

TRANSPOSING MUTES FOR TRUMPETS

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ABSTRACT

The main question with regard to early trumpet mutes concerns their transposing interval: Do they raise the pitch by a half-step or a whole step? Modern reference books offer the unsatisfactory answer that both transpositions are possible. Surviving mutes raise the pitch by a half-step, but theoretical and musical sources from the seventeenth and eighteenth centuries specify a whole step.

I began my research by comparing surviving mutes, many of which were tested acoustically by Hannes Vereecke with original trumpets, using the *Brass Instrument Analyzing System (BIAS)*. No mute could be found that raised the instrument's pitch by a whole step, so the research was abandoned.

In an effort to solve this problem I read the relevant treatises again, comparing them with music for muted trumpets and evaluating this information in light of performance-practices of the time. The most important consideration here is the necessity for trumpeters to move from *Chorton* to *Cammerton* by exchanging bows of different sizes, and also to adjust the mutes when they are used with different bows in order to play in tune in several different keys. It can be shown that upward transposition of a whole tone is the best solution for all situations. All surviving mutes can be used for transposing up a whole step by removing a half-tone-bow (mute minus half-tone-bow = two half-steps = whole step up). The variable difference between *Chorton* and *Cammerton* of a half-step to a minor third always accommodates this procedure.

Many of the remarks on mutes on Altenburg's *Versuch* (1795) are incorrect; perhaps he simply copied his information from earlier books. In any case, it appears that a mute for upward transposition by a whole step did not exist during the heyday of the natural trumpet.

1. DISCUSSION

“Do old trumpet mutes transpose the pitch a half or a whole tone higher?” This is the central question which many musicians pose in connection with this issue. In music lexica we read answers such as: “The wooden mutes of olden times raised the pitch by one or two half tones.”¹ How did it come to this unsatisfactory statement?

1. Written and printed sources² and music³ all speak of whole-tone transposition. However, no whole-tone transposing mute has ever been found.

¹ Riemann Musik Lexikon, Sachteil (Mainz 1976), “Dämpfer”, 194.

² Daniel Speer, *Grundrichtiger Unterricht ...* (Ulm 1697), 219; Johann Mattheson, *Das Neu-Eröffnete Orchestre* (Hamburg 1713), 266; Johann Mattheson, *Exemplarische Organisten-Probe* (Hamburg 1719), 63; Johann Mattheson, *Critica Musica* (Hamburg 1722); Johann Mattheson, *Der vollkommene Capellmeister* (Hamburg 1739), 461; Johann Heinrich Zedler, *Grosses Universal Lexikon ...* (Leipzig 1731-1754), Bd. 38 (1743), 524, Bd. 39 (1744), 478, 524; Joseph Majer, *Museum Musicum* (Schwäbisch Hall

2. All surviving transposing mutes raise the pitch by approximately half a tone.⁴ No written or published source, however, mentions half-tone transposition. Nevertheless, the music shows the possibility of using existing mutes for half-tone transposition.⁵

Up until now these absurdities and contradictions could not be explained or solved,⁶ and one article even speaks of a mystery.⁷ A recent attempt at a solution has appeared in the form of a particularly long mute which in fact does transpose a whole step upwards.⁸ The question arises, however, as to whether such mutes ever existed.

The present article dealing with the solution of the above-mentioned problems will consider pitch ratios as well as tuning practice, leading to a hypothesis which will be verified – i.e. confirmed or investigated as to its accuracy – towards the end.

“All transposing trumpet mutes raise the pitch by half a tone. With them, when playing together with other instruments, a whole-tone transposition upwards could be effected by simultaneously removing a half-tone crook. There were no special whole-tone transposing mutes.”

When a trumpet is playing alone or in a trumpet ensemble, the extent of the pitch rise caused by the mute is irrelevant, because all performers are equally affected. The pitch rise consists of half a step, a fact which is later confirmed and, additionally to

1732), 40; Johann Philipp Eisel, *Musicus autodidaktos ...* (Erfurt 1738), 92; Johann Gottfried Walther, *Musikalisches Lexikon ...* (Leipzig 1732), 571, 610; Johann Ernst Altenburg, *Versuch einer Anleitung zur heroisch-musikalischen Trompeter- und Pauker-Kunst ...* (Halle 1795), 75, 85, 86, 109, 110, 111; Heinrich Christoph Koch, *Musikalisches Lexikon* (Frankfurt am Main 1802), 1605, 1606; Edward Tarr, *Johann Ernst Altenburg, Essay on an Introduction to the Heroic and Musical Trumpeters' and Kettledrummers' Art* (1795), Engl. transl. with preface (Nashville 1974). If these treatises mention a “Thon” or “Ton”, a whole step is always meant.

³ They will be presented during the course of this article.

⁴ We will comment on this later.

⁵ This issue, too, will be commented on later.

⁶ Christian Friedrich Daniel Schubart, *Ideen zu einer Ästhetik der Tonkunst* (Vienna 1806), 310; Gustav Schilling, *Enzyklopädie der gesamten musikalischen Wissenschaften...* 2 (Stuttgart 1845), 356, “Dämpfer”; Hermann Eichborn, *Das alte Clarinblasen auf Trompeten* (Leipzig 1891), 96; Wolfgang Osthoff, “Trombe Sordine”, *Archiv für Musikwissenschaft* 13 (1956), 77-95; Andrew McCredie, *Instrumentarium und Instrumentation in the North German Baroque Opera* (Hamburg 1964), 78; Don Smithers, *The Music & History of the Baroque Trumpet before 1721* (London 1973); Detlef Altenburg, *Untersuchungen zur Geschichte der Trompete im Zeitalter der Clarinblasen*, 3 vols. (Regensburg 1973); Robert Pyle Jr., “A Computational Model of the Baroque Trumpet and Mute”, *HBSJ* 3 (1991), 79-97; Tom Crown, “Antique Trumpet Mutes”, *HBSJ* 3 (1991), 263-264; Peter Downey, “More on Mutes”, *HBSJ* 3 (1991), 264-268; Jeffrey Nussbaum, “Baroque Trumpet Mutes”, *HBSJ* 3 (1991), 260; Don Smithers, “Antique Trumpet Mutes: A retrospective Commentary”, *HBSJ* 10 (1998), 103-111.

⁷ Tom Crown, loc. cit. – see footnote 6.

⁸ Developed by Ralph Bryant and Friedemann Immer. See also FN 37.

the muting effect, results in playing in a tonality felt to be strange.⁹ This characteristic distinguishes trumpet mutes from those used by bowed instruments.¹⁰

During the course of our acoustical survey of surviving trumpet mutes, one particular specimen stood out, because the accompanying instrument also survives.¹¹ The pitch rise amounts to exactly half a tone. Other late Baroque mutes in private and public Austrian collections,¹² when combined with surviving original instruments from the same time period,¹³ all yield a pitch rise of approximately half a tone.¹⁴ Similar dimensions of further existing mutes¹⁵ allow the conclusion that all surviving mutes from the seventeenth and eighteenth centuries raised the pitch by half a tone. Mutes from the early Baroque period have not yet been discussed; we will deal with them later.

In general, trumpets were tuned to choir pitch.¹⁶ During the course of time this pitch was subject to only the slightest of fluctuations. Stringed and woodwind instru-

⁹ Today the half-tone step is not unusual. In the Baroque period we find only the whole-tone step.

¹⁰ Gustav Johann Petri, *Anleitung zur praktischen Musik* (Leipzig 1782), 383.

¹¹ Both the trumpet and the mute come from the period around 1800; they were found in the church of Dietmanns near Gmünd, northern Waldviertel, Lower Austria. They are now in the Kunsthistorisches Museum Vienna, inv. no. SAM 825 and 824; see Gerhard Stradner, *Die Klangwelt Mozarts* (Vienna 1991), no. 212, ill. 19 and 53.

¹² Seven of these mutes come from Austria and one from south Germany: National Music Museum BA 0097, 0101 and 0102; from the collection of Nikolaus Harnoncourt, four mutes; Musikinstrumenten-Museum Schloss Krenschegg, inv. no. PIZ 041. See G. Stradner, op. cit., nos. 21–215 and ill. 46; Sabine Klaus, “Historical Instrument Window”, *International Trumpet Guild Journal* 36/2 (January 2012), 65.

¹³ The trumpets combined with mutes come from Germany and Austria: Friedrich Ehe (Nuremberg 1750), Johann Wilhelm Haas (Nuremberg), Wolf Magnus Ehe (Nuremberg), Leonhard Ehe (Nuremberg) (all from the collection of N. Harnoncourt); Carl Starzer (Vienna c. 1770) and Joseph Huschauer (Vienna 1806) (both from the Museum Schloss Krenschegg). See G. Stradner, op. cit., nos. 209–211 and ill. 53.

¹⁴ Since the trumpets belonging to them are not known, various bell profiles yield different pitches. All objects were tested acoustically by Hannes Vereecke with using the Brass Instrument Analyzing System (BIAS).

¹⁵ Trumpet mutes not mentioned up to now are found in the following collections, among others: Nationalmuseum Prague (18); Kunsthistorisches Museum Vienna, Sammlung alter Musikinstrumente (5); Germanisches Nationalmuseum Nuremberg (2); Musikmuseum Basel (1); Reichsstadt Museum Rothenburg ob der Tauber (1). See Jindrich Keller, “Alte Trompetendämpfer”, *Glareana* 18/1 (1969), 2–9 (Keller is mistaken, when he indicates that all Prague mutes raise the pitch a whole step); see G. Stradner, op. cit., no. 213 and ill. 8; Konrad Ruhland, *Musikinstrumente aus Oberbayern vom 17. bis 19. Jahrhundert*, Stadtmuseum Deggendorf (Deggendorf 1993), 151; Dieter Krickeberg & Klaus Martius, “Two trumpet mutes recently acquired by the Germanisches Nationalmuseum Nuremberg”, *HBSJ* 6 (1994), 394–354; Jindrich Keller, “Antique Trumpet Mutes”, *HBSJ* 6 (1998), 97–103.

¹⁶ If we use today’s pitch as a point of departure, then choir pitch was approximately a half step higher. Concerning the various pitches, see J. E. Altenburg, op. cit., 84; Gerhard Stradner, “Zur Stimmtonhöhe der Blasinstrumente zur Zeit Joseph Haydns”, in: Joseph Haydn (Munich 1986), 81–86; Gerhard Stradner, “The Evolution of Pitch of Cornets and Trombones at the Time of Schein and Buxtehude”, in: Dietrich Buxtehude and Hermann Schein (Saskatchewan 1987), 106–110; Gerhard Stradner, “Stimmtonhöhe, Tonarten und Klangcharakter”, in: G. Stradner, op. cit. in FN 11, 109–120; Bruce Haynes, *A History of Performing Pitch* (Lanham, Maryland, and Oxford 2002).

ments, on the other hand, were tuned to low chamber pitch. During the seventeenth century this was approximately a minor third lower than choir pitch, but with time it gradually became higher, so that at the end of the eighteenth century it was only about half a tone lower. Therefore, when performing together with other instruments, trumpeters had to adapt to the prevailing chamber pitch by lengthening their instruments, adding crooks or tuning bits. The use of crooks is described in many sources, often close to data about mutes.¹⁷ Even though the subtraction of crooks as a contrary measure to their application is hardly ever mentioned, it is a matter of course in connection with tuning.¹⁸

Whenever trumpet mutes were required, trumpeters were compelled to re-tune. At least theoretically, muted trumpets could be tuned to any desired higher or lower interval by manipulation of its crooks and bits. It was thus necessary to find a connecting note from the scale of the instruments sounding in chamber pitch, a note that would make sense both for these instruments and for the trumpets. Tuning down would bring the following disadvantages:

1. The typical rise in pitch due to the mutes would be abolished.
2. Extra crooks normally did not exist.
3. Adding further crooks would make the trumpet’s response less stable than before, because the instrument with many crooks would tend to wiggle.
4. The longer air passage would result proportionally in a narrower bore.

These arguments also applied to re-tuning to chamber pitch by adding a half-tone crook.¹⁹ A higher pitch therefore presented itself by the removal of a crook. An obvious solution would seem to be an adaptation to the higher fourth or fifth of the chamber pitch. Such transpositions, however, could not be carried out for the following two reasons:

1. The trumpets would dispose of too few crooks to be removed.
2. For the other instruments many notes would become unplayable, since they would go beyond their pitch range.

For these reasons, a whole-tone upward transposition was the only option. A half-tone crook was thereby removed from the trumpets. Because of the insertion of the mute, the instrument’s pitch had already been raised by half a tone, so that with the removal of such a crook a whole-tone upward transposition was finally effectuated. Hence the resulting formula: trumpet + mute – half-tone crook = two half-tones higher = one whole tone higher. Such a reduction of crooks was always possible, since

¹⁷ Michael Praetorius, *Theatrum Instrumentorum* (Wolfenbüttel 1620), VIII (four illustrations of lengthening pieces); Daniel Speer, *Grundrichtiger Unterricht ...* (Ulm 1697), 219; Joseph Majer, *Museum Musicum* (Schwäbisch Hall 1732), 40f.; Johann Gottfried Walther, *Musikalisches Lexikon ...* (Leipzig 1732), 572, 619; Johann Heinrich Zedler, *Grosses Universal Lexikon ...*, Bd. 38 (Leipzig 1743), 524; Johann Philipp Eisel, *Musicus autodidaktos ...* (Erfurt 1738), 92; Johann Ernst Altenburg, *Versuch einer Anleitung zur heroisch-musikalischen Trompeter- und Pauker-Kunst ...* (Halle 1795), 84 f.; Heinrich Christoph Koch, *Musikalisches Lexikon* (Frankfurt am Main 1802), 884, 1602 f., 1605 f. Koch, to be sure, was aware of J. E. Altenburg’s book, but did not take over his opinion about whole-tone mutes.

¹⁸ Because of the variances in pitch, the tuning possibilities during the Baroque period were more complicated than today, where only a small pitch correction is required.

¹⁹ John Henry van der Meer supposes that the simultaneous use of a mute plus a half-step crook results in echo effects. See John Henry van der Meer, *Johann Josef Fux als Opernkomponist* (Bilhoven 1961), vol. 3, 183; Dagmar Glüxam, *Instrumentarium und Instrumentalstil in der Wiener Hofoper zwischen 1705 und 1740* (Tutzing 2006), 558, FN 2576.

the trumpeters had previously adapted to chamber pitch and thus had at least one half-step crook at their disposal.²⁰

The trumpet was thus raised in pitch by a whole step when a mute was inserted and simultaneously a half-step crook was removed. The removal of a crook belonged to the process of tuning, was thus regarded as self-evident, and was therefore not mentioned in treatises. Trumpeters became especially conscious of the rise in pitch with the insertion of a mute when they were to perform in chamber pitch and this fact compelled them to tune anew.²¹ Because of this the mute was attributed the capability of raising the pitch by a whole tone. Mutes therefore are qualified for transposition a whole tone higher, as we can read in many treatises²² and pieces of music.²³

If trumpets already tuned to chamber pitch were in use during the eighteenth century, muting could be accomplished in a similar way: one took a trumpet pitched a whole step higher,²⁴ added simultaneously a mute and a half-step crook,²⁵ thus accomplishing both the transposition and the muting.

If mutes were inserted into a trumpet without any further tuning, a half-tone upward transposition resulted. Although this fact is not mentioned in any source, it could be utilized in practice, for example in the *Sonata Mortuorum à 5* by Johann Georg Linike.²⁶ Here we assume a chamber pitch lying a whole step below choir pitch. Trumpets in choir pitch are in C will be in D in chamber pitch. If that work is to be performed in E-flat (chamber pitch), it would suffice to insert a mute into the trumpets when asked for.²⁷

The previous conclusions were drawn from surviving late Baroque mutes. Early Baroque trumpets had a wider bell throat and correspondingly thicker mutes, as can be seen from the earliest pictorial representation of trumpet and mute by Marin Mersenne.²⁸ Early Baroque pieces of music, such as *L'Orfeo* (1607) by Claudio Monteverdi,²⁹ allow us to

²⁰ As explained above, to lower trumpets from choir to chamber pitch, into the instruments crooks had been inserted that lowered the pitch between a minor third and a half step, dependent on the chamber pitch.

²¹ If mutes were used in the trumpet ensemble or for solo playing, this process did not apply.

²² For example, Daniel Speer wrote: “so gebrauchte man sich eines Sertins, ... so lautet es um einen Thon höher ...” (“if one uses a mute, ... then it sounds a whole step higher”). See D. Speer, *Grundrichtiger Unterricht ...* (Ulm 1697), 219.

²³ For example, Pavel Josef Vejvanovský (1633-1693), *Sonata Sancti Mauriti à 7*. This work begins for the un-muted trumpets in C Major. After twelve bars pause mutes are called for, and then the trumpets sound in D Major. After further 24 bars the mutes are removed for playing again in C Major. Thus there is enough time for changing mutes and crooks. See also Maurizio Cazzati, *Sonata La Cappara à 5*, Op. 35/10; Dietrich Buxtehude (1637-1707), *Ihr Christen, freut euch nun*; Buxtehude, *Auf! Stimmet die Saiten*; Georg Philipp Telemann (1681-1767), *Trauerkantate auf das Ableben Friedrich August II. von Sachsen und Pohlen* (1737).

²⁴ J. E. Altenburg refers to trumpets in various pitches. See Altenburg, op. cit., 85.

²⁵ Mutes and half-step crooks used together cancelled the transposition effect.

²⁶ Johann Georg Linike, *Sonata Mortuorum à 5* (1737).

²⁷ This procedure also functions when a different chamber pitch is involved.

²⁸ Marin Mersenne, *Harmonie universelle* (Paris 1636), XX, fig. 56. The representation also shows that the thick mute inserted into the wide bell throat is located more or less in the same place as with thinner mutes in later trumpets.

²⁹ Claudio Monteverdi (1567-1643), *L'Orfeo*, 1607. His instruction for the performance of the introductory toccata reads: “*Toccata / che si suona avanti il levar de la tela tre volte con tutti li*

conclude that mutes from that period displayed the same transposing properties as surviving later ones. They raised the pitch by half a tone, and by removing a half-tone crook a whole-step upward transposition was effectuated.

Johann Ernst Altenburg was in 1795 the first to write an extremely detailed treatise about trumpet-playing.³⁰ His models were books by Johann Joachim Quantz,³¹ Carl Philipp Emanuel Bach,³² and Leopold Mozart.³³ He succeeded in presenting a logical sequence of ideas, whereby, as far as mutes are concerned, his starting point was a false assumption.³⁴ Apparently he was not familiar with existing mutes and their use, deriving his information simply from statements printed in other books. He interpreted them literally and came to the conclusion that a mute raised the pitch of a trumpet by a whole step. He wrote: “when it is inserted underneath into the trumpet, it not only gives the trumpet a completely different, almost oboe-like tone, but it also raises it [in pitch] by a whole tone ...”³⁵ Altenburg was the first to write clearly about whole-tone mutes. Because of his false assumption he prepared the erroneous way that many later authors followed, searching in vain for a single example of this kind of mute.^{35/36}

In this connection, the following attempt seems to guarantee success. We insert one of the surviving late Baroque mutes into the wide bell of an early Baroque trumpet. Because of its slim diameter it fits very far into the instrument. Because of the considerable shortening of the windway, the transposition interval was more than half a tone. This situation shows the way to make a mute that fits far enough into the trumpet to result in a whole-tone transposition. Such whole-tone mutes are offered by Annegret Schaub.³⁷ The question remains, however, as to whether such mutes ever existed. The following arguments speak against the existence of a historical whole-tone mute and also show why there never was any demand for the production of such a mute. They furthermore support the hypothesis established at the beginning about mutes and their incapability for whole-tone transposition:

1. With normal mutes the pitch could be preserved by the addition of a half-tone crook. This was not mentioned by

stromenti / & si fa un tuono più alto volendo sonar le trombe con le sordine.” (English translation: “Toccata which is sounded before the raising of the curtain three times with all the instruments, and it is performed a whole step higher if one wishes the trumpets to be played with mutes.”)

³⁰ Both earlier trumpet treatises, by Cesare Bendinelli (1614) and Girolamo Fantini (1638), were methods that went into much less detail. See J. E. Altenburg, op. cit.

³¹ Johann Joachim Quantz, *Versuch einer Anweisung die Flöte traversiere zu spielen* (Berlin 1752).

³² Carl Philipp Emanuel Bach, *Versuch über die wahre Art das Clavier zu spielen* (Berlin 1753).

³³ Leopold Mozart, *Gründliche Violinschule ...* (Augsburg 1756).

³⁴ J. E. Altenburg, op. cit., 86-87. Lars Laubhold has investigated Altenburg's treatise critically, thereby pointing out several absurdities, also in connection with trumpet mutes: Lars Laubhold, *Magie der Macht* (Würzburg 2009), 53; see Edward Tarr's review thereof in *HBSJ* 21 (2009), 115-118.

³⁵ Original text: “... wenn es ... unten in die Trompette gesteckt wird, so giebt es ihr nicht nur einen ganz andern, fast einer Oboe ähnlichen Klang, sondern erhöht ihn ... auch um einen ganzen Thon.” J. E. Altenburg, op. cit., 86. See also: „Aus meines Herzensgrunde“ 110, 111.

³⁶ See the numerous articles mentioned in FN 6, and especially FN 22 with a quote from Daniel Speer. Actually Altenburg quoted on p. 87 from the first edition of Johann Mattheson's [Exemplarische] *Organisten-Probe* (Hamburg 1719), 63, where the change of pitch through muting goes from C to D, or from D to E, although the exact relationship of these keys to each other differed slightly because a kind of unequal temperament was in use.

³⁷ These mutes were developed together with Ralph Bryant after a suggestion made by Friedemann Immer. See FN 8.

the theorists. The surviving mutes transposed half a step upwards, a fact they also did not mention. On the other hand, they often spoke of transposition a whole step upwards. As we have shown, this was effectuated through crook reduction. Mutes, then, were a universal tool, by means of which – together with suitable crook manipulation – it was possible to transpose various intervals upwards or even downwards.

2. One needed no special whole-tone mute, since it was already possible to tune a whole step higher with existing mutes.³⁸
3. It is not comprehensible that the surviving mutes could be said to be used only for half-step transposition.
4. Most musical instruments have the possibility of pitch correction. Why should this not have applied as well to muted trumpets, since for them via crook reduction whole-tone transposition is possible?
5. Throughout historical developments we cannot recognize any occasion that would have called for an alteration of the mute type.³⁹

6. Why are hints about whole-tone mutes missing before J. E. Altenburg's treatise?
7. Numerous mutes survive, but among them there is not a single whole-tone mute. It is highly unlikely that they existed but that all of them were lost.
8. We can expect a normal mute to produce a better sound than a whole-tone mute, because when the half-tone crook is removed, the trumpet's bore comes closer to its standard size.

When we take all these arguments into account, it appears unlikely that a whole-tone transposing mute had ever existed. Therefore the hypothesis offered at the beginning will be sufficiently confirmed, and the solution reads:

There existed only one kind of transposing mute with which it was possible to tune a whole step upwards. It was actually a half-tone mute, but because of the accompanying crook reduction it achieved the function of whole-tone transposition.

The mystery of trumpet mutes has finally disappeared.

³⁸ This applies to any tool, which is only then requested and used when it is needed.

³⁹ With this we mean the presence of both kinds of mute, either at different times or simultaneously.

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