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Horn

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Horn

(Fr. *cor*, *cor d'harmonie*; *cor à pistons* [valve horn]; *cor simple*, *cor à main* [hand horn]; *cor de chasse*, *huchet*, *trompe de chasse* [hunting horn]. Ger. *Horn*; *Ventilhorn* [valve horn]; *Naturhorn* [hand horn]; *Hiefhorn*, *Hifthorn*, *Jagdhorn*, *Waldhorn* [hunting horn]. It. *corno*; *corno a macchina* [valve horn]; *corno a mano*, *corno naturale* [hand horn]; *corno da caccia*, *tromba da caccia* [hunting horn]. Sp. *trompa*; *trompa da caza* [hunting horn]).

A term that refers, in its broadest sense, to a variety of wind instruments usually of the lip-reed class. A distinction often drawn between horns and trumpets is that the bore of a trumpet is mainly cylindrical, that of a horn mainly conical. In the Hornbostel-Sachs classification system, however, horns are considered to be within the family of trumpets (see [AEROPHONE](#)). Horns used for signalling (and sounding perhaps only one note) have been fashioned from conches, animal horns etc., as well as metal. Horns capable of playing many notes usually consist of a conical brass (or other metal) tube in a curved, coiled or hooped shape. By virtue of its length and slender proportions the horn can be made to sound a larger number of notes in its natural harmonic series than can other brass instruments.

This article is concerned with the European orchestral horn, often referred to as the 'french horn', probably in recognition of its country of origin, but nowadays the adjective is normally omitted. For a discussion of non-European horns and further details relating to horns as members of the trumpet family see [TRUMPET](#), §§1–2.

See also [ORGAN STOP](#).

1. General.

(i) Construction of the modern horn.

The modern horn comprises five parts: the body, bell, mouthpiece, mouthpipe and valve system. The instrument may be made of brass alloy (copper and zinc in varying proportions) or nickel silver (brass with a small amount of nickel), and consists mainly of a tube in the form of a circle. The bore is slightly conical beginning at the hole for the mouthpiece, with a cylindrical central section (the valve system) followed by a fairly pronounced dilation of the tubing terminating in the wide flare of the bell, which reaches a diameter of about 30 cm. This profile influences the intonation of the instrument's natural harmonics, its timbre and the power of sound produced. Since the second half of the 19th century, makers and players have tended to favour a wider bore in order to obtain a more vigorous sound. The bell, which is held facing downwards and to the back, is either fixed, or may be unscrewed for ease of transport. The player's right hand is held inside the bell to support the instrument, adjust the intonation, or to obtain particular timbral effects.

The mouthpiece is generally made out of a single piece of metal (or sometimes another material, such as plastic). It is in the form of an inverse cone, with the cavity ('cup') sometimes slightly concave, tapering down to a narrow opening ('throat'; between 3.1 and 5.1 mm) out of which

comes an inversely conical tube ('backbore') which is inserted in to the mouthpipe (for illustration see [MOUTHPIECE](#)). In some cases the modern mouthpiece has a rim that can be screwed on or else pressed in by means of rubber packing, which means that its lower part can be replaced and the dimensions of the internal cavity varied without necessitating a change in the rim favoured by the performer. The horn mouthpiece produces a softer and more mellow tone than the shallow, cup-shaped trumpet mouthpiece, which favours a brilliant tone. The mouthpipe constitutes the initial part of the tubing, and connects to a section with a slightly conical bore (the conicity varies depending on the model of instrument); this section usually includes the general tuning-slide (a piece of U-shaped tubing with two tenon connections, or, more rarely, one tenon and the other mortise). This in turn connects to the valve system, which fills up the area inside the circular body of the instrument and comprises the valves with their corresponding removable loops (the 'valve loops'); the valves are worked by the player's left hand. The whole tubing in this part of the instrument, unlike the remainder, has a cylindrical bore.

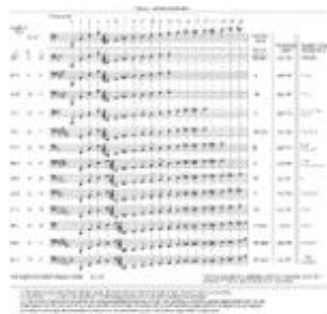
The valves may be of various types (see [VALVE \(i\)](#)), but in the modern horn it is normal to use rotary valves, more rarely pistons and rarer still double pistons (such as are found in the 'Vienna' horn). The normal purpose of these devices is to lengthen (in exceptional cases, to shorten), the tubing of the horn. Modern horns generally have four valves, although there can be as many as six. 'Single' horns, which have three valves, are pitched in $B\flat$ or F; on 'double' horns the fourth valve transforms the instrument from one pitch to another. Most of the notes within the compass of the double horn are common to several series, which gives the performer a liberal choice of alternative fingerings. The usual range of the horn is from $B\flat$ to f (with some further notes available in the upper and lower registers). On shorter horns (above F) notes above the 12th partial sound with difficulty, but the fundamental (1st partial) is more easily obtainable than on the longer horns. (For illustration of the series of partials available on natural and three-valve brass instruments, see [VALVE \(i\)](#), [ex.1](#) and [ex.2](#).)

(ii) The double horn.

Of the several varieties of valve horn in use, the most common is the double horn in F/ $B\flat$ with four valves. This is the model normally employed in the orchestra, and the one which players customarily use when they first begin to learn the instrument. The double horn has two independent sections of tubing of different lengths, one in F and the other a 4th higher in $B\flat$ (referred to respectively as 'F horn' and ' $B\flat$ horn'), in the central part of the body containing the valves. With the use of the thumb valve it is possible to select either of the two sections (on many models depressing the thumb key brings on the $B\flat$ section and releasing it causes the switch back to F). The $B\flat$ horn is the one most used by modern horn players (to the extent that the section in F has become almost an unused accessory), although the horn was traditionally pitched in F. Increasing demands on players' technical and artistic abilities have led many to adopt the $B\flat$ tubing as an acceptable compromise between security and precision of intonation (which is more easily obtainable with the shorter tube length) and beauty of sound. The $B\flat$ horn is approximately 270 cm in length (based on the modern pitch of $a' = 440$), and the F horn measures approximately 369 cm.

Depressing the first of the three finger valves lowers the instrument by a tone, the second by a semitone and the third lowers the horn by one and a half tones. However, while with the application of the individual valves the column of air is correctly lengthened, when two or more valves are combined the overall length of tubing engaged is shorter than required (whether the horn is in B or F) and the intonation consequently sharpens. The most problematic combinations are the first and third valves and (even more so) all three together; these combinations are so sharp on the F horn that in practice they are only used to obtain C and B' (notes that can be corrected by lip technique). On the B horn these fingerings can be completely avoided since the notes they obtain can be played more accurately in alternative positions on the F horn. From the many alternative fingerings available to the player, two principal systems have emerged: the first employs the B horn for most of the range, making use of the F horn for the

missing notes in the low register ($B'-F$) or else to pitch more accurately those notes which on certain instruments can be particularly out of tune (e.g. b or c'); in the second the $B\flat$ horn is used from $G\flat'$ to $B\flat'$ (in practice, the notes obtainable with the various combinations of valves starting from the fundamental $B\flat'$), the F horn from B' to c' , and the $B\flat$ horn for the remainder of the range (Table 1).



Various other double-horn systems have been devised, each of which have some specific advantages. Before the conventional type became established there was considerable experimentation with 'compensating systems'. On one such type the F set of (which attempt to 'compensate' for the intonation problems inherent in the valve combinations) is 'dependent' on the $B\flat$ set: when the player uses the $B\flat$ section the air passes through the $B\flat$ valve loops only, but the F horn uses the $B\flat$ valve loops in addition to its own set in order to correct the intonation. This system uses a smaller amount of tubing and therefore the instrument is lighter and cheaper; however, since the air has to follow a more tortuous route the sound obtained is much less satisfactory, and the instrument is consequently less popular with professional players.

In the wake of the double horn, to help with playing high-lying parts typical of the Baroque and some Classical repertory, the horn in $B\flat/F$ alto (an octave above the normal F) was developed, probably by Kalison in Milan in 1955 and soon after experimented with by German makers such as Alexander (Mainz) and Helmut Finke (Herford). This instrument is constructed on the same principle as the conventional double horn, but often with an extra valve in the $B\flat$ section to lower the range of the instrument by three-quarters of a tone to correct the intonation of hand-stopped notes (see §1(iii) below) which would otherwise sound sharp. Other models were devised according to the preferences of particular players. There are, for example, double horns in $B\flat/B\flat$ soprano and F/F alto, as well as the triple horn in F/ $B\flat$ /F alto (see §3(ii) below) which, though heavier than the others, works more effectively and has been quite popular with professional players. There have been further attempts to improve performance of the instrument in the more awkward keys. One of these was the 'omnitonic' horn (see §2(i) below and fig.10 below) invented by Hermann Prager in 1918 and built by Knopf of Markneukirchen (mostly between 1933 and 1937), based on a complicated mechanism of six ascending and descending valves which made the instrument very heavy (see Morley-Pegge, 1973, pp.66–8). Another model was patented by Paul Geyer of Schwerin in 1924: this has an additional semitone valve which allows the basic tuning to be lowered from $B\flat$ to A and from F to E, and has had a certain amount of success. This instrument is useful both for playing difficult passages in sharp keys as well as for 'compensating' on the $B\flat$ horn for the otherwise sharp intonation of stopped notes.

(iii) Types of single horn.

Long before the modern double horn became established, the instrument that was widely used by professional players was pitched in a single key, either F, or, later, B . The single course of tubing made it very light and easy to handle and, because the tubing was less twisted and there was a well-balanced relationship between its diameter and the expansion of the bell, a good sound was easier to produce. The single horn, particularly the version in B , therefore survived for a long time, even after the establishment of the double horn. One problem with the single horn is the tendency for the pitch of hand-stopped notes to rise because of the effective shortening of the

tubing that results. While on the horn in F the pitch rises by a semitone, on the B \flat instrument this shortening is quite excessive, and a correcting valve to lower the pitch by three-quarters of a tone is required. Eventually some makers preferred to add a further section of tubing (and the corresponding valve) to the B \flat instrument, to obtain the partials of a horn in F.

Of the various types of single horn that were widely used in the past, the most common type of F horn from the second half of the 19th century until the 1920s was the 'German' horn. This had a slide-crook which also served as a master tuning-slide, a particularly broad bell, a strictly conical mouthpiece with a flat-edged rim and a bore which measured up to 11.5 mm in the cylindrical valve section (thus wider than all other models).

The 'Vienna' horn is essentially a type of natural orchestral horn with characteristic double-piston Vienna valves of the type developed by Josef Kail and Joseph Riedl in 1823 (see [VALVE \(i\)](#)); with some improvements patented in 1830 by Leopold Uhlmann, it is still used, uniquely, by the Vienna PO. It has a much larger bell with a greater flare than average, but the bore is reduced to an average of about 10.7 mm; the instrument still uses detachable crooks, which have been abandoned on all other valve horns. The F crook is completely conical, while the B \flat one is a simple short tube which, once inserted, necessitates replacing the slides of the valves with other, shorter ones.

The French preferred a model which preserved the characteristic structure of the natural (valveless) horn that had been built from the 18th century onwards by Raoux of Paris. It has crooks at the mouthpipe, and a piston machine which can sometimes be replaced with a simple slide to transform it into a genuine hand horn. Another characteristic feature is the 'ascending third valve' (invented by Halary (iii) in about 1847) which in normal position allows the air to pass through the corresponding slide, but when depressed cuts out the slide so as to raise the pitch of the instrument by a tone. The bore varies from 10.8 to 11 mm; the tone is clear and balanced, but rather sour in the bass register, in the region of the 3rd partial. This instrument faithfully reflects the characteristics of the *cor solo* (see §2(iii) below), and was often played with hand-horn technique (the pistons then serving exclusively to alter the basic pitch); the famous solo in Ravel's *Pavane pour une infante défunte* (1910) was intended for this usage. The same model, but with a normal third valve lowering the pitch by three semitones was particularly widely used in Britain up until the 1930s.

The various innovations made to help horn players tackle particularly high-lying pieces led instrument makers to construct valve horns in higher keys than normal. At the end of the 19th century the horn player F.A. Gumbert [Gumpert] used a horn in F alto for Siegfried's horn call (Wagner's *Ring*) and subsequently horns in G alto (some with an additional slide in F) and B \flat soprano were also made. In addition, a curious model (probably invented by the firm of Riedl in Vienna) was particularly widespread in Italy and Austria during the 19th century. This instrument had the valves turned round 180° (i.e. ranged close to the bell) so that they could be worked by the right hand, which made it quite impossible for the player to place a hand inside the bell. Single horns in E \flat (or sometimes in F) with a right-hand action and the bell on the left are still widely found in bands. They replicate the normal fingering of all the other brass band instruments and are generally given to the youngest recruits.

2. History to c1800.

(i) Development of the natural horn.

The many types of horn used in Europe prior to the emergence in 17th-century France of the broad circle, or hooped, horn (on which future developments of the orchestral horn were based) are illustrated in Mersenne's *Harmonie universelle* of 1636–7. Two of these models had a dominant role in the subsequent history of the instrument: the *trompe*, a hunting horn made in a crescent shape

Trompe (hunting horn), 1604
(Stadsmuseum Hof van
Busleyden, Mechelen)

with a single coil in the tubing, used throughout Europe, and the *cor à plusieurs tours*, being much longer and close-coiled in spiral form. The *trompe*, which is also illustrated in Jacques du Fouilloux's treatise *La vénerie* (?1561) and Praetorius's *Theatrum instrumentorum* (1620, pl.xii), was described by Mersenne as the horn most commonly used for hunting (it was later replaced by the hooped horn in France), although there seem to be only two examples extant, one dating from the first half of the 17th century, now in the Historisches Museum, Dresden, the other dating from 1604 (now in Mechelen, [fig.1](#); there is a copy in the Museum of Musical Instruments, Brussels Conservatory). Mersenne declared (clearly referring to France) that the spiral model was little used. However, there is evidence of such a model in Virdung (*Musica getutscht*, Basle, 1511) and other documentation referring to the region around upper Saxony and northern Bohemia where the instrument was associated with the trumpet repertory heard in the courts. Iconographic sources for the spiral horn, again with reference to hunting, include engravings by Wenceslaus Hollar (1607–77; for illustration see Morley-Pegge, 1973, pl.I, 2) and *The Bath of Diana* by Hendrick van Balen (c1574/5–1632). Among the surviving examples of horns, the oldest is by Valentin Springer and dates from about 1570 (see Heyde, 1986, pl.86); another was made in Dresden before 1668 (Heyde, 1986, pl.87), and there is a third by Haas, dating from 1688 (formerly in the Trompetenmuseum, Bad Säckingen, no.21401).

The spiral horn raises a difficult question of terminology. This instrument was sometimes referred to as a 'horn' ('Jeger horn', Virdung, 1511), sometimes a 'trumpet' ('Jägertrommet', PraetoriusTM, pl.viii), and sometimes either, indiscriminately. Although Mersenne termed the spiral model a *cor* and the single-coil one a *trompe*, he was not always careful to differentiate between the two, seeming to use *cor* in a more generic sense than *trompe*. Notwithstanding, therefore, the lively modern debate among some scholars as to which category, horn or trumpet, some surviving examples of the helical instrument belong, there was no clear distinction between the two at the time. Nevertheless, according to modern criteria, the spiral instruments should generally be classified as horns (see Tarr, 1988, p.8). Praetorius himself maintained that 'some trumpets built like post horns, that is coiled like a serpent, do not give the same sort of sound as a trumpet' (PraetoriusSM, ii, p.33).

Both the *trompe* and the spiral horn seem to have played fundamental, though different roles in the adoption during the first half of the 17th century of hunting signals with more elaborate melodic lines than used previously. In France, for example, the signal for the sighting of the stag given by Du Fouilloux and Mersenne consisted of three short notes followed by one long one; by 1705 Philidor could notate signals with melodic fragments based on the notes of a major chord (see [SIGNAL \(I\), §2](#)). This may have been the result of the introduction of the *trompe* which, due to its longer tubing, was able to sound the fifth partial (i.e. the 3rd of the chord). In Germany and Bohemia it seems that the tradition of horn signals developed in a similar way, but was influenced by the repertory of court trumpeters. Typically, the French hunting signals utilized triple time (particularly suited to the trot of a horse), while in Germany and Bohemia the pace was faster, and, most importantly, the signals given in duple time, similar to that of contemporary trumpet repertory.

Mersenne gave some advice about the formation of a hunting horn ensemble, plainly referring to the use of older forms of horn:

"If hunters wish to have the pleasure of playing together in four or more parts with their horns, it is fairly easy, as long as they are able to play the right notes, and adjust the length and breadth of their *trompes* observing the same ratios as organ pipes: for example, if the largest horn is six feet long, it will play a 5th lower against the one which is 4 feet long. I write elsewhere that their breadth must be in the ratio of 3:2. And if one adds a third horn, three foot in length, it will play a 4th above the second, so that the three will make a perfect trio, and play the three main notes of the first mode: and it will be easy to add three or four others to them to play the other chords."

Partly on the basis of this valuable piece of documentation, it is necessary to reconsider some deeply-held convictions on the earliest music for natural horn, whereby a role is mistakenly attributed to Italy which in fact it did not play. Firstly, the presence of a horn in Michelangelo Rossi's *Erminia sul Giordano* of 1633 has to be ruled out, since the score makes reference only

to a 'chorus of hunters', with no explicit quotation of identifiable hunting signals (see Fitzpatrick, 1970, p.5). On the other hand, the term 'chiamata alla caccia' in Cavalli's *Le nozze di Teti e di Peleo* (1639) might indeed be a reference to a group of horns (see [CHIAMATA](#)), although, given the date of composition, it cannot be assumed that hooped horns were used. The piece is written for strings rather than horns, although it obviously mimics music for a hunting horn ensemble of the type described by Mersenne but with the parts written in the lower octave to make them suit the string tessitura. Only one iconographic source supports a possible tradition of hooped horns in early 17th-century Italy, the anonymous *Figure con strumenti musicali e boscarecci* (attributed to Giovanni Battista Bracelli, fl 1616–50; see Heinitz, 1929, pl.III, 1); this seems rather suspect, not least as it shows a close affinity with the bizarre illustrations by the famous French engraver Jacques Callot (1592–1635). Otherwise the only models of which there is evidence in Italy seem in fact to have been semicircular (made of animal horn or metal), or of the *trompe* type.

Some odd representations of hooped horns which appear in some very old iconographic sources are worthy of mention. One example is carved on a choir stall at Worcester Cathedral, dating from the end of the 14th century, and another is depicted in the Grüninger edition of Virgil (Strasbourg, 1502). While it is difficult to arrive at a totally convincing explanation for them, it is likely that they sprang from the artist's imagination, or else that they were influenced by the iconography of the circular Roman *cornu* (such influence is obvious, for example, in Giulio Romano's frescoes of 1524–35 in the Palazzo del Te, Mantua).

The first fully circular horns (*trompes de chasse*) were probably used in a *comédie-ballet* by Lully, *La Princesse d'Elide*, given at Versailles in 1664. The score contains an *Air des valets des chiens et des chasseurs avec Cors de chasse*, while the libretto makes explicit reference both to *cors* and *trompes de chasses*; the appearance of the new instrument on this occasion, however, is also documented by an engraving by Israël Silvestre, *Les plaisirs de l'Isle enchantée, ou les festes et divertissemens du Roy à Versailles* (published c1676), which portrays a scene from the comedy, and is probably the earliest iconographic representation of true hooped horns. Another important source of documentation is provided by Cardinal Flavio Chigi, papal legate at the court of France, who in the same year, 1664, again at Versailles, attended a *curée* (feeding some of the prey to the hounds to the sound of instruments) during which his attention was caught by 'alcune trombe ritorte' ('some bent trumpets'; Lionnet, 1996). Also at Versailles, in the Salon de Diane, the hooped horn appeared on some hunting trophies carved between the end of the 1670s and 1682, while the earliest surviving example of the instrument is the one made by Hieronimus Starck of Nuremberg in 1667 (now in the Musikhistorisk Museum, Copenhagen). A hooped model was also built by Crétien of Paris from 1680 onwards. This had a broad body comprising one and a half coils of tubing (227 cm long, 48 cm in diameter), with a bore of 12 mm, a mouthpiece soldered to a long, removable shank and a bell of 14.5 cm reinforced with a covering decorated with designs typical of the Louis XIV period (D'Anterrockes, 1992). Given this origin, the description 'French horn' should not be considered one of the many 'fantasies' in the terminology of musical instruments, but rather as an explicit and appropriate reference to its country of origin.

An instrument dating from 1689 attributed to Michel Koch of Dresden is an example of a later development (now in the Musikinstrumenten-Museum, University of Leipzig). The mouthpiece is soldered to the body and strengthened by a crosspiece, as is the bell (which is a good 21 cm in diameter); thus the instrument is more solid and suitable for hunting on horseback. A similar model, but with two coils of tubing, was still being used in 1710 by Augustus the Strong, king of Poland. From 1723 onwards, however, a model invented by the Marquis Marc-Antoine de Dampierre, the commander of Louis XV's hunters, was in widespread use. It had one and a half coils, and its dimensions were enormous (405 cm in length, with a diameter of 72 cm). On the occasion of the birth of the Dauphin in 1729, Dampierre, in collaboration with the instrument maker Le Brun, created a new model, described as 'à la Dauphine', with two and a half coils of tubing (450 cm in length and 54 cm in diameter). This instrument was more manageable, and it remained in use for about 100 years, up until the appearance of the *trompe d'Orléans* at the turn of the 19th century with three and a half coils (about 40 cm in diameter) which is still in use (Marolles, 1930). These models have a repertory of signals, which are first documented in a collection assembled by A.D. Philidor in 1705 under the title *Tous les appels de trompe pour la chasse* ([F-V](#) 1163).

That the instrument which appeared at Versailles was completely new is clearly demonstrated by the fact that it was unknown in German-speaking countries, until its discovery by the Bohemian Count Franz Anton Sporck (1662–1738), who first heard it when he went to Paris in 1680. He was

so fascinated by the new horn that he left behind two of his servants (Wenzel Sweda and Peter Röllig) to learn the technique of the instrument and bring it back to Prague and the rest of Bohemia. However, bearing in mind that Sporck came from an area where the spiral horn was much used, and that he was surrounded by representations of horns and apparently also by horn players who took part in the hunt, he might have had another reason to consider the French model to be new. It is possible that during his visit to France he also encountered some unfamiliar way of playing it, and this might be the French style described above, traditionally in triple time. The existence of two parallel musical traditions, one French and the other Saxon and Bohemian, is borne out by the most famous horn works of the early 18th century, Vivaldi's concertos and Bach's First Brandenburg Concerto. These works, in which the triple rhythms of the French style are juxtaposed with the duple time that was more common, east of the Rhine, have a further bearing on the subsequent history of the instrument, in that the pitch of F was adopted.

(ii) Ensemble and orchestral use.

In addition to Cavalli's *Le nozze di Teti e di Peleo* cited above, an imitation by string instruments of a hunting ensemble is found in Lully's *Isis* (1677). It appears that a hunting ensemble was introduced into the orchestra in a performance of a ballet by J.H. Schmelzer, given in Linz for the name-day of Emperor Leopold I on 15 November 1680; according to the libretto (the music is lost), on that occasion an intrada was played by violins and hunting horns together (see Fitzpatrick, 1970, p.8). Similar evidence is found in the libretto of Georg Bronner's opera *Echo und Narcissus* (1693), the music of which is also lost (see McCredie, 1964, p.193). In all likelihood the presence of a horn ensemble in the orchestra may be ascertained in the score of Agostino Steffani's opera *I trionfi del fato* (Hanover, 1695) which calls for four *trompes*; here the term clearly indicates *trompes de chasse* (and not trumpets), as is borne out by the notation (similar to that of contemporary French scores) and the fact that many French musicians were then to be found in the court orchestra in Hanover.

Although the horn was still linked to the hunting tradition, it began to be used as a concertante instrument in ensembles by the end of the 17th century. A short, anonymous *Sonata da caccia con un cornu* dating from before 1680 and preserved in Kroměříž (Meyer, 1956) belongs to this repertory; the horn plays signal motives in a concertante relationship with two violins, two violas and basso continuo. Such a piece, which uses the 3rd to the 12th partials, must have been played by an 8' spiral horn, since the hooped type was not known in the area before 1680, the year of Sporck's visit to France. The two *trombae breves* called for in a *Sonata venatoria* dating from 1684 by the Moravian composer P.J. Vejvanovský are perhaps again to be understood as spiral horns, but at that date the term could also refer to the hooped instrument. A more reliable piece of evidence for the use of the fully hooped horn is in a Concerto à 4 in B♭ by Johann Beer (1655–1700) for *corne de chasse, posthorn*, two violins and basso continuo. The surviving parts were transcribed by a later copyist (probably Peter Johann Fick) and the horn part is written in treble clef with one flat, for a transposing instrument in F playing a 5th lower than written (thereby in the 'classical' notation; see §4 below). C.A. Badia's *Diana rappacificata*, performed in Vienna in 1700, includes a hunting fanfare where two horns in F play music in triple time which displays features typical of music for horn ensemble and also contains melodic phrases characteristic of the later solo horn idiom (Haller, 1970, p.176). However, did the horn did not officially enter the orchestra of the imperial court in Vienna until 1712 (Köchel, 1867, p.80), a date which seems surprisingly late considering that the Leichamschneider brothers had acquired a considerable reputation in Vienna as horn makers a good ten years earlier, and that the small electoral and princely courts of northern Germany had taken the instrument permanently into their orchestras before 1706. This may be explained by the fact that there were no substantial modifications to the make-up of the imperial chapel during the final years of the reign of the elderly Joseph I, but as soon as Charles VI, a music and hunting enthusiast (like Sporck), ascended to the throne, changes were instituted.

Examples of the use of the horn in northern Germany include Reinhard Keiser's *Die römische Unruhe*, performed in Hamburg in 1705, where the instrument is used both in a concertante manner and as an integral part of the orchestra (Haller, loc. cit.). Further east, in Szczecin, horns also appeared in two cantatas by F.G. Klingenberg, one dating from 1704 (now lost), the other, *Die aus dem Markt nach Pommern wandernde Liebe*, composed in 1705. In Lübeck, also in

1705, Buxtehude used horns in his cantata *Templum honoris*, in which players from Hamburg took part, while in 1708 the Berlin court composer A.R. Stricker employed them in his opera *Alexanders und Roxanens Heirat*. In any case, by 1713 the instrument had become well-enough established that Johann Mattheson was able to declare in *Das neu-eröffnete Orchestre* (p.267) that 'the lovely, majestic hunting horns have now become very fashionable'. The fact that many horn players were taken on by the leading musical chapels further confirms the instrument's increasing diffusion throughout the German-speaking area. Following J.T. Zeddelmayer's appointment to Weissenfels in 1706, other players were engaged in Wolfenbüttel (1710), Dresden (1710), Düsseldorf (1711), Stuttgart (1715) and Darmstadt (1718). Dresden in particular was an important centre of horn playing throughout the 18th century; notable performers employed there included the Schindler brothers (from 1723 to 1733 and 1737 respectively), J.G. Knechtel (from 1733 or 1734 until about 1756), A.J. Hampel (from 1737 until about 1768) and Carl Haudek (1747–96).

The first occurrence in France of a part written specifically for the hooped instrument is likely to have been in the divertissement *La chasse du cerf* by J.-B. Morin, performed at Fontainebleau in 1708. An early example of the horn in a concertante role in an Italian score is found in Francesco Gasparini's *L'bracolo del fato* (Vienna, 1719), which calls for two 'trombe da caccia', while one of the first appearances of the horn in London must have been when German (possibly Bohemian) players appeared at Chelsea College in 1704. It seems that Handel did not adopt the horn on a permanent basis before 1720.

The official adoption of the horn into the Viennese court orchestra makes it possible to trace the route by which the instrument quickly came to take a permanent place in the most fashionable operatic repertory of the day, that of the Neapolitan school; here it assumed its characteristic 'harmonic' role which subsequently became habitual in orchestral use of the instrument. Between 1707 and 1719 the Neapolitan viceroyalty, then dominated by the Austrians, was represented by Count Johann Wenzel von Gallas, a member of a Bohemian family with a strong musical tradition. The family supported a sizable orchestra from which, in all probability, the count selected a core of players to take to Naples. There, on 28 August 1713, during the celebrations for the birthday of Empress Elizabeth Christina, there was a performance of the serenata *Il genio austriaco: Il Sole, Flora, Zefiro, Partenope e Sebeto*, on a text by l'abbé G. Papis, with music by Alessandro Scarlatti: 'there were countless harmonious instruments, timpani, trumpets, hunting horns, as well as flutes and all sorts of strings and organ, and a great number of singers in the chorus' (D.A. Parrino, quoted in Prota-Giurleo, 1952, p.89). A few months later, on 19 November, Lotti's opera *Porsenna* was performed at the Teatro S Bartolomeo for the name day of the empress, 'adapted and directed' by Scarlatti; from that point onward, Scarlatti gave the horn a permanent place in almost all his operas. In view of this, the declaration in Heinrich Domnich's *Méthode* (1807, p.iii) that Scarlatti and Lotti were the very composers responsible for the introduction of the horn into the orchestra in Italy seems to be strongly supported by the evidence. According to Domnich, their principal pupils, Hasse (whose first Italian opera, *Tigrane*, was performed in Naples in 1729) and Domenico Alberti respectively, imitated and continued their teachers' use of the horn. The Neapolitan school appropriated the instrument on a permanent basis, and it regularly appears in the scores of Durante, Porpora, Vinci, Feo, Leo and Pergolesi from at least 1720 onwards.

A terminological peculiarity of Neapolitan scores is the adoption of the name 'tromba da caccia', an Italianization of the French *trompe de chasse*. This term distinguished the horn from the simple folded 'tromba' or trumpet, referred to elsewhere in Italy as 'tromba diritta' or 'tromba lunga' (the Italian language had not adopted the diminutive form 'trombetta' as was the case in the other principal European countries). The presence of a 'trombon da caccia' in two Vivaldi scores (the opera *Orlando finto pazzo*, 1714, and his Concerto in F for violin, 2 'trombon da caccia', 2 oboes and bassoon, RV574) probably stems from this same terminological tradition: the instrument was therefore a hooped horn. Further documentation of the reception of this model in Italy is provided by Filippo Bonanni who, in his *Gabinetto armonico* (1722), as well as referring to the still-common 'Corno per la Caccia' as being similar to an animal horn, mentioned an 'Altro Corno da Caccia' made of metal with a small central coil, adopted 'by Hunters and by Messengers', and lastly a hooped 'Corno raddoppiato' ('doubled horn') which was 'much larger and more resonant' and made 'a terrific sound, overpowering the other instruments'.

(iii) Crooks and hand technique.

The crucial aspects of the evolution of a truly orchestral horn and its playing technique were the adoption of a more compact and manageable shape, and the introduction of crooks. Crooks were introduced in Austria as early as the beginning of the 18th century and were in common use by the 1740s. They consist of a piece of tubing turned back on itself and inserted at the mouthpipe or along the pipework, thus adding to the overall length of the instrument and effecting a change of pitch. The introduction of crooks represented substantial transformation of the horn's actual sound. Their use involved a considerable variation in tone colour from key to key, as the overall proportions of the tubing differed according to the crook. This variation was especially noticeable on the crooks at each end of the range (B \flat and C bass; A, B \flat and C alto), the tone being very different from that obtainable in the central keys (D, E \flat , E, F, G). As far as is known, the earliest surviving example of a horn with crooks dates from 1721, and was made by Michael Leichnam Schneider (for illustration see Fitzpatrick, 1970, fig.IVa). When crooks were inserted in the mouthpipe, players were obliged to change the way they held the instrument, so that the crooks did not fall out. The left hand, which in hunting on horseback had been used to hold the reins, now had to hold the crooks and the instrument securely, while the right hand could grasp a side of the bell, and not the body of the horn as had previously been the case.



(a) Helical horn, c1572 (Historisches Museum, Dresden);
(b) triple-coil horn...

The earliest surviving sets of crooks belong to English-made horns and include two conical 'master crooks', to which cylindrical 'couplers' of various sizes were added to obtain the lowest pitches (see fig.2c). While on one hand this early system produced a considerable saving in the difficult construction of conical crooks, on the other it had the drawback of making the instrument heavier and quite awkward to hold when more than one coupler had to be used together. Couplers were abandoned after 1750 with the introduction

of a complete series of nine or more crooks inserted in the mouthpipe, one for each key starting from B \flat or C alto. Another important invention, dating from 1753 at the latest and known as the *Inventionshorn*, was conceived by the famous horn player A.J. Hampel with the help of the instrument maker Johann Georg Werner of Dresden. This model has the distinctive features of a fixed mouthpipe and series of sliding crooks of cylindrical bore which are inserted into the body of the instrument to lower the pitch from E downwards, while from F upwards it is necessary to insert a new mouthpipe which also acts as a crook. The earliest surviving example of the *Inventionshorn* is by Johann Gottfried Haltenhof (1776, now in the Musée de la Musique, Paris). The most famous model of horn with sliding crooks, however, was the *cor solo*, invented by Raoux in Paris in about 1780 and adopted by many soloists in France. It was distinguished by the use of only five crooks (those most commonly used in solo compositions), G (a simple bend), F, E, E \flat , and D.

In the mid-18th century, as crooked horns became increasingly common in orchestras, notes alien to the harmonic series began to appear in some scores, e.g. Durante's *Abigaille* (Rome, 1736; see Fitzpatrick, 1970, p.65). These notes probably required some use of the hand inside the bell, a technique which was made more easy by the reduced dimensions of the body of the instrument and the increased aperture of the bell. Before that time, according to Dauprat's *Méthode* (1824), horn parts were played in the same manner as the contemporary hunting instrument (probably with the 'natural' intonation of the 11th and 13th partials), held in one hand with the bell turned upwards. He also maintained that as late as 1800, in some theatres in Milan, the players (probably including the virtuoso Luigi Belloli) used to hold the bell upwards to play *forte*. This points to the survival of a much older technique and seems to confirm the many pictures showing the horn held in such a position even if some of them may be exaggerated for artistic or pictorial reasons. In any case, Dauprat himself observed that some horn players were resistant to the direction to play with the 'pavillon en l'air', because the position rendered the quality of attack and intonation less reliable.

The first complete description of the use of hand technique is found in the *Essai d'instruction à l'usage de ceux qui composent pour la clarinette et le cor* by Valentin Roeser (1764) who wrote:

"The notes I have marked ... are too high, but they can be played in tune by placing the hand in the bell of the horn There are a further four or five notes which can be played on the horn by using the hand. But care must be taken if one wishes to use them."

In practice, Roeser was referring to an elementary technique of playing using the hand, aimed as much towards tuning the sharp partials as to lowering of a semitone with a larger occlusion. In this technique the hand is inserted into the bell (the horn being held with the bell turned downwards, in the now customary position) with the fingers resting on the part furthest from the player's body, and slightly curled round. By bringing in the thumb to form a sort of 'spoon', the player can close the bell as much as is necessary to lower each harmonic by a semitone, thus obtaining a new series of pitches, but with a muffled tone. Another aspect of this technique is the complete closure of the bell, which results in an even duller and more 'metallic' timbre and obtains a further series of notes (but only from the 4th partial), one semitone higher than the natural ones. However, for some partials which have a tendency to sound particularly flat, it is necessary to open the hand completely, i.e. by stretching the palm towards the inside. This technique is required for $b\flat$ ' (the 7th partial), \sharp " (11th) and a " (13th) – both also possible with a closed hand – and finally $b\flat$ " (14th). The combination of these hand techniques mean that a chromatic scale can be played in a good part of the range, while a proper positioning of the hand gives a more well-blended tone. It seems that hand technique was at first used only by some virtuosos and it is impossible yet to establish with any certainty the place where it first took root. Domnich (1807) credited Hampel with its invention, but his testimony does not seem completely reliable (see Hiebert, *HBSJ*, 1992), although it is likely that Hampel was one of the first to use it when he played second horn in the Dresden orchestra, passing it on to his pupils, including Giovanni Punto. Another, older technique survived into the 18th century, having been known to Praetorius (1619). Known as 'falsetto' technique, it involved relaxing the lips to obtain an artificial lowering of the lowest partials.

During the whole hand-horn period there was a particularly marked distinction between the roles of 'first' and 'second' horn, referred to as *cor alto* and *cor basse* respectively. It was customary for the *cor alto* to specialize in playing only the top register (generally from the 5th to the 16th and sometimes up to the 24th partials), thanks to an embouchure derived from trumpet technique which helped with playing high notes. In contrast, the *cor basse* specialized in playing the low register which, because of the greater distance between the available harmonics, necessarily implied better development of hand technique and 'falsetto'. It is evident from various methods published by the Paris Conservatoire, which call for different mouthpieces and embouchures for the two categories, that players began to specialize early on in their careers, during their apprentice years. The mouthpiece required for *cor alto* playing was short and narrow, and the embouchure similar to that of the trumpet, with one-third of the mouthpiece resting on the upper lip and two-thirds on the lower; for *cor basse* the mouthpiece was broad and deep and leaned two-thirds on the upper lip and one-third on the lower. This division of roles has remained in use in the modern orchestra, where two distinct registers are normally assigned to pairs of players.

Hand technique evolved into a distinctive horn idiom which saw as desirable the varied timbre which results from the alternation of open and stopped notes, giving rise to all the 'classic' repertory for the instrument, from Mozart's and Haydn's concertos to the works by Beethoven (Horn Sonata in F) and Weber (Concertino in E minor op.45), and also the many solo horn passages in the orchestral and operatic repertory (e.g. the overtures to Weber's *Oberon* and *Der Freischütz*; see [ex.1](#)). The technique clearly left a considerable mark on later writing for the horn, so much so that Brahms's orchestral parts continued to be composed with the hand horn in mind, despite the fact that by the time they were written the instrument was fully mechanized. It is known that he hoped that his Trio op.40 would be played in such a way. Hand technique continued to be taught in the early years of study up until the 1920s and later in the 20th century it experienced a considerable revival in period instrument performances.

Ex. 1

1 = Fulling in lower register
 2 = Fulling in lower register
 3 = Fulling in lower register
 4 = Fulling in lower register

Ex. 1

There is evidence that more unusual or unfamiliar timbres, produced by means of special techniques or mechanisms, were exploited as early as the mid-18th century. Hampel's insertion of a wad of cotton in the bell, to obtain a particular dampening effect preferable to that with the mute, is documented in Domnich's *Méthode* (p. iv). This technique must already have been in use for some time, since Vivaldi asked for it in his Concerto for viola d'amore, 2 oboes, 2 horns and bassoon RV97. The two horn parts in Beethoven's *Rondino* WoO25 (1743) calls for mutes to be inserted into the bell (for further details about horn mutes, see [MUTE, §2](#)).

3. History from c1800.

(i) Keyed and omnitonic horns.

One of the various attempts to make the horn chromatic involved the addition of keys similar to those already in use on woodwind instruments. An instrument, known as an 'Amor-Schall', whose bell was covered by a hemispherical (*d'amore*) bell pierced with holes, invented in the second half of the 18th century by Ferdinand Kölbel, a horn player at the Russian court, was thought to be of such a type. In 1995, however, a pen and ink sketch of the instrument was found which shows that it was rather a kind of omnitonic valve horn (see Koshelev, 1998, pp. 52–5, and Tarr, forthcoming). Much later, in 1822, the horn player Benedetto Bergonzi of Cremona added four keys to the natural horn, taking his lead from the [KEYED BUGLE](#). These experiments were not developed any further and no example of either has survived.

The invention of 'omnitonic' horns probably arose from the desire to have all the crooks accessible at the same time and to be able to select them instantaneously. In these horns all the crooks were actually incorporated into the instrument, with a special device to enable the player to choose the one required. Although their success was rather limited (in the meantime valves had been invented, and these produced an almost identical result though incurring less expense and overall weight) a vast number of models were designed and built. The earliest was made by J.-B. Dupont (Paris, c.1815), comprising eight independent tubes, each with its own mouthpiece into which the mouthpiece was inserted to obtain a different series of partials. In May 1818 Dupont obtained a patent for a second, more advanced model in which a single mouthpiece served for all the crooks and a long notched slide could be moved to select the desired key. A more conventional and efficient model was patented in 1824 by Charles Sax of Brussels, which was based on the *Inventionshorn* but placed all the crooks on a slide. There was a host of other experiments with omnitonic horns, almost all developed by French makers, with some exceptions, such as Embach in the Netherlands, Pelitti in Italy and Kruspe in Germany.

(ii) Valve horns.

(For further discussion and illustration of the valve types discussed here, see [VALVE \(i\)](#)). The earliest documentation of the invention of a horn with valves (apart from a rudimentary valve device applied to a 'horn' by the Irishman Charles Clagget in 1788 – this was probably actually a trumpet) is a letter dated 6 December 1814 from Heinrich Stölzel addressed to King Friedrich Wilhelm II of Prussia, in which he requests recognition of his horn with two tubular piston valves which he had demonstrated by July 1814. However, Friedrich Blühmel claimed to have had the

idea first (in 1811–12) – though his invention was a box valve (a piston valve of square section) – thus setting in motion a long-lasting battle which came to an end only with the issuing of a joint Prussian patent in April 1818 for a box valve (see Heyde, 1987, pp.14–21). Stölzel quickly paid off his competitor and thereafter was able to exploit the patent alone. In 1819 a third valve was added to the horn by C.F. Sattler, who in 1820–21 also experimented with a double-piston valve; the latter device, with various improvements, was particularly successful in Germany and Austria (after having been improved in 1830 by Leopold Uhlmann it became known as the ‘Vienna valve’).

In Italy in 1822 Luigi Pini invented a horn with two double rotating cylinders, set in motion by indented wheels worked by long rods, an example of which has survived (Museo Civico Medievale, Bologna, no.1847). A large number of experimental valves, both rotary and piston, were later invented for the horn. Important early examples of the rotary valve include one invented by Blühmel in 1828 and, in particular, one devised by J.F. Riedl in 1835 which, with a few improvements, is essentially the type still in use today. Horns have also been made with piston valves such as Wieprecht’s ‘Berlin’ valve (1833) and the ‘Périnet’ valve (1838), named after its inventor, which was subsequently successfully applied to all types of brass instrument.

There is no doubt that there were band players, especially in Germany, who adopted the valve horn immediately after it was invented, using it chromatically in the manner still current today. Some soloists were also quick to take up the new model for concert use, but orchestral horn players, even if aware of the advantages of the invention, were slow to accept the new horn unconditionally, since hand technique and its associated variety of timbre was universally much in demand and much appreciated. The adoption of the valve horn involved not only the elimination of such differences in timbre, but also a drastic reduction of the keys in which the instrument was pitched, leaving almost only the horn in F (and later in B \flat) with its characteristically dark, resonant tone colour. This meant that all the existing repertory when performed on this standardized model became tonally uniform. The transformation seems to have been encouraged by a general search for tonal uniformity which was then taking root, particularly in German-speaking areas and in Italy. There was great criticism of the increasing indifference to the old distinctions of tone colour. F.L. Schubert (*NZM*, 1865) suggested that conductors ought not to be tolerating players’ neglect of the hand horn. Perhaps for similar reasons Henri Kling, in his *Populäre Instrumentationslehre* (c1882), recommended the use of a G crook for the third movement of Mozart’s Symphony in G minor K550, without which, he felt, the special timbre of the passage was lost.

The earliest example of solo use of the new valved model is probably G.A. Schneider’s *Concertino für drei Waldhörner und ein Chromatisches Horn* (first performed in Berlin in 1818), while its first known undisputed appearance in the orchestra was in Halévy’s opera *La juive* (1835). As early as 1823 Spontini sent a large number of valved instruments from Berlin to Paris, some of which were destined for Dauprat (see Kastner, 1848, p.192). It seems that there were two hybrid techniques for playing the valve horn: one in which valves were used instead of crooks, playing in all other respects as if on a hand horn, and the other with an intermittent use of closed notes. Both these techniques were employed by Wagner: examples appear respectively in *Rienzi* (1842) and in *Tristan und Isolde* (1865) respectively. The second technique called for the adoption of new symbols (‘+’, countermanded by ‘o’; see [ex.2](#)) to indicate the notes which were to be hand-stopped (Fr. *sons bouchés*; Ger. *gestopft*; It. *chiuso*). These were probably devised by Wagner and his horn player in Dresden, J.R. Lewy. This technique seems to validate the adoption of F as the principal pitch for valve horns, as it is more comfortable and efficient than B \flat when hand technique and valves are used in combination.

Ex.2

A clear advantage the valve horn has over the hand horn is the ability to play a chromatic scale satisfactorily in the low register. Orchestral horn players therefore eventually moved over to the new instrument, an indication of this being the publication of numerous methods for valve horn alone, the earliest being by J.E. Meifred (Paris, 1840) and Antonio Tosoroni (Florence, c1846). In Austria, Joseph Farbach (whose method dates from about 1860) declared himself vehemently against the uneven effect of the ‘old habit of suffocating the harmonics by means of the hand’. In contrast with other countries, in France the hand horn continued to be learned and used into the

20th century, with the exception of the period when Meifred taught valve horn at the Paris Conservatoire from 1833 to 1864. The French also continued to play instruments with both valves and crooks long after their use had ceased elsewhere. The French preference for the hand horn is evident even in 20th-century pieces, such as Dukas' famous *Villanelle* (1906).

The invention of the double horn is attributed to the 19th-century German maker Fritz Kruspe of Erfurt. It was designed in collaboration with a nephew of the horn player F.A. Gumbert and first introduced in Markneukirchen in 1897. However, similar experiments had already been carried out in France by the maker Pierre Louis Gautrot from 1858 onwards. His 'système équitonique' (patented in 1864) was originally conceived as a compensating system, but in effect worked on the same principle as that of the double horn. It consisted of three valves, each with a double set of additional tubing – a primary set tuned normally and a shorter auxiliary set whose length was added to that of the primary set by depressing a fourth valve. Although intended chiefly to correct the intonation of the lowest notes of the euphonium and the *bombardon*, the system was also applied to the horn, where it made possible the use of an E \flat or an F crook without having to reset the valve-slides after changing from one crook to the other. The object attained was not in this case worth the extra weight and cost, but the instrument was in essence a double horn. In 1912 D.J. Blaikley patented a piston-valve double horn in F/B \flat almost identical with the Gautrot 1864 layout, but it met with little favour among players. It nevertheless served in a measure as inspiration for the double horn in F/B \flat built on the ascending third-valve principle by the French firm Jérôme Thibouville-Lamy, in collaboration with the horn player Louis Vuillermoz (c1928).

In the second half of the 20th century, the designs of the London horn player Richard Merewether, in collaboration with the firm of Paxman, gave rise to various other combinations of double and triple horns, which have been increasingly adopted in many countries, along with the standard double horn in F/B \flat and single horns in B \flat (A) introduced tapered lengths into the circuits carrying the valves and enabled double horns in B \flat (A)/F alto, F/F alto and even B \flat (A)/B \flat soprano to be built, with both horns in each combination of a quality that bears comparison with good single instruments ('B \flat (A)' denotes that the horn is equipped with an additional valve that allows the instrument to be put into A; see §1(ii) above). For triple horns in F/B \flat /F alto and F/B \flat /B \flat soprano the same system adds a descant horn to the regular F/B \flat double horn without harmful acoustical compromise. The ascending third valve, still popular in France, may be employed in the longer parts of these horns, with the F alto carrying the usual three-semitone descent remaining the more useful device.

4. Notation and transposition.

Before a single system of notation, which may be usefully termed 'classical' notation, had emerged which was adopted by almost all composers, several systems had been used. The 'French' notation, such as is found in Steffani's *I trionfi del fato* (1695), utilized the old soprano, alto, tenor and bass clefs, with sometimes the treble clef for the highest part. This system was not widely used, and by 1729 J.-J. Mouret was already using the 'classical' notation in the second of his *Suites de symphonies*. The 'Saxon' notation (treble clef, with the notes written an octave higher than sounding pitch) was the principal system found in the early history of the horn in the orchestra. The use of this system meant that the most frequently used partials (from the 4th to the 12th) remained as far as possible within the staff; in addition, this was the same notation as was then used by the trumpet. The favoured keys of the horn in this period, F (apparently the most frequent) and D, were differentiated by their respective key signatures. There is evidence that 'Saxon' notation was used for a certain time in Dresden and the surrounding area (the region where some of the earliest music for the horn is found). The same notation was adopted by Vivaldi in *Orlando finto pazzo* (1714), the earliest surviving work in which he calls for the horn ('trombon da caccia'); he subsequently adopted notation at pitch for the instrument (still in treble clef).

The earliest 'Neapolitan' notation was in bass clef with the notes written an octave below sounding pitch, possibly because it was felt to be more suited to the baritone register of the

instrument, or perhaps to distinguish it from the corresponding treble clef notation used by the trumpet. The 'Saxon' and early 'Neapolitan' systems were perfectly functional as long as the horn remained tied to a single basic key, but decidedly inadequate (and inconvenient) in the era of crooks. However, in a group of Neapolitan scores dating from 1753 to 1763 (*GB-Lbl*) the C clef (particularly the alto clef) is used as well as the bass and treble clefs (see Carse, 1925, p.115). In this system, the harmonic series was indicated with a single series of positions on the staff, but was transposed to different keys by use of clefs. Thus the C major triad, C–E–G, could be read and played as D–F \sharp –A when preceded by the alto clef; the bass clef gave E–G \sharp –B, the mezzo-soprano clef, F–A–C, and so on (the distinction between keys with sharps or flats was established by altering the key signatures).

The 'classical' system, which with few exceptions has remained in use from the early 18th century, is based on the use of the treble clef (with rare interpolations of the bass clef), with no key signature whatsoever, and indicates the various partials of the natural series on C. These last are transposed according to indications to the player as to which key of instrument to use, or else which crook to insert. The player thinks of the part in terms of absolute pitches in the harmonic series on C, while the sounds produced correspond to those set by the key of the instrument or by the crook in use. If the player performs the sequence C–E–G with the D crook ('horn in D') the sounds produced will be D–F \sharp –A, with the E \flat crook, E \flat –G–B \flat , and so on. The earliest example of this notation which has so far come to light is found in Badia's *Diana rappacificata* (Vienna, 1700); this seems to confirm the Viennese origin of horn crooks, which made such notation necessary (see §2(iii) above). The next known example is that found in Keiser's opera *Diana* (Hamburg, 1712), showing that this functional method of notation soon became known and used over a wide geographical area.

For the lower part of the range the bass clef is used with the notes sounding an octave higher than written (e.g. in Strauss's *Till Eulenspiegel*; *ex.3*). The origins of such a notational incongruity merit some clarification. The earliest explanation, but at the same time possibly also the most contrived, is that given in Dauprat's *Méthode* (1824, p.30). He declared that the bass clef was to be taken as a point of arrival in the bass of the whole descending system of keys which could be obtained with the different clefs in use, corresponding to the various crooks adopted; it was therefore not to be understood as a normal continuation downwards of the treble clef, but as the lowest clef of the entire tonal system (thus giving rise to the gap of an octave). Despite such an adroit interpretation, it is much more likely that this method of notation derives from the need to avoid any possible confusion with the use of the bass clef in the Neapolitan system (see Haller, 1970, p.277). In essence, then, this feature (which is also found in Italian notation for English horn and other middle- to low-pitched wind instruments) is a survival of Neapolitan bass-clef notation. When the third harmonic became playable with the use of valves this notation was rendered ambiguous, and so the lowest notes also began to be written in the treble clef, despite the fact that this involved the use of many ledger lines. Many authoritative voices have argued in favour of a bass clef corresponding to the treble (without the octave gap) ever since the time of Domnich's *Méthode* (1807, pp.6–7). Nevertheless, the classical system has survived to our own day, together with the transposed writing for the horn in F. Some 20th-century composers have adopted writing at pitch, eliminating the need for transposition once and for all. This would have had greater success were it not for the fact that almost all the standard repertory which involves the horn was originally written (and often published) in 'classical' notation.

Ex. 3

Ex.3

5. Repertory.

Although the repertory for the horn as a solo instrument is not extensive, it includes some fine

compositions. 18th-century concertos for horn and orchestra include those by Telemann, Christoph Förster, Michael and Joseph Haydn, Leopold and W.A. Mozart and Carl Stamitz, in addition to Vivaldi's concertos for two horns and Bach's First Brandenburg Concerto. The horn also featured in chamber music, most notably Mozart's Quintets in E \flat K407/386c (horn, violin, two violas and cello) and K452 (piano, oboe, clarinet, bassoon and horn), Beethoven's Quintet op.16 for piano and wind, his Sextet op.81b for two horns and strings and his Septet op.20, and Schubert's Octet D803. There are also sets of duets by Mozart (K487/496a), Puntó, Rossini and Schubert, among others. Beethoven's Horn Sonata in F op.17 was composed for Puntó, while Weber was perhaps the first to explore the Romantic potential of the instrument in the overtures to *Oberon* and *Der Freischütz*, and his Concertino; the latter work contains an early use of the phenomenon of multiphonics. The association of the instrument with hunting is reflected in Rossini's *Rendez-vous de chasse* for four 'corni da caccia' and orchestra (1828). Other early 19th-century compositions for solo horn and orchestra were written by Cherubini and Danzi.

The influential French 19th-century teacher and performer L.F. Dauprat composed extensively for the horn, as did his pupil J.F. Gallay. Between them they produced a number of concertos and works for solo horn with piano accompaniment, as well as chamber music for horns alone, and for horns in combination with other instruments. A significant solo work for the valve horn was Schumann's Adagio and Allegro for horn and piano op.70 (1849); the composer's equally interesting *Concertstück* for four horns and orchestra dates from the same year. Other compositions for solo horn and orchestra from the second half of the 19th-century include those by Mercadunte and Franz Strauss, as well as the First Concerto (1882–3) of Richard Strauss, whose Second Horn Concerto is a much later work (1942), and Saint-Saëns's Romance op.36 (1874) and *Morceau de concert* op.94 (1887). Rimsky-Korsakov's Nocturne (c1888) is for a quartet of horns. Some examples of works for solo horn with piano accompaniment are Rossini's *Prélude, thème et variations* (1857), Saint-Saëns's Romance op.67 (1885), the Romance by Skryabin (1890), and Glazunov's *Rêverie* (1890). The horn was also successfully combined with the violin and piano in J.L. Dussek's *Notturmo concertante* op.68 (1809) and Brahms's Trio op.40 (1865). Schubert's song *Auf dem Strom* D943 (1828) includes an obbligato horn part, as does Richard Strauss's *Ein Alphorn hör' ich schallen* (1876).

The horn was quite well served by 20th-century composers. Hindemith wrote a sonata for horn and piano, and both he and Michael Tippett wrote sonatas for four horns. The playing of Dennis Brain inspired several fine works, including a concerto by Hindemith and two vocal works by Britten with horn obbligato, *Canticle III* ('Still falls the rain') and the *Serenade* op.31. Among younger composers Thea Musgrave made striking solo use of the horn in her *Night Music* (1969) and *Horn Concerto* (1971). Other works for solo horn include H.E. Apostel's *Sonatina* op.39b (1964), Malcolm Arnold's *Fantasy* op.88 (1966), *Sea Eagle* by Peter Maxwell Davies (1982), Hermann Baumann's *Elegia* (1984), *The Dying Deer* by Alun Francis (1989) and Oliver Knussen's *Horn Concerto* (1994). Poulenc's chamber works include three pieces incorporating the horn: the *Sonata* for horn, trumpet and trombone (1922, rev. 1945), a *Sextet* for wind quintet and piano (1932–9) and the *Élégie* for horn and piano (1957). There are also trios for horn, violin and piano by Lennox Berkeley (op.44, 1953) and Ligeti (1982).

Late Romantic and 20th-century horn parts increasingly explored a whole range of tone colours. Special effects include echoes (indicated by a cross within a circle; obtained by playing a stopped note pianissimo), glissandos, flutter-tonguing, *cuvrés* (loud, brassy notes), and so on. A common way of altering the sound is by using mutes. Those usually required in orchestral practice are conical ('straight'), and made from cardboard, fibre or synthetic materials, being closed at the wider end. These are non-transposing devices (i.e. they do not affect the pitch); other types of mute have the same effect as hand-muting (partially closing the bell with the hand), which raises the pitch a semitone (for which the player must compensate with the valves).

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