when accompanying.⁶⁶³⁸

The other fact revealed by the tables is that 8' organs with a short octave (C/E) hardly ever had split keys in the bass octave to provide $F\#$ and $G\#$, whereas nearly all harpsichords and virginals with split chromatic keys also had these two bass notes. The obvious explanation is that the extra pipes in an organ would have required a lot of space and expense. On the other hand, the existence in large organs of A^b , $D\#$, and even AA^b gives some idea of how extraordinarily low some accompanying must have been.

It is almost certainly no coincidence that string keyboard instruments with extra chromatic notes are nearly all associated with centers where there was an important tradition of secular vocal performance—Ferrara in the 16th century, Florence and Rome in the early 17th. In fact, perhaps this survey helps to throw more light on Frescobaldi's relationship with split keys. Frederick Hammond has already pointed out the likelihood that Frescobaldi was responsible for Nigetti's obsession with enharmonic keyboards and suggested that Doni's derogatory anecdote has been overworked in discussions of Frescobaldi's attitude toward mean-tone tuning.⁶⁷³⁹If we remember that Frescobaldi was a pupil of Luzzaschi (the one virtuoso known to have been able to play Vicentino's *archicembalo*), that shortly after he took up his post at S. Peter's, Rome (where he would undoubtedly have known the Blasi organ in the Lateran), there was the possibility of an organ with split keys being built for him, and that the change that took place between his first book of Toccatas (1615), which remains within the 12-note mean-tone system, and the second book of 1627, in which the first of several a^b s occurs on the first page, coincided with the production by Boni of at least three harpsichords with split keys, it is somewhat difficult to imagine

⁶⁵Cf. Costanzo Antegnati, *L'Arte Organica* (Brescia, 1608), ff. 7v-8v where recommended registrations include the *ottava* on its own in 12' organs, the *flauto in ottava* on its own, and also the two stops together. These are not, however, among registrations which Antegnati suggests for accompaniment.

⁶⁶Cf. Arnaldo Morelli, "Alcuni avvertimenti da farsi, et altri da fugirsi nel suonare l'organo sopra la parte. La prassi del basso continuo all'organo nel XVII secolo," *Il flauto dolce* 10-11 (1984), 18-22.

⁶⁷Frederick Hammond, *Girolamo Frescobaldi* (Cambridge, MA., 1983), 106-7. See also Stembridge, "The *Cimbalo cromatico* and Other Italian Keyboard Instruments with Nineteen or More Divisions to the Octave," *Performance Practice Review* 6 (1993): 33-59, cf. p. 58.

him as a dedicated "12-key" man. It is interesting to notice what a good year 1629 was for split keys in Florence—and perhaps worth remembering that Frescobaldi moved to that city in 1628. There is no way of proving any link between these coincidences and an instrument with the split keys necessary for a performance of *Cento Partite sopra Passachagli* (d^\sharp , a^b , and d^b) has yet to be found—unless a *cimbalo cromatico* or the 1639 Sciacca organ were used.

It is possible to see a logical development from the primitive diatonic keyboard with b^b as the only "chromatic" key, right through to the *archicembalo*. In the 14th century, the "ordinary" chromatic keys were added—though not all at once.⁶⁸⁴⁰In the context of mean-tone tuning, or perhaps even Pythagorean tuning in the first stages, the addition of extra chromatic keys was not an unnatural further step. With the *cimbalo cromatico*'s 19 keys per octave, the keyboard reached what was probably its most complex form while remaining within the bounds of general practical usefulness.

⁶⁸Two paintings dated as late as 1460 (when, as has been shown, the first recorded split keys were soon to appear) depict positive organs with only three chromatic keys to the octave in Cologne and Vienna. Cf. Wilhelm Dupont, *Geschichte der musikalischen Temperatur* (Nördlingen, 1935), 18.

ADDENDA

Regarding my previous (related) article, "Music for the *Cimbalo cromatico* and Other Split-Keyed Instruments in Seventeenth-Century Italy," *Performance Practice Review* 5 (1992): 5-43, please add the following information (here in bold) to what was on p. 32:

under "*d#* only," unspecified instruments:

1603 G. Trabaci Durezza et Ligature

under "*a^b* only" 1627 G. Frescobaldi Toccata I, V, VI:

IX

Regarding my other previous (related) article, "The *Cimbalo cromatico* and Other Italian Keyboard Instruments with Nineteen or More Divisions to the Octave (Surviving Specimens and Documentary Evidence)," *Performance Practice Review* 6 (1993): 33-59, please rearrange or recaption the following illustrations:

Combine the drawings on p. 35 (correctly labeled there) with the corresponding drawing (on the left) on p. 38 (also correctly labeled).

See below as Illustration Number One.

Combine (again) the two illustrations originally presented on pages 50 and 51, but recaption the second of these.

**See below as Illustration Number Two and
Illustration Number Three.**

Discard the two illustrations originally presented on pages 52 and 53.

Illustration Number One

Keyboard of the Luython Harpsichord (77 Keys) as described by Praetorius

Keyboard of the Faber (1631) Harpsichord on the Evidence of Pin-Holes in the Key Frame (65 Keys)

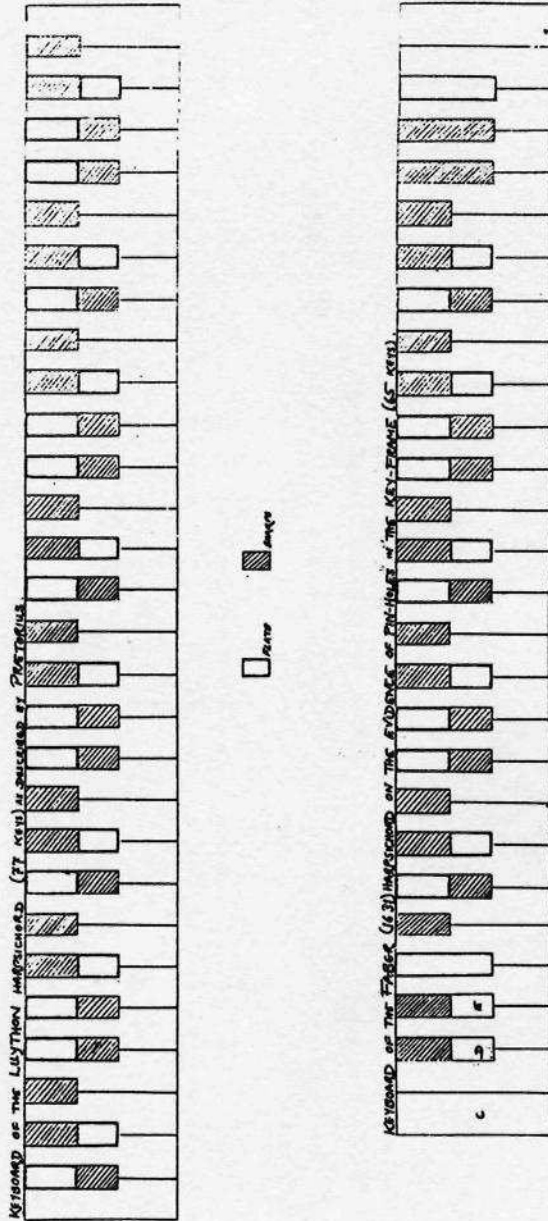


Illustration Number Two

24-Key Octave of Harpsichord Made by Domenico da Pesaro for Zarlino (1548)

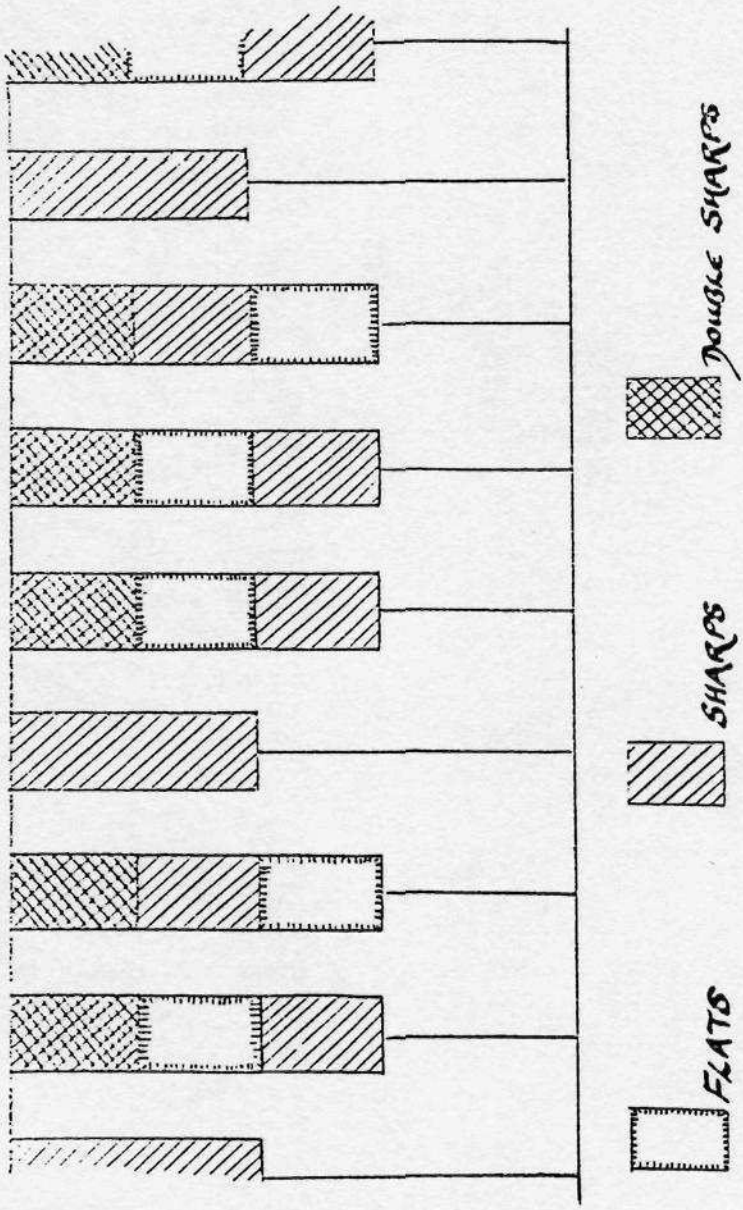


Illustration Number Three

28-Key Octave of Harpsichord Made by Trasuntino (1601)

