The Valve Trombone

The valve trombone is something of a contradiction. The defining characteristic of the trombone is its slide, which allows the overall tube length to be adjusted by the player. The simplicity of this design also provides for another feature which contributes to the sound quality of the instrument: there are only two bends in the mainly cylindrical tube length of the instrument – one on the bell section, the other on the slide section. The application of valves apparently negates these qualities. However, nineteenth-century inventors saw things somewhat differently. They saw the invention of valves as holding the prospect of improving playing techniques and also having other practical advantages – especially for military musicians. They attempted to design instruments that preserved the essential sound quality of the slide trombone, and many were successful. Certainly the slide trombone was a commercial success, and while there is no statistical evidence to verify it, there is a compelling possibility that more valve trombones than slide instruments were in circulation in the second half of the nineteenth century. This short section from a much longer chapter in Trevor Herbert's The Trombone *(Yale University Press, 2006) outlines some of the issues and the likely origin of the valve trombone.*

Trombones with valves were introduced from the early nineteenth century. It is helpful to think of them as falling into three categories. In the first are those with three or more valves, where the valves substitute for the slide so as to provide the instrument with a chromatic compass. In the second are those fitted to slide instruments (usually one or two thumb valves, but sometimes a middle-finger valve) which change the nominal pitch of the instrument when depressed. They provide several facilities, but their main advantage – and the reason for their introduction – is that they give access to additional notes in the low register. In the final, somewhat smaller category are instruments with a valve for the production of special effects, particularly trills. Before dealing with these different devices, it is necessary to say something about valve mechanisms in general, because their application to trombones should be seen in the wider context of the problems that brass instrument designers and manufacturers of the period were trying to solve. In this chapter I also deal with some other species of instruments that are not trombones at all, but that are nonetheless relevant to the subject of this book, either because they are usually played by trombone players as adjunct instruments (such as the bass trumpet), or because they have had an important bearing on the sonority of the trombone section in orchestral music (such as the ophicleide).

The valve principle

All valve systems have the same aim: they provide a means of altering the sounding length of an instrument to facilitate access to the notes of additional harmonic series.

To put it somewhat differently, valves provide an alternative way of doing what the slide does on the slide trombone. Several different valve designs were introduced in the first half of the nineteenth century. The earliest was invented in 1814 by Heinrich Stölzel, a horn player in the Pless court band in Prussia, and his collaborator Friedrich Blühmel, a civilian band musician. The two men were in dispute about who was responsible for the device, especially after a notice appeared in the *Allgemeine musikalische Zeitung* in 1815, announcing the invention solely in Stölzel's name.[i] But by 1818 they had resolved their differences and jointly secured a ten-year Prussian patent protection for the principle of the valve mechanism.[ii]

Other successful systems include the double-piston valve introduced by Christian Friedrich Sattler in 1821. This continued to be used in Belgium until the second half of the twentieth century on the *trombone Belge*. The double-piston valve design was further developed in Vienna, and applied to the trombone. A yet different design, the so-called Berlin valve, was introduced by Wilhelm Wieprecht, a Prussian bandmaster, in 1833.[iii] However, the most widely adopted piston valve system was devised by the French instrument maker François Périnet, and patented in 1838 in Paris. Illustration 1 gives a simple illustration of the Périnet system; it also shows the general principle of how valves work. This is a 'descending system': it works on the principle that the engagement of a valve *adds* tubing to the wind-way, and consequently *lowers* the pitch. When a valve is not depressed, the wind-way runs directly through the valve without interruption. But when it is depressed, the wind-way is diverted through an extra length of tubing, thus making the overall sounding length longer, causing the pitch of the instrument to descend so that a different harmonic series is accessed. (The difference between this and the 'ascending system' is discussed below.) In order to obtain a chromatic spectrum equivalent to that obtained from the seven positions on a slide trombone, it is necessary for an instrument to have three valves which are used either individually or in combination.

The rotary valve achieves the same end as a piston valve, but the mechanism is different. It was probably introduced by Blühmel in the late 1820s, but a somewhat later design (1835) by Kail and Riedl of Vienna became more popular and enduring. Rotary valves have been applied to brass instruments of all voices, and have been especially popular in Austria, Germany and Eastern Europe. The rotary valve, in one format or another, has been favoured for trombone thumb valves.

Despite the apparent simplicity of the principle, valve systems present a range of problems for instrument designers. The action of the valve needs to be easy and efficient, the distance of travel between the open and closed valve must be executed swiftly and comfortably, and it is important that neither the timbre nor the intonation of the instrument is impaired when valves are engaged. Such problems are prevalent when sharp bends are introduced into the wind-ways and when there are alterations and interruptions to the bore profile in the valve section. Intonational inconsistencies may also arise when two or more valves are used in combination, and this problem particularly occupied nineteenth-century inventors. It follows that many modifications to valve designs have been introduced since the nineteenth-century, and the goal of finding a perfect valve system (despite the claims of manufacturers) has never really been achieved.

Valve trombones

The exact origin of the valve trombone has not been reliably established, and we can only speculate as to why there was a perceived need for such an instrument when the slide trombone had proved so satisfactory for so long. A valve trombone was produced around 1830 in Vienna – interestingly enough, the city which, in the eighteenth century, had sustained the clearest and most distinguished line of fine *slide* trombone playing. According to Andreas Nemetz, who obviously knew no differently, the inventor of the valve trombone was indeed a Viennese maker, Josef Riedl. Nemetz does not mention the valve trombone in the first edition of his *Neueste Posaun-Schule*, published in Vienna in 1827, but in the second edition, published some time after 1830, he makes it clear where he believed it originated:

> The trombone has attained the greatest perfection with the valve trombone. To Mr. Jos. Riedl goes the honour of having first transferred the artificial mechanism of the valve trumpet and the valve horn to the trombone. In the year 1830, Mr. Joh. Tob. Uhlmann, brass instrument maker in Vienna, substantially altered and perfected that mechanism; for this reason he was also awarded an exclusive Imperial Royal privilege.[iv]

In fact Riedl was not the first to apply the valve to the trombone. A trombone with Blühmel's box-valve (*Kastenventil*) design was produced by Berlin manufacturer Joseph Caspar Gabler in 1818, while Blühmel was lodging with him.[v] It is also possible that other models may have been developed in one of the centres where innovative brass instrument design thrived, but the Vienna instruments seem to have been the first to have been produced and used in any quantity. The valve trombone introduced by Uhlmann was patented in 1830[vi] as the '*Doppelschubrohrventil*' (double sliding-tube valve) instrument, and it is clearly illustrated in Nemetz's method, with the maker's name visible (Illustration 2). Nemetz regarded it highly.

Records of the Court Opera Orchestra (of which Nemetz was a member) do not survive for this time, but it seems that valve trombones were introduced there in the mid-1830s. A further valve trombone was purchased from Uhlmann for the court chapel at around the same time,[vii] and in 1858 the court chapel bought a bass-tenor trombone with four valves.[viii] At then end of 1835, Carlo Balochino and Bartolomeo Merelli (both directors at La Scala, Milan), took over the direction of the Vienna court opera. The change to valve trombones probably came at about this time.[ix]

In 1862 wind players in the opera orchestra had to change their instruments because of the introduction of the new lower French tuning standard. The court opera management offered players 'the right and responsibility to define for themselves, according to their experience and opinions' the form and type of instruments 'that appear most appropriate for their purposes'.[x] The trombonists elected to acquire one three-valve and three four-valve trombones in B flat, and two three-valve trombones in F, made by Leopold Uhlman and Daniel Meinl; and the on-stage band acquired two three-valve instruments in F. The practice of using valve trombones in Vienna prevailed until 1883, when the new court opera director Wilhelm Jahn, believing that 'the effect of the slide trombone gives the orchestra a much more lively timbre' re-

introduced slide trombones – wide-bore German instruments.[xi] Only two of the orchestra's five trombonists agreed to make the change, so three German players were recruited. The orchestra bought a slide alto instrument in E flat, a tenor in B flat and a tenor-bass instrument from the Penzel factory (the successor to Sattler) in Leipzig, because the slide trombone was 'not even cultivated' in Vienna.[xii]

What motivated makers to apply valves to the trombone? There was a tendency among makers and designers in the early nineteenth century to look for ways of improving instruments (Illustration 3). The most immediate objects for attention were trumpets and horns, which relied on crooking and hand-stopping to obtain an uninterrupted melodic compass. But there was also an ambition to apply effective mechanisms to instruments in the bass range. There is no evidence to suggest that valve trombones were introduced in order to render slide instruments obsolete, but they were perceived as having pragmatic advantages. The absence of a slide must have seemed an obvious advantage to military musicians, especially those in mounted bands.[xiii] This was not a minor matter, because marching and mounted cavalry bands were integral components in official ceremonials. In the second half of the century, some valve trombones were manufactured specifically with this function in mind. For example, upward-pointing bells and circular-shaped instruments made it easier for instruments to be played on horseback. The rotary valve *Armee-Baβposaune* in F, introduced by V.F. Červený in 1867, led to the development, a year later, of a family of *Armeeposaune* instruments, made in sizes from alto in F to contrabass in B flat (Illustration 4).[xiv]

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[i] The text of the announcement is given in A. Baines, *Brass Instruments: Their History and Development*, 1976 (London: Faber, 1980), p. 206.

[ii] The patent was for the principle enshrined in the valve mechanism, rather than for the particular design specified by Stölzel and Blühmel. This led to protection being denied to some other perfectly legitimate applications.

[iii] It has recently been suggested that Stölzel devised a similar mechanism independently in 1827. See *New Grove 2*, s.v. 'Valve'.

[iv] A. Nemetz, *Neueste Posaun-Schule*, 2nd edn (Vienna, n.d. [after 1830]), translation by Howard Weiner.

[v] See H. Heyde, *Das Ventilblasinstrument* (Leipzig: VEB Deutscher Verlag für Musik, 1987), p. 18; also W. Waterhouse, *The New Langwill Index: A Dictionary of Musical Wind-Instrument Makers and Inventors* (London: Tony Bingham, 1993), s.v. 'Gabler, Joseph Caspar'.

[vi] Baines, *Brass Instruments*, p.210.

[vii] G. Zechmeister, 'The role of the (contra)bass trombone in the Vienna sound', *Brass Bulletin,* 102, no. 2 (1998), 20. (Citations refer to Zechmeister's original German text quotations have been newly translated here by Howard Weiner.)

[viii] Haus-, Hof- und Staatsarchiv, Vienna. HHStA/HMK/K25.1858/Nr. 374/17, cited in ibid., 22. Ignaz Assmayr had reported 4 January 1851 that valve trombones were 'currently a solid instrument in every orchestra'. (HHStA/HMK/K23/1851/Nr.6074, quoted in ibid., 22.)

[ix] Ibid.,19-21.

[x] HHStA/OPER/K11/1862/Nr.178, quoted in ibid., 22.

[xi] HHStA/OPER /K74/1883/Nr. 71, quoted in ibid., 23-4.

[xii] HHStA/OPER/K74/1883/Nr. 311, quoted in ibid.
[xiii] The Garde-Jäger-Bataillon of Potsdam introduced a *Posaune mit Wiener Ventilen* in 1832. H. Heyde, *Das Ventilblasinstrument* (Leipzig: VEB Deutscher Verlag für Musik, 1987), p.78.
[xiv] See G. Joppig, tr. V. von der Lancken, 'Václav František Červený: leading European inventor and manufacturer', *Historic Brass Society Journal,* 4 (1992), 210-228.