GASTON BORCH

PRACTICAL MANUAL *of* INSTRUMENTATION

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To the memory
of my dear master
Jules Massenet

PRACTICAL MANUAL

of

INSTRUMENTATION

By

GASTON BORCH

With numerous musical illustrations,
and particular reference to the reduction
of large scores for smaller orchestra

net $1.00

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FOREWORD

In presenting this "Practical Manual of Instrumentation," my object is to supply the long-felt need for a short, comprehensible guide for the use of both professional and amateur musicians. As a text-book it will be found valuable to advanced students in composition, who have the technique of harmony and counterpoint, wherewith to treat the instrumental parts of an orchestral score in much the same manner as the voice parts in a choral score, with regard to the "leading" of the parts, the avoidance of bad intervals and "cross relations," etc., etc.

The study of instrumentation—alike with all other branches of Musical art—is largely dependent for its mastery upon native talent and musical perception. Neither can its technique be entirely acquired from the study of text-books alone, even though the subject may be treated thoroughly and exhaustively.

To attain technical skill for good orchestrating, it is necessary that the student study orchestral scores, and frequently hear good orchestral music. Also, if possible, to have practical experience playing in orchestras. The latter is of inestimable value. Some of our greatest composers have never arisen above mediocrity in their orchestrations largely because they have not mastered the playing of any orchestral instrument, and, consequently, were unable to fill any place in an orchestra. In view of furthering one's practical knowledge of the details of instrumentation, it were better to play the drums in an orchestra than no instrument at all.[1]

This "Manual" treats of every instrument actually used in the symphony or grand-opera orchestras. Regarding the wood-wind instruments, I have considered only those possessing the latest improvements of the Boehm system.

The differently pitched French Horns are not included in this work for the reason that modern orchestral players use only the Chromatic-horn (Valve-horn) in *F*.—The *E-flat* Horn is sometimes employed in Military bands.—Likewise with the Trumpets and Cornets: only those in *B-flat* and *A* are considered, because of their almost exclusive use in modern orchestras.—In the orchestras of some European countries, the Trumpet in *C* is frequently found, but rarely in this country.

[1] Both Vincent d'Indy and Jules Massenet, during their student days, played the drum in orchestras so as to obtain training in the technique of instrumentation.

In Appendix III will be found a table of transposing instruments, giving the notation in relation to the key of the composition to be orchestrated. In selecting the pitch of Clarinets and Trumpets (or Cornets) to be used in a composition, where *B-flat* or *A* instruments would seem to be equally good (*e. g.*, the key of *C*-major indicating *D*-major for a *B-flat* Clarinet or Cornet, and *E-flat* major for the *A* instrument), it is well to remember that the selection of Clarinets and Cornets may be determined by the different modulations (or transitions from one key to another) in the composition. Should the composition in *C*-major contain several measures in the key of *A-flat*, it is obvious that the *B-flat* instruments would be better adapted; whereas the *A* instruments would have seven flats or five sharps to contend with. On the other hand, if the composition in *C* should modulate into *E*-minor, then the *A* Clarinet, or Cornet, would be more suitable than the *B-flat* instruments.

The performer can exchange his instruments, but several measures' rest must be allowed him for so doing. It requires about one-half minute's time for a clarinetist to take his other instrument and "warm it up" to pitch,—still longer if the temperature is low.

With regard to the French Horns; it is not customary to indicate their key by the usual key-signature at the beginning of each staff, but instead, to use accidentals for each note, where required, throughout the entire composition. An exception to this rule may be made when the composition is very simple in its modulations, as for example, in the ordinary military march and two-step.

Appendix II also contains a table showing the tonal compass of every orchestral instrument; examples of scoring for various combinations of instruments, and the disposition of different instruments in a modern score for full Symphony (or Grand-opera) orchestra and Concert (or small "American") orchestra.

By its necessary brevity, it is obvious that this Manual does not undertake the study in detail of each instrument, describing all its technical possibilities, etc. For a complete description of each and every instrument employed in the modern orchestra, the student is referred to some modern edition of Berlioz's treatise on instrumentation, or E. Prout's or H. Kling's. Paramount to all text-books, however, I would urge, as being the most helpful study in orchestration, the constant reading of scores, beginning with Haydn's quartets and symphonies, followed by Mozart's quartets and symphonies, and then the quartets,

quintets, septets and symphonies of Beethoven. I also suggest that the student *re*-orchestrate the full Symphony score and adapt it to the requirements of the Concert or "American" orchestra. By so doing, he will greatly increase his familiarity with any work which he is desirous of memorizing. I know from my own personal experience, that a mental visualization of the score is thus obtained, which will always remain in one's memory.

This reducing of large scores for smaller orchestras is explained at length in this Manual, and will be found of much practical value to orchestrators and conductors of small orchestras.

Having set forth what is, or is not, to be expected of this little book, it now remains for me earnestly to express the wish that it will prove all that I intend it to be: *A practical and comprehensible guide to the study of instrumentation.*

GASTON BORCH

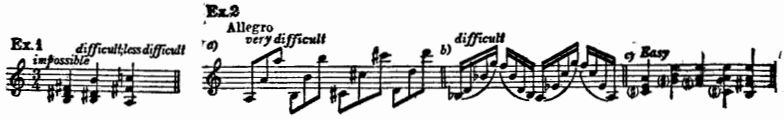
CONTENTS

CHAPTER I

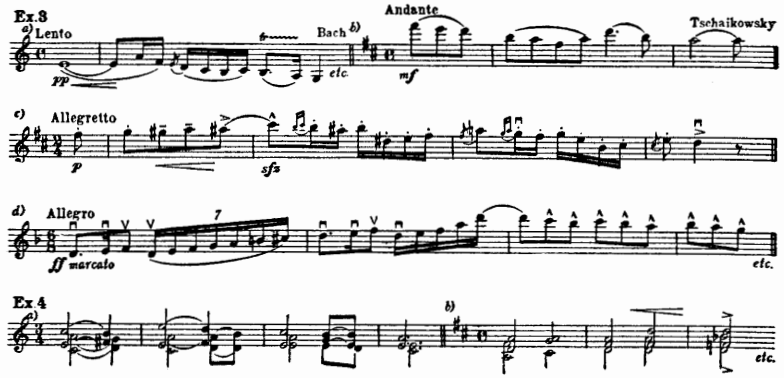
STRING-INSTRUMENTS

The Violin.—For tonal compass, see Appendix II. Tuned in perfect fifths: *E-A-D-G*:  It would require a large volume in which to explain the many different effects to be produced by the Violin. Haydn, Mozart and Beethoven, in their quartets and symphonies, have shown most of the possibilities of this "Queen of the Orchestra."

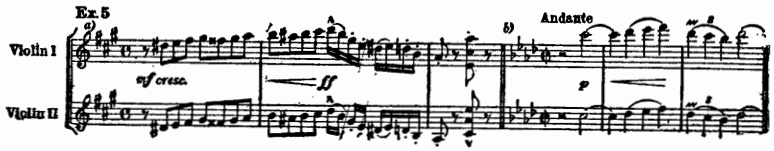
As the ability of performers has greatly improved in the course of time, so, also, have modern composers ventured to introduce new effects, unknown to former generations. There are no positive rules for the employment of the violin in orchestral scoring, except in regard to *arpeggi* and chords, or double-, triple- and quadruple-stopping, which are either very difficult, or quite impossible for the average player.



The use of the violin in orchestration must be left to the discretion of the composer or arranger. It is essentially a melodic instrument, but also very effective when several are employed together for the playing of sustained chords, properly divided amongst their number.



In the orchestra there are 1st Violins (or Violin I), which usually carry the melody, and 2nd Violins (or Violin II) which, as a rule, belong to the harmonic section, playing the unaccented beats or "after-notes," tremolo chords, broken chords, etc. But—especially now-a-days—the 2nd Violin should not be treated as a "filler in". It is, or should be, perfectly capable of reinforcing the 1st Violins, occasionally, either in unison with them or playing the melody an octave lower.



In a string-quartet it is quite obvious that the 2nd Violin is fully as important as the 1st Violin. There are passages for the 2nd Violins in the modern scores, of greater difficulty than were formerly given to the 1st Violins.

Besides the division of orchestra violins into 1st and 2nd, it is sometimes necessary, for the obtaining of certain effects, to subdivide the 1st Violin and also the 2nd. Good examples of such writing are found in the Introduction to "Lohengrin,"—Wagner; Overture to "Euryanthe,"—Weber; and countless others in "Das Rheingold" and "Die Walküre,"—Wagner, etc.

It is unwise to overdo this subdividing of the 1st and 2nd Violins. And it should occur only in scores written for full symphony- (or grand-opera-) orchestra, where the extreme minimum in the number of all the violins, should never be less than ten,—six 1st and four 2nd Violins.

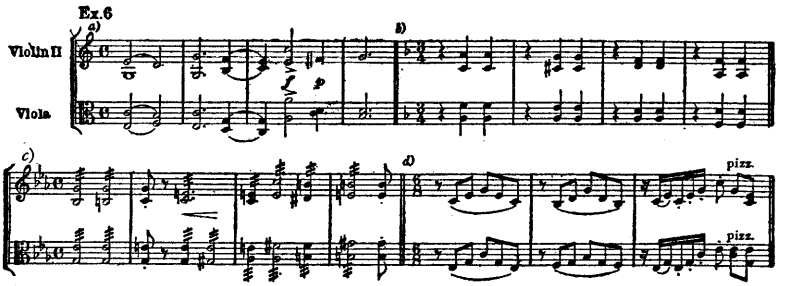
The question of bowing is of the utmost importance in obtaining desired effects of performance. It is best, in the case of difficult passages, to confer with an experienced, practical violinist, and accept his advice in the matter of the bowing.

The Viola.—For tonal compass, see Appendix II.

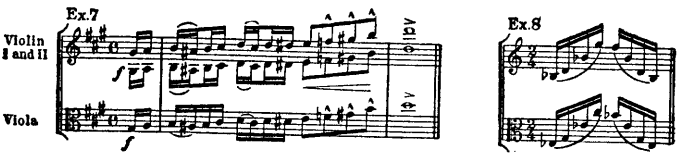
Tuned in perfect fifths: *A-D-G-C:*  Music for this instrument is written in the *C*-clef, 3rd line; the high notes in the violin—or *G*-clef.

The yearning, somewhat sombre tonal-character of the Viola, has a peculiar charm, especially in the middle register, but it should be

sparingly employed as a solo-instrument. It is best adapted, in connection with the 2nd Violins, for divided chords, either in sustained notes or broken form.



In passages where the 1st and 2nd Violins play in octaves, it is well to reinforce the 2nd Violins with the Violas, so as to obtain a proper balance of tone. This applies especially to small orchestras.



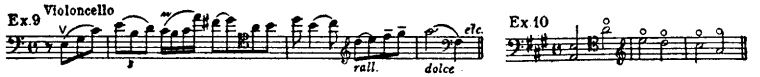
All that applies to the Violin in regard to double stops, practicable chords and bowing, is equally applicable to the Viola; that is, whatever is technically possible on the Violin is *correspondingly* practicable on the Viola.

The Violoncello.—For tonal compass, see Appendix II.

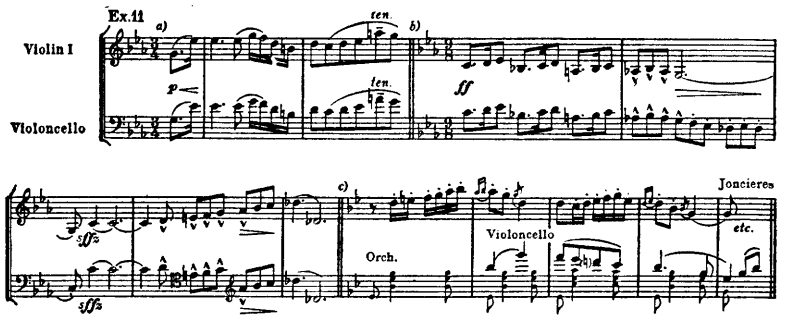
Tuned in perfect fifths: *A-D-G-C*:  Music for thisi nstru-

ment is written in the bass- or *F*-clef, the high notes in the tenor- or *C*-clef, 4th line. Occasionally the violin-clef is used for the highest notes—sounding as written. (Frequently, one will find the Violoncello part notated in the *G*-clef—violin-clef— with the intention that it sound and, necessarily, be played an octave lower than it is written; but this custom is practically in disuse, now-a-days.) It is best to use only the bass- and tenor-clefs, having recourse to the violin-clef only when immediately

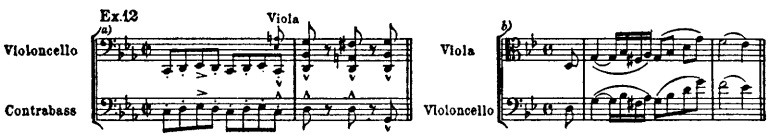
following high notes in the tenor-clef for still higher notes in the violin-clef.



The Violoncello is an instrument affording many and varied possibilities for its use in orchestral writing. It is used to carry the melody, in octaves, with the 1st Violins, in unison with the lower and middle register of the same, or in independent counter-melodies.



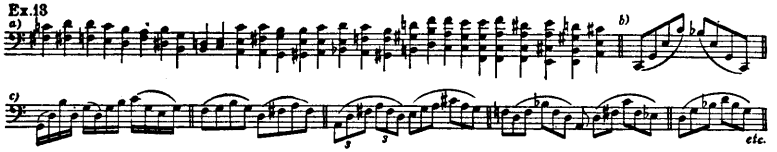
It is excellent for reinforcing the Bass (Contrabass) and also for improving the tone-color or strength of the Violas.



It is a splendid solo-instrument, possessing many different tone qualities; full of contrasts, and of great carrying power, especially in the higher register. Sweetness, earnestness and sternness can be equally well expressed by the Violoncello. Excellent illustrations of its use are to be found in Beethoven's string-quartets.

Double stops and broken chords are practicable, though in lesser degree than on the Violin or Viola.

Ex.13

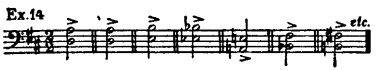


The Double-bass or Contrabass.—For tonal compass, see Appendix II.

Tuned in perfect fourths: *G-D-A-E*  The Modern five-string Double-bass possesses a low *C*-string  which may be tuned down to *B* or *A* in order to produce some desired pedal-effect. Music for the Double-bass in the orchestra is written in the bass- or *F*-clef, the notes sounding an octave lower than written.

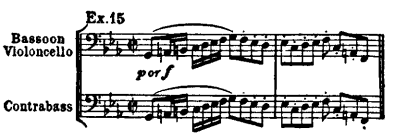
Double stops are to be avoided in orchestra playing, except very simple ones, and these only for double-pedal effects.

Ex.14



The principal use of the Double-bass is so generally known as not to require mention. As a solo-instrument it is rarely employed. Combined with the Violoncello, Bassoon (and, at times, Trombone or Tuba) it is given melodic passages and even quick runs, which if played by Double-basses alone would not be clearly audible. This is not due to a

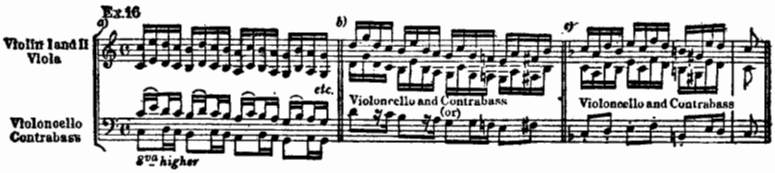
Ex.15



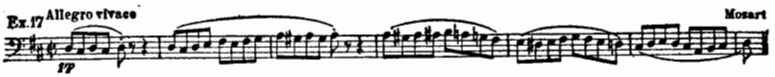
lack of carrying power, but instead to the difficulty in producing the tone, i. e., the comparatively long time needed to impart proper vibrations to the heavy and long strings of this instrument.

Figuratively speaking, the Double-bass is the foundation or "base" of the orchestra, and is as important as any other instrument. A poor bass-section spoils an orchestra more than any other defect. It is best

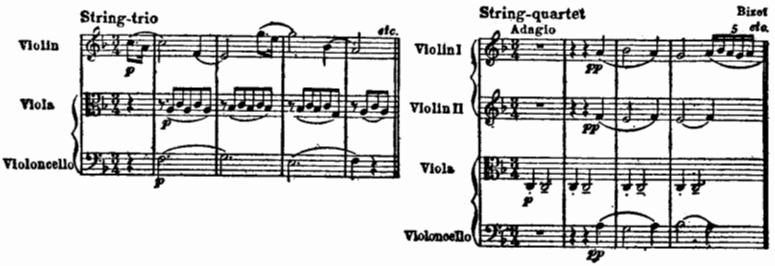
not to give the Double-basses very difficult runs. When such passages are to be played by all the strings, in rather quick *tempo*, it is better to simplify the Double-bass part by omitting certain notes of the figure, or run, which will not be perceptible to the ear.

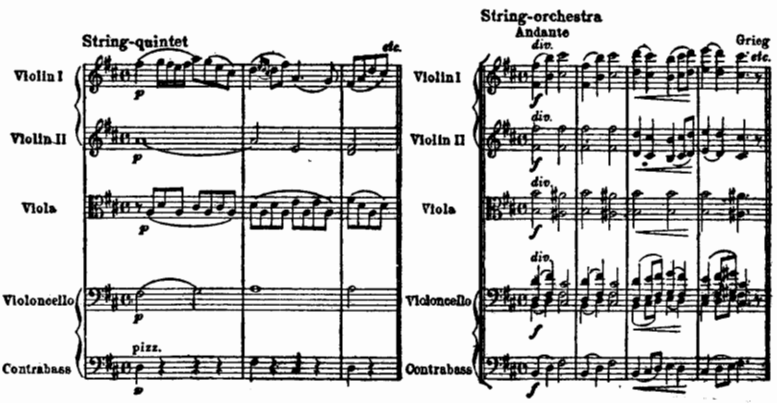


If the run or passage is free from skips (wide intervals) modification of the Double-bass part will then not be necessary—being as practicable for this instrument as any other in the string section.



The following excerpts illustrate different combinations for string-instruments.





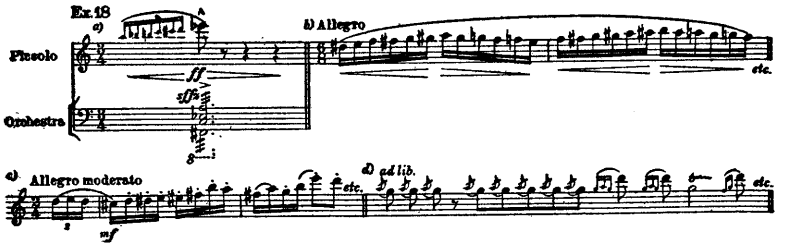
CHAPTER II

THE WOOD WIND-INSTRUMENTS

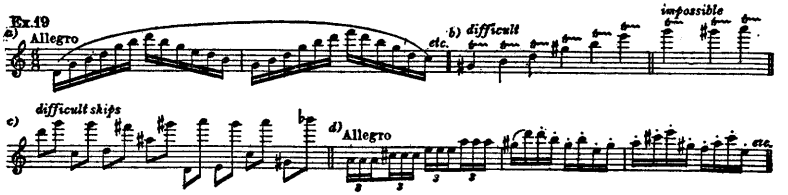
The Piccolo.—For tonal compass, see Appendix II.

The Tones of the Piccolo sound an octave higher than they are notated.

This little instrument well adapts itself to illustrating the elements of Nature in melodramatic scenes, such as the whistling of the wind, the lightning of the storm, etc.



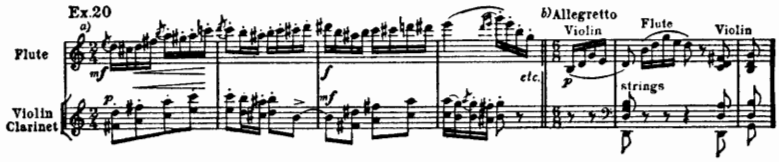
It can also depict a jocular mood, the martial spirit, bird-songs, etc. It should be used sparingly in the orchestra, and for special effects only. Its higher notes are very piercing and harsh, while the lower ones have very little power. It is essentially a solo instrument and should only occasionally play in unison with the Violins, for example; far more rarely one octave above. Tonally, it is extremely flexible and runs or *arpeggi* can be played upon it with the greatest rapidity. Most skips are easy, and also "double- and triple-tonguing," so-called.



The Flute.—For tonal compass, see Appendix II.

This, also, is a flexibly tonal instrument, but possessing, besides some of the characteristics of the Piccolo—brilliancy of tone, for example,—many individual qualities, due to the various tone-colors of its different registers. The lower notes have a grave, mellow character, suggesting a religious spirit. The middle register is soft and dreamy,

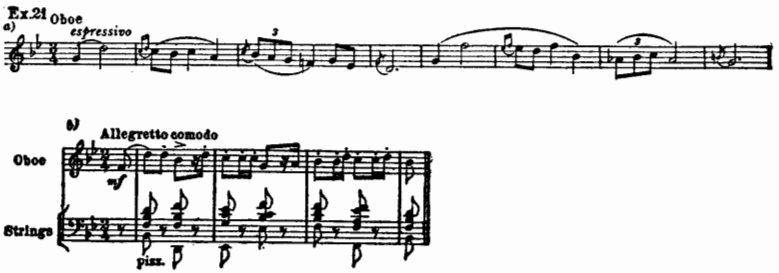
the upper one bright and brilliant, but never shrill. It bears some resemblance to the female voice, and has been successfully employed in alternating with it,—as, for example, in the Aria from "Lakame," by Delibes. In the orchestra proper, it is sometimes used to follow and reinforce the 1st Violins (frequently one octave above), or carry out runs, embellishments, or answers (imitations of a preceding phrase), etc.



As with the Piccolo, nearly all skips are easy upon the Flute, and also double- and triple-tonguing. (See the Flute Solo in the Overture to "William Tell.")

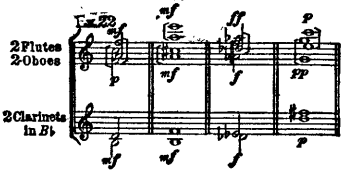
The Oboe.—For tonal compass, see Appendix II.

The tone-color of the Oboe is of a nasal quality, and expressive of sadness and complaint. It is well suited for the depiction of loneliness, grief and suffering; also admirably adapted for illustrating rural and mountain scenes—often in a minor key,—for example, Schubert's "Unfinished Symphony."—On the other hand, it is also capable of rendering humorous moods, especially if employed *staccato.*



As the tonal quality of the Oboe is more penetrating than that of the Flute and Clarinet, it is well to remember, when employing it in chords, in combination with the latter instruments, to give the Oboe either the principal note of the chord, or else indicate that it is to be

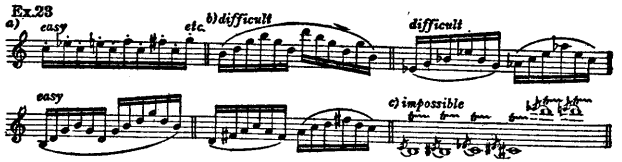
played *mezzo-forte* (*mf*) against *forte* (*f*), or *piano* (*p*) against *mezzo-forte* (*mf*), or *pianissimo* (*pp*) against *piano* (*p*) of the Flutes and Clarinets.



Of all the wind instruments, the Oboe is the least affected by changes of temperature, and, therefore, is always depended upon for sounding the "*A*," or pitch, to the orchestra.

The best sounding notes are those of the middle register, the lower notes being "thick" and somewhat rough, and the higher ones thin and sharp

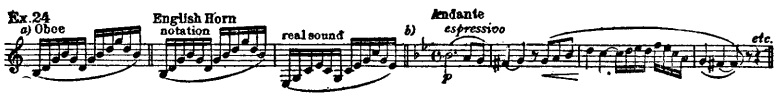
Skips, *arpeggi* and trills:



The English Horn.—For tonal compass, see Appendix II.

The tones of the English Horn sound a perfect fifth lower than they are notated.

This instrument has many of the same tonal characteristics peculiar to the Oboe. Its lower register is very sonorous and more powerful than that of the Oboe. The fingering is also the same as that of the Oboe; and all that is practicable upon the latter instrument is correspondingly possible upon the English Horn.



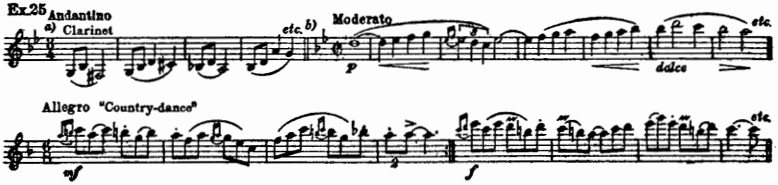
It is superbly adapted to the expression of sad or painful feelings or dramatic situations. Also, for imitating the shepherd's horn (Alpine Horn), and portraying pastoral scenes, it is well adapted. (See Overture to "William Tell;" also "Tannhäuser," Act I, 3rd scene, and "Tristan and Isolde," Act III.) It lacks the humorous possibilities of the Oboe, as its *staccato* is too heavy.

The best results will be obtained with the English Horn when using it in *cantabile* passages and slurred notes.

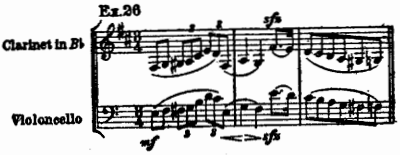
The Clarinet.—For tonal compass, see Appendix II.

The tones of the Clarinet in *B-flat* sound one whole tone lower than they are notated; and those of the Clarinet in *A* sound a minor 3rd (three half-tones) lower than notated.

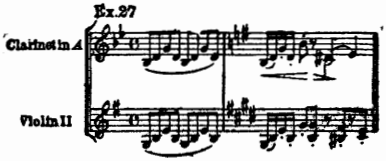
This beautiful toned instrument possesses many and varied qualities. Tenderness, sadness and dignity, and impulsive emotional feelings are all within its scope. Its three registers are quite unlike each other in character. The lower one (*Chalumeau*) is adapted to sadness and dramatic or religious moods. The middle register reflects happy, joyous, tender emotions, and the higher register proclaims joy of a more boisterous character. From this it will be seen that it is an excellent solo-instrument.



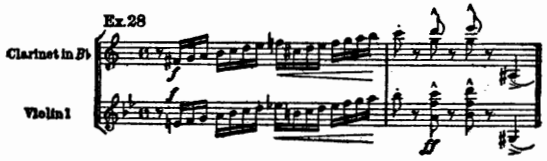
In the orchestra, manifold and diverse use is found for the Clarinet, for example: in reinforcing the Violoncello in its middle register,—the lower notes of the Clarinet, played in unison with the Violoncello produce a beautiful effect:—



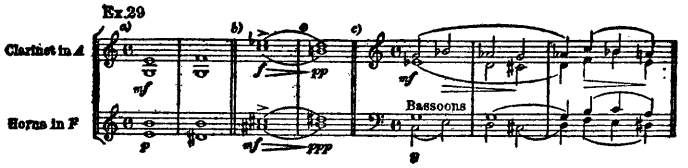
in strengthening the Violas or the 2nd Violins in broken chords:—



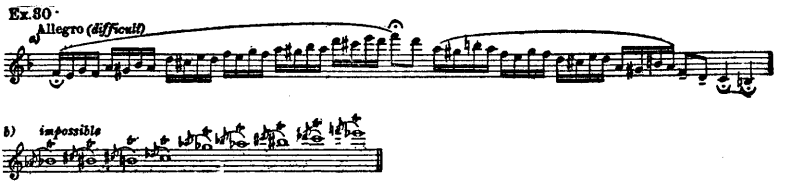
in unison with the 1st Violins, in melody or runs:—



also, in sustained chords in combination with other wood-wind instruments, or with the French Horns:—



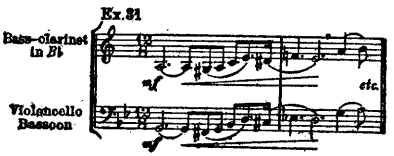
The tonal flexibility of the Clarinet renders *arpeggi*, runs, embellishments, trills, etc., very easy of execution.



Excellent examples of the employment of this instrument are to be found in the Overture to "Mignon" by A. Thomas; Quintet by Weber, and Tschaikowsky's "Symphonie Pathétique."

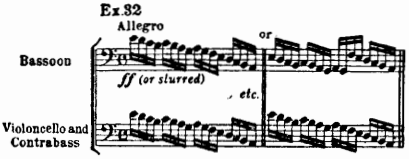
The Bass-clarinet.—For tonal compass, see Appendix II.

The tones of the Bass-clarinet in *B-flat* (the one most commonly used) sound one whole tone lower than they are notated *when written in the bass-* or *F-clef*; and sound a major ninth lower than notated *when written in the G-clef*. Occasionally, this instrument will also be found in *A*, or even *C*, but it is safe to say that everything written for it thus far is playable upon the *B-flat* instrument, with the possible exception of some of the works of Richard Strauss. Anything written for the ordinary Clarinet could be played upon the Bass-clarinet (sounding an octave lower), but the nature of the instrument makes it best suited to *cantabile* passages. Its lower register is of wonderful beauty and will greatly enhance the tonal color of the Bassoon or the Violoncello, when a somewhat prominent effect is desired.

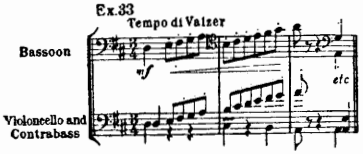


The Bassoon.—For tonal compass, see Appendix II.

This instrument is the bass of the wood-wind section. Notwithstanding its size, it is tonally very flexible, and exceedingly helpful to the Violoncello and Double-bass. Runs and passages played by the Bassoon in unison with these instruments become much more clearly defined.



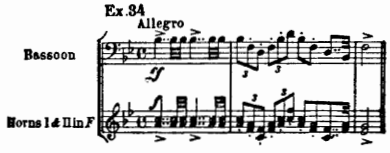
Detached and *staccato* notes are very clear and precise.



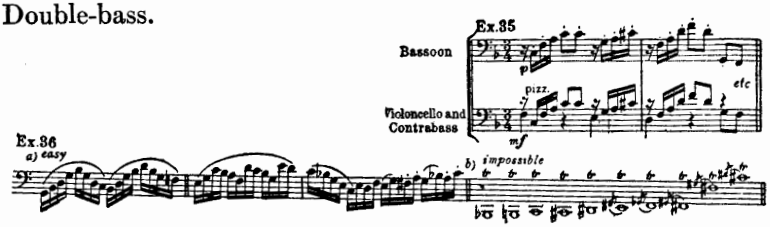
The lower register is very powerful, the middle register mellow, and the higher, somewhat nasal in the French-made instruments and more hoarse in those of German make. (This dissimilarity may result from the different reeds used.)

The Bassoon is capable of rendering grave or mysterious effects, or lamentation, and also, quite to the contrary, can easily be adapted to humorous situations and become exceedingly comical in its depictions. (See Humperdinck's "Moorish Rhapsody" and the Overture to Wagner's "Die Meistersinger.")

In the small orchestra the Bassoon will be found valuable in taking the place of a 3rd Horn, where a complete chord is desired.



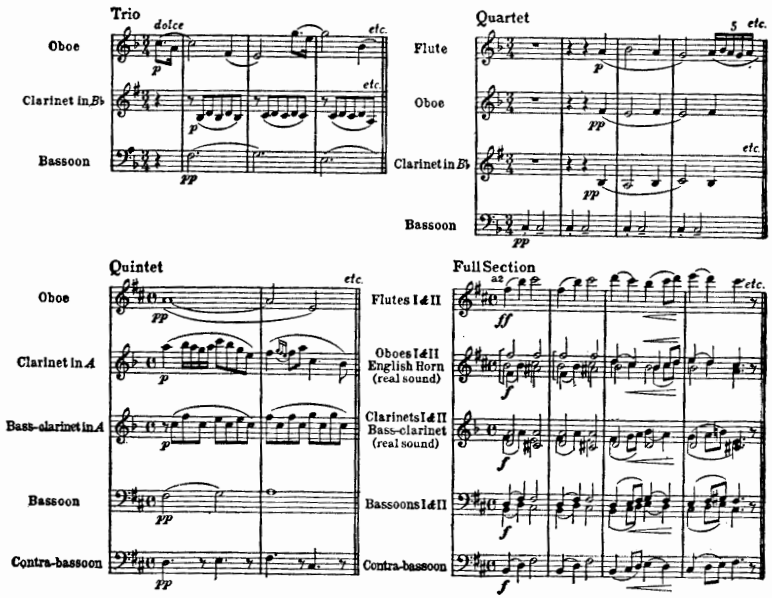
Also, it will prove helpful in reinforcing *pizzicati* of the Violoncello and Double-bass.

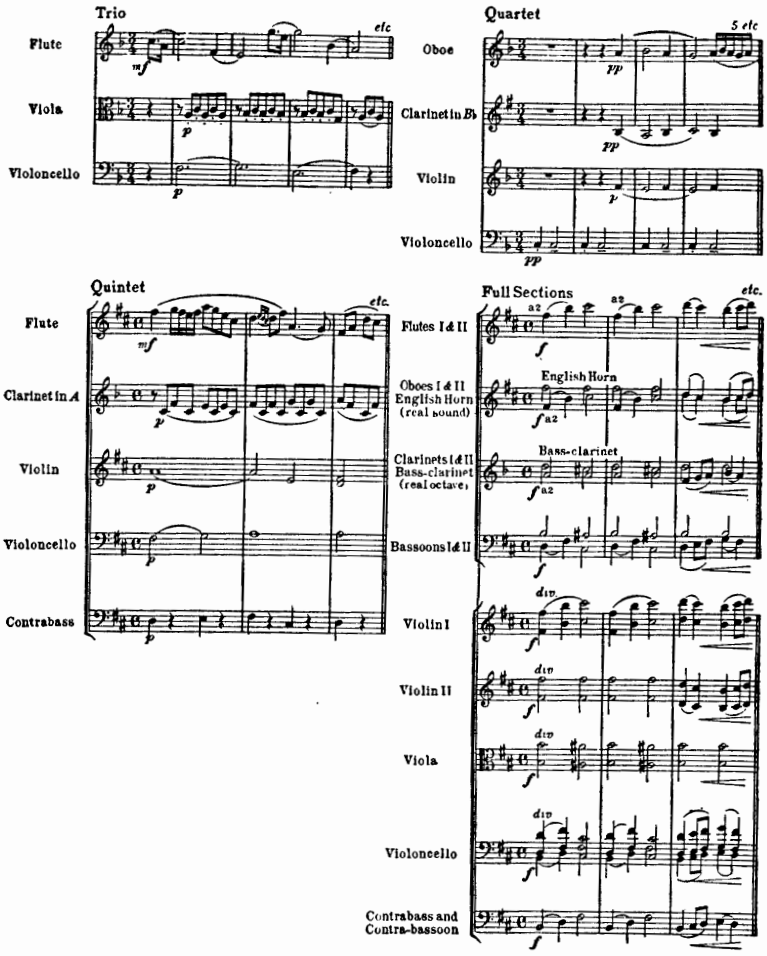


The Double-bassoon or Contrabassoon.—For tonal compass, see Appendix II.

The tones of this instrument sound an octave lower than they are notated,—one octave lower than the Bassoon. It is the double-bass of the wood-wind section. Best adapted for sustained notes, its stupendous low *B-flat* being the lowest tone in the orchestra. Owing to its great size, it is not tonally flexible, and, therefore, not suitable for quick runs, which should be avoided when writing for it. *Staccato* notes are not effective, and *arpeggi* would be more out of place on the Double-bassoon than on the Double-bass.

The following excerpts illustrate different combinations for wood-wind instruments alone, and string and wood-wind combined.




Trio
Flute
Viola
Violoncello
etc
Quartet
Oboe
Clarinet in B♭
Violin
Violoncello
5 etc
Quintet
Flute
Clarinet in A
Violin
Violoncello
Contrabass
etc
Full Sections
Flutes I & II
Oboes I & II
English Horn
(real sound)
English Horn
Clarinets I & II
Bass-clarinet
(real octave)
Bass-clarinet
Bassoons I & II
Violin I
Violin II
Viola
Violoncello
Contrabass and
Contra-bassoon
div
etc.

CHAPTER III

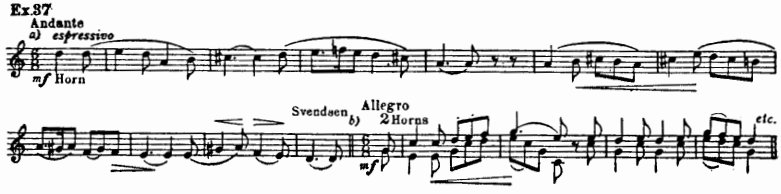
THE BRASS WIND-INSTRUMENTS

The French Horn.—(Valve- or Chromatic-horn). **For tonal compass, see Appendix II.**

The tones of the French Horn in *F* sound a perfect fifth lower than they are notated; and those of the Horn in *E-flat* sound a major sixth lower than notated.—As stated in the foreword of this Manual, only the Chromatic-horns in *F* and *E-flat* are herein considered, the author's aim being to advise only in connection with the instruments used in orchestras of the present day. And the French Horns actually used in modern orchestras are those in *F* and *E-flat* (the latter, in the Military band).—For an extensive study of the Natural Horn, the student is referred to the works of either Berlioz or Kling.

The French Horns are the principal and central support of harmony in the orchestra. They cannot be dispensed with. Their absence creates a "gap" in the harmony which cannot be properly filled by any other instrument. At least four French Horns are employed in the complete, modern orchestra. In the author's estimation there should be three in a small concert orchestra, as no chord is complete with less than three notes.

As a solo-instrument, the Horn is capable of being beautifully and earnestly expressive. It is equally adapted to the depiction of forest and hunting scenes, the martial spirit, or the expression of fear, horror and passion, etc. (See Overture to "Der Freischütz,"—Weber; "Tannhäuser," Act I, 3rd scene,—Wagner; "Till Eulenspiegel,"—Richard Strauss; "Siegfried,"—Wagner.)

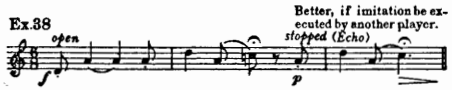


There is no wind instrument capable of greater contrasts in tone-production, from the softest *pianissimo*, (*pp*) of organ-like character, to the shrill, penetrating *fortissimo* (*ff*) of extraordinary brilliancy and carrying power.

Stopped tones can be produced so as to be scarcely audible; while the open, *fortissimo* tones, carry better than those of the Trombones. Hearing an orchestra from a distance, when nothing but occasional tones can be heard, it is noticeable that the tones of the French Horns will always be more distinct than those of any other instrument.

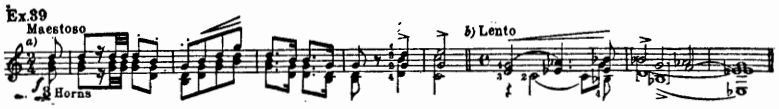
The "mute" on a French Horn is not adapted to soften its tone, but to give it a distinct color, thin, nasal and very effective in *forte* (*f*) or *fortissimo* (*ff*), expressing horror, or imitating a chime. The author does not approve of using the mute for echo-effects, but is in favor of producing such by "stopped" tones.

Ex.38



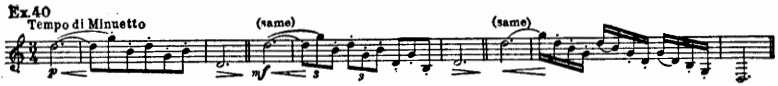
An echo reproduces the tone faithfully, only softer, but the mute of a French Horn completely alters its tone-color.

Ex.39



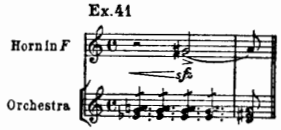
The French Horn is quite flexible in its tonal-production, especially when employed in figures or skips which do not require too frequent use of different valves.

Ex.40



It is a "tricky" instrument, and the least mechanical of all the wind-instruments. Before the intonation of a note, it is necessary that the player have the tone "in mind," or, in other words, know exactly *how* it should sound. This requires not only acute tonal perception, but, more especially, innate musical aptitude at the outset. A master-player upon the French Horn is, by nature, thoroughly musical, and endowed with the necessary talent for his vocation.

Ex.41



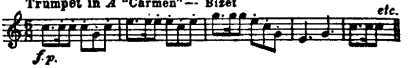
Some modern instruments possess an extra valve, thereby shortening the tube to *B-flat*, thus making it correspond in length to the *B-flat* Cornet. This permits high notes easier of execution; the tones thus produced, however, have not the proper French Horn quality.

The Trumpet.—For tonal compass, see Appendix II.

The tones of the Trumpet in *B-flat* sound one whole tone lower than they are notated; and those of the Trumpet in *A* sound a minor third (three half-tones) lower than notated.

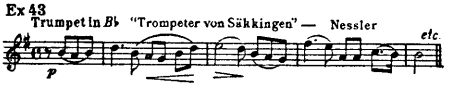
The tone of this instrument blends well with that of the French Horn, but it has a more metallic quality than the latter. Its character is essentially martial.

Ex. 42
Trumpet in *A* "Carmen"— Bizet



Occasionally, it may be employed in a melodic figure, either as a solo, or one octave below the Violins, to reinforce the melody.

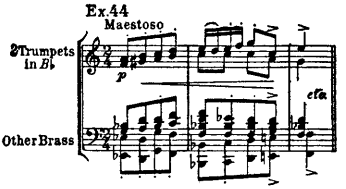
Ex 43
Trumpet in *B♭* "Trompeter von Säkkingen"— Nessler



Runs of all kinds are not especially difficult, but they do not suit the character of the instrument. Military, or Bugle-calls, are peculiarly suitable to the Trumpet.

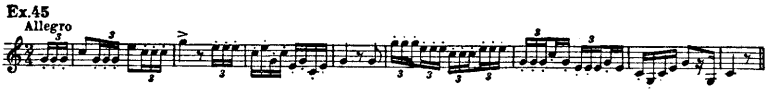
As it is the upper voice in the brass-section, it will be given the melody in passages for brass instruments alone, or in combination with wood-wind instruments.

Ex.44
Maestoso



One tone can be repeated many times, with extraordinary rapidity, on the Trumpet, by means of double- and triple-tonguing.

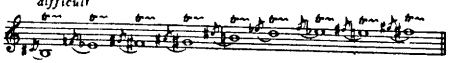
Ex.45
Allegro



In writing for the "American orchestra," so-called, it is best to keep the Trumpet within the range of the Cornet, as its place in such orchestras (in this country) is frequently occupied by the latter instrument. The full Symphony orchestra uses three and, sometimes, four Trumpets.

Trills rarely occur in Trumpet parts except in solo work.

Ex 46
difficult



The mute when used on a Trumpet causes it to sound like a toy-trumpet. (See the "Market Scene" in Puccini's "La Bohème.")

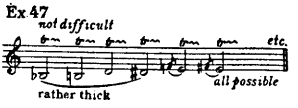
The Cornet.—For tonal compass, see Appendix II.

The tones of the Cornet in *B-flat* sound one whole tone lower than they are notated; and those of the Cornet in *A* sound a minor third (three half-tones) lower than notated.

The Cornet is a brilliantly toned instrument, possessing an exceptionally bright, metallic timbre. It is a very important instrument in this country, especially in small orchestras, where it is used in *soli* and generally as a melodic instrument, playing one octave below the 1st Violins. As there is nothing harsh in its tone quality, excepting in the low register, it well answers this purpose. As before mentioned it can, and often does, take the place of the Trumpet. Technically, both instruments are played exactly alike, and can be substituted for each other in every way, with the exception of a slight difference in range. But in a Symphony orchestra the Cornet is rarely employed. Gounod makes use of it in his Opera "Faust."

Trills should not be written for the low notes of the Cornet. Double- and triple-tonguing is the same in ease of execution as on the Trumpet. Also, the use of the mute is the same in its effect as upon the Trumpet.

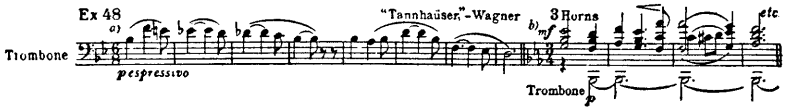
Ex 47
not difficult



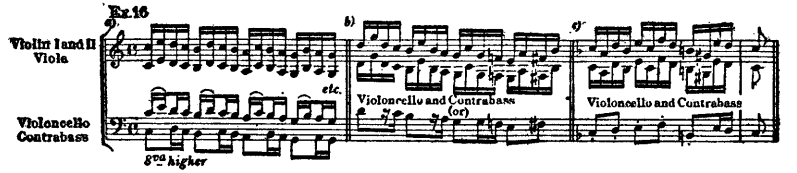
The Slide-Trombone.—For tonal compass, see Appendix II.

The tonal quality of the Trombone can be, if well played, heroic and noble, martial, emotional or grave,—according to the treatment of its

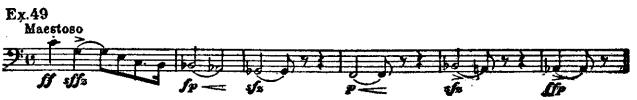
part. A *cantabile* passage of sustained notes, played *piano* (*p*) or *pianissimo* (*pp*) will be expressive of a serious or religious mood.



It is a good melodic instrument, but not very flexible in its tone production. Runs or scales in quick *tempo* should be avoided in its use. In rapid passages, where the Trombone will seem necessary to impart added tonal strength, it is best to simplify the passage by omitting certain notes, —in the same manner as with the Double-bass, in similar passages.



Played *forte* (*f*), or *fortissimo* (*ff*), the Trombone can express awe, terror and other dramatic moods.



In the "American orchestra" the Trombone is the bass of the brass-section, and also a valuable solo-instrument. In small combinations, it is often employed in place of the French Horns, and sometimes even in place of the Violoncello. In the Symphony orchestra three Trombones are generally used and with admirable effect in special passages. (See Tschaikowsky's "Symphonie Pathétique.")

Trills should not be written for the Trombone, as only a few can be produced on this instrument, and then only by very skilled players.

The Valve-trombone, rarely used in this country, is almost as flexible in its tonal production as the Cornet, and can replace a Slide-Trombone,—the range being the same. The tonal quality, however, is less noble than that of the Slide-Trombone.

Mutes can be used with much the same effect as upon the French Horn.

The Bass-tuba.—For tonal compass, see Appendix II.

This instrument is the double-bass of the brass-section. Its tone is penetrating and serious in character. It is equally effective when played either *pianissimo* (*pp*) or *fortissimo* (*ff*). Owing to its size it is not flexible in its tone production, and, therefore, quick runs should not be written for this instrument. In combination with three Trombones, the Bass-tuba produces the most *grandiose* and astounding effects. (See Tschaikowsky's "Symphonie Pathétique;" Wagner's "Lohengrin," and modern scores in general.)

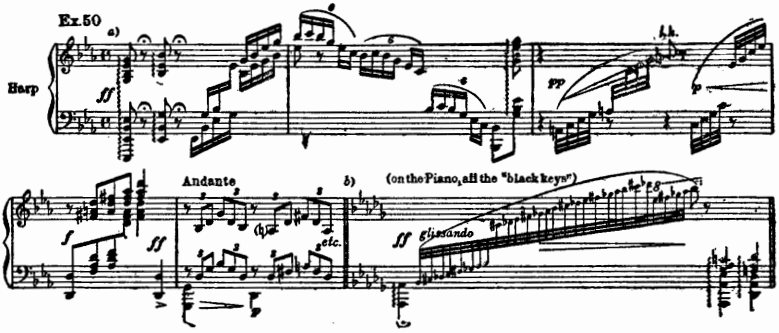
In the Concert or "American" orchestra, deep notes that should be played upon the Bass-tuba, can be imitated by the Double-bass, and, also, by the pedal-notes of the Trombone.

CHAPTER IV

THE HARP

The Harp.—For tonal compass, see Appendix II.

When used as an orchestral instrument, the Harp is best adapted for passage work, *arpeggi, glissandi* and large chords. As it is not a chromatic instrument, but one whose half-tone intervals are produced by pedal changes, runs with chromatic progressions must therefore be avoided. Scales (diatonic) are not easy, except when performed very quickly as *glissandi;* chromatic scales are practically impossible, unless played in very slow *tempo.*



To be able to write well for the Harp requires a thorough understanding of the mechanical construction of the instrument with regard to its pedals. There are seven of these pedals (one for each note of the scale) for shortening the strings by tension-action. They can be placed in many different positions, or combinations, as illustrated by the following examples:

With all the pedals "up," the strings are in their natural position for producing the scale of *C-flat* major.

With all the pedals set in the middle notch, the strings are thereby shortened (raising them one half-tone) for producing the scale of *C*-major.

With all the pedals set in the lowest notch, the strings are thereby doubly shortened (raising them one whole tone) for producing the scale of *D-flat* (or *C-sharp*) major.

With the *F*-pedal set in the middle notch, thereby raising the *F-flat* to *F-natural,* and all the remaining six pedals "up," the scale of the strings will then be that of *G-flat* major.

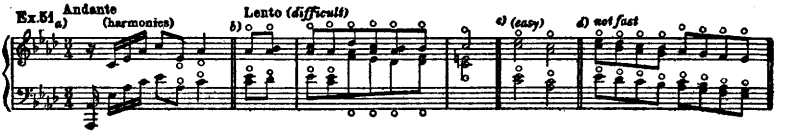
With the *F*-pedal set in the lowest notch, thereby raising the *F* to *F-sharp*, and all the remaining six pedals set in the middle notch (thus raising six of the scale-tones to *C*-major), the scale of the strings will then be that of *G*-major.

A thorough study of this pedal-system will make clear the many different combinations obtainable and suitable for *glissandi* and *arpeggi*.

Simple accompaniments written for the Piano can be played fairly well upon the Harp. But this instrument is utterly lacking in sustaining power and should not be used except as mentioned, in the orchestra, or in solo-work written especially for it. A fine example of the use of the Harp is found in the Overture to "Mignon," by A. Thomas.

A Symphony orchestra is not complete without a Harp, and frequently two or three are employed.

The harmonic tones of the Harp sound one octave above the written notes,—the latter should be marked with this sign o over them. They possess a beautiful, ethereal quality of tone, but they are weak. Not more than two harmonic tones can be produced simultaneously.



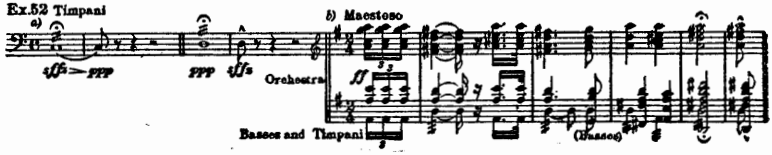
CHAPTER V

PERCUSSION INSTRUMENTS

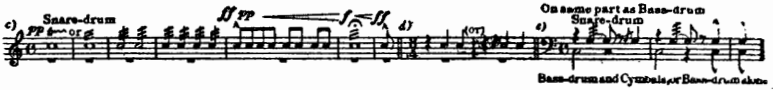
The Timpani or Kettle-drums.—For tonal compass, see Appendix II.

The Timpani are used to accentuate the rhythm or to give tonal as well as rhythmic emphasis to the bass. There are generally two employed in the orchestra, and modern scores have necessitated the addition of one or two more in the Symphony orchestra. As they are generally tuned in the tonic and dominant of the composition, and should be very carefully used for the playing of any but the bass-note of the chord, it is very difficult to perform the Timpani parts of modern compositions upon only one pair of timpani. The latter would require constant change of pitch and a very clever performer.

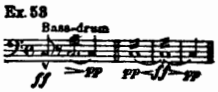
A *fortissimo* (*ff*) roll on the Timpani, gradually diminishing to *pianissimo* (*pp*) will fittingly imitate thunder. The reverse dynamic effect, from *pianissimo* to *fortissimo*, is also excellent. (See the "Symphonie Fantastique" by Berlioz.



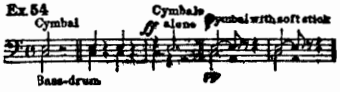
The Snare-drum (*Small or Side-drum*).—This is a military rhythmic instrument, and its proper place is in the military band. Its use in the orchestra should be restricted to compositions of a martial character, or to dance music.



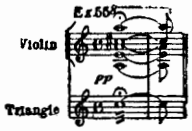
The Bass-drum.—With this instrument a good imitation of a cannon shot can be obtained, with its subsequent reverberations (roll) or distant echo. It is also very effective when played *pianissimo* (*pp*). But its principal use is in accentuating the force of a climax. For dance music, or in military marches, it is used on practically every "down-beat."



The Cymbals.—These are usually employed together with the Bass-drum, but certain effects can be obtained with one or both of the Cymbals alone. One Cymbal, struck with a soft Kettle-drum stick, produces the effect of a Tam-tam. When vigorously clashed together, they well depict a stroke of lightning.

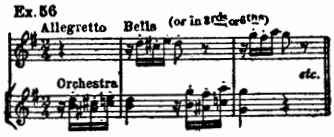


The Triangle.—This little instrument is very effective in *pianissimo* (*pp*) or *fortissimo* (*ff*), and is capable of an excellent *crescendo* or *decrescendo*. A *tremolo* on the Triangle played *pianissimo* together with a chord on the higher notes of the wood-wind instruments, or divided Violins, produces a beautiful effect.



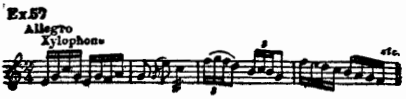
The Bells, or Glockenspiel.—For tonal compass, see Appendix II.

This instrument should not be used too frequently. In a response or answer to a foregoing figure, it is effective in employment.



The Xylophone.—For tonal compass, see Appendix II.

Many showy *soli* have been written for this instrument. Its use in the Symphony orchestra is restricted to certain characteristic effects. (See "Danse Macabre" by Saint-Saëns.)



CHAPTER VI

ORCHESTRATION

Having given a description of the instruments used in a Symphony orchestra, indicating their respective characteristics and the best use to which they can be put, I will proceed to advise how to write for the orchestra, giving examples to illustrate the different points as they occur.

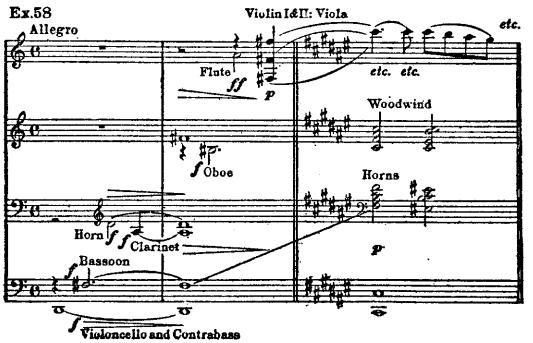
As heretofore stated, and now again emphasized, the study of orchestral scores will prove *more* helpful than all else; but that requires a long time, and, in the meanwhile, this Manual will serve as a practical guide to the end desired.

Instead of taking up much space in reproducing parts from the Master-scores, I shall use my own illustrations as they are needed, and only occasionally have recourse to borrowed excerpts; at the same time indicating, as much as possible, whatever Master's work will verify the fitness of my own illustrations.

In composing for the orchestra, after having your themes, counter-themes and modulations well fixed in your mind, make a "sketch" on four staves, more or less, according to necessity. This sketch will usually be playable on the piano with two (or four) hands.

Indicate on your sketch not only the *soli* for different instruments, but make this sketch a complete score in reduced form.

Ex.58

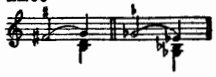


Give special attention to the treatment of your string-section, whether it be alone, in places, or combined with the wood-wind, or in "*tutti*" (whole orchestra). Even a large body of strings will fail to assert itself adequately if improperly matched against the other sections of the orchestra. This being true with regard to a Symphony orchestra, it is all the more applicable to smaller combinations, as, for example, the average "Comic Opera" orchestra, where three Violins, one Viola, one Violoncello and one Double-bass must contend with two Cornets, two Horns, Trombone and——Drums! In writing for the strings, therefore, remember that difficult double-stops and chords always sound weak; that tones on open strings always sound more brilliant than the artifical ones; and this is true to such an extent that it is best to avoid entirely the use of open strings in soft, *legato* passages. But this, of course, must be left to the discretion of the player.

For brilliancy of tone in the string-section, including the easiest double-stops and chords, the best keys are those of *A*, *D*, *G* and *E*. (*E*-major is difficult for Violoncello and Viola.) *B*-major is of great brilliancy, but, owing to technical difficulties, is more adapted to broad, majestic movements than to *allegro* or quick *tempo*. It is well here to remark that its enharmonic key, viz., *C-flat* major, has an entirely different tone-color, and its use in a quick movement would be both difficult and absolutely without brilliancy. In connection with this, a few words about the much discussed subject of enharmonics will not be out of place. On the keyboard of the Piano, *F-sharp* and *G-flat* are one and the same note, but *not* so on the Violin, or any instrument for which the ear determines the pitch to be imparted while playing. *F-sharp*, considered as a major seventh, or leading note, progressing to *G*, will always be played some-

what sharper than *G-flat*—the latter note considered as the minor third of *E-flat*.

Ex.60

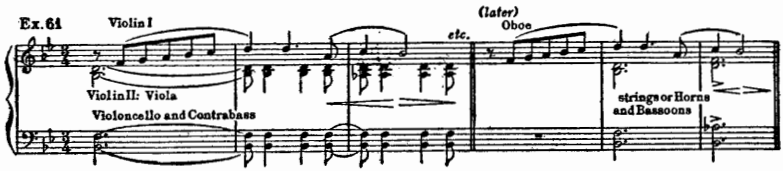


B, as the leading note to *C*, is sharper than *C-flat*, the latter note being the minor sixth of *E-flat*. This infinitesimal difference of pitch is mathematically determined by the division of a diatonic degree (whole tone) consisting of nine "commas," into half-degrees (half-tones) of five and four commas each.—For a thorough understanding of this subject a special study of acoustics is necessary.

Whether Tschaikowsky, in his "1812" (Solennelle) Overture, used both keys of *B*-major and *C-flat* major simultaneously (in different instruments, of course) for some special effect, or to point out a disbelief in any difference, I do not know, but I can give an instance of a great composer changing from *D-flat* major to *C-sharp* major, *very evidently* to alter the tone-color from that of a plaintive lullaby to that of the joyous song of birds,—viz., Antonin Dvořák in his "New-World" Symphony.

For "*andante*," or "*adagio*," of a serious character, or dreamy mood, the keys of *D-flat*, *E-flat* and *B-flat*-major, together with their corresponding minors, will be found to possess the appropriate and true tone-color; also the keys of *G-flat* and *C-flat*, likewise. For slow movements of a more hopeful, brighter character, the key of *F*-major (see Schumann's "Traümerei" and Bizet's "l'Arlesienne") is very good, also *C*-major (Wagner's "Albumblatt") and *G*-major (Massenet's "Le dernier Sommeil de la Vierge") sound appropriately well.

Ex.61

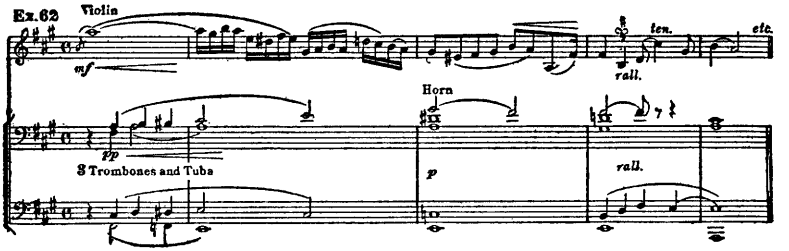


Some of our modern composers seem to forget that the players of wind-instruments are physically dependent upon breathing for the necessary "wind." The author has seen score-parts, especially for the Horns, which scarcely allowed a moment's rest for the player. Remember that diversity of combinations enhances the interest of a score, and unless

such diversity is present, the sameness of tone-color will finally become monotonous. On the other hand, do not "chop up" your score into varied examples of a few measures each, for different combinations of instruments, but lead the instruments to take their right place at the right moment, according to their respective tonal character. A most remarkable example of the adding of one instrument to the other and one section to another, is found in the Introduction to "Lohengrin."

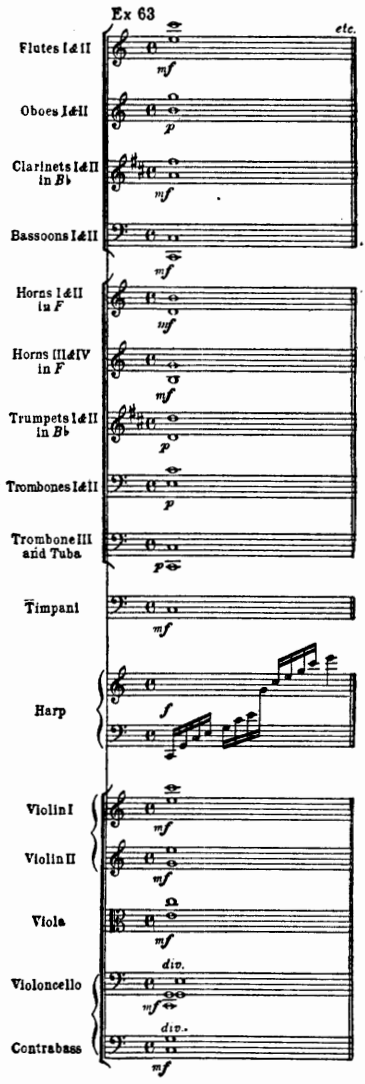
In the accompaniment of a Solo, make your orchestration rather "thin" than too "thick." One of the finest models for the orchestra accompanying a Solo Violin is that of Mendelssohn's Concerto. It could be done differently, no doubt, but certainly no better.

It is possible to find the proper use for three Trombones, Tuba and even Bass-drum in accompanying a Violin, but—be careful!



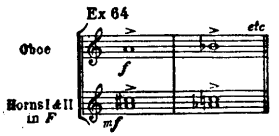
In accompanying the Voice, even greater care should be exercised in order not to cover either the vocal tones of the singer or the words being sung. Many singers give all their attention to the tone-production, at the expense of the enunciation of the words. In the author's opinion, the tones to be produced, and the words to be sung, should be so closely allied that the vocal production of the former will not interfere with the attention necessary for the distinct enunciation of the words.

The balance of orchestral tone is a matter that must not be neglected. A chord for full orchestra, with every instrument mark *mezzo-forte* (*mf*) has not the right balance, for the reason that the *mezzo-forte* is stronger in some instruments, and weaker in others. Similarly, with regard to *piano* (*p*) and *pianissimo* (*pp*) it would be very incorrect to mark all the instruments with the *same* dynamic degree. Example 63 shows the right dynamic balance for the instruments in each section,—unless it were desired that some special instrument, or instruments, predominate.

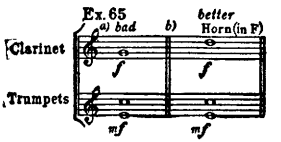


In *forte* (*f*) or *fortissimo* (*ff*) passages, the differences in the dynamic degrees to be indicated for individual instruments depend, for their

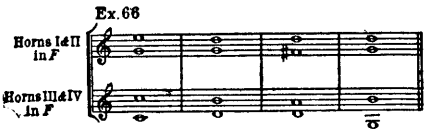
correct proportional balance, upon the tonal strength and character of each instrument.



The distribution of the notes of a chord among the different instruments is also of great importance. It is obvious that the middle note, *G*, in Example 65*a*, would be too weak if played by the Clarinet; better, if played by the Horn, as indicated in *c* of the same example.



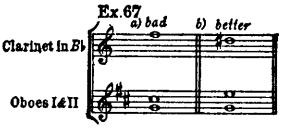
In writing for four Horns, it is customary to cross the parts in such a way that 1st and 3rd Horns play the high notes; the 2nd and 4th taking the low ones.

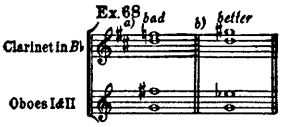


This custom is probably derived from old compositions, scored for two Horns, where the 2nd player was entrusted with the low notes. The custom has influenced the players, and, now-a-days, a 4th Horn player, even when a virtuoso, does not like to play high notes. Neither does a 3rd Horn player care to play low notes.

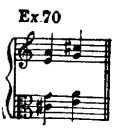
In fact, though not for the same reason, a score written in proper manner will show crossing of the parts from top to bottom. This is for the purpose of a better blending and a more even distribution of the parts. And another reason is that certain intervals are more agreeable than others to two musicians playing similar instruments. If crossing of the parts was not permissible, the intervals of a perfect fourth would often occur between two Oboes, or, for that matter, any two instruments of a

kind. Now, the interval of a perfect fourth is *not* an agreeable one, and a major seventh is still less so.



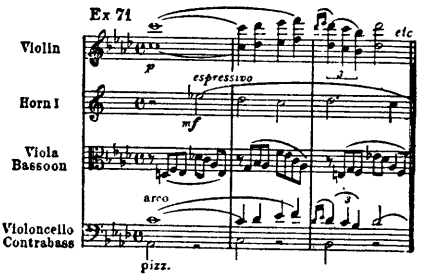


The rule of crossing is a good one, but it cannot always be followed, though it is observed, when feasible, between the 2nd Violins and Violas in chord-playing.



A counterpoint or counter-melody should be treated in such a manner as to be duly prominent. Next to the theme proper, it is of the greatest importance that the counter-theme should stand out distinctly.

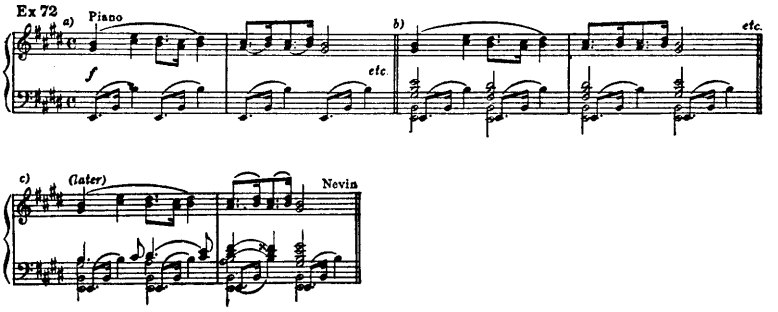
In commencing a counter-theme, be sure that the intonation notes are not made indistinct by interference with the notes of other instruments.



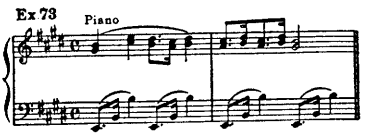
To work three or four themes simultaneously and give them all their proper balance so that each single theme is clearly discernible to the ear, is not an easy task. One of the master-examples of such workmanship is found in the Overture to Wagner's "Die Meistersinger." The scores of Richard Strauss are well worth studying in this regard. His contrapuntal work and excellent balance of his orchestra (mostly colossal) is unrivalled.

In orchestrating a composition written for the piano, several facts must be borne in mind.

Usually, a composition for the piano does not contain sufficient material from which to make the orchestration interesting (unless it has been composed and written for four hands, or better, two pianos). It then becomes necessary to add counter-themes to "fill in the gaps," or to extend chords, add here an octave, or the third or sixth to a run or figure. It is largely a matter of artistic perception and inventive genius.

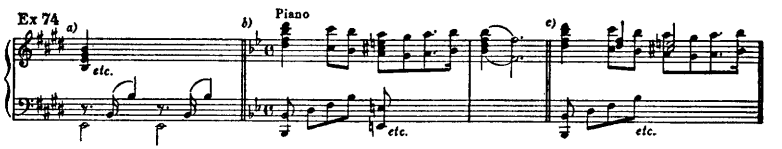


Then again, frequently the notes in a piano composition are not written, or indicated in time-value, for the sustained effects which they are intended to produce with the aid and proper use of the damper-pedal. The neglect to "fill in" such omissions when scoring, would result in very thin and poor orchestration.

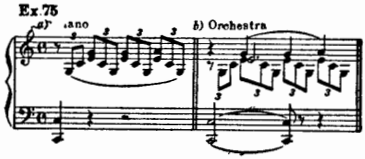


In many instances, a bass note indicated for the piano as a quarter-note should be sustained in the orchestra throughout a whole measure, or even longer,—as illustrated in Example 74*a*.

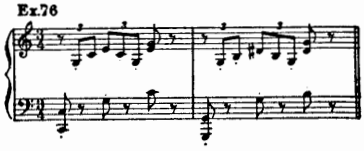
This applies also to harmonies in the right-hand part of a piano composition, as shown at *b* and *c* in the following example.



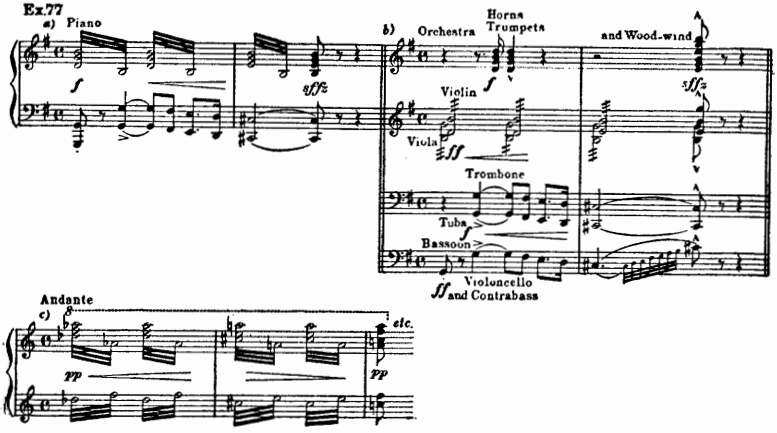
The accompaniment figure of broken chords (for piano) as shown in Example 75*a*, sounds, if played right, as illustrated at *b*, in the same example. In the orchestra version, therefore, some instruments must be given sustained notes whereby to obtain the desired effect, and avoid thinness in the harmony.

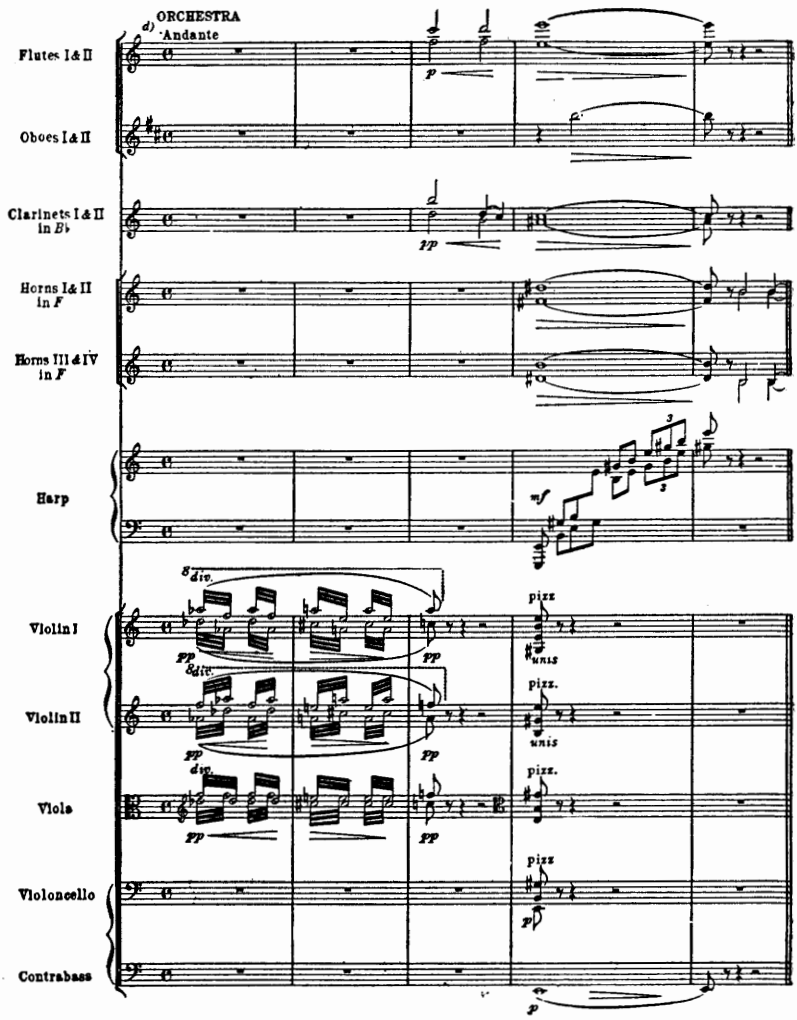


In Example 76, note for note of the piano score can be copied in transcribing for the orchestra.

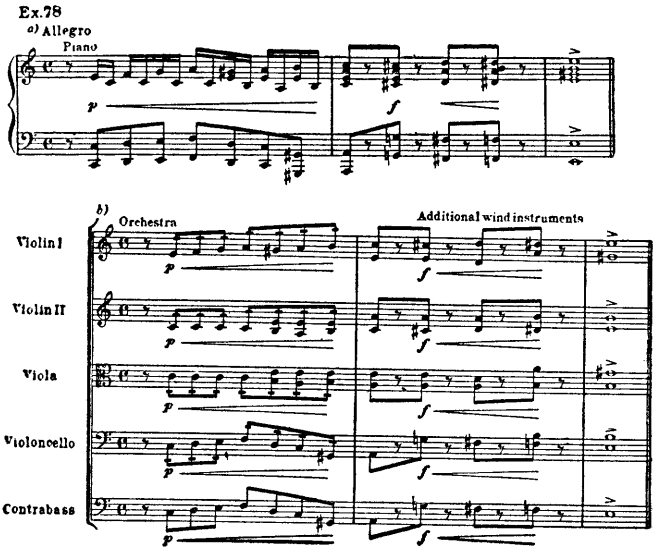


Example 77 illustrates chords in *tremolo* for piano, and ways of writing the same for orchestra.




d) ORCHESTRA
Andante
Flutes I & II
Oboes I & II
Clarinets I & II in B♭
Horns I & II in F
Horns III & IV in F
Harp
Violin I
Violin II
Viola
Violoncello
Contrabass
8 div.
div.
pizz
pizz.
unis
p
pp
mf

Example 78 illustrates figures for piano and their practical transcription for orchestra.



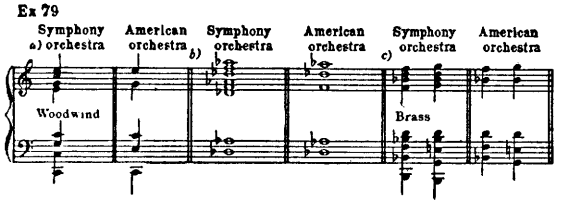
CHAPTER VII

THE REDUCING OF LARGE SCORES FOR THE CONCERT OR "AMERICAN ORCHESTRA"

Nearly all compositions written for Symphony orchestra can be successfully reduced so as to be playable for the Concert or "American" orchestra, the latter consisting of the following instruments, viz., one Flute, one Oboe, two Clarinets, one Bassoon, two Horns, two Trumpets or Cornets, one Trombone, Timpani and Drums, etc., and at least two 1st Violins, two 2nd Violins, two Violas, two Violoncellos and one Double-bass. Of course, such works as the Symphonies of Richard Strauss or Gustave Mahler had better be left alone. But examples of what *can* be done are to be found in Charles F. Roberts' transcription of "Caucasian Sketches," by Ipolitow Iwanow, also in the author's own arrangement of Tschaikowsky's "Overture Solennelle (1812)" and Richard Strauss' Serenade, op. 7.

The main point is to know *how* to dispose of large chords intended for a full section of a Symphony orchestra, and produce as nearly as possible the same effect (only weaker) with, for example, five instruments in place of eight. (A Symphony orchestra has *at least* eight wood-wind instruments—the Concert orchestra, five; and in the Brass-section the proportion is eleven to five!) Illustrations of the "thinning out" of such large chords will be found in the following example.

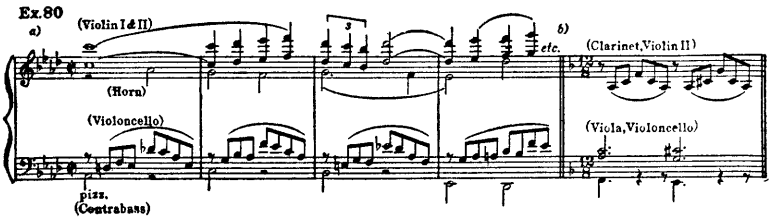
Ex 79



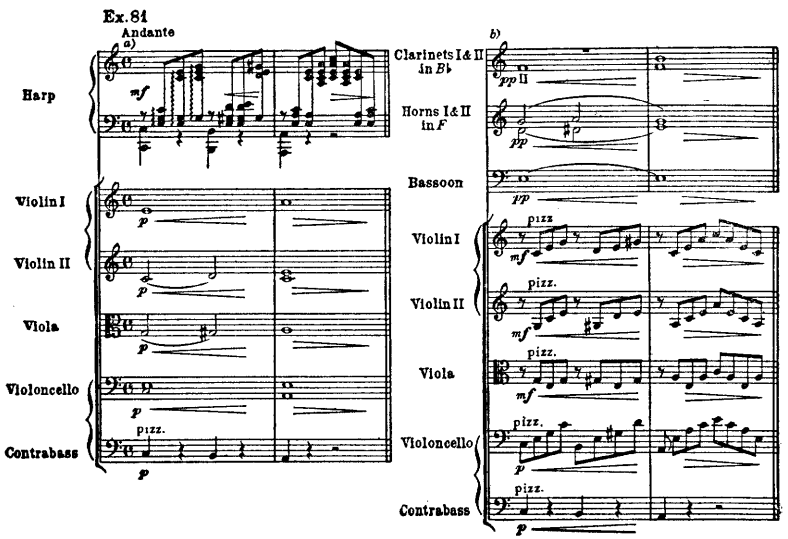
As there are very often only two 1st Violins, in certain instances it will be best to reinforce the 1st Violins with the 2nd, in unison, whenever possible. This will be found excellent in a "*tutti*," where a passage or figure for the 1st Violins should be prominent. The 2nd Violin can be

replaced by some other instrument, and its "helping out" of the 1st Violins need leave no "gap."

Where there is an important passage or figure for the 2nd Violins or Violas, and where the 1st Violins are occupied, it is well to reinforce the former with one of the Clarinets.

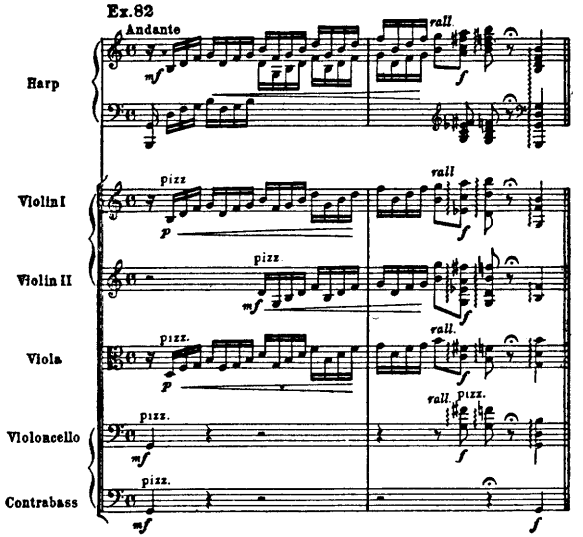


Passages for the Harp are difficult to treat in reducing from full orchestra to the Concert orchestra. The Harp cannot be properly replaced by any combination of instruments. Example 81 illustrates chords, originally written for the Harp, replaced by the strings, played *pizzicato*. Not a note is missing, but the smoothness and roundness of tone, peculiar to the Harp, is lacking. Nevertheless, it is the best that can be done in instances of this kind.



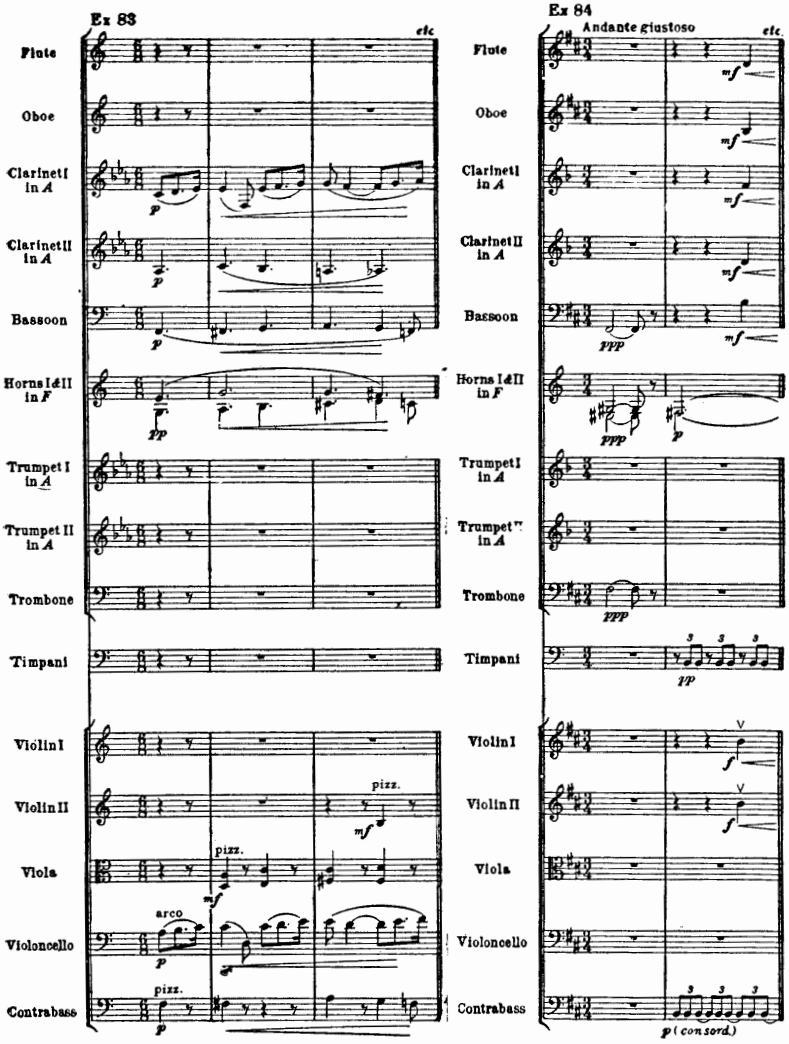
Arpeggi of the Harp, if not too fast, can be treated in the same manner, but, again, they lack roundness of tone.

Ex.82



Of course, the evenly and broadly broken chord (the final one in the above example) of the Harp cannot be imitated by the strings. As already stated, however, the Harp cannot be replaced in the orchestra, unless a Piano is used for that purpose. When there is a Harp-*cadenza*, the only thing to do is to substitute for it a *cadenza* by some other instrument, e. g., the Clarinet, or a combination of Flute, Clarinet and Strings. This will require composing; but a good arranger should not be found wanting in such instances.

It is the habit of some arrangers to "simplify" the master-scores, and one of the means frequently adopted by them in this connection is that of transposing the composition to an easier key. Their argument for so doing is, that otherwise the composition would prove too difficult for the average musician. The reply to such an argument is, that a "musician" who is not at ease in *every* key, has no place in an orchestra! Moreover, it often happens that a composition does *not* become any easier when transposed, though it may seem so at a superficial glance.


Ex 83
etc.
Flute
Oboe
Clarinet I in A
Clarinet II in A
Bassoon
Horns I & II in F
Trumpet I in A
Trumpet II in A
Trombone
Timpani
Violin I
Violin II
Viola
Violoncello
Contrabass
p
pp
mf
pizz.
arco
Ex 84
Andante giustoso
etc.
Flute
Oboe
Clarinet I in A
Clarinet II in A
Bassoon
Horns I & II in F
Trumpet I in A
Trumpet II in A
Trombone
Timpani
Violin I
Violin II
Viola
Violoncello
Contrabass
mf
ppp
p
pp
f
p (con sord.)

CHAPTER VIII

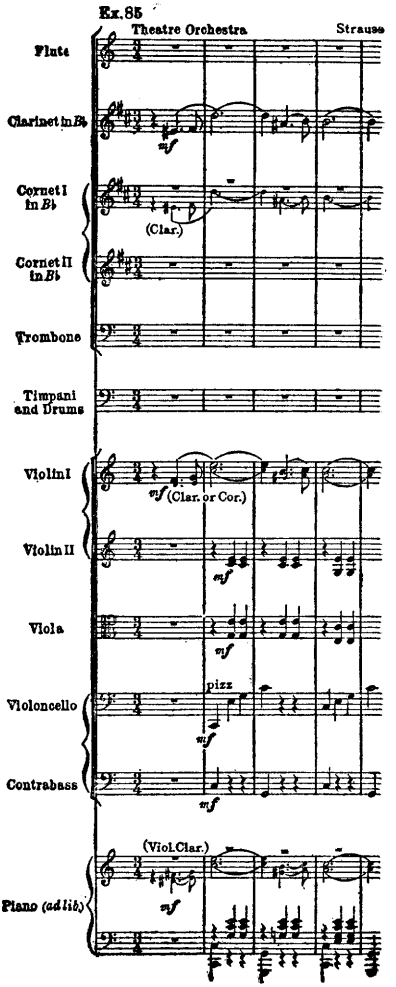
THE REDUCING OF SCORES FOR STILL SMALLER COMBINATIONS OF INSTRUMENTS

In this country, most Theatre orchestras are smaller than the Concert orchestra. They exclude one Clarinet, the Oboe, the Bassoon and the Horns; also, the strings are reduced in number to two 1st Violins (often only *one*), one 2nd Violin, one Viola, one Violoncello and one Double-bass.

Example 85 illustrates the average Theatre orchestra, which is sometimes still further reduced by excluding the 2nd Violin, Viola and either the Flute or Clarinet, one Cornet or even the Violoncello, and substituting the piano in lieu of all these missing instruments. But, rest assured that the drums are *never* excluded!

Now, only certain compositions can be played by such small "orchestras"—save the name!—the Piano filling in the "gaps." If the pianist is a clever performer almost anything can be attempted! But let us consider for the present the unreduced Theatre orchestra and its possibilities. This orchestra does without a Piano, as a rule, using the parts from the "American orchestra" score. As certain instruments belonging to the Concert orchestra are missing, the score for the same orchestra has

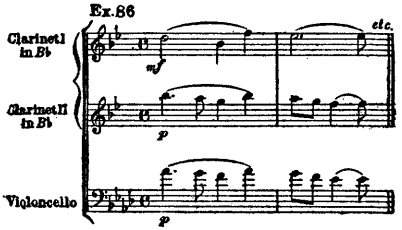
Ex. 85



been made in such a way that in the absence of the Oboe, 2nd Clarinet, Bassoon and Horns, the composition can still be played acceptably by the employment of the *small notes* or "cue-notes," written into the score parts.

In writing for the Concert orchestra, with the purpose of rendering a composition playable by a smaller combination, one must treat the 1st Clarinet like the 2nd of a full score, that is, *not* for melody, but for harmony,—and be very careful to "cue in" (by means of small notes) in other instruments (which for the moment are not occupied) the parts originally intended for Oboe, 2nd Clarinet, Bassoon and Horns; and to select for such substitution an instrument whose tone-color most closely resembles the instrument it is intended to imitate.

Ex.86



In the Theatre orchestra, the closest imitation of an Oboe will be the Clarinet. Should the latter instrument have an important part of its own, then the Flute may be used in its stead. The Viola, also, will do, or the Violin, but more often than not each of these instruments is engaged with its own part, and, therefore, not available.

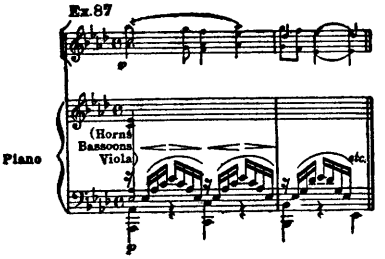
The Bassoon finds a good substitute in the Violoncello; occasionally the Trombone can take its place or even the Clarinet, if the passage (for the Bassoon) is within the tonal compass of the latter. The Viola will also prove acceptable, as substitute for the Bassoon, with the same proviso, as regards tonal compass. And the Double-bass can be used for substituting the low, sustained notes of the Bassoon.

The substitutes for the Horns are found in Cornets and Trombone, the latter instrument sharing the honor with the 2nd Cornet. As for the 2nd Clarinet, it must travel, more than any other instrument, from one substitute to another, and often does not find any. This, however, is of minor importance, as the 2nd Clarinet in the Concert orchestra is used very often to reinforce the melody, while the 1st Clarinet is being

employed in the harmony. Of course, in passages for wind-instruments alone, this difficulty is overcome by having the Viola, or a Violin, play the 2nd Clarinet part. Careful "cueing-in" of a Concert orchestra score will result in a fairly good orchestration for a Theatre orchestra. Naturally, the cueing-in can be carried still farther, so that even a smaller combination than the Theatre orchestra can render the composition, but the cueing-in should not be overdone. It is best, however, to have all the wind-instruments cued-in to the string-instruments, when these latter are not occupied with their own parts. The result will be, that the strings alone can render the composition.

To a Concert orchestra score also belongs a Piano part, to be used by the Conductor, or by the pianist of a smaller orchestra. This piano part should be written upon three staves, the upper staff containing the melody and counter-melody—written in small notes;—the notes on the two lower staves are to be playable upon the piano in substitution of any missing instrument, or of all instruments with the exception of those which carry the melody. This Piano part should also indicate the intonation of each instrument as originally written in the Concert orchestra score, *not its substitute* in the Theatre orchestra.—With this Piano part, one 1st Violin part and a Violoncello part, a fair rendition of the composition as a trio may be expected.

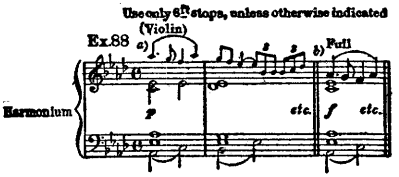
Ex. 87



To this can be added a Violin-obbligato part, made from the score, and containing counter-themes occurring, for example, in Clarinet, Horn or Flute parts,—in short, anything of interest besides the melody proper; sometimes the melody in octaves with the 1st Violin.

A combination much in vogue now-a-days is the above together with an Organ or Harmonium (Reed-organ) part, also made from the score and containing mostly sustained notes belonging, in the score, to the Horns, Cornets, Clarinets, Bassoon or strings. (See illustration *a* in Example 88.)

In writing for the Harmonium, avoid large chords and quick passages. The large chords can be produced by the adding of stops, whereby every note struck will also sound its octave. Quick, or *staccato* passages (especially the latter) are not suited for the Harmonium.

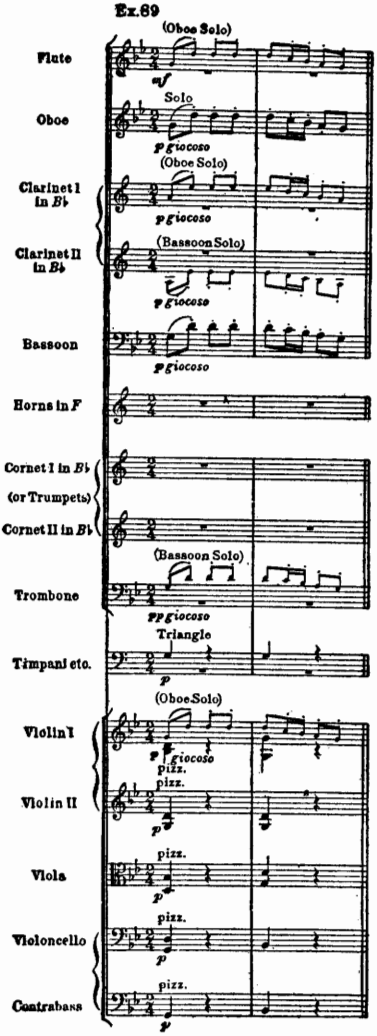


CHAPTER IX

"CROSS-CUEING"

When reducing a score to make it playable by small combinations, you will be tempted to "cue-in" the notes of a missing instrument to the parts of *several* other instruments, not occupied for the moment with their own notes.

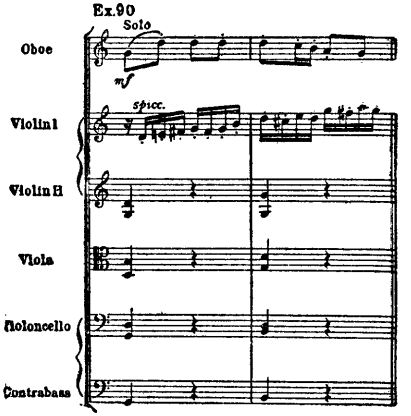
Ex.89



In the instance of an Oboe solo or passage, for example, you will naturally cue-in this Oboe part to the Clarinet, then to the Oboe's next best substitute, and finally to the 1st Violin,—always provided, of course, that these substituting instruments are not otherwise engaged with their own particular parts, for the time being.

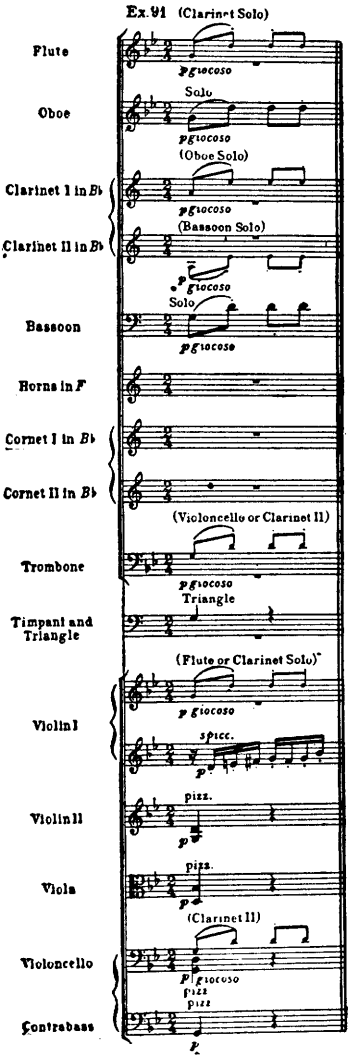
Make it a rule to cue-in *all Soli* to the 1st Violin part, using an extra staff for the cue-in notes, lest they should otherwise interfere with the notes of the Violin part.

Ex.90



This cueing-in to different instruments is practical and good on condition that you "cross-cue." Example 91 is an illustration of cross-cueing. The solo is for the Oboe, and it is cued-in to the 1st Clarinet, Flute and 1st Violin. The substitute which you would naturally prefer in this instance is the Clarinet. Write, then, over the small notes of the Clarinet part, "Oboe." Over the same small notes given to the Flute (in case the Clarinet is missing) write "Clarinet," *not* "Oboe;" and over the same solo passage cued-in to the 1st Violin part, write "Flute." If for some reason you should prefer the Viola as substitute for the Oboe, then the *first* cue-in will be to that instrument (Viola) with "Oboe" written over it; then it may be in the Clarinet, marked "Viola;" in the Flute, marked "Clarinet," and in the Violin, marked "Flute." If you do not proceed in such a manner, you will hear the Oboe solo simultaneously palyed by *all* the instruments to whose parts that solo has been cued-in!

This procedure entails much work, but it is certainly worth the trouble; and if your "cross-cueing" is good, you will find yourself considerably in advance of arrangers who are not familiar with the system.



In conclusion, let me repeat that orchestration *cannot be learned from books.* Listen to orchestral music and try to remember the tone-effects. First, write simple things for string-instruments alone; slow movements (with sustained notes) at first, then more complicated and varied movements, followed by the addition of several of the wind-instruments; then take, for example, a Mozart piano sonata, and transcribe it for "American

orchestra," excluding the drums, but not the Timpani. Follow this with the reducing of some good work, from the full Symphony score, to Concert orchestra score; then reduce this latter score, by cross-cueing," to the Theatre orchestra.

It is *experience*, in unlimited amount, that makes the master in everything!

Until you feel reasonably sure of the technique in your work, use a lead pencil in writing: and last, but not least, write *distinctly* and *legibly*, making your ordinary notes not too small, so that there may be a marked difference between them and the "cue"-notes.

APPENDIX I

THE GROUPING OF INSTRUMENTS IN A MODERN SCORE

For Full Symphony Orchestra

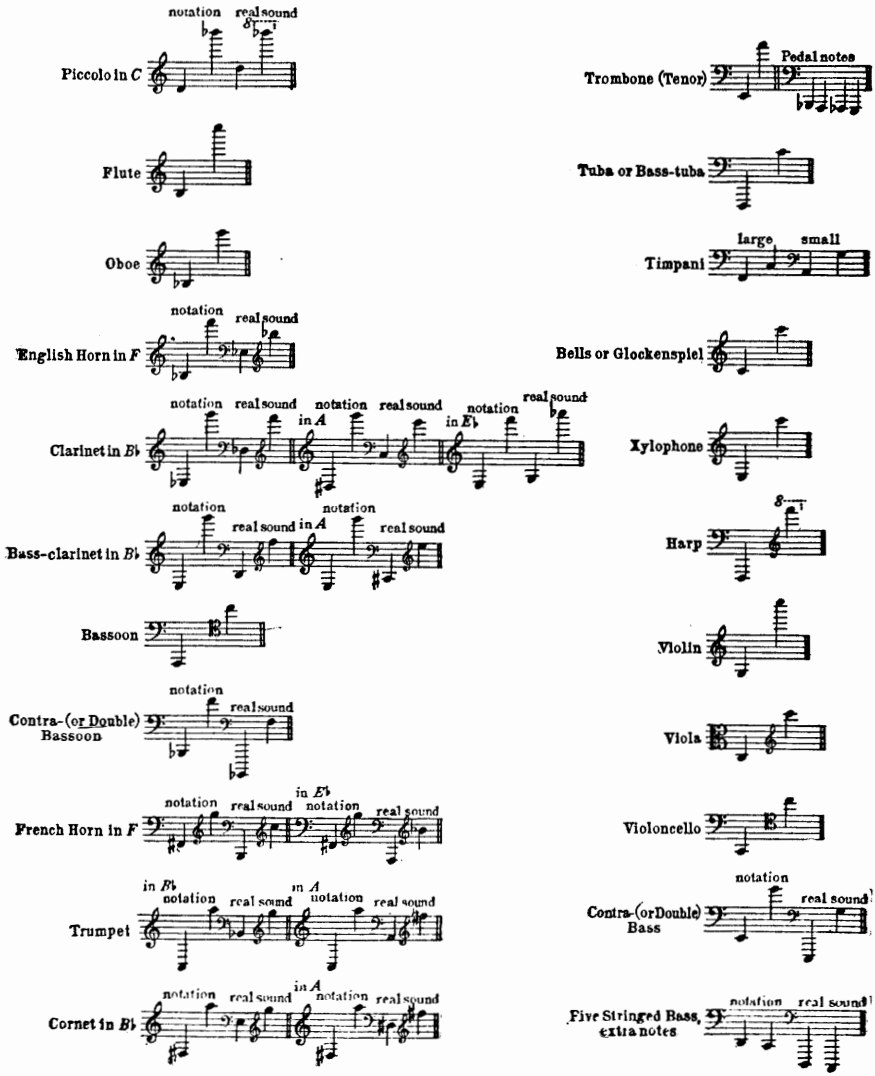
1st Staff		Piccolo
2nd	"	Flutes I and II
3rd	"	Oboes I and II
4th	"	English Horn
5th	"	Clarinets I and II
6th	"	Bass-clarinet
7th	"	Bassoons I and II
8th	"	Contra- (or Double-) Bassoon
9th	"	Horns I and II
10th	"	Horns III and IV
11th	"	Trumpets, or Cornets, I and II
12th	"	Trumpets, or Cornets, III and IV
13th	"	Trombones I and II
14th	"	Trombone III and Tuba
15th	"	Timpani or Kettle-drums
16th	"	Snare-drum and Bass-drum, etc.
17th	"	Harp
18th	"	
19th	"	Solo-instrument,
20th	"	Voice or chorus
21st	"	Violin I
22nd	"	Violin II
23rd	"	Viola
24th	"	Violoncello
25th	"	Contra- (or Double)-bass

For Smaller Concert Orchestra (or "American Orchestra")

1st Staff		Flute (s)—when Piccolo, use separate staff.
2nd	"	Oboe
3rd	"	Clarinet I
4th	"	Clarinet II
5th	"	Bassoon
6th	"	Horns I and II
7th	"	Trumpet, or Cornet, I
8th	"	" " " II
9th	"	Trombone
10th	"	Timpani or Kettle-drums
11th	"	Snare-drum, Bass-drum, etc.
12th	"	Violin I
13th	"	Violin II
14th	"	Viola
15th	"	Violoncello
16th	"	Contra- (or Double-) bass

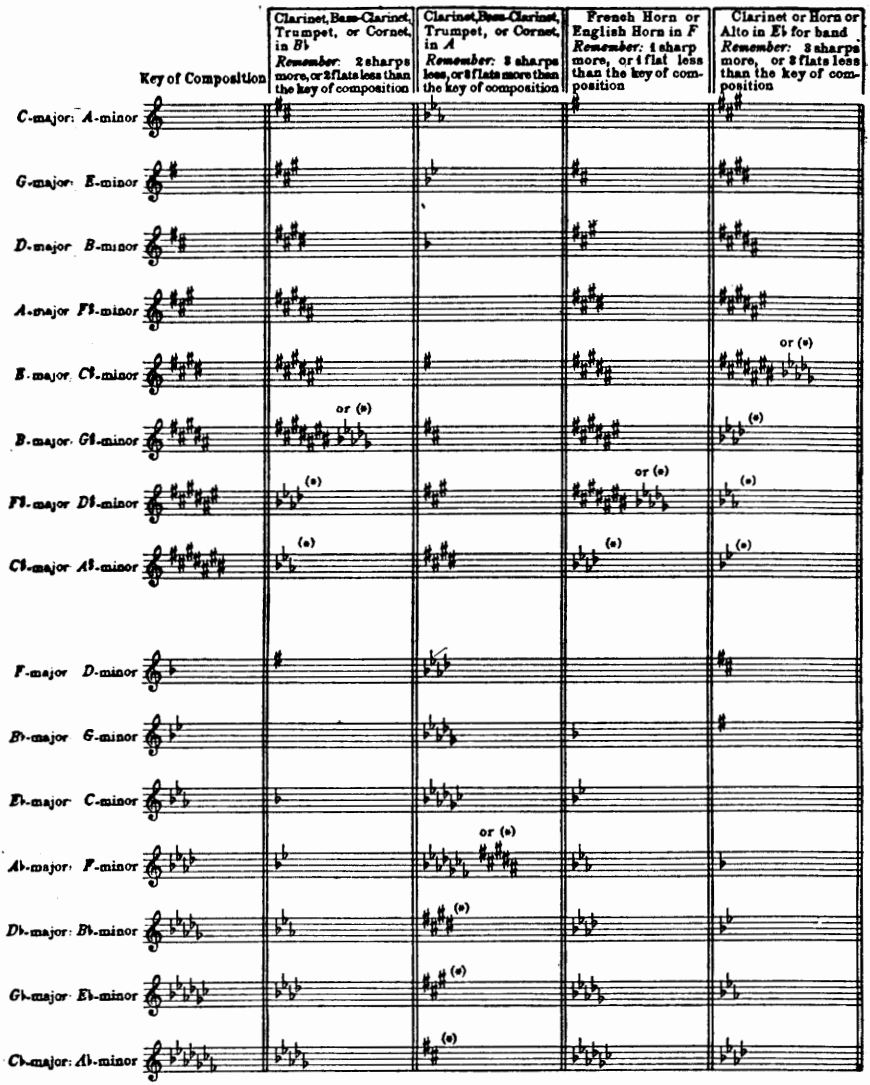
APPENDIX II

TONAL COMPASS OF INSTRUMENTS WHEN USED IN ORCHESTRA



APPENDIX III

TABLE OF TRANSPOSITION: SHOWING RELATIVE KEY OF TRANSPOSING INSTRUMENTS



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