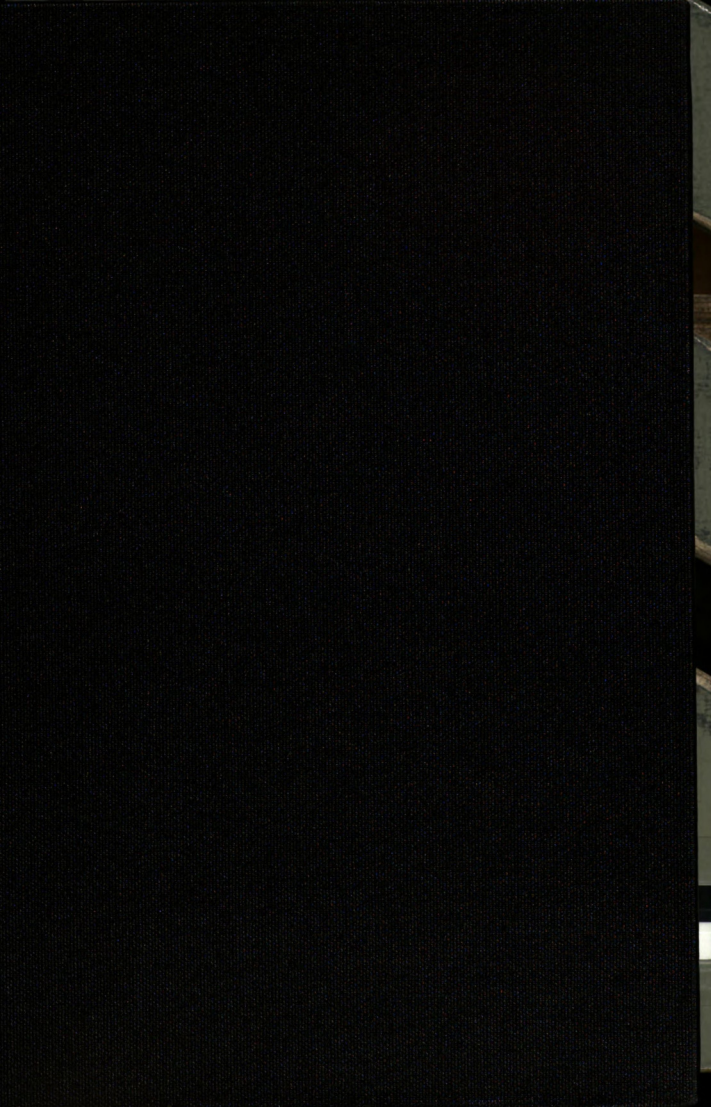






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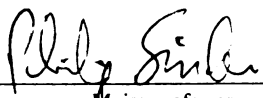
THE DOUBLE BELL EUPHONIUM:
DESIGN AND LITERATURE PAST AND PRESENT

presented by

EDWARD KEITH MALLETT

has been accepted towards fulfillment
of the requirements for

D.M.A. degree in Music Performance


Major professor

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**THE DOUBLE BELL EUPHONIUM:
DESIGN AND LITERATURE PAST AND PRESENT**

VOLUME I

By

Edward Keith Mallett

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF MUSICAL ARTS

**School of Music
College of Arts and Letters**

1996

ABSTRACT

THE DOUBLE BELL EUPHONIUM: DESIGN AND LITERATURE PAST AND PRESENT

By

Edward Keith Mallett

Relegated to museums, attics, and bar room walls, the double bell euphonium is often thought of as a forgotten oddity in the family of brass instruments. In reality, this instrument enjoyed unprecedented popularity during the "Golden Age of Bands," when double bell euphonium soloists such as Simone Mantia, Joseph DeLuca, and Joseph Michele Raffayola performed with the bands of John Philip Sousa, Arthur Pryor, Herbert Clarke and others, achieving a celebrity status that parallels that of present era pop music stars.

While the C. G. Conn company of Elkhart, Indiana was the dominant manufacturer of double bell euphoniums from the 1880s through the 1950s, nearly all American instrument makers, as well as several European companies, included double bell euphoniums in their product offerings at some time. An examination by the author of 49 instruments, representing eleven instrument companies and a time span of nearly 70 years, was conducted to study instrument design and construction. Of primary interest was the shape of the bell flare of both sides of the instrument, with other measurements including bore, valve casing, height, and weight. Photographs were taken of all instruments studied.

Using information from these studies as well as a consideration of late twentieth century euphonium aesthetics, a new double bell euphonium was designed and built by the author, attempting to remove deficiencies found in older instruments and include new features and capabilities previously untried. The design and manufacturing process is documented, including photographs.

Finally, literature for the double bell euphonium was studied: original works

written and notated for the instrument, including a piece composed by the author for the new instrument; works which were originally played on the instrument but not specifically notated for it; and, works written for other instruments which are suited to the double bell euphonium.

It is hoped that a renewal of interest in the double bell euphonium will result in the commissioning of new literature and continued performances for the instrument, as well as a more thorough understanding of the double bell euphonium and its place in the history of instruments.

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To Jun

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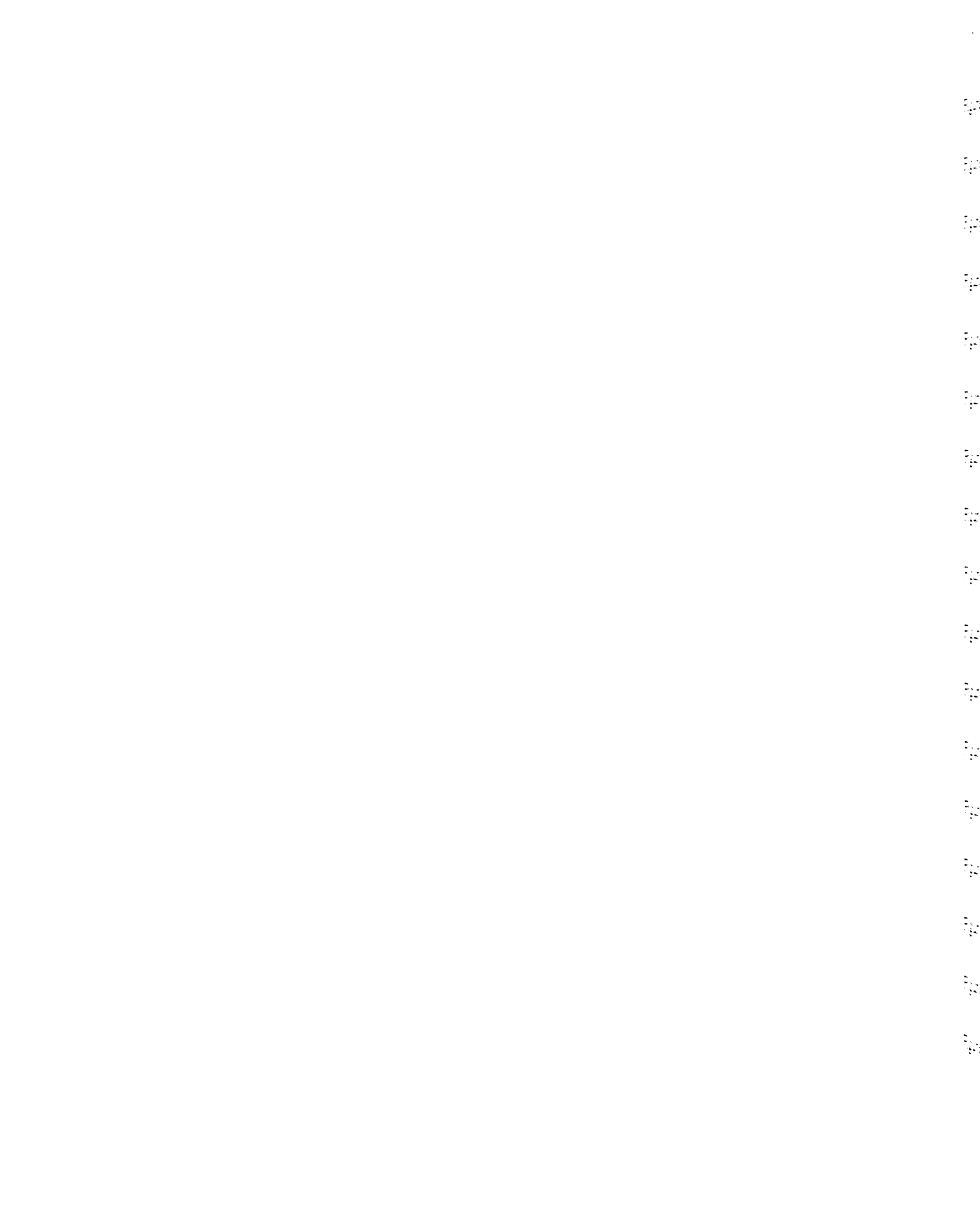


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INTRODUCTION

Seventy-six trombones caught the morning sun,
With a hundred and ten cornets right behind.
There were more than a thousand reeds
Springing up like weeds,
There were horns of every shape and kind.
There were copper-bottomed timpani in horse platoons,
Thundering, thundering, all along the way.
Double bell euphoniums and big bassoons¹

These are the words sung by Professor Harold Hill as he describes the sights and sounds of a marching band to the people of River City, Iowa in Meredith Willson's *The Music Man*. The song is a familiar one, but the double bell euphonium remains a mystery to most listeners. In fact, this song is probably the only time many have even heard of the instrument. As strange as it may seem, however, the double bell euphonium was actually a common member of most American bands from the late nineteenth through the first half of the twentieth century.

Following a virtual absence from the music world for nearly fifty years, the double bell euphonium is enjoying a bit of a revival, with several avid collectors and devotees around the United States and Canada stirring up interest in the instrument. The advent of on-line communications and electronic bulletin boards and web sites has also played a part in the resurgence of interest in the double bell euphonium. Unfortunately, much misinformation is also spread this way, and in many cases interested parties come away from their searches more confused than when they started.

As most of the information available about the double bell euphonium is passed by

¹Meredith Willson, *The Music Man*. New York: Frank Music, 1957.

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word of mouth, it is the intent of this dissertation to fill in gaps in the brief but eventful reign of the double bell euphonium, focusing not only on the history of the instrument, but on design considerations of period instruments, literature, and playing styles of the era. This information was then used to design and build a new modern-day double bell euphonium, attempting to retain the best qualities of past instruments and combine them with new technologies and performance considerations. The resulting instrument did indeed accomplish these goals, and it is hoped that it, too, will generate interest in the instrument and garner recognition as being a viable, versatile musical instrument.

The study of past literature and playing styles, combined with an interest in twentieth-century compositional techniques, resulted in the composition of a work by the author for double bell euphonium and piano, written specifically with the new instrument and its unique features and capabilities in mind. Editing of a number of other pieces also adds to the repertoire for the instrument, but here too it is hoped that enough interest can be generated in the instrument that composers will take note and once again bring a forgotten instrument out of closets, attics, museums and bar rooms and back to center stage.

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A BRIEF HISTORY OF THE DOUBLE BELL EUPHONIUM

The double bell euphonium is a member of the duplex family of instruments, or those consisting of either two instruments of similar timbre but of different pitch, or two instruments of the same pitch but possessing different tone qualities, connected by a single lead pipe. The double bell euphonium falls into this second category, it being essentially a conically bored baritone or euphonium and a cylindrically bored valve trombone combined in a single instrument, with a shared leadpipe and valve cluster. Incidentally, duplex instruments are not as unusual as one might think. The B-flat/F double horn, used by virtually all of today's horn artists, is a member of the first category of duplex instruments.

The idea of combining more than one instrument into a single unit can be traced back as far as the 4th century AD, when double, triple, and even quadruple pipes and whistles were built in Central and South America.² Double flutes and clarinets were used in Morocco, Egypt, Greece and Slavic territories, as well as India, as early as 800 AD.³ Although not an aerophone, mention must also be made of the double manual harpsichords built in the eighteenth century, giving the performer essentially two harpsichords in a single case, the possibility of echo effects being one of its many advantages over single keyboard instruments.

The idea of combining two brass instruments by means of a single leadpipe and

²Ruth Midgley, *Musical Instruments of the World*. New York: Bantam, 1976, p. 24.

³*Ibid.*, 37-45.

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mouthpiece was first put into practice in 1788 by an Irish instrument maker named Thomas Clagget who, by means of a primitive type of valve mechanism, joined together a D and an E-flat trumpet.⁴ The end of the eighteenth and beginning of the nineteenth centuries was a time of great significance for brass instrument construction with the development of the valve. The use of valves allows the airstream to be diverted through additional lengths of tubing, thus enabling an instruments to sound more than the overtones of its fundamental pitch.

In 1851, a London instrument maker named Gismore and a Dublin manufacturer named McNeil each took the idea of the valve one step further than other instrument makers, using it to direct the airstream through differently shaped tubing, thus allowing for more than one timbre to be produced on a single horn. Gismore's instrument was a combined cornet and flügelhorn, while McNeil's actually combined three instruments: trumpet, cornet and flügelhorn.⁵ A single valved trumpet-bugle was also designed in 1851 by Dr. J. P. Oates of Lichfield. This instrument, in its normal state, "approximates to an ordinary bugle, but the use of the valve introduces a considerable length of cylindrical tubing which transforms it into what is virtually a natural trumpet. It is presumed that the idea was to have a single instrument that would serve for either infantry or cavalry duties."⁶

The 1855 Paris Exposition saw introduced a family of *Gemelli* [twins] designed by an instrument maker from Milan named Pelitti.⁷ These were all duplex instruments of the

⁴H. W. Schwartz, *The Story of Musical Instruments*. New York: Doubleday, 1938, p. 173.

⁵Anthony Baines, *Musical Instruments Through the Ages*. London: Faber & Faber, 1961, p. 284.

⁶Albert Levignac, *Encyclopédie de la Musique*. Paris: Librairie Delagrave, 1927, p. 1462.

⁷Cliford Bevan, *The Tuba Family*. London: Faber & Faber, 1978, p. 200.

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following combinations: cornet and flügelhorn; alto horn and E-flat trumpet; baritone and valve trombone; and tenor tuba and bass trumpet.⁸ Pelitti's baritone/valve trombone appears to be the first duplex instrument made in the tenor range, and thus the first direct ancestor of the double bell euphonium.

The September 11, 1859 issue of the *London Times* shows an advertisement for an echo cornet built by John Köhler. This instrument consisted of a cornet coupled with a second bell that was bulb-shaped with a constricted opening, thus producing a distant echo effect.⁹ The Shrine to Music Museum, University of South Dakota, has in its collection an echo cornet built by Graves & Co., Boston, ca. 1851. Assuming the year to be correct or close to it, this seems to be the first use of multiple bells on an instrument and also the first attempt at building a duplex horn for which the sole purpose is a special effect designed for soloists. The Graves echo cornet is shown at the top of page 6 (Figure 1). The 1859 Paris exposition introduced an alto horn made by Henry John Distin of London which also included an echo bell, presumably meant to be used for the same soloistic effects as Köhler's cornet.¹⁰

A peculiar relative of the double bell horn was conceived and patented by Adolphe Sax in 1859. In an attempt to overcome the intonation problems of the three-valve system in use on most brasses, Sax designed an instrument with six valves and seven independent bells, each calculated to the exact length needed for perfect intonation.¹¹

The instrument . . . is in fact a combination of seven instruments of slightly

⁸Curt Sachs, *Real-Lexicon der Musikinstrumente*. Berlin: Julius Bard, 1913, p. 123.

⁹*Ibid.*, 126.

¹⁰Bevan, 110.

¹¹Wally Horwood, *Adolphe Sax*. Surrey: Bramley, 1979, p. 102.



Figure 1
Echo Cornet by Graves & Co., Boston, ca. 1851
The Shrine to Music Museum, University of South Dakota



Figure 2
Echo Horn by C. G. Conn, Elkhart, Indiana, ca. 1900
The Shrine to Music Museum, University of South Dakota

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different length, each with a separate tube and bell. The six valves control the way the airstream goes from the mouthpiece to one of the bells. If no valve is activated the air passes through a maximum length of tubing and leaves through the bell farthest away from the mouthpiece. If the first valve is set in action, the airstream is directed to the second bell, thus travelling a shorter distance, which results in a sound one half-tone lower [sic.]; and so on.

The resulting design is of striking beauty. Out of the maze of tubing surrounding the two sets of pistons, the seven tubes emerge in a semicircular turn and, gradually widening, flare out in a cluster of seven oval bells - almost the surrealist abstraction of a multi-headed hydra, likely to receive a prize in any mid-twentieth-century exhibition of sculpture. The only drawback of this acoustically perfect construction is the great weight of the accumulation of tubes and valves and bells, a factor which may have prevented wide acceptance of the instrument.¹²

Sax presented a full family of his *Instruments á 6 pistons indépendants et 7*

pavillons, soprano, alto and tenor, at the 1867 Exposition Universelle de Paris.¹³ Henry

Distin also built an alto horn constructed on this principle in 1878, but it is doubtful that it was intended for any other purpose than an oddity in a show band.¹⁴

The Vienna Exposition of 1873 presented the first double-belled instrument combining two instruments of different bores into a single unit. It was at this event that F. Hirschberg of Breslau introduced his B-C Clairon, a combined flügelhorn in B-flat and cornet in C.¹⁵

It was also in the 1870's that Bohland and Fuchs of Graslitz built the first double-belled tenor range instrument, a baritone/valve trombone combination.¹⁶ It is unfortunate

¹²Emanuel Winternitz, *Musical Instruments of the Western World*. New York: McGraw-Hill, n.d., p. 244.

¹³Malou Haine, *Adolphe Sax*. Bruxelles: Editions de l'Université de Bruxelles, 1980, p. 157.

¹⁴Philip Bate, *The Trumpet and Trombone*. London: Ernest Benn, 1978, pp. 185-86.

¹⁵Sachs, p. 42.

¹⁶Sachs, p. 123.

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that all records of this instrument have apparently been lost, for this seems to have been the first actual example of a double bell euphonium.

The next definite date in the history of the double bell euphonium is 1887, when J.J. Chediwa of Odessa is credited with inventing the duetton and lyrophone, the first being a “cornet and tenor trombone with common mouthpiece, built in form of a classical lyre, with both bells turned upward,”¹⁷ and the second being built “with two tubes of the same length but with different bores The narrow tube was used for solo and piano passages, the wide bore tube for tutti and forte passages.”¹⁸ A similar instrument, C. G. Conn’s Echo Horn, ca. 1900, is shown on page B-4 (Figure 2). While the 1887 date is documented, an 1885 lithograph of the P. S. Gilmore band shows a musician holding a double bell horn with rotary valves similar in appearance to a horn built in 1892 by Ch. Missenharter of Stuttgart, detailed later as instrument no. 36.

The C. G. Conn Company of Elkhart, Indiana began working on the first American-made double bell euphonium in the late 1880s.¹⁹ Although no exact date is known for when work began on the Conn instruments, Gilmore’s euphonium soloist Harry Whittier adopted the instrument in 1888, followed a year later by Joseph Michele Raffayola, soloist with John Philip Sousa’s band.²⁰

By 1890 several European instrument makers were producing double-belled baritone/trombone instruments under various names: for example, Higham of Manchester

¹⁷Sybil Marcuse, *Musical Instruments*. New York: Doubleday, 1964, p. 158.

¹⁸*Ibid.*, p. 323.

¹⁹Sachs, p. 123.

²⁰Bevan, p. 200.

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marketed a *Highamphone*,²¹ and Fontaine-Besson of Paris dubbed their instrument a *Doblophone*.²² American instrument seller J. W. Pepper imported double bell euphoniums by C. A. Mouchel of Paris in 1891,²³ and the previously mentioned Missenharter instrument was imported by the Coleman Music Company of New York. It is interesting to note the diversity of designs in use at this point in the double bell euphonium's history. By the final decade of the nineteenth century all of the instruments were a combination B-flat baritone horn (conical bore) and B-flat valve trombone (cylindrical bore), but bell placement, valve placement, and tubing wraps differed greatly from company to company and even within the same company from year to year.

By the turn of the century, the only double-belled instruments being made and used were the double bell euphonium and the echo cornet. For some reason, the echo cornet never caught on in the United States but enjoyed considerable success in Europe, while the double bell euphonium prospered in the U. S., but had little or no following in Europe. Through the first decade of the twentieth century, Besson of London continued to make the double bell euphonium, but by 1910 it was virtually an American instrument. The few European instruments still being manufactured were imported into the United States by Carl Fischer, J. W. Pepper and others. A few one-of-a-kind experimental duplex instruments were built, no doubt on demand for specific individuals. Two double belled trumpets (Figures 3 and 4, p. 10), both on permanent display at the Shrine to Music Museum at the University of South Dakota, feature a second bell with a permanent wah-wah type mute built in. These were undoubtedly built for the jazz idiom (one was even labeled

²¹Ibid.

²²Sachs, p. 118.

²³J. W. Pepper, *Catalog*. Philadelphia: Pepper, 1891, p. 18.

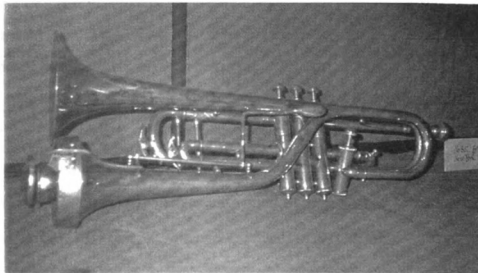


Figure 3
Echo Trumpet, 1931
The Shrine to Music Museum, University of South Dakota



Figure 4
"Jazzophone" by Martin, ca. 1925
The Shrine to Music Museum, University of South Dakota

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“jazzophone”), and were intended to expand improvisatory capabilities as well as provide convenience, not to mention the visual advantage of an eye-catching instrument to attract audience attention. These, as well as others that were likely made, however, were never mass produced and were never intended to be.

The C. G. Conn Company continued to improve their instruments and remained the best selling manufacturer of double bell euphoniums until the U. S. Military bands discontinued their use in 1956.²⁴ Conn was joined by several other American companies, again with a great diversity of designs and nomenclature. Three of the top selling instruments were the Conn “Wonderphone,”²⁵ and “Mantia Model,”²⁶ after euphonium soloist Simone Mantia, and the Holton “Pryorphone,”²⁷ after trombonist and band leader Arthur Pryor.

No definite dates are known for the discontinuation of double bell euphonium production by any of the manufacturers, although Holton appears to have stopped its production between 1931 and 1935,²⁸ as it no longer appears in the 1935 catalog. By this time the U. S. Marine Band was exclusively using Conn instruments, and the U. S. Navy Band was using Kings, made by the H. N. White Co. Other manufacturers began to fade out of the picture, succumbing to the unbeatable competition of the bigger companies. King/White seems to have been the last manufacturer to offer the double bell euphonium in

²⁴Art Lehman, Interview, November 17, 1992.

²⁵C. G. Conn, *Catalog*. Elkhart: Conn, 1917, p. 46.

²⁶C. G. Conn, *Catalog*. Elkhart: Conn, 1935, p. 32.

²⁷Holton, *Catalog*. Chicago: Holton, 1926, n.p.

²⁸Holton, *Catalog*. Chicago: Holton, 1931 and 1935, n.p.

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their catalogs, finally removing them in the late 1960s.²⁹ Conn presumably stopped production shortly after the Marine band ceased their use of the instruments in 1956.³⁰

During the double bell euphonium's heyday, the late nineteenth and early twentieth centuries, or the "Golden Age of Bands," it was used in virtually all of the professional and military bands, played by all of the prominent euphonium soloists and section players. Previously mentioned were Harry Whittier of the Gilmore band and Joseph Michele Raffayola of Sousa's band. Other artists who used the instrument include John Perfetto, Joseph DeLuca and Noble Howard, all with the Sousa band;³¹ Jean Manganaro of the United States Navy Band;³² Aaron Harris, Salvatore Florio, Charles O. Caputo and Charles Bezucha, all soloists with famous circus bands;³³ and Pasquale Funaro and Ole May, both members of several different bands during their careers.³⁴

The most prominent and greatest of the euphoniumists of the time was Simone Mantia. Mantia was born in Palermo, Italy in 1873 and came to New York at the age of eight. He started the study of music at age nine, and began playing the euphonium by the age of twelve. While in his teens, he played trombone in many orchestras and euphonium in many bands in New York. In the early 1890s, Mantia studied for a time with Raffayola

²⁹Bevan, p. 200.

³⁰Lehman.

³¹Paul Bierly, *John Philip Sousa*. New York: Meredith, 1973, p. 177.

³²Russel Sumpman, interview. November 19, 1992.

³³John Floyd, "The Double Bell Euphonium," *Woodwind World, Brass, and Percussion* 21/4 (July-August, 1982), p.8.

³⁴Glenn Bridges, *Pioneers in Brass*. Detroit: Sherwood, 1965, p. 96.

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and in 1898 succeeded his teacher as euphonium soloist with Sousa's band. In 1904, Mantia left Sousa to become soloist and assistant conductor of Arthur Pryor's newly formed band, where he remained for over thirty years. In 1940 Mantia performed as soloist at the New York World's Fair, and in 1948 he joined the City Service Band of America where, even at age seventy five, he continued to perform as euphonium soloist. Simone Mantia remained active as a soloist, band member and clinician until his death in June, 1951.³⁵ Throughout his extensive career, Mantia performed exclusively on Conn double bell euphoniums.³⁶

The function of the double bell euphonium was twofold, being designed both for section playing and for use as a solo instrument. The Distin Company advertised its instrument this way: "With this magnificent instrument the player can produce the full round tone of the Euphonium or the snap and sparkle of the Trombone. Wonderful effects can be produced by the alternate use of the large and small bells"³⁷ A description from a 1917 C. G. Conn catalog reads: "The small bell is known as the Trombone or Echo Bell and is used most effectively by soloists. There are also many passages in band music of the highest order which call for a strong Trombone section and the small bell enables the Euphoniumist to add to the power of this particular Trombone passage. In solo work the echo effect is most entrancing."³⁸

For section work within a band, the use of the small bell on the double bell euphonium was understood to be primarily a doubler of the trombone section. This

³⁵Bridges, p. 97.

³⁶Conn, (1935), p. 32.

³⁷Distin, *Catalog*. Williamsport: Distin, 1907, p. 21.

³⁸Conn, (1917), p. 44.

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function was possibly what first gave rise to the instrument's popularity, as most communities had a concert band, and not all were of sufficient size to ensure complete and proper instrumentation. Any help that a small town band could get toward filling out the sound of their brass section was of vital importance, and an instrument enabled a single player to help out with the bite of the trombone section while still keeping the richness of the euphonium close at hand was definitely an asset to the ensemble. Bill Pruyn, former conductor of the Ringling Brothers-Barnum & Bailey Circus Band, recalls that his euphonium players would often switch to the large bell to the small bell to reinforce the trombones during the break strains and trios of marches, citing Sousa's *Stars and Stripes Forever* as an example.³⁹ Paul LaValle, former conductor of the City Service Band of America, said that the euphonium section would often use the small bell for a thinner sound to blend with the trombone section and the broader sound of the large bell to blend with the tubas.⁴⁰

The well established concert bands, such as John Philip Sousa's, Arthur Pryor's, and the United States military bands, obviously were not lacking in their trombone sections, so this function of the double bell euphonium was not often called for. However, it did not go completely unused. Art Lehman, euphonium soloist with the United States Marine Band from 1947 to 1971, recalled that in the playing of Morton Gould's *Jericho*, Don Kimble, one of the euphoniumists, would play bugle calls on the small bell as loud as he could during the section of the piece depicting the falling of the walls. However, as the rest of the band was also playing full strength at the time, it was not heard by anyone outside of the low brass section, and was done solely for their entertainment.⁴¹ Vincent

³⁹Bill Pruyn, Interview. November 19, 1992.

⁴⁰Paul LaValle, Interview. November 17, 1992.

⁴¹Lehman.

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Methods

Clarke, past euphoniumist with the Ringling Bros. Circus Band, the Goldman Band, and others, recalls that by the late 1930's or early 1940's, the small bell was used so infrequently for ensemble playing that he and the other euphoniumists often removed the bell during rehearsals to cut down on weight, only putting it on for the sake of appearance for performances.⁴²

The use of the trombone bell as an added effect for solo playing received a bit more attention:

The euphonium soloist of the "Golden Age of Bands" era (ca. 1860-1915) certainly was nearly as important in programming as was the cornet soloist. The performing potential of having a double set of tubings resulting in two contrasting sound qualities, was increased, not unlike the performance variety possible today with mutes and "prepared" instruments. The 19th century [solo] literature with its question-and-answer type melodies, its slur-three-tongue-one disjunct variations and its "schmaltzy" obligatos all became natural outlets for the double-bell instrument.⁴³

Bill Bryan, former conductor of the Asbury Park Concert Band, recalls going to concerts given by Arthur Pryor's band as a child in the late 1920s and early 1930s. One of his fondest memories of those concerts was hearing cornet soloist Oscar Short and Simone Mantia playing the *Misere* from Giuseppe Verdi's *Il Trovatore*, for which Mantia would play his part some distance away from Short and use the small bell as an echo effect.⁴⁴

Vincent Clarke says that, in a band piece with a repeated euphonium solo, Mantia would often play the solo on the large bell the first time and on the small bell the second time. He also recalls being told that, although Mantia did not use the small bell for solo playing with the City Service Band in the 1940s, he used it quite frequently for special

⁴²Vincent Clarke, Interview. November 18, 1992.

⁴³Petersen, p. 5.

⁴⁴Bill Bryan, Interview. November 21, 1992.

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effects during his earlier years as soloist with Sousa and Pryor.⁴⁵

LaValle remembers Mantia using the small bell for soft passages in his solos,⁴⁶ while Pruyn remembers him using the trombone bell for flashy back-and-forth effects in cadenzas.⁴⁷ Glenn Bridges, author of *Pioneers in Brass*, “. . . once heard him [Mantia] play double stops, or chorded tones, in the rendition of a simple song, using alternate bells.”⁴⁸

There is no way to know for sure all of the different ways that this unique instrument was used and exploited by Mantia or any of the other soloists. Few recordings of these soloists are available, and the existing ones do not seem to feature the use of the smaller bell. Perhaps this is due to the primitive stage of the recording industry in the early decades of the twentieth century⁴⁹ or that, by the time recordings were being made, the soloists no longer thought it necessary or prudent to continue using what was possibly just a faddish technique.⁵⁰ Printed music from that era also fails to provide any performance practice clues, no examples of printed bell designations having been found by this author in parts or scores of band music or in printed solos. The absence of designators in band music is probably because each ensemble had different needs in terms of support and

⁴⁵Clarke.

⁴⁶LaValle.

⁴⁷Pruyn.

⁴⁸Bridges, p. 97.

⁴⁹Rick Benjamin, Interview. November 18, 1992.

⁵⁰David Werden, Interview. December 1, 1992.

balance, making specific use of the double bell euphonium far from universal. As for solo literature, each soloist would have had his own distinctive style and preferences for use of the small bell. As soloists played from memory, and quite likely varied their performances from concert to concert, even penciled notes by the performers are nonexistent.

Since no one can be sure of the exact playing techniques, they must be deduced in the same manner that music historians and performers of early music use in trying to come as close as possible to playing or singing in the style of Palestrina, Bach, Mozart and Liszt: by studying as thoroughly as possible what is known of the artists, social environment, physical capabilities of the instruments, etc. Knowing that the band soloists of the late nineteenth and early twentieth centuries were not only remarkable technicians of their instruments, but also flamboyant showmen, one can imagine that they would have made extensive use of any device that would add to their arsenal of musical pyrotechnics and captivate their audiences. So many of the solos of the time, particularly of the theme-and-variations variety, lend themselves so well to the double bell euphonium that it is difficult to imagine the second bell *not* being used to its fullest extent.

Why, then, did such a remarkable instrument all but disappear from the world of music by the 1950s? In 1939, just as World War II began, a British Navy vessel docked at a United States port for repairs. On board was a small brass band, whose instruments were also in need of repair. The United States graciously offered to replace the worn out instruments with brand new American-made instruments, and the grateful English musicians put out to sea once again with their new horns, leaving behind their old ones. Harold Brasch, then euphonium soloist with the United States Navy Band, latched on to one of these left-behind instruments, a Boosey & Hawkes compensating euphonium. This instrument featured a much larger bore than American euphoniums, and its dark, mellow tone endeared it to Brasch, who set aside his King double bell euphonium and began using the Boosey & Hawkes instrument exclusively. This darker, fuller, and more resonant

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euphonium sound gained increasing attention and popularity, and by the middle of the 1950s all of the United States military bands were using the large bore English instruments.⁵¹

By this time, the professional concert bands were all but extinct and community bands were also well on the decline, undoubtedly due in no small part to the advent of television and the reduced interest in entertainment outside of the home. The public school system was now the only other large-scale purchaser of low brass instruments, and the comparative low cost of single bell versus double bell euphoniums also no doubt contributed to its decline. Whatever the reasons, the double bell euphonium was completely gone from the new instrument market by the early 1960s.

As for already existing instruments, a number of theories have been suggested regarding their disappearance, although I was unable to obtain verification for any of them. It has been suggested by a number of musical instrument repairmen that the majority of double bell euphoniums, especially those in the public school systems, were converted into single bell instruments in the 1940s, donating the brass from the small bell and its connective tubing to the war effort as a source of materials for ammunitions manufacture. Several other instruments were probably converted merely for the sake of weight reduction, and others to emulate at least the physical appearance of the increasingly popular English instruments. Other instruments turned up as antique store bargains, wall hangings, planters and countless other debasements.

All is not completely lost for the double bell euphonium, however. Several of the "oldtimers" continue to play their instruments in community bands across the country, and a remarkable renewal of interest in the instrument has taken place just in the past few years. Dr. Brian Bowman, former euphonium soloist with the United States Air Force Band and current Professor of Euphonium at Duquesne University, and David Werden, euphonium

⁵¹Lehman.

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soloist with the United States Coast Guard Band, occasionally perform solos from the turn of the century on double bell euphoniums, as do a few other soloists with various community band organizations. The late Ashley Alexander, jazz trombone and euphonium artist, can be heard playing double bell euphonium on recordings with the Matteson-Phillips Tubajazz Consort, for example on *Noreen's Nocturne*, from the "*Super Horn*" album.⁵² Russel Sumpman, past member of a United States Navy field band, still uses his double bell euphonium for jazz work, as well.⁵³

Some new development of duplex instruments has also begun, although still in experimental stages. In the early 1980s, jazz trumpeter Ben Neil began working on his "Mutant Trumpet," a three-belled instrument that enables him to switch back and forth between open and muted trumpets. He says he envisions an entire brass ensemble of "mutant" instruments, but so far he has not taken it beyond the trumpet stage. Neil can be heard playing his instrument on a number of recordings.⁵⁴ As for the double bell euphonium, the instrument built as part of this DMA project, as far as can be determined, is the first new double bell euphonium to be constructed since the 1960s.

While the double bell euphonium will likely not ever regain the popularity it enjoyed during the "Golden Age of Bands," it is an important part of the euphonium family and vitally important to the euphonium's history. It is hoped that the renewed interest in the instrument will continue and the double bell euphonium will find its way off of bar room walls and out of dusty attics, back into the hands of musicians.

⁵²The Matteson-Phillips Tubajazz Consort, "*Superhorn*." New York: Mark Records, 1982.

⁵³Sumpman.

⁵⁴Ben Neil, Interview. December 12, 1992.

CONSTRUCTIONAL INFORMATION FOR PERIOD INSTRUMENTS

With one of the major objectives of this project being the construction of a new instrument, it seemed prudent to first study the designs and construction techniques used in the manufacture of original instruments from the late 1800s and early 1900s. Forty nine instruments, representing eleven different manufacturers and a time span of sixty nine years were studied, with a variety of measurements, photographs and, wherever possible, audio recordings being made of each instrument. These instruments were made available from a number of sources, including both private collectors and public museums in Michigan, Wisconsin, and South Dakota.

While perhaps the primary reason for the close scrutiny of old instruments was to identify the deficiencies that could be improved upon in the new instrument, such as intonation problems, awkward valve placements, and unnecessarily complicated tubing configurations, the study also proved interesting in pointing out the surprisingly wide variety of physical variances in double bell euphoniums not only from one manufacturer to another, but within one company, even within the same period of construction.

The most common overall configurations are front-action instruments with an upright or front-facing large bell on the left side of the instrument and a front-facing small bell on the right side of the instrument; and top-action instruments with an upright large bell on the right side and a front-facing small bell on the left. Two instruments (Nos. 1 and 31) feature a top-action with both bells on the right side of the instrument, the large bell being upright and the small bell front facing (one other design, not observed but pictured in Figure 5 on page 21, features both bells upright — as this is the bell configuration of the

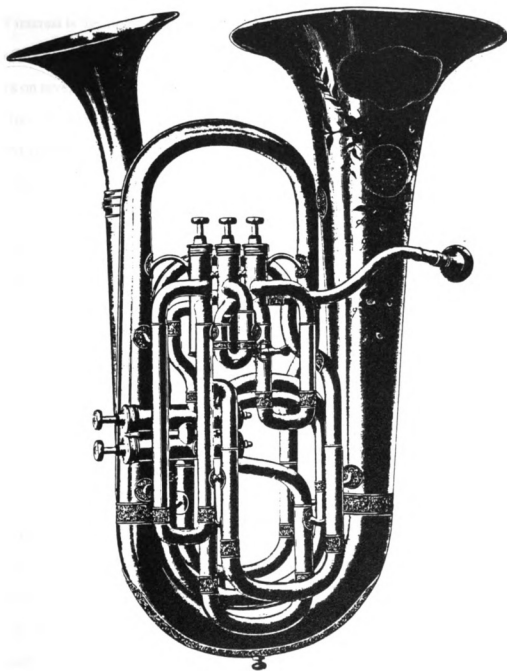


Figure 5
Excerpt from Henry Distin Catalog, ca. 1907

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new instrument, verification of its use in 1907 is somehow comforting). While these overall arrangements are similar, the tubing wraps of the small bell and its location on either the front or back side of the main tubing vary drastically from one instrument to the next. Also of interest is the large range of sizes of both large and small bells, large bells ranging from 9.75 inches in diameter (nos. 1 and 31) to 12 inches (no. 2), and the small bells from 6 inches on several instruments to 7.125 inches (no. 35). Overall height varies from 24 inches (no. 45) to 33 inches (nos. 33 and 34), and weight varies from 6.9 pounds (no. 31) to 13.063 pounds (no. 35). Much of the variation in weight is due to the number of valves, the presence or absence of a mouthpiece, and, in the case of nos. 31 and 36, the absence of the small bell. However, heavier weights also seem indicative of heavier gauges of brass used in construction.

Of particular interest, and consequently receiving the most detailed inspection, is the shape of the bell flare and the tubing leading up to it on both large and small bells. Measurements were taken at six inch increments from the opening of the bell to thirty six inches back from the opening. When compared with the main bore of the horn, a reasonably accurate determination can be made in determining the conical versus cylindrical shape of the instrument, accounting for the difference in timbres between the two bells, and also the inherent tuning problems between them. Also assisting in these determinations are measurements specifying the location of tuning slides on both sides of the euphonium as well as entrance and exit bores of those tuning slides.

The forty-nine double bell euphoniums studied are presented in the following pages, with manufacturing information, measurements, comparative graphs illustrating commonalities and differences between given instruments and the new double bell euphonium, and photographs being shown for each instrument. Instruments are listed alphabetically by manufacturer, and chronologically within each manufacturer's entries. Dates for most horns were determined by serial number as per Allied Supply company's

1994 catalog.⁵⁵ Instruments with missing or incomplete serial numbers, or those not represented in Allied Supply's catalog are dated according to owner's records, with the exception of the Distin euphoniums (nos. 29 and 30), for which information was obtained from musical instrument historian Lloyd P. Farrar.⁵⁶ The owner or museum housing each instrument is also identified, except in cases where anonymity was requested.

Measurements were taken using the following precision instruments: Mitutoyo CD-6"BS digital calipers; Chuan telescoping gages; and a Normark digital scale. Measurements are given in both American and metric. Photographs were taken with a Nikon Lite-Touch camera with a 28mm lens, using Fuji 100 speed color slide film. Black and white images were produced using color photocopy technology.

⁵⁵Allied Supply Corporation, *Catalog*. Elkhart, WI: Allied, 1994.

⁵⁶Lloyd P. Farrar, *Henry Distin*. Xerox page obtained from L. Farrar.

Instrume

Manufac

Serial N

Date of

Owner C

Finish:

Bell Loca

Bell Size

Number

Valve Lo

Valve Ca

Bore Siz

Tuning S

Tuning S

Height:

Weight:

Comment:

Instrument Number:	01		
Manufacturer:	J. B. Besson London, England		
Serial Number:	79690		
Date of Manufacture:	ca. 1903		
Owner/Collection:	The Shrine to Music Museum, Cat. #2297 University of South Dakota		
Finish:	silver plated, gold inside small bell		
Bell Location	Large:	upright, right side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	9.75 in	247.65 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	3 on top, 1 on left side		
Valve Casing Diameter:		.778 in	19.76 mm
Bore Size:		.507 in	12.88 mm
Tuning Slide Location	Large:	after 4th valve	7.50 in 190.50 mm
	Small:	after 4th valve	6.25 in 158.75 mm
Tuning Slide Bore	Large	In:	.544 in 13.82 mm
		Out:	.558 in 14.17 mm
	Small	In:	.507 in 12.88 mm
		Out:	.507 in 12.88 mm
Height:		26.0 in	660.40 mm
Weight:		8.625 lbs	3.912 kg
Comments:	Imported by Carl Fischer "Doblophone"		

#01

Bell Bot

(# 01)

Bell Bore	Large	36 inches from bell:	1.550 in	39.37 mm
		30 inches from bell:	1.801 in	45.75 mm
		24 inches from bell:	2.033 in	51.64 mm
		18 inches from bell:	2.368 in	60.15 mm
		12 inches from bell:	2.854 in	72.49 mm
		6 inches from bell:	3.527 in	89.59 mm
	Small	36 inches from bell:	.619 in	15.72 mm
		30 inches from bell:	NA	
		24 inches from bell:	.818 in	20.78 mm
		18 inches from bell:	1.012 in	25.70 mm
		12 inches from bell:	1.414 in	35.92 mm
		6 inches from bell:	1.815 in	46.10 mm

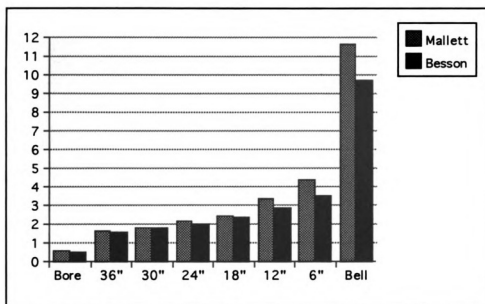


Figure 6
Bore and large bell comparison: Instrument No. 1

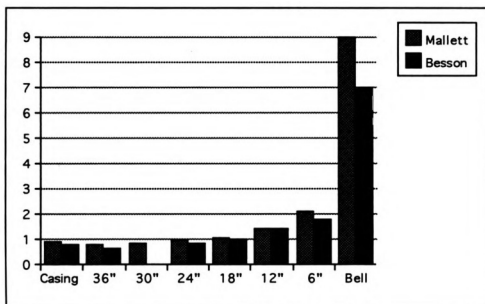


Figure 7
Valve casing and small bell comparison: Instrument No. 1



Figure 8
Instrument No. 01: Besson, Serial # 79690 - Front



Figure 9

Instrument No. 01: Besson, Serial # 79690 - Back

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Bell L

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Valve

Valve

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Tuning

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Instrument Number:	02		
Manufacturer:	Buescher Elkhart, Indiana		
Serial Number:	33152		
Date of Manufacture:	1915		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver plated		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	12.0 in	304.80 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	3 on top, 2 on left side		
Valve Casing Diameter:		.883 in	22.43 mm
Bore Size:		.565 in	14.35 mm
Tuning Slide Location	Large:	after 5th valve 3.50 in	88.90 mm
	Small:	after 5th valve 14.0 in	355.6 mm
Tuning Slide Bore	Large	In:	.640 in 16.26 mm
		Out:	.715 in 18.16 mm
	Small	In:	.565 in 14.35 mm
		Out:	.565 in 14.35 mm
Height:		24.75 in	628.65 mm
Weight:		11.375 lbs	5.160 kg
Comments:			

(# 02)

Bell Bore	Large	36 inches from bell:	NA	
		30 inches from bell:	1.916 in	48.67 mm
		24 inches from bell:	2.284 in	58.01 mm
		18 inches from bell:	2.600 in	66.04 mm
		12 inches from bell:	3.141 in	79.78 mm
		6 inches from bell:	4.250 in	107.95 mm
	Small	36 inches from bell:	.641 in	16.28 mm
		30 inches from bell:	.690 in	17.53 mm
		24 inches from bell:	.757 in	19.23 mm
		18 inches from bell:	.916 in	23.27 mm
		12 inches from bell:	1.239 in	31.47 mm
		6 inches from bell:	1.792 in	45.52 mm

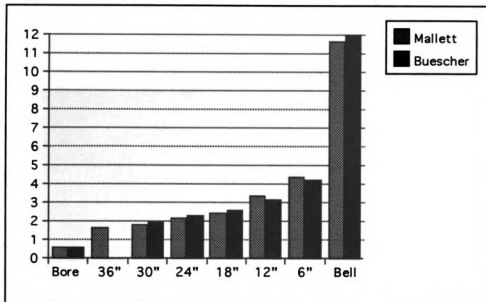


Figure 10
Bore and large bell comparison: Instrument No. 2

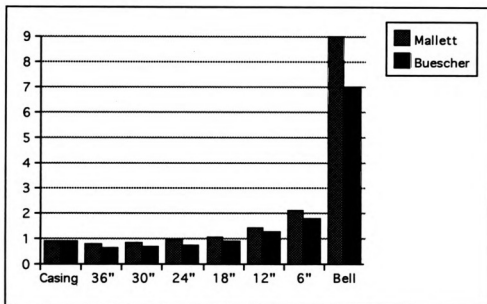


Figure 11
Valve casing and small bell comparison: Instrument No. 2

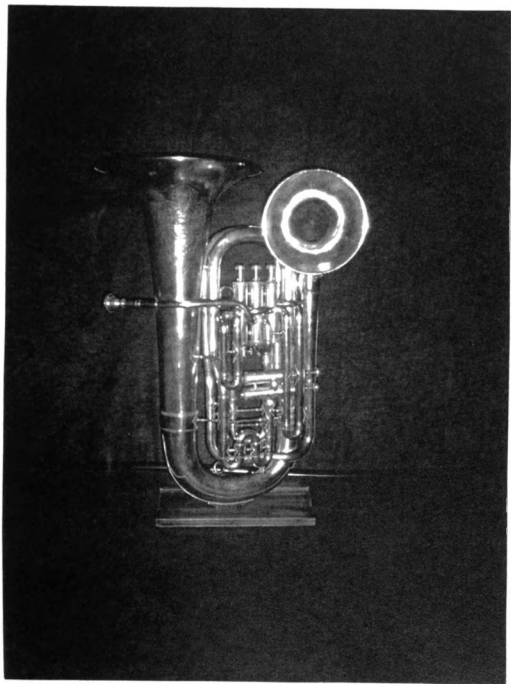


Figure 12
Instrument No. 02: Buescher, Serial # 33152 - Front

Instrument Number:

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Manufacturer:

Buescher

Serial

Date

Owner

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Comments:

**Figure 13**

Instrument No. 02: Buescher, Serial # 33152 - Back

Instrument

Manufact

Serial Nu

Date of M

Owner C

Finish:

Bell Loca

Bell Size

Number

Valve Lo

Valve Ca

Bore Size

Tuning S

Tuning S

Height:

Weight:

Comment:

Instrument Number:	03		
Manufacturer:	Buescher Elkhart, Indiana		
Serial Number:	210879		
Date of Manufacture:	ca. 1925-1930		
Owner/Collection:	The Shrine to Music Museum, Cat. #831 University of South Dakota		
Finish:	lacquered brass		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.25 in	260.35 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.879 in	22.33 mm
Bore Size:		.563 in	14.30 mm
Tuning Slide Location	Large:	after 4th valve 3.75 in	95.25 mm
	Small:	after 4th valve 7.5 in	190.50 mm
Tuning Slide Bore	Large	In:	.600 in 15.24 mm
		Out:	.634 in 16.10 mm
	Small	In:	.563 in 14.30 mm
		Out:	.563 in 14.30 mm
Height:		31.25 in	793.75 mm
Weight:		10.313 lbs	4.678 kg
Comments:			

#39

Bell Bore

(# 03)

Bell Bore	Large	36 inches from bell:	1.970 in	50.04 mm
		30 inches from bell:	2.138 in	54.31 mm
		24 inches from bell:	2.553 in	64.85 mm
		18 inches from bell:	2.859 in	72.62 mm
		12 inches from bell:	3.195 in	81.15 mm
		6 inches from bell:	4.105 in	104.27 mm
	Small	36 inches from bell:	.616 in	15.65 mm
		30 inches from bell:	.661 in	16.79 mm
		24 inches from bell:	.736 in	18.69 mm
		18 inches from bell:	.902 in	22.91 mm
		12 inches from bell:	1.162 in	29.51 mm
		6 inches from bell:	1.709 in	43.41 mm

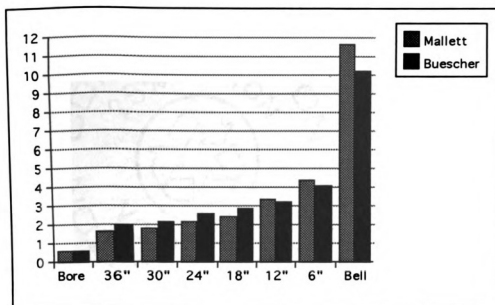


Figure 14
Bore and large bell comparison: Instrument No. 3

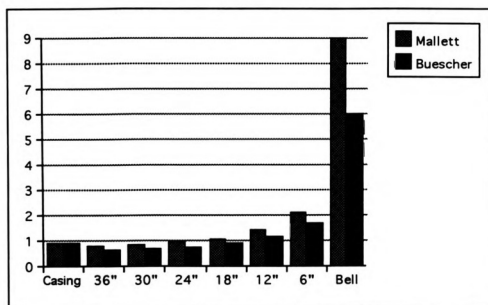


Figure 15
Valve casing and small bell comparison: Instrument No. 3



Figure 16
Instrument No. 03: Buescher, Serial # 210879 - Front



Figure 17
Instrument No. 03: Buescher, Serial # 210879 - Back

Instrument

Manufacturer

Serial Number

Date of

Owner's

Finish:

Bell Location

Bell Size

Number

Valve Location

Valve Condition

Bore Size

Tuning

Tuning

Height:

Weight:

Comment

Instrument Number:	04		
Manufacturer:	C. G. Conn Elkhart, Indiana; Worcester, Massachusetts		
Serial Number:	NA (worn off)		
Date of Manufacture:	ca. 1893 (owner's estimate)		
Owner/Collection:	Matt Schumacher Avoca, Michigan		
Finish:	unlacquered brass		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.75 in	171.45 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	3 on top, one on left front		
Valve Casing Diameter:		.778 in	19.76 mm
Bore Size:		.522 in	13.26 mm
Tuning Slide Location	Large:	after 4th valve 7.50 in	190.50 mm
	Small:	after 4th valve 28.25 in	717.55 mm
Tuning Slide Bore	Large	In:	.584 in 14.83 mm
		Out:	.660 in 16.76 mm
	Small	In:	.524 in 13.31 mm
		Out:	.524 in 13.31 mm
Height:		25.0 in	635.0 mm
Weight:		8.5 lbs	3.856 kg
Comments:	Played in Fowlerville, Mich. Marching Band in 1896		

#54

Bell Bore

(# 04)

Bell Bore	Large	36 inches from bell:	1.716 in	43.59 mm
		30 inches from bell:	1.824 in	46.33 mm
		24 inches from bell:	2.089 in	53.06 mm
		18 inches from bell:	2.396 in	60.86 mm
		12 inches from bell:	2.825 in	71.76 mm
		6 inches from bell:	3.454 in	87.73 mm
	Small	36 inches from bell:	.599 in	15.22 mm
		30 inches from bell:	.632 in	16.06 mm
		24 inches from bell:	.699 in	17.76 mm
		18 inches from bell:	.916 in	23.27 mm
		12 inches from bell:	1.273 in	32.34 mm
		6 inches from bell:	2.169 in	55.09 mm

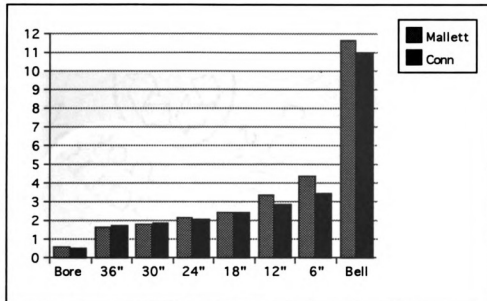


Figure 18
Bore and large bell comparison: Instrument No. 4

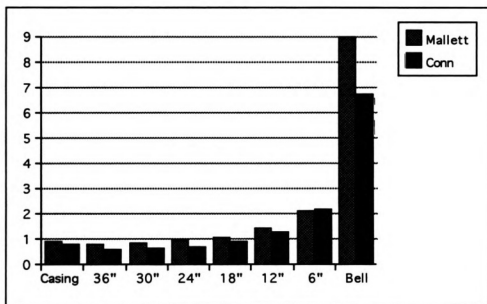


Figure 19
Valve casing and small bell comparison: Instrument No. 4



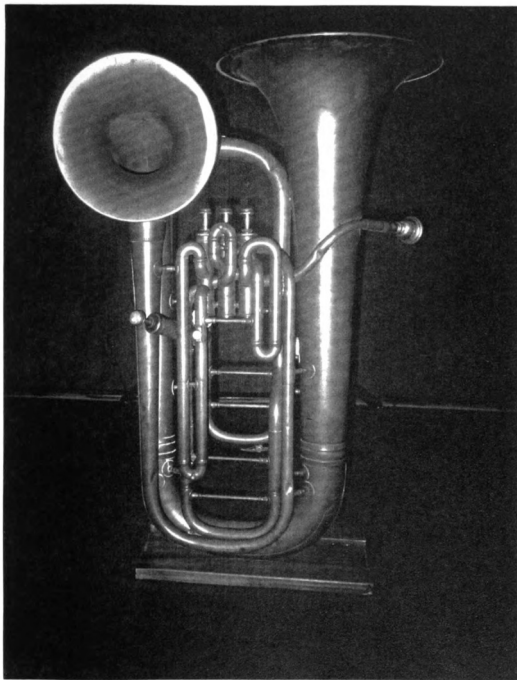


Figure 20
Instrument No. 04: Conn, Serial # NA (ca. 1893) - Front

Instrument Number:

Manufacturer:

C. O. Conn

Serial

Date

Own

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Bell

Bell

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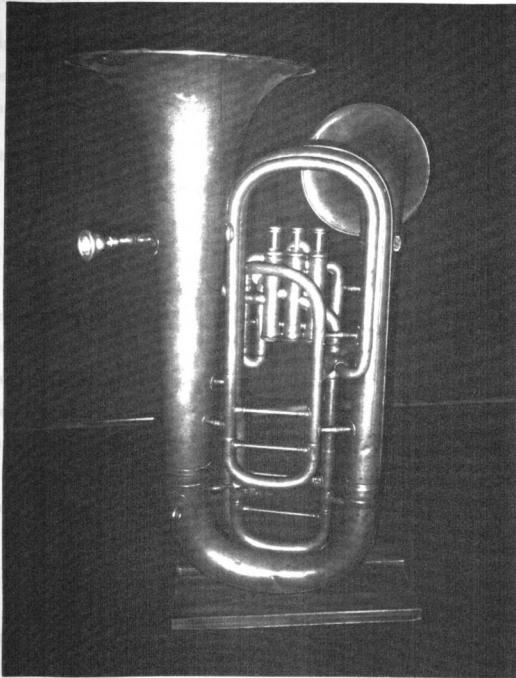
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Comments:

**Figure 21**

Instrument No. 04: Conn, Serial # NA (ca. 1893) - Back

Instrument

Manufacture

Serial Num

Date of Mar

Owner/Coll

Finish:

Bell Location

Bell Size

Number of

Valve Locat

Valve Casin

Bore Size:

Tuning Slide

Tuning Slide

Height:

Weight:

Comments:

Instrument Number:		05	
Manufacturer:		C. G. Conn Elkhart, Indiana; Worcester, Massachusetts	
Serial Number:		20953	
Date of Manufacture:		ca. 1895	
Owner/Collection:		anonymous private collection Wisconsin	
Finish:		silver plated	
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.75 in	171.45 mm
Number of Valves:		5 (4 + 1)	
Valve Location:		front, in line	
Valve Casing Diameter:		.778 in	19.76 mm
Bore Size:		.524 in	13.31 mm
Tuning Slide Location	Large:	after 5th valve	7.25 in 184.15 mm
	Small:	after 5th valve	22.5 in 571.50 mm
Tuning Slide Bore	Large	In:	.583 in 14.81 mm
		Out:	.639 in 16.23 mm
	Small	In:	.525 in 13.34 mm
		Out:	.525 in 13.34 mm
Height:		24.75 in	628.65 mm
Weight:		9.625 lbs	4.366 kg
Comments:			

151

Bell Bore

(# 05)

Bell Bore	Large	36 inches from bell:	1.699 in	43.16 mm
		30 inches from bell:	1.829 in	46.46 mm
		24 inches from bell:	2.154 in	54.71 mm
		18 inches from bell:	2.432 in	61.77 mm
		12 inches from bell:	2.955 in	75.06 mm
		6 inches from bell:	3.891 in	101.12 mm
	Small	36 inches from bell:	.593 in	15.06mm
		30 inches from bell:	.637 in	16.18 mm
		24 inches from bell:	.709 in	18.01 mm
		18 inches from bell:	.857 in	21.77 mm
		12 inches from bell:	1.247 in	31.67 mm
		6 inches from bell:	2.077 in	52.76 mm

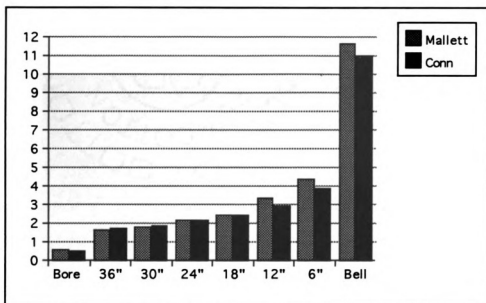


Figure 22
Bore and large bell comparison: Instrument No. 5

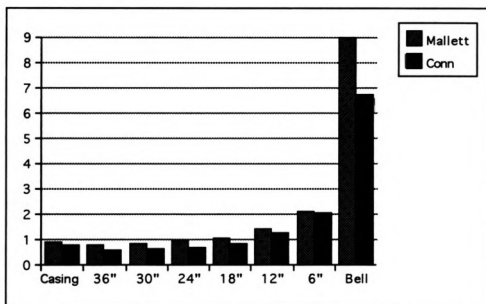


Figure 23
Valve casing and small bell comparison: Instrument No. 5



Figure 24
Instrument No. 05: Conn, Serial # 20953 - Front



Figure 25
Instrument No. 05: Conn, Serial # 20953 - Back

Instrument

Manufactu

Serial Num

Date of M

Owner/Co

Finish:

Bell Loca

Bell Size

Number

Valve Lo

Valve Ca

Bore Siz

Tuning S

Tuning S

Height:

Weight:

Comment

Instrument Number:	06		
Manufacturer:	C. G. Conn Elkhart, Indiana; Worcester, Massachusetts		
Serial Number:	28743		
Date of Manufacture:	ca. 1897		
Owner/Collection:	The Shrine to Music Museum, Cat. #987 University of South Dakota		
Finish:	silver plated		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.777 in	19.74 mm
Bore Size:		.515 in	13.08 mm
Tuning Slide Location	Large:	after 4th valve 8.5 in	215.90 mm
	Small:	after 4th valve 22.0 in	558.80 mm
Tuning Slide Bore	Large	In:	.574 in 14.58 mm
		Out:	.647 in 16.43 mm
	Small	In:	.515 in 13.08 mm
		Out:	.515 in 13.08 mm
Height:		25.25 in	641.35 mm
Weight:		8.625 lbs	3.912 kg
Comments:	Bracing missing on small bell		

(# 06)

Bell Bore	Large	36 inches from bell:	1.747 in	44.37 mm
		30 inches from bell:	1.880 in	47.75 mm
		24 inches from bell:	2.159 in	54.84 mm
		18 inches from bell:	2.359 in	59.92 mm
		12 inches from bell:	2.792 in	70.92 mm
		6 inches from bell:	3.586 in	91.08 mm
	Small	36 inches from bell:	.613 in	15.57mm
		30 inches from bell:	.654 in	16.61 mm
		24 inches from bell:	.719 in	18.26 mm
		18 inches from bell:	.874 in	22.20 mm
		12 inches from bell:	1.168 in	29.67 mm
		6 inches from bell:	1.985 in	50.42 mm

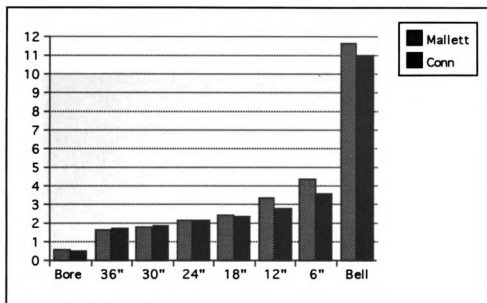


Figure 26
Bore and large bell comparison: Instrument No. 6

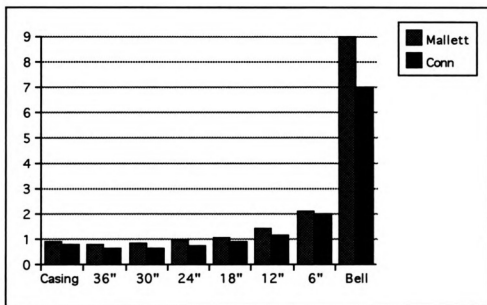


Figure 27
Valve casing and small bell comparison: Instrument No. 6



Figure 28

Instrument No. 06: Conn, Serial # 28743 - Front

Instrument Number:

07

Manufacturer:

C. G. Conn

Section:

Date:

Owner:

Finish:

Bell:

Bell:

Number:

Valve:

Valve:

Bore:

Tuning:

Tuning:

Height:

Weight:

Comments:

**Figure 29**

Instrument No. 06: Conn, Serial # 28743 - Back

Instrument

Manufact

Serial Nu

Date of M

Owner/C

Finish:

Bell Loca

Bell Size

Number

Valve Lo

Valve Ca

Bore Siz

Tuning S

Tuning S

Height:

Weight:

Comment

Instrument Number:		07	
Manufacturer:		C. G. Conn Elkhart, Indiana; Worcester, Massachusetts	
Serial Number:		33885	
Date of Manufacture:		ca. 1897	
Owner/Collection:		anonymous private collection Wisconsin	
Finish:		silver plated	
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.75 in	171.45 mm
Number of Valves:		4 (3 + 1)	
Valve Location:		front, in line	
Valve Casing Diameter:		.778 in	19.76 mm
Bore Size:		.530 in	13.46 mm
Tuning Slide Location	Large:	after 4th valve 8.5 in	215.90 mm
	Small:	after 4th valve 24.0 in	609.60 mm
Tuning Slide Bore	Large	In:	.677 in 17.20 mm
		Out:	.767 in 19.49 mm
	Small	In:	.530 in 13.46 mm
		Out:	.530 in 13.46 mm
Height:		25.5 in	647.70 mm
Weight:		9.063 lbs	4.111 kg
Comments:			



Bel Bore

(# 07)

Bell Bore	Large	36 inches from bell:	1.753 in	44.53 mm
		30 inches from bell:	1.969 in	50.01 mm
		24 inches from bell:	2.137 in	54.28 mm
		18 inches from bell:	2.439 in	61.95 mm
		12 inches from bell:	2.916 in	74.07 mm
		6 inches from bell:	3.835 in	97.41 mm
	Small	36 inches from bell:	.597 in	15.17 mm
		30 inches from bell:	.630 in	16.00 mm
		24 inches from bell:	.740 in	18.80 mm
		18 inches from bell:	.876 in	22.26 mm
		12 inches from bell:	1.256 in	31.90 mm
		6 inches from bell:	2.113 in	53.67 mm

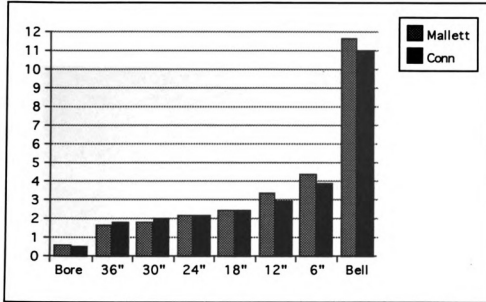


Figure 30
Bore and large bell comparison: Instrument No. 7

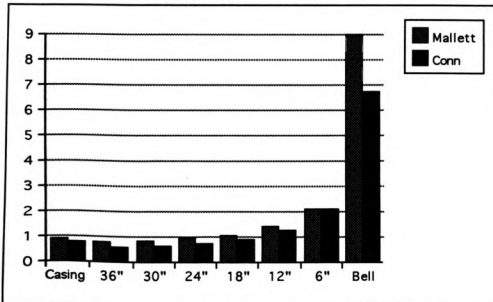


Figure 31
Valve casing and small bell comparison: Instrument No. 7



Figure 32

Instrument No. 07: Conn, Serial # 33885 - Front

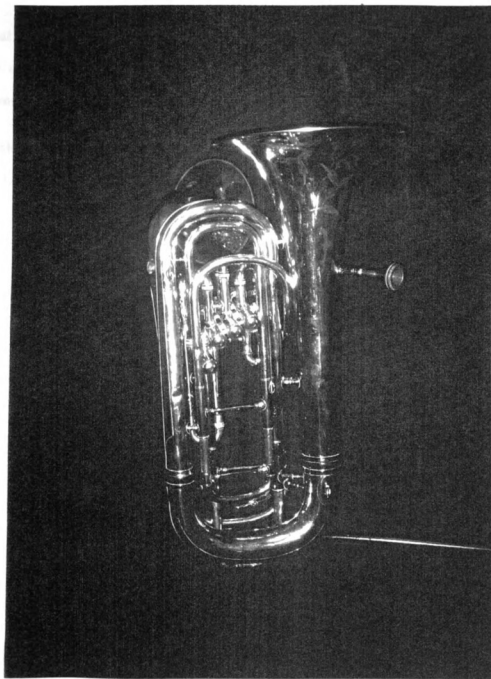


Figure 33
Instrument No. 07: Conn, Serial # 33885 - Back

Instrument Number:		08	
Manufacturer:		C. G. Conn Elkhart, Indiana; Worcester, Massachusetts	
Serial Number:		32088	
Date of Manufacture:		ca. 1897	
Owner/Collection:		The Shrine to Music Museum, Cat. #949 University of South Dakota	
Finish:		silver plated, gold inside both bells	
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.75 in	171.45 mm
Number of Valves:		5 (4 + 1)	
Valve Location:		three on top, two on left side	
Valve Casing Diameter:		.773 in	19.89 mm
Bore Size:		.515 in	13.08 mm
Tuning Slide Location	Large:	after 5th valve 5.25 in	133.35 mm
	Small:	after 5th valve 28.5 in	723.90 mm
Tuning Slide Bore	Large	In:	.577 in 14.66 mm
		Out:	.653 in 16.59 mm
	Small	In:	.515 in 13.08 mm
		Out:	.515 in 13.08 mm
Height:		25.25 in	641.35 mm
Weight:		8.813 lbs	3.997 kg
Comments:			

8)

Bell Bo

(# 08)

Bell Bore	Large	36 inches from bell:	1.633 in	41.48 mm
		30 inches from bell:	1.912 in	48.56 mm
		24 inches from bell:	2.145 in	54.48 mm
		18 inches from bell:	2.401 in	60.99 mm
		12 inches from bell:	2.937 in	74.60 mm
		6 inches from bell:	3.853 in	97.87 mm
	Small	36 inches from bell:	.580 in	14.73 mm
		30 inches from bell:	NA	
		24 inches from bell:	.689 in	17.50 mm
		18 inches from bell:	.831 in	21.11 mm
		12 inches from bell:	1.184 in	30.07 mm
		6 inches from bell:	1.935 in	49.15 mm

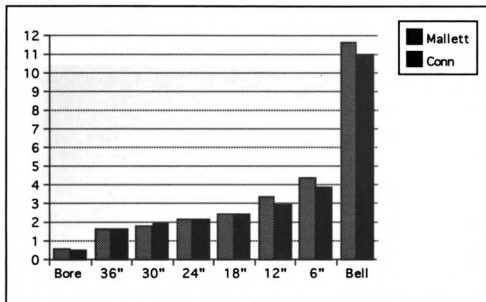


Figure 34
Bore and large bell comparison: Instrument No. 8

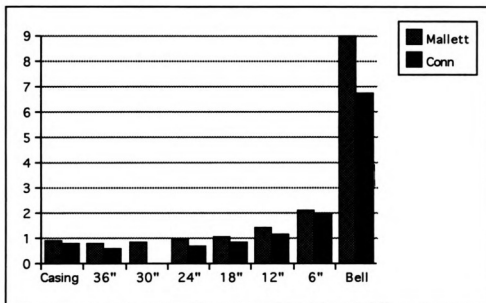


Figure 35
Valve casing and small bell comparison: Instrument No. 8



Figure 36
Instrument No. 08: Conn, Serial # 32088 - Front



Figure 37
Instrument No. 08: Conn, Serial # 32088 - Back

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Instrument Number:	09		
Manufacturer:	C. G. Conn Elkhart, Indiana; Worcester, Massachusetts		
Serial Number:	32308		
Date of Manufacture:	ca. 1897		
Owner/Collection:	The Shrine to Music Museum, Cat. #1522 University of South Dakota		
Finish:	silver plated, gold inside both bells		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.781 in	19.84 mm
Bore Size:		.516 in	13.11 mm
Tuning Slide Location	Large:	after 5th valve 5.75 in	146.05 mm
	Small:	after 5th valve 27.75 in	704.85 mm
Tuning Slide Bore	Large	In:	.583 in 14.81 mm
		Out:	.644 in 16.36 mm
	Small	In:	.519 in 13.18 mm
		Out:	.519 in 13.18 mm
Height:		25.5 in	647.70 mm
Weight:		9.313 lbs	4.224 kg
Comments:			

§ 19)

Bell Bor

(# 09)

Bell Bore	Large	36 inches from bell:	1.709 in	43.41 mm
		30 inches from bell:	1.940 in	49.28 mm
		24 inches from bell:	2.157 in	54.79 mm
		18 inches from bell:	2.375 in	60.33 mm
		12 inches from bell:	2.857 in	72.57 mm
		6 inches from bell:	3.714 in	94.34 mm
	Small	36 inches from bell:	.605 in	15.37 mm
		30 inches from bell:	.621 in	15.77 mm
		24 inches from bell:	.692 in	17.58 mm
		18 inches from bell:	.909 in	23.09 mm
		12 inches from bell:	1.305 in	33.15 mm
		6 inches from bell:	2.107 in	53.52 mm

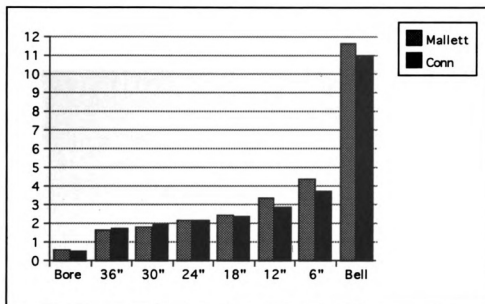


Figure 38
Bore and large bell comparison: Instrument No. 9

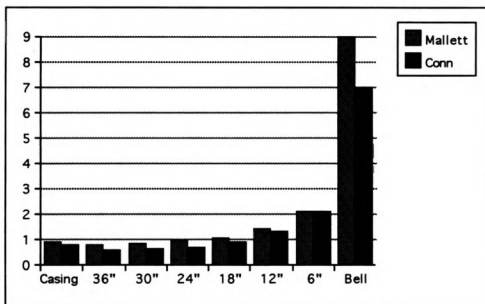


Figure 39
Valve casing and small bell comparison: Instrument No. 9



Figure 40

Instrument No. 09: Conn, Serial # 32308 - Front



Figure 41
Instrument No. 09: Conn, Serial # 32308 - Back

Instru

Manu

Serial

Date c

Owner

Finish

Bell L

Bell S

Numb

Valve

Valve

Bore

Tunin

Tunin

Heigh

Weigh

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Instrument Number:	10		
Manufacturer:	C. G. Conn Elkhart, Indiana; New York		
Serial Number:	66929		
Date of Manufacture:	1901		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver plated		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	10.5 in	266.70 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on front left		
Valve Casing Diameter:		.776 in	19.72 mm
Bore Size:		.532 in	13.51 mm
Tuning Slide Location	Large:	after 4th valve 6.5 in	165.10 mm
	Small:	after 4th valve 27.5 in	698.50 mm
Tuning Slide Bore	Large	In:	.588 in 14.94 mm
		Out:	.699 in 17.76 mm
	Small	In:	.529 in 13.44 mm
		Out:	.529 in 13.44 mm
Height:		27.75 in	704.85 mm
Weight:		9.0 lbs	4.082 kg
Comments:	Small bell not original		

#10)

Bell B

(# 10)

Bell Bore	Large	36 inches from bell:	1.833 in	46.56 mm
		30 inches from bell:	1.945 in	49.40 mm
		24 inches from bell:	2.163 in	54.94 mm
		18 inches from bell:	2.405 in	61.10 mm
		12 inches from bell:	2.878 in	73.10 mm
		6 inches from bell:	3.952 in	100.38 mm
	Small	36 inches from bell:	.608 in	15.45 mm
		30 inches from bell:	.621 in	15.77 mm
		24 inches from bell:	.765 in	19.44 mm
		18 inches from bell:	.894 in	22.70 mm
		12 inches from bell:	1.230 in	31.25 mm
		6 inches from bell:	1.901 in	48.28 mm

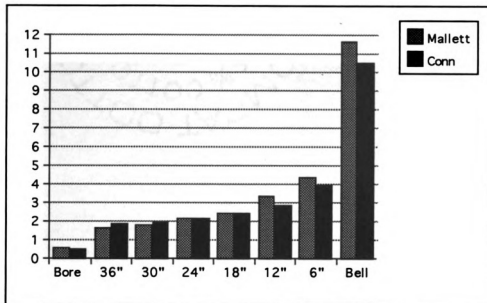


Figure 42
Bore and large bell comparison: Instrument No. 10

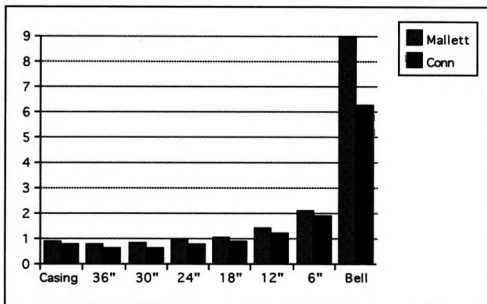


Figure 43
Valve casing and small bell comparison: Instrument No. 10



Figure 44
Instrument No. 10: Conn, Serial # 66929 - Front

Instrument Number

Make

Serial

Date

Owner

Find

Bell

Bell

Nut

Valve

Valve

Key

Tune

Tune

Bell

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Comments

**Figure 45**

Instrument No. 10: Conn, Serial # 66929 - Back

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Own

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Bell L

Bell S

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Valve

Valve

Bore

Tuning

Tuning

Height:

Weight:

Comme

Instrument Number:	11		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	71664		
Date of Manufacture:	1901		
Owner/Collection:	The Shrine to Music Museum, Cat. #3186 University of South Dakota		
Finish:	silver plated, gold in small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.25 in	285.75 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.825 in	20.96 mm
Bore Size:		.555 in	14.10 mm
Tuning Slide Location	Large:	after 4th valve 8.0 in	203.20 mm
	Small:	after 4th valve 23.75 in	603.25 mm
Tuning Slide Bore	Large	In:	.592 in 15.04 mm
		Out:	.692 in 17.58 mm
	Small	In:	.565 in 14.35 mm
		Out:	.565 in 14.35 mm
Height:		27.5 in	698.50 mm
Weight:		8.625 lbs	3.912 kg
Comments:	On permanent display at the Shrine to Music Museum		

(# 11)

Bell Bore	Large	36 inches from bell:	1.610 in	40.89 mm
		30 inches from bell:	1.817 in	46.15 mm
		24 inches from bell:	2.057 in	52.25 mm
		18 inches from bell:	2.458 in	62.43 mm
		12 inches from bell:	2.986 in	75.84 mm
		6 inches from bell:	3.953 in	100.41 mm
	Small	36 inches from bell:	.618 in	15.70 mm
		30 inches from bell:	.693 in	17.60 mm
		24 inches from bell:	.787 in	19.99 mm
		18 inches from bell:	.963 in	24.46 mm
		12 inches from bell:	1.310 in	33.27 mm
		6 inches from bell:	2.082 in	52.88 mm

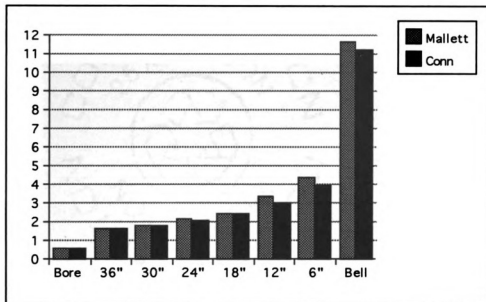


Figure 46
Bore and large bell comparison: Instrument No. 11

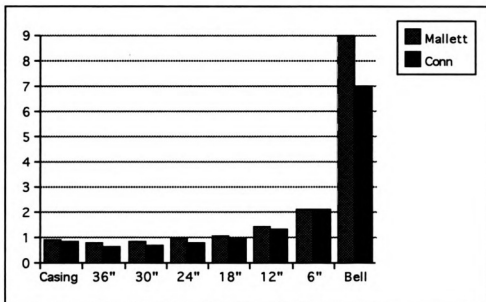


Figure 47
Valve casing and small bell comparison: Instrument No. 11



Figure 48

Instrument No. 11: Conn, Serial # 71664 - Front



Figure 49
Instrument No. 11: Conn, Serial # 71664 - Back

Inst

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Own

Fin

Bell

Bell

Num

Valv

Valv

Bore

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Instrument Number:	12		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	77340		
Date of Manufacture:	1903		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver plated		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.5 in	292.10 mm
	Small:	6.875 in	174.63 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.838 in	21.28 mm
Bore Size:		.561 in	14.25 mm
Tuning Slide Location	Large:	after 5th valve 6.5 in	165.10 mm
	Small:	after 5th valve 23.5 in	596.90 mm
Tuning Slide Bore	Large	In:	.628 in 15.95 mm
		Out:	.689 in 17.51 mm
	Small	In:	.564 in 14.33 mm
		Out:	.564 in 14.33 mm
Height:		27.0 in	685.80 mm
Weight:		9.25 lbs	4.196 kg
Comments:	Large bell patched to repair cut in brass from fall on guy wire during escape from big top fire with Ringling Bros. Circus.		

(# 12)

Bell Bore	Large	36 inches from bell:	1.658 in	42.12 mm
		30 inches from bell:	1.996 in	50.70 mm
		24 inches from bell:	2.273 in	57.73 mm
		18 inches from bell:	2.571 in	65.31 mm
		12 inches from bell:	3.236 in	82.20 mm
		6 inches from bell:	4.200 in	106.68 mm
	Small	36 inches from bell:	.611 in	15.52 mm
		30 inches from bell:	.708 in	17.98 mm
		24 inches from bell:	.814 in	20.68 mm
		18 inches from bell:	.985 in	25.02 mm
		12 inches from bell:	1.400 in	35.56 mm
		6 inches from bell:	2.206 in	56.04 mm

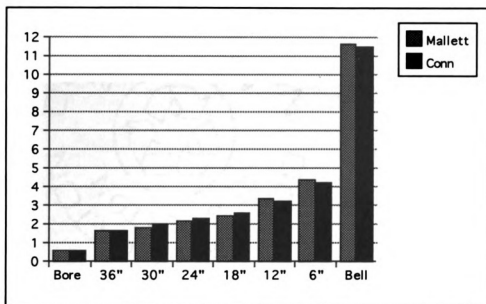


Figure 50
Bore and large bell comparison: Instrument No. 12

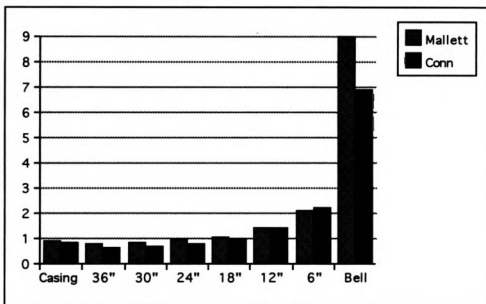


Figure 51
Valve casing and small bell comparison: Instrument No. 12



Figure 52
Instrument No. 12: Conn, Serial # 77340 - Front



Figure 53
Instrument No. 12: Conn, Serial # 77340 - Back

Instr

Man

Serial

Date

Owner

Finish

Bell L

Bell S

Number

Valve

Valve

Bore S

Tuning

Tuning

Height:

Weight:

Comment

Instrument Number:	13		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	80860		
Date of Manufacture:	1903		
Owner/Collection:	The Shrine to Music Museum, Cat. #2204 University of South Dakota		
Finish:	silver plated, gold inside small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.5 in	266.70 mm
	Small:	6.75 in	171.45 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.831 in	21.11 mm
Bore Size:		.555 in	14.10 mm
Tuning Slide Location	Large:	after 5th valve 4.75 in	120.65 mm
	Small:	after 5th valve 24.5 in	622.30 mm
Tuning Slide Bore	Large	In:	.579 in 14.71 mm
		Out:	.720 in 18.29 mm
	Small	In:	.562 in 14.27 mm
		Out:	.562 in 14.27 mm
Height:		27.5 in	698.50 mm
Weight:		9.938 lbs	4.508 kg
Comments:	On permanent display at the Shrine to Music Museum.		

(# 13)

Bell Bore	Large	36 inches from bell:	1.701 in	43.21 mm
		30 inches from bell:	1.912 in	48.56 mm
		24 inches from bell:	2.194 in	55.73 mm
		18 inches from bell:	2.528 in	64.21 mm
		12 inches from bell:	3.081 in	78.26 mm
		6 inches from bell:	4.054 in	102.97 mm
	Small	36 inches from bell:	.615 in	15.62 mm
		30 inches from bell:	.704 in	17.88 mm
		24 inches from bell:	.803 in	20.40 mm
		18 inches from bell:	.960 in	24.38 mm
		12 inches from bell:	1.277 in	32.44 mm
		6 inches from bell:	1.998 in	50.75 mm

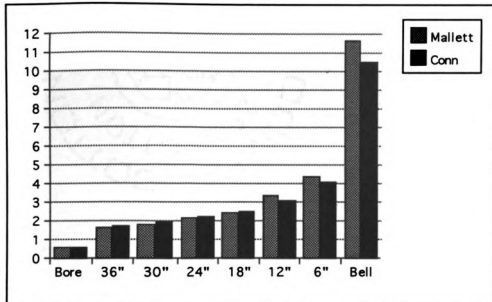


Figure 54
Bore and large bell comparison: Instrument No. 13

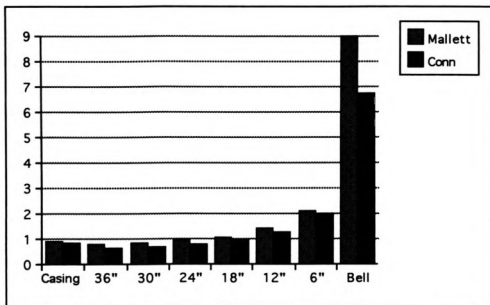


Figure 55
Valve casing and small bell comparison: Instrument No. 13



Figure 56
Instrument No. 13: Conn, Serial # 80860 - Front

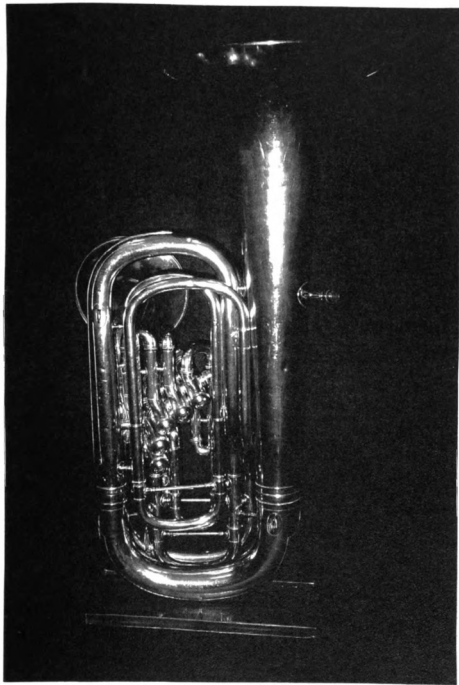


Figure 57
Instrument No. 13: Conn, Serial # 80860 - Back

Instrument Number:	14		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	94639		
Date of Manufacture:	1906		
Owner/Collection:	Harvey Davis Haslett, Michigan		
Finish:	silver plated, gold inside small bell		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	10.625 in	269.88 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:		.884 in	22.45 mm
Bore Size:		.589 in	14.96 mm
Tuning Slide Location	Large:	after 4th valve	4.375 in 111.13 mm
	Small:	after 5th valve	28.625 in 727.08 mm
Tuning Slide Bore	Large	In:	.595 in 15.11 mm
		Out:	.717 in 18.21 mm
	Small	In:	.540 in 13.72 mm
		Out:	.540 in 13.72 mm
Height:		27.0 in	685.80 mm
Weight:		9.438 lbs	4.281 kg
Comments:	Small bell not original		

(# 14)

Bell Bore	Large	36 inches from bell:	1.701 in	43.21 mm
		30 inches from bell:	1.942 in	49.33 mm
		24 inches from bell:	2.174 in	55.22 mm
		18 inches from bell:	2.537 in	64.44 mm
		12 inches from bell:	3.120 in	79.25 mm
		6 inches from bell:	4.304 in	109.32 mm
	Small	36 inches from bell:	.616 in	15.65 mm
		30 inches from bell:	.684 in	17.37 mm
		24 inches from bell:	.835 in	21.21 mm
		18 inches from bell:	.901 in	22.89 mm
		12 inches from bell:	1.257 in	31.93 mm
		6 inches from bell:	2.162 in	54.91 mm

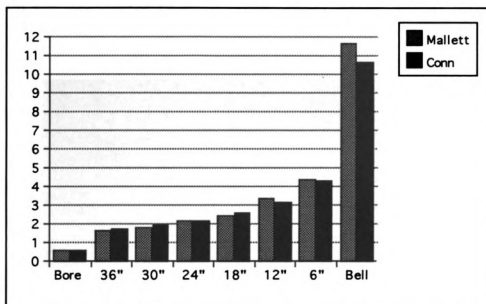


Figure 58
Bore and large bell comparison: Instrument No. 14

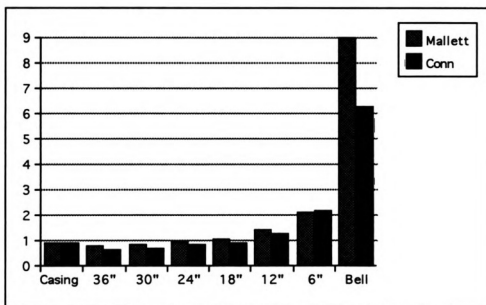


Figure 59
Valve casing and small bell comparison: Instrument No. 14



Figure 60
Instrument No. 14: Conn, Serial # 94639 - Front

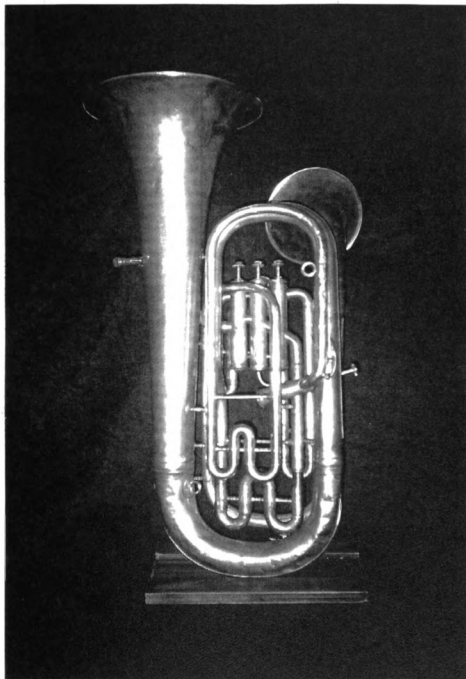


Figure 61

Instrument No. 14: Conn, Serial # 94639 - Back

Instrument Number:	15		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	97867		
Date of Manufacture:	1906		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	lacquered brass		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.625 in	269.88 mm
	Small:	6.625 in	168.28 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front. In line		
Valve Casing Diameter:		.895 in	22.74 mm
Bore Size:		.593 in	15.06 mm
Tuning Slide Location	Large:	after 5th valve 5.0 in	127.00 mm
	Small:	after 5th valve 24.0 in	609.60 mm
Tuning Slide Bore	Large	In:	.610 in 15.50 mm
		Out:	.722 in 18.34 mm
	Small	In:	.560 in 14.23 mm
		Out:	.560 in 14.23 mm
Height:		27.0 in	685.80 mm
Weight:		10.063 lbs	4.564 kg
Comments:			

(# 15)

Bell Bore	Large	36 inches from bell:	1.716 in	43.59 mm
		30 inches from bell:	1.916 in	48.66 mm
		24 inches from bell:	2.229 in	56.61 mm
		18 inches from bell:	2.619 in	66.53 mm
		12 inches from bell:	3.239 in	82.27 mm
		6 inches from bell:	4.442 in	112.83 mm
	Small	36 inches from bell:	.625 in	15.88 mm
		30 inches from bell:	.706 in	17.93 mm
		24 inches from bell:	.783 in	19.89 mm
		18 inches from bell:	.964 in	24.49 mm
		12 inches from bell:	1.308 in	33.22 mm
		6 inches from bell:	2.112 in	53.65 mm

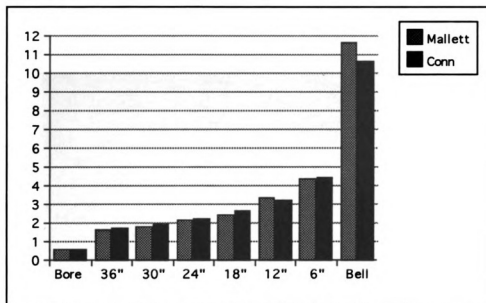


Figure 62
Bore and large bell comparison: Instrument No. 15

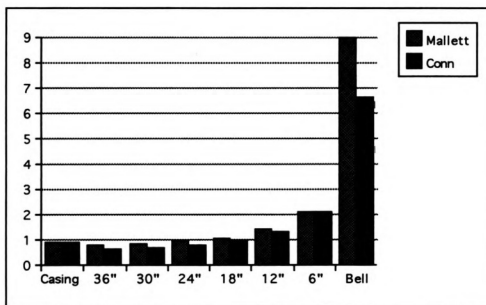


Figure 63
Valve casing and small bell comparison: Instrument No. 15



Figure 64
Instrument No. 15: Conn, Serial # 97867 - Front



Figure 65
Instrument No. 15: Conn, Serial # 97867 - Back

Instrument Number:	16		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	101429		
Date of Manufacture:	1907		
Owner/Collection:	The Shrine to Music Museum, Cat. #974 University of South Dakota		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.75 in	273.05 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:	.896 in	22.76 mm	
Bore Size:	NA		
Tuning Slide Location	Large:	after 4th valve 8.0 in	203.20 mm
	Small:	after 4th valve 24.5 in	622.360 mm
Tuning Slide Bore	Large	In:	.614 in 15.60 mm
		Out:	.728 in 18.49 mm
	Small	In:	.554 in 14.07 mm
		Out:	.554 in 14.07 mm
Height:	27.5 in	698.50 mm	
Weight:	9.125 lbs	4.139 kg	
Comments:			

(# 16)

Bell Bore	Large	36 inches from bell:	1.704 in	43.28 mm
		30 inches from bell:	1.890 in	48.01 mm
		24 inches from bell:	2.125 in	53.98 mm
		18 inches from bell:	2.517 in	63.93 mm
		12 inches from bell:	3.097 in	78.66 mm
		6 inches from bell:	4.158 in	105.61 mm
	Small	36 inches from bell:	.616 in	15.65 mm
		30 inches from bell:	.702 in	17.83 mm
		24 inches from bell:	.847 in	21.51 mm
		18 inches from bell:	.952 in	24.18 mm
		12 inches from bell:	1.318 in	33.48 mm
		6 inches from bell:	2.152 in	54.66 mm

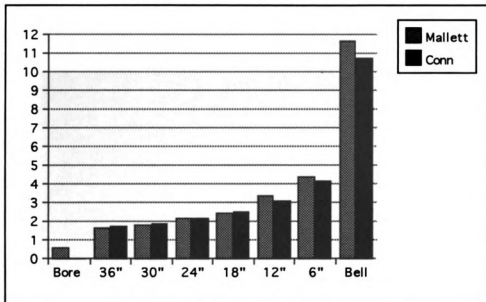


Figure 66
Bore and large bell comparison: Instrument No. 16

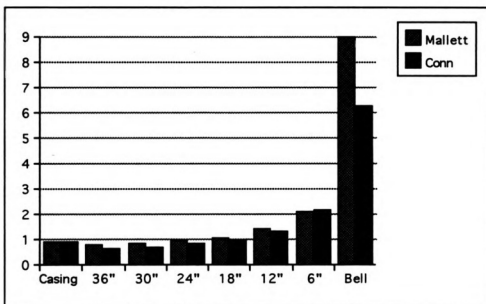


Figure 67
Valve casing and small bell comparison: Instrument No. 16



Figure 68

Instrument No. 16: Conn, Serial # 101429 - Front



Figure 69
Instrument No. 16: Conn, Serial # 101429 - Back

Instrument Number:	17		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	131124		
Date of Manufacture:	1913		
Owner/Collection:	Charles Nelson Albion, Michigan		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.5 in	266.70 mm
	Small:	6.75 in	171.45 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.806 in	20.47 mm
Bore Size:		.557 in	14.15 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	14.125 in 358.77 mm
Tuning Slide Bore	Large	In:	.557 in 14.15 mm
		Out:	.557 in 14.15 mm
	Small	In:	.557 in 14.15 mm
		Out:	.557 in 14.15 mm
Height:		27.125 in	688.98 mm
Weight:		8.313 lbs	3.771 kg
Comments:	Lead pipe not original.		

(# 17)

Bell Bore	Large	36 inches from bell:	1.560 in	39.62 mm
		30 inches from bell:	1.905 in	48.39 mm
		24 inches from bell:	2.145 in	54.48 mm
		18 inches from bell:	2.484 in	63.09 mm
		12 inches from bell:	3.035 in	77.09 mm
		6 inches from bell:	3.999 in	101.57 mm
	Small	36 inches from bell:	.635 in	16.13 mm
		30 inches from bell:	.685 in	17.40 mm
		24 inches from bell:	.782 in	19.86 mm
		18 inches from bell:	.930 in	23.62 mm
		12 inches from bell:	1.226 in	31.14 mm
		6 inches from bell:	1.921 in	48.79 mm

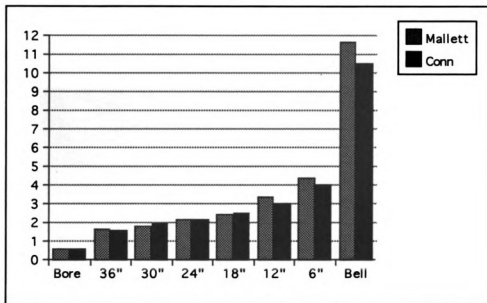


Figure 70
Bore and large bell comparison: Instrument No. 17

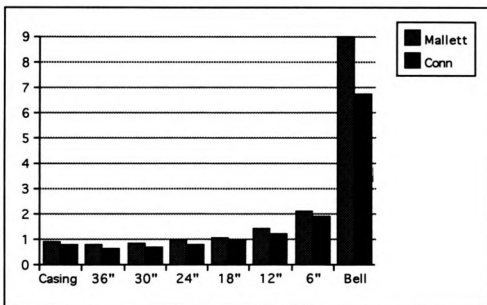


Figure 71
Valve casing and small bell comparison: Instrument No. 17



Figure 72
Instrument No. 17: Conn, Serial # 131124 - Front

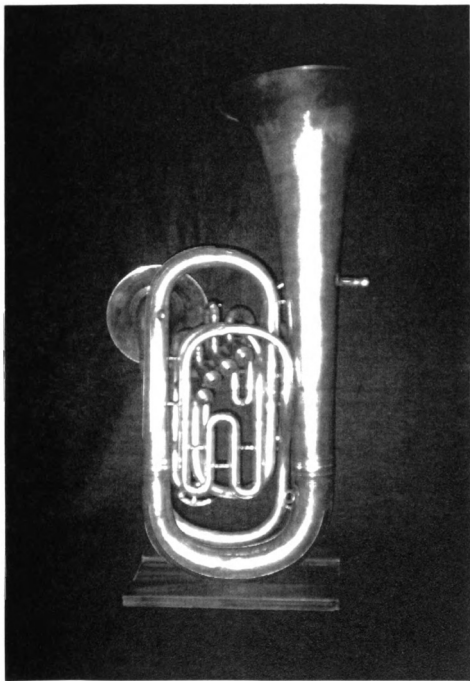


Figure 73

Instrument No. 17: Conn, Serial # 131124 - Back

Instrument Number:	18		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	138012		
Date of Manufacture:	ca. 1915		
Owner/Collection:	The Shrine to Music Museum, Cat. #1031 University of South Dakota		
Finish:	silver		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.75 in	273.05 mm
	Small:	6.5 in	165.10 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.827 in	21.01 mm
Bore Size:		.554 in	14.07 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 5th valve	19.5 in 495.30 mm
Tuning Slide Bore	Large	In:	.554 in 14.07 mm
		Out:	.554 in 14.07 mm
	Small	In:	.554 in 14.07 mm
		Out:	.554 in 14.07 mm
Height:		29.0 in	736.60 mm
Weight:		10.5 lbs	4.763 kg
Comments:			

(# 18)

Bell Bore	Large	36 inches from bell:	1.668 in	42.37 mm
		30 inches from bell:	2.022 in	51.36 mm
		24 inches from bell:	2.287 in	58.09 mm
		18 inches from bell:	2.733 in	69.42 mm
		12 inches from bell:	3.329 in	84.56 mm
		6 inches from bell:	4.163 in	105.74 mm
	Small	36 inches from bell:	.619 in	15.72 mm
		30 inches from bell:	.712 in	18.08 mm
		24 inches from bell:	.799 in	20.29 mm
		18 inches from bell:	.966 in	24.54 mm
		12 inches from bell:	1.324 in	33.63 mm
		6 inches from bell:	2.175 in	55.25 mm

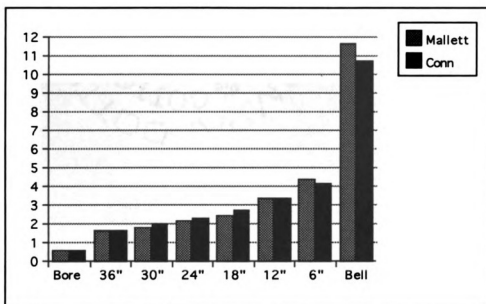


Figure 74
Bore and large bell comparison: Instrument No. 18

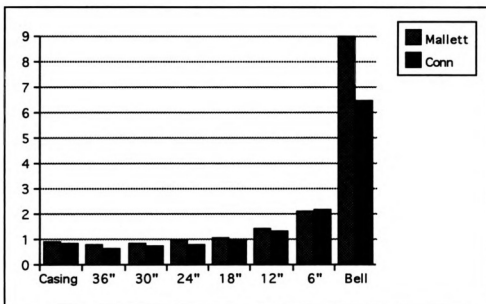


Figure 75
Valve casing and small bell comparison: Instrument No. 18



Figure 76
Instrument No. 18: Conn, Serial # 138012 - Front

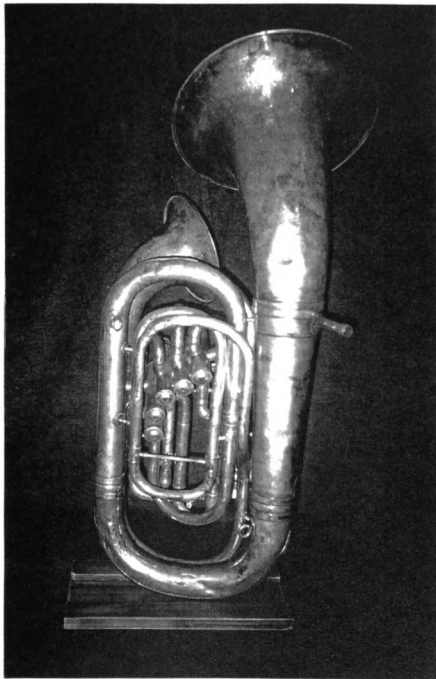


Figure 77

Instrument No. 18: Conn, Serial # 138012 - Back

Instrument Number:	19		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	150990		
Date of Manufacture:	1917		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	10.875 in	276.23 mm
	Small:	6.125 in	155.58 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:	.830 in	21.08 mm	
Bore Size:	.555 in	14.10 mm	
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	25.5 in 647.70 mm
Tuning Slide Bore	Large	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
	Small	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
Height:	27.5 in	698.50 mm	
Weight:	9.5 lbs	4.309 kg	
Comments:			

(# 19)

Bell Bore	Large	36 inches from bell:	1.637 in	41.58 mm
		30 inches from bell:	1.874 in	47.60 mm
		24 inches from bell:	2.174 in	55.22 mm
		18 inches from bell:	2.616 in	66.45 mm
		12 inches from bell:	3.183 in	80.85 mm
		6 inches from bell:	4.434 in	112.63 mm
	Small	36 inches from bell:	.624 in	15.86 mm
		30 inches from bell:	.701 in	17.80 mm
		24 inches from bell:	.818 in	20.79 mm
		18 inches from bell:	.962 in	24.44 mm
		12 inches from bell:	1.330 in	33.79 mm
		6 inches from bell:	2.137 in	54.28 mm

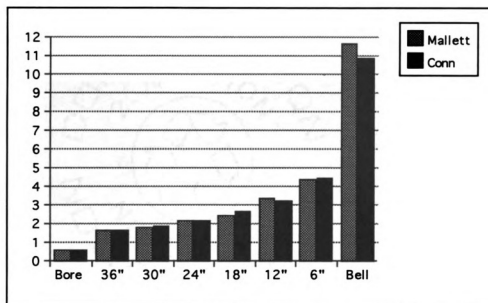


Figure 78
Bore and large bell comparison: Instrument No. 19

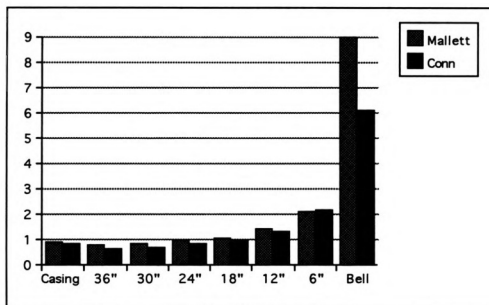


Figure 79
Valve casing and small bell comparison: Instrument No. 19



Figure 80
Instrument No. 19: Conn, Serial # 150990 - Front

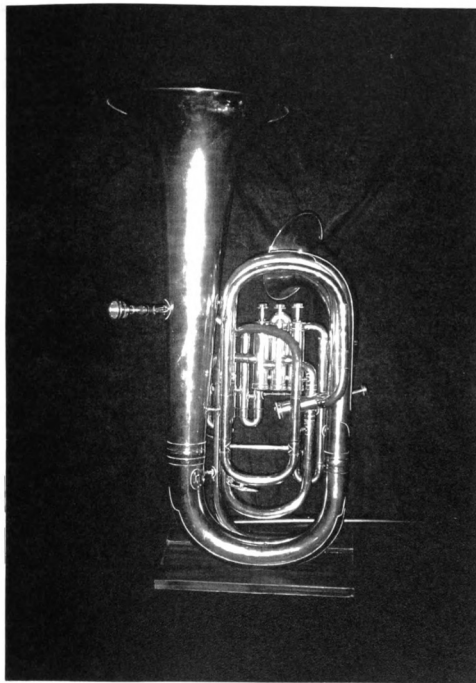


Figure 81

Instrument No. 19: Conn, Serial # 150990 - Back

Instrument Number:	20		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	151986		
Date of Manufacture:	1917		
Owner/Collection:	Ron Gibbs East Lansing, Michigan		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	10.875 in	276.23 mm
	Small:	6.125 in	155.58 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:		.834 in	21.17 mm
Bore Size:		.585 in	14.87 mm
Tuning Slide Location	Large:	after 4th valve 5.5 in	139.70 mm
	Small:	after 4th valve 30.0 in	762.00 mm
Tuning Slide Bore	Large	In:	.657 in 16.70 mm
		Out:	.729 in 18.50 mm
	Small	In:	.557 in 14.14 mm
		Out:	.557 in 14.14 mm
Height:		27.375 in	695.33 mm
Weight:		9.563 lbs	4.338 kg
Comments:			

(# 20)

Bell Bore	Large	36 inches from bell:	2.107 in	53.52 mm
		30 inches from bell:	2.230 in	56.65 mm
		24 inches from bell:	2.308 in	58.61 mm
		18 inches from bell:	2.705 in	68.71 mm
		12 inches from bell:	3.192 in	81.08 mm
		6 inches from bell:	4.340 in	110.22 mm
	Small	36 inches from bell:	.602 in	15.30 mm
		30 inches from bell:	.733 in	18.62 mm
		24 inches from bell:	.815 in	20.69 mm
		18 inches from bell:	.926 in	23.53 mm
		12 inches from bell:	1.294 in	32.87 mm
		6 inches from bell:	1.979 in	50.27 mm

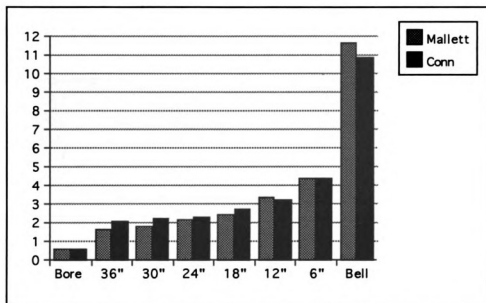


Figure 82
Bore and large bell comparison: Instrument No. 20

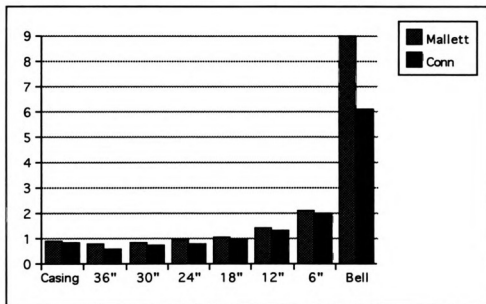


Figure 83
Valve casing and small bell comparison: Instrument No. 20



Figure 84

Instrument No. 20: Conn, Serial # 151986 - Front



Figure 85

Instrument No. 20: Conn, Serial # 151986 - Back

Instrument Number:	21		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	155282		
Date of Manufacture:	1918		
Owner/Collection:	The Shrine to Music Museum, Cat. #2604 University of South Dakota		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.829 in	21.06 mm
Bore Size:		.555 in	14.10 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	18.0 in 457.20 mm
Tuning Slide Bore	Large	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
	Small	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
Height:		28.0 in	711.20 mm
Weight:		9.438 lbs	4.281 kg
Comments:			

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(# 21)

Bell Bore	Large	36 inches from bell:	1.605 in	40.77 mm
		30 inches from bell:	1.850 in	46.99 mm
		24 inches from bell:	2.137 in	54.27 mm
		18 inches from bell:	2.478 in	62.94 mm
		12 inches from bell:	2.997 in	76.12 mm
		6 inches from bell:	4.088 in	103.84 mm
	Small	36 inches from bell:	.605 in	15.37 mm
		30 inches from bell:	.709 in	18.01 mm
		24 inches from bell:	.825 in	20.96 mm
		18 inches from bell:	.987 in	25.07 mm
		12 inches from bell:	1.286 in	32.66 mm
		6 inches from bell:	2.056 in	52.22 mm

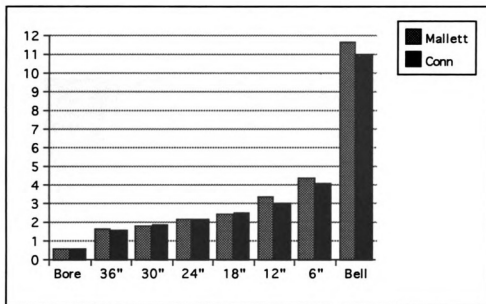


Figure 86
Bore and large bell comparison: Instrument No. 21

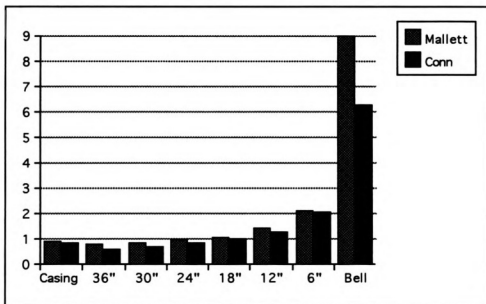


Figure 87
Valve casing and small bell comparison: Instrument No. 21



Figure 88

Instrument No. 21: Conn, Serial # 155282 - Front

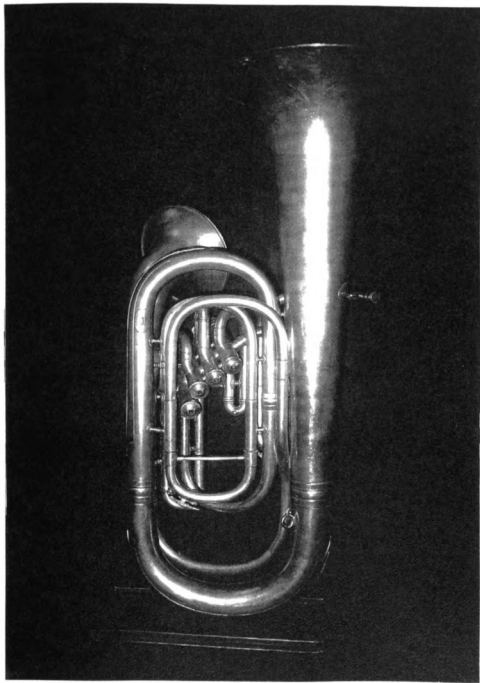


Figure 89

Instrument No. 21: Conn, Serial # 155282 - Back

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Instrument Number:	22		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	159643		
Date of Manufacture:	1918		
Owner/Collection:	The Shrine to Music Museum, Cat. #629 University of South Dakota		
Finish:	silver		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.829 in	21.06 mm
Bore Size:		.555 in	14.10 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	21.0 in 533.40 mm
Tuning Slide Bore	Large	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
	Small	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
Height:		28.0 in	711.20 mm
Weight:		9.688 lbs	4.394 kg
Comments:			

(# 22)

Bell Bore	Large	36 inches from bell:	1.646 in	41.81 mm
		30 inches from bell:	1.870 in	47.50 mm
		24 inches from bell:	2.123 in	53.92 mm
		18 inches from bell:	2.480 in	62.99 mm
		12 inches from bell:	3.090 in	78.49 mm
		6 inches from bell:	4.252 in	108.00 mm
	Small	36 inches from bell:	.617 in	15.67 mm
		30 inches from bell:	.715 in	18.16 mm
		24 inches from bell:	.811 in	20.60 mm
		18 inches from bell:	.982 in	24.94 mm
		12 inches from bell:	1.406 in	35.71 mm
		6 inches from bell:	2.058 in	52.27 mm

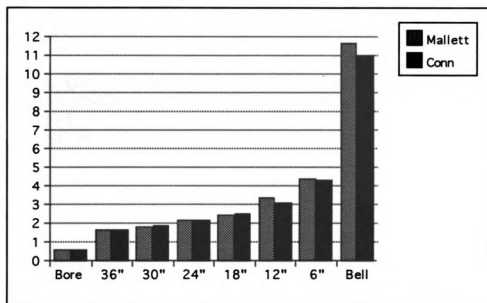


Figure 90
Bore and large bell comparison: Instrument No. 22

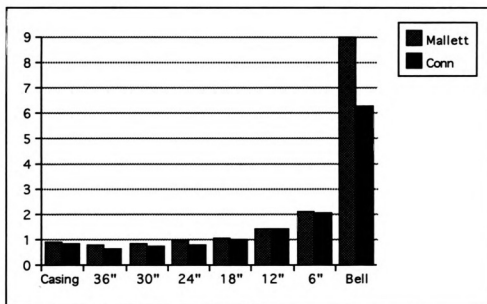


Figure 91
Valve casing and small bell comparison: Instrument No. 22



Figure 92
Instrument No. 22: Conn, Serial # 159643 - Front



Figure 93
Instrument No. 22: Conn, Serial # 159643 - Back

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Instrument Number:	23		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	170545		
Date of Manufacture:	1920		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	lacquered brass		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:	.831 in	21.11 mm	
Bore Size:	.556 in	14.13 mm	
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 5th valve 21.5 in	546.10 mm
Tuning Slide Bore	Large	In:	.556 in 14.13 mm
		Out:	.556 in 14.13 mm
	Small	In:	.556 in 14.13 mm
		Out:	.556 in 14.13 mm
Height:	29.75 in	755.65 mm	
Weight:	10.5 lbs	4.763 kg	
Comments:	lacquer quite heavy - probably redone at some point.		

(# 23)

Bell Bo

(# 23)

Bell Bore	Large	36 inches from bell:	1.600 in	40.64 mm
		30 inches from bell:	1.843 in	46.82 mm
		24 inches from bell:	2.118 in	53.80 mm
		18 inches from bell:	2.469 in	62.71 mm
		12 inches from bell:	3.142 in	79.81 mm
		6 inches from bell:	4.204 in	106.78 mm
	Small	36 inches from bell:	.560 in	14.23 mm
		30 inches from bell:	.687 in	17.46 mm
		24 inches from bell:	.773 in	19.64 mm
		18 inches from bell:	.922 in	23.42 mm
		12 inches from bell:	1.209 in	30.71 mm
		6 inches from bell:	1.882 in	47.80 mm

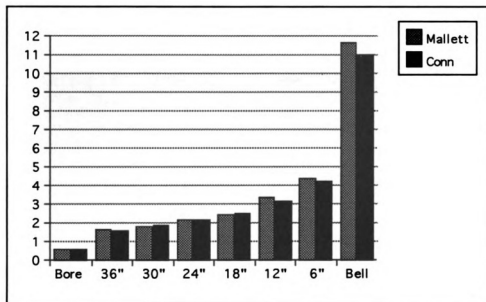


Figure 94
Bore and large bell comparison: Instrument No. 23

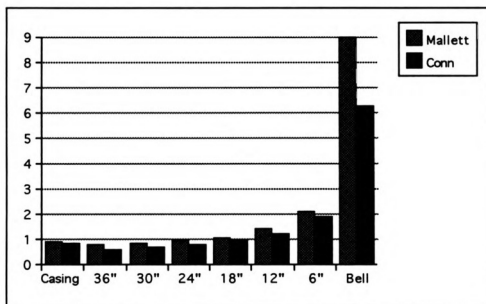


Figure 95
Valve casing and small bell comparison: Instrument No. 23



Figure 96

Instrument No. 23: Conn, Serial # 170545 - Front



Figure 97

Instrument No. 23: Conn, Serial # 170545 - Back

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Instrument Number:	24		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	224167		
Date of Manufacture:	1925		
Owner/Collection:	Ron Gibbs East Lansing, Michigan		
Finish:	lacquered brass		
Bell Location	Large:	upright, left side;	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.831 in	21.11 mm
Bore Size:		.560 in	14.22 mm
Tuning Slide Location	Large:	after 4th valve 7.625	193.68 mm
	Small:	after 4th valve 26.0 in	660.40 mm
Tuning Slide Bore	Large	In:	.597 in 15.15 mm
		Out:	.731 in 18.56 mm
	Small	In:	.563 in 14.30 mm
		Out:	.608 in 15.45 mm
Height:		28.5 in	723.90 mm
Weight:		9.125 lbs	4.139 kg
Comments:			

(# 24)

Bell Bore	Large	36 inches from bell:	1.646 in	41.80 mm
		30 inches from bell:	1.909 in	48.50 mm
		24 inches from bell:	2.110 in	53.56 mm
		18 inches from bell:	2.424 in	61.57 mm
		12 inches from bell:	2.926 in	74.32 mm
		6 inches from bell:	3.913 in	99.40 mm
	Small	36 inches from bell:	.608 in	15.45 mm
		30 inches from bell:	.693 in	17.61 mm
		24 inches from bell:	.746 in	18.94 mm
		18 inches from bell:	.937 in	23.79 mm
		12 inches from bell:	1.267 in	32.18 mm
		6 inches from bell:	1.956 in	49.68 mm

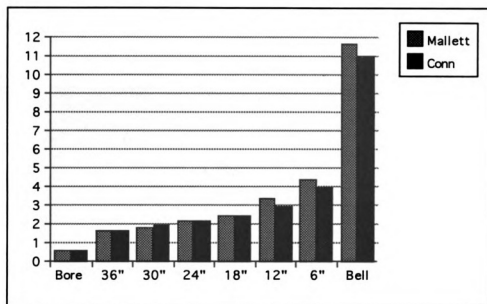


Figure 98
Bore and large bell comparison: Instrument No. 24

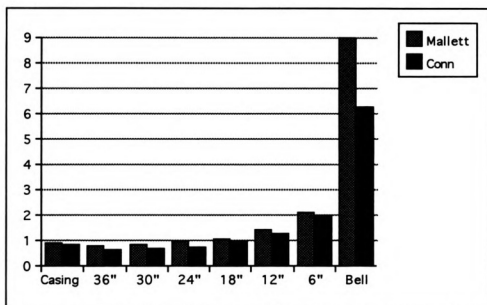


Figure 99
Valve casing and small bell comparison: Instrument No. 24



Figure 100
Instrument No. 24: Conn, Serial # 224167 - Front



Figure 101
Instrument No. 24: Conn, Serial # 224167 - Back

Instrument Number:	25		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	274996		
Date of Manufacture:	ca.1930		
Owner/Collection:	The Shrine to Music Museum, Cat. #1398 University of South Dakota		
Finish:	silver, gold inside both bells		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.75 in	273.05 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.829 in	21.06 mm
Bore Size:		.546 in	13.87 mm
Tuning Slide Location	Large:	after 5th valve 6.0 in	152.4 mm
	Small:	after 5th valve 27.0 in	685.80 mm
Tuning Slide Bore	Large	In:	.590 in 14.99 mm
		Out:	.717 in 18.21 mm
	Small	In:	.546 in 13.87 mm
		Out:	.546 in 13.87 mm
Height:		31.0 in	787.40 mm
Weight:		11.063 lbs	5.018 kg
Comments:			

(# 25)

Bell Bore	Large	36 inches from bell:	1.735 in	44.07 mm
		30 inches from bell:	1.967 in	49.96 mm
		24 inches from bell:	2.252 in	57.20 mm
		18 inches from bell:	2.651 in	67.34 mm
		12 inches from bell:	3.266 in	82.96 mm
		6 inches from bell:	4.190 in	106.43 mm
	Small	36 inches from bell:	.622 in	15.80 mm
		30 inches from bell:	.755 in	19.18 mm
		24 inches from bell:	.834 in	21.18 mm
		18 inches from bell:	.893 in	22.68 mm
		12 inches from bell:	1.358 in	34.49 mm
		6 inches from bell:	2.087 in	53.01 mm

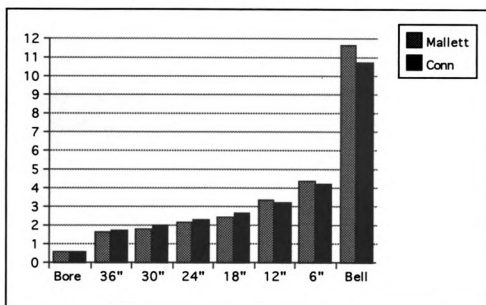


Figure 102
Bore and large bell comparison: Instrument No. 25

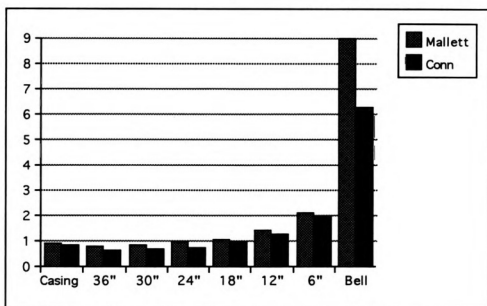


Figure 103
Valve casing and small bell comparison: Instrument No. 25



Figure 104

Instrument No. 25: Conn, Serial # 274996 - Front



Figure 105
Instrument No. 25: Conn, Serial # 274996 - Back

Instrument Number:	26		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	303798		
Date of Manufacture:	1935		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	matte silver, gold inside both bells		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.898 in	22.82 mm
Bore Size:		.555 in	14.10 mm
Tuning Slide Location	Large:	after 5th valve 6.0 in	152.4 mm
	Small:	after 5th valve 26.75 in	679.45 mm
Tuning Slide Bore	Large	In:	.595 in 15.12 mm
		Out:	.721 in 18.31 mm
	Small	In:	.559 in 14.20 mm
		Out:	.559 in 14.20 mm
Height:		31.0 in	787.40 mm
Weight:		12.063 lbs	5.472 kg
Comments:	Series 30-I		

(# 26)

Bell Bore	Large	36 inches from bell:	1.696 in	43.08 mm
		30 inches from bell:	1.994 in	50.65 mm
		24 inches from bell:	2.237 in	56.82 mm
		18 inches from bell:	2.672 in	67.87 mm
		12 inches from bell:	3.228 in	82.00 mm
		6 inches from bell:	4.318 in	109.68 mm
	Small	36 inches from bell:	.620 in	15.74 mm
		30 inches from bell:	.659 in	16.74 mm
		24 inches from bell:	.736 in	18.70 mm
		18 inches from bell:	.906 in	23.01 mm
		12 inches from bell:	1.193 in	30.30 mm
		6 inches from bell:	1.859 in	47.22 mm

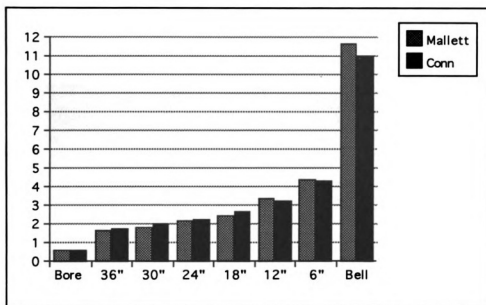


Figure 106
Bore and large bell comparison: Instrument No. 26

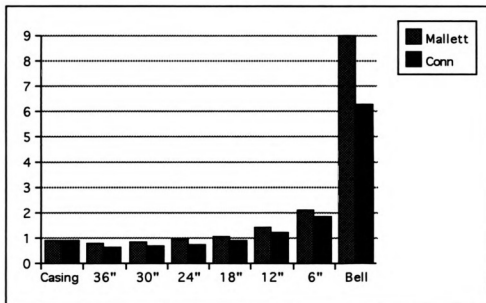


Figure 107
Valve casing and small bell comparison: Instrument No. 26



Figure 108
Instrument No. 26: Conn, Serial # 303798 - Front



Figure 109
Instrument No. 26: Conn, Serial # 303798 - Back

Instrument Number:	27		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	358093		
Date of Manufacture:	1946		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	matte silver, gold inside both bells		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.899 in	22.84 mm
Bore Size:		.558 in	14.17 mm
Tuning Slide Location	Large:	after 5th valve 6.5 in	165.10 mm
	Small:	after 5th valve 27.0 in	685.80 mm
Tuning Slide Bore	Large	In:	.593 in 15.07 mm
		Out:	.716 in 18.18 mm
	Small	In:	.560 in 14.22 mm
		Out:	.560 in 14.22 mm
Height:		31.0 in	787.40 mm
Weight:		12.25 lbs	5.557 kg
Comments:	Series 30-I		

(# 27)

Bell Bore	Large	36 inches from bell:	1.739 in	44.17 mm
		30 inches from bell:	1.952 in	49.58 mm
		24 inches from bell:	2.333 in	59.26 mm
		18 inches from bell:	2.709 in	68.82 mm
		12 inches from bell:	3.005 in	76.33 mm
		6 inches from bell:	4.115 in	104.52 mm
	Small	36 inches from bell:	.607 in	15.42 mm
		30 inches from bell:	.648 in	16.46 mm
		24 inches from bell:	.735 in	18.68 mm
		18 inches from bell:	.920 in	23.37 mm
		12 inches from bell:	1.166 in	29.62 mm
		6 inches from bell:	1.838 in	46.69 mm

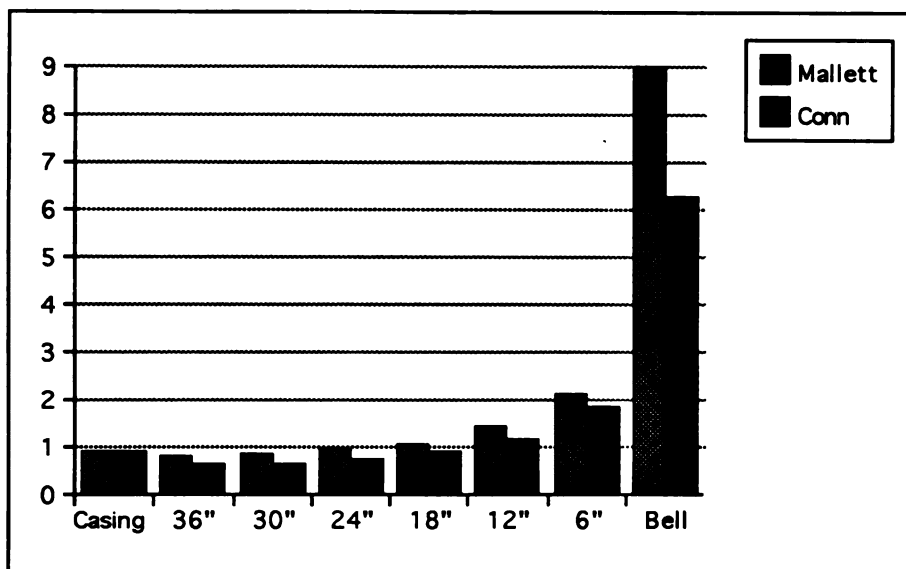


Figure 110
Bore and large bell comparison: Instrument No. 27

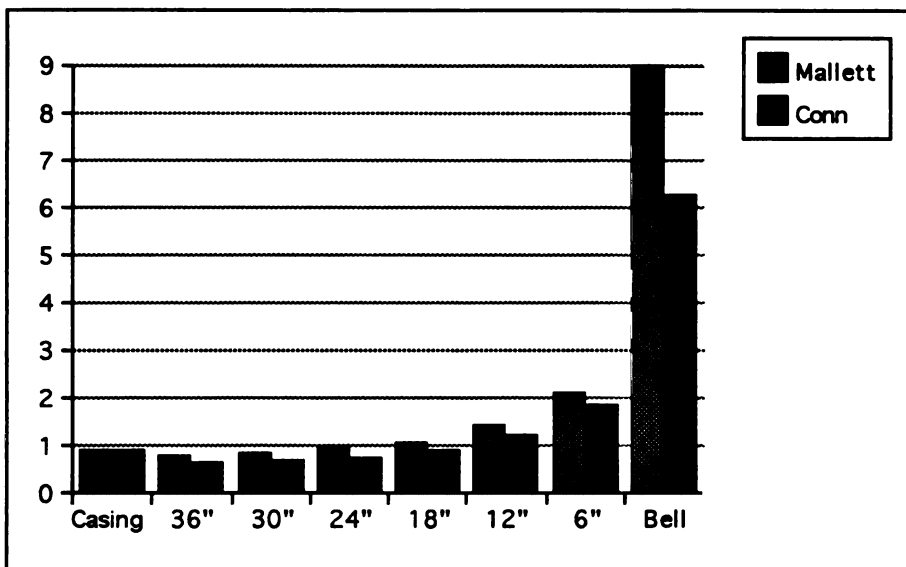


Figure 111
Valve casing and small bell comparison: Instrument No. 27



Figure 112

Instrument No. 27: Conn, Serial # 358093 - Front



Figure 113
Instrument No. 27: Conn, Serial # 358093 - Back

Instrument Number:	28		
Manufacturer:	C. G. Conn Elkhart, Indiana		
Serial Number:	358122		
Date of Manufacture:	1946		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	matte silver, gold inside both bells		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.899 in	22.84 mm
Bore Size:		.558 in	14.17 mm
Tuning Slide Location	Large:	after 5th valve 6.5 in	165.10 mm
	Small:	after 5th valve 26.75 in	679.45 mm
Tuning Slide Bore	Large	In:	.593 in 15.07 mm
		Out:	.710 in 18.04 mm
	Small	In:	.560 in 14.22 mm
		Out:	.560 in 14.22 mm
Height:		31.0 in	787.40 mm
Weight:		12.063 lbs	5.472 kg
Comments:	Series 30-I		

(# 28)

Bell Bore	Large	36 inches from bell:	1.668 in	42.37 mm
		30 inches from bell:	1.927 in	48.95 mm
		24 inches from bell:	2.181 in	55.40 mm
		18 inches from bell:	2.680 in	68.07 mm
		12 inches from bell:	3.044 in	77.32 mm
		6 inches from bell:	4.222 in	107.22 mm
	Small	36 inches from bell:	.609 in	15.46 mm
		30 inches from bell:	.655 in	16.64 mm
		24 inches from bell:	.733 in	18.62 mm
		18 inches from bell:	.904 in	22.96 mm
		12 inches from bell:	1.174 in	29.82 mm
		6 inches from bell:	1.852 in	47.04 mm

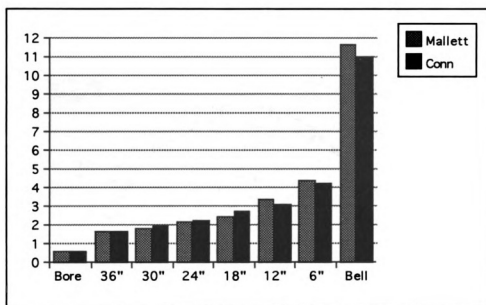


Figure 114
Bore and large bell comparison: Instrument No. 28

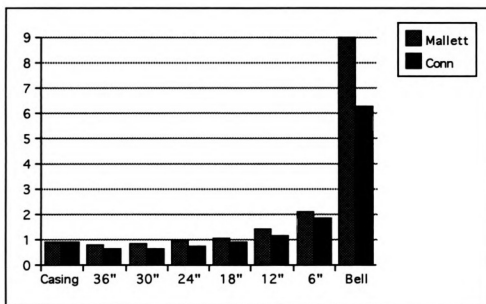


Figure 115
Valve casing and small bell comparison: Instrument No. 28



Figure 116

Instrument No. 28: Conn, Serial # 358122 - Front



Figure 117

Instrument No. 28: Conn, Serial # 358122 - Back

Instrument Number:	29		
Manufacturer:	Henry Distin Williamsport, Pennsylvania		
Serial Number:	10178		
Date of Manufacture:	1893		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.5 in	292.10 mm
	Small:	6.25 in	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	three on top, two on left side		
Valve Casing Diameter:	.885 in 22.48 mm		
Bore Size:	.570 in 14.48 mm		
Tuning Slide Location	Large:	after 5th valve 5.0 in	127.00 mm
	Small:	after 5th valve 29.0 in	736.60 mm
Tuning Slide Bore	Large	In:	.592 in 15.04 mm
		Out:	.673 in 17.09 mm
	Small	In:	.620 in 15.75 mm
		Out:	.620 in 15.75 mm
Height:	25.34 in 654.05 mm		
Weight:	9.813 lbs 4.451 kg		
Comments:	Small bell not original		
	Heavy engraving on bells, ferrules, braces and protective plates.		

(# 29)

Bell Bore	Large	36 inches from bell:	1.725 in	43.82 mm
		30 inches from bell:	1.931 in	49.05 mm
		24 inches from bell:	2.169 in	55.09 mm
		18 inches from bell:	2.644 in	67.16 mm
		12 inches from bell:	3.258 in	82.75 mm
		6 inches from bell:	4.395 in	111.63 mm
	Small	36 inches from bell:	.653 in	16.59 mm
		30 inches from bell:	.705 in	17.91 mm
		24 inches from bell:	.792 in	20.12 mm
		18 inches from bell:	1.000 in	25.40 mm
		12 inches from bell:	1.225 in	31.12 mm
		6 inches from bell:	2.010 in	51.05 mm

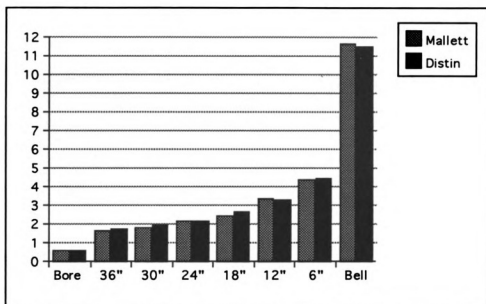


Figure 118
Bore and large bell comparison: Instrument No. 29

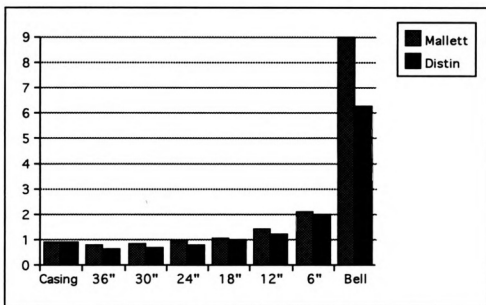


Figure 119
Valve casing and small bell comparison: Instrument No. 29



Figure 120

Instrument No. 29: Distin, Serial # 10178 - Front

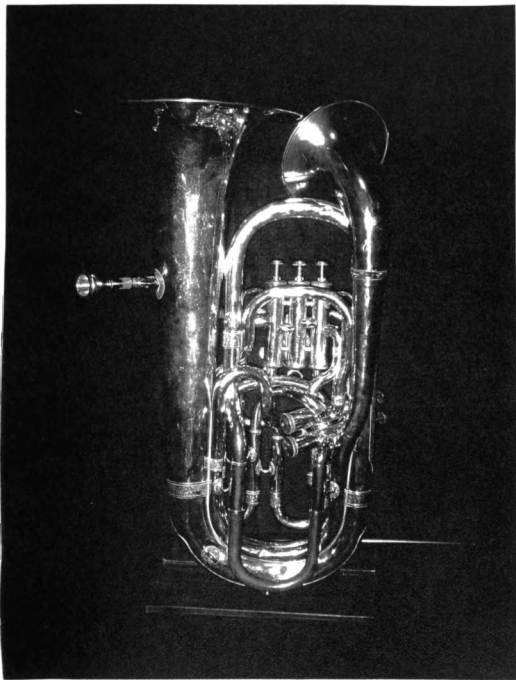


Figure 121
Instrument No. 29: Distin, Serial # 10178 - Back

Instrument Number:	30		
Manufacturer:	Henry Distin Williamsport, Pennsylvania		
Serial Number:	10271		
Date of Manufacture:	1893-94		
Owner/Collection:	William White, Traveler's Club International Restaurant and Tuba Museum; Okemos, MI		
Finish:	silver		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.5 in	292.10 mm
	Small:	7.188 in	182.56 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	three on top, two on left side		
Valve Casing Diameter:	.876 in 22.23 mm		
Bore Size:	.560 in 14.23 mm		
Tuning Slide Location	Large:	after 5th valve 6.25 in	158.75 mm
	Small:	after 5th valve 12.0 in	304.80 mm
Tuning Slide Bore	Large	In:	.619 in 15.72 mm
		Out:	.680 in 17.28 mm
	Small	In:	.617 in 15.67 mm
		Out:	.623 in 15.82 mm
Height:	28.25 in 717.55 mm		
Weight:	9.25 lbs 4.196 kg		
Comments:	Heavy engraving on bells, ferrules, braces and protective plates.		

(# 30)

Bell Bore	Large	36 inches from bell:	1.600 in	40.64 mm
		30 inches from bell:	1.738 in	44.14 mm
		24 inches from bell:	2.103 in	53.40 mm
		18 inches from bell:	2.513 in	63.83 mm
		12 inches from bell:	2.961 in	75.20 mm
		6 inches from bell:	3.996 in	101.50 mm
	Small	36 inches from bell:	.667 in	16.93 mm
		30 inches from bell:	.714 in	18.14 mm
		24 inches from bell:	.802 in	20.36 mm
		18 inches from bell:	.996 in	25.29 mm
		12 inches from bell:	1.333 in	33.84 mm
		6 inches from bell:	1.787 in	45.37 mm

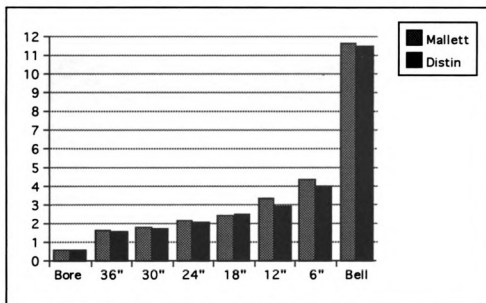


Figure 122
Bore and large bell comparison: Instrument No. 30

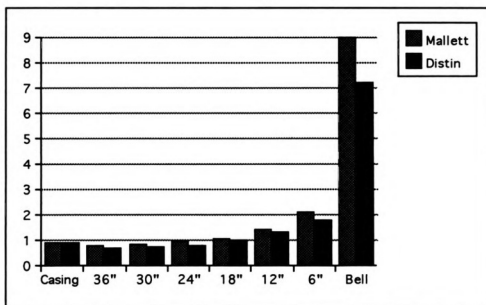


Figure 123
Valve casing and small bell comparison: Instrument No. 30



Figure 124
Instrument No. 30: Distin, Serial # 10271 - Front



Figure 125
Instrument No. 30: Distin, Serial # 10271 - Back

Instrument Number:	31		
Manufacturer:	Carl Fischer (importer) New York		
Serial Number:	NA		
Date of Manufacture:	ca. 1910		
Owner/Collection:	The Shrine to Music Museum, Cat. #2153 University of South Dakota		
Finish:	silver		
Bell Location	Large:	upright, right side	
	Small:	missing, (front facing), right side; detachable	
Bell Size	Large:	9.75 in	247.65 mm
	Small:	NA	
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:		.822 in	20.88 mm
Bore Size:		.522 in	13.26 mm
Tuning Slide Location	Large:	after 4th valve 6.0 in	152.40 mm
	Small:	after 4th valve 13.25 in	336.55 mm
Tuning Slide Bore	Large	In:	.559 in 14.20 mm
		Out:	.588 in 14.94 mm
	Small	In:	.509 in 12.93 mm
		Out:	.509 in 12.93 mm
Height:		25.25 in	641.35 mm
Weight:		6.938 lbs	3.147 kg
Comments:	Small bell missing. Probably imported from Besson, London.		

(#31)

Bell Bore	Large	36 inches from bell:	1.424 in	36.17 mm
		30 inches from bell:	1.594 in	40.49 mm
		24 inches from bell:	1.874 in	47.60 mm
		18 inches from bell:	2.245 in	57.02 mm
		12 inches from bell:	2.826 in	71.78 mm
		6 inches from bell:	3.779 in	95.99 mm
	Small	36 inches from bell:	NA	
		30 inches from bell:	NA	
		24 inches from bell:	NA	
		18 inches from bell:	NA	
		12 inches from bell:	NA	
		6 inches from bell:	NA	

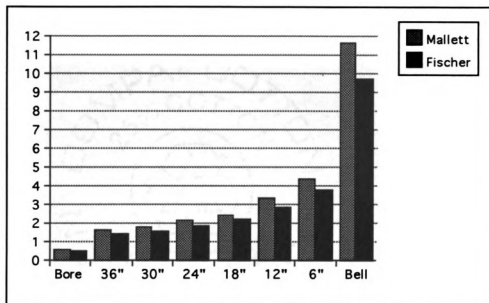


Figure 126
Bore and large bell comparison: Instrument No. 31

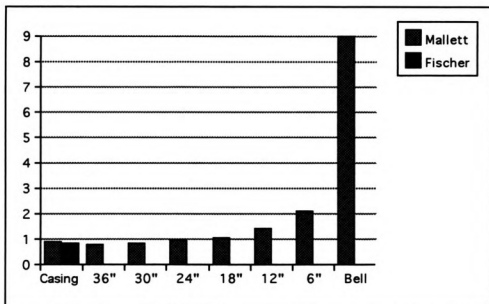


Figure 127
Valve casing and small bell comparison: Instrument No. 31



Figure 128
Instrument No. 31: Fischer, Serial # NA (ca. 1910) - Front



Figure 129
Instrument No. 31: Fischer, Serial # NA (ca. 1910) - Back

Instrument Number:	32		
Manufacturer:	Frank Holton Chicago		
Serial Number:	11375		
Date of Manufacture:	1910		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	10.75 in	273.05 mm
	Small:	6.0 in.	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:		.799 in	20.29 mm
Bore Size:		.555 in	14.10 mm
Tuning Slide Location	Large:	after 4th valve 4.25 in	114.30 mm
	Small:	after 4th valve 6.75 in	171.45 mm
Tuning Slide Bore	Large	In:	.590 in 14.99 mm
		Out:	.660 in 16.76 mm
	Small	In:	.570 in 14.48 mm
		Out:	.570 in 14.48 mm
Height:		24.25 in	615.95 mm
Weight:		10.00 lbs	4.536 kg
Comments:			

(# 32)

Bell Bore	Large	36 inches from bell:	1.648 in	41.86 mm
		30 inches from bell:	1.861 in	47.27 mm
		24 inches from bell:	2.168 in	55.07 mm
		18 inches from bell:	2.602 in	66.09 mm
		12 inches from bell:	3.267 in	82.98 mm
		6 inches from bell:	4.299 in	109.19 mm
	Small	36 inches from bell:	.609 in.	15.47 mm
		30 inches from bell:	.609 in.	15.47 mm
		24 inches from bell:	.706 in.	17.93 mm
		18 inches from bell:	.794 in.	20.17 mm
		12 inches from bell:	1.032 in.	26.21 mm
		6 inches from bell:	1.543 in.	39.19 mm

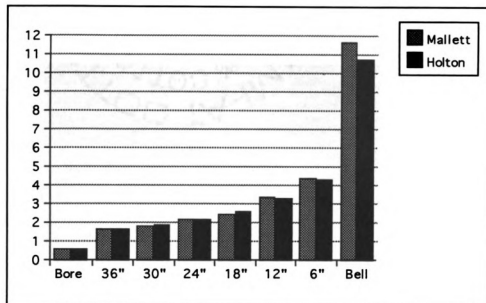


Figure 130
Bore and large bell comparison: Instrument No. 32

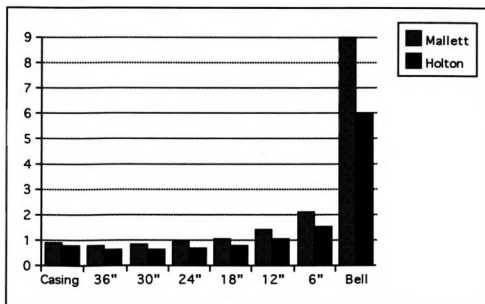


Figure 131
Valve casing and small bell comparison: Instrument No. 32



Figure 132
Instrument No. 32: Holton, Serial # 11375 - Front



Figure 133
Instrument No. 32: Holton, Serial # 11375 - Back

Instrument Number:	33		
Manufacturer:	Frank Holton Elkhorn, Wisconsin		
Serial Number:	84612		
Date of Manufacture:	1924		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver, gold inside both bells		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in.	158.75 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:	.933 in 23.70 mm		
Bore Size:	NA		
Tuning Slide Location	Large:	after 4th valve 5.75 in	146.05 mm
	Small:	after 4th valve 22.25 in	565.15 mm
Tuning Slide Bore	Large	In:	.585 in 14.86 mm
		Out:	.650 in 16.51 mm
	Small	In:	.577 in 14.66 mm
		Out:	.577 in 14.66 mm
Height:	33.0 in 838.20 mm		
Weight:	11.688 lbs 5.301 kg		
Comments:			

(# 33)

Bell Bore	Large	36 inches from bell:	1.865 in	47.37 mm
		30 inches from bell:	2.090 in	53.09 mm
		24 inches from bell:	2.398 in	60.91 mm
		18 inches from bell:	2.702 in	68.63 mm
		12 inches from bell:	3.247 in	82.47 mm
		6 inches from bell:	4.159 in	105.64 mm
	Small	36 inches from bell:	.716 in.	18.19 mm
		30 inches from bell:	.725 in.	18.42 mm
		24 inches from bell:	.822 in.	20.88 mm
		18 inches from bell:	.994 in.	25.25 mm
		12 inches from bell:	1.245 in.	31.62 mm
		6 inches from bell:	1.913 in.	48.59 mm

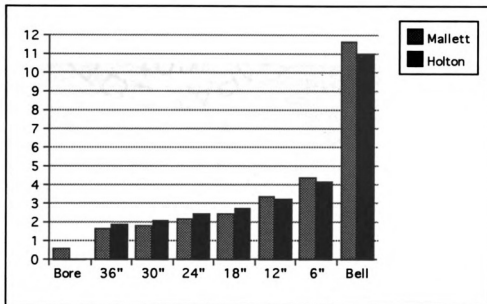


Figure 134
Bore and large bell comparison: Instrument No. 33

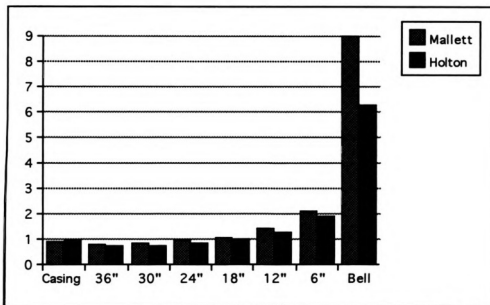


Figure 135
Valve casing and small bell comparison: Instrument No. 33

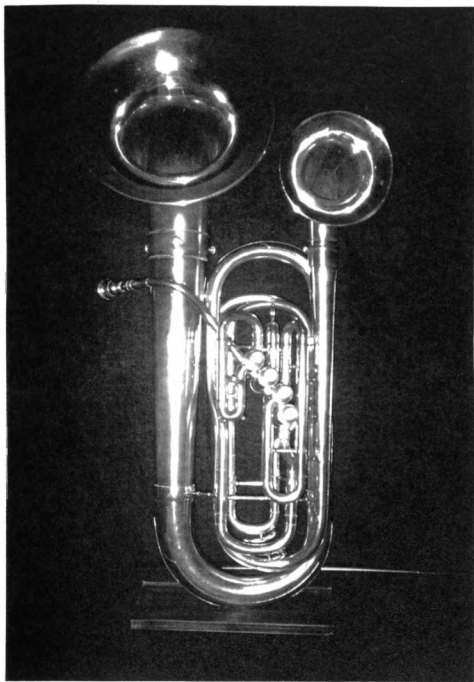


Figure 136
Instrument No. 33: Holton, Serial # 84612 - Front



Figure 137
Instrument No. 33: Holton, Serial # 84612 - Back

Instrument Number:	34		
Manufacturer:	Frank Holton Elkhorn, Wisconsin		
Serial Number:	93447		
Date of Manufacture:	1927		
Owner/Collection:	The Shrine to Music Museum, Cat. #3618 University of South Dakota		
Finish:	silver, gold inside both bells		
Bell Location	Large:	front facing, left side; detachable	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.25 in.	158.75 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.811 in	20.60 mm
Bore Size:		.572 in.	14.53 mm
Tuning Slide Location	Large:	after 5th valve 4.25 in	107.95 mm
	Small:	after 5th valve 24.5 in	622.30 mm
Tuning Slide Bore	Large	In:	.585 in 14.86 mm
		Out:	.659 in 16.74 mm
	Small	In:	.585 in 14.86 mm
		Out:	.585 in 14.86 mm
Height:		33.0 in	838.20 mm
Weight:		11.938 lbs	5.415 kg
Comments:			

(# 34)

Bell Bore	Large	36 inches from bell:	1.900 in	48.26 mm
		30 inches from bell:	2.157 in	54.79 mm
		24 inches from bell:	2.429 in	61.70 mm
		18 inches from bell:	2.807 in	72.90 mm
		12 inches from bell:	3.357 in	85.27 mm
		6 inches from bell:	4.249 in	107.92 mm
	Small	36 inches from bell:	NA	
		30 inches from bell:	.708 in.	17.98 mm
		24 inches from bell:	.844 in.	21.44 mm
		18 inches from bell:	1.017 in.	25.83 mm
		12 inches from bell:	1.337 in.	33.96 mm
		6 inches from bell:	2.060 in.	52.32 mm

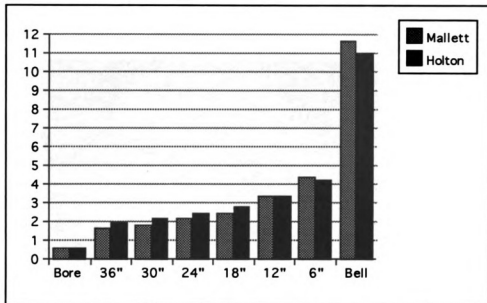


Figure 138
Bore and large bell comparison: Instrument No. 34

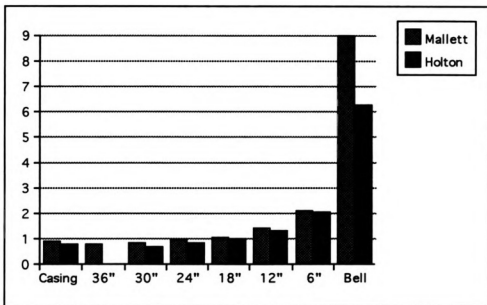


Figure 139
Valve casing and small bell comparison: Instrument No. 34



Figure 140
Instrument No. 34: Holton, Serial # 93447 - Front



Figure 141
Instrument No. 34: Holton, Serial # 93447 - Back

Instrument Number:	35		
Manufacturer:	Martin Elkhart, Indiana		
Serial Number:	14148		
Date of Manufacture:	NA		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.5 in	292.10 mm
	Small:	7.125 in.	180.96 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.820 in	20.83 mm
Bore Size:		.554 in.	14.07 mm
Tuning Slide Location	Large:	after 5th valve	7.75 in 196.85 mm
	Small:	after 5th valve	25.75 in 654.05 mm
Tuning Slide Bore	Large	In:	.579 in 14.71 mm
		Out:	.703 in 17.86 mm
	Small	In:	.558 in 14.17 mm
		Out:	.558 in 14.17 mm
Height:		27.5 in	698.50 mm
Weight:		13.063 lbs	5.925 kg
Comments:			

(# 35)

Bell Bore	Large	36 inches from bell:	2.039 in	51.72 mm
		30 inches from bell:	2.261 in	57.43 mm
		24 inches from bell:	2.504 in	63.60 mm
		18 inches from bell:	2.802 in	71.17 mm
		12 inches from bell:	3.301 in	83.85 mm
		6 inches from bell:	4.478 in	113.74 mm
	Small	36 inches from bell:	.604 in.	15.34
		30 inches from bell:	NA	
		24 inches from bell:	.771 in.	19.58 mm
		18 inches from bell:	.916 in.	23.27 mm
		12 inches from bell:	1.249 in.	31.72 mm
		6 inches from bell:	1.826 in.	46.38 mm

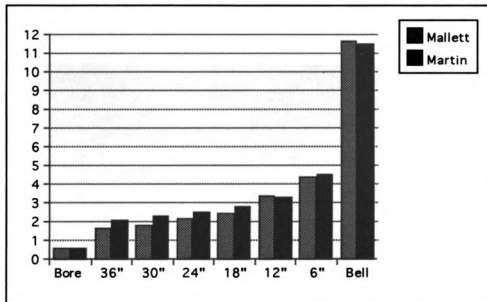


Figure 142
Bore and large bell comparison: Instrument No. 35

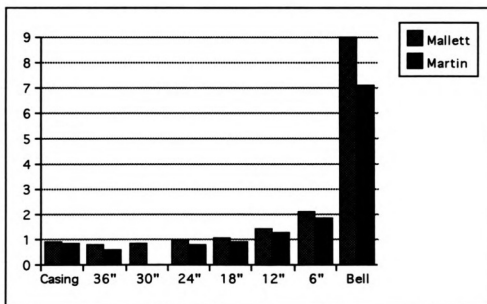


Figure 143
Valve casing and small bell comparison: Instrument No. 35



Figure 144
Instrument No. 35: Martin, Serial # 14148 - Front



Figure 145
Instrument No. 35: Martin, Serial # 14148 - Back

Instrument Number:	36		
Manufacturer:	Ch. Missenharter Stuttgart, Germany		
Serial Number:	9537		
Date of Manufacture:	ca. 1892		
Owner/Collection:	The Shrine to Music Museum, Cat. #2129 University of South Dakota		
Finish:	unlacquered brass		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable (missing)	
Bell Size	Large:	12.0 in	304.80 mm
	Small:	7.75 in.	196.85 mm
Number of Valves:	5 (4 + 1) - rotary valves		
Valve Location:	front, in line vertically		
Valve Casing Diameter:	NA		
Bore Size:	.572 in.	14.53 mm	
Tuning Slide Location	Large:	after 5th valve 2.75 in	69.85 mm
	Small:	after 5th valve 7.75 in	196.85 mm
Tuning Slide Bore	Large	In:	.572 in 14.53 mm
		Out:	.605 in 15.37 mm
	Small	In:	.580 in 14.73 mm
		Out:	.580 in 14.73 mm
Height:	28.0 in	711.20 mm	
Weight:	7.813 lbs	3.544 kg	
Comments:	Small bell missing. Imported by Harry Coleman, Philadelphia.		

(# 36)

Bell Bore	Large	36 inches from bell:	NA	
		30 inches from bell:	1.731 in	43.97 mm
		24 inches from bell:	2.002 in	50.85 mm
		18 inches from bell:	2.349 in	59.66 mm
		12 inches from bell:	3.013 in	76.53 mm
		6 inches from bell:	4.121 in	104.67 mm
	Small	36 inches from bell:	NA	
		30 inches from bell:	NA	
		24 inches from bell:	NA	
		18 inches from bell:	NA	
		12 inches from bell:	NA	
		6 inches from bell:	NA	

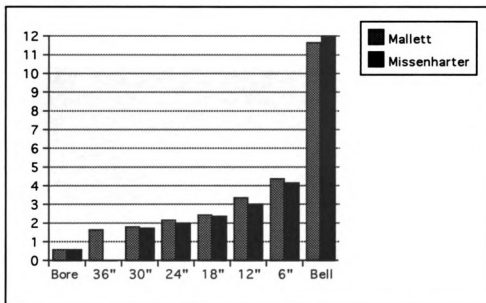


Figure 146
Bore and large bell comparison: Instrument No. 36

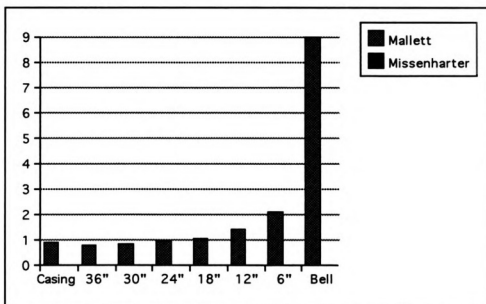


Figure 147
Valve casing and small bell comparison: Instrument No. 36



Figure 148
Instrument No. 36: Missenharter, Serial # 9537 - Front



Figure 149
Instrument No. 36: Missenharter, Serial # 9537 - Back

Instrument Number:	37		
Manufacturer:	Roth-Reynolds Cleveland, Ohio		
Serial Number:	61067		
Date of Manufacture:	1961		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	lacquered brass		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.75 in.	171.45 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.835 in.	21.21 mm
Bore Size:		.560 in.	14.22 mm
Tuning Slide Location	Large:	after 4th valve 6.75 in	171.45 mm
	Small:	after 4th valve 26.0 in	660.40 mm
Tuning Slide Bore	Large	In:	.600 in 15.24 mm
		Out:	.671 in 17.04 mm
	Small	In:	.562 in 14.27 mm
		Out:	.562 in 14.27 mm
Height:		29.0 in	736.60 mm
Weight:		10.25 lbs	4.649 kg
Comments:			

(# 37)

Bell Bore	Large	36 inches from bell:	1.669 in	42.39 mm
		30 inches from bell:	1.887 in	47.93 mm
		24 inches from bell:	2.223 in	56.46 mm
		18 inches from bell:	2.647 in	67.23 mm
		12 inches from bell:	3.178 in	80.72 mm
		6 inches from bell:	4.058 in	103.07 mm
	Small	36 inches from bell:	.663 in	16.84 mm
		30 inches from bell:	.747 in	18.97 mm
		24 inches from bell:	.864 in	21.95 mm
		18 inches from bell:	1.018 in	25.86 mm
		12 inches from bell:	1.392 in	35.36 mm
		6 inches from bell:	1.942 in	49.33 mm

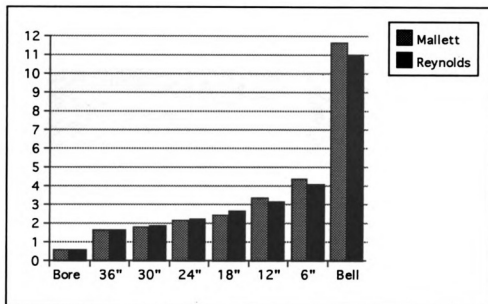


Figure 150
Bore and large bell comparison: Instrument No. 37

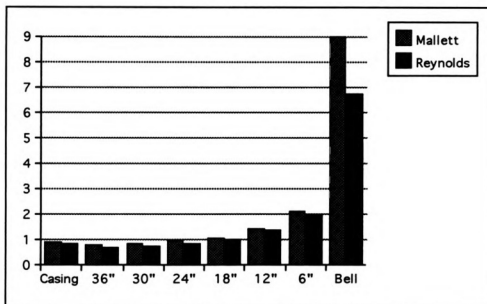


Figure 151
Valve casing and small bell comparison: Instrument No. 37



Figure 152
Instrument No. 37: Reynolds, Serial # 61067 - Front



Figure 153
Instrument No. 37: Reynolds, Serial # 61067 - Back

Instrument Number:	38		
Manufacturer:	H. N. White (King) Cleveland, Ohio		
Serial Number:	20881		
Date of Manufacture:	ca. 1892-1915		
Owner/Collection:	David Friedkin St. Clair, Michigan		
Finish:	matte silver, gold inside small bell		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:		.841 in.	21.36 mm
Bore Size:		.553 in.	14.05 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	17.25 in 438.15 mm
Tuning Slide Bore	Large	In:	.553 in 14.05 mm
		Out:	.553 in 14.05 mm
	Small	In:	.562 in 14.27 mm
		Out:	.562 in 14.27 mm
Height:		26.25 in	666.75 mm
Weight:		8.625 lbs	3.912 kg
Comments:	Refinished by Badger State Repair, Elkhorn, WI in 1994.		

(# 38)

Bell Bore	Large	36 inches from bell:	1.671 in	42.45 mm
		30 inches from bell:	1.849 in	46.96 mm
		24 inches from bell:	2.146 in	54.51 mm
		18 inches from bell:	2.529 in	64.24 mm
		12 inches from bell:	3.381 in	85.88 mm
		6 inches from bell:	4.512 in	114.61 mm
	Small	36 inches from bell:	.608 in	15.45 mm
		30 inches from bell:	.717 in	18.22 mm
		24 inches from bell:	.776 in	19.71 mm
		18 inches from bell:	1.067 in	27.10 mm
		12 inches from bell:	1.546 in	39.27 mm
		6 inches from bell:	2.339 in	59.41 mm

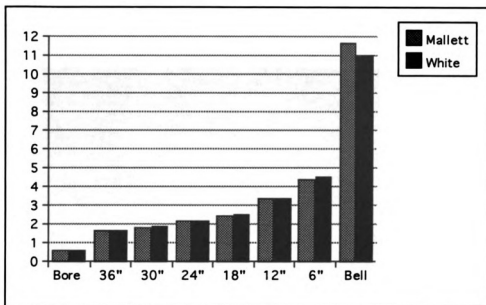


Figure 154
Bore and large bell comparison: Instrument No. 38

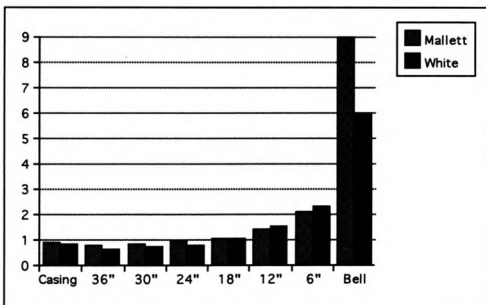


Figure 155
Valve casing and small bell comparison: Instrument No. 38



Figure 156
Instrument No. 38: White, Serial # 20881 - Front



Figure 157
Instrument No. 38: White, Serial # 20881 - Back

Instrument Number:	39		
Manufacturer:	H. N. White (King) Cleveland, Ohio		
Serial Number:	70409		
Date of Manufacture:	ca. 1915-1925		
Owner/Collection:	The Shrine to Music Museum, Cat. #1067 University of South Dakota		
Finish:	silver, gold inside both bells		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	10.5 in	266.70 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.837 in.	21.26 mm
Bore Size:		.554 in.	14.07 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	17.25 in 438.15 mm
Tuning Slide Bore	Large	In:	.554 in 14.07 mm
		Out:	.554 in 14.07 mm
	Small	In:	.554 in 14.07 mm
		Out:	.554 in 14.07 mm
Height:		26.25 in	666.75 mm
Weight:		9.875 lbs	4.479 kg
Comments:			

(# 39)

Bell Bore	Large	36 inches from bell:	1.633 in	41.48 mm
		30 inches from bell:	1.886 in	47.90 mm
		24 inches from bell:	2.224 in	56.49 mm
		18 inches from bell:	2.530 in	64.26 mm
		12 inches from bell:	3.092 in	78.54 mm
		6 inches from bell:	3.957 in	100.51 mm
	Small	36 inches from bell:	.645 in	16.38 mm
		30 inches from bell:	.683 in	17.35 mm
		24 inches from bell:	.780 in	19.81 mm
		18 inches from bell:	NA	
		12 inches from bell:	1.425 in	36.20 mm
		6 inches from bell:	2.012 in	51.10 mm

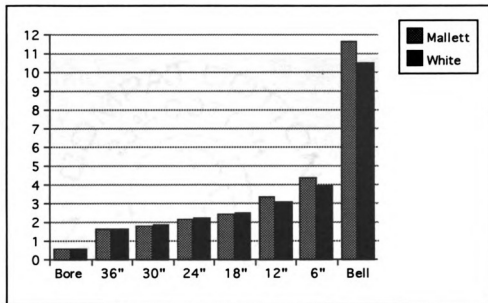


Figure 158
Bore and large bell comparison: Instrument No. 39

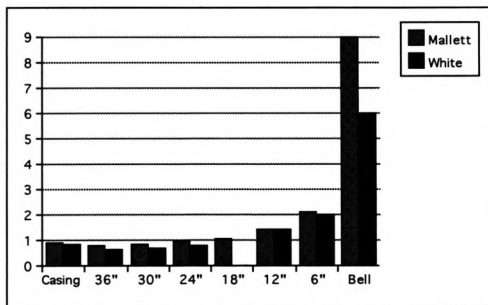


Figure 159
Valve casing and small bell comparison: Instrument No. 39



Figure 160
Instrument No. 39: White, Serial # 70409 - Front



Figure 161

Instrument No. 39: White, Serial # 70409 - Back

Instrument Number:	40		
Manufacturer:	H. N. White (King) Cleveland, Ohio		
Serial Number:	78508		
Date of Manufacture:	ca. 1925		
Owner/Collection:	The Shrine to Music Museum, Cat. #2203 University of South Dakota		
Finish:	silver		
Bell Location	Large:	front facing, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.841 in.	21.36 mm
Bore Size:	NA		
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	17.5 in 444.50 mm
Tuning Slide Bore	Large	In:	NA
		Out:	NA
	Small	In:	.555 in 14.10 mm
		Out:	.555 in 14.10 mm
Height:		28.75 in	730.25 mm
Weight:		9.625 lbs	4.366 kg
Comments:			

(# 40)

Bell Bore	Large	36 inches from bell:	1.702 in	43.23 mm
		30 inches from bell:	1.932 in	49.07 mm
		24 inches from bell:	2.187 in	55.55 mm
		18 inches from bell:	2.511 in	63.78 mm
		12 inches from bell:	3.104 in	78.84 mm
		6 inches from bell:	4.401 in	111.79 mm
	Small	36 inches from bell:	.630 in	16.00 mm
		30 inches from bell:	.677 in	17.20 mm
		24 inches from bell:	.768 in	19.51 mm
		18 inches from bell:	.983 in	24.97 mm
		12 inches from bell:	1.406 in	35.71 mm
		6 inches from bell:	2.076 in	52.73 mm

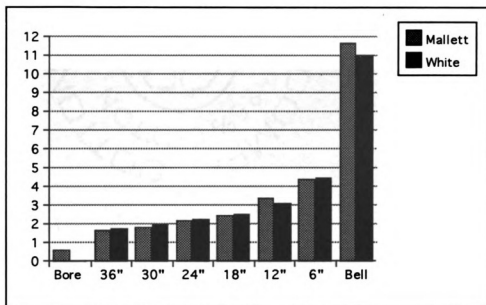


Figure 162
Bore and large bell comparison: Instrument No. 40

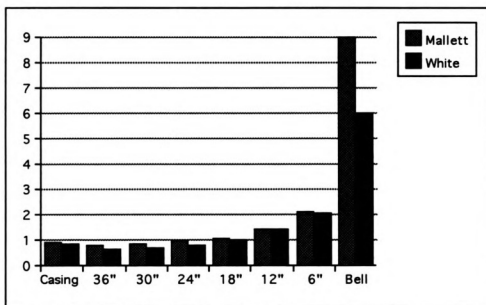


Figure 163
Valve casing and small bell comparison: Instrument No. 40



Figure 164

Instrument No. 40: White, Serial # 78508 - Front



Figure 165

Instrument No. 40: White, Serial # 78508 - Back

Instrument Number:	41		
Manufacturer:	H. N. White (King) Cleveland, Ohio		
Serial Number:	108729		
Date of Manufacture:	ca. 1925-1930		
Owner/Collection:	Port Huron History and Art Museum Port Huron, Michigan		
Finish:	silver, gold inside both bells		
Bell Location	Large:	front facing, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.125 in	282.58 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.837 in	21.26 mm
Bore Size:		.560 in	14.24 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	18.0 in 457.20 mm
Tuning Slide Bore	Large	In:	.560 in 14.24 mm
		Out:	.560 in 14.24 mm
	Small	In:	.557 in 14.15 mm
		Out:	.557 in 14.15 mm
Height:		31.5 in	800.10 mm
Weight:		10.313 lbs	4.678 kg
Comments:			

(# 41)

Bell Bore	Large	36 inches from bell:	1.815 in	46.09 mm
		30 inches from bell:	2.043 in	51.90 mm
		24 inches from bell:	2.450 in	62.22 mm
		18 inches from bell:	2.853 in	72.49 mm
		12 inches from bell:	3.273 in	83.14 mm
		6 inches from bell:	4.338 in	110.17 mm
	Small	36 inches from bell:	.617 in	15.68 mm
		30 inches from bell:	.692 in	17.58 mm
		24 inches from bell:	.758 in	19.24 mm
		18 inches from bell:	.973 in	24.72 mm
		12 inches from bell:	1.375 in	34.93 mm
		6 inches from bell:	1.830 in	46.48 mm

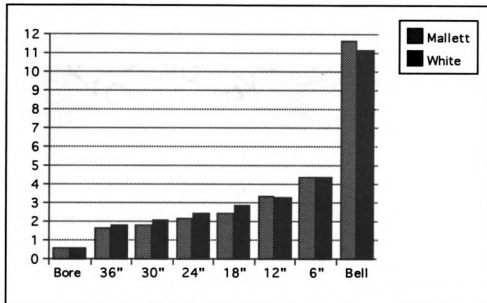


Figure 166
Bore and large bell comparison: Instrument No. 41

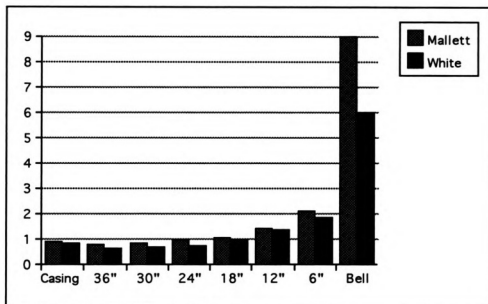


Figure 167
Valve casing and small bell comparison: Instrument No. 41



Figure 168
Instrument No. 41: White, Serial # 108729 - Front



Figure 169

Instrument No. 41: White, Serial # 108729 - Back

Instrument Number:	42		
Manufacturer:	H. N. White (King) Cleveland, Ohio		
Serial Number:	114123		
Date of Manufacture:	ca. 1925-1930		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	lacquered brass		
Bell Location	Large:	front facing, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.839 in	21.31 mm
Bore Size:		.565 in	14.35 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	18.5 in 469.90 mm
Tuning Slide Bore	Large	In:	.565 in 14.35 mm
		Out:	.565 in 14.35 mm
	Small	In:	.565 in 14.35 mm
		Out:	.565 in 14.35 mm
Height:		30.75 in	781.05 mm
Weight:		8.688 lbs	3.941 kg
Comments:			

(# 42)

Bell Bore	Large	36 inches from bell:	1.716 in	43.59 mm
		30 inches from bell:	1.990 in	50.55 mm
		24 inches from bell:	2.313 in	58.75 mm
		18 inches from bell:	2.671 in	67.84 mm
		12 inches from bell:	3.250 in	82.55 mm
		6 inches from bell:	4.745 in	120.52 mm
	Small	36 inches from bell:	.624 in	15.85 mm
		30 inches from bell:	.681 in	17.30 mm
		24 inches from bell:	.740 in	18.80 mm
		18 inches from bell:	.941 in	23.90 mm
		12 inches from bell:	1.340 in	34.04 mm
		6 inches from bell:	1.793 in	45.54 mm

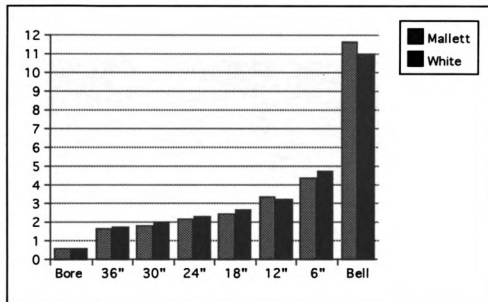


Figure 170
Bore and large bell comparison: Instrument No. 42

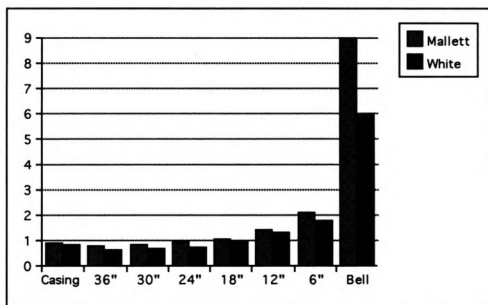


Figure 171
Valve casing and small bell comparison: Instrument No. 42



Figure 172

Instrument No. 42: White, Serial # 114123 - Front

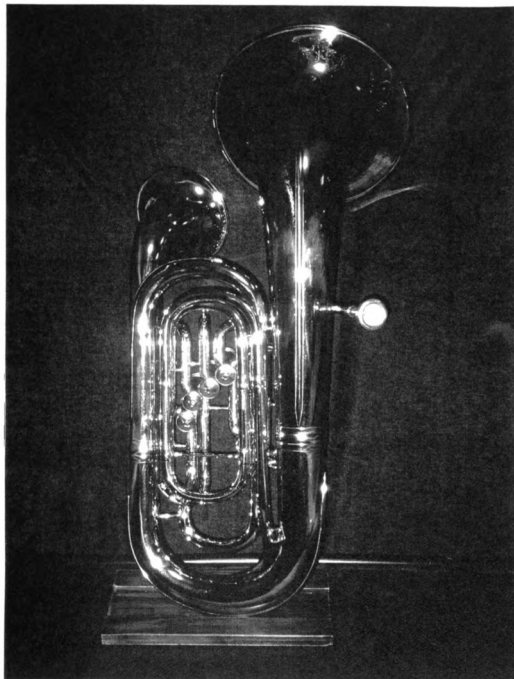


Figure 173
Instrument No. 42: White, Serial # 114123 - Back

Instrument Number:	43		
Manufacturer:	H. N. White (King) Cleveland, Ohio		
Serial Number:	124814		
Date of Manufacture:	ca. 1925-1930		
Owner/Collection:	Ron Gibbs East Lansing, Michigan		
Finish:	lacquered brass		
Bell Location	Large:	front facing, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.0 in	279.40 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.840 in	21.34 mm
Bore Size:		.562 in	14.28 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	17.5 in 444.50 mm
Tuning Slide Bore	Large	In:	.562 in 14.28 mm
		Out:	.562 in 14.28 mm
	Small	In:	.563 in 14.30 mm
		Out:	.563 in 14.30 mm
Height:		30.25 in	793.75 mm
Weight:		9.375 lbs	4.253 kg
Comments:			

(# 43)

Bell Bore	Large	36 inches from bell:	1.739 in	44.17 mm
		30 inches from bell:	1.996 in	50.69 mm
		24 inches from bell:	2.227 in	56.57 mm
		18 inches from bell:	2.566 in	65.16 mm
		12 inches from bell:	2.991 in	75.98 mm
		6 inches from bell:	4.493 in	114.12 mm
	Small	36 inches from bell:	.636 in	16.15 mm
		30 inches from bell:	.683 in	17.34 mm
		24 inches from bell:	.774 in	19.66 mm
		18 inches from bell:	1.011 in	25.68 mm
		12 inches from bell:	1.311 in	33.29 mm
		6 inches from bell:	1.772 in	45.00 mm

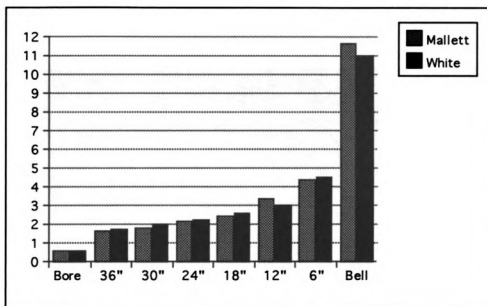


Figure 174
Bore and large bell comparison: Instrument No. 43

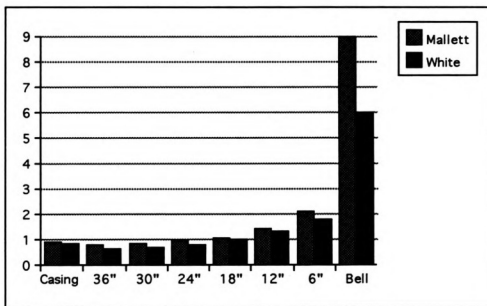


Figure 175
Valve casing and small bell comparison: Instrument No. 43



Figure 176
Instrument No. 43: White, Serial # 124814 - Front



Figure 177

Instrument No. 43: White, Serial # 124814 - Back

Instrument Number:	44		
Manufacturer:	J. W. York Grand Rapids, Michigan		
Serial Number:	95981		
Date of Manufacture:	ca. 1897		
Owner/Collection:	Eric Satterlee, Meridian Winds Haslett, Michigan		
Finish:	silver, gold inside both bells		
Bell Location	Large:	front facing, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.25 in	285.75 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.802 in	20.38 mm
Bore Size:		.560 in	14.23 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve 4.5 in	114.30 mm
Tuning Slide Bore	Large	In:	.560 in 14.23 mm
		Out:	.560 in 14.23 mm
	Small	In:	.560 in 14.23 mm
		Out:	.560 in 14.23 mm
Height:		30.125 in	765.18 mm
Weight:		11.0 lbs	4.990 kg
Comments:			

(# 44)

Bell Bore	Large	36 inches from bell:	1.762 in	44.76 mm
		30 inches from bell:	1.885 in	47.86 mm
		24 inches from bell:	2.270 in	57.66 mm
		18 inches from bell:	2.579 in	65.49 mm
		12 inches from bell:	3.068 in	75.92 mm
		6 inches from bell:	4.495 in	114.17 mm
	Small	36 inches from bell:	.630 in	16.00 mm
		30 inches from bell:	.646 in	16.40 mm
		24 inches from bell:	.704 in	17.88 mm
		18 inches from bell:	.770 in	19.55 mm
		12 inches from bell:	1.128 in	28.64 mm
		6 inches from bell:	1.567 in	39.79 mm

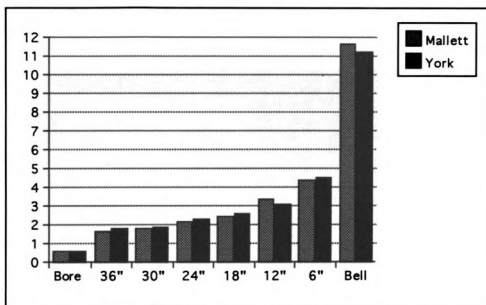


Figure 178
Bore and large bell comparison: Instrument No. 44

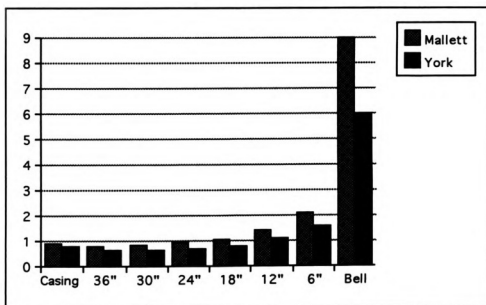


Figure 179
Valve casing and small bell comparison: Instrument No. 44



Figure 180

Instrument No. 44: York, Serial # 95981 - Front



Figure 181

Instrument No. 44: York, Serial # 95981 - Back

Instrument Number:	45		
Manufacturer:	J. W. York Grand Rapids, Michigan		
Serial Number:	17101		
Date of Manufacture:	1900		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.5 in	292.10 mm
	Small:	6.625 in	168.28 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	four on top, one on left side		
Valve Casing Diameter:		.815 in	20.71 mm
Bore Size:		.561 in	14.25 mm
Tuning Slide Location	Large:	after 5th valve 3.75 in	95.25 mm
	Small:	after 5th valve 20.0 in	508.00 mm
Tuning Slide Bore	Large	In:	.598 in 15.19 mm
		Out:	.647 in 16.44 mm
	Small	In:	.570 in 14.48 mm
		Out:	.570 in 14.48 mm
Height:		24.0 in	609.60 mm
Weight:		12.25 lbs	5.557 kg
Comments:			

(# 45)

Bell Bore	Large	36 inches from bell:	1.639 in	41.63 mm
		30 inches from bell:	1.857 in	47.17 mm
		24 inches from bell:	2.054 in	52.18 mm
		18 inches from bell:	2.597 in	65.96 mm
		12 inches from bell:	3.106 in	78.90 mm
		6 inches from bell:	4.278 in	108.67 mm
	Small	36 inches from bell:	.591 in	15.01 mm
		30 inches from bell:	.661 in	16.79 mm
		24 inches from bell:	.762 in	19.35 mm
		18 inches from bell:	.898 in	22.81 mm
		12 inches from bell:	1.234 in	31.34 mm
		6 inches from bell:	2.040 in	51.82 mm

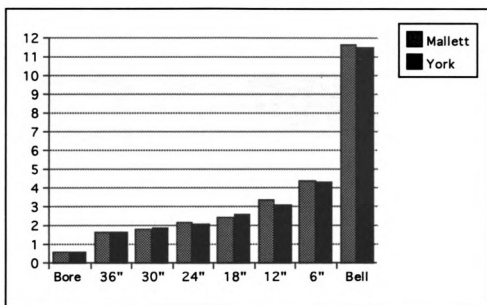


Figure 182
Bore and large bell comparison: Instrument No. 45

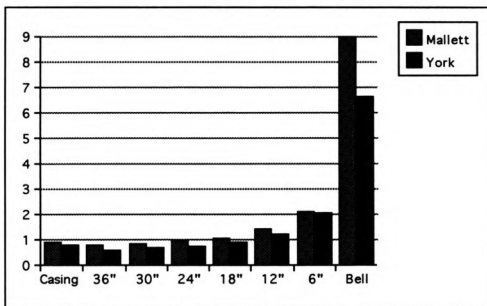


Figure 183
Valve casing and small bell comparison: Instrument No. 45



Figure 184

Instrument No. 45: York, Serial # 17101 - Front



Figure 185
Instrument No. 45: York, Serial # 17101 - Back

Instrument Number:	46		
Manufacturer:	J. W. York Grand Rapids, Michigan		
Serial Number:	48538		
Date of Manufacture:	1912		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.5 in	292.10 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on left side		
Valve Casing Diameter:		.802 in	20.37 mm
Bore Size:		.546 in	13.87 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	36.0 in 914.40 mm
Tuning Slide Bore	Large	In:	.546 in 13.87 mm
		Out:	.546 in 13.87 mm
	Small	In:	.546 in 13.87 mm
		Out:	.546 in 13.87 mm
Height:		25.25 in	641.35 mm
Weight:		9.5 lbs	4.309 kg
Comments:			

(# 46)

Bell Bore	Large	36 inches from bell:	1.577 in	40.06 mm
		30 inches from bell:	1.751 in	44.48 mm
		24 inches from bell:	2.055 in	52.20 mm
		18 inches from bell:	2.558 in	64.97 mm
		12 inches from bell:	3.072 in	78.03 mm
		6 inches from bell:	3.927 in	99.75 mm
	Small	36 inches from bell:	.546 in	13.87 mm
		30 inches from bell:	.658 in	16.71 mm
		24 inches from bell:	.745 in	18.92 mm
		18 inches from bell:	.964 in	24.49 mm
		12 inches from bell:	1.352 in	34.34 mm
		6 inches from bell:	2.061 in	52.35 mm

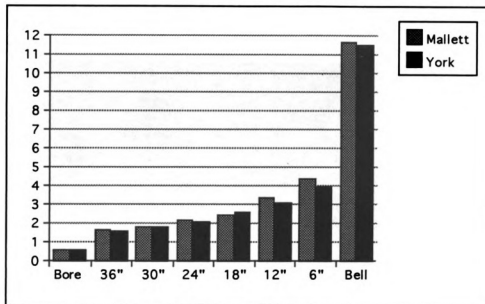


Figure 186
Bore and large bell comparison: Instrument No. 46

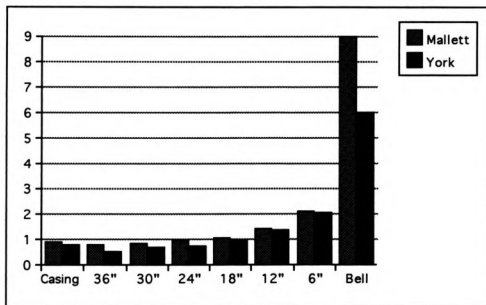


Figure 187
Valve casing and small bell comparison: Instrument No. 46



Figure 188

Instrument No. 46: York, Serial # 48538 - Front

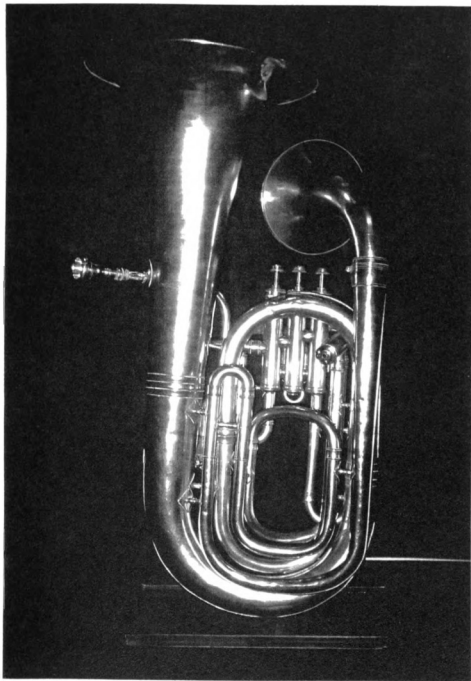


Figure 189
Instrument No. 46: York, Serial # 48538 - Back

Instrument Number:	47		
Manufacturer:	J. W. York Grand Rapids, Michigan		
Serial Number:	63895		
Date of Manufacture:	1918		
Owner/Collection:	The Shrine to Music Museum, Cat. #1023 University of South Dakota		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, right side	
	Small:	front facing, left side; detachable	
Bell Size	Large:	11.0 in	279.4 mm
	Small:	6.0 in	152.40 mm
Number of Valves:	4 (3 + 1)		
Valve Location:	three on top, one on front left side		
Valve Casing Diameter:		.804 in	20.42 mm
Bore Size:		.552 in	14.02 mm
Tuning Slide Location	Large:	before valve cluster	
	Small:	after 4th valve	40.0 in 1016.00 mm
Tuning Slide Bore	Large	In:	.552 in 14.02 mm
		Out:	.552 in 14.02 mm
	Small	In:	.556 in 14.12 mm
		Out:	.556 in 14.12 mm
Height:		25.75 in	654.05 mm
Weight:		9.688 lbs	4.394 kg
Comments:			

(# 47)

Bell Bore	Large	36 inches from bell:	1.627 in	41.33 mm
		30 inches from bell:	1.861 in	47.27 mm
		24 inches from bell:	NA	
		18 inches from bell:	2.590 in	65.79 mm
		12 inches from bell:	3.199 in	81.25 mm
		6 inches from bell:	4.046 in	102.77 mm
	Small	36 inches from bell:	.556 in	14.12 mm
		30 inches from bell:	.687 in	17.45 mm
		24 inches from bell:	.746 in	18.95 mm
		18 inches from bell:	.940 in	23.88 mm
		12 inches from bell:	1.372 in	34.85 mm
		6 inches from bell:	2.150 in	54.61 mm

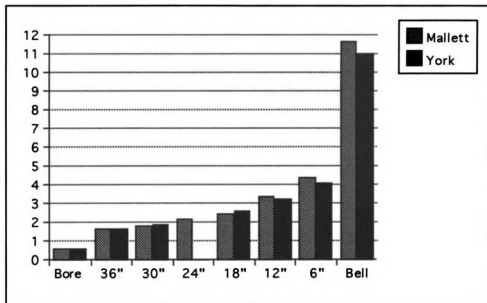


Figure 190
Bore and large bell comparison: Instrument No. 47

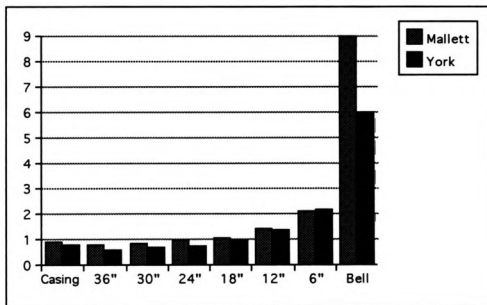


Figure 191
Valve casing and small bell comparison: Instrument No. 47



Figure 192
Instrument No. 47: York, Serial # 63895 - Front



Figure 193
Instrument No. 47: York, Serial # 63895 - Back

Instrument Number:	48		
Manufacturer:	J. W. York Grand Rapids, Michigan		
Serial Number:	126390		
Date of Manufacture:	1940		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.25 in	285.75 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.805 in	20.45 mm
Bore Size:		.549 in	13.94 mm
Tuning Slide Location	Large:	after 5th valve	5.75 in 146.05 mm
	Small:	after 5th valve	23.75 in 603.25 mm
Tuning Slide Bore	Large	In:	.596 in 15.14 mm
		Out:	.713 in 18.11 mm
	Small	In:	.556 in 14.12 mm
		Out:	.556 in 14.12 mm
Height:		27.5 in	698.50 mm
Weight:		11.688 lbs	5.301 kg
Comments:	"US" engraved at top of large bell, indicating its intent for use in a United States Military band.		

(# 48)

Bell Bore	Large	36 inches from bell:	1.657 in	42.09 mm
		30 inches from bell:	1.899 in	48.23 mm
		24 inches from bell:	2.136 in	54.25 mm
		18 inches from bell:	2.578 in	65.48 mm
		12 inches from bell:	3.194 in	81.13 mm
		6 inches from bell:	4.319 in	109.70 mm
	Small	36 inches from bell:	.622 in	15.80 mm
		30 inches from bell:	.689 in	17.50 mm
		24 inches from bell:	.777 in	19.74 mm
		18 inches from bell:	.959 in	24.36 mm
		12 inches from bell:	1.240 in	31.50 mm
		6 inches from bell:	2.005 in	50.93 mm

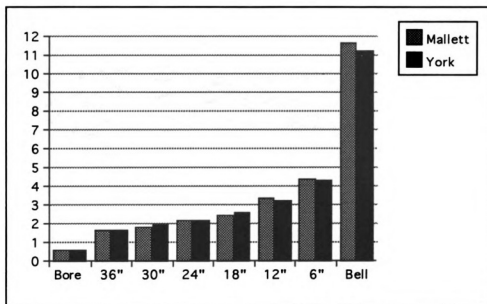


Figure 194
Bore and large bell comparison: Instrument No. 48

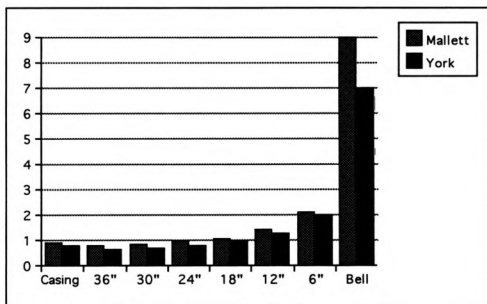


Figure 195
Valve casing and small bell comparison: Instrument No. 48



Figure 196

Instrument No. 48: York, Serial # 126390 - Front

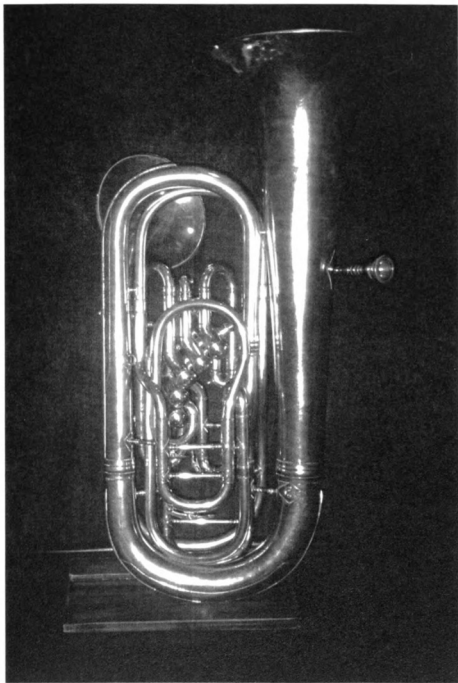


Figure 197

Instrument No. 48: York, Serial # 126390 - Back

Instrument Number:	49		
Manufacturer:	J. W. York Grand Rapids, Michigan		
Serial Number:	126393		
Date of Manufacture:	1940		
Owner/Collection:	anonymous private collection Wisconsin		
Finish:	silver, gold inside small bell		
Bell Location	Large:	upright, left side	
	Small:	front facing, right side; detachable	
Bell Size	Large:	11.25 in	285.75 mm
	Small:	7.0 in	177.80 mm
Number of Valves:	5 (4 + 1)		
Valve Location:	front, in line		
Valve Casing Diameter:		.805 in	20.45 mm
Bore Size:		.549 in	13.94 mm
Tuning Slide Location	Large:	after 5th valve	5.75 in 146.05 mm
	Small:	after 5th valve	23.75 in 603.25 mm
Tuning Slide Bore	Large	In:	.596 in 15.14 mm
		Out:	.713 in 18.11 mm
	Small	In:	.556 in 14.12 mm
		Out:	.556 in 14.12 mm
Height:		27.5 in	698.50 mm
Weight:		11.688 lbs	5.301 kg
Comments:	“US” engraved at top of large bell, indicating its intent for use in a United States Military band. Identical to instrument No. 48 - serial numbers differ by 3.		

(# 49)

Bell Bore	Large	36 inches from bell:	1.657 in	42.09 mm
		30 inches from bell:	1.899 in	48.23 mm
		24 inches from bell:	2.136 in	54.25 mm
		18 inches from bell:	2.578 in	65.48 mm
		12 inches from bell:	3.194 in	81.13 mm
		6 inches from bell:	4.319 in	109.70 mm
	Small	36 inches from bell:	.622 in	15.80 mm
		30 inches from bell:	.689 in	17.50 mm
		24 inches from bell:	.777 in	19.74 mm
		18 inches from bell:	.959 in	24.36 mm
		12 inches from bell:	1.240 in	31.50 mm
		6 inches from bell:	2.005 in	50.93 mm

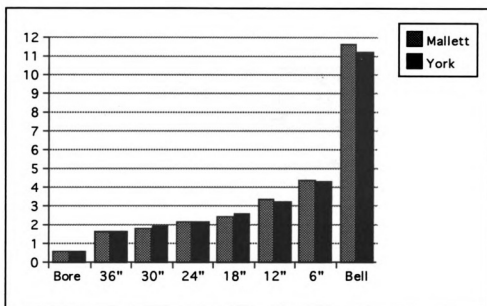


Figure 198
Bore and large bell comparison: Instrument No. 49

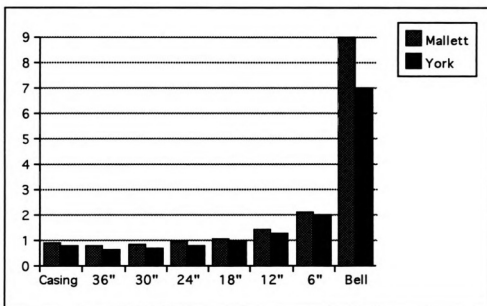


Figure 199
Valve casing and small bell comparison: Instrument No. 49



Figure 200
Instrument No. 49: York, Serial # 126393 - Front



Figure 201
Instrument No. 49: York, Serial # 126393 - Back

CONCLUSIONS

Having forty nine double bell euphoniums available for study was a wonderful opportunity, and to have nearly all of them in such good condition was well beyond expectations. The variety of designs and configurations was much greater than expected, and while many of the instruments were actually studied after the new instrument was completed, those looked at before construction began were quite helpful in determining overall design characteristics. Even those not studied until later proved helpful in gaining a fuller understanding and background of the double bell euphonium.

In designing the new euphonium, perhaps the most helpful aspect of the study of period instruments was discovering shortcomings and areas needing improvement. Tuning between the two bells was a problem consistent among all those instruments that were played, some being off by more than a half step in what should have been “good” ranges. The least offensive instruments still suffered considerable discrepancies in at least some ranges, generally getting worse towards both high and low extremes. Expected in the older instruments, but a bit of a surprise in the more recent euphoniums, was the overall tendency toward small bores. Equally surprising was the conical shape of most of the small bells. The combination of these two factors brings the physical shape of the euphonium and trombone sides of the instrument much closer together than I had previously thought. While the two sides are obviously different, the general tendency of the instruments studied seems to indicate the smaller bell being simply a smaller version of the large bell, in terms of flare shape. While a brighter tone is obtained from the smaller bell due to its smaller bore, the brassy sound generally characteristic of cylindrically bored

instruments was not as evident as expected. Timbral differences proved to be, in many cases, as much the result of the directionality of the small bell versus the large bell than from other factors.

In studying the graphs comparing each of the instruments with the new double bell euphonium, relatively small differences were observed in the shapes of the large bell flares of most instruments compared with that of the new instrument. In many cases, the bell flare was actually less abrupt than that of the new horn, although not significantly. Bore comparisons tended to show little discrepancies on the graphs, but it should be considered that even small differences in the bore size (smaller than could be represented on the graphs) can produce significant variations in timbre. It must also be noted that the bore size which was represented on the graph for the new instrument is the bore through the first three valves only: the new instrument is a compensating euphonium, and as such features a larger bore from the fourth valve on.

The greatest difference between the old double bell euphoniums and the new instrument showed up on the graphs comparing the small bell flares. Without exception, all of the period instruments featured small bell flares of a conical shape, beginning much smaller than the new instrument, but increasing in size much more rapidly than that of the new instrument's small bell, which more closely resembles the size and flare of a bass trombone. Bell size differences were much more significant in the small bells as well, with most being between 6 and 6.5 inches in diameter, compared to 9 inches for the new euphonium.

Also of interest was noting the similarities and differences among instruments of the same manufacturer. This was most evident with the Conn instruments, due to the large number of them studied (25 of the 49), but was of interest with the other manufacturers as well.

In editing period music for the double bell euphonium, the physical act of holding

and playing the instrument proved to be every bit as helpful in recreating the “feel” of the Golden Age soloists as were written and oral descriptions from witnesses. Physical properties, such as valve placement and bell direction, as well as the sensation of switching from one bell to the other, lend themselves to various performance techniques, to be discussed later, and for those who believe in such things, the “connectedness” that one feels with the past can be truly inspiring.



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**THE DOUBLE BELL EUPHONIUM:
DESIGN AND LITERATURE PAST AND PRESENT**

VOLUME II

By

Edward Keith Mallett

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF MUSICAL ARTS

**School of Music
College of Arts and Letters**

1996

CONSTRUCTIONAL INFORMATION FOR ORIGINAL INSTRUMENT

Design Considerations and Materials Resources

The single most important aspect of this double bell euphonium project was the design and construction of a new “modern-day” double bell euphonium, overcoming deficiencies of past instruments and incorporating new innovations not previously imagined. In setting out to do so, of course, these improvements and innovations needed to be identified and clarified, and then accepted or rejected as practical or even possible.

Before even considering practicality, then, a sort of “wish list” of desired features included: a large bore euphonium for the large side of the instrument, in keeping with current euphonium aesthetics; a compensating valve system, enabling more accurate intonation in the low and pedal registers; a large bore cylindrical small side, approximating the bite and full range of a bass trombone; all of the valves in the right hand, freeing the left for other functions; accurate intonation on both sides of the horn in all registers; tuning slides for both bells accessible by the left hand for fine tuning; tuning slide on at least the trombone side built to allow glissando capabilities; consistency of timbres in all registers on both sides; small bell constructed to allow for insertion of mutes, expanding timbral possibilities; small bell to be multi-directional; small bell to be detachable; center of balance to be maintained; and physical appearance to be striking without appearing awkward or unnatural.

Also necessary to the manufacturing process was to find a capable and willing craftsman to oversee production of the instrument. Kevin Powers, brass instrument maker

and owner of Michigan Musical Instrument Service in Monroe, Michigan agreed to become involved with the project and provide guidance in all subsequent aspects of the design and manufacturing process.

Practicality dictated that rather than build a double bell euphonium completely from scratch, a suitable single bell euphonium be found that could serve as a starting point and be modified by adding an extra valve, required tubing and a second bell. A front action compensating euphonium, built by the Willson Company of Switzerland, was chosen for its outstanding quality, including evenness of tone throughout all registers, ease and comfort of holding and playing the instrument, accessibility of the main tuning slide by the left hand, and physical beauty of the instrument. As this instrument unfortunately is not presently available in the United States, Willy Kurath, owner of the Willson Company, graciously agreed to make a single euphonium to be used for the double bell euphonium project.

For the second bell, a bass trombone bell was decided upon, supplied by Ed Getzen, president of the Getzen Company in Elkhorn, Wisconsin. Also supplied by Getzen were a rotor valve to be used for switching between bells, three pieces of brass tubing, and several connecting ferrules. All materials, including the euphonium and parts supplied by Getzen, were made of unlacquered yellow brass.

Exact specifications of all pre-purchased parts are as follows:

Euphonium

Serial number:	09749	
Date of manufacture:	May 1995	
Bore at mouthpiece receiver:	.548 in	13.92 mm
Bore through first three valves:	.594 in	15.09 mm
Bore of fourth and compensating:	.630 in	16.00 mm
Bore into main tuning slide:	.705 in	17.91 mm
Bore out of main tuning slide:	.790 in	17.91 mm
Fourth valve to tuning slide:	10.875 in	276.23 mm
Valve casing diameter:	.918 in	23.32 mm
Diameter of bell:	11.625 in	295.28 mm
Diameter at bell joint:	2.335 in	59.30 mm
Length of bell:	19.500 in	495.30 mm

Fourth valve to bell:	91.000 in	2311.40 mm
Height:	25.25 in	641.35 mm

Trombone Bell

Material:	21 gauge yellow brass	
Rim:	soldered	
Inside diameter at joint end:	.978 in	24.84 mm
Outside diameter at joint end:	1.030 in	26.17 mm
Diameter of bell:	9.000 in	228.60 mm
Length of bell:	22.000 in	558.80 mm

Rotary Valve

Bore:	.592 in	15.04 mm
-------	---------	----------

Brass tubing

Bore:	.590 in	15.00 mm
Outside diameter:	.638 in	16.20 mm
Lengths (3 pieces):	app. 24.00 in	app. 610.00 mm

Ferrules

Inside diameter:	.638 in	16.20 mm
Outside diameter:	.669 in	17.00 mm

Pre-fabricated parts are shown in Figure 202 at the top of page 275.

With these materials at hand, it became possible to focus on the “wish list,” deciding what possibly could and could not be incorporated into the final instrument. Because of the thickness of the brass used in the trombone bell, it was determined that it could not be successfully bent, thus eliminating the possibility of any sort of a directional second bell, as it was too long a piece to face front even at an angle without some sort of bend. Therefore, at a very early stage, it was decided that both bells would be upright, on opposite sides of the body of the euphonium. This design concept is similar to that shown in the Distin catalog (Figure 5, page 21), although the Distin instrument features top action valves rather than the front action valves of the Willson euphonium. Although the directional capability was no longer an option, the upright trombone bell was suitable for the use of mutes, a feature that would not have been possible with a bent directional bell. It was decided that a removable second bell was not a viable option for reasons of bracing.



Figure 202

Materials purchased for double bell euphonium construction:
Willson front-action compensating euphonium, 15mm brass tubing,
15mm rotary valve, 9 inch bass trombone bell, and ferrules



Figure 203

Tubing filled with pitch

Contained within the design of the Willson euphonium were a compensating valve system with all four valves activated by the fingers of the right hand, as well as the main tuning slide positioned in such a way as to be easily accessed by the left hand. It was decided to put the fifth valve, the rotor, immediately after the fourth valve, allowing the euphonium side to expand its bore right out of the valve cluster while maintaining the cylindrical shape of the trombone side. This valve was to be activated by the thumb of the right hand, similar in design to the valve sets of many five valve tubas. Of the physical characteristics hoped for in the “wish list” then, only the long tuning slide for the trombone side of the instrument remained undecided as to its possible inclusion. After much discussion with Mr. Powers, a compromise was reached wherein the tuning slide would be accessible to the left hand, but glissando capabilities would be limited to a shorter interval than originally hoped for. As for intonation problems, consistency of timbres, etc., correct lengths of tubing could be determined, but only playing the instrument upon its eventual completion would prove whether or not these goals were attained.

A number of pencil sketches were created during the designing process, although none of these survived to the end of the project. While many configurations of tubing were discussed and drawn, all were made with the understanding that the tubing would be formed to fit one piece at a time during the construction process. Preliminary decisions and plans were made by the end of August, 1995, at which time the actual work began.

Manufacturing Process

The first order of business was to prepare two of the lengths of brass tubing for eventual bending. First, both tubes were annealed — a process of heating the brass to between 750° and 1000° fahrenheit, using a propane torch. This process softens the brass

as well as reforming the molecular structure, making it more malleable and conducive to manipulation. After cooling, the tubes were then filled with pitch, a compound of resin, beeswax and tar which, at room temperature, allowed the tubing to be bent while retaining its circular cross section. In filling the tubes, the pitch was first heated to a liquid state, care being taken not to boil it, which would cause air bubbles to be present and thus an inconsistent filling, and then poured into heated tubes, both of which were stopped with cork and hung vertically (Figure 203, page 275). These tubes were then allowed to cool back down to room temperature, then set aside for later use.

The next step was the creation of the bottom bow, the conical piece of tubing that would connect the trombone bell to the 15 mm tubing. It was decided to form this piece from heavy weight sheet brass, which would then be rolled, soldered and finally bent to shape. After determining the desired length for the bow (approximately 33 inches), a trapezoidal piece of brass was cut from flat stock and then annealed (Figures 204 and 205, page 278). The flat piece was then formed over a steel taper into a rough tube, first by hand, then by hammer as it came nearer to its final shape (Figures 206 and 207, page 279). Once rolled, notches were cut along one edge allowing for several tongues to overlap the abutting piece for structural strength (Figure 208, page 280). The seam was then soldered with silver solder, a strong solder with a high liquification temperature of over 1100° fahrenheit (Figure 209, page 280).

After cooling, the tube was then worked to eliminate uneven points in the seam, using a combination of mallets and ironing tools (Figure 210, page 281). Once ironed, the tube was polished (Figure 211, page 281), then once again annealed. The new tube was then corked and filled with pitch in the same manner as the two earlier straight tubes. After being cooled back to room temperature, the bottom bow was prepared for bending, partially in a wood jig, created to allow a controlled bending process (Figures 212 and 213, page 282), and partially by hand, when compound bends were not possible on the jig. At

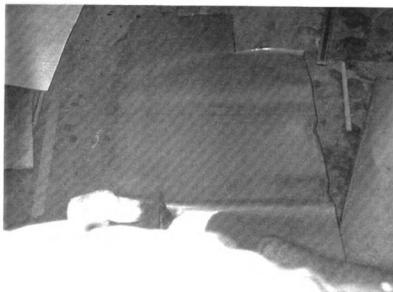


Figure 204
Cutting bottom bow from sheet brass

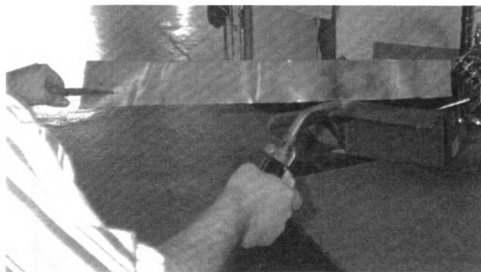


Figure 205
Annealing unformed bottom bow

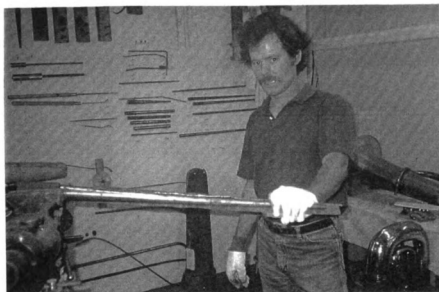


Figure 206
Rolling bottom bow — A



Figure 207
Rolling bottom bow — B



Figure 208
Bottom bow rolled and notched

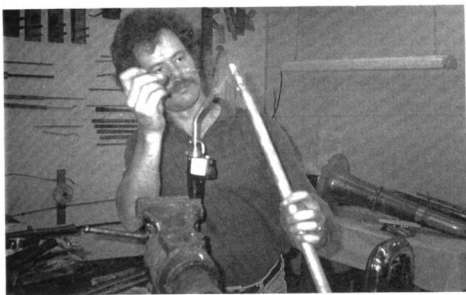


Figure 209
Silver soldering the bottom bow



Figure 210
Ironing the bottom bow seam

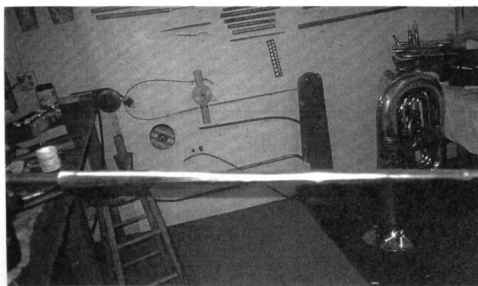


Figure 211
Polished bottom bow tube



Figure 212
Jig for bending bottom bow

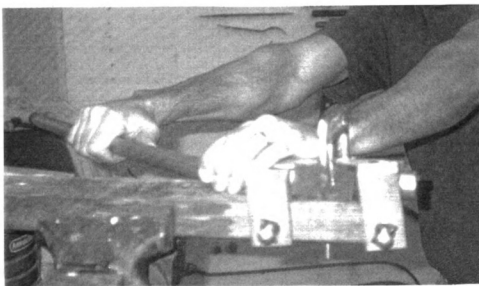


Figure 213
Bending bottom bow to shape

several points during the bending process, the bottom bow was fitted to its destination spot nestled within the bottom bow of the euphonium.

Once bent, the tube was hung upside down and slowly heated, melting the pitch and allowing it to drip out. Any remaining residue was burned out, then soaked in kerosene for complete removal. Small wrinkles that appeared on the inside of the bow during the bending process were removed by a combination of tapping with a small metal mallet (Figure 214, page 284), filing and sanding.

At this point several braces were manufactured, using a combination of materials. Quarter inch brass rod was hollowed out in approximately one inch lengths on a milling machine. These small tubes were then silver soldered onto various sizes of thin brass discs, later to be formed to different parts of the instrument. Two of these pieces were connected with a length of eighth-inch rod fitted in the drilled out receivers of each. When adjusted to their final size, these were then soft soldered into place. Figure 215 on page 284 shows the newly formed bottom bow temporarily spot-soldered to the trombone bell and ready for putting into place on the euphonium. One of the braces can be seen just below the bow/bell joint.

With the bottom bow completed, attention turned to the tuning slide for the trombone. Inner slides were cut from the 15 mm tubing, with the outer slides being made from nickel alloy. In fitting the outer slide shafts to the inner slides, the nickel tubing was meticulously honed with an expanding diamond bit on a honing machine, removing only minute amounts of metal at a time from the inside of the tubes over a period of several minutes for each thousandth of an inch (Figures 216 and 217, page 285). After being honed to a close fit, the inner and outer tubes were hand lapped together for a smooth fit, using a combination of lapping compound, motor oil and slide grease. Once lapped to satisfaction, the inner slides were soldered to a short bow, and the slide assembly was temporarily tied to the euphonium tuning slide in its approximate ultimate position.



Figure 214
Hammering wrinkles out of formed bottom bow



Figure 215
Bottom bow attached to bass trombone bell,
spot-soldered in approximate position

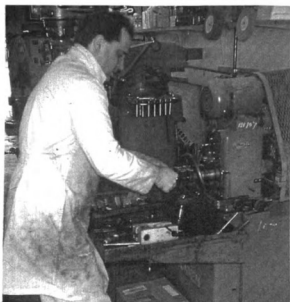


Figure 216
Honing outer tuning slides — A

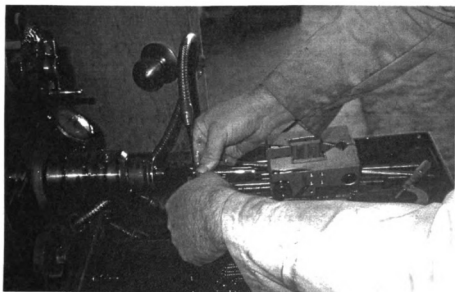


Figure 217
Honing outer tuning slides — B

With the bottom bow and tuning slide tacked into place, a connecting S-shaped piece was cut and bent from one of the pitch filled tubes that had been set aside. As with the bottom bow, once formed, the tube was heated and the pitch removed, then tacked into place.

Another piece of the 15mm tubing was then cut and bent to fit from the tuning slide back down to the bottom of the instrument, again spot-soldering into place. After rechecking measurements, a final piece of tubing was bent to connect to the site of the fifth valve, completing the tubing for the trombone side of the instrument.

All that remained, then, was the installation of the rotary valve, which would allow for the switching back and forth between large and small bells. In order to fit the valve in, a portion of the original euphonium branch from the fourth valve to the tuning slide had to be removed and replaced with a shorter tapered branch, cut and drawn from stock brass tubing. The valve casing was then silver soldered to the connective tube from the fourth valve, as well as the branches to both tuning slides. An interesting situation then arose, that being what to do with the fourth port on the rotor valve, as only three were needed for the actual instrument. Conveniently, this tied into another problem that had arisen, that being the removal of the only water key on the instrument when the fifth valve was installed. By reattaching that portion of the tubing with the water key to the fourth valve port on the rotor valve and capping the other end, a small water reservoir was created, eliminating all gurgling problems from the large side of the euphonium and leaving the active tubing uninterrupted by water holes. Front and back details of this device are shown in Figures 218 and 219 on page 287.

With all of the parts bent, fashioned and formed, final installation and soldering could now be done. Figure 220 on page 288 shows a detail of the tapered branch to the large tuning slide in its final spot, while Figure 221, also on page 288, shows the two branches to the small tuning slide. For ease of active adjustment, thumb rings were made



Figure 218
Detail of water tube — front



Figure 219
Detail of water tube — back

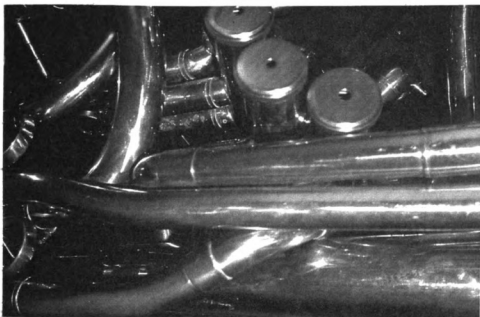


Figure 220
Detail of branch to large tuning slide

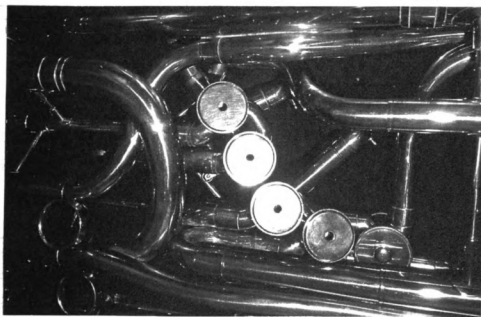


Figure 221
Detail of branch to small tuning slide

for and installed on each of the tuning slides, these rings being cut from solid brass stock on a milling machine (Figure 222, page 290) and attached to square brass rods, which in turn were soldered to the bows of each tuning slide.

Figure 223 on page 290 shows Kevin Powers in the final installation of the connective branch from the rotor valve to the small tuning slide branch.

All tubing permanently installed, the only remaining detail was the valve linkage, allowing operation of the rotary valve with the thumb of the right hand. A two-part linkage was designed and built by Powers, one arm extending from the rotor valve to just above the fourth valve, and the second arm connecting with the first on one end and terminating in a flat pad for the thumb on the other end, bent around the first valve. The springed pivot point was installed on the top side of the second valve. This linkage is shown in Figures 224 and 225 on page 291.

At this point a playing test of the instrument revealed a slight discrepancy in pitch between the two bells, which was rectified by shortening the trombone tuning slide by approximately 1.5 inches. All aspects of the construction being completed and satisfactory, the instrument was cleaned and polished, both by machine, as shown in Figures 226 and 227 on page 292, and by hand.

Following the same format used with the period instruments, measurements and photographs (Figures 228 and 229) of the new double bell euphonium are shown on pages 293 through 296.



Figure 222
Milling thumb rings for tuning slides



Figure 223
Installing branch to rotary valve



Figure 224
Linkage for fifth valve — A



Figure 225
Linkage for fifth valve — B

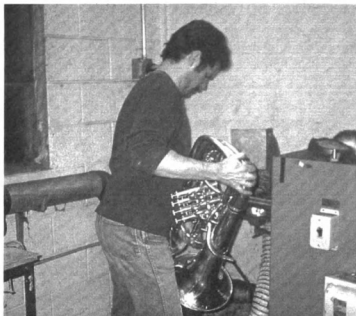


Figure 226
Polishing the instrument on buffing machine — A



Figure 227
Polishing the instrument on buffing machine — B

Manufacturer:		Willson / Getzen / Powers / Mallett		
Serial Number:		09749 (Willson)		
Date of Manufacture:		1995		
Owner/Collection:		Edward K. Mallett Lansing, Michigan		
Finish:		unlacquered brass		
Bell Location	Large:	upright, left side		
	Small:	upright, right side		
Bell Size	Large:	11.625 in	295.28 mm	
	Small:	9.0 in	228.60 mm	
Number of Valves:		5 (4 + 1)		
Valve Location:		front action, in-line		
Valve Casing Diameter:		.918 in	23.32 mm	
Bore Size:		.594/.630 in	15.09/16.00 mm	
Tuning Slide Location	Large:	after 5th valve	10.875 in	276.23 mm
	Small:	after 4th valve	31.625 in	803.28 mm
Tuning Slide Bore	Large	In:	.705 in	17.91 mm
		Out:	.790 in	20.06 mm
	Small	In:	.590 in	15.00 mm
		Out:	.590 in	15.00 mm
Height:		25.25 in	641.35 mm	
Weight:		13.5 lbs	6.124 kg	

Bell Bore	Large	36 inches from bell:	1.612in	40.94 mm
		30 inches from bell:	1.817 in	46.16 mm
		24 inches from bell:	2.152 in	54.65 mm
		18 inches from bell:	2.463 in	62.55 mm
		12 inches from bell:	3.390 in	86.10 mm
		6 inches from bell:	4.365 in	110.88 mm
	Small	36 inches from bell:	.782 in	19.85 mm
		30 inches from bell:	.839 in	21.30 mm
		24 inches from bell:	.923 in	23.45 mm
		18 inches from bell:	1.074 in	27.27 mm
		12 inches from bell:	1.404 in	35.65 mm
		6 inches from bell:	2.098 in	53.29 mm



Figure 228
Completed instrument — Front



Figure 229
Completed instrument — Back

CONCLUSIONS

While nothing but success was expected of the new instrument project, the end product far exceeded the expectations of all those involved. Pitch discrepancies between the two bells are relatively minor, and with the left-hand tuning system, pose no real problem. The required coordination of the right hand is quite extensive, but sufficient practice time cures any temporary ailments and frustrations. The timbral difference between the two bells is not as great as expected — perhaps this is due as much to the large shank, deep cup mouthpiece as much as anything else. A continuation of this project should probably include the design of a new mouthpiece that is able to bring out the desired characteristics of both sides of the instrument.

Perhaps the biggest difficulty in playing this double bell euphonium is in managing its bulk. It is quite a heavy instrument, and with no thumb ring or any other support for the right hand, most of the weight bearing is relegated to the left hand, which of course impedes that hand's ability to manipulate tuning slides, etc. A neck strap seems the best solution, although optimum placement for an attaching ring has yet to be determined. Other upcoming additions or amendments include a protective wire on the bottom bow of the trombone side and silver plating of the instrument.

This instrument has been well received by all who have seen it and had an opportunity to play it. However, its prohibitively high production costs make future versions of this instrument unlikely.

LITERATURE FOR THE DOUBLE BELL EUPHONIUM

As was discussed earlier, very little can be stated with absolute certainty about playing techniques on the double bell euphonium. It is certainly known that all of the great euphonium soloists used the instruments, and it is also understood that they most certainly would have taken full advantage of the instrument in any way possible, but just what those ways are is not likely to ever be known for sure. Nothing appears in print in any old manuscripts of solos. Even band music of the time does not give any clues as to when the small bell would have been used, even though it most certainly was.

As for solo music, the theme-and-variations solos so popular during that era seem to lend themselves to all sorts of echo effects and accented notes, conducive to effective performances on the double bell euphonium. Because this period and the soloists involved play such a prominent role in the history of the euphonium, and specifically that of the double bell euphonium, an edited version of one of Simone Mantia's solos, *Original Fantasie*, has been included, featuring specific performance directives for the double bell euphonium.

There is virtually no double bell euphonium music in print. The *Father and Son Fantasy* by W. W. York is included in this document was quite likely the only solo piece ever written and notated specifically for the double bell euphonium up to the present time. As far as can be determined, however, this piece was never published and has therefore remained obscure since its composition.

Brass Publications of Bloomington, Indiana printed in 1965 a collection of brass sextets arranged by Philip Palmer, the eighth of which has markings indicating the use of

the small bell in the baritone part.⁵⁷ While again not widespread, this seems to be the only designation specifically for double bell euphonium in an ensemble setting.

More recently, Jan Bach's *Concert Variations* for euphonium and piano, composed in 1977, contains a number of timbre trills which are generally performed by means of alternate fingerings, but for which Bach has included optional instructions to alternate bells on a double bell euphonium.⁵⁸

In preparing for this project, a number of options were explored for literature, including the adapting of music for other instruments and the composition of an original work written specifically with the capabilities of the new instrument in mind. Following are brief descriptions of each piece chosen for performance and their reasons for inclusion on the program. An analysis of each piece was not done, as this fell out of the scope of this particular project. It is felt, however, that all of the pieces meet a high musical standard, and serve well the purpose for which they were chosen.

⁵⁷Philip Palmer, *8 Artistic Brass Sextets*. Bloomington: Brass publications, 1965.

⁵⁸Jan Bach, *Concert Variations for Euphonium and Piano*. Annandale, VA: T.U.B.A., 1991.

FANTASIE ORIGINAL

by

Simone Mantia

From the “Golden Age of Bands,” Mantia’s *Fantasie Original*⁵⁹ on themes by Picchi exemplifies the virtuosic solo euphonium stylings of the era. Nothing seems to be known of Picchi or the origin of this work, but it is quite typical of the Italian type of showpiece solo so popular with euphonium soloists of the period, most of whom were Italian or at least of Italian descent, including Raffayola, Perfetto, DeLuca, Mangenaro, Florio, and Funaro, as well as Mantia, generally regarded as the greatest euphonium soloist of all time.

Extant manuscript versions of this piece show no specific indications for performance on double bell euphonium, but it is certain that the instrument was used by Mantia for performances of this piece, even though its exact use is a mystery. In editing this work for the double bell euphonium, recollections of Mantia’s playing style by former band members and conductors fortunate enough to have heard and worked with Mantia were taken into consideration, as were recordings by several artists (none, however, on the double bell instrument). In many instances, the small bell is used as an echo effect against the large bell, reiterating phrases with dynamic and timbral shifts. At other times the two bells alternate phrases in a sort of dialogue, and in other places the crisper timbre of the trombone bell is used to pop out accented notes hidden within a tangle of ornamented figures and scales from the large bell, in much the same manner as was discussed in regards to the final variation of Herbert Clarke’s *Carnival of Venice*. Cadenza passages are a combination of free adaptations of manuscript and recorded versions as well as original

⁵⁹Simone Mantia, *Fantasie Original*. Unpublished.

material. In all aspects of the editing procedure, care has been taken to remain as close to turn-of-the-century solo stylings as possible.

In adding bell designations to the score, the system of + and o over note heads indicating small and large bell, respectively, was chosen for its overall ease of readability. Adapted from horn notation (stopped vs. open horn), these symbols are universally understood and work well in a piece of this type, where passages for each bell tend to be long enough so as not to clutter the page with symbols. As will be seen in other works, particularly *Mutations*, other bell designating devices become necessary as pieces become more complicated.

In keeping with the historical traditions of Mantia's piece, a period instrument seems appropriate for performance of *Original Fantasie*, featuring the compact sound of the baritone and sharp, crisp timbre of the small bell.

on themes by Picchi

Simone Mantia

Edward K. Mallett

A musical score for a piece titled "Cadenza". The score is written in bass clef with a key signature of one flat (B-flat). The melody begins with a half note B-flat, followed by a quarter note G, and then a triplet of eighth notes (F, E, D). This is followed by a quarter rest, then a triplet of eighth notes (C, B, A), and another quarter rest. The piece concludes with a rapid sixteenth-note scale starting on G and descending to D. The word "cadenza" is written below the final scale. The piano part consists of three measures, each containing a whole note chord: B-flat major (B-flat, D, F) in the first measure, G major (G, B, D) in the second, and F major (F, A, C) in the third.

First system of a musical score. The bass staff has a melodic line starting with a half note G4, followed by a quarter note F4, and a quarter rest. The piano (p) dynamic is indicated. The treble staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The bass staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The treble staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated.

Second system of a musical score. The bass staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The treble staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The bass staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The treble staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated.

Third system of a musical score. The bass staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The treble staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The bass staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated. The treble staff has a whole rest, followed by a half note G4, and a half note F4. The piano (p) dynamic is indicated.

First system (measures 1-4):

- Measure 1: Bass clef, B-flat major key signature. Treble clef has a whole note chord (F, A-flat, C). Bass clef has a whole note chord (B-flat, D-flat, F). Dynamics: *fff*.
- Measure 2: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 3: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 4: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.

Second system (measures 5-8):

- Measure 5: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 6: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 7: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 8: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.

Third system (measures 9-12):

- Measure 9: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 10: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 11: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.
- Measure 12: Treble clef has a half note chord (F, A-flat, C). Bass clef has a half note chord (B-flat, D-flat, F). Dynamics: *mp*.

First system of a musical score. The bass staff begins with a treble clef, a key signature of two flats (B-flat and E-flat), and a common time signature. It features a melodic line starting with a quarter note G4, followed by a sixteenth-note triplet ascending to B4, and then a quarter note A4. The piano accompaniment in the grand staff starts with a half-note chord of G4 and B-flat4, followed by a half-note chord of G4 and B-flat4, and then a half-note chord of G4 and B-flat4. The piano part includes dynamic markings *f* and *rub.* (rushing).

Second system of the musical score. The bass staff continues the melodic line with a half-note G4, followed by a half-note A4, and then a half-note B4. The piano accompaniment in the grand staff continues with a half-note chord of G4 and B-flat4, followed by a half-note chord of G4 and B-flat4, and then a half-note chord of G4 and B-flat4. The piano part includes dynamic markings *pp* (pianissimo) and *legato*.

Third system of the musical score. The bass staff continues the melodic line with a half-note G4, followed by a half-note A4, and then a half-note B4. The piano accompaniment in the grand staff continues with a half-note chord of G4 and B-flat4, followed by a half-note chord of G4 and B-flat4, and then a half-note chord of G4 and B-flat4. The piano part includes dynamic markings *sub. f* (subito forte) and *accel.* (accelerando).

First system of musical notation. The upper staff (bass clef) contains a piano solo with a long, flowing melodic line marked with a slur and a fermata. The lower staves (treble and bass clefs) provide harmonic support with chords and single notes, marked with accents and a forte (*ff*) dynamic. The word *cadenza* is written above the piano solo.

Second system of musical notation. The upper staff (bass clef) contains a piano solo with a long, flowing melodic line marked with a slur and a fermata. The lower staves (treble and bass clefs) provide harmonic support with chords and single notes, marked with accents and a forte (*ff*) dynamic. The word *cadenza* is written above the piano solo.

B Allegro moderato ♩ 144

f

B Allegro moderato ♩ 144

f

Third system of musical notation. The upper staff (bass clef) contains a piano solo with a long, flowing melodic line marked with a slur and a fermata. The lower staves (treble and bass clefs) provide harmonic support with chords and single notes, marked with accents and a forte (*ff*) dynamic. The word *cadenza* is written above the piano solo.

First system of a musical score. The bass staff is empty. The treble staff contains a melody with eighth and quarter notes, including a trill. The piano accompaniment in the lower staff consists of chords. The system concludes with a double bar line and a *pp* (pianissimo) dynamic marking.

Second system of a musical score. The bass staff is empty. The treble staff features a melody of eighth notes and a section of sustained chords. The piano accompaniment in the lower staff includes chords and a steady eighth-note bass line. A *f* (forte) dynamic marking is present.

Third system of a musical score. The bass staff is empty. The treble staff contains a melody with dotted rhythms and a crescendo. The piano accompaniment in the lower staff consists of chords. A *mp* (mezzo-piano) dynamic marking is present.

First system of music. The bass line consists of three measures: a whole rest, a whole rest, and a half note G. The piano accompaniment features a continuous eighth-note pattern in the left hand and chords in the right hand. A dynamic marking of *f* (forte) is present in the second measure of the right hand.

③ Tirolese-Allegretto ♩ 96-100

Second system of music. The bass line consists of three measures: a whole rest, a whole rest, and a half note G. The piano accompaniment features a continuous eighth-note pattern in the left hand and chords in the right hand. A dynamic marking of *mf* (mezzo-forte) is present in the first measure of the right hand.

Third system of music. The bass line consists of three measures: a whole rest, a whole rest, and a half note G. The piano accompaniment features a continuous eighth-note pattern in the left hand and chords in the right hand. A dynamic marking of *mf* (mezzo-forte) is present in the first measure of the right hand.

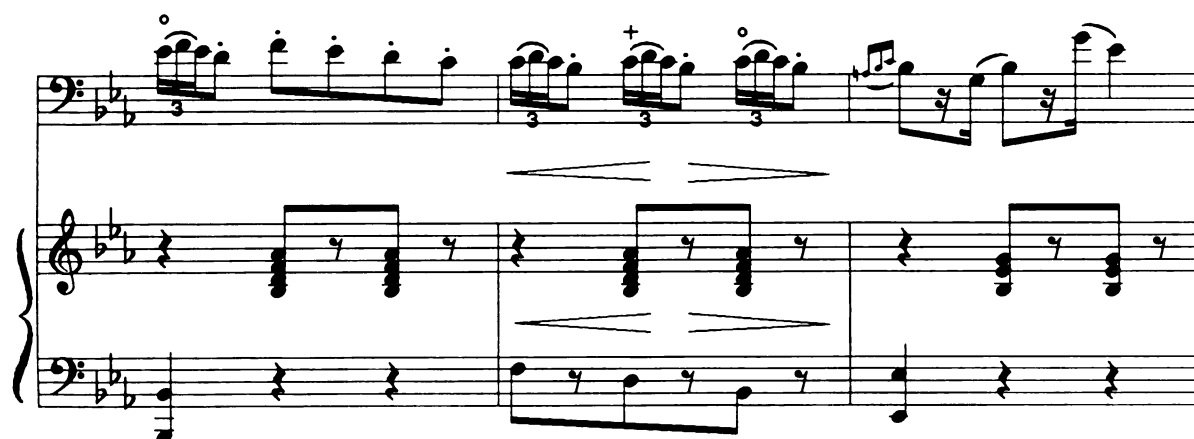


The first system of musical notation consists of three staves. The top staff is a single bass line with a whole rest. The middle staff is a treble line with a melodic line featuring eighth and sixteenth notes, some with slurs and ties. The bottom staff is a bass line with a rhythmic accompaniment of eighth notes and chords.

THEME



The second system of musical notation consists of three staves. The top staff is a single bass line with a melodic line starting with a half note, followed by eighth and sixteenth notes, some with slurs and ties. The middle staff is a treble line with a rhythmic accompaniment of eighth notes and chords. The bottom staff is a bass line with a rhythmic accompaniment of eighth notes and chords. Dynamics include *mp* (mezzo-piano) and *p* (piano).



The third system of musical notation consists of three staves. The top staff is a single bass line with a melodic line featuring eighth and sixteenth notes, some with slurs and ties. The middle staff is a treble line with a rhythmic accompaniment of eighth notes and chords. The bottom staff is a bass line with a rhythmic accompaniment of eighth notes and chords. Dynamics include *sfz* (sforzando) and *p* (piano).

First system of a musical score in B-flat major (two flats). The top staff is a single melodic line with various ornaments (circles with a dot) and a '+' sign above the first measure. The bottom staff is a piano accompaniment with chords and eighth notes. A fortissimo (*ff*) dynamic marking is present in the third measure of the bottom staff.

Second system of the musical score. The tempo is marked "Slower" above the first measure of the top staff. The dynamics are marked *mp* (mezzo-piano) in the first measure of both the top and bottom staves.

Third system of the musical score. The top staff continues the melodic line with a '+' sign above the second measure. The bottom staff continues the piano accompaniment with chords and eighth notes.

First system of music. The solo part (bass clef) begins with a melodic line marked *mf* and *rit.* The piano accompaniment (grand staff) features a steady eighth-note bass line in the left hand and chords in the right hand, also marked *mf* and *rit.*

Second system of music. The solo part (bass clef) is marked *a tempo* and *mp*. The piano accompaniment (grand staff) is marked *a tempo* and *p*. The solo part includes a triplet of eighth notes and a measure with a plus sign and a triplet of eighth notes.

Third system of music. The solo part (bass clef) includes a triplet of eighth notes, a measure with a plus sign and a triplet of eighth notes, and another triplet of eighth notes. The piano accompaniment (grand staff) features a steady eighth-note bass line in the left hand and chords in the right hand.

Var. I
piu mosso
◦ 1st x, + 2nd x

The image displays three systems of musical notation for a piano and bassoon. The first system begins with a key signature change to B-flat major (two flats) and a tempo change to *piu mosso*. It features a complex bassoon line with sixteenth-note patterns and triplets, and a piano accompaniment with chords and a steady bass line. A first ending bracket labeled 'D' spans the final measures of the first system. The second system continues the melodic lines, with the bassoon playing a long, flowing phrase. The third system introduces triplets in both the bassoon and piano parts, with a dynamic marking of *p* (piano) appearing in the piano part.



musical score for a piano and bassoon piece, page 314. The score is in B-flat major and 4/4 time. It consists of three systems.

The first system shows the bassoon playing a melodic line with grace notes and slurs, while the piano provides harmonic support with chords and a walking bass line.

The second system features a "cadenza" section for the bassoon, marked with a fermata and a crescendo leading to a fortissimo (*ff*) section. The piano part has a dynamic change from piano (*p*) to fortissimo (*ff*).

The third system shows the bassoon playing a rapid, ascending scale-like passage, while the piano part remains silent.

This musical score consists of three systems, each featuring a piano (p) and a bassoon (mp) part. The key signature is B-flat major (two flats). The piano part is written in treble and bass staves, while the bassoon part is in a single bass staff. The first system includes dynamic markings *mp* for the bassoon and *p* for the piano. The second system includes a *+* marking above the bassoon staff. The third system includes a *+* marking above the bassoon staff. The piano part features a variety of rhythmic patterns, including eighth and sixteenth notes, and rests. The bassoon part features a variety of rhythmic patterns, including eighth and sixteenth notes, and rests. The score is written in a standard musical notation style with a clear layout and a professional appearance.



First system of musical notation. The top staff (bass clef) features a rapid ascending scale with a fermata, marked *ff* and circled **E**. The middle staff (treble clef) contains a melody with a fermata, marked *ff* and circled **E**. The bottom staff (bass clef) provides a harmonic accompaniment with chords and a melodic line, marked *f*.



Second system of musical notation. The top staff (bass clef) is empty. The middle staff (treble clef) continues the melody with a fermata. The bottom staff (bass clef) continues the harmonic accompaniment with chords and a melodic line.



Third system of musical notation. The top staff (bass clef) is empty. The middle staff (treble clef) continues the melody with a fermata. The bottom staff (bass clef) continues the harmonic accompaniment with chords and a melodic line.



First system of musical notation. The bass staff is empty. The treble and bass staves of the piano part show a melodic line in the treble and a rhythmic accompaniment in the bass. The key signature has two flats (B-flat and E-flat).



Second system of musical notation. The bass staff is empty. The treble and bass staves of the piano part continue the melodic and rhythmic patterns from the first system. The key signature remains two flats.



Third system of musical notation. The bass staff is empty. The treble and bass staves of the piano part conclude the piece. The key signature remains two flats. Performance markings include *rit.* (ritardando) and *mp* (mezzo-piano) in the bass staff, and *rit.* and *sfz* (sforzando) in the treble staff. A final chord is marked with a *+* sign.

F Var. II $\text{♩} = 84$

p



The first system of musical notation consists of three staves. The top staff is a single bass clef staff with a key signature of two flats (B-flat and E-flat). It contains a complex melodic line with many sixteenth and thirty-second notes, including slurs and ties. A first ending bracket labeled '1' spans the final measures. The middle staff is a grand staff (treble and bass clefs) with a key signature of two flats. It contains a series of chords, mostly triads and dyads, with some rests. The bottom staff is a single bass clef staff with a key signature of two flats, containing a simple bass line with eighth and quarter notes.



The second system of musical notation consists of three staves. The top staff is a single bass clef staff with a key signature of two flats. It continues the complex melodic line from the first system, with a second ending bracket labeled '2' over the final measures. The middle staff is a grand staff with a key signature of two flats, containing chords and rests. The bottom staff is a single bass clef staff with a key signature of two flats, containing a simple bass line.



The third system of musical notation consists of three staves. The top staff is a single bass clef staff with a key signature of two flats. It continues the complex melodic line, with a third ending bracket labeled '3' over the final measures. The middle staff is a grand staff with a key signature of two flats, containing chords and rests. The bottom staff is a single bass clef staff with a key signature of two flats, containing a simple bass line.



The musical score for 'The Rose Tree' is presented in three systems. The first system features a vocal line in the treble clef and a piano accompaniment in the bass clef. The vocal line begins with a quarter note G4, followed by a half note A4, and then a quarter note B4. The piano accompaniment starts with a quarter note G3, followed by a half note A3, and then a quarter note B3. The second system continues the vocal line with a quarter note C5, followed by a half note D5, and then a quarter note E5. The piano accompaniment continues with a quarter note G3, followed by a half note A3, and then a quarter note B3. The third system concludes the vocal line with a quarter note F5, followed by a half note G5, and then a quarter note A5. The piano accompaniment concludes with a quarter note G3, followed by a half note A3, and then a quarter note B3. The score includes dynamic markings such as *ff* (fortissimo) and *mp* (mezzo-piano), and articulation marks like accents and slurs.

The musical score for 'The Rose Tree' is presented in three systems. The first system features a single melodic line in the bass clef, starting with a key signature of one flat (B-flat) and a common time signature. The melody begins with a forte (*ff*) dynamic, followed by a crescendo leading to a mezzo-forte (*mp*) dynamic. The second system consists of two staves: the upper staff is in the treble clef and the lower staff is in the bass clef. Both staves begin with a forte (*ff*) dynamic. The third system continues the two-staff arrangement, with the upper staff in the treble clef and the lower staff in the bass clef. The score concludes with a final measure in the upper staff.

③ $\text{♩} = 84$

pp

mp

The musical score is written in G major (one sharp) and 2/4 time. It begins with a tempo marking of 84 beats per minute. The first system consists of a bass line and a piano line. The bass line starts with a quarter note G, followed by eighth notes A and B, then a quarter note C. The piano line consists of chords: G-B-E, A-C-E, and B-D-F. The second system continues the bass line with a quarter note D, followed by eighth notes E and F, then a quarter note G. The piano line consists of chords: C-E-G, D-F-A, and E-G-B. The third system features a more complex bass line with sixteenth notes and a piano line with chords and a melodic phrase. The bass line starts with a quarter note A, followed by eighth notes B and C, then a quarter note D. The piano line consists of chords: F-A-C, G-B-E, and A-C-E. The score ends with a double bar line.

First system (measures 1-3): The bass staff is silent. The right hand plays a sequence of eighth and sixteenth notes, while the left hand provides a steady eighth-note accompaniment.

Second system (measures 4-6): The bass staff remains silent. The right hand continues with a melodic line, featuring a triplet in measure 5. The left hand continues with eighth-note accompaniment.

Third system (measures 7-9): The bass staff begins with a half rest in measure 7, followed by a half note in measure 8, and a half note with a '+' sign in measure 9. The right hand has a half note in measure 7, followed by a half note with a circled 'H' in measure 8, and a half note in measure 9. The left hand continues with eighth-note accompaniment. Dynamic markings include *mp* (mezzo-piano) in measure 8 and *p* (piano) in measure 9.



The first system of musical notation consists of three staves. The top staff is a single melodic line in bass clef, featuring a series of eighth and sixteenth notes with various accidentals and a fermata. The bottom two staves are a grand staff in bass clef, with the left hand playing a simple eighth-note accompaniment and the right hand playing a series of chords.



The second system of musical notation consists of three staves. The top staff continues the melodic line from the first system, with a fermata and a plus sign. The bottom two staves continue the accompaniment. The instruction *poco accel.* is written below the right hand of the grand staff.



The third system of musical notation consists of three staves. The top staff continues the melodic line, with a plus sign and a fermata. The bottom two staves continue the accompaniment. The instruction *poco a poco cresc.* is written below the left hand of the grand staff.

First system of the musical score, measures 170-172. The music is in 3/4 time with a key signature of two flats (B-flat and E-flat). The bass staff features a melodic line with a trill in measure 170, followed by a half note in 171 and a quarter note in 172. The treble staff provides harmonic support with chords. Dynamics include *(cresc.)*, *rit.*, and *f*.

Second system of the musical score, measures 173-175. Measures 173 and 174 are marked with a circled 'I' and the word 'FINALE'. The tempo is marked '♩ 172'. The bass staff has a melodic line with a trill in measure 173, followed by a half note in 174 and a quarter note in 175. The treble staff has a steady accompaniment of chords. The dynamic is *p*.

Third system of the musical score, measures 176-178. The bass staff features a melodic line with a trill in measure 176, followed by a half note in 177 and a quarter note in 178. The treble staff has a steady accompaniment of chords. The dynamic is *p*.



First system of musical notation. The top staff (bass clef) contains a melodic line with eighth and sixteenth notes, including accents and a '+' sign. The bottom staff (treble and bass clefs) contains a piano accompaniment with chords and eighth notes. The instruction *poco accel. 2nd time* appears above the right half of the system.



Second system of musical notation. The top staff continues the melodic line with accents and '+' signs. The bottom staff continues the piano accompaniment. The instruction *poco accel. 2nd time* appears above the right half of the system.



Third system of musical notation. The top staff begins with a fermata and a rest, followed by a whole rest. The bottom staff features a piano accompaniment with chords and eighth notes, marked with a forte *f* dynamic.



First system of musical notation. The bass staff is empty. The treble and bass staves of the piano part show a melodic line with slurs and a steady eighth-note accompaniment.



Second system of musical notation. The bass staff has a short melodic phrase marked *ff*. The piano part continues with slurs and a steady eighth-note accompaniment, also marked *ff*.



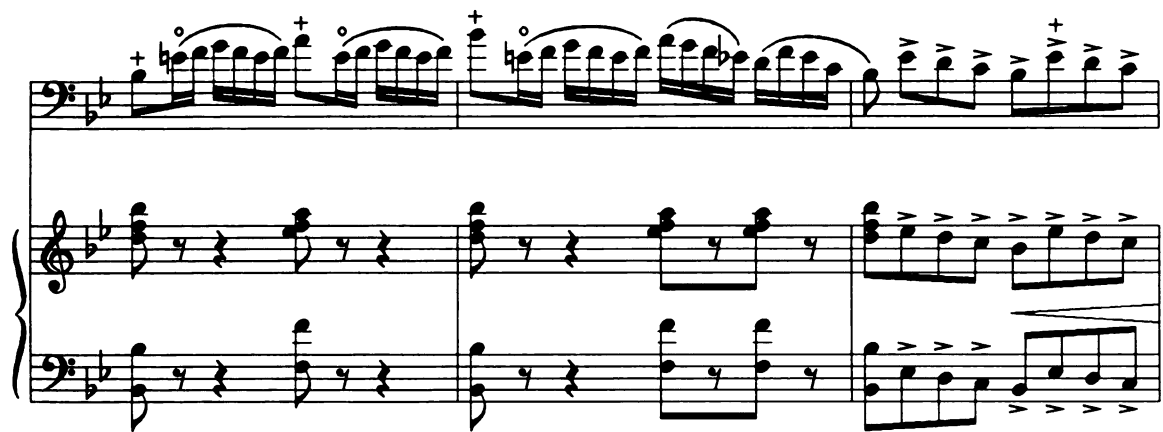
Third system of musical notation. The bass staff features a complex melodic passage marked *ff*, followed by a section marked *mp* and *poco accel.*. The piano part has a section marked *f* and *ff*, followed by a section marked *poco accel.*.



First system of musical notation. The top staff (bass clef) features a rapid sixteenth-note scale ascending, followed by a half note G4 with a breath mark (+) and a half note A4. The bottom staff (treble and bass clefs) shows a piano introduction with a half note G3 in the bass and a half note G4 in the treble, followed by a half note F#4 in the bass and a half note G4 in the treble. The dynamic *ff* (fortissimo) is marked above the treble staff.



Second system of musical notation. The top staff (bass clef) continues the rapid sixteenth-note scale. The bottom staff (treble and bass clefs) features a piano introduction with a half note G3 in the bass and a half note G4 in the treble, followed by a half note F#4 in the bass and a half note G4 in the treble. The dynamic *poco accel. to end* is marked below the treble staff.



Third system of musical notation. The top staff (bass clef) continues the rapid sixteenth-note scale. The bottom staff (treble and bass clefs) features a piano introduction with a half note G3 in the bass and a half note G4 in the treble, followed by a half note F#4 in the bass and a half note G4 in the treble. The dynamic *poco accel. to end* is marked below the treble staff.

musical score for piano, measures 329-331. The score is written for three staves: Treble, Bass, and a grand staff (Treble and Bass). The key signature is one flat (B-flat). The time signature is 4/4. The notation includes various musical symbols such as notes, rests, and dynamic markings.

Measure 329: Treble staff has a half note G4, a half note A4, and a half note B4. Bass staff has a half note G3, a half note A3, and a half note B3. Grand staff has a half note G3, a half note A3, and a half note B3.

Measure 330: Treble staff has a half note G4, a half note A4, and a half note B4. Bass staff has a half note G3, a half note A3, and a half note B3. Grand staff has a half note G3, a half note A3, and a half note B3.

Measure 331: Treble staff has a half note G4, a half note A4, and a half note B4. Bass staff has a half note G3, a half note A3, and a half note B3. Grand staff has a half note G3, a half note A3, and a half note B3.

FATHER AND SON FANTASY

by

Walter Wynn York

No precise information is available about when W. W. York's *Father and Son Fantasy* was composed. The piece is previously unpublished and was not copyrighted, and the composer cannot be reached. A photocopy of the manuscript score was obtained through Dr. Brian Bowman, Professor of Music at Duquesne University, who in turn received his copy from Mr. York in 1979. A composition date of ca. 1950 was suggested by Dr. Bowman and is supported by York's compositional style. Regardless of the void of information surrounding the composer and this piece, its importance lies in the fact that it is the only known work written and notated specifically for the double bell euphonium.

York's choice of notation for large bell vs. small bell indication is the use of reduced note heads for music to be played on the small bell. While somewhat effective in York's manuscript style, this distinction becomes somewhat difficult to manage in printed form. While it is certainly possible to produce uniformly reduced noteheads, this device still is somewhat confusing and hard to read, particularly in a performance situation. In editing this piece, the + and o indication again seems to be the clearest. Other editing included rewriting several awkwardly voiced passages in the piano part, adding additional as well as clarifying existing articulation marks in both the euphonium and piano parts, and adjusting dynamic markings for a more effective balance between instruments.

While the *Father and Son Fantasy* is probably not destined for inclusion in the list of masterworks for euphonium and piano, it is a good piece to "get one's feet wet" in learning to play the double bell euphonium, providing a few challenges without overextending the player or requiring virtuosic technique, while staying musically satisfying for the most part. The range is quite extreme, from GG to b¹ for both bells.

Particularly in the low register, this seems to be a problem on most older double bell euphoniums, particularly when using the small bell. Most of these passages would be suitable with octave adjustments made to facilitate performance. This piece works well for audiences also, particularly when used with the composer's program notes. The use of distinct personalities for the two bells combined with a story line proves to be an effective tool for introducing the double bell euphonium, particularly for young audiences.

The piece is through composed, but is made up of six distinct sections: *Aria for Father*; *(Introduction and) Song for Son*; *Mirror Echo*; *Antiphon*; *Instruction and Argument*; and *Tall Stories*. The two bells are used in a variety of ways in these sections, ranging from extended solo passages on one bell in the first two sections to rapidly alternating bells in the *Mirror Echo* and *Instruction and Argument*. The *Mirror Echo*, as the title implies, employs the compositional technique of inverted imitation, done so in an accessible and easily heard manner, making this section a good teaching tool for audiences.

York provides the following program notes for the piece in the form of a short story:

My father, Mr. Von Speck, was a proud man. He sang. And he was proud of me, Arcadia Antiphon von Speck, who also sang, after a fashion. On Saturday nights when there was company, he would favor us with a song, and one night he introduced me, announcing that I would sing. "And now, ladies and gentlemen, allow me to introduce my son, Arcadia." I responded with a piping "How do you do," and launched into my song, with an occasional encouraging word from Father.

On other long winter evenings, when we would play checkers (later chess) by the fire, Father would gaze at me meditatively for a long time with a somewhat puzzled look. As I learned later, he was thinking that while I was in face and voice the mirror and echo of himself, he was also wondering whether the workings of my mind corresponded with those of his own at my age. I understand that he had his doubts about this, and that he thought that Mother may have had something to do with the difference.

One evening each week we would have a music lesson, and since I was not much good at reading music, Father would teach me songs by rote, one phrase at a time.

One night when I was feeling in a playful mood, I sang a wrong note on purpose, knowing that Father would correct me with the stern admonition that I

was singing a D flat when it was supposed to be a D natural. He tried several times to correct me, but I stubbornly repeated the wrong note. Finally Father lost his temper, as he not infrequently did, and upon such occasions he would stamp his feet and curse a little, though there was, of course, nothing personal in anything he said. I had to laugh, and I am afraid that didn't help matters any.

Nevertheless, afterwards Father felt better, and announced that we would just have time for a tall story or two before bedtime. I believe his favorite story was something about an old bull and a young bull, though I disremember the details. Mine was about a boy who killed giants with a sling shot.

After we had each told a story, Father spoke his cheerful "good night" in a way clearly meaning that the end of the day had come⁶⁰.

⁶⁰Walter Wynn York, program notes to *Father and Son Fantasy*. Unpublished, provided by Brian Bowman.

Father and Son Fantasy

for Double Bell Euphonium and Piano

by

W. W. York

edited by

Edward K. Mallett

Aria for Father
Andante

Euphonium

Piano

Andante

p

mf

cantabile

A Tempo

pochississimo rall.

A Tempo

pochississimo rall.

12

12

First system of music, measures 18-21. The bass staff features a melodic line with a slur over measures 18-20 and a fermata in measure 21. The piano accompaniment consists of chords in the right hand and a rhythmic pattern in the left hand. The tempo marking *poco rall.* appears in both staves.

poco rall.

poco rall.

20 A Tempo

Second system of music, measures 22-25. The bass staff continues the melodic line. The piano accompaniment features a more active right hand with sixteenth-note patterns. The tempo marking *A Tempo* is present in both staves.

20 A Tempo

Third system of music, measures 26-29. The bass staff has a melodic line with a slur over measures 26-28 and a fermata in measure 29. The piano accompaniment includes chords and a rhythmic pattern in the left hand.

Introduction and ...

32 *rall e dim.* *mp quasi recitativo*

32 *rall e dim.*

Song for Son

poco più mosso *p*

poco più mosso *pp* *una corda*

39

39

sim.

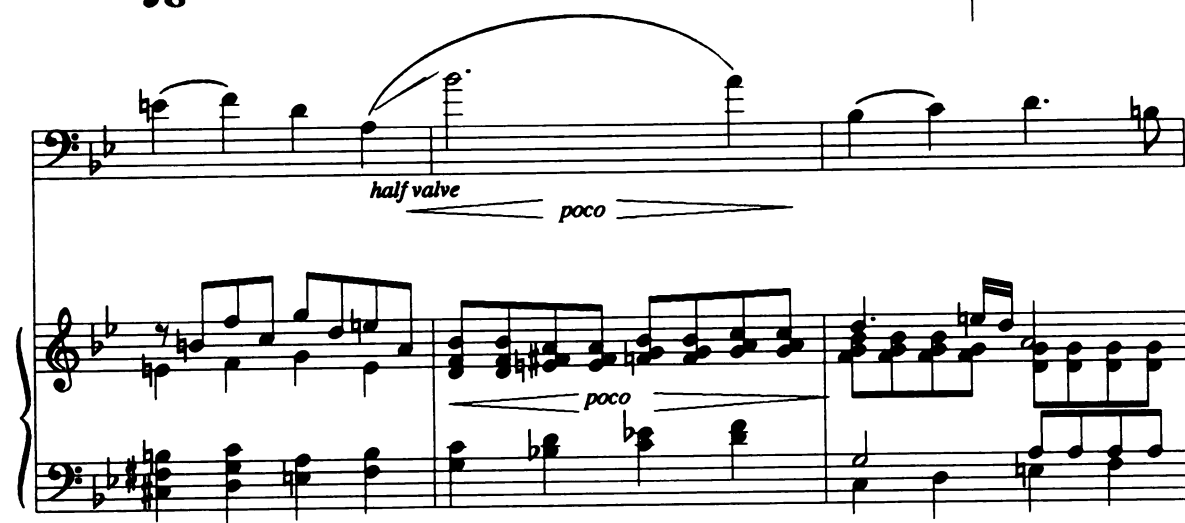
This musical score consists of four systems, each with a vocal line (bass clef) and a piano accompaniment (treble and bass clefs). The key signature is B-flat major (two flats). Measure 39 is marked with a circled '39'. The piano part in measure 39 includes the marking 'sim.' (simile). The score features various musical notations including eighth notes, quarter notes, half notes, and full notes, as well as rests, ties, and slurs. The piano accompaniment includes chords and arpeggiated figures. The vocal line includes a melodic line with some grace notes and a final cadence in measure 42.



The first system of musical notation consists of three staves. The top staff is a single line in bass clef with a key signature of two flats. The middle and bottom staves are grouped by a brace and represent a piano accompaniment in treble and bass clefs, respectively. The piano part features a complex texture with many beamed sixteenth and thirty-second notes, suggesting a rapid, tremolo-like effect. The bass line is simpler, with a few notes and rests.



The second system of musical notation continues the piece. The top staff has a triplet of eighth notes marked with a '3' and a '+' sign. The piano accompaniment continues with dense, beamed notes. A dynamic marking 'p' (piano) is visible at the end of the system.



The third system of musical notation includes performance instructions. Above the top staff, a slur covers a phrase with the instruction 'half valve' written below it. A 'poco' (poco) instruction is written below the piano part, with a double-headed arrow indicating a gradual change. The piano accompaniment continues with its characteristic dense, beamed texture.

A musical score for the song 'The Rose Tree'. It features three staves: a vocal line at the top, a piano accompaniment in the middle, and a bass line at the bottom. The key signature is one flat (B-flat), and the time signature is 4/4. The vocal line consists of a single melody line. The piano accompaniment includes chords and arpeggiated figures. The bass line provides a harmonic foundation with chords and moving lines. The score is written in a standard musical notation style with a treble and bass clef.

71 Molto allegro

71 *Molto allegro*

71 Molto allegro



The first system of musical notation consists of three staves. The top staff is a single bass clef line in B-flat major, featuring a melodic line with eighth and sixteenth notes, including triplets and a grace note. The middle and bottom staves are grand staff lines (treble and bass clefs) containing block chords, with a piano (*p*) dynamic marking in the first measure.



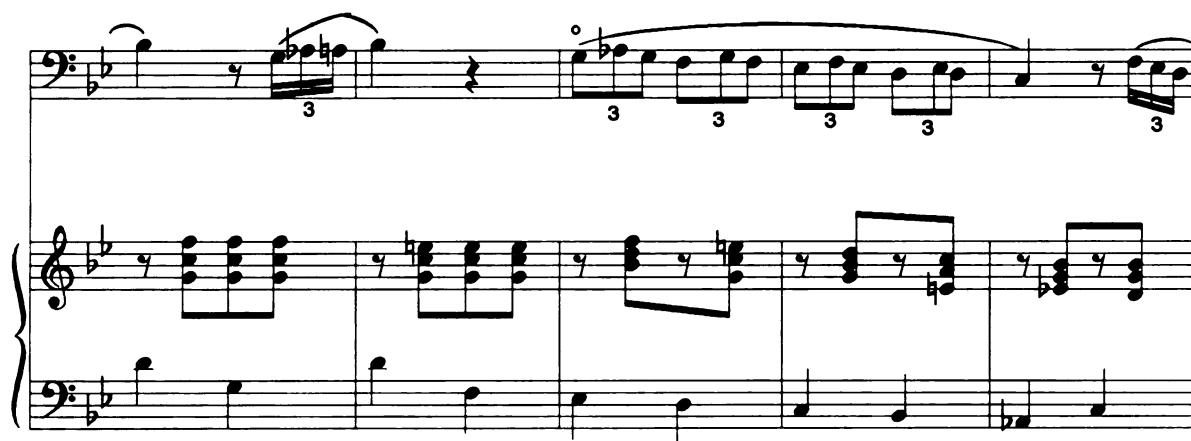
The second system of musical notation also consists of three staves. The top staff continues the melodic line from the first system, featuring triplets and a grace note. The middle and bottom staves continue the harmonic accompaniment with block chords.



The third system of musical notation consists of three staves. The top staff continues the melodic line with eighth and sixteenth notes and grace notes. The middle and bottom staves continue the harmonic accompaniment with block chords and some sixteenth-note patterns in the treble staff.



The first system of musical notation consists of three staves. The top staff is in bass clef with a key signature of two flats (B-flat and E-flat). It begins with a half note G2, followed by a quarter note F2, a half note E2, and a quarter rest. The next measure contains a half note D2 with a '+' sign above it, followed by a quarter rest. The final measure is a half note with a slur over it, containing a triplet of eighth notes: C2, B1, and A1. The piano accompaniment is in grand staff (treble and bass clefs). The right hand plays a series of chords: a half note G2, a half note F2, a half note E2, a half note D2, and a half note C2. The left hand plays a half note G2, a half note F2, a half note E2, a half note D2, and a half note C2.



The second system of musical notation consists of three staves. The top staff is in bass clef with a key signature of two flats. It begins with a half note G2, followed by a quarter note F2, a half note E2, and a quarter rest. The next measure contains a half note D2 with a '+' sign above it, followed by a quarter rest. The final measure is a half note with a slur over it, containing a triplet of eighth notes: C2, B1, and A1. The piano accompaniment is in grand staff. The right hand plays a series of chords: a half note G2, a half note F2, a half note E2, a half note D2, and a half note C2. The left hand plays a half note G2, a half note F2, a half note E2, a half note D2, and a half note C2.



The third system of musical notation consists of three staves. The top staff is in bass clef with a key signature of two flats. It begins with a half note G2, followed by a quarter note F2, a half note E2, and a quarter rest. The next measure contains a half note D2 with a '+' sign above it, followed by a quarter rest. The final measure is a half note with a slur over it, containing a triplet of eighth notes: C2, B1, and A1. The piano accompaniment is in grand staff. The right hand plays a series of chords: a half note G2, a half note F2, a half note E2, a half note D2, and a half note C2. The left hand plays a half note G2, a half note F2, a half note E2, a half note D2, and a half note C2.

105

105

This musical score is for a piano piece, spanning measures 105 to 110. The key signature is B-flat major (two flats). The score is written for a single melodic line in the bass clef and a piano accompaniment in grand staff (treble and bass clefs).
Measure 105: The bass line begins with a quarter note G2, followed by eighth notes A2 and B2, and a quarter rest. The piano accompaniment features a steady eighth-note pattern in the right hand and a bass line of G2, B1, and D2.
Measure 106: The bass line has a quarter rest, a quarter note C3 with an accent, and a quarter rest. The piano accompaniment continues with the eighth-note pattern and a bass line of D2, F2, and G2.
Measure 107: The bass line has a quarter rest, a quarter note D3 with an accent, and a quarter rest. The piano accompaniment continues with the eighth-note pattern and a bass line of A1, C2, and D2.
Measure 108: The bass line has a quarter rest, a quarter note E3 with an accent, and a quarter rest. The piano accompaniment continues with the eighth-note pattern and a bass line of E2, G2, and A2.
Measure 109: The bass line has a quarter rest, a quarter note F3 with an accent, and a quarter rest. The piano accompaniment continues with the eighth-note pattern and a bass line of F2, B1, and C2.
Measure 110: The bass line has a quarter rest, a quarter note G3 with an accent, and a quarter rest. The piano accompaniment continues with the eighth-note pattern and a bass line of G2, B1, and D2.

Antiphon
Andante quasi lento

125

mf legato *p leggiero* *sim.*

Andante quasi lento

125

mp *sim.*

ped. * *ped.* * *sim.*

131

cantabile

131

p

mf

mf

Measures 141-142 of a musical score. The piece is in B-flat major (two flats) and 4/4 time. The bass staff features a melodic line with a slur over measures 141 and 142. The piano accompaniment consists of a steady eighth-note pattern in the left hand and a more complex melodic line in the right hand.

Measures 143-144 of a musical score. The piece is in B-flat major (two flats) and 4/4 time. The bass staff has a melodic line with a slur and a fermata over measure 144. The piano accompaniment continues with a steady eighth-note pattern in the left hand and a melodic line in the right hand.

Measures 145-146 of a musical score. The piece is in B-flat major (two flats) and 4/4 time. The bass staff features a melodic line with a slur and a fermata over measure 146. The piano accompaniment continues with a steady eighth-note pattern in the left hand and a melodic line in the right hand.

Measures 147-148 of a musical score. The piece is in B-flat major (two flats) and 4/4 time. The bass staff features a melodic line with a slur and a fermata over measure 148. The piano accompaniment continues with a steady eighth-note pattern in the left hand and a melodic line in the right hand.



The first system of musical notation consists of three staves. The top staff is in bass clef with a key signature of two flats (B-flat and E-flat) and a 4/4 time signature. It contains a melodic line with eighth and sixteenth notes, including triplets and slurs. The middle staff is in treble clef and contains a series of chords. The bottom staff is in bass clef and contains a series of chords. The system concludes with a double bar line.



The second system of musical notation consists of three staves. The top staff continues the melodic line from the first system, featuring triplets and slurs. The middle staff contains chords, including a triplet of eighth notes. The bottom staff contains chords. The system concludes with a double bar line.



The third system of musical notation consists of three staves. The top staff continues the melodic line, featuring triplets and slurs. The middle staff contains chords, including a triplet of eighth notes. The bottom staff contains chords. The system concludes with a double bar line.

Instruction and Argument
Allegro

First system of music (measures 347-350). The top staff is in bass clef with a key signature of one flat (B-flat). It begins with a triplet of eighth notes (B-flat, A, G) marked with a '3' and a '+' above. This is followed by another triplet (F, E, D) and a final triplet (C, B, A) also marked with a '3' and a '+'. The tempo is marked 'Allegro'. The first measure is marked 'rit.' (ritardando). The second measure is marked 'mf' (mezzo-forte). The bottom staff is in treble clef with a key signature of one flat. It contains sustained chords and a single eighth note in the final measure.

155

Second system of music (measures 351-354). The top staff continues the bass line from the previous system. The bottom staff continues the treble line. The tempo remains 'Allegro'. The first measure of this system is marked '155' in a circle.

155

Third system of music (measures 355-358). The top staff continues the bass line. The bottom staff continues the treble line. The tempo remains 'Allegro'. The first measure of this system is marked '155' in a circle.

First system of music, measures 1-6. The piece is in B-flat major (two flats) and 2/4 time. The first staff is a bass line with eighth-note patterns and a triplet of eighth notes in measure 5. The second staff is a piano accompaniment with chords and eighth-note patterns. The key signature has two flats (B-flat and E-flat). The time signature is 2/4. The system ends with a repeat sign.

Second system of music, measures 7-12. The piece continues in B-flat major and 2/4 time. The first staff features a bass line with eighth-note patterns and a triplet of eighth notes in measure 10. The second staff is a piano accompaniment with chords and eighth-note patterns. The key signature has two flats (B-flat and E-flat). The time signature is 2/4. The system ends with a repeat sign.

Third system of music, measures 13-18. The piece continues in B-flat major and 2/4 time. The first staff features a bass line with eighth-note patterns and a triplet of eighth notes in measure 15. The second staff is a piano accompaniment with chords and eighth-note patterns. The key signature has two flats (B-flat and E-flat). The time signature is 2/4. The system ends with a repeat sign.

The musical score is divided into three systems, each consisting of a single melodic line (top staff) and a piano accompaniment (bottom two staves). The key signature is B-flat major (two flats). The time signature changes from 5/8 to 2/4 in the first system, and then to 3/4 in the second system.

System 1: The melodic line begins with a series of eighth notes in 5/8 time, followed by a half note in 2/4 time. The piano accompaniment features chords in the right hand and single notes in the left hand. A fermata is placed over the final note of the melodic line.

System 2: The melodic line continues with eighth notes in 5/8 time, followed by a half note in 2/4 time. The piano accompaniment features chords in the right hand and single notes in the left hand. A fermata is placed over the final note of the melodic line.

System 3: The melodic line continues with eighth notes in 5/8 time, followed by a half note in 2/4 time. The piano accompaniment features chords in the right hand and single notes in the left hand. A fermata is placed over the final note of the melodic line.

ff much slower *flutter tongue* fff *laughing* mf *half valve fall off*

211 Tall Tales *tr*
bravura 211 p
poco Allarg. e dim.

p *rit.* f

219 Andante

f cantabile grandioso

219 Andante

mp

f

accel.

broaden

broaden

228 Allegro

faster

rit.

mf

228 Allegro

mf

sim.

First system of music, measures 233-236. The bass staff features a melodic line with eighth-note runs and a half note. The piano accompaniment consists of chords in the right hand and single notes in the left hand.

Second system of music, measures 237-240. The bass staff has a long melodic phrase with a crescendo from *ff* to *poco dim.* and then a decrescendo to *pp*, ending with a *f* dynamic. The piano accompaniment includes chords and single notes, with dynamics *ff*, *pp*, and *ppp* indicated. A *Seo.* (Solo) marking is present in the bass staff.

Third system of music, measures 241-244. The bass staff begins with a *very broad* marking and a *mf* dynamic, followed by a *leggero* marking and a *Vivace* tempo change at measure 242. The piano accompaniment also features a *mf* dynamic and a *leggero* marking, with a *Vivace* tempo change at measure 242.

This musical score is arranged in three systems, each consisting of a piano (grand staff) and a bass staff. The key signature is one sharp (F#), and the time signature is 4/4.

System 1:
The piano part begins with a treble clef and a key signature of one sharp. The bass staff starts with a bass clef and a key signature of one sharp. The piano part features a series of chords and single notes, while the bass staff has a melodic line with eighth and sixteenth notes.

System 2:
The piano part continues with a treble clef and a key signature of one sharp. The bass staff has a bass clef and a key signature of one sharp. The piano part features a series of chords and single notes, while the bass staff has a melodic line with eighth and sixteenth notes.

System 3:
The piano part continues with a treble clef and a key signature of one sharp. The bass staff has a bass clef and a key signature of one sharp. The piano part features a series of chords and single notes, while the bass staff has a melodic line with eighth and sixteenth notes.

ETUDE 48

by

Verne Reynolds

In the process of becoming acquainted with the new double bell euphonium, exploring its capabilities and limits, practice materials were needed. Finding existing study pieces and etudes that suited the unique properties of the instrument was, to say the least, quite a challenge. The option of composing etudes specifically targeted for the double bell instrument is a possibility, and one which I intend to eventually pursue, but this course of action presents two primary obstacles: the tendency to compose for techniques which are already comfortable (or the inverse - composing beyond reasonable limitations); and the lack of variance in style and technique.

While many of the “old school” method and etude books, such as Herbert Clarke’s *Characteristic Studies for the Cornet*⁶¹ and J. B. Arban’s *Complete Conservatory Method for the Cornet*⁶² are well suited and easily adapted for practicing in the style of the Mantia, Clarke and Pryor solos, and have, in fact, been used by euphoniumists since their initial publication, material exploring performance and compositional techniques not yet discovered at the time of these publications is needed as well. Unfortunately, many of the more recent etude books tend to be either at a very basic level, in which case study of the older materials is still more beneficial, or very idiomatic for specific instruments, making performance on other instruments impractical or often impossible.

⁶¹Herbert L. Clarke, *Characteristic Studies for the Cornet*. New York: Carl Fischer, 1943.

⁶²J. B. Arban, *Complete Conservatory Method for the Cornet*. New York: Carl Fischer, 1894 (rev. ed. 1982).

Verne Reynolds' *48 Etudes for French Horn*,⁶³ published in 1961, transcends the differences between brass instruments and is beneficial to all (editions for trumpet and tuba have been made with only minor adjustments made for range and stopping effects). In the original version for horn, many of the etudes contain designations for stopped and open horn, working effectively for bell designations on the double bell euphonium. Of particular interest is etude No. 48, written specifically to explore and push the boundaries of hand muting techniques.⁶⁴ Rapid switches between bells (stopped or open horn) and dynamic levels, often but not always coinciding with each other and usually in very unexpected combinations, serve to make this etude ideal for the new instrument. It is particularly effective with one bell muted, making the dynamic and timbral contrasts even more effective. No revisions are necessary to play this etude on the double bell euphonium other than performing it a perfect 5th lower than its originally intended pitch.

Due to copyright restrictions, it is not possible to include the actual etude in the body of this document, but it is readily available in both the original horn version and the adapted version for trumpet.

⁶³Verne Reynolds, *48 Etudes for French Horn*. Milwaukee: G. Schirmer (Hal Leonard), 1961.

⁶⁴Verne Reynolds, forward to *48 Etudes for French Horn*.

CHORAL VARIÉ

by

Edison Denisov

In the search for recital repertoire for the new double bell euphonium, several works borrowed from the repertoire of other instruments were perused. Consideration must be taken not only of what is possible, but what would possibly be enhanced by performance on the double bell rather than degenerated by it. The temptation to over use the second bell feature is strong, and a composer's original intent can quickly be lost behind a circus-like side show of gimmickry. A program of this type can quickly move beyond the initial audience fascination with the uniqueness of the instrument to a boredom and even disappointment with the monotony of musically unsatisfying renditions. By the same token, under-use of the instrument's capabilities likely leaves the audience (and performer) wondering why the double bell euphonium was even used. The challenge, then, is to find compositions which utilize the double bell's resources in effective ways.

Edison Denisov's *Choral Varié*⁶⁵ meets these challenges, proving to be an effective vehicle for the double bell euphonium. Composed originally for trombone and piano, the work makes much use of alternating muted and open passages. The timbral distinctions are extremely effective, but the physical challenge of repeatedly inserting and removing the mute often detracts from a performance, causing a serious, meditative piece to appear somewhat comical. The pauses required to change the mute also have a tendency to hinder performances, disrupting the flow of music. By using the double bell euphonium with a straight mute in the trombone bell and the large bell left open, all pauses and extraneous movements are eliminated, leaving audience and performers alike free to concentrate on and

⁶⁵Edison Denisov, *Choral Varié pour Trombone et Piano*. Paris: Leduc, 1979.

be absorbed by the music.

Denisov's work also makes much use of quarter tones and glissandi, techniques that are idiomatic to the slide trombone, but are equally well suited to the newly designed double bell euphonium. The accessibility of the tuning slides for both bells by the left hand allows for an execution of these techniques of the same quality as that on the trombone, with the added benefit of easier trilling capabilities.

Not a piece for the conservative or weak of heart, *Choral Varié* places strenuous demands on the performer: physically, in terms of range (EE to f^1), flexibility, control and endurance; and musically, in terms of sensitivity, rhythmic accuracy, and interpretation. What may seem beyond the comprehension of most audiences, however, is surprisingly well received when effectively presented. No editing whatsoever is required for performance of this piece on the double bell euphonium.

As with the Reynolds etude, copyright restrictions prohibit the reproduction of *Choral Varié* in this document, but it is in print and readily available.

MUTATIONS

Sonic Explorations for Double Bell Euphonium and Piano

By

Edward K. Mallett

In composing a piece for a brand new instrument, I needed to take several things into consideration, as well as guard myself from several temptations. With only one piece to display the capabilities of the instrument, and possibly only that one piece for people to make a decision determining the validity or invalidity of the instrument, how should I go about presenting this new double bell euphonium, exhibiting its potential and hopefully generating interest, without falling into the trap of trying to do absolutely everything possible within this single piece, presenting more of a circus sideshow than a musical experience.

The multi-timbral capabilities of the instrument were chosen as the focal point of the piece, with my thought processes including not just the two bell potential, but also mute possibilities, articulations and vocalizations, multiphonics, as well as multi-timbral capabilities of the piano. The title *Mutations* was chosen for its multiple connotations — a multi-timbral word. In a sense, the double bell euphonium can be thought of as a “mutation” of the single bell instrument, the inside-piano effects are somewhat of a “mutation” of traditional playing techniques, the extensive use of “mutes” lends itself nicely to the title, and finally, while an overall serial approach was taken in the composition of the piece, the matrix generated from the initial series was used in a variety of “mutated” forms.

Step one in the compositional process was to make a “shopping list” of possible timbres that could be created by either the euphonium or the piano. A partial list includes a variety of mutes for both bells, flutter-tonguing, multiphonics, half-valve

techniques, glissandi, rapid bell alternation, micro tones, amplified breathing, tongue clicks, mouthpiece buzzing, percussive effects from striking the instrument or mutes, changes in vibrato speed and/or width, use of spoken phonemes while playing, rips, and growls for the euphonium; harmonics, plucking strings, sweeping across strings, dampening strings, scraping string coils, percussive striking of parts of the instrument, tone clusters, and flutter pedaling techniques for the piano. Not all of these ideas were ultimately used, but this initial list served as a springboard to launch the piece.

The tone row was derived from a musical transcription of the word “mutations,” assigning each letter a specific pitch in the following manner: letters were numbered according to their alphabetic position, ie. A=1, B=2, etc. Pitches were numbered in ascending half-steps, starting with middle C=1. The full spelling of “mutations” first occurs in the Harmon-muted small bell and in several fragments and interpolations throughout the piece in both the double bell euphonium and the piano.

Prime, retrograde, inverted, and inverted retrograde forms of the series are all used, often with specific rules governing which voice is allowed to use specific versions of the row at any given time. The 12×12 grid (shown in Figure 230 on page 361) was also divided up into sixteen equal sections, each being 3×3 . These also were used with particular voices assigned exclusive use of particular sections.

Other “unconventional” uses of the row include diagonal readings and spiraled readings, using all 144 notes starting from one corner and spiraling into the center (increasing the frequency of certain pitch classes in the process).

Nine different mutes are used between the two bells: straight mutes for both; practice mutes for both; mica-bowl mutes for both; a cup mute for the trombone; a bucket mute for the trombone; and a Harmon wah-wah mute for the trombone. There are sections in the piece where the desired effect is little or no distinction between bells or even between euphonium and piano, and other sections where extreme contrast is of primary importance.

0	8	7	2	1	6	4	3	E	5	T	9
4	0	E	6	5	T	8	7	3	9	2	1
5	1	0	7	6	E	9	8	4	T	3	2
T	6	5	0	E	4	2	1	9	3	8	7
E	7	6	1	0	5	3	2	T	4	9	8
6	2	1	8	7	0	T	9	5	E	4	3
8	4	3	T	9	2	0	E	7	1	6	5
9	5	4	E	T	3	1	0	8	2	7	6
1	9	8	3	2	7	5	4	0	6	E	T
7	3	2	9	8	1	E	T	6	0	5	4
2	T	9	4	3	8	6	5	1	7	0	E
3	E	T	5	4	9	7	6	2	8	1	0

Figure 230
Serial matrix used in composition of *Mutations*

An important aesthetic goal of the piece is one approaching *klangfarbenmelodie*, or an essentially timbre-dominated piece. While melodic elements are present, sonic exploration remains the primary objective.

A mechanical detail to be considered was that of a suitable system of notation for the double bell euphonium part. The = and o method used in the Mantia and York pieces was also considered for *Mutations*, but seemed too restrictive and clumsy for several sections, such as those utilizing tremelos between the two bells while altering pitch in one or both bells. After much deliberation, I chose a two-staff notation, with separate staves for the two bells. While this is also awkward, mostly because most instrumentalists are not accustomed to reading more than one staff at a time — especially when both staves use the same clef, often with the upper staff displaying notes lower in pitch than the lower staff, it seemed the best possible solution under the circumstances.

While *Mutations* does not in any way exploit all of the possibilities of the new double bell euphonium, it hopefully fills out a broad picture of its capabilities, particularly in conjunction with the other pieces chosen. It is hoped that this is only the first of many new pieces to be composed for this instrument.

ABBREVIATIONS AND EXPLANATIONS FOR *MUTATIONS* SCORE

Euphonium

- Capital letters enclosed in triangles denote mutes, with the following letters and mutes corresponding:

P = Practice mute
H = Harmon (wah-wah) mute
C = Cup mute
S = Straight mute
B = Bucket mute
M = Mica bowl mute

- Glissandi and pitch bends are achieved through manipulation of tuning slides when possible, by half-valve techniques when the range is too great for tuning slides.
- Multiphonics, achieved by singing and playing simultaneously, are notated at actual pitch.
- Arrow note head (m. 321) indicates highest pitch possible.

Piano

- m. 1 and following: T.D. = Thumb-dampen — achieved by muting the indicated string(s) near the pinblock with the thumb of one hand while striking the indicated note on the keyboard with the other hand.
- mm. 14 - 15: Coils of indicated string should be scraped with fingernail or guitar pick.
- m. 15: string should be plucked by finger with considerable force.
- m. 34 and following: cluster chords, utilizing all pitches within blocked range.
- mm 43 - 44: Glissando on strings using fingernail.
- m. 45 and following: Indicated string should be lightly plucked with fingernail.
- mm 314 - 315: Harmonics achieved by lightly touching string at 1/4 its length while striking the indicated note on the keyboard.
- m. 322: "Scrub" low strings with fingers in claw-like position.

Sonic Explorations for Double Bell Euphonium and Piano

Edward K. Mallett

5

S

L

Pno.

pp *f* *pp* *mf* *ff*

mp *mp* *mp* *p*

T.D. T.D. T.D. T.D.

The musical score for 'The Wind' by Gustav Mahler, featuring Soprano (S), Alto (L), and Piano (Pno.) parts. The score includes a 'Wa' (Wind) section marked 'mp' and a 'cresc.' (crescendo) section.



10

S

Wa

Wa

Wa

ff

mp

L

Pno.

f

mf

T.D.

ff

mp

T.D.

Red.

*

Score for Soprano (S), Alto (L), and Piano (Pno.).

Soprano (S): Melodic line with a long slur. Includes lyrics "Wa" and "Wa". Dynamic markings: *f*, *pp*, *f*. Includes performance instructions: $\triangle H$ out, $\triangle C$ in, $\triangle P$ out.

Alto (L): Melodic line with a long slur. Includes lyrics "Wa" and "Wa". Dynamic markings: *f*, *pp*, *f*.

Piano (Pno.): Accompanying line. Includes performance instructions: *f*, *pp*, *f*. Includes fingerings: 6, 6, 3.

Score for Soprano (S), Alto (L), and Piano (Pno.).

Soprano (S): Melodic line. Includes performance instructions: *ppp* (no cresc.), *ppp*. Includes a box containing the number 15.

Alto (L): Melodic line. Includes performance instructions: *f*, *ff*. Includes a box containing the number 15.

Piano (Pno.): Accompanying line. Includes performance instructions: *pp*, *scrape coils of string*, *ff*, *sfz*, *+ snap pizz.*, *ff*, *mp*. Includes a box containing the number 15 and a fingerings: 5.

S △ out
 L
 Pno.

sub. *p* *f* *sfz*
 Red.

S open
 L , *mf*
 Pno.

p T.D. *mp* *mf*
 S in
 *

25

S

L

Pno.

5

flatter longue

p

3

pp 3

P in

S

L

Pno.

mf

pp

p

mf

5

7

7

3

3

6

6

ff

30

S

L

Pno.

p *mf* *p* *mf*

gltz.

gltz.

6

6

ff

1 e

S

L

Pno.

pp *f* *mp*

4ⁿ 4ⁿ 4ⁿ

out

open

7

3

Rea

* Rea

* Rea

* Rea

Rea

35

Soprano (S): *p* 5th 8th

Alto (L): *ff* 5th 8th

Piano (Pno.): *ff* *ppp* *mf* *ff* *ppp*

Lyrics: The Rose Tree, The Rose Tree, The Rose Tree, The Rose Tree

40

S

L

Pno.

rit.

mp

fall

p

T.D.

Ped.

45

S

L

Pno.

fade out

insert

gliss. on strings

ppp

fp

pizz. *mp*

S

L

Pno.

Wa wa wa

p

ppp

p

T.D.

S

L

Pno.

50 ♩ = 68 Δ out

50 ♩ = 68 Δ out

50 ♩ = 68

pp

pp

pp

S

L

Pno.

pp

Ped

55

S

L

Pno.

55

mp

S *open* *fp* *mp* 60

L *open*

Pno. *p* 60

And. *

S *fp*

L

Pno. *mp* *p* *And.*

65

S

L

mp

Pno.

mf

mp

*

Red

S

L

Pno.

*

70

S

L

Pno.

mf

70

S

L

Pno.

mp

Red.

73

75

S

L

fp

Pno.

f

mf

And.

80

S

L

f

Pno.

f

And.

The musical score for 'The Rose Tree' is presented in three systems. The first system features a vocal line (Soprano and Alto) and a piano accompaniment. The vocal line begins with a whole note chord of B-flat and D-flat in the Soprano part, and a whole note chord of B-flat and D-flat in the Alto part. The piano accompaniment consists of a continuous eighth-note pattern in the right hand and a continuous eighth-note pattern in the left hand. The second system continues the vocal line and piano accompaniment. The third system concludes the piece with a final chord in the vocal line and a final cadence in the piano accompaniment.

The musical score for 'The Rose Tree' is presented in three systems. The first system features a Soprano (S) and Alto (L) vocal line in 6/8 time, with a key signature of one flat (B-flat). The Soprano part begins with a melodic line marked *mp* (mezzo-piano), while the Alto part provides a harmonic accompaniment marked *mf* (mezzo-forte). The second system shows the Piano (Pno.) accompaniment, consisting of a right-hand melody marked *mp* and a left-hand bass line. The third system continues the vocal and piano parts. The score includes a rehearsal mark '85' and a final double bar line with a repeat sign.

95

S

L

pp

Pno.

p

95

S

L

mf

Pno.

pp (no cresc.)

p

*led **

100

S

L

Pno.

mf

S

L

Pno.

105

S

L

Pno.

f

mf

$\triangle B_{\text{in}}$

110

S

L

Pno.

p

loco

p

8va

S

L

(8^{va})

poco a poco cresc.

loco

p

Pno.

S

L

115

p

mf

115

p

(cresc.)

Pno.

S

L

Pno.

6

6

6

S

L

Pno.

mp

mf

(cresc.)

6

6

6

6

120

S

mf

L

Pno.

6 6

f

6 6

S

L

Pno.

(cresc.)

6 6 6 6

S

L

125

Pno.

6

6

125

6

ff

6

S

L

mf 3

mp

ff

Pno.

6

6

6

7

poco a poco dim.

S

L

Pno.

This system of music features three staves. The Soprano (S) staff is in bass clef and contains a melodic line starting with a half note G2, followed by eighth notes A2, Bb2, C3, D3, E3, F3, and G3, all under a slur. The Alto (L) staff is also in bass clef and is empty. The Piano (Pno.) system consists of two staves. The right hand is in treble clef and plays a descending eighth-note scale: G4, F#4, E4, D4, C4, B3, A3, G3, with a '7' above the first six notes. The left hand is in bass clef and plays a descending eighth-note scale: G3, F#3, E3, D3, C3, B2, A2, G2, with a '7' above the first six notes. Dynamics include *mp* (mezzo-piano) for the Soprano and *mf* (mezzo-forte) for the Piano. A fermata is placed over the final G3 in the Soprano staff.

S

L

Pno.

This system continues the musical piece. The Soprano (S) staff is in bass clef and contains a half note G2, followed by a half note A2, and then a half note Bb2. The Alto (L) staff is in bass clef and contains a half note G2, followed by a half note A2, and then a half note Bb2. The Piano (Pno.) system consists of two staves. The right hand is in treble clef and plays a descending eighth-note scale: G4, F#4, E4, D4, C4, B3, A3, G3, with a '7' above the first six notes. The left hand is in bass clef and plays a descending eighth-note scale: G3, F#3, E3, D3, C3, B2, A2, G2, with a '7' above the first six notes. Dynamics include *mf* (mezzo-forte) for the Piano and *p* (piano) for the Soprano and Alto. A fermata is placed over the final G3 in the Soprano staff.

130

S

L

Pno.

f

(dim.)

Measures 130-133. The vocal part (S) has a short melodic phrase in the first measure of measure 130, marked with accents and a forte (*f*) dynamic. The piano accompaniment (Pno.) features a complex, chromatic melody in the right hand and a supporting bass line in the left hand. The dynamic is marked *(dim.)* for the piano part.

S

L

Pno.

mf

5

Measures 134-137. The vocal part (S) is silent. The vocal part (L) has a short melodic phrase in the first measure of measure 134, marked with a mezzo-forte (*mf*) dynamic. The piano accompaniment (Pno.) continues with a complex, chromatic melody in the right hand and a supporting bass line in the left hand. The dynamic is marked *mf* for the piano part.

S

L

p

Pno. *mp*

First system of music. The Soprano (S) part has a whole rest followed by a half note G2, a half note F2, and a whole note E2. The Alto (L) part has a half note G2, a half note F2, and a whole note E2. The Piano (Pno.) part has a half note G2, a half note F2, and a whole note E2. The piano part is marked with a piano (*p*) dynamic for the vocal parts and a mezzo-piano (*mp*) dynamic for the piano accompaniment.

S

L

$\triangle$ B out

Pno. (*dim.*)

Second system of music. The Soprano (S) part has a whole rest followed by a half note G2, a half note F2, and a whole note E2. The Alto (L) part has a half note G2, a half note F2, and a whole note E2. The Piano (Pno.) part has a half note G2, a half note F2, and a whole note E2. The piano part is marked with a piano (*p*) dynamic for the vocal parts and a mezzo-piano (*mp*) dynamic for the piano accompaniment. A triangle symbol with "B out" is placed above the Soprano part.

S

L

Pno.

135

S

L

Pno.

S

L

(8^{va})

loco

Pno.

S

L

open

mf

f

Pno.

f

And.

140

S

L

Pno.

140

S

L

Pno.

fff

pp

f

145

S

L

Pno.

mp

mf

ff

Red. *

S

L

Pno.

pp

p

mf

mf

f

pp

pp

f

8va

8va

150

S

L

Pno.

mf

f

p

ff

mp

pp

ff

p

S

L

Pno.

f

fp

half valve gliss.

ff

p

155

S

L

Pno.

mp

mf

f

ff

Measures 155-156. The vocal part (S) has a melodic line with a fermata. The piano accompaniment (L and Pno.) features a rhythmic pattern of eighth and sixteenth notes. Dynamics include *mp*, *mf*, *f*, and *ff*.

S

L

Pno.

mp

f

mp

Red.

Measures 157-159. The vocal part (S) has a melodic line with a fermata. The piano accompaniment (L and Pno.) features a rhythmic pattern of eighth and sixteenth notes. Dynamics include *mp*, *f*, and *mp*. A "Red." marking is present at the bottom.

160

S

L

Pno.

160

S

L

Pno.

p

< p

162

S
 L
 Pno.

Musical score for Soprano (S), Alto (L), and Piano (Pno.). The Soprano part begins with a piano (*p*) dynamic. The Piano part features a mezzo-piano (*mp*) dynamic in the right hand and a mezzo-forte (*mf*) dynamic in the left hand.

S
 L
 Pno.

Musical score for Soprano (S), Alto (L), and Piano (Pno.), measures 165-167. The Soprano part features a forte (*f*) dynamic in measure 165 and a piano (*p*) dynamic in measure 167. The Piano part features a mezzo-forte (*mf*) dynamic in measure 165 and a forte (*f*) dynamic in measure 166.

*

S

L

Pno.

168 169

170

S

L

Pno.

170 171

mp *mf* *tr*

S

L

Pno.

p

sub. p

* *And.* *

S

L

Pno.

180

f

180

tr.

ff

S

L

Pno.

Red

This musical system features three staves. The Soprano staff (S) is in bass clef with a key signature of one flat and contains a melodic line with a slur and a fermata. The Alto staff (L) is also in bass clef with the same key signature and contains a similar melodic line. The Piano staff (Pno.) consists of two staves, treble and bass, with a key signature of one flat. It contains a complex accompaniment with many beamed sixteenth notes. The first two measures of the piano part are circled. The system concludes with a double bar line and the word "Red" written below the piano staff.

185

S

L

Pno.

185

mp

mf

in

in

This musical system continues from the previous one. The Soprano staff (S) has a long note with a slur and a fermata, followed by a rest. The Alto staff (L) has a long note with a slur and a fermata, followed by a rest. The Piano staff (Pno.) continues with its accompaniment. The system is marked with a box containing the number "185" above the Soprano staff and another box with "185" above the Piano staff. Dynamics include *mp* (mezzo-piano) for the vocal parts and *mf* (mezzo-forte) for the piano part. There are also markings for "in" (in) with a triangle symbol. The system ends with a double bar line.

Score for Soprano (S), Alto (L), and Piano (Pno.).

The score is in 6/8 time. The Soprano and Alto parts are in bass clef. The Piano part is in treble and bass clef.

Measure 1: Soprano and Alto have whole rests. Piano has a half note G4 (marked *Red*) in the treble and a half note G3 in the bass.

Measure 2: Soprano and Alto have whole rests. Piano has a half note G4 (marked *Red*) in the treble and a half note G3 in the bass.

Measure 3: Soprano and Alto have a half note G4 (marked *mp*) in the treble and a half note G3 in the bass. A triangle symbol with an 'S' is above the Soprano staff.

Score for Soprano (S), Alto (L), and Piano (Pno.).

The score is in 6/8 time. The Soprano and Alto parts are in bass clef. The Piano part is in treble and bass clef.

Measure 1: Soprano and Alto have a half note G4 (marked *Red*) in the treble and a half note G3 in the bass. A triangle symbol with an 'S' is above the Soprano staff.

Measure 2: Soprano and Alto have a half note G4 (marked *Red*) in the treble and a half note G3 in the bass. A triangle symbol with an 'S' is above the Soprano staff.

Measure 3: Soprano and Alto have a half note G4 (marked *Red*) in the treble and a half note G3 in the bass. A triangle symbol with an 'S' is above the Soprano staff.

S
 L
 Pno.

S
 L
 Pno.

200

S

L

Pno.

rit.

pp

3

$\triangle$ out $\triangle$ B in

pizz. +

Red.

S

L

Pno.

$\triangle$ B $\text{♩} = 60$

mp connected sing

mf

ppp

$\text{♩} = 60$

pp connected

The musical score for 'The Song of the Shrike' is presented in three systems. The first system features a Soprano (S) and Alto (L) vocal line. The Soprano part begins with a half note G4, followed by a quarter note A4, and then a half note B4. The Alto part begins with a half note G3, followed by a quarter note A3, and then a half note B3. The second system continues the vocal lines. The Soprano part has a half note G4, followed by a quarter note A4, and then a half note B4. The Alto part has a half note G3, followed by a quarter note A3, and then a half note B3. The third system features a Piano (Pno.) accompaniment. The right hand (treble clef) begins with a half note G4, followed by a quarter note A4, and then a half note B4. The left hand (bass clef) begins with a half note G3, followed by a quarter note A3, and then a half note B3. The score includes various musical notations such as notes, rests, and dynamic markings like *mf* and *f*.

The image shows a musical score for the song "The Rose Tree". The score is written for Soprano (S), Alto (L), and Piano (Pno.). The tempo is marked as $\text{♩} = 132+$. The key signature has one flat (B-flat). The score is divided into two systems. The first system starts with a measure rest for the Soprano and Alto parts, followed by a measure where the Soprano part has a whole note G4 and the Alto part has a whole note F4. The Piano part has a whole note G4. The second system starts with a measure rest for the Soprano and Alto parts, followed by a measure where the Soprano part has a whole note G4 and the Alto part has a whole note F4. The Piano part has a whole note G4. The score includes various musical notations such as notes, rests, dynamics (sf, mp, open), and articulation marks (accents, slurs).

S

L

Pno.

220

S

L

220

Pno.

The image displays a musical score for the song "The Rose Tree". It is divided into two systems. The first system is for the vocal part, with a Soprano (S) line and a Bass (L) line. The Soprano line begins with a treble clef and a key signature of one flat (B-flat). The Bass line begins with a bass clef and the same key signature. Both lines start with a wavy line indicating a rest, followed by a *mf* (mezzo-forte) dynamic marking. The second system is for the piano accompaniment (Pno.), featuring a right-hand (RH) line with a treble clef and a left-hand (LH) line with a bass clef. Both piano parts also begin with a wavy line and a *mf* dynamic marking. The score includes measure numbers 230 and 231, which are enclosed in boxes above the respective measures. The music is written in a style typical of early 20th-century sheet music, with clear notation for notes, rests, and dynamics.

The image shows a musical score for the song "The Rose Tree". It is written for Soprano (S), Alto (L), and Piano (Pno.). The key signature has one flat (B-flat), and the time signature is 4/4. The Soprano part begins with a whole note G4, followed by a half note A4, and then a half note Bb4. The Alto part begins with a whole note F4, followed by a half note G4, and then a half note A4. The Piano part begins with a whole note G3, followed by a half note A3, and then a half note Bb3. The music concludes with a final chord of G4, A4, and Bb4.

235

S

L

Pno.

p

235

240

S

L

Pno.

f

240

240

Score for Soprano (S), Alto (L), and Piano (Pno.).

The Soprano part (S) consists of three measures of whole notes, each tied to the next. The Alto part (L) consists of three measures of whole notes, each tied to the next. The Piano part (Pno.) consists of three measures of whole notes, each tied to the next. The Piano part includes a dynamic marking *p* (piano) in the third measure.

Score for Soprano (S), Alto (L), and Piano (Pno.).

The Soprano part (S) consists of three measures of whole notes, each tied to the next. The Alto part (L) consists of three measures of whole notes, each tied to the next. The Piano part (Pno.) consists of three measures of whole notes, each tied to the next. The Piano part includes a dynamic marking *mf* (mezzo-forte) in the third measure.

245

S

L

Pno.

mf

mf

250

S

L

Pno.

250

ff *p* *pp*

ff *mp*

ff

p

pp

ff

mp

255

S

L

Pno.

ff

f

S

L

Pno.

mf

mf

260

S

L

Pno.

p

S

L

Pno.

pp *mf* *ff*

ff *2*

white key gliss.

265

S

L

Pno.

ff

ff

gliss.

ff

265

270

S

L

Pno.

p

pp

2

2

270

270

S

L

Pno.

f *p* *gliss.*

275

S

L

Pno.

275

p *f* *p* *275*

Score for Soprano (S), Alto (L), and Piano (Pno.).

The first system shows the vocal parts and piano accompaniment. The Soprano part begins with a melodic line, followed by the Alto part. The piano accompaniment features a bass line with a *pp* (pianissimo) dynamic marking, and a treble line with a *ff* (fortissimo) dynamic marking.

Score for Soprano (S), Alto (L), and Piano (Pno.).

The second system begins at measure 280. The Soprano part continues with a melodic line, and the Alto part provides harmonic support. The piano accompaniment features a bass line with a *pp* (pianissimo) dynamic marking, and a treble line with a *f* (forte) dynamic marking.

285

S

L

mp

285

Pno.

mp

S

L

f

ff

p

Pno.

f

ff

fp

tr

290

S

L

mp *f* *ff*

Pno.

290

tr. *fp* *ff*

S

L

sub. p *p*

Pno.

ff *ff* *ff*

The image displays a musical score for the song "The Rose Tree". It is divided into two systems. The first system features a vocal line with a Soprano (S) and a Lute (L) part. The Soprano part begins with a measure marked "295" in a box, followed by a series of notes. The Lute part starts with a measure marked "mp" (mezzo-piano) and includes a dynamic change to "p" (piano) in the second measure. The second system shows the Piano (Pno.) accompaniment, which consists of a grand staff with treble and bass clefs. The piano part has a measure marked "295" in a box, followed by a series of notes. The score is written in a key signature of one flat (B-flat) and a 4/4 time signature.

300

S

L

mf

p

300

Pno.

S

L

Pno.

f

Measure 303: Soprano and Alto have whole rests. Piano right hand has a melodic line starting on G4, moving up to Bb4, then down to A4, G4, F4, E4, D4, C4. Piano left hand has a bass line starting on C3, moving up to D3, E3, F3, G3, A3, Bb3, C4. Measure 304: Soprano and Alto have whole rests. Piano right hand continues the melodic line with a slur and tie. Piano left hand continues the bass line with a slur and tie.

S

L

Pno.

p

305

Measure 305: Soprano has a piano (p) dynamic and a melodic line starting on G4, moving up to A4, Bb4, then down to A4, G4, F4, E4, D4, C4. Alto has a whole rest. Piano right hand has a piano (p) dynamic and a melodic line starting on G4, moving up to A4, Bb4, then down to A4, G4, F4, E4, D4, C4. Piano left hand has a piano (p) dynamic and a bass line starting on C3, moving up to D3, E3, F3, G3, A3, Bb3, C4. Measure 306: Soprano has a whole rest. Alto has a whole rest. Piano right hand continues the melodic line with a slur and tie. Piano left hand continues the bass line with a slur and tie. Measure 307: Soprano has a whole rest. Alto has a whole rest. Piano right hand continues the melodic line with a slur and tie. Piano left hand continues the bass line with a slur and tie.

Score for Soprano (S), Alto (L), and Piano (Pno.) in 4/4 time.

Soprano (S): The melody begins with a half note G₂ (two ledger lines below), followed by a quarter note F₂ (one ledger line below), a quarter note E₂ (one ledger line below), and a quarter rest. This is followed by a half note D₂ (one ledger line below) and a half note C₂ (two ledger lines below). The phrase concludes with a whole note G₂ (two ledger lines below), marked with a triangle and the text "S out".

Alto (L): The part begins with a half note G₂ (two ledger lines below), followed by a quarter note F₂ (one ledger line below), a quarter note E₂ (one ledger line below), and a quarter rest. This is followed by a half note D₂ (one ledger line below) and a half note C₂ (two ledger lines below). The phrase concludes with a whole note G₂ (two ledger lines below).

Piano (Pno.): The right hand begins with a half note G₄ (treble clef, one line below), followed by a quarter note F₄ (treble clef, one line below), a quarter note E₄ (treble clef, one line below), and a quarter rest. This is followed by a half note D₄ (treble clef, one line below) and a half note C₄ (treble clef, one line below). The phrase concludes with a whole note G₄ (treble clef, one line below). The left hand begins with a half note G₂ (two ledger lines below), followed by a quarter note F₂ (one ledger line below), a quarter note E₂ (one ledger line below), and a quarter rest. This is followed by a half note D₂ (one ledger line below) and a half note C₂ (two ledger lines below). The phrase concludes with a whole note G₂ (two ledger lines below).

Score for Soprano (S), Alto (L), and Piano (Pno.) in 4/4 time, starting at measure 310.

Measure 310: The tempo is marked $\text{♩} = 60$. The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 311: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 312: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 313: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 314: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 315: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 316: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 317: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 318: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 319: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Measure 320: The Soprano (S) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Alto (L) part begins with a half note G₂ (two ledger lines below), followed by a half note F₂ (one ledger line below). The Piano (Pno.) part is silent.

Ω

M ready

S

L

Pno.

mf

Red.

315

M closed → open

S

L

Pno.

315

pp

sfz

sim.

Red.

Score for Soprano (S), Alto (L), and Piano (Pno.).

Soprano (S): Three measures of music. Each measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B² in the first measure; G², A², and B² in the second measure; and G², A², and B² in the third measure. A box containing the number **320** is placed above the third measure.

Alto (L): Three measures of music. Each measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B² in the first measure; G², A², and B² in the second measure; and G², A², and B² in the third measure. A box containing the number **320** is placed above the third measure.

Piano (Pno.): Three measures of music. Each measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B² in the first measure; G², A², and B² in the second measure; and G², A², and B² in the third measure. A box containing the number **320** is placed above the third measure.

Below the piano part, there are three measures of music. Each measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B² in the first measure; G², A², and B² in the second measure; and G², A², and B² in the third measure. A box containing the number **320** is placed above the third measure.

Score for Soprano (S), Alto (L), and Piano (Pno.).

Soprano (S): Two measures of music. The first measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². The second measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². A box containing the number **320** is placed above the second measure.

Alto (L): Two measures of music. The first measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². The second measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². A box containing the number **320** is placed above the second measure.

Piano (Pno.): Two measures of music. The first measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². The second measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². A box containing the number **320** is placed above the second measure.

Below the piano part, there are two measures of music. The first measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². The second measure begins with a fermata, followed by a sharp dynamic marking (***sfz***) and a slur. The notes are G², A², and B². A box containing the number **320** is placed above the second measure.

open 12" *half valve gliss.* *fff* *mp* *in* *ready*

S

L

Pno. *gliss. on strings* *fff* *let ring* *mf* *lead*

12"

mf

lead

*

325 ♩ = 56

S

L

Pno. *pizz.* *mp* *f* *3* *8va* *ord.* *3* *mp*

p *mf* *p*

lead

*

Score for Soprano (S), Alto (L), and Piano (Pno.).

Soprano (S): Melody line with notes and rests. Dynamics include *pp*, *mp*, and *p*. A triangle symbol is present above the first measure.

Alto (L): Melody line with notes and rests. Dynamics include *mf* and *p*. A triangle symbol is present below the first measure.

Piano (Pno.): Accompanying line with notes and rests. Dynamics include *mf* and *mp*. A triangle symbol is present below the first measure. The word "ord." is written above the piano part.

Rehearsal mark: Red * (first system)

Score for Soprano (S), Alto (L), and Piano (Pno.).

Soprano (S): Melody line with notes and rests. Dynamics include *mp*, *f*, *sfz*, and *mp*. A triangle symbol is present above the first measure.

Alto (L): Melody line with notes and rests. Dynamics include *mp*, *f*, *sfz*, and *mp*. A triangle symbol is present below the first measure.

Piano (Pno.): Accompanying line with notes and rests. Dynamics include *f*, *mp*, *ff*, and *sfz*. A triangle symbol is present below the first measure. The word "T.D." is written above the piano part.

Rehearsal mark: Red * (second system)

335

S

L

mf

sfz

mp

Pno.

♩ = 48

sing

mf

mp

f

8^{va}

♩ = 48

mp

f

Red * *Red* * *Red* * *Red* *soff. Red*

The musical score for "The Song of the Shrike" by Charles Ives is presented in two systems. The first system includes staves for Soprano (S), Alto (L), and Piano (Pno.). The Soprano and Alto parts feature complex rhythmic patterns, including triplets and sixteenth notes, with dynamic markings such as *mf*, *f*, and *pp*. The Piano part includes a triplet of eighth notes and a sixteenth-note figure. The second system continues the vocal parts and the Piano accompaniment, with dynamic markings including *sfz*, *p*, and *mf*. The score is divided into two systems, each ending with a double bar line and a repeat sign.

5

S

L

Pno.

fp *mp* *fp*

2 3

Red Red Red Red *

345

S

L

Pno.

sub. p *f* *mf*

3 3

345

f

Red 8th - - - *

S *out*

L *out in*

Pno. *p* *ff* *mp*

Red

S

L

Pno. *pp* *ff* *pp* *mf*

Red *Red*

350

S

L

Pno.

pp

ff pp

p 5 *rit.*

9ⁿ

P^{out}

* *Red.* * *Red.*

350

351

352

$\text{♩} = 120$

S

L

Pno.

p open

cresc.

$\text{♩} = 120$

p

cresc.

353

354

355

356

355

S

L

Pno.

ff

3

3

7

8

3

S

L

Pno.

And.

3

4

4

3

S

L

Pno.

tr

p

Red.

360

S

L

Pno.

tr

mf

mp

mf

f

S
 L
 Pno.

f
 fff
 Wah
 p

S
 L
 Pno.

365
 Wah
 p
 Wah
 p
 out

♩. = 144+

S

L

370

pp *mp* *mp* *p*

sfz *sfz*

Pno.

370

pp *mp* *mp* *p*

sfz *sfz*

S

L

f

Pno.

f

CONCLUSIONS

It is hoped that a renewed interest in the double bell euphonium will result in a drastic increase in the literature for the instrument, both in new editions of old pieces and, especially, in new compositions exploring and pushing the boundaries of the capabilities of this most versatile of brass instruments. One of the biggest obstacles in composing for the double bell euphonium is its probable limitations in terms of performance opportunities, which will no doubt discourage composers. By way of example, *Mutations* could not be performed on any existing instrument besides the one constructed as part of this project. Whether this will discourage other composers from exploring the double bell euphonium or encourage them to find ways of obtaining like instruments remains to be seen. Certainly if the instrument is treated with respect and given the recognition it deserves rather than the curious looks and misunderstandings it currently receives, it stands a chance of reappearing as a viable instrument.

In addition to original literature for double bell euphonium, there is a wealth of music originally written for other instruments that is worthy of further exploration for the instrument. The trombone repertoire seems a logical starting point, with many pieces lending themselves well to the timbral diversity. Other sources also may prove to be useful, including music for other brass instruments, as well as that for woodwinds, strings, and voice. Baroque music, with its characteristic compound lines, lends itself nicely to the unique capabilities of the double bell euphonium, as does the operatic repertoire, with the possibilities of multiple characters — a continuation of the concept presented in the *Father and Son Fantasy*.

One area not explored in this project, but where the double bell euphonium — particularly an instrument with mute capabilities — could excel, is the jazz genre, where the instrument's multi-timbral effects could have quite an impact. Perhaps someone will take up where Ashley Alexander left off.

SUMMARY AND RECOMMENDATIONS

In spending so much time immersed in double bell euphoniums, it has become evident to me just how little is really known about the instrument, the performers and the literature that they played. To bring the instrument and the music up to date, pushing ahead into the next century, is important. More important, for it provides a basis for all things new, is a fuller grasp of the old. Much information still needs to be gathered concerning the manufacturing processes, from the very first duplex instruments up through the end of production in the 1960's; specifically, how many instruments were made, by whom, for whom, and designed by whom. Also, much information still needs to be gathered concerning music for the double bell euphonium - again, by whom, and for whom. This might also include new editions of manuscripts, as well as arrangements of music originally composed for other genres.

Countless double bell euphoniums are scattered throughout the country and around the world, some in large collections, most in the hands of private collectors. Assembling a directory locating all known double bell euphoniums, detailing their histories and identifying their owners, might be an interesting and valuable project.

Also important is the promotion of both the old and new, reaching audiences of all ages and backgrounds. Although it probably will never regain the prominence it once enjoyed, the double bell euphonium can hopefully make at least some kind of a comeback, and not slip away again as it did half a century ago.

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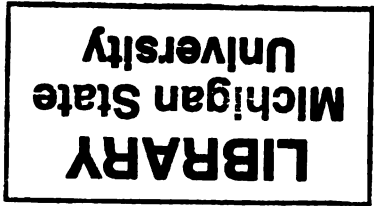
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