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THE PRINCIPLES
OF
WIND-BAND TRANSCRIPTION

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NEW YORK
CARL FISCHER
1921

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Eastman School
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To
GEORGE BARRÈRE
THE EMINENT FLUTE SOLOIST
FOUNDER OF THE BARRÈRE ENSEMBLE
IN RECOGNITION OF AND AS TRIBUTE TO
HIS INSISTENT LABORS TO WIN FOR WIND INSTRUMENTS
THEIR RIGHTFUL PLACE IN PUBLIC APPRECIATION AND
AS ESSENTIAL FACTORS IN THE REALM OF MUSIC
THIS BOOK IS INSCRIBED
BY THE AUTHOR

PREFACE

No apology is offered by the author for the advent of this book. Its "raison d'être" lies in the fact of the paucity of similar works in the English language (or others) and the inadequacy of those which exist in treating of transcription for the wind-band upon a plane of musical usefulness, higher than that implied by the rendering of a military march, dance tune, or an operatic selection.

Herein, the effort is made to exhibit its more varied possibilities and furnish grounds for the claim, that, when seriously treated, the wind-band is entitled to be regarded as a potential factor in the musical arena. Treatment of individual instruments and groups of instruments is applied in the light of modern developments, in structural efficiency, as well as in the wonderful progress made by players in overcoming their difficulties of technique. The latter results from the former and without them both, our famous bands could not exist.

Compositions of the first rank have yet to be written for the wind-band. For which reason, skillful musicians have been compelled to transcribe such works from among "scores" written for orchestra, organ, pianoforte, and voices.

Few, if any, of those excellent, but arduous transcriptions have appeared in printed form; they having been made for special concert organizations of high character, include works of difficulty so great, as to tax the powers of a first class orchestra.

Observation of the effects produced, combined with practical experience, inspired the author with the desire to formulate the principles by which transcribers of the above order were guided in their labors. Whether or not the effort be comparable in result with the interest taken in its achievement, is for those, who study the following pages, to render decision.

In conclusion, though several exceedingly valuable works on orchestration are published, no one of them treats of wind instruments in their relation to the wind-band, as an organization apart from the orchestra,

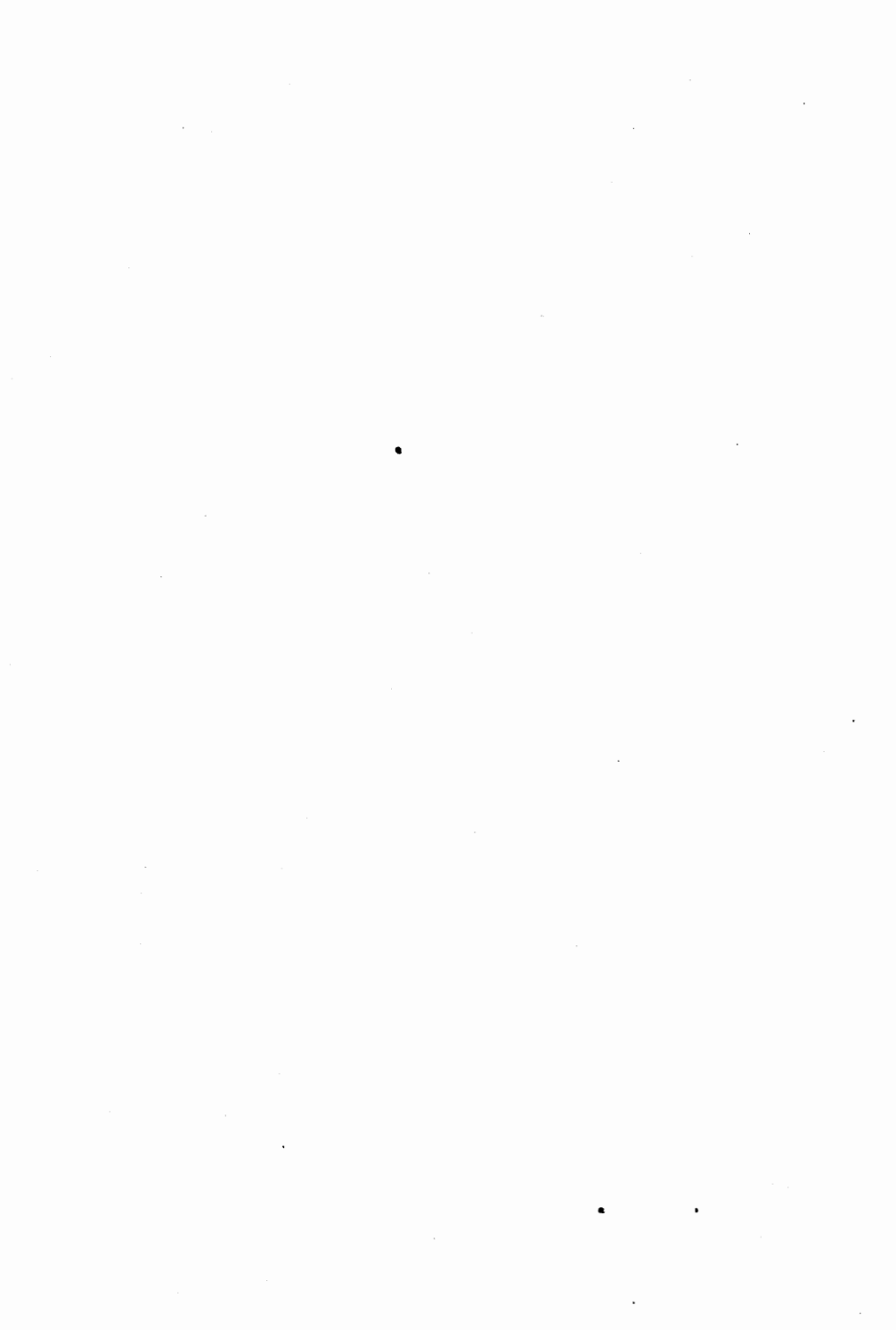
and existing on its own merits. Wind instruments are there kept in leading strings, and the principle of passive obedience to established orchestral usage and subordination to precedent are constantly inculcated in their pages.

It is hoped that this book will assist in widening the horizon generally believed to circumscribe the capabilities of wind instruments, and lead to a higher conception than at present obtains of the wind-band as a musical organism of great potency and high mission.

A. A. C.

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PRINCIPLES OF WIND-BAND TRANSCRIPTION

A Parallel with "Orchestration" for Wind Instruments

CHAPTER I

ORCHESTRATION, INSTRUMENTATION, TRANSCRIPTION

Orchestration is defined by Webster as "the arrangement of music for an orchestra; orchestral treatment of a composition; — called also *instrumentation*." Authors, as Berlioz, Gevaert, Jadassohn, and others, employ the term orchestration as distinct from and not synonymous with instrumentation. Prout, Stainer and Barrett seem to consider them as terms of parallel significance.

Inasmuch as an orchestra is generally held to be a band of musicians, playing on string (bowed), wind, and percussion instruments, — the former predominating — it would appear more consistent and expressive, when referring to the act of writing for such a combination to do so as orchestration. The term is precise and use of any other leads to confusion of ideas, being indefinite and ambiguous; for, as every one knows, there are other groupings of musical organics to be written for than those employed in the aggregation referred to as an orchestra.

Orchestration is the last subject taught in a well designed course in musical instruction, for the reason that its practice demands a knowledge of all other subjects, including naturally, familiarity with the technique of instruments to be employed. All the student has learned are as aids to the art of orchestration, but unless he possess the temperament of an artist, his efforts in that direction will lack in grace and fitness. He may have acquired the material, but how to use it is another matter. Example and precept are proffered by his masters. They are of great value and illuminate his paths on the way to experience and practice, through reading the scores of great musicians, listening, whenever opportunity offers, with observant attention to the effects produced by combination of instruments, and, lastly, by constant writing.

Orchestration deals with the emotional and aesthetic possibilities of instruments, in their tone color and shading, mixtures and blending characteristics, dynamic values in relation one to the other, their use to enhance nuance, rhythm, distinctive passages, or entire melodies. It teaches the use of instruments as pigments to be mixed on the palette and applied to the expression of every possible degree of light and shade required in the evolution of a tone picture. It is the highest expression of the musical art, and, in consequence, while books may treat of it, discuss its requirements and by so doing assist the student, they can not carry him beyond the psychic veil which interposes between material manifestation and spiritual expression of art. At that altitude there are lights which lead, in the works of the great masters. These may be followed with safety, and due observance of their indications will guide his steps and stimulate his endeavors to reach the fountain whence flows the pure and limpid stream of art, destined by the Infinite to reach man through his emotions, for solace and enjoyment and moral betterment.

Instrumentation is an element of orchestration. It implies a more or less practical knowledge of the technique of instruments; but possession of that knowledge, without mastery of harmony, counterpoint, musical forms and the higher requirements previously intimated, does not necessarily qualify him as one who can orchestrate. It is incidental to, and though absolutely essential, is nevertheless a lower function of orchestration. Experience shows there are many who, capable of playing several instruments, more or less well, are ignorant of musical theory beyond the simplest elements and devoid of artistic instinct; and experience also teaches that no man can be efficient in orchestration who does not possess a sound musical education, underlying an artistic perception, and the capacity to express himself in manner equal to the task imposed by orchestration in its true sense.

The term* instrumentation is also employed collectively, to express quality and variety of instruments included in the wind-band, *i. e.*, its instrumental constituents.

If musicians and music publishers could be brought to appreciate the distinction, the flood of publications with which we are constantly

*The author's work entitled "The Wind Band and Its Instruments" is a treatise on instrumentation in the above sense, hence valuable for study or reference in this connection. It is published by Henry Holt & Co., New York.

deluged, wherein every rule of art is befouled by the slime of ignorance, would be reduced, higher ideals would develop, and the outlook for true artistic appreciation much improved.

A term has yet to be invented that shall aptly describe the process of arranging or "scoring" music for the wind-band, as distinct from orchestration. As long as music for the wind-band was confined to elementary forms or, at the best, selections from operas, grand or otherwise, the word "arrangement" was sufficient to describe the process, which involved exercise of no acquirements higher than a certain skill to set the several parts in order by transposition and knowledge of instrumentation. But now, with changing conditions, the concert wind band coming to be recognized as a factor in musical art, a term that shall apply to it specifically, as does orchestration to its sister organization, seems to be needed.

Original compositions of artistic mould are rare for the wind-band, yet its executive development has been so great during the past twenty years that skilled transcribers have drawn largely upon orchestral works of great magnitude, intensely difficult pianoforte and organ solos, and so on, to furnish music suitable to the requirements, and rising to the capabilities of the modern concert wind-band. When composers of the first rank can be induced to recognize its potentialities, we may have symphonies, tone poems, and other forms suited to its genus and characteristic of its thoroughly masculine position in the realm of art. When that day arrives — as it will in the not remote future — a specific term for wind-band scoring will be evolved.

In the meantime, the word "transcription," employed in its musical sense, would appear more appropriate than "arranging." Truly, transcribe signifies to copy, in its limited application, but when one considers the sense in which it was employed by Liszt in his famous transcriptions, as well as by other writers, it must be recognized as having acquired a new meaning, as far as music, at least, is concerned.

The process of transcribing a great art work from orchestral or pianoforte score, for concert wind-band is as much greater in its demands upon the educational and artistic qualifications of the musician who undertakes it, than those required by the arranger from elementary forms, as would be the requirements necessary for an architect employed to copy and maintain the original beauties of some magnificent structure while erecting its duplicate amid new environments, as against those of one required to perform a similar feat with a log cabin. From this

point of view, the word transcription appears to cover more ground than arrangement. It not only implies setting in order conformably with the indications of the composition copies, but also with as great regard to its spirit and intent, tone color, and dynamic potency as shall be possible in the transference from one "locale" to another. This can be efficiently done only by a musician of high attainments, aims, and experience. For compositions of lower rank, which may be much enhanced by infusion of good taste and judgment in the setting, the work of a man of lesser ability is probably all sufficient. His task is confined chiefly in transposition and setting in order, in the limited sense, and therefore, is arrangement.

Moved by these considerations, the author, for want of a more descriptive designation, has adopted the title "Principles of Wind-Band Transcription" for this book, conceiving it to be more appropriate than the term arranging, which, though broader in its general sense and application, is less idealistic and significant as applied to a musical work.

CHAPTER II

CLASSIFICATION OF INSTRUMENTS

The science of acoustics furnishes a physical basis for classifying musical instruments and, further, explaining variations in tone quality, values in dynamic intensity, discrepancies of intonation and certain other points of weakness incidental to wind instruments, as well as showing cause for the relations and inter-relations subsisting between the various groups. These, and other matters, as will appear as we proceed, should all be mastered by the student of wind-band transcription. They provide logical reasons for use or avoidance, as the case may be, of employment of certain parts of the compass of instruments, here or there, and exhibiting the cause why mixtures may be good, bad, or indifferent as result of harmonious blending, or otherwise, of instrumental affinities.

Broadly, the wind-band is made up from two classes of instruments, (1) those in which the air column within a resonating tube is caused to vibrate, and (2) those of percussion. These may be divided into the four following groups according to the principle of vibrational impulse, as:

- (1) Instruments with reeds, as clarinet, oboe, bassoon, etc.
- (2) Instruments sounding by action of elastic membranes (the lips) on a current of air, as in the trumpet, French horn, cornet, trombone, etc.
- (3) Instruments producing their sounds by percussion of stretched membranes, *i. e.*, parchment heads, as drums of various kinds, which may have definable or indefinable resonance, as illustrated by tympani and other drums.
- (4) Instruments depending on the percussion of solid bodies, which, again may have definable or indefinable resonance, as bells, xylophone and cymbals.

Wind instruments involve the two principles common with all tubes or pipes, the clarinet family alone representing the "stopped pipe," and all others the "open pipe" principle.

Reed instruments include all those where the vibratory impulse is imparted by an applied reed, which may be single or double. The single reed group consists of clarinets and saxophones; the double reed group of oboe, cor anglais, bassoon, and contra bassoon and sarrusophones of all kinds.

The clarinet produces sounds as a stopped pipe, and its harmonics are the odd numbers, 1, 3, 5 and so on, of the harmonic scale, whereas, those of the saxophone include both even and odd numbers, as is usual with the open pipe. The difference between them lies in the form of their tubes, the former being cylindrical and the latter conical. This difference of form affects the quality of tone, for, as every musical tone is a composite sound, *i. e.*, compounded of a fundamental and the harmonics to which it gives rise, it follows that any instrument increases in richness of tone, proportionately with the number of harmonics, or "partial tones" its construction may permit of being recognized. This accounts for the fuller flavored vibrancy of the saxophone as against the softer and more pipe-like character of the clarinet.

Double reed instruments are all constructed on the open pipe principle, and have conical tubes, similarly with the saxophone, but, as the vibrating surface of their reeds is double, the characteristic "reediness" of tone is strongly in evidence at all times. The elliptic aperture formed by the two reeds varies with size of instrument, but in all cases, being small, the tone resulting becomes nasal, while reedy, and peculiarly penetrating. Low notes on each of the group, compression of the reed by the lips being at the minimum, are freely vibrant, but as pressure is

more and more brought to bear in the ascending scale of tones, the nasal quality above mentioned manifests itself.

The flute (mouth hole instruments) is classed as an open pipe. It is weak in harmonics, or partial tones, and therefore its voice is more feeble than that of the clarinet or oboe. It and the piccolo are of cylindrical form, the flute being double the size in length and diameter of the piccolo which is, therefore, an octave higher in pitch, and of twice the degree of shrillness, as compared with the upper tones, of the flute. The rush of wind is across the head, therefore transversely, directed into the mouth-hole to communicate vibrations to the air column within the instrument. Impingement of the wind on the sharp edge of the mouthhole, and as well, vibration of the lips themselves, tend to give character to the tone of the flute and kindred.

Instruments with cup mouthpieces all belong to the class said to produce sound by the action of elastic membranes on a current of air. The lips of the player are the elastic membranes, and they, when pressed into the mouthpiece, are caused to vibrate somewhat similarly with a double reed, by the rush of wind, which, in connection with the former, throw the air column of the instrument into a state of vibration, synchronizing with those of the lips. Length and form of tube modify the vibrations as to height and breadth of tone and incidentally its purity. Instruments of this class are of the open pipe principle and their harmonics may be freely developed up to the 8th in most instances, but in case of the low trumpet and French horn as high as the 16th, or even higher, according to the pitch at which the instruments stand. Prodigality of harmonics indicates great virility of tone; hence, it is not surprising to find this class more loudly voiced than those previously considered.

Tympani differ from other drums in that they each have only one head, or membrane, stretched over a metal chamber, or resonance cavity, which by means of screws may be tightened or relaxed sufficiently to produce tones throughout the interval of a fourth or fifth at definite pitch. Other drums are designed to reinforce rhythms, but without any attempt or intent to have their tones correspond in pitch with any other instruments. Sound is produced from all drums by percussion, that is, by beating their heads of stretched membranes with sticks, differing in structure according to the style of drum employed.

Bells and xylophones afford the best example of instruments depending on the percussion of solid bodies, with definable resonance. They

have musical uses and abuses. Cymbals are solid bodies caused to vibrate by percussion, clashing one against the other, or being struck by a drum stick. Their resonances are indefinable, except as to distinction between music and noise.

CHAPTER III

ACOUSTIC KNOWLEDGE WITH REFERENCE TO TRANSCRIPTION

Just as the chemist must be able to analyse and separate, one from the other, the elements which combine to form any material substance, so should the musician who aims at proficiency as an arranger of music for the wind-band or orchestra possess an analytic knowledge of the elements entering into the various and distinctive features observable in instrumental musical performance. The chemist is able to extract certain elements from some one body and by addition to those of another, or, by interchange of elements, apparently create one, two, or more forms differing so much in appearance and utility in application as to suggest the creation of new substances. This process is precisely that which the expert arranger by application of scientific principles, or, as the result of observation and experiences, pursues in the course of his work. Intuition, that is, inborn perception of the means to apply to attain certain ends, whether in art, or in more material things is not so common that consideration by the majority of students of the formulæ of science may with safety be disregarded. To recognize an effect as an established fact, a self evident verity, is one thing, but to trace that effect to its causal source and thus be able, as is the skilled chemist to combine elements and produce identical results at any time he may desire to do so, is quite another. Fine perception, trained faculties of sight, feeling and smell may enable the chemist to compound without recourse to the use of delicately adjusted scales and other measuring appliances, but reliance on those individual qualities alone is not always safe. Mistakes will occasionally happen, more or less serious in result. Hence, it is better to safeguard against them by application of correct formulæ and methods, than to have to regret their effects later on.

Though, hitherto, disregarded by the student arranger, there exist certain acoustic principles the consideration of which, enabling him to

trace effects to their cause, will show why this, or that combination of instruments is good, bad or indifferent, and how, by application of acoustic knowledge of association and *justesse* of balance among them, he may avoid errors in instrumental tone coloring, thus equipping him to handle his elements in confidence that their amalgam will produce good results.

Musical sounds are compounded of elements. There is no such thing as a simple musical sound; all are complex, and the result of the combination of many accompanying, though feebler sounds. If a key, say C, on a pianoforte be struck, and the loud pedal held down for a few seconds, the listener will hear the sound above named and will notice that, as its intensity diminishes, a succession of higher sounds, at defined intervals, appear. By use of resonators, the air cavities of which correspond with the vibratory requirements of each of the accompanying sounds, the successively higher sounds referred to may be isolated and very distinctly heard. Such sounds are termed harmonics or overtones; their numbers extend indefinitely, and are limited only by our aural range. They may be traced to the 16th harmonic by the unaided ear, and by use of resonators to the 48th, and even higher. All sounds arising from and accompanying the fundamental are included in what is known as the harmonic scale.

That musical sounds are complex and not simple becomes evident by consideration of the law that when a string vibrates as a whole it usually divides at the same time into its aliquot parts, each throwing off smaller (less intense) vibrations, the rapidity of which is in inverse ratio with the length of the string and its vibratory capacity as a whole. The co-existence and co-mingling of these harmonics with the fundamental gives to each sound its strength, its effect of completeness, resulting in the quality known variously as clangtint, timbre, or klangfarbe. Further, it is the addition of such overtones to fundamental tones of the same pitch which enables us to distinguish the sound of a clarinet from that of a flute, and the sound of a violin from either. Could the pure fundamental tones of the instruments mentioned, or, in fact, any others, be detached, they would be indistinguishable from each other, but the different admixture of overtones in the different instruments renders the clangtint diverse, and therefore distinguishable.

From consideration of the foregoing it is evident (*a*) that tone color, or clangtint varies according to the number and intensity of harmonics, or overtones co-existent with a fundamental sound, and (*b*) the moulding influence of the structural form of an instrument, which, either by

“damping” certain harmonics, or affording increase of strength to others, gives to each instrument its characteristic tone quality as truly as the quantity of ingredients, more or less, changes the character of chemical compounds.

If the operation of a simple natural law and its application to instrumental structure builds tones and imparts distinctive color thereto, the extension of that law — which, after all, is one of proportions — and its application to the adjustment of balance, assuring the elements, thereby provided, to the purpose of arranging, must act as a guide, whenever selection of instruments and their combination is under consideration. It is not what an instrument is in appearance or structure, but rather the result proceeding from the latter and *why*, that is of the greatest importance to the arranger. An intimate knowledge of the harmonic peculiarities of each instrument and the tone color effected thereby, enables him to build up on scientific basis, qualities of clang-tint that a person lacking the knowledge might arrive at only after a long period of experimentation.

For instance the unison of the notes of the throat register of the E flat Clarinet, with the high range notes of a bassoon will give a distinctively string like effect, somewhat resembling the first string of the 'cello. That string is the most tense of the four, consequently, more penetrating in tone quality, from its open fundamental sound upward. Its harmonics extend into a very high range; hence the quality referred to. The combination of wind instruments above mentioned produces a very similar effect. The height at which the bassoon plays imparts a rigidity of tone, somewhat nasal, the sense of the double reed being lost, as also is that of its harmonics, excepting, perhaps, the first of the series. Conjunction with the E flat Clarinet tones makes up the deficiency in that respect, in that its harmonics — the first a 12th above — impart the color lacking from absence of those essential to build up and round out the tone of the bassoon notes. Also, the freedom of the reed vibration, on the clarinet, being here about medium, tempers the rigidity, referred to, of the bassoon to such an extent as to cause their unified vibrations to closely resemble the transverse vibrations of the 'cello string.

By similar course of analysis, it might be shown that union of flute, with its feeble harmonics, and saxophone, with more pronounced series, will, in certain registers, produce French horn-like effects. Again, unison of oboe with flute in certain registers and for similar reasons will imitate a soft voiced trumpet, and so on. To be certain of such effects

requires careful adjustment of tonal balance and, further, demands on the part of the transcriber a knowledge of the difference of tone quality in the range, or register, of the several wind instruments included in the wind-band. For instance, the clarinet has four ranges, the chalumeau, throat, clarion, and high, each of which differs from the other in clang-tint. Those differences may be utilized for purpose of obtaining color in combinations with the voices of other instruments — the chalumeau with the bassoon or euphonium, the throat with flute or oboe, the clarion with high notes, *c''* to *c'''*, of the trumpet, or high notes with the flute or piccolo. The suggestions should be tested at the unison with the instruments named, then by interchange of instruments, the effects in each case being recorded upon the tablets of the memory for future reference — Differences in the high and low ranges of oboes, bassoons, saxophones (particularly the soprano saxophone) and all brass instruments, the varying quality of tone of the French horn calling for special observation.

In all instruments there is naturally a greater breadth of tone and more "reediness" in the lower than in the higher register. The cause is based on the acoustic law of the action of the air column within a tube, consideration of which should bring clearly to view, how, where, and when it might be advisable to employ unisons of the registers of certain instruments or even the contrasts provided by their octaves.

Instrumental form, or structure exercises a determining influence on tone quality. For that reason, while superficially of similar appearance to the casual observer, there exists, nevertheless, a notable difference of clang-tint between the trumpet, the cornet, and the flugel horn. In the two last named, diameter and form of tube differ, the cornet and flugel horn being conical thruout, the diameter of the former being smaller than that of the latter; the bell section of each varying as the broadening cone proceeds to its extremity. The trumpet is smaller of bore than either, is two-thirds cylindrical, and one-third conical, the cone formed by the "bell" differing from both cornet and flugel horn. The resultant differences from the variations in structure are:—

(1) The low tones of the trumpet are less powerful than those of the flugel horn, while, on the other hand, its brilliancy of tone is much superior in the higher registers owing to the fact that its high harmonics, particularly the dissonant 7th, is more prominent among its overtones than is the case with the flugel horn. The trumpet in form, though smaller, is comparable proportionately with the trombone,

and is the natural soprano, when in B_♭, or contralto, when in E_♭, to the trombone family.

(2) The cornet derives from the old post horn, and though it is said to be conical thruout, is not strictly so, its mouthpiece section, like that of its progenitor, is cylindrical. For that reason it emits tones which, not so solid as those of the flugel horn in its low register, are somewhat broader than those of the trumpet, but as the dissonant 7th among its harmonics is less apparent, it loses in virility in its upper tones as compared with the trumpet, but less so as compared with the flugel horn.

(3) The flugelhorn, structurally, is about the middle section of a French horn, with suitable "bell" appendix. It is, therefore, appropriate for amalgamation with the French horn, which, also, is conical in form and with which it has harmonic affinity.

For purpose of "balance" the arranger is cautioned that the carrying power of instruments depends upon the amount of atmospheric displacement each may cause as the result of the component elements of their sounds. The primary tones of the flugel horn, cornet, and trumpet, as well as instruments akin to them, stand in relation of solidity and power of displacement in the order named and exemplify the acoustic law that "resultant displacement is equal to the sum or difference of the component displacements." Instruments with strong clear primaries cause greater displacement than those with weaker ones, though the latter may be richer in harmonics, which, of feebler utterance, cause progressively less aerial disturbance.

Differences of similar nature may be established by examining into the structural form of other instruments, as, for instance, between the oboe and saxophone, both conical, and the flute and clarinet, both cylindrical. In the two former the harmonics are influenced by (a) the reed, (b) expansion of the cone; in the two latter the harmonic difference results from (a) the fact (in case of the flute, a mouth hole instrument,) that from the assemblage of pulses created by the current of air breaking against the sharp edge of the mouth hole (embouchure) the flute selects that one, alone, with which it synchronizes, and acts on the open pipe principle in relation to its harmonics; whereas, in case of the clarinet, the primary vibration formative is a single reed beating against the chisel edge of a stopper mouthpiece. It acts on the stopped pipe principle, its harmonics being the odd numbers of the series, because (differing from the saxophone of conical bore) owing to the cylindrical

form of the tube, the pressure is exerted at the reed, which vibrates in an inclosed space having no communication with the outside air. The maximum pressure being thus at the reed, a node of vibration is there formed, and the clarinet becomes virtually a stopped pipe, differing thus from the open pipe cylindrical flute whose first node is midway of its air column. It thus must be obvious to the student that in tonal character the two instruments just mentioned — as it is known they do — differ greatly, for, whereas the primary tones of the flute are weak and its harmonics, rising by arithmetical progressions, are yet more feeble, the primaries of the clarinet are stronger and its harmonics — the odd numbers only of the series — are, though fewer in number, more powerful than those of the flute. This difference influences the clang in each instrument and explains why one has greater tone carrying power than has the other.

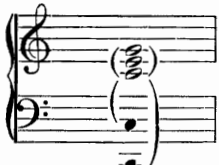
It has been said that a musical sound is complex, not simple, that is, the tone and its color which we hear is compounded of a fundamental or primary and certain feebler sounds resulting from the vibrations of the division of a string or air column into its aliquot parts. This principle exerts an immense influence on balance of tone, for, it should be borne in mind, each sound in a triad major, minor, or dissonant, or a chord composed of one, or more discordant elements, if it be sounded loudly enough to be recognized as an entity, throws off its own series of harmonics. Further, the combination of two or more sounds generates other sounds which are the produce of the difference existing between the vibrating number of sounds heard in combination. This fact is the result of the rule that “when two simple sounds loud enough to make the excursion of particles of air bear sensible ratio to the wave length a third tone is produced having for vibration number the difference of the vibration numbers of their generators.” For instance, the notes




at philosophic pitch have respectively $c' - 256$ vibrations, $e' - 320$ vibrations, the difference between which is 64; that being the vibrations number of the fundamental tone of the series, adds C as a solidifying influence to the major third above shown. The tone, feeble but discernible, is termed a resultant tone. As previously intimated, each tone of sufficient strength to be identified in a chord, throws off its own series of harmonics, it will readily be understood that great harmonic complexity arises from combining sounds with each other. As an illustration, take the triad $c'-e'-g'$. Considering, as we must in this instance, c' as the 4th, e' as the 5th, and g' as the 6th

harmonics of C, we obtain the following complex effect (which may be demonstrated by use of the siren and resonators) as produced by the combination of sounds and the resultants and harmonics, or overtones to which they give rise.

Resultant tones



Whole notes considered as 2nd harmonics



The foregoing show that, while the resultant tones harmoniously strengthen the chord, the harmonics introduce those discordant elements to which Helmholtz refers as "roughness."

It is those discordant elements, which, as products of one sound, or of combination of two or more sounds, influences the clang of instruments and differentiates one from the other. Thus it will be obvious why we may obtain so much variety of tonal color from — say, the three notes above plotted — if the instruments be changed during progress of experimentation to that end. The facts to be learned from the foregoing consideration of the complex nature of sounds, are (a) that tone color results from operation of nature's laws, (b) that perfect balance of tone cannot exist in arrangements, unless care be taken to adjust the tonal weight of each sound of a chord, whether emitted by instruments of the same family, or as result of intermixture by others. If an instrument be overblown the sound produced is rough, as the result of forcing its dissonant harmonic elements into undue prominence; or, contra-wise, if underblown the tone lacks individuality because of the loss of those dissonant harmonic elements which should impart zest, and season it to its full flavor. That which is true, as applied to one instrument is equally true as applied to combination of instruments playing in chord progress, and for that reason it behooves the arranger to consider well the weight of tone subsisting among the instruments for which he is writing. Correct mixture of tone color and adjustment of tonal sound weight must be his constant effort if he desire to produce a work that shall exhibit artistic unity of sound, equalling in effect the splendid employment of pigments by the painter of ability. Study of applied acoustics supplying scientific principles as a guide will greatly assist the labor of the arranger.

He learns thereby how and why results may be assured, realizes the force of the laws of nature in relation to music, and, as well, the penalties inflicted by disregard of those laws.

The roughness of chords is affected by position of their intervals; the reason for which is changed relation of the harmonics, that is, the higher or lower positions they are caused to occupy by the intervallic inversion made between the strong notes of the chords as changes of position occur. For instance, (a) shows juxtaposition of c and e in bass clef with harmonics, (b) c bass clef and e[~] in treble clef position, in one case a 3rd — in the other a 10th. When the notes at (a) are sounded the harmonics arising from the strong notes occur within the range of easy audibility, and so doing cause very pronounced roughness, caused by the clashing of harmonics a semitone apart. At (b) the dissonant qualities of the harmonics are less evident.



At (a) there are three clashing harmonics, at (b) there are two in evidence, but only one that is really disturbing, the 5th harmonic on e' being remote and of feeble intensity.

The foregoing teaches that rough, muddy effects result from writing sounds too close together in the bass, or elsewhere that low primaries are strongly in evidence. It may be considered as a rule that chord positions most nearly approximating those of the natural harmonic scale are at all times the best sounding. Dissonance is increased by close positions, whereas consonance is increased by open positions among chords. Murkiness on the one hand, clarity on the other.

In order to illustrate the influence of the harmonic elements, the examples given below exhibit the overtones arising from various intervals and, by inference, the state of consonance of each interval. In relation to these overtones, Tyndall remarks "Overtones play a part of the utmost importance. For though the primaries may sound together without any perceptible roughness, the overtones may be so related to each other as to produce harsh and grating beats. A strict analysis of the subject proves that intervals which require large numbers to express

them are invariably accompanied by overtones which produce beats, while in intervals expressed by small numbers the beats are practically absent." Beats are most disagreeable in the middle and upper parts of the musical scale. At the rate of 33 the second they are very disagreeable, diminishingly so until the rate of 132 the second is reached, when they become imperceptible. It may be well to state that beats increase in intensity proportionately with loudness of sounds which cause them.

In the examples quoted from Pole's Philosophy of Music are given vibration numbers at philosophic pitch, as well as those of beats arising from clash of dissonances between the harmonics or overtones.

Octave	Beats per second																				
Perfect 5th																					
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1280	...	128																			
1634	...	128																			
	1152	...																			
Perfect 4th																					
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Major 3rd																					
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1536	...	1704	...	168																	
	852	...	84																		
	426	...	86																		

REMARKS

There is no interference; therefore, no beating. The interval is perfectly consonant.

The d''' , second overtone of the upper fundamental g' sounds against c''' and e''' third and fourth overtones of the lower fundamental causing interference, and giving rise to two series of beats.

The upper series of beats are so feeble as to exercise little if any influence on the quality of this interval. The two lower ones are in evidence, but not disagreeable in effect.

Between g''' and $g\#'''$ and between b'' and c''' the beats are within perceptibility as creating roughness, greater in degree than in the three foregoing examples.

The beats being quicker than in the major 3rd are less pronounced. The interval is therefore slightly more consonant.

Tritone

		Beats	
		per second	
1536	•••••	1440	... 96
1380	•••••	1080	... 180
1024	•••••		
768	•••••	720	... 48

Some of the beats approach the harsh velocity and are also caused by loud notes. Hence the combination is less agreeable than any of the foregoing examples.

Minor 2nd

		Beats	
		per second	
1536	•••••	1370	... 108
1380	•••••	1090	... 90
1024	•••••		
768	•••••	822	... 184
		548	... 72
			... 54
256	•••••	274	... 18

The strong clash of beats is here very apparent. In consequence the dissonance is very harsh.

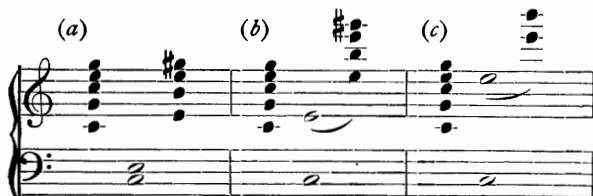
It is necessary to bear in mind that as "the positive degree of harshness of any given combination varies materially according as it is taken higher or lower," the foregoing examples, taken, say, an octave lower, will be less consonant, excepting only those of the 8th, 5th and 4th, which remain nearly normal in every position. The following example of binary combinations vary in degree of harshness and effect upon the ear. The harshness is greatest in the lowest combination diminishing proportionately as the intervals change to the higher positions.

Pole remarks: "This is a fact well known in musical practice: combinations and chords, which are excellent consonances in the upper part of the scale, become unendurable when taken in the low bass."

From the above it may be inferred that if the examples of the 3rd, 6th tritone, and minor 2nd be reduced an octave, the beats halved, in rapidity, interfere at about the maximum harshness.

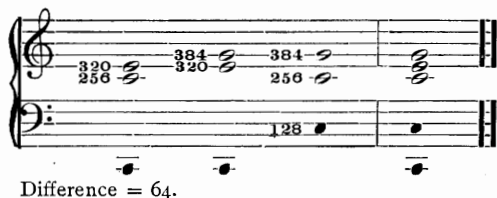
These considerations, applied to the work of arranging, should prove cautionary, establishing in the arranger's mind guides as to the positions of combinations conducing to consonance, and, on the other hand, those which should be avoided for scientific, as well as aesthetic reasons.

The degree of dissonance of an interval changes as the parts are more or less widely separated by the interposition of octaves. This can be understood by laying out and studying harmonic tables on the following intervals, thus:



(a) The clash of beats is strong between c'' and b' , and g'' and $g\sharp''$ of the harmonics; (b) the interference is lessened and the interval becomes more concordant; (c) there can be little, if any, appreciable interference, because the harmonics of the upper tone are so high as to be too feeble and remote for the ear to recognize. The author quoted previously remarks, "The fact of a difference in effect by the spreading out of the harmonics is well known in practical music and is always taken advantage of in good compositions."

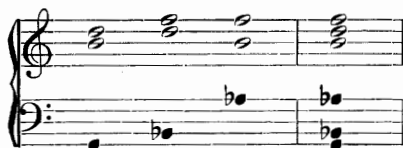
It is not generally recognized by musicians that when two notes are sounding at the same time, another sound lower and feebler is generated. Such a sound is the result of the differing vibration numbers of the two tones of the interval. Thus $c' = 256$, and $e' = 320$, difference $64 = C$. The acoustical effect of that increment is to add fullness to the sounds. It will be obvious that position of the notes written exercises influence on the sounds heard. The generated sound is known as a *resultant tone* and the first to observe it was Tartini (1745) who discovered the phenomenon and applied it in his system of violin teaching, to guide his pupils to correct intonation in "double stopping." The following will illustrate the resultants arising from combinations of notes in the common triad.



If the strong tones be raised an octave, the resultants too are raised to the same extent.

Dissonant and minor intervals also are accompanied by resultant tones which, in a remarkable manner, illustrate why they are less harmonious in effect than their written appearance would seem to indicate. Take the diminished triad, for example, that in the key of C major. The

reason for its harshness is apparent from consideration of its resultant tones, from its constituent intervals, two minor 3rds and a diminished 5th we obtain—



From which it is apparent that two of the three resultants do not belong to C major.

In the following example the resultants from two chords in frequent use are shown—

Chord of the minor 7th

Chord of the diminished 7th



Resultant tones for other chords of chromatic construction may be found by study of any hand book on applied acoustics. Familiarity with them will guide the arranger to use of his material, for when he realizes that clang-tint of instruments as individuals is the result of the harmonic components of their fundamentals, he will easily understand that when those same individuals are combined to play in intervals, binary or in triads, he is adding new coloring ingredients to and enriching the clang of the instruments for which he is writing by generation of resultant tones.

Reverting to structural influence on wind instruments, it may be well to state that those having cupped mouthpiece, whether played with valves or slides, afford facilities equal to seven open pipes; that is to say, descending by semitones to the diminished 5th or augmented 4th below, each valve singly or by combinations of valves, or lengthening of slide, requisite for each of the semitones, practically creates a new open pipe. In the case of valve instruments, the act of pressing a valve down opens an air-way into a length of tubing adding it to the main or original tube, thus creating a longer pipe which acts acoustically as does the original,

each having a fundamental and series of harmonics peculiar to its tonality. On slide instruments a precisely similar effect is produced by pushing the slide outwards for each semitone.

Mouth hole instruments (flutes) and all reed instruments, so called, act differently from those with cupped mouthpiece, for, in their case, each opening of a hole, necessary to produce each semitone thruout the chromatic scale, ascending to the major 7th above, creates a new fundamental, or first sound of its harmonic series, on which are based the harmonics of that new fundamental. The notes beginning from the octave on flute, oboe, bassoon, saxophone, are harmonics of those progressing upwards from the lowest, in ratio 2 : 1. Acoustically, the ratio 3 : 1 may be obtained by over blowing the fundamentals. The clarinet scale differs from the foregoing. Its ratio is 3 : 1, which means that the 12th of its first and each succeeding fundamental may be fingered in the same manner as the fundamental of which it is the harmonic, there being no 2 : 1 ratio on the clarinet.

CHAPTER IV

INSTRUMENTATION OF THE U. S. ARMY BANDS

In June, 1918, General Pershing, Commanding the U. S. Army in France, cabled a recommendation to the War Department at Washington that our band instrumentation be increased suitably for forty-seven performers and submitted a list of instruments for that purpose. After consideration, acting on advice, the Department decided to convene a board of experts to pass upon the recommendations, with authority to suggest such changes therein as its members might decide would improve the instrumentation submitted. The board assembled at the U. S. Army Music School July 30, 1918, and as the result of its sessions, finally recommended the instrumentation given on page 20. The methods by which the board reached its decision are thus stated in the report were (1) various demonstrations by the individual groups of instruments; (2) by the full wood-wind section, including saxophones; (3) by the band constituted as a brass band, and (4) finally by the whole ensemble. The board, after hearing the various combination, reported itself satisfied "that the instrumentation submitted is for the very best interests of the

service, and it is thought the tone color and balance is the best that can be obtained with the number of men available."

The instrumentation recommended differing in several points with that submitted by General Pershing, was authorized by the Chief of Staff, and ordered to be issued and adopted as the official instrumentation for U. S. Army bands.

C Flute	I
D \flat Flute	I
Piccolo	I
Oboes	2
E \flat Clarionet	I
B \flat Clarionets	10
E \flat Alto Clarionets	2
B \flat Bass Clarionets	2
Bassoons	2
E \flat Alto Saxophone	I
B \flat Tenor Saxophone	I
E \flat Baritone Saxophone	I
French horns (altos for mounted bands)	4
B \flat Trumpets	4
B \flat Cornets (or Flugelhorns)	2
B \flat Baritone (small bore)	I
Euphonium (4 valves)	I
B \flat Trombones (valve or slide)	3
F Trombone (valve or slide)	I
E \flat Basses (4 valves)	2
BB \flat Basses (4 valves)	2
Contrabass sarrusophone	I
Snare drum (and triangle)	I
Bass Drum (and cymbals)	I

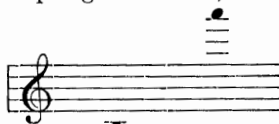
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Further, the board recommended "There will be issued in addition 2 Soprano saxophones and one snare drum, it being intended that the saxophones shall be used by oboe players and the snare drum by one bassoonist, and the other bassoonist shall play cymbals when the band is on the march." The board also recommended the issue of a set of bells, xylophone, and tambourine for use by the band at concerts. The issue was duly authorized.

THE SARRUSOPHONE

The contra-bass sarrusophone, included in the foregoing instrumentation, is useful as a tone color ingredient for the brass basses, as a foundation bass for its own family, and for the wood-wind section, or any part thereof. It belongs to a family consisting of B \flat soprano, E \flat alto, B \flat tenor, E \flat baritone, B \flat bass, and E \flat contra-bass, six in all. The instrument was invented by Mons. Sarrus, Bandmaster in the French Army during the third empire, and by him, it is said, intended to supplant oboes and bassoons in bands. They are double reed instruments, conical tube, open pipe principle, made of brass. Owing to difference in bore, their tone is more veiled than is that of either oboe or bassoon, but, nevertheless, though less piquant, is of pronounced quality, and worthy of place in the wind-band.

Similarly with saxophones, their notation is that of the treble clef. It is well to remark that the E \flat baritone and E \flat contra-bass may play from bassoon or bass parts, by the familiar expedient of dropping three sharps, raising accidentals a semitone, and reading as though the parts were written in the treble clef. The fingering chart gives the compass of all sarrusophones, excepting the contra, as from b to a''' in alt.



This notation is nominal, the actual varying for concert pitch according to the key name of each instrument.

The compass range is therefore two octaves and a 7th, exceeding the extreme, upwards, of the saxophone by a major third; but while this appears on paper, it is advisable not to write for the sarrusophone (Soprano and Alto) higher than f''' in alt; for the B \flat Bass, higher than c''', and for the E \flat Contra higher than c''. All sarrusophones are of good tone quality, free in the lower and middle ranges, then progressively to the small part of the cone, more confined and nasal. In the high range the tone becomes more inflexible, unsympathetic, and rigid. The E \flat Alto of the group has the most responsive tone, and is excellent for solo work, while the more ponderous tones of the B \flat Bass and E \flat Contra are exceedingly effective additions to the bassoon, euphonium, and bass ranges, through which they infuse a string-like quality. The B \flat tenor and E \flat baritone are very useful as coloring ingredients, affording support to the bassoons, and baritones.

The following table gives the nominal and actual (concert pitch) playable range of each instrument of the group.

B \flat Soprano Sarrusophone	} Nominal for all; full range		Concert Pitch
E \flat Alto Sarrusophone			for
B \flat Tenor Sarrusophone			Safe Playing Range
E \flat Baritone Sarrusophone			
B \flat Bass Sarrusophone			
E \flat Contra bass Sarrusophone			

Sounds 8ve bassa

CHAPTER V

RELATIVE DYNAMIC VALUES ON WIND BAND INSTRUMENTS

No transcription can be good unless based on certain principles logically applied to treatment of compositions as a whole, with modifications, only, to illustrate change of sentiment or emotional transitions and contrasts such as may appear as incidental but at all time relevant to the form and character of the work. Even then, modifications must be considered in relation to the context, and the law of homogeneity prevail.

One of the principles, often neglected, is that of relative dynamic values among instruments, an understanding of the full meaning of which leads to a clear conception of balance of tone, the fitness of one

instrument or group of instruments, to be placed in juxtaposition with some other in the same range, or at intervals above or below, the intermixture of groups and finally in the *ensemble*.

In order to obtain some idea of relative dynamics and its corollary, balance of tone, it is convenient to assume degrees of strength by units, taking 10 as stating the minimum, and 120 as the maximum. Examination reveals that the wind-band is susceptible of twelve divisions of tone strength for comparative purposes, and, of course, many other and more minute subdivisions if it be desired to investigate the entire scope of their possibilities. The divisions here stated, will, it is hoped, be sufficient to suggest the line of further and more detailed investigation, as well as the method of procedure.

If, at some distance, we hear a wind-band playing, say a march, or other composition of full treatment, the sound of the bass drum will first impress us; following that, the large bass, and next in order the euphonium and trombones. Should we proceed toward the organization, approaching nearer and nearer, we become conscious of the intermediate instruments, then the melodical brass, and, finally, when within the atmospheric radius thru which even the weakest in tone will extend, our ears recognize the presence of the reed and flute or piccolo elements. This illustration proves that the aerial disturbance, or intensity of the sound waves, induced by the several instruments or group of instruments is not equal in extent, from which it may be deduced that the weaker instruments are numerically insufficient to balance the tones of the stronger voices. Yet, were it formulated as a theory that, say, four clarionets are required to balance one cornet, that proportion would be found insufficient, applied to the band collectively; the reason for which lies in the fact that the fuller voiced instruments attract and absorb tones of the more feeble, enriching their own sounds, while retaining their character, and, thus, to some extent neutralizing the utility of the smaller mediums. Variety of rhythmic impulse may modify, but does not entirely obliterate this fact. As an illustration, suppose a euphonium sustain the notes *b*, *c'*, *d'*, above the bass staff, and a clarinet, oboe, or flute play the same notes at identical pitch and normal strength, the identity of either of the latter will be lost in the former; a similar result will ensue if a bassoon and euphonium play in unison. Differentiation can only be brought about by keeping those, and other instruments, an octave or some other interval apart. When such a course is adopted, the second element of dynamic value is introduced, viz: qualification by

pitch. This consideration points to the conclusion that unisons of weaker with stronger and broader toned instruments should be avoided, unless — which is rare — the former are numerically sufficient to balance those of the latter, or better, surcharge them to the point of losing their own identity. Take a parallel in colors. For instance, assume a perfectly black ground of newly laid water color to represent the euphonium and orange to represent the clarinet. If one streak of orange be placed on the black it will disappear by absorption, and require many streaks at the same point for the orange to become evident, and more to make it entirely palpable. Even then the black environment qualifies it.

Relative dynamics, at normal degree of pressure and medium range, as previously intimated, may be stated in units, as follows:

	units
1. Piccolo and Flute	10
2. Oboe group	20
3. Clarinet group	30
4. Saxophone group	40
5. French horn	50
6. Cornet, Flugel horn, or Soprano Saxhorn.	60
7. Saxhorns (alto) and B \flat Althorn.	70
8. Trumpet, B \flat or E \flat	80
9. Trombone, B \flat or G	90
10. B \flat Baritone, or Bass, or Euphonium	100
11. Bases E \flat and BB \flat contra	110
12. Drums	120

From the foregoing it will be apparent that a cornet of 60 units would require 6 flutes to balance against its tone in unisonal the ratio of 6 : 1. But, if it be required to establish the ratio between any two instruments, so as to illustrate their relative intensity in particular, the higher must be considered as representing the minimum, 10, and so on, downwards by addition of units of 10. For instance, stating the clarinet as 10, we find by downward progress, the cornet will be represented as 40; the ratio being 4 : 1, which inversely shows that four clarionets is the dynamic equivalent to one cornet, a proportional experience has shown to be necessary in a well organized concert wind-band. The table, for general purposes, may be worked out on this plan.

Before proceeding with other considerations pertaining to relative dynamics, it may be here suggested that although the bass is proportionate with other instruments as stated, it will be found in practice

advisable to increase it somewhat. The weight of its air column is so great as to require much exertion on part of a player to set it in vibration. Where basses are too few in number, the effort to play *forte*, almost always leads to over-blowing, thus unduly forcing the tone, affecting the pitch, and ruining the homogeneous sonority so desirable to the foundation of the harmonic structure. The difficulty here pointed out should be held in view by transcribers, whose effort must be to write so as never to make unnecessary demands on the player.

Pitch is a qualifying element in relative dynamics, for while the tones of the feebler would be lost in, or absorbed by those of the louder instruments, the two playing in unison — they will be distinct if superimposed at a 3rd, 6th, 8ve, or other interval. The physical reason for this is that the higher tones are reinforcing the weaker harmonics — inaudible, except under specific conditions — and thus, as it were, bringing them into relief against the denser background of low sounds. Characteristic tone quality of the upper instrument will, naturally, be affected by its setting, becoming more cloudy, the vibrational influence of its more powerful companion.

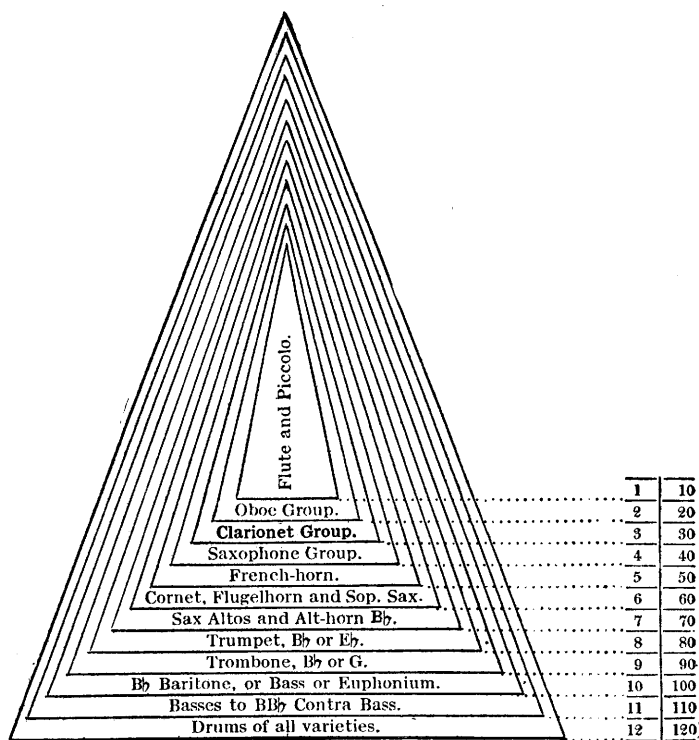
Where instruments are all playing in unison, so called, but really in two, three or more octaves, the several ranges or tiers of sound will be evident as composite tones; thus, flutes, clarionets, oboes, saxophones, will fuse their characteristic vibrations; cornets, trumpets, horns, with the lower clarionets and saxophones will do likewise; the larger brass instruments with contra bassoon, contra sarrusophone, also amalgamating. Not only may the several ranges be heard at their differing pitch altitudes, but the whole mass will appear to be evolving a tone, complex in constituents, but sonorous and harmonious in proportion to the balance obtaining among the elements employed in the formation of the wind-band.

Another element qualifying dynamic relativity, is rhythmic impulse, otherwise variation of melodic, or accompanying figures. If a weak toned instrument sustain a sound, while a stronger one play at the same pitch in broken figures or vice versa, the two instruments will be heard, the difference of impulse somewhat neutralizing the absorptive power of the stronger toned instrument. The effect upon the ear is of intermittent shocks, which direct the attention of that organ to the two qualities of tone, during the minute periods of rest involved in the attack of those fractional parts into which the figures are broken.

Recurring to dynamic balance, it may be said that as far as the con-

cert wind-band is concerned, the reed element should constitute quite two thirds of its ensemble; for, if we are to transcribe from orchestra scores, for works to render, or a composer of merit desires to write for it, we must have an organization rich and varied in voicing, flexible and agile in execution to surmount difficulties, and in all respects worthy as an art factor and equal in other points to the work undertaken. Clarionets, therefore, must preponderate in number and variety so that they shall be able to interpret, within their limitations, which are few, music such as is now plotted for violins, violas, celli, and string basses. To fulfill that high requirement, it is necessary to have the clarionet family complete, and in proportions somewhat approaching those of string instruments in the orchestra.

CHART OF DYNAMIC TONE VALUES, AND DISSIPATION OF
ENERGY BY UNITS



The above multi-cone plan is designed to illustrate comparative strength of tone by units, assuming the flute to represent 10 degrees of force as the minimum and the bass drum 120, the maximum. It shows also the covering, or absorbing tone power of instrument against instrument, and suggests, by diminution of the cones from bass to apex, the relative length of air wave, and dissipation of tonal energy. It is based upon the idea of a medium tone on each instrument produced by normal exertion on part of the player. Counting from base line to base line downwards, an idea may be formed as to the number of instruments of one group, considered necessary to balance the tone of the other. Thus, from the base of the Clarionet cone (B \flat Clarionet) to the base of the Cornet cone, we find the latter has four times the force of the former. Clarionets should therefore, be as 4-1 with Cornets. Basses should be somewhat increased, to avoid necessity for overblowing in *Forte* and incident fatigue.

CHAPTER VI

INDIVIDUAL AND COLLECTIVE COMPASS

A concert wind-band may have a collective range of compass of seven octaves, the brass wind extending thru four octaves and a perfect fifth and the reed element extending it further upwards by two octaves and a third. But, as shown in the following "Comparative Compass Chart," the reed and flute groups embrace the whole enormous range, in fact, the reed group includes instruments having the gravest as well as highest tones of the band. The chart referred to exhibits the overlapping of the various registers, the points of unison and the full compass of each instrument, at actual pitch, as well as their relative altitude one with the other. In the "Compass Chart" will be found the playable chromatic extent of each individual instrument, notation as written, its actual value, or impression, the differential *interval* between the two, and lastly, range of each family or group. This chart, in connection with the first mentioned, is designed for reference in the practical work of transcription, showing the transpositions necessary, and indicating the limits, below or above, by which the writer is bounded. Pedal sounds and very high notes are not included, except in case of the euphonium

with four or five valves, specially designed to fill the gap chromatically existing between the pedal, or the fundamental sound of the open tube, and the first note possible by combination on the ordinary three valve euphonium. It may here be remarked the low notes on all brass valve instruments, produced by combinations of valves, are more or less out of tune, from operation of certain physical causes, beyond control of the maker, and for that reason should be sparingly written for.

The extent is small, being only three semitones, typified by small f#, g, and g# of a cornet; nevertheless, it is well to observe the foregoing precaution.

For exploitation of rapid passages, the medium to upper range of all cup mouthpiece instruments is best adapted. In the larger ones of this class, the weight of the air column is so great as to almost preclude the possibility of clear utterance in rapid passages, especially so if they involve skips of only a third or fourth. Tubes of wide diameter, where of the low reed or cup mouthpiece genus, are best fitted for deliberate enunciation, pompous, dignified, and grave as becomes organisms of such great responsibility.

Sounds included in the highest fifth of all wind instruments impose progressively greater and greater strain upon the player, a fact that should be borne in mind, in order to avoid long continued passages in that range; particularly is this necessary when of less intensity than *mezzo-forte*.

Clarionets, saxophones, flutes, and even the oboe, sarrusophone, bassoon — excepting in the very low registers of the groups — are extremely agile and flexible, speaking freely throughout their compass. Still, for the reason above suggested, long continued high notes should not be indulged in by the transcriber. This applies particularly to wind-bands of average instrumentation. In the large one it is not so material, because, with very many reed instruments playing from the same parts, one or more may rest occasionally for time sufficient to relieve the strain without any appreciable bad effect on the work.

With the tables in hand, at the end of this chapter, it seems almost unnecessary to refer further to the subject of compass. But to make the matter of notation clear, it may be said that all flutes and reed instruments, single or double, are written for in the treble clef, (excepting the bassoon), contra-bassoon, contra-bass clarinet, E \flat bass, and contra saxophone, and E \flat bass and contra sarrusophone, notation for which is variably in the bass and treble clefs. The tenor clef is occasionally

employed for the high range of the bassoon. Meyerbeer, in his opera, "The Huguenots" wrote a brief unaccompanied solo for the bass clarinet, in treble clef notation, thereby establishing a precedent which, to say the best of it, is an anomaly. That instrument, as well as the baritone saxophone and sarrusophone, should have their notation expressed in the bass clef, thus uttering the sounds as written and not, as at present, a major 9th below their notation.

Cornets, trumpets, horns, and all the smaller brass instruments, as well as the baritone — which should not — have their notation in the treble clef. Trombones, euphonium, and all basses are indicated in the bass clef. Frequently notation for trombones (above bass trombone) is written in the tenor, or C clef. In old scores, to the $E\flat$ alto trombone, the alto clef was assigned. It would be a good plan to continue the use of the tenor clef for the $B\flat$ trombones, and also to introduce its employment in connection with the $B\flat$ baritone, but with its position changed, for obvious reasons, from the fourth line to the third space. Notes would then sound as written, as of course, they do at present, so far as the trombone is concerned.

The fundamental (or pedal) sounds of the open tube are possible on all cup mouthpiece instruments, but are not of value either in orchestra or wind-band. An exception is made to this in case of the French horn, the pedal sound of which may be frequently found in symphonic and grand opera scores. In transcription the intended effect should be retained in the horn part, if at all practicable, but if not, the note must be given to some instrument whose tone bears resemblance to the French horn. Another exception has already been instanced in the euphonium.

NOTES.

1. In the following charts the extreme compass of each instrument is stated. For effective band work piccolos and flutes in $D\flat$ and $E\flat$, as well as oboe, cor anglais, $E\flat$ Clarinet, $E\flat$ Alto Clarinet, all Saxophones and Sarrusophones, and $E\flat$ alto (cupped mouthpiece) should be reduced in their high range at least a minor third. Further, the first sound and its fifth on all cupped mouthpiece instruments should be sparingly written, being much out of tune.

2. The first four semitones on $E\flat$ Bass and $BB\flat$ Bass, by reason of diameter and length of their tubes and corresponding weight of air column are somewhat difficult of utterance, but in a movement of broad character they can be made effective.

REFERENCE COMPASS SCALE

Key (with chromatics) to table.

Grave

Double Great Octave

Great Octave

Small Octave

BBB CC DD EE FF GG AA BB C D E F G A B c d e f g a b

One Line Octave

Two Line Octave

In Alto

In Altissimo

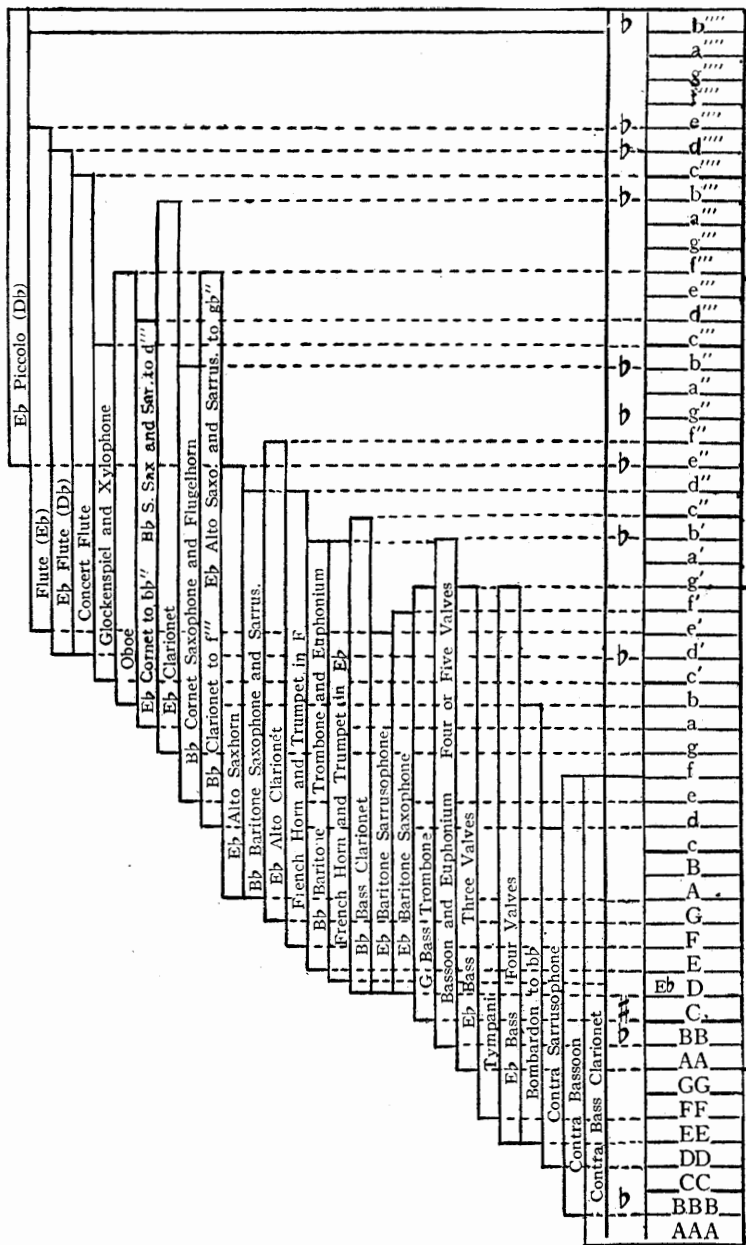
c d e f g a b c d e f g a b

COMPASS CHART OF WIND INSTRUMENTS

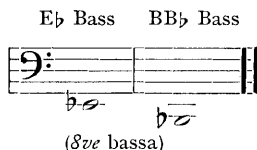
Instruments	Extent	As written	Actual	Difference	Family range
Piccolo, in Eb (so called)	2 Oct. & 5th	d' to a'''	eb'' to bb'''''	Min. 9th above	4 Octaves and a major 7th.
Flute, " F (")	3 Oct.	c' to c'''	eb'' to eb'''''	Min. 3rd above	
" " (")	3 Oct.	c' to c'''	db' to db'''''	Min. 2nd above	
" " C	3 Oct.	c' to c'''	Same	None	

Clarinet in E ^b	3 Oct. & 3rd	e to g''' e to g''' e to d''' e to d''' aa to f'	g to b ^b ''' d to f''' g to f''' d to c''' aaa to f	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 9th below Octave	6 Octaves and a Minor 2nd.
Saxophone in B ^b -Soprano	2 Oct. & 4th	b to e ^b ''' b to e ^b ''' b to d ^b ''' d to f'	a to d ^b ''' d to g ^b ''' a to d ^b ''' Same	Maj. 2nd below Maj. 6th below Maj. 9th below None	3 Octaves and diminished oct.
" " " B ^b -Tenor	2 Oct. & 4th	b to f''' BB ^b to b ^b ' BB ^b to f'	Same Same BBB ^b to f	None None Octave	5 Octaves and a 5th.
" " " E ^b -Baritone	2 Oct. & 3rd	b to e ^b ''' b to e ^b ''' b to e ^b ''' b to e ^b ''' d to e ^b ' D to d'	a to d ^b ''' a to g ^b ''' a to d ^b ''' a to d ^b ' Same DD to d	Maj. 2nd below Maj. 6th below Maj. 9th below None Octave	4 Octaves and diminished oct.
Oboe	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Bassoon	3 Octs.	b to f''' BB ^b to b ^b ' BB ^b to f'	Same Same BBB ^b to f	None None Octave	5 Octaves and a 5th.
Sarrusophone, B ^b Soprano	2 Oct. & 4th	b to e ^b ''' b to e ^b ''' b to e ^b ''' b to e ^b ''' d to e ^b ' D to d'	a to d ^b ''' a to g ^b ''' a to d ^b ''' a to d ^b ' Same DD to d	Maj. 2nd below Maj. 6th below Maj. 9th below None Octave	4 Octaves and diminished oct.
" " " E ^b Tenor, or Baritone	2 Oct. & 4th	b to e ^b ''' b to e ^b ''' b to e ^b ''' b to e ^b ''' d to e ^b ' D to d'	a to d ^b ''' a to g ^b ''' a to d ^b ''' a to d ^b ' Same DD to d	Maj. 2nd below Maj. 6th below Maj. 9th below None Octave	4 Octaves and diminished oct.
" " " E ^b Bass	2 Oct. & 2nd	b to e ^b ''' b to e ^b ''' b to e ^b ''' b to e ^b ''' d to e ^b ' D to d'	a to d ^b ''' a to g ^b ''' a to d ^b ''' a to d ^b ' Same DD to d	Maj. 2nd below Maj. 6th below Maj. 9th below None Octave	4 Octaves and diminished oct.
" " " Contra	2 Octs.	b to e ^b ''' b to e ^b ''' b to e ^b ''' b to e ^b ''' d to e ^b ' D to d'	a to d ^b ''' a to g ^b ''' a to d ^b ''' a to d ^b ' Same DD to d	Maj. 2nd below Maj. 6th below Maj. 9th below None Octave	4 Octaves and diminished oct.
Cornet and Soprano Saxhorn in E ^b	2 Oct. & 2nd	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
" Saxhorn and Flugelhorn in B ^b	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Alto Saxhorn in E ^b	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
French Horn and Trumpet in E ^b	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
" " " " F	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Baritone, called also Altohorn or Tenor Horn, B ^b	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Euphonium, or B ^b Bass, three valves	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
" " " " four or five valves	3 Octs.	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Bass, or Tuba, E ^b , three valves	2 Oct. & 7th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
" " " E ^b , four valves	3 Oct. & 3rd	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
" Contra, BB ^b or Bombardon	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Trombone, B ^b Tenor	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
" " " G Bass	2 Oct. & 5th	f# to g''' f# to c''' f# to c''' f# to c''' c to g''' c to g''' f# to c''' E to b ^b ' BB ^b to b ^b '	a to b ^b ''' a to b ^b ' a to e ^b ' E ^b to b ^b ' F to d ^b ' E to b ^b ' Same Same Same Same Same	Min. 3rd above Maj. 2nd below Maj. 6th below Maj. 6th below Per. 5th below Maj. 9th below None " " " "	4 Octaves and imperfect 5th.
Tympani	1 Oct.	F to f''' c' to c''' And in other key	May be tuned to other octaves	
Bells, or Glockenspiel and Xylophone	2 Octs.	F to f''' c' to c''' And in other key	May be tuned to other octaves	

COMPARATIVE COMPASS CHART
Showing Points of Unison, Extent and Overlapping Registers of the Several Instruments, at Actual Pitch of Card



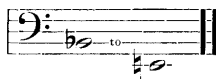
3. "Pedals" (fundamental open tones) of the instruments last named are



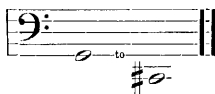
Those of the euphonium and closed position of B \flat trombone and G trombone are



Euphonium and B \flat trombone have "pedals" to each tone in the chromatic scale descending from



of the G trombone from



4. Development of the lower tones of all wind instruments, especially flutes, saxophones (those of the latter, from careless study, are often stiff, coarse, and out of tune) and all cupped mouthpiece instruments is much neglected by performers and too little in demand by arrangers, probably for the foregoing reason. Many fine effects are thus lost.

5. The practice of writing for the contra B \flat bass as though its range were the same as the euphonium is incorrect. Excepting its fundamental open tone, all tones descending on the euphonium from E \flat to E natural are in the great octave, whereas the contra bass can play those notes as part of its scale from B \flat to E natural and continue downwards by semitones to EE natural in the contra great octave. This low octave is often lost as result of the practice referred to.

6. In scores by German, Russian, and some other European writers the E \flat and B \flat basses are written for as octave instruments to the contra B \flat bass; that is, so far as the compass of each permits, the parts are written in two octaves, the E \flat and B \flat basses playing the upper octave.

In France and Belgium basses in $BB\flat$, $B\flat$, C, $E\flat$, and F are used. In other European countries and the United States the first practical sound of the open tube of all basses being considered the key tone of a scale on that sound, the fingering of that scale, no matter upon which note it may be founded is the same for each bass. Thus $E\flat$ is the key tone of the scale for the $E\flat$ bass, as $BB\flat$ is for the contra bass. The fingering of the two scales is alike —



The two instruments being written for at concert pitch their tones coalesce without transposition, altho the fingering differs. The French system which teaches all first open tones as C, reverses our system and thus for each bass a distinct part must be written, so transposed as to make up the difference in pitch, lost by the method of fingering. There is this to be said in favor of the French system, a player on one bass is familiar with the fingering of all basses and may take up one or the other as circumstances require. It is not so with our bass players, as will be seen by reference to the scales above given.

The French system is exemplified in our method of fingering the $B\flat$ Trumpet and $E\flat$ alto. If the first scale of the former were taught as $B\flat$ and of the latter as $E\flat$ the two could play from the same part. As it stands, they must be transposed for in the writing. The opposite may be said of the $B\flat$ and G Trombones. If the latter were taught to consider $B\flat$ as the closed or first position, the two instruments could not play together unless by transposing one part or the other; but a $B\flat$ Trombone player being familiar with the "shifts" on the G Trombone could thus play it at once without special study.



The preceding example which, according to our system might be written, thus, for trombones, euphonium, bassoon, $E\flat$ and $B\flat$ bass, and contra bass sarrusophone, would require according to the French method to be written as follows:—

Tromb. Bassoon
 Basse tuba
 C

Basse B♭
 Contra Basse

Contra Basse
 Sarrusophone } E♭
 Contra Bass }
 (Sarrus.)

CHAPTER VII

DIGITAL AND OTHER FACILITIES OF WIND INSTRUMENTS

Less than a century ago, wind instruments were still constructed along primitive lines. Mechanical key facilities were meagre and crude on reed instruments and flutes, and valves, or pistons, had not come into use. Further, the relation of diameter and form of bore to tone production had not been given serious attention, each maker was a law unto himself, and in consequence, it was rare to find two or more instruments of the same class identical in *timbre*. Key positions on reed, and valve or key arrangement on cup mouthpiece instruments, such as then existed, were so poorly adjusted that the requirements of correct intonation between individual instruments and in general were impossible of fulfillment.

In spite of these disabilities, many of the greatest musical works, still enriching the world of art, were written, and wind instruments employed to color their orchestration. Handel, 1685-1759; Haydn, 1732-1809; Mozart, 1756-1791; and Beethoven, 1770-1829, wrote for the imperfect wind instruments of their days. It is truly wonderful and a tribute to their genius that they succeeded in creating works of such manifold and marvelous beauties with the poor material at their disposal. Bowed string instruments, the backbone of the orchestra, were relied upon for stability of their harmonic creations, and wind instruments, employed for contrast of light and shade, were treated as accessories, most cautiously undertaken, in view of their many imperfections of intonation, as well as crudity and inequality of tone through their several registers.

Midway the period of those activities, the improvement of wind instruments was seriously undertaken by Boehm, 1794-1881, for the flute, and Sax, the elder, 1791-1865, and Sax, the younger, 1814-1895, for reed and cup mouthpiece instruments. In the days when Sax, father and son, took up the work of development of cup mouthpiece instruments there was "no coherence, no unity between the individual members of the group, in one case keys, in another valves, a small compass, an imperfect scale, lack of accurate intonation throughout, bad quality of tone, variations of fingering requiring fresh study in passing from one instrument to another. The key bugle, built on false proportions, offered no prospect of improvement; the mechanism of the valves themselves, by their abrupt angles, deteriorated the quality of tone, and the absence of intermediate instruments caused gaps in the general scale, and at times false combinations." They (the Sax) improved the bore and key mechanism, and acoustically adjusted the key-holes for betterment of intonation on clarionets, and, in their saxophones, introduced an entirely new group of instruments to the world. In this period, Sarrus invented the sarrusophone group of double reed instruments, specifically to reinforce the oboe and bassoon family in the wind-band.

The labors of these men made the wind-band possible, and successive improvements by more recent makers have brought its possibilities to such a height of perfection that it may justly be considered an art factor and worthy the consideration of our greatest writers, as a medium for the expression for their musical thoughts. Clarionets now are almost the equals in technique of violins, violas, violoncellos and string basses, as individuals along mononote lines, while in quality of tone, perfection of intonation, and expressional degrees of dynamic power, they leave little to be desired. They are the backbone of the wind-band and should be employed complete and in manner such as to parallel the string instruments of the orchestra. The new voices found in the saxophone group might be employed to take the clarinet parts as formerly were assigned.

Their tone, while bearing some affinity to the clarinet, is distinctly characteristic, and sufficiently poignant to mark the difference in *timber* in particular between the two groups.

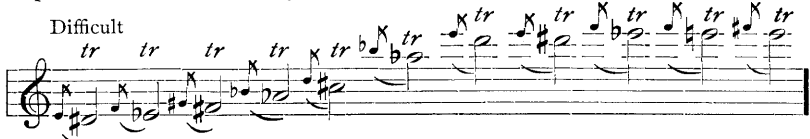
In the matter of combinations of wind instruments, chiefly in relation to the strings, but subordinately with respect to themselves, the great masters excelled, and their works are worthy of devoted study. They teach little, however, to the student of wind-band transcription, which, coming later than their days, is a modern development, new ground, to

be thoroughly explored. Works on orchestration naturally treat of wind instruments from an orchestral point of view, and, therefore, are inadequate, tending to obscure the view of their higher possibilities and utilities. As a matter of fact, those works inculcate the principle of passive obedience to established orchestral usage, subordination to precedent and permit no diversion in their favor. Their usefulness in concrete to fill certain musical functions of a low order is admitted, but recognition of their individual and collective potentialities to form an independent organization on a high place of artistic excellence is not so readily accorded. For those reasons, consideration of the wind-band as an entity, distinct from the orchestra is necessary and desirable. Modern development, under the impetus of prominent and progressive bandmasters, emphasises the necessity for emancipation of the elements entering into the composition of a wind-band, from the bondage of centuries, that it may stand forth in the art world, a great and independent organism, of itself and for itself as a medium for translation and transmission of the higher order of musical ideas.


As a means to that end a good knowledge of instruments, on the part of the transcriber is requisite, for, unless he be so equipped, he will either not write up to their possibilities, or, on the other hand, will introduce impracticable absurdities in his score. To meet the requirement, the following exposition of the technique of individual instruments is made.

FLUTES. This group includes piccolo and flutes given in the Compass Chart. All possess great agility, in scale passages, diatonic or chromatic, chords, arpeggio, and skips of small or great extent, in *legato* or *staccato*. Iteration of notes in twos, threes, fours, etc., is entirely practicable. The flute offers facilities for most rapid execution in all directions, greatly increased in extreme keys since introduction of the Boehm system. Certain trills are difficult and some nearly or quite impossible on the ordinary members of the group, such as:

Difficult



Impossible



Obviously, these should be avoided.

CLARIONETS. E \flat and B \flat clarionets are *legato* rather than *staccato* instruments. In the former style connected scale work and arpeggio can be rendered with great rapidity, with the reservation that wide skips are difficult, and, if too quick, impossible. Staccato is practicable at moderate speed, whether by reiteration of notes at the same pitch, or in ascending or descending scales and chords. For clarionets of ordinary construction, it is advisable to confine selection of keys to normal, one, two, and three sharps, and one, two, three, to four flats. Application of the Boehm system has facilitated execution in more extreme keys, and, as well, made easy, in many instances, certain trills and intervals classed as difficult or impossible on thirteen and fifteen keyed clarionets. [The following should be avoided.

Difficult

tr tr tr tr tr tr tr tr tr tr tr

Impossible

tr tr tr tr tr

The image contains two musical staves. The first staff, labeled 'Difficult', shows a scale starting on G4 and ending on G5. It includes several trills marked 'tr' above notes. The second staff, labeled 'Impossible', shows a similar scale but with trills marked 'tr' above notes that involve larger intervals or specific fingerings that are deemed impossible on certain clarionets.

Trills indicated 1 are easy on the fifteen keyed clarionet, and the one at 2 may be approximated by the long side key on the upper joint operated by the index finger of the right hand. Skips involving the following must be avoided equally with the trills above given:

The image shows a musical staff with a scale from G4 to G5. Asterisks (*) are placed below certain intervals: G4 to B4, A4 to C5, B4 to D5, and C5 to E5. These intervals are identified as prohibited in the text.

The prohibition applies to the employment of the foregoing intervals in rapid passages. It is well to observe they cannot be played *legato* under any condition of speed. Intervals at the asterisk may all be played on the fifteen keyed clarionet, the two first being also practicable on the one with thirteen keys, by system of cross fingering. The E \flat however is of poor quality, but quite permissible in *tremolo*.

On all clarionets the following "throat" notes are weak in tone and give rise to troublesome intervals. They should therefore be employed very sparingly.



E \flat alto and bass clarionets, by reason of their larger size are less flexible than their smaller relatives. The above remarks and prohibitions are otherwise applicable to them. They are the equivalent of the viola and violoncello in the orchestra. The contra bass clarinet, while more agile and flexible and better adapted to flights of notes than the cup mouthpiece bass instrument, is too ponderous for rapid manipulation and its air column too weighty to respond readily to the impact of wind from the player, as do its immediate, but smaller, relatives.

THE OBOE. This instrument is flexible and agile thruout its compass. Scales and intervals can be played with much rapidity, and as its harmonics are those of the open pipe, octaves can be produced with considerable ease. It is essentially a legato instrument, the staccato form of articulation being difficult, even at a moderate degree of speed. The fingering strongly resembles that of the flute, in ordinary as well as Boehm systems. Its compass begins on b \flat as also does that of some modern flutes. The difficult trills are:



and all above.

THE BASSOON is an instrument of great compass range, and from F upwards agile to a degree in legato, but much less so in staccato. It is an open pipe, or octave instrument, and scales, chords, and intervals may be freely written, excepting such as involve difficult fingering, which are few. Its agility ceases with F downward to B \flat . Those notes are somewhat difficult of utterance and, as all the key holes are covered by keys to be controlled by the thumb of the left hand, the passage from one to the other cannot be effected quickly. Connectedly they must not be written for rapid passages. This limitation, in part only, applies when proceeding by skips from those lower notes to the in-

terval of a fifth or more higher. Trills below F are all impossible, and those next given are of great difficulty and should be avoided.



THE CONTRA BASSOON, often referred to as double bassoon, or contra fagotto, is a ponderous instrument, thick of speech. It has not the nimbleness nor compass of the ordinary bassoon, and nothing more difficult than the usual bass part should be written for it.

SAXOPHONES. In the matter of fingering and exceptions, this group is akin to the oboe, in fact players passing from one to the other have little, if anything, to learn in the direction of fingering, so nearly are they alike in that respect. The great difficulty in such a change is the dissimilarity of the mouthpieces, the oboe having a double reed contrivance of small proportions, and the saxophone a single reed stopped mouthpiece similar with that of the clarinet. Of course, in progression downwards thru the group, saxophones become less responsive to demands of agility, until in the contra bass saxophone the limit is reached in massive tones, that, like all large bodies, move slowly. The B \flat soprano is as nimble and flexible as the cornet, the E \flat alto as much so as the E \flat alto saxhorn, the B \flat tenor as the euphonium, the E \flat baritone inclines to slow movement, but is well adapted to rapid bass passages, and the contra is as above stated.

THE SARRUSOPHONE group is double reed, on the open pipe, octave principle, the tube being made of brass and extended conical form. Oboe players can change to sarrusophone without difficulty, the only real difference existing in feel of the latter and the more veiled character of tone. In point of utility sarrusophones are comparable with oboe and bassoon for wind-band work, and the remarks above made as to saxophones as well as the analogies, apply equally to this group.

CUP MOUTHPIECE GROUP } Cornet, E \flat alto saxhorn and B \flat baritone, or althorn, each of which have their notation in the treble clef with compass reading from F \sharp to c''' at nominal pitch, *i. e.*, e to b \flat ' actual. Of the foregoing the E \flat and B \flat cornets are the highest in pitch, and, having tubes of smaller diameter, are essentially soprano melodial instruments. The comparative lightness of tone, and very responsive

valve action fit them for performances of a rapid style of music in legato or staccato, which latter, on notes at the same pitch, by double, triple, or quadruple style of tonguing, quite easy, may be caused to equal tremolo of the violin in celerity of iteration.] Connected scale passages in legato are more effective than those by intervals, especially those exceeding a 3rd; in fact, it is almost impossible to slur intervals of the 5th, 6th, 7th, 8ve, and so on, in quick tempo, altho easy enough in staccato. Notes above g'' involve considerable strain, therefore should not be frequently written, nor long continued, while those from small a, a \flat , g, to f \sharp should be sparingly employed as sustained notes, or in slow movements, because they are much too sharp. Quick passages are, also, more difficult in the lowest register than in the octave above.

By reason of large mouthpieces being employed and increase of weight of their air columns, incident to wider diameter and greater length of tubes, the E \flat alto and B \flat baritone do not offer the same degree of facility for rapid tonguing and execution in general, otherwise what has been said of the cornet applies equally to them.] The annexed scale, in inches (1 $\frac{1}{2}$) shows their pitch in relation one to the other. It shows that the B \flat cornet and baritone, nominally playing the same note, expressed by c'', are really an octave apart, sounding c'' - c', and similarly with E \flat cornet and alto. The four instruments are playing in two octaves, B \flat and E \flat cornets sounding a note at actual pitch of b \flat ' and baritone and alto the octave b \flat .

B \flat CORNET - c'' (8)	
(7)	
(6)	
(5)	(8) E \flat CORNET - g'
(4)	(7)
(3)	(6)
(2)	(5)
B \flat BARITONE - c' (1)	(4)
	(3)
	(2)
	(1) E \flat ALTO - g

On the foregoing instruments trills lower than e' are difficult, impossible, and valueless. They should not be written, and the following must be avoided.



B \flat TENOR (VALVE) TROMBONE AND EUPHONIUM. These instruments are written for in the bass clef, the first named, occasionally

for its higher notes in the tenor clef also. In pitch they are identical with the B \flat baritone, in quality of tone they differ, which arises from modifications in form of tube. It must be borne in mind, the B \flat trombone is practically a tenor trumpet, its tube is of narrow dimensions, $\frac{2}{3}$ cylindrical and $\frac{1}{3}$ conical at the bell end. The calibre of the euphonium is greater than that of the baritone, but similar in form, being $\frac{2}{3}$ conical and $\frac{1}{3}$ cylindrical, the latter at the mouthpiece end. All that is possible for the baritone may be accomplished by the B \flat trombone or euphonium. It should be observed, however, that generally speaking, agility decreases with increase in size of bore; that is, diameter of tube; they are in inverse ratio. Consequently, rapid passages, easy for smaller instruments to play, should not be expected from the larger ones. Much may be learned of how to write judiciously for cup mouthpiece instruments from observation of the flexible possibilities of the ranges of the human voice, which are soprano, contralto, tenor, and bass. Trills, light, aerial, graceful, for soprano would appear clumsy for tenor and more so for bass.

THE BOMBARDON, BB \flat BASS AND G BASS TROMBONE (VALVE) are the largest instruments of the group. They are adapted for slow moving tempi—in other words, rapid successions of notes are ill suited to their genus. Their low notes require deliberation to voice with the rotund sonority characteristic of a firm sub bass. Enormous diameter of tube, and great length of same, with great density of air column, indicate exacting demands on the wind power of players, even in the medium range. In the lower compass the labor to produce sounds of good quality is increased. Long continued sustained sounds must be avoided, and, otherwise, parts must be so written as to allow of ample breathing opportunity. Trills, and other expedients suitable to smaller instruments are here out of place, except for occasional and special effects. The BB \flat Bass is written for in the same position as euphonium but sounds an octave lower.

THE E \flat BASS OR TUBA is more agile than the BB \flat bass and in that respect ranks next to the euphonium. Production of tone is not as fatiguing as on the larger bass; it may, therefore, be employed to play quite rapid bass figures. An E \flat bass with four valves is useful, the fourth valve by combination with others, extending the compass below AA by chromatic intervals down to EE; that is, an octave below the

lowest note by the valves on the ordinary three valve E \flat bass. It is classed as a non-transposing instrument, and plays from the same part as other basses.]

FRENCH HORN AND TRUMPET IN E \flat or F. Besides the keys stated these instruments are employed in many other keys extending thru the octave from B \flat high to B \flat low. Those above named are the most common, and in part, only ones now used in the wind-band. They are always found equipped with pistons. By reason of great length of tube and its narrow diameter they have a wider range of harmonics than other cup mouthpiece instruments, and, above the 7th, a scale of "open" tones (*i. e.*, without valves) may be obtained. In quality of tone the instruments differ, the French horn having conical tube, and the trumpet cylindrical tube almost to the flare of the bell.

To the foregoing are chiefly assigned the task of accompanying other instruments, but may be effectively employed in solos suitable to their special character, as will be shown in a later chapter. Horn parts are usually written in quartette, for 1st and 2nd, 3rd and 4th horns, first and 3rd being given the two higher parts for convenience in writing, and 2nd and 4th the lower parts. Players of the higher parts generally use mouthpieces with smaller cup than do those playing the lower. This practise facilitates production of high and low notes accordingly.

Trills, though possible, with certain exceptions, are seldom, if ever, written for either horn or trumpet.

B \flat TENOR AND G SLIDE TROMBONES. Mechanically, these instruments are the most perfect of all in their intonation. They are constructed so as to admit the use of a lengthening slide, which, from its first, or closed position, may be extended, proceeding by semitones downwards, to an imperfect fifth below, thus involving seven positions in all. The first position on the B \flat trombone is B \flat , on the G trombone it is G; the lowest note of the former being E and the latter C \sharp , enharmonically D \flat . Each position occupied gives rise to a new series of harmonics in the usual order, the first open note sounded being 2, and thence up to the 8th. [The fundamentals, or pedals, of the several series may be obtained, but are never written in scores. Tenor trombones are employed in accompanying parts chiefly, but may be used melodically with great effect, and the G trombone is very useful as bass to its own group — consisting of trumpets and trombones — or to support, color, and strengthen the other basses.]

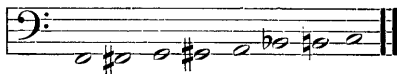
The slur is impracticable, as, also, is the trill (excepting where a player has a piston attachment designed for that purpose) and each should be avoided. Further, rapid movements in scale, or more especially by intervals or skips are extremely difficult in the low register of trombones, octaves excepted, as they involve no change of position. In the medium and high registers, the player being able to select his positions from among those of other harmonic series, passages utterly impracticable below, are easily played at considerable speed.

PERCUSSION INSTRUMENTS. Percussion instruments are classified as (1) those with definable resonance, and (2) those with indefinable resonance; that is, those whose vibrations are periodic and determinate, hence musical, and those whose vibrations are non-periodic, complex, and indeterminate, consequently, noise producers.

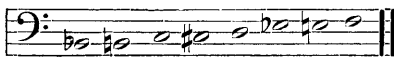
Of the former are tympani, orchestra bells, xylophone, tubaphone, cuckoo. Of the latter are the snare and tenor drums, so called, the bass drum, Indian tom-tom, tambourine, cymbals, gong, triangle, castagnettes, and other traps employed to produce characteristic effects and sounds such as heard in nature, as wind, thunder, rain, and hail, and notes of birds, as well as those common to the experience of daily modern life, as the noises of the railroads, blacksmith's shop, steam boat, and train whistles, clog dancing, footfall of horses, and other noises which, from time to time writers of characteristic music introduce in their works.

TYMPANI, as the name implies, consist of two drums, one larger than the other, each having one sheep skin head only, stretched over a metal resonance chamber by means of a series of screws set on their circumference. The sticks employed to produce the sound are somewhat flexible and have felt heads. Tympani are largely employed in operatic and symphonic orchestras to musically re-inforce rhythms, assist in production of dynamic effects, and others incidental to the composition in which employed. The low drum may be tuned by successive chromatic steps from Great F to B \flat , or even small c; the high drum similarly, from Great B \flat to small f, thus their joint compass is from Great F to small f.

Low drum



High drum



The tympani require to be tuned for each step. Usually the tuning required of drum to drum is that of a perfect 4th or perfect 5th, occasion-

ally other intervals are demanded. In the course of operas, symphonies, tone poems, and other long compositions, demand is made for change of tuning. In such instances sufficient time to make the change is provided by the composer in his composition for that purpose. But as such change of tuning must be effected while the orchestra is still playing, it follows that the tympanist must possess a well developed sense of pitch discrimination. To be able to tune well is the tympanist's most exacting task.

The mechanical efforts of the tympanist are somewhat akin to that of the snare drummer, but rather less varied, in that the demand is chiefly for strokes, rolls, and patterns conforming to the rhythmic structure of phrases. As the resonance following a stroke continues for some little time, it is necessary that the vibration be damped by imposition of the hand upon the drum head immediately after the stroke to check the vibrations, where, as is frequently the case, the stroke is, as it were, isolated, that is, not followed by others in quick succession. Unless this be done, the drum vibrations may cause interference with the succeeding harmonic construction. Wherever such is necessary it would seem advisable that the composer employ the piano damping sign, *, to call attention to the requirement. Of course, where the chord, of which the stroke note is a constituent, continues, the above precaution is not necessary. But at the close of cadences, pedal points, sudden breaks, and termination of compositions it must be observed.

TYMPANI

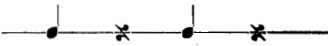
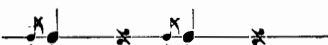
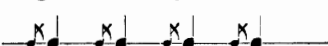










* (damp.)

etc.

etc.

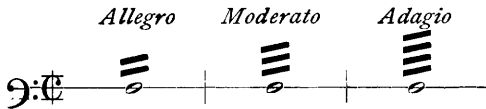
In the first example the tympani should be damped immediately after the stroke, in the second there is no need so to do, as the vibrations of the drums form part of and mingle with the chord.

SNARE DRUM. The snare drum is a purely rhythmic instrument; it is employed for re-inforcements, to emphasize motive, sectional and phrasal patterns, and is of great use in the military band for marching music. The variety of strokes employed, with names of same, are given in the following example.

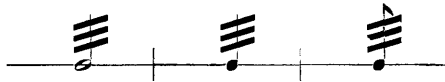
Stroke	
Open flam	
Close flam	
Flam and stroke	
Flam and feint	
Feint and flam	
Open drag	
Single drag	
Double drag	
Ne Ruff, or close drag	
Four stroke Ruff	
Single ratamacue	
Double ratamacue	
Triple ratamacue	

Additional to the foregoing are the single paradiddle, eight even notes in rapid tempo, when the accent is exceptionally strong on the first of each of the four notes, it becomes the stroke paradiddle, with one grace note preceding four, the flam paradiddle, with two notes the drag paradiddle. The stroke and drag paradiddle is a stroke succeeded by a drag and four even notes.

Rolls are named according to the number of strokes included as in the five, six, seven, eight, nine, ten, and eleven stroke rolls. The roll to fill one or more measures may be considered a continuous roll. It is written according to the time signature. In foreign scores the number of short heavy bars employed to designate the roll increase in number as the tempo is decreased. For instance



Rolls on notes of less value than the foregoing are employed, written thus:



The snappy tone of the snare drum results from its shallow depth, number of snares on the "snare" head, and use of hardwood sticks on the "batter" head. Its shallow depth differentiates its tone from that of the tenor drum with deeper shell.

The tone of the snare drum varies considerably accordingly as the head is beaten near the hoop or onwards to its center. When such a difference is required by the transcriber, it is usual to indicate as "near the hoop" or "near the hoop, moving to the center," etc. The snare drum is effective in military music, and has been employed by the masters in works of great artistic value.

BASS DRUM. The bass drum is an instrument of large size. Its shell being covered by stretched parchment discs. It is beaten by a felt headed stick. It is employed for rhythmic demarcations, dynamic re-inforcements, either by strokes or rolls of more or less continuance. To play the roll effectively, a stick having a felt head on either end should be used, the stick being grasped at its center, is caused by movement of the wrist, to deliver a series of rapidly alternating beats on the drum head. Glancing up and down strokes produce a much better tone than does a blow delivered stiffly on the center of the head.

CYMBALS are round discs made of metal composite, either spun or hammered into shape. The latter are preferable, their vibrations being more free and bright than the former. They are, or, rather, should be, clashed together with a sliding up and down stroke, not in manner such as to allow the face of each disc to strike the other in its entirety at one

and the same instant, and there held for even a minute fraction of a second, the effect of which is to damp the sound. The arm movement should be free and the cymbals well separated one from the other immediately following the glancing stroke. If this be properly done, the position of the right and left arm will alternate after each movement, the one being brought to position about level with the face, the other about opposite the abdomen. Cymbals from which the best effect is produced are those of Turkish or Chinese make, the outer edges of their circumference being slightly flared and thinner than those of home make.

Like many other band accessories, their employment is much abused. In concert music they are useful for occasional effect, and not, except in military marches, as is the common custom, to be beaten on every occasion when the bass drum is being played. To avoid such a possibility the transcriber should take the precaution to use the directions "with cymbals" or "without cymbals" to the part for bass drum.

Whenever a gong effect is required one cymbal may be employed for that purpose, a smart blow thereon, near the edge, with a bass drum stick being all that is necessary. But whether clashed together or employed as a gong, care should be taken that the vibrations are immediately checked in instances where they are employed to help reach a climax, which may be followed by a dramatic silence of all instruments of the band.

Because cymbals are instruments of indeterminate resonance, they must not be considered or written for, only, as noisy additions to the band. It is possible to have them played in all degrees of dynamic intensity, and many characteristic effects may be produced by their intelligent employment. Light tapping with a small (unpadded) stick on the edge of a cymbal may be employed with good effect, with, or without, accompanying *piano* strokes on the same drum. This suggestion is one of many that may be employed by the transcriber in his effort to produce musical effects from otherwise unmusical instruments. It is bad musical form and pernicious to attach one cymbal to the bass drum, so that the bass drummer may strike it with the other. The tone of each is thus impaired.

THE TRIANGLE is a slender metal rod bent, as its name implies, to form a triangle. The ends of the rod are free. Sound is produced by stroke of a small metal bar, either by direct blow on the base of the rod or by titulation in the lower angle, thus producing rapid iterations of sound. As the triangle may be made of any size, and its tone is dis-

tinctly musical as a result of operation of the free rod principle, it is suggested that a complete chromatic octave of such rods — not necessarily in triangular form, but straight or otherwise bent for convenience — suspended in a frame would add an attractive effect to the concert band. Their tones differ from the metal bars which form the bells so called, being more silvery and aerial in quality. As at present employed they have, as a rule, no affinity with the tonality of the composition in which they are introduced, the suggestion above made would extend their musical use.

CASTAGNETTES are made of wood and consist of four small plates, two of which were originally attached by connecting loops to a finger and thumb, or to the palm of each hand, and so played. At present they are so contrived for orchestral use that the plates, loosely attached to a transverse bar, which firmly connected with a handle, may be caused to produce almost any rhythmic variation, with much more certainty than was possible in their primitive form. They are employed chiefly in certain forms of dance music having Spanish or Moorish characteristics. Their use, like cayenne pepper, is not recommended for all occasions.

THE TAMBOURINE is of very ancient origin, is in much favor in the countries of Southern Europe, and northern Africa. It is constructed of a hoop, $1\frac{1}{2}$ to 2 inches deep, in which apertures are cut at intervals for the insertion in each of two brass jingles, or more correctly, perhaps, timbales. A parchment head is stretched tightly over the hoop.

The instrument is played by shaking, which causes clattering of the jingles, or by strokes by the knuckles or palm of the hand, or by rubbing the front of the top joint of the thumb across the head. The instrument is useful for exotic effects, and, like the castagnettes, assists in imparting local color to dances, etc., with Spanish or Oriental characteristics.

THE INDIAN TOM-TOM is a small single head drum, without braces, and has a shallow bowl, which, acting as a resonance chamber, gives it a more musical color than possessed by the snare drum. It is beaten by a stick or by the hand according to the effect a transcriber wishes to produce. It is somewhat similar in form to the ancient Hebrew "toph" in connection with which a double knobbed stick was employed, apparently, to enable the player, grasping the stick at its center to produce the effect of a roll. Revival of that practice would enhance the effectiveness of this rather solemn sounding little drum.

There are other kinds of tom-tom, one of which is double headed, two or more feet in length, the shell being quite narrow in diameter. In some, the heads are tightly stretched and immovable, in others they may be tightened or caused to relax by means of cord rove through the hoops and tugs, similarly with the bass drum. In oriental countries this kind of tom-tom is played by beating the tips of the fingers, knuckles, or hands upon their heads.

The tom-tom, whichever its kind, is employed for occasional and characteristic effects only.

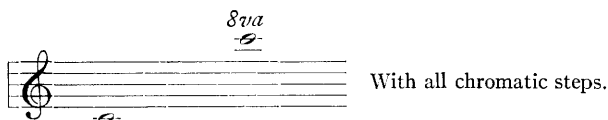
THE XYLOPHONE. This is a distinctly musical instrument, and is equipped with a three octave chromatic scale. It is constructed of a number of wooden bars, graduating as to length, strung on cord for the purpose of adjustment. In each bar are two holes intended to set down on pins in a wooden frame, and thus attain a proper degree of rigidity of all for playing. Recently a set of resonators has been added to the xylophone, the air chamber of each resonator synchronizing in effect with the vibrations of the wooden bar placed above, but not attached to it. The idea is far from being new. Certain primitive tribes of South Africa have long used an instrument, styled "marimba," which is the prototype of our xylophone; its resonators being made of "gourds" while those of civilized mankind are made of metal.

The xylophone is for occasional effects only, in either band or orchestra. It is more satisfactory by itself and for itself. Quite difficult music may be performed on it. The player, using two sticks with padded heads made of hard or soft rubber, for use according to the effect desired, can play scales and chords with great rapidity, perform iterations to resemble the sound of long connected notes, make all divisions and strokes possible on a snare drum, and, besides, play in 3rds, 6ths, or other intervals. Groups of performers on xylophones varying in size have appeared who render standard overtures and other concert music.

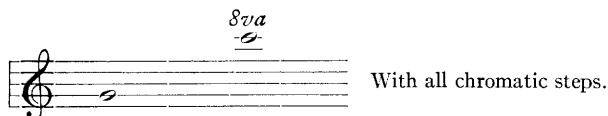
Nevertheless, there is a character of roughness inherent to the instrument, such as to bar it for all time to serious consideration as an organism suitable for artistic purposes. The roughness, referred to, is induced by the all pervading effect of the upper partials or overtones, which cannot be damped or suppressed. Continuance of those vibrations — especially such as result from the lower bars — mingling with others created by bars, brought into use as individuals or conjointly in intervals, results in a degree of complexity so great as to produce an impression of discordancy, just as does a pianoforte being played upon with the loud pedal

held down. Use of soft headed sticks slightly subdues but does not suppress the roughness referred to. This defect affords opportunity for some inventive genius to construct a xylophone damper pedal.

The full scale of a xylophone has the nominal range of three octaves with all chromatic steps, but this statement may be qualified to the extent that the instrument is susceptible of reduction to embrace any number of bars selected from the three octaves. It may thus have a range of one or two octaves, or any addition thereto, arranged to begin upon any given sound.

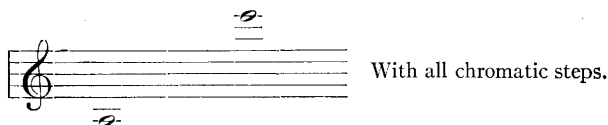


BELLS. The bells, so called, is constructed on a plan similar with the xylophone, except that its bars, or plates, are made of hard steel, and that they have no resonators attached. Further, the sticks have metal heads. The tone is not so coarse as that of the xylophone, but acoustically it suffers from similar objectionable effects, though not in a form quite so pronouncedly rough. The compass is



The notation for both xylophone and bells is an octave lower than the real sound. (The scales given above are those of instruments issued to Army bands by the War Department.)

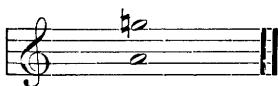
THE TUBAPHONE. This instrument consists of two or more octaves of metal tubes varying in length and diameter, suspended on a frame. The sounds produced resemble bells from those of grave sonority through all scale steps to those of high pitch. Accordingly, as the tubes are struck with sticks having felt, wooden, rubber, or metal heads, the tone varies, proportionately with their power to arouse the upper partials of each tube. The compass, approximately is as follows:



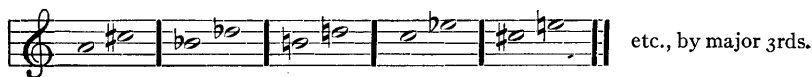
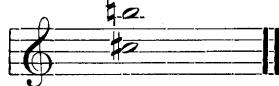
The notation for the TUBAPHONE is at actual pitch.

THE CUCKOO is a wood wind instrument having a rectangular tube, one hole to be closed by the thumb, a whistle head with slit. It acts on the stopped pipe principle. The tube is shortened at will by means of a sliding piston which enables the player to produce any sound within the compass of a minor seventh when the thumb hole is closed. When the thumb is removed from the hole, the pitch is raised a major third, which, again, gives a compass of a minor seventh, but at a major third higher than when the thumb hole is closed. Therefore, the actual compass is that of a major ninth. The result is the well known "cuckoo call." The compass is

Stopped thumb hole



Open thumb hole



Aside from the fact that the snare and bass drum, cymbals, and triangle are indispensable to marches and other ceremonial music of military character, all percussion instruments should be regarded as accessories in the potage. Employed in moderation, they give zest to music, but if over abundantly employed, arouse distaste. It is wise to give heed to that condition, when tempted to overwork the battery, bells, and traps. *Moderata durante* are two words worth while to remember in this connection.

CHAPTER VIII

TRANSPOSITION

This subject is one with which the transcriber must be thoroughly familiar in all its details. For that reason it is here treated more completely than is usual in works on orchestration and much familiar ground gone over for the sake of cohesive presentation of this useful feature in transcription.

Transposition of music means to write or play a composition at a degree of pitch, higher or lower, as required, than that in which it appears. It is purely a mechanical operation, but requires considerable practice to execute with facility.

Need for it arises (1) when a composition is set too high, or too low for a certain voice or instrument; (2) in the process of arranging, (3) also, in band and orchestra when a part written in one key is required to be played in another at a different pitch.

Preliminary requirements, essential to the practice of transposition are complete knowledge of the several scales, chromatic and diatonic, major and minor, as well as the clefs. Also, it is necessary to be conversant with the various intervals, major, minor, augmented, diminished, and perfect; otherwise, the transposer cannot operate intelligently, and in consequence, will be apt to err from time to time.

Scales are *Diatonic* and *Chromatic*. Diatonic scales are those, the steps in which include full tone and semitone intervals and may be *Major* or *Minor*. Chromatic scales are formed entirely of semitone intervals. All scales, diatonic or chromatic, are constructed on the same pattern with respect to occurrence of degrees, full tone or semitone, according to the requirements of the aforesaid divisions. Thus the scales of C major, A minor, and chromatic on C may be taken as models for all others, excepting the variation in minor descending scales noted later on. The semitone interval is indicated by ———.

C major	{	1	2	<u>3</u>	<u>4</u>	5	6	<u>7</u>	<u>8</u>		<u>8</u>	<u>7</u>	6	5	<u>4</u>	<u>3</u>	2	1
		C	D	E	F	G	A	B	C		C	B	A	G	F	E	D	C
A minor	{	1	2	<u>3</u>	4	5	6	<u>7</u>	<u>8</u>		8	7	<u>6</u>	<u>5</u>	4	<u>3</u>	<u>2</u>	1
		A	B	C	D	E	F#	G#	A		A	G	F	E	D	C	B	A

Chromatic scales are written ascending, usually by introducing *sharps*, contradictions (*naturals*) in the flat keys, and occasional *double sharps* in sharp keys where required. The plan is similar in descending. Modifications are, however, frequently met with in practice.

By reference to Ex. 1, it will be seen the semitones occur between the 3rd and 4th and 7th and 8th degrees, ascending and descending. This is the invariable form of all *Major scales*. To maintain that formation it becomes necessary to introduce sharps and flats as the key note upon which the scale is founded requires. In each new flat key the additional flat is placed before the 4th, but in sharp keys the additional sharp precedes the 7th degree. Thus: —

WIND-BAND TRANSCRIPTION

		FLAT KEYS								Number of flats
		1	2	3	4	5	6	7	8	
1.	C major	C	D	E	F	G	A	B	C	None
2.	F major	F	G	A	B \flat	C	D	E	F	One
3.	B \flat major	B \flat	C	D	E \flat	F	G	A	B \flat	Two
4.	E \flat major	E \flat	F	G	A \flat	B \flat	C	D	E \flat	Three
5.	A \flat major	A \flat	B \flat	C	D \flat	E \flat	F	G	A \flat	Four
6.	D \flat major	D \flat	E \flat	F	G \flat	A \flat	B \flat	C	D \flat	Five
7.	G \flat major	G \flat	A \flat	B \flat	C \flat	D \flat	E \flat	F	G \flat	Six
8.	C \flat major	C \flat	D \flat	E \flat	F \flat	G \flat	A \flat	B \flat	C \flat	Seven

		SHARP KEYS								Number of sharps
		1	2	3	4	5	6	7	8	
1.	C major	C	D	E	F	G	A	B	C	None
2.	G major	G	A	B	C	D	E	F \sharp	G	One
3.	D major	D	E	F \sharp	G	A	B	C \sharp	D	Two
4.	A major	A	B	C \sharp	D	E	F \sharp	G \sharp	A	Three
5.	E major	E	F \sharp	G \sharp	A	B	C \sharp	D \sharp	E	Four
6.	B major	B	C \sharp	D \sharp	E	F \sharp	G \sharp	A \sharp	B	Five
7.	F \sharp major	F \sharp	G \sharp	A \sharp	B	C \sharp	D \sharp	E \sharp	F \sharp	Six
8.	C \sharp major	C \sharp	D \sharp	E \sharp	F \sharp	G \sharp	A \sharp	B \sharp	C \sharp	Seven

MINOR SCALES

Each major scale is said to have a *relative minor* scale; related in the fact that both bear the same *key signature*. The *Sixth degree* with flat or sharp necessary thereto, of any major scale furnishes the key note of its relative minor. For instance

C	D	E	F	G	A	B	C
1	2	3	4	5	6	7	8

A is the sixth degree of the foregoing, consequently the key note of its relative minor. The following will show the minor relatives of the major scales above plotted.

Major keys — Flat series	—C	F	B \flat	E \flat	A \flat	D \flat	G \flat	C \flat
Minor keys — Flat series	—A	D	G	C	F	B \flat	E \flat	A \flat
Major keys — Sharp series	—C	G	D	A	E	B	F \sharp	C \sharp
Minor keys — Sharp series	—A	E	B	F \sharp	C \sharp	G \sharp	D \sharp	A \sharp

The form of the ascending minor scale already given varies exceptionally in practice; but in its descending form such variation is common. Sometimes, though most rarely, it is constructed similarly with the ascending, in which case the semitones occur as already given. In two other, and by far the most frequent forms, viz: the "Melodic" and "Harmonic," the difference is marked. In the melodic descending form, the semitones occur between the 6th and 5th, and 3rd and 2nd degrees, thus: — Melodic minor descending —

A G F E D C B A
8 7 6 5 4 3 2 1

In the Harmonic form there occur three semitones and the step of an *augmented second*, thus: — Harmonic minor descending —

A G# F E D C B A
8 7 6 5 4 3 2 1

The augmented second occurs between 7 and 6, and the semitones between 8 and 7, 6 and 5, 3 and 2. The following table will show the differing forms of the melodic and harmonic minor scales descending, as compared with the relative major:—

8 7 6 5 4 3 2 1

C Major

A Minor Melodic

A Minor Harmonic

The form of the ascending minor scale has already been given; its repetition here is not considered necessary. The intervals in the harmonic scale occur in both forms, ascending and descending alike.

INTERVALS

From one sound to the next above, or below, that is, the distance of a semitone apart, may be considered as chromatic or diatonic. When a

sound upon any position of the staff is raised by a sharp, or lowered by a flat, thus differing from one preceding or succeeding it, thus:—

the step is termed *chromatic*.

When a semitone interval involves two positions on the staff, thus:—

the step is termed *diatonic*.

When two notes, the second of which is one degree higher or lower in position than the first, but caused to sound the same by accidental alterations, thus:—

the change is said to be *enharmonic*, which means, literally, very harmonious.

Enharmonic change of entire compositions, or portions thereof, is frequently resorted to for facility in reading. For instance, the keys of E major, four sharps, and F \flat major, eight flats; also, B major, five sharps, and C \flat major, seven flats, though appearing differently to the eye, sound alike to the ear. For that reason arrangers of band music, when compelled by the exigencies of a composition to write the B \flat cornet parts in G \flat , might, instead of writing in F \flat for the bass make an enharmonic change, and write that part in the key of E major.

F# major enharmonically changed to G \flat major.

Intervals are classed as major, minor, perfect, diminished, and augmented.

The term major is applied to 2nds, 3rds, 6ths, and 7ths.

The term minor is applied to 2nds, 3rds, 6ths, and 7ths.

The term perfect is applied to 4ths, 5ths, 8ths, or octaves.

The term diminished is applied to 2nds, 3rds, 6ths, and 7ths.

The term augmented is applied to intervals containing one semitone more than major, or perfect of same name.

Also, it may be added, 4ths and 5ths, *one semitone* less than perfect, are sometimes termed Imperfect instead of diminished.

The above may be grouped under the heads before given. Diatonic and chromatic. Diatonic intervals may be formed in one part or

another of every diatonic scale, without the aid of accidentals. The following is a table of diatonic intervals, counted from C, with the number of semitones in each interval.

Seconds. Thirds. Fourths. Fifths.

Minor. Major. Minor. Major. Perfect. Augmented. Diminished. Perfect.

Semitones 1 2 3 4 5 6 6 6 6 7

Sixths Seventh Octave Ninth

Minor Major Minor Major Perfect Minor Major

Semitones 8 9 10 11 12 13 14

The augmented 4th — from 4th to 7th in the scale as F to B in the scale of C — is sometimes designated Pluperfect 4th; at other times Tritone, as the interval contains three full tones.

Chromatic intervals are so named because they can never be formed without aid of an accidental taken from the chromatic scale. The terms augmented (or superfluous) and diminished are applied to them. The following table shows the formation of such intervals: —

Aug. 2nd Dim. 3rd Dim. 4th Aug. 5th Aug. 6th

Semitones 3 2 4 8 10

Dim. 7th Dim. 8th Aug. 8th Aug. 9th

Semitones 9 11 13 15

Intervals may be *inverted*; that is, the lower may be placed above the higher note, or vice versa. Inversion changes the nature of the interval, 2nds becoming 7ths, 3rds becoming 6ths, and so on. It also changes their character: minor becoming major, major minor, and augmented diminished, and diminished augmented.

Ex.

Minor 3rd Major 6th Aug. 2nd Dim. 7th

An easy rule for finding what an interval will become by inversion is to state the numerical name of the interval and subtract its number

from nine; thus, 2 standing for 2nd, subtracted from 9, leaves 7; the last figure shows that a 2nd inverted becomes a 7th.

Table of inversions —

9	9	9	9	9	9	9
2	3	4	5	6	7	8
7	6	5	4	3	2	1

With this it is necessary to remember what has previously been stated concerning the change of character.

CLEFS.

Understanding of the several clefs is necessary to the student of transposition, for the reason that he may have occasion to transpose from one to the other, from time to time.

There are four clefs in use at present, viz: Soprano or G, Bass or F, Alto or C, Tenor or C. In olden times clefs were not located as rigidly as now. Composers in those days assigned them to any line or space, apparently with little reason, excepting that of personal convenience. It is no uncommon thing to find clefs used in the most capricious manner in old compositions. In modern practice clef positions are uniform, being assigned to the same lines by all composers.

The use of the several clefs is to define the different divisions — low, medium, and high of the Great Staff, and by so doing locate the pitch range of sounds to be used.

The Great Staff consists of eleven lines and ten spaces. The line names counting from the first or lowest line, are G, B, D, F, A, C, E, G, B, D, and F. The spaces are A, C, E, G, B, D, F, A, C, and E.

The first five lines are assigned to the sounds, indicated by the bass clef. The second division for medium sounds is indicated by the tenor and alto clefs, the former beginning with the third line extending thru to the seventh, and the latter from the fourth to the eighth line inclusive.

The third division, for the highest sounds is indicated by the soprano or G clef; begins with the seventh line and extends to the eleventh.

The Great Staff

The diagram illustrates the Great Staff with three clefs: Alto, Treble, and Tenor. The staff consists of 11 lines and 10 spaces. The Alto clef (C) is positioned on the 4th line, the Treble clef (G) is on the 7th line, and the Tenor clef (C) is on the 4th line. The diagram shows the corresponding line and space names for each clef.

<p>Alto</p> <p>8 — G</p> <p>7 — E</p> <p>6 — C</p> <p>5 — A</p> <p>4 — F</p> <p>3 — D</p> <p>2 — B</p> <p>1 — G</p>	<p>Treble</p> <p>11 — F</p> <p>10 — D</p> <p>9 — B</p> <p>8 — G</p> <p>7 — E</p> <p>6 — C</p> <p>5 — A</p> <p>4 — F</p> <p>3 — D</p> <p>2 — B</p> <p>1 — G</p>	<p>Tenor</p> <p>8 — E</p> <p>7 — C</p> <p>6 — A</p> <p>5 — G</p> <p>4 — D</p> <p>3 — B</p> <p>2 — F</p> <p>1 — C</p>
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Bass

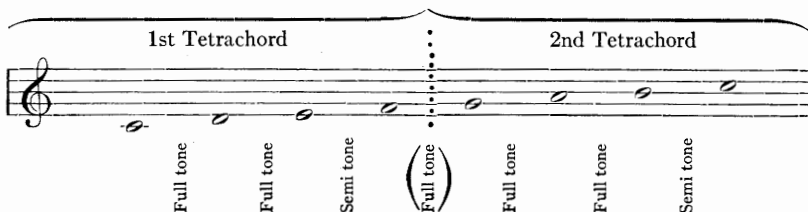
It will be noticed, the central, or sixth line, pitch c' , is common to all clefs; to the bass as a ledger line above, to the treble as a ledger line below their specific divisions; to the tenor as its fourth line, and to the alto as its third. In other words, a note written in any of the positions named would, according to the clef, call for the production of c' in unison.

To show this more clearly, the following is given on the ordinary, or small staff. Each note represents a sound at the same pitch.



Having considered the formation of scales and intervals, it is now time to turn the information thus gained to practical account in transposition.

By examination of the scale of C major, we find it consists of five full tones and two semi-tones, the latter occurring between the 3rd and 4th, and 7th and 8th degrees. Also, the scale may be divided into two parts, (tetrachords) each being of uniform construction, that is, two full tones followed by a semitone.



It will be observed the third full tone of the complete scale lies between, or, it may be said, links the two tetrachords. This pattern is identical in all major scales. Other tetrachords, somewhat similar, but preserving the variations already pointed out — may be constructed for ascending and descending minor scales.

If then, the rigid relation of full tone and semitone degrees must be maintained in scales, written or played at a pitch higher or lower than the normal scale, formed into melodic or other sequence, must be just as faithfully observed (it follows, any variation of notes within the scales) in their relations one to the other, and to the keynote, when transposed into a new tonality. This rule applies, not only to the natural or diatonic notes of the scale, but also to others such as may be chromatically altered for the purpose of melodic or harmonic expression.

The first efforts in transposition should be confined to writing, and, in the earliest attempts, figures should be written over each note, to indicate its relation to the keynote, thus —



Supposing it be required to transpose the foregoing a major third higher. The question arises, which note bears relation of a major third to C? Examining the scale named, we find E is the major third, therefore, that note is to be the new key note. We plot down a scale beginning on E, and, by introduction of sharps requisite to maintain the scale relation, the following is obtained —



Comparing the latter with the model, it will be seen the proper relations have been strictly maintained both in the scale and in the melody derived therefrom. This has been done by introduction of sharps as previously mentioned, four of which were necessary for the purpose. Had the transposition required been that of a minor instead of a major third, the new key would have been E \flat , and the key E \flat major instead of E major, thus:



This transposition demands the introduction of three flats in order to maintain the scale relation of tones and semitones, as found in the model. As each note, the 7th excepted, is, for purpose of transposition, susceptible of two chromatic alterations, it is necessary the student be thoroughly familiar with the names and relations of intervals amongst themselves, and with reference to the key note, since, by misapprehension of the subject, the mistake of a semitone, or more, may occur in writing out the composition. For instance, supposing the transposition required be that of a minor second above from C, the new key note would be D flat major, and the scale arising therefrom require five flats, whereas, transposition to a major second above would call for D major and the scale involve employment of two sharps. Equally, the transposition below C, as from the minor semitone, B, a scale requiring five sharps

results; while if the major tone B flat is to be the new key note, the scale will have two flats only. The importance of an accurate knowledge of intervals becomes apparent from the foregoing, especially if it be remembered that each note of the chromatic scale ascending, as is usual, mainly by sharps, or descending, chiefly thru flats, may in turn be used as a key note from which to construct new scales.

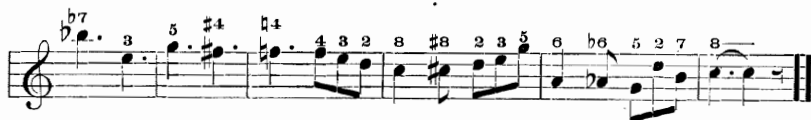
The following table will be found useful to the student.

2nds			3rds			4ths			5ths			6ths			7ths		8ths
Min.	Maj.	Aug.	Min.	Maj.	Aug.	Imp.	Per.	Sharp.	Imp.	Per.	Sharp.	Min.	Maj.	Aug.	Min.	Maj.	Per.
Maj.	Min.	Dim.	Maj.	Min.	Dim.	Flat.	Per.	Imp.	Flat.	Per.	Imp.	Maj.	Min.	Dim.	Maj.	Min.	Per.
7ths			6ths			5ths			4ths			3rds			2nds		Unisons

The intervals in above table expressed in black notes are calculated from C, open note.

When transposing from one key to another, great care must be taken to preserve the relation of notes accidentally raised by a sharp, lowered by a flat, or contradicted by a natural, as in some cases the sharp transposed may require to become a double sharp, or in flat keys a natural, while the flat in certain transpositions becomes a natural, in others a double flat. The force of these conventional signs is relative and not absolute, as "natural sharp," "natural flat," "double sharp," and "double flat" have in many instances power pertaining to the single character only, while the latter two signs in other cases possess double the raising or lowering power of the single sharp or flat.

The following chromatic melody will serve to illustrate the application of the foregoing principles.



The transposition of the above to a major third below gives $A\flat$ as the new key note; the 3rd in this key is C, followed, as in the example, by an interval of a minor 6th, which, in this instance, would be $E\sharp$. The $\sharp 4$ in the 3rd measure becomes natural 4 ($D\sharp$) in the new key and so on.

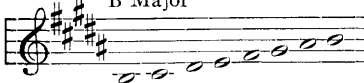
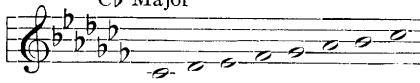
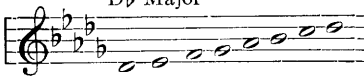
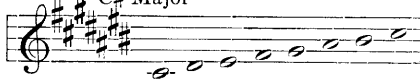
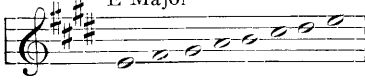
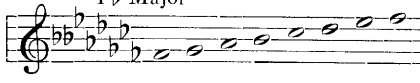
Again, supposing the transposition required be that of a minor 2nd above, the key being that of $D\flat$ major, the interval of a minor 6th in the first measure would be represented in the new key by F, falling to $A\flat$. In the third measure $F\sharp$ would become $G\flat$ similarly in the twelfth, while in the 14th measure, $C\sharp$ transposed would appear as $D\flat$. In the fifth and fifteenth measures the $\flat 6$ would require a $\flat\flat$ in transposition, the $A\flat$ becoming $B\flat\flat$.

Perhaps an example of transposition to an extreme key will better illustrate the points in question than does verbal description. For that purpose the foregoing melody is subjoined, transposed a chromatic semitone higher; that is, to the key of $C\sharp$ major.

Musical notation for the second example, showing the same melody transposed to $C\sharp$ major. The notes are $A\sharp 4$, $B\sharp 4$, $C\sharp 5$, $B\sharp 4$, $A\sharp 4$, $G\sharp 4$, $F\sharp 4$, $E\sharp 4$, $D\sharp 4$, $C\sharp 4$, $B\sharp 3$, $A\sharp 3$, $G\sharp 3$, $F\sharp 3$, $E\sharp 3$, $D\sharp 3$, $C\sharp 3$, $B\sharp 2$, $A\sharp 2$, $G\sharp 2$. Fingerings and accidentals are adjusted for the new key.

In the foregoing, it will be observed that, in each instance where a sharp is accidentally introduced in the original, the new key, a chromatic semitone higher, demands the double sharp, the contradiction of which is sharp natural. Also, where flats are employed in the model, by transposition they become natural. Thus, the force of the previous remarks as to the relative power of the signs of elevation and depression becomes apparent.

When, for convenience in reading, a diatonic transposition from one step on the staff to the next above or below is made, and flats or sharps are used in manner such as to make the music, in both original and new key sound alike, although appearing differently, the transposition is said to be "enharmonic." Composers resort to such changes when their modulations carry them, in a direct line, into extreme keys. Arrangers resort to it, from time to time, when the normal key of a work, already in an advanced key, would make it necessary to write parts for some of the transposing instruments in tonalities introducing double sharps or double flats, and thus obviate the complexity arising from their use. And, lastly, the change is occasionally made to facilitate reading, it being considered by some easier to read in the key of, for instance, D flat, than in that of C sharp, and so on. A few scale examples of enharmonic transpositions will place the matter in a clearer light.

Original	Enharmonic
B Major 	C \flat Major 
D \flat Major 	C \sharp Major 
E Major 	F \flat Major 

If the student play the above examples, he will obtain a clear comprehension of what is meant by enharmonic transposition, or, as it is termed in some theoretical works, "enharmonic mutation."

Another kind of transposition, is that from major or minor, or vice versa. The effect of that transposition is most marked, for, while major keys may be said to express certain phases of daylight, minor can be likened to those of night time only. The one is cheerful and gay, the other gloomy and lugubrious. These characteristics have often been seized upon by composers to effect contrasts in sentiment, while retaining similarity of rhythmic and melodic form. The following, from Haydn's 6th ("Surprise") symphony, familiar to all musicians will illustrate the point.



It will be remembered the movement opens, in the above manner, in a major key, and after thirty-two measures, breaks out *ff* in minor, unison for four measures, following which comes a departure from the original melodic form. Thus:—



Instances of similar treatment might be multiplied. The late Bandmaster Gilmore, caused "Marching through Georgia" to be transposed into minor, and with suitable change of tempo, thus converting its bold martial measures into those of a mournful dirgè, had it played at General Sherman's funeral. In making transposition of that nature, the essential characteristics of the minor mode, with its flat 3rd, sharp 6th, and 7th, as well as its proneness to transform certain intervals from major to minor, minor to diminished, and diminished to augmented, must be borne in mind. The following scales ascending and descending, in both modes, are placed here to refresh the memory of the student.



The student is advised to familiarize himself with both of the foregoing methods by making copious written enharmonic transpositions and changes of melodies from minor to major and major to minor. The exercise will be beneficial to both eye and ear.

Having acquired facility in effecting written transposition, it is now time to turn attention to the more difficult paractice of transposing simultaneously with performance. He who would attain proficiency in this valuable accomplishment must learn to think music. He must have all scale relations, interrelations, signatures, etc., thoroughly within his mental grasp, otherwise he cannot be sure of himself, and his efforts must always be those of hazard instead of certainty.

The surest method of procedure is to begin by slowly transposing some one scale and its derivative chords into others above or below, endeavoring

to form a mental picture of the notes as they should appear in the new key. In the beginning it is advisable to transpose to and from the more simple keys, or those related most closely to the normal key, C major. For instance, the nearest relatives of C major are A minor, G major, F major; the first a minor 3rd below or major 6th above; the second a 5th above or 4th below; the third a 4th above or 5th below. When these have been satisfactorily mastered, the range can be extended to other keys. It is advisable not to effect transposition during study from the same key at all times, otherwise the student will get into a rut, in which case a new starting point would cause him almost as much perplexity as though he had not grappled the subject at all. The following exercises should therefore be utilized as above suggested to nearly related keys; next to those further removed, than a written transposition made of them to other keys, successively, followed by the practical effort as already laid down.



2 Dominant Chord

Tonic Chord

3 Subdominant Chord

4 Relative Minor

5 Exercise introducing above

The application of transposition in practical orchestra and band work is, from time to time, needful, imposing upon the player a requirement,

the labor of which is about equal with that of an interpreter, translating between two persons speaking different languages, with this difference, the interpreter can take time to make his translation, but the musician is compelled to make his transposition at a rate of speed decided for him by others. It is therefore obviously necessary that the student must practice unremittingly until he attains facility in transposition at sight if he desires to become a really valuable member of any first class orchestra. Occasionally, for convenience of singers, or to effect a fit modulation when a cut is made, the entire band or orchestra is required to transpose a whole composition or portion thereof. Very frequently clarinet, cornet, trumpet, and French horn parts have to be transposed at sight by the players. Some players are so expert in the practice that they habitually play all parts on one instrument, making transpositions as they go, and as required by the exigency of the moment. The clarinetist will use the B \flat clarinet only, Cornetist the cornet in B \flat , or French horn player the horn in F, making the transposition from the part designed by the composer for an instrument in some other key. The practice, though evincing great skill on part of the player is not commendable, because the clangtint — tone color — of instruments varies somewhat with length, but more particularly so with difference of diameter, this being especially noticeable amongst clarionets, as any one familiar with those in different keys must have noticed. The most serious objection lies in the fact that occasionally one or more notes will go above or below the compass of the instrument used by the player. When that happens, the player takes such note or notes an octave higher or lower, as the case may be, thus changing its character and disturbing its melodic flow. For instance, following written for clarinet in A, thus:



could not be played on the B \flat clarinet by necessary transposition of a semitone lower, as the passage would run down to D sharp, and thus go beyond the lower compass of that instrument as ordinarily constructed.

The following table indicates the interval of transposition necessary in writing for an orchestra and incidentally serves as a guide for the player who is studying the subject of practical transposition.

Violins

REMARKS

Normal pitch.

Viola

Sound an *8ve* lower than violins.

Cello, bass, bassoon, euphonium, and trombones

The bass sounds an octave lower than the cello, etc.

Flute, piccolo, oboe, C clarinet and horn in C high

The piccolo sounds an *8ve* higher than the flute.

Flute and piccolo in D \flat

(Maj. 7th)

These instruments are sometimes referred to as in E \flat the notes sound *8va* higher than violins above written.

Flute in E \flat , alto clarinet, saxophone, sarrusophone, and clarinet in E \flat

(Maj. 6th)

The flute is sometimes referred to as in F. The notes sound *8va* higher than violins. E \flat saxophone and alto clarinet sound an *8va* lower.

Clarinet, soprano saxophone, sarrusophone, and cornet B \flat .

(Maj. 2nd)

Unison with violins, French horn and trumpet in B \flat may play this part. Bass clarinet written the same sounds an *8va* lower.

Clarinet and cornet in A

(Min. 3rd)

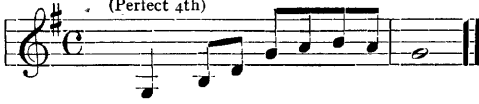
Unison with violins. French horn and trumpet in A may play this part.

Clarinet, trumpet, or French horn in D

(Major 2nd)

Unison with strings.

Clarinet, trumpet, or French horn in F
(Perfect 4th)



The small F clarinet sounds in unison with strings. The large F clarinet, or, as it is termed, "basset horn," sounds an *8va* lower as also do trumpet and horn.

French horn or trumpet in G
(Perfect 4th)



Unison with strings.

The bass clarinet, tenor saxophone, and tenor sarrusophone are usually written for in the G clef, the sounds resulting an octave lower than the notes indicate. The same may be said of the baritone saxophone and baritone sarrusophone.

The table shows the interval of transposition of almost every instrument when compared with the violin standard, and will apply to all other keys. By comparison it shows, also, the necessary transposition between any of the instruments other than the strings. For instance, suppose a B \flat cornet player be required to transpose from a trumpet part in F. By reference to the table, he will perceive the transposition required to be that of a 5th, or the difference counting names of the notes upwards — all inclusive — lying between the name of his own (B \flat) instrument and that of the trumpet or any other instrument in F. Should he choose to play it on the cornet in A, the transposition will be a minor 6th, as will be seen by reference to the table.

The student should transpose the foregoing into all keys, as an exercise in written transposition, and subsequently propose to himself other phrases for similar treatment. Having acquired efficiency in that direction, he should follow it with practical study for sight transposition, and persist in his purpose until he can play and transpose readily any parts that may be handed to him.

In conclusion, the student is advised to keep ever present in his mind the moral to be deduced from the fable of the hare and the tortoise, and, in all he undertakes, imitate the tenacity of the latter rather than the brilliant, but discursive gambols of the former.

READY REFERENCE TRANSPOSITION TABLE

	C	C	D \flat or c \sharp	D	E \flat or d \sharp	E	F	G \flat or f \sharp	G	A \flat or g \sharp	A	B \flat or a \sharp	B
C	Instrument in C as Flute, Oboe and C Clarinet.	C	D \flat or c \sharp	D	E \flat or d \sharp	E	F	G \flat or f \sharp	G	A \flat or g \sharp	A	B \flat or a \sharp	B
D \flat	Instruments in D \flat as Flute and Piccolo.	B	C	D \flat or c \sharp	D	E \flat or d \sharp	E	F	G \flat or f \sharp	G	A \flat or g \sharp	A	B \flat or a \sharp
B \flat	Instruments in B \flat as B \flat Clarinet, Trumpet, Cornet, Flugel-horn, Soprano and Tenor Saxophone and Sar-rusophone.	D	E \flat or d \sharp	E	F	G \flat or f \sharp	G	A \flat or g \sharp	A	B \flat or a \sharp	B	C	D \flat or c \sharp
E \flat	Instruments in E \flat as E \flat Cor-net, Saxophone and Sar-rusophone, French-horn, Alto and Trumpet.	A	B \flat or a \sharp	B	C	D \flat or c \sharp	D	E \flat or d \sharp	E	F	G \flat or f \sharp	G	A \flat or g \sharp
F	Instruments in F as French-horn, Trumpet and Cor anglais.	G	A \flat or g \sharp	A	B \flat or a \sharp	B	C	D \flat or c \sharp	D	E \flat or d \sharp	E	F	G \flat or f \sharp
On trans-posing	Non-transposing instruments, Bass <i>claf</i> , Bassoon, Eupho-nium, Trombone and Bases in all keys.	C	D \flat or c \sharp	D	E \flat or d \sharp	E	F	G \flat or f \sharp	G	A \flat or g \sharp	A	B \flat or a \sharp	B

TRANSPOSITION

CHAPTER IX

TRANSPOSITION OF THE SEVERAL INSTRUMENTS

Preceding chapters have shown the following to be the pitch names of the several instruments of the wind band, viz:

C, represented by Flute, Oboe, Glockenspiel.

D \flat , represented by piccolo and flute, sometimes designated as in E \flat .

E \flat , represented by Flute, E \flat Clarinet, E \flat Alto Clarinet, E \flat Cornet, E \flat Saxophone, E \flat sarrusophone, E \flat horn, alto, trumpet, and E \flat bass.

F, represented by Horn and Trumpet and F (bass) Trombone.

G, represented by Bass Trombone.

B \flat , represented by Clarinet, Trumpet, Cornet, Flugelhorn, Saxophones, Sarrusophones, Bassoon, Baritone, Euphonium, and Bass.

In all, six.

As all bass instruments, those reading in the bass clef, including F and G trombone and E \flat and B \flat basses (as well as members of the double reed bass group) may read from the same part; they may be classed together for purposes of transposition.

Other instruments in E \flat , given above, jointly with those in B \flat , may be classed as high and low; for, while apparently playing the same note, their sounds are an octave apart.

Instruments in C, voice their notes at actual pitch, while flute and piccolo in D \flat , playing nominally the same notes, stand an octave apart.

As the purpose here is to show the relation by interval of one instrument to the other, the B \flat clarinet is taken as the standard, counting from which it becomes apparent that:

C instruments are one degree above;

D \flat instruments are a minor 3rd above (Piccolo in alt.);

E \flat instruments are a perfect 4th above — or 5th below;

F instruments are a perfect 5th above — or 4th below.

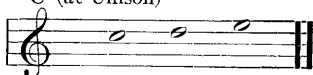
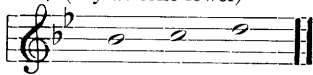
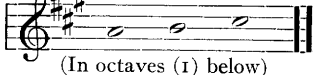
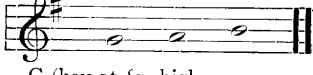
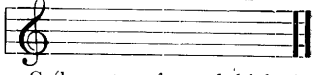
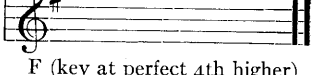
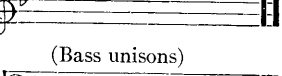
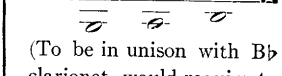
Bass instruments are, of course, understood as playing at actual pitch, and, therefore, grouped together, irrespective of names, stand nominally, at distance of a major second and octave, or, as case may be, octaves below.

To express a unison, according to the showing of the above table, tones of instruments named must be lowered, or raised, inversely, as higher or lower, to make up the difference of interval between them and the standard. From which it appears that, assuming the

NOTATION AND EFFECT CHART



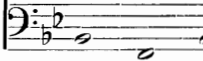
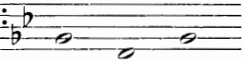
Notation for all instruments named below	Concert pitch of notes written in left column for instruments in key of								PRINCIPLES
	c	d \flat	e \flat	f	g	a	b \flat		
Chromatics									
Flute and Piccolo in C and D \flat is (Piccolo sounds <i>ave</i> higher than the written notes).									mouth hole open pipe principle
Oboe (1) and Cor anglais (2)									Double reed open pipe principle
Clarionets are all written for alike. E \flat Clar. (1) and B \flat Clar. (2).									Single reed
E \flat alto (1) and B \flat bass (2) Clarts.									Stopped pipe principle
Saxophones and Sarrusophones E \flat alto (1) and B \flat Soprano (2) (B \flat tenor <i>ave</i> bassa (2).									Single reed saxophones
Saxophones and Sarrusophones E \flat baritone and contra sarrusophone (1) (latter <i>ave</i> bassa), and B \flat bass sarrusophone (2)									Double reed sarrusophone open pipe principle
Bassoon (1) and Contra-bassoon (2) written for alike at concert pitch.									Double reed open pipe principle
E \flat Altos (1) and B \flat Trumpet, Cornets, and Flugelhorns (2).									Cupped mouth piece principle
E \flat French horns and E \flat trumpets F French horns and F Trumpets.									The lips act as reeds to impart vibration to the air column
All the following are at concert pitch — Euphonium and B \flat Trombones (1) E \flat Bass (3 valves (2)), F Trombone (3) G Trombone (4), B \flat Contra bass (5.)									
Tympani, low drum (1), high drum (2), Bells (3), and Xylophone (4).									Percussion with definable pitch

B \flat clarinet to be playing in C,
 Transposition required for C flute and oboe will be to B \flat ,
 Transposition required for D \flat flute and piccolo will be to A,
 Transposition required for E \flat clarinet and F flute will be to G,
 Transposition required for F trumpet and horn will be to C,
 the higher instruments downwards and the lower ones upwards, thus:

	C (at Unison)
B \flat clarinet, saxophone, sarrusophone, cornet	
C flute and and oboe	B \flat (key at tone lower)
	
E \flat (D \flat) piccolo (1) and flute (2)	A (key at minor 3d lower)
	(In octaves (1) below)
	(G (key at perfect 4th lower)
E \flat clarinet and F (E \flat) flute	
B \flat bass clarinet, tenor saxophone, sarrusophone, and baritone	C (key at <i>5ve</i> higher)
	
E \flat Alto clarinet, saxophone, sarrusophone, horn, trumpet, and E \flat alto	G (key at perfect 5th higher)
	
F Horn and trumpet	F (key at perfect 4th higher)
	
	(Bass unisons)
All instruments reading in bass clef as bassoon, E \flat bass, saxophone, euphonium, and tenor trombone	
	(To be in unison with B \flat clarinet, would require to be raised two octaves for upper notes.)
Contra bass instruments, saxophone, sarrusophone, bassoon, BB \flat bass. The notation is here an octave higher than the real sounds.	

To avoid use of leger lines, contra basses are usually (not always) written for an octave higher than their real sounds.

Reading a wind band 'score,' the harmony may be deduced at a glance by mentally changing the key signature of the $E\flat$ horns and other $E\flat$ instruments reading in the treble clef, to correspond with that of the bass, notes remaining the same as written, excepting that accidentals will change as natural — sharp, flat — natural, sharp — double sharp, and so on, according to chromatic requirements of the key. This plan, practically reduces the parts referred to, to one denomination, the bass clef. For instance: —

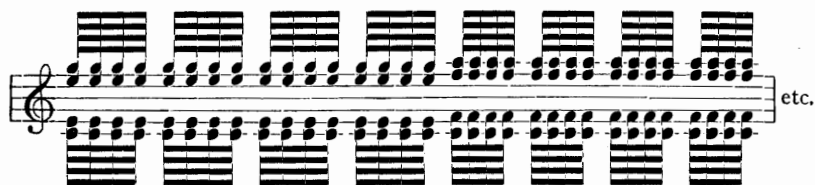
	as written	as suggested
Instruments in $E\flat$ treble,		
“ “ bass		

The mind will naturally take account of the true relative position of the parts. Other parts must be worked out by process of mental transposition.

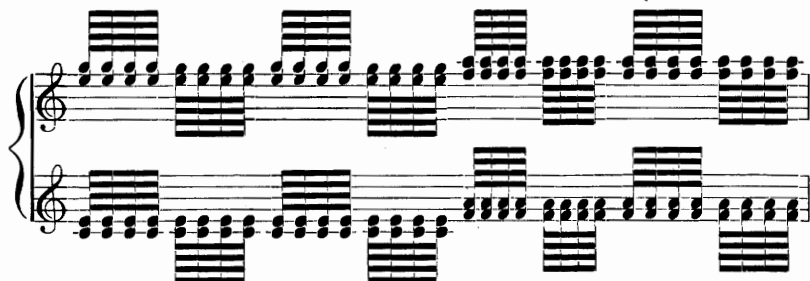
CHAPTER X

TRANSCRIPTION FROM ORCHESTRA, PIANO, ORGAN AND VOCAL SCORES

THE ORCHESTRA. Each instrument has some features of technique peculiar to itself and suited to the facilities for execution it affords the performer. Those characteristic features are, as a rule, easy to play on the instrument in particular, but are found more or less difficult when transcribed for other instruments in general. Thus, the extremely rapid reiteration of single or double notes, or detached tremolo, easy enough on bowed instruments cannot be played as written by the clarinet, unless modified in some manner. Assuming the first and second violins required to play



it would require to be written in some other form, in order that clarionets might approximate its effect. If there were a sufficient number of clarionets to permit of so doing, they might be divided and the parts written



indicating a division into groups one continuing where the other leaves off.

With limited number of clarionets, the tremolo would be approximated by writing 3rd notes, or only 16th notes to fill the measure, according to the degree of speed required. Again, it might be written as a legato tremolo, which, of course, would be easy; supposing the notes not to lie within the range of prohibitions previously pointed out; thus:



or it may even be expressed



Tremolo for lower instruments should be treated in similar manner.

Occasionally a melody is written to be played on one string of violin, viola, or cello, indicated according to the string to be used, Sul G, Sul D, etc. As, owing to different degrees of thickness, each string possesses a shade of timbre peculiar to itself, the formula implies that the composer desires the special quality indicated, and no other, during the continuance of the same. The transcriber must approximate the required quality as

closely as possible, on some wind instrument having the necessary range of compass, or, if he employ two, he must select such as have affinity in tone and range, writing for them in unison.

Pizzicato, plucking the strings, is another feature peculiar to the orchestra; the term is abbreviated 'pizz,' and implies difference of tone character as well as notes of small fractional value, short duration. In transcription, pizzicato passages must be marked *puntato*, or better, being much more explicit, the note appearing in the original, divided and followed by a rest to make up its value.



(1) *Pizzicato* for strings, (2) *puntato* for wind, (3) with rests following notes.

Although *arpeggios* of the ordinary chord type are, generally speaking, easily executed on clarionets, the form peculiar to string instruments described as "crossing the strings," involving skips of wide dimensions, are not so easy, and require modification in transcription. Here are some "First position" arpeggios for violin:

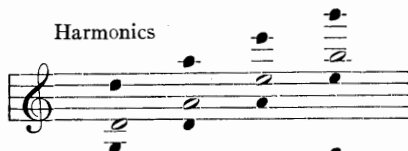


which, in rapid *tempi* would need to be distributed between two clarionets, to secure the effect intended:

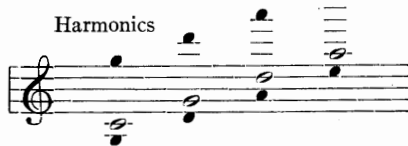


Con Sordino is a direction to play with muted strings. Transcription should render it *ppp* (pianissimo) for reed instruments, and *molto ppp* for brass, thus requiring reduction of dynamic intensity to the minimum.

By lightly touching the fifth, the 8th above the 5th is obtained:



By lightly touching the fourth, the 12th above the 4th is obtained:



In the two last examples the white notes are those touched.

ARTIFICIAL HARMONICS

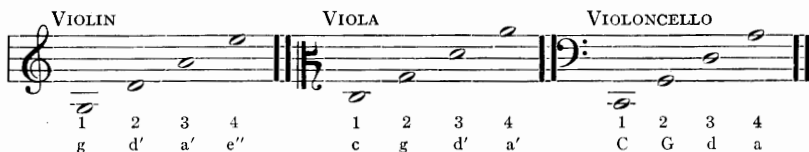
By firm pressure of the 1st finger and lightly touching the fourth above, the 12th of that 4th is produced.



By firm pressure of the 1st finger, and lightly touching the fifth above, the 8th of that 5th is produced:



Harmonics may, also, be produced on viola and violoncello; but it must be remembered, their open strings differ from those of the violin, as:—



Harmonics carry sounds into the high tonal range, and differ in quality from the natural tones. For which reason, the transcriber must so adjust the means at his disposal that both characteristics shall be represented in the new setting. Flute and piccolo are here useful to express the difference in tone and to carry the range upwards, assuming the clarinet to represent the ordinary tones of the violin. The E \flat alto saxophone may be employed to represent the harmonic of the violoncello, assuming the euphonium to parallel the latter; or the oboe, or E \flat a alto sarrusophone, in relation to bass clarinet or baritone saxophone, to carry out similar purpose. The harmonic passages must always be indicated *ppp* in transference, and the accompaniment subdued, because harmonics are, naturally, feeble tones on string instruments.

The pianoforte is characterized by lack of sustaining power, and its wonderful capacity for production of extended scales and arpeggios. To imitate the effect of the former, the composer avails himself of the legato tremolos, as:

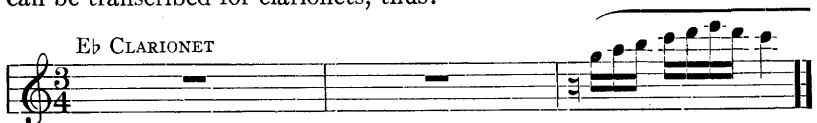


or in some other of the many chord positions possible in right or left hand. This species of writing would be transferred to a wind-band score in plain sustained notes, at an altitude similar with that of the original. If the tremolo be in the upper range, the sustained effect may be transcribed for flutes, clarionets, singly or together, or with oboes mixed in. Should it appear in the middle range, with or without bass below, and with melody above, the sustained notes will be assigned to the middle reeds, horns, or other instruments for which the sounds intended can be written. When the tremolo appears in the lower range, sustained notes may be given to the lower reeds, trombones, or other suitable instruments. It is often advantageous to add, by invention, an independent bass part to the latter.

Extended scales or arpeggios, written for the seven and one-fourth octave pianoforte, may be reproduced by the wind-band as may be seen by reference to the Comparative Compass Chart, by overlapping their registers and thus passing from one to the other, from low to the limit of *altissimo*. In this connection it may be observed that in order to obtain uniformity of tone throughout the scale, it is advisable to unite the medium range of one instrument with the lower range of the next joining in to carry the scale upwards, or, descending, to join the higher range of the next lower instrument to the one that has preceded it. For instance, a scale, (which may also be written chromatically) similar to the following for pianoforte:



can be transcribed for clarionets, thus:

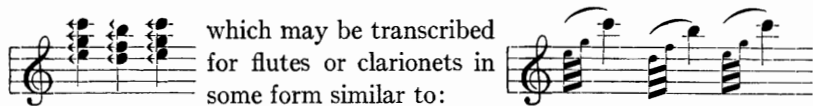


The scale could be extended lower by contra-bass clarinet, contra bassoon, or contra sarrusophone, or higher by flute and piccolo. The example given furnishes an illustration of an unbroken diagonal scale line of uniform *timbre*. Employing the E \flat alto in the lower part of the scale, and flute or piccolo in its highest range, thirds might be added, and, where admissible, even thirds accompanied by sixths.

Arpeggio, or harp like effects, may be reproduced by clarionets in extended range, on the plan above given. An impression may, however, be created by either B \flat or E \flat clarionets, or by use of both. They offer a large compass and are adaptable in high degree to that form of writing. For instance:

Played on the E \flat clarinet the effect would be a fifth higher. Passages of the above character are easy in about six major keys, as E \flat , B \flat , F, C, G, and D, and a similar number of relative minor keys; they are somewhat more difficult in C minor and B minor. These remarks apply to the ordinary fifteen keyed clarinet; the Boehm system affords almost unlimited facilities for arpeggio.

Another form of arpeggio — a kind of chord flight or *gruppetto* of chord intervals, from a lower note to a higher principal or stress note, without interference with the time, is frequent in pianoforte music, thus:



which may be transcribed for flutes or clarinets in some form similar to:

THE ORGAN. To transcribe from an organ score, it is requisite to have some acquaintance with the character of organ "stops."

A "stop" controls many pipes. The pitch of a stop is stated as that of its longest pipe. The acoustic principles are those of the "open" and "stopped" pipe, and those governing the application of the "free" and "striking" reed. The former are named "flue" pipes and the latter "reed" pipes; they vary in form, and may be cylindrical, conical, upright, or inverted, or rectangular, and also in length and diameter. They are divided into Flue stops, Foundation stops, Mutation stops, Compound stops, Manual reed stops, Pedal flue stops — which include Pedal Doubles, Foundation and Mutation — and Pedal reed stops.

A stopped pipe is referred to as of "8 feet tone," an open pipe as of "8 foot length," because a 4 foot stopped pipe will produce a tone (weaker in quality) but of equal pitch with an open pipe of 8 feet length.

A large organ may have five keyboards, four operated upon by the hands and the fifth by the feet. These keyboards control the Great Organ, Swell Organ, Choir Organ, Echo Organ, and Pedal Organ.

Stops on the "manuals" or keyboards and Double Stops of 16 feet; Foundation stops, 8 feet, Mutation stops, 4 feet, 2 feet, also 5 feet 4 inches and 2 feet 8 inches, and Compound stops, not classified as to length. The latter have several small pipes to each note, producing faint upper harmonics or partials, to strengthen and enrich their tones.

Couplers are mechanical contrivances employed for uniting one manual with another. They, too, are controlled by stops, which are drawn, when indicated in a composition, as Swell to Great (Sw. to Gt.), Swell to Choir (Sw. to Ch.), etc. This implied the unison of two or more bodies of tone, a fact to be noted by transcribers.

Again, the score may require use of two manuals, played independently with or without pedals, at one and the same time; variety of quality is there indicated. Combinations of stops with each other must also be observed and imitated as nearly as possible in transcription.

The compass of the keyboards extends from C (nominal) to g in alt, but on an organ with 32 foot pipes, C, though written in that octave, sounds two octaves below as CCC.

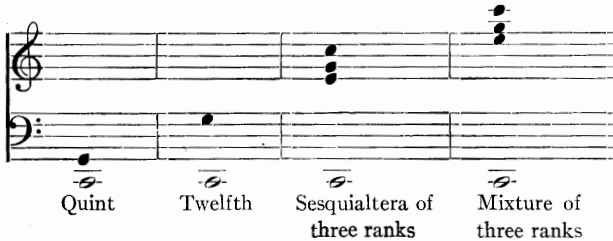
COMPASS — Grave Oct. 32 ft.		CC oct. 16 ft.	C oct. 8 ft.	c oct. 4 ft.	c' oct. 2 ft.	c'' oct. 1 ft. and c to g in alt.
Length Feet or Tone	Name of Stop					
		GREAT ORGAN				
8	Bourdon		Soft and sweet			
8	Open diapason		Rich and strong			
8	Small open diapason		Less so than above			
	Gamba		Reedy			
4	Stopped diapason		Subdued but sweet			
4	Principal		Bright and reedy			
	Flute		Sweet and bright			
	Twelfth		Full tone			
2	Fifteenth		Bright and full			
	Sesquialtera (3 ranks)		Adds fullness to others			
	Mixture (3 ranks)		Adds brightness to others			
8	Trumpet		Full and rich			
4	Clarion		Very bright			
	SWELL ORGAN					
16	Bourdon		Soft and sweet			
8	Open diapason		Full and rich			
	Stopped diapason		Subdued, sweet			
8	Salicional		Reedy, soft			
4	Spitzflöte		Reedy, bright			
4	Dulciana		Reedy, soft			
4	Fifteenth		Bright, full			
2	Flageolet		Fluty, very bright			
	Contra oboe		Soft, rich quality			
16	Oboe		Resembles oboe			
8	Cornopean		Full, rich			
8	Clarion		Very bright			
8	Vox humana		Tremulant quality			
			Character			
			Wind Band Parallel			
			FULL BAND			
			When the indication is Gt. Full, the whole of the resources of the organ are utilized, and so must be those of the band. The great organ alone, Gt. would indicate sonority without employing all instruments. Certain stops on the Great may be coupled to those on another manual, as Diap. Gt. to Sw. This formula calls for the rich diapason of the Great against the softer swell, and is for solo purposes. The trombone, euphonium, or other broadly voiced instrument would correspond to the Diapason.			
			When the Swell organ is indicated the effect produced is a rich, warm, reedy brightness, mixed of flute and reed. The wind band analogue would be flutes, single reeds, double reeds, horns, flugelhorns and lighter brass basses. It affords a contrast in quality and power with the great organ, furnishes a fine accompaniment for a solo stop selected from the great, and is effective in its own mass. As a whole, or in certain combinations, its effects may be reproduced in the band by instruments of above quality.			

8	4 & 8	<p style="text-align: center;">CHOIR ORGAN</p> <p>Geigen Principal Lieblich Gedacht Dulciana Gedacht Vox Angelica Viol d'amore Clarabella Harmonic flute Gems-horn Piccolo harmonique Corno di bassetto Orchestral oboe</p>	<p>Reedy, bright Soft, sweet Soft, reedy Sweet Sweet, soft Thin, delicate Soft, sweet Sweet, rather full Reedy, bright Flute like, very bright Orchestral effect Orchestral effect</p>	<p>The choir organ may be used alone, all its elements combined, or they may be united in smaller groups. It is formed of soft voiced stops. Its parallel in the band would be flute, clarionets, oboes, horns, bassoons, and reed bass. If any brass bass, the euphonium would be ample. It provides excellent accompaniment for solo stop from the Sw., thus indicating employment of its parallel.</p>
16	32	<p style="text-align: center;">PEDAL ORGAN</p> <p>Sub bass Open diapason Bourdon Violone Principal Violincello Flute bass Fifteenth Mixture (5 ranks) Contra fagotto Trombone Posaune Double diapason</p>	<p>Very soft Full, heavy Soft Sweet, soft Full Sweet, soft Sweet, soft Adds brightness Adds brightness Rather soft Heavy, solid Broad tone Very rich, powerful</p>	<p>In the wind band there are basses to correspond with those of the Pedal organ. They should be selected according to the nature of the composition in its several parts, or as a whole. The bass clarinet and contra bass clarinet are excellent substitutes for the Bourdon and sub bass; euphonium and bass trombone for Violone and open diapason; contra fagotto, contra sarrusophone, Eb bass and Bombardon are splendid to reproduce contra fagotto and double diapason.</p>
16	16			
8	8			
8	8			
4	4			
2	2			
8	8			
8	32			
8	8			
32	32			
16	16			
8	8			
8	8			
4	4			
32	32			
16	16			
8	8			
32	32			

TABLE OF ORGAN STOPS

The preceding table furnishes information as to the pipes and stops and provides an approximate wind instrument parallel.

Certain "stops" on the organ control pipes, each note of which is accompanied by feebly voiced overtones, produced from small pipes, for the purpose of increasing their intensity as well as to provide enriching harmonic elements for use in combinations. Of such are the following, the overtones being written in black notes:



The organ is the Emperor of instruments. It possesses majesty, dignity, power, beauty, and subtlety of character in contrasts, such as to produce an effect upon the feelings possible with no other instrument. As a matter of fact it is not one, but a group of instruments of almost infinite possibilities in the performance of music, failing only in the staccato style of execution and in that sympathetic, emotional quality which, in smaller instruments, seems to be inherent to their structure. It is a Wind-Band of great capacity, and many masterly works have been written for it. Its repertoire opens a field to the transcriber for adaptation of works of rare beauty, such as, by their nature, are better fitted for transcription for the wind-band than almost any other class of compositions.

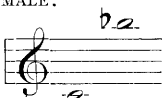
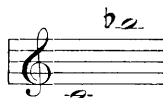



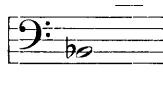
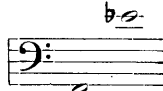
THE VOICE. Transcription of compositions, intended primarily for voices, may be effectively rendered for the wind-band. Works of that character are hymn-tunes and chorals in their simple form; solos, duets, trios, quartets, sextets, and choruses, single or double, from grand operas, oratorios, cantatas, etc.; they are found accompanied by the pianoforte, organ, or orchestra, by independent parts, or mere duplication of parts, or, at times, are unaccompanied.

A general view of the compass and divisions of voices will assist the transcriber in making a selection of instruments for reproduction, but it may be observed, — and, indeed, emphasized — once the assignment is made, there should be no deviation and nothing more nor less than what appears for the voices should be introduced in parts intended

for their instrumental analogues. The copy must be as pure as the original, and the adaptation, less the difference of timbre, must maintain the spirit and intent desired by the composer.

Voices are male or female; the latter including soprano, mezzo soprano and contralto. The male division may be 1st tenor (sometimes designated alto) 2nd tenor, 1st bass, or baritone, and 2nd bass. They vary in range of compass and also in characteristic *timbre*, as a result of physical differences in form of the vocal cords and larynx of individual vocalists. That diversity must be considered by the transcriber when assigning instruments to represent the several vocal divisions.

For choruses, the compass of voices is as follows:

FEMALE:		MALE:		
1st Soprano		Sounding an Octave Lower:	1st Tenor or Alto:	
2nd Soprano Mezzo "			2nd Tenor	
Contralto			Baritone or 1st Bass	
			Bass or 2nd Bass	

Solo voices exceed the above limits, some high sopranos continuing the scale upwards from $b\flat''$ to d''' and even f''' , and bass singers are found who can carry the compass downwards from F to D or C.

Consideration of the foregoing divisions makes it apparent that family groups of clarionets, saxophones, or brass cup mouthpiece instruments, may be utilized to represent the voices of the chorus, (which may be taken to include the quartet, etc.). Solo parts may be assigned to any instrument having sufficient compass and character to create a parallel.

Orchestral accompaniments should be transcribed with fidelity as to balance and with forethought as to contrast requisite to permit the transferred vocal parts to appear distinct from others of the band.

In conclusion, great care must be observed in transcribing compositions of contrapuntal and fugal treatment, to maintain the intervals

between the parts with most rigid accuracy. Disregard of this requirement is ruinous, and displays ignorance on part of a transcriber.

Another point of importance is selection of the key scheme. Not infrequently it becomes necessary to transpose entire compositions, with a view to accomodating them to the compass limitations or to render them more playable by the several instruments for which they are to be transcribed. It must be well considered in advance, to avoid the probability of breaking the flow of melody by having to drop an octave, or being compelled to pass it over to some other instrument at certain points, and there changing its *timbre*.

CHAPTER XI

PITCH LEVEL AND BALANCE OF ELEMENTS

Reference to the Comparative Compass Chart will show the pitch levels of the instruments of a wind band in their individual relations one to the other. The present purpose is to group those pitch levels in the order corresponding, in some measure, with the vocal divisions of (1) high soprano, (2) soprano, (3) mezzo soprano, (4) contralto (with its freer vibrations of its lower scale as against the (5) alto (with tense vibrations required to meet in unison with the lower contralto), (6) tenor, (7) baritone and (8) bass. The four first named are female, and the second four male voices. Broadly, their counterparts are (1) flutes and reed, (2) cup mouthpiece instruments, subject to certain modifications as will appear below.

The distinction between contralto and alto, above intimated, may be thus explained, contralto as the medium and low sounds of a high vibrational range, and alto, as the high and medium sounds of a low vibrational range. Efforts for production of unisonal sounds are inverse, small for contralto and more or less great for alto. Difference in vibration and effort result in variety of *timbre*, even among instruments of the same type, as for instance in the following unisons:—

The same pitch		The same pitch	
			
B \flat Cornet	Baritone	E \flat Cornet	E \flat Alto

Thus, it is obvious that while the wind-band has two sets of instruments equal to producing the inner range of sounds, they are in opposition as to effort and effect, the difference observable being that subsisting between contralto (female) and alto (male) voices.

Hence, mixed choruses, quartets, etc., should be transcribed with a contralto parallel and male choruses, etc., with alto equivalent. Where, however, a quality of firmness and vigor needs to be imparted to that range, unisons of the two will be found very effective.

From comparisons with the vocal divisions above given, the following instrumental classification may be made:

- HIGH SOPRANO**— Piccolo, flutes, soprano clarionets in their high compass.
- SOPRANO**— Clarionets from c upwards thru their clarion register.
- MEZZO SOPRANO**— Oboe, soprano saxophone and sarrusophone, cornets, sax sopranos, flugelhorn, and B \flat trumpets.
- CONTRALTOS**— Soprano clarionets in chalumeau and low to middle tones of cornets, sax sopranos, flugelhorn and B \flat trumpets.
- ALTO**— E \flat alto clarionet, B \flat bass clarionet, E \flat alto saxophone and B \flat baritone saxophone and sarrusophone, bassoon, E \flat alto, and French horns in E \flat or F, B \flat baritone, B \flat trombones and euphonium, each in its upper range.
- TENOR**— B \flat tenor trombones, baritone and euphonium, bassoon and others of the double reed type, as well as bass clarionet, and other corresponding single reed instruments, each in its medium range.
- BARITONE**— B \flat euphonium, B \flat baritone, trombones, and reed instruments mentioned in the preceding paragraph, in middle and medium ranges.
- BASS**— All low range bass instruments including reed and those with cup mouthpiece, as those above mentioned, and G \flat trombone, E \flat bass, BB \flat bass or bombardon, contra clarionet, fagotto and sarrusophone, each from its lowest range upward.

The foregoing classification, designed to show where the several instruments may move with unisonal effect, does not take the individual

tone quality into consideration. They are grouped in masses of composite tone, brought about by fusion of those individual qualities, and, as such, useful for requirements of broad treatment, as well as indicating the ranges and individuals suitable for employment in other and varied connections. It may here be pointed out, that the great difference of calibre of tubing, causes an equal differentiation of tone quality among wind instruments in their several groups, as well as in the relation of one group with another. That variability makes it apparent that instruments fitted for alto, tenor, or bass in its own group, would, by consequent lightness or heaviness of tone, be ill suited to fill a similar position in some other. They, by incongruity of association, would disturb the balance and of course, ruin the effect of any transcription of sectional passages, or concerted compositions wherein they were thus injudiciously employed.

From the preceding it is possible to pass to consideration of the balance of elements. Reference to Chapter V and the accompanying chart of Relative Dynamic Tone values will refresh the memory on the subject of intensity and absorptive powers of individual instruments. The practical bearing of that subject at the present moment, on transcription, is illustrated by treatment of the following quartet, being an excerpt from "Oh Power Benign," Massaniello, by Auber:

The musical score consists of three staves. The top staff is labeled 'Treble' and contains a single melodic line in E-flat major, 4/4 time. The middle staff is labeled 'Tenor' and 'Sva' (Soprano voice), and contains a piano accompaniment marked with a 'p' (piano) dynamic. The bottom staff is labeled 'Bass' and contains a piano accompaniment also marked with a 'p' (piano) dynamic. The score concludes with a double bar line and the word 'etc.' written above the Treble staff.

The arrangement is for treble, two tenors, and bass. Were it transcribed for cornet, two clarionets and euphonium, the inner parts would be too weak. Supposing it to be arranged for clarionet, two cornets, and bass trombone, the clarionet would lack the power necessary to balance the other parts. There are other settings possible, each equally faulty. But if the quartet were transcribed for cornet, two trombones, and G bass trombone, or cornet, E \flat alto, B \flat baritone, and euphonium, the balance would be good and the effect about parallel with the open dia-

passons of the organ. Again, were it transcribed for 1st and 2nd B \flat clarionets, E \flat alto clarinet, and bass clarinet, though in this instance the 2nd clarinet would impart somewhat of a contralto effect, the result would be good. It might also be written for B \flat soprano, E \flat alto, B \flat tenor, and E \flat baritone saxophones with good results. For richness and variety an arrangement for oboe, 2 French horns, and bassoon would be excellent. The three arrangements just given are comparable with the "swell" organ, especially the latter, which is here rendered.

etc.

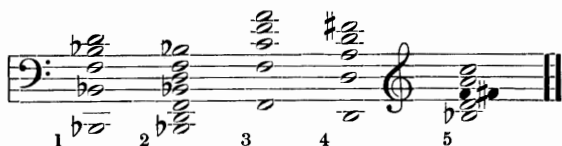
To illustrate the balance of elements the chord of B \flat concert is taken. As a rule, it may be accepted that the nearer the distribution of a chord conforms with the sequence of the consonant sounds of the harmonic scale, the better it will be. The masters observed the sequence, and their arrangements of full chords are invariably patterned upon it.

In B \flat the chord would appear thus:
The section of the chord in treble clef
being placed above the bass.

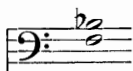
It will be seen that the notes given in the bass clef, covering two octaves, are the intervals of an octave, fifth, and fourth, and that the first appearance of the third follows the second octave. This openness of position in the lowest parts is nature's own teaching and philosophically exact. It permits the lowest and most sonorous elements of the chord to vibrate clearly and harmoniously in ratio so simple that the ear can at once grasp and measure their relations and find pleasure in receiving them. Were the chord set out in the bass above filled in between the notes of the first and second octaves it would be found turbid, heavy, and almost intolerable to the ear, the cause of which may be ascribed to the fact that when notes reach such depths, even when sounded in conjunction with others, they set up their own

series of overtones, and thus create, (in an instance such as suggested), a feeling amounting to the effect, almost, of an absolute dissonance.

An example carried to the fifth harmonic will illustrate the foregoing:



1 is the true position; 2 the turbid mass referred to; 3 and 4 are the natural harmonics arising from F and D, and 5 the approximate effect upon the ear. Notes from the 'roots' shown in 1 and 3 are often combined in the practice of harmony; but never will the fifth on root 1 be found sounding in conjunction with the sharp third on root 4, and in the same octave. Incidentally, it may be observed, and for somewhat similar reasons, when the second inversion of a chord is in the bass, the octave of the root should not appear as the next note above it, as:


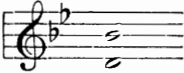
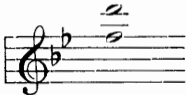
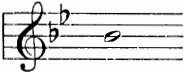
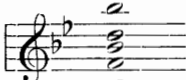
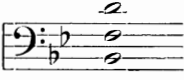
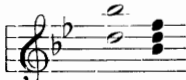
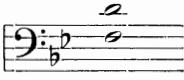
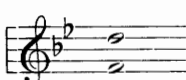
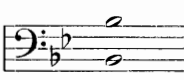
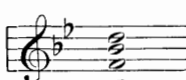
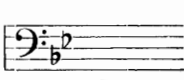


The result would not be good.

This seeming digression is considered necessary to show why the effect of a close chord may not be good in all positions in the tonal range, and, it is hoped, may help to check the tendency common with immature writers, of confusing their arrangements by carrying their full harmonies too low.

A chord may appear in many positions by inversion of its bass, or of its upper constituents, but no matter which the position, its balance, when transmuted into palpable vibrations by the alchemy of instrumental practice, must be constant, whether the whole or only a portion of the band produce it. The notes of a common chord, or triad should be equi-resonant with nature's chord; any dissonant note added, may be given less weight of tone, as its condition of dissonance impresses the ear, although the instrument sounding it may be feeble.

In the following no transposition is made, the notes are at concert pitch, B \flat as the standard, and the names of instruments to which they may be assigned, in the effort to establish a balance of elements are set opposite.

Flute Piccolo		Trumpets	
E♭ clarinet		Baritone	
B♭ clarinets 1, 2 and 3 E♭ alto and bass		Tenor trombones and bass trom- bone	
Oboes, saxophones, and sarrusophones in order, sop., alto, bar., and bass		Bassoons	
Cornet, etc., 1 and 2 of each		Euphonium and E♭ bass	
E♭ alto and French horn		Bombardon and contrabass reeds	

This arrangement shows the balance of elements to be as follows:

THE OCTAVES—Flute, piccolo, B♭ and bass clarinets, oboes, saxophones, sarrusophones, alto and French horn, trumpet, baritone, bass trombone, euphonium, E♭ bass, and contra basses.

THE THIRDS—E♭ clarinet, B♭ clarinet, oboe, saxophone, sarrusophone, cornet, horns, trumpet, trombone, bassoon

THE FIFTHS—E♭ clarinet, E♭ alto clarinet, saxophone, sarrusophone, cornet, horn, bassoon, and tenor trombone.

This balance will be found generally effective for a chord in its full position, traversing the five octaves of the compass of the wind band. Modifications are possible, and, it may be said, inevitable, arising as they will, from conditions contingent upon progressions of melody and harmony; but, as both are constantly referring to or leaning upon the fundamental position of the key chord, the above may answer as a point of departure and haven of return. In the exposition the key note is strongly voiced, next the third, and lastly the fifth, this being in the order of their importance in establishing the key identity of a chord and whether it be major or minor.

CHAPTER XII

CHARACTER OF TONE

Success in transcription depends largely upon the point of view from which a transcriber regards the materials — composition and instruments — with which he deals. If he be possessed of imaginative temperament, he will picture for himself the emotional characteristics, tendencies, sensations, descriptive qualities, and picturesque elements he assumes the composition to contain and endeavor to emphasize and enhance their values by the adjustment and adaption of instrumental tone color, appropriate to heighten the effects which he conceives to be intended by the composer. If he approach his work in a purely practical frame of mind, the result will prove mechanical and as distinctively lifeless or uninspired, as is the rendition by a barrel organ, or street piano. From which it will be apparent that cultivation of the imaginative faculty is an essential of the transcriber's education. Now, while it is true that imagination cannot, like a pair of spectacles, be made to order, it is equally true that the faculty may be developed from a latent germ, by rightly directed effort. For that reason the following statements collated from the views of well known authors are made, wherein are shown their ideas of (1) the relations subsisting between dynamic intensity and pitch of musical sounds in relation to state of mind, (2) characteristic descriptions of the several instruments of the wind-band, and (3) the analogy of their tones with colors.

STATES OF MIND. Blaserna, the Italian scientist, ("Theory of Sound in Relation to Music") remarks, "Music proceeds by notes clearly separated from one another. It seems that it is in its movement by interval and by rhythmic steps, as also by different shades of *p*, *f*, *cres.*, *dim.*, *accel.*, *rall.*, *legato*, *stacc.*, which constitute musical accent that the secret of the great impression which music makes upon the human heart resides. Varied means of completely adapting itself to the psychological movements which constitute any given state of mind. Music does not express determinate sentiment. It is applicable to certain states of mind from which a special sentiment may arise." Blaserna, further, makes the sound statement that "The laws of *timbre* are the basis of the theory of instrumentation and, also, embrace the whole of harmony."

In "The Origin and Function of Music" Herbert Spencer points out cause and shows the effect. The views here expressed are not always in the exact words of that celebrated writer, but, where not, they are deduced by inference from the context.

LOUDNESS. "Low soft sounds are the habitual results of strong feelings. A fit of passion calls forth a howl. When voices in an adjoining room become unusually audible, we infer anger, surprise, joy. Loud applause signifies great approbation."

QUALITIES. "Voices in ordinary conversation have little resonance. Under rising ill temper, sound acquires a metallic ring. Ringing laughter implies a joyous temperament. Grief is expressed by tones approaching *timbre* of chanting."

PITCH. "Calmness or indifference will use the medium tones, but during excitement tones will be either above or below them, will rise higher and higher or fall lower and lower according to strength of feeling. Anger expresses itself in high tones, or else in curses not loud but deep. Deep tones, too, are always used in uttering strong reproaches. Groans of disapprobation, horror, remorse, and extreme joy and fear alike are accompanied by shrill outcries."

INTERVALS. "Calm speech is comparatively monotonous. Emotion causes the use of 5ths and 8ths, and even wider intervals."

VARIABILITY OF PITCH. "On meeting of friends, voices will be heard to undergo changes of pitch not only greater, but much more numerous than usual. Children furnish instances of variability."

Again, Spencer remarks: "Music has the indirect effect of developing the language of the emotions." "That the cultivation of music has no effect on the mind few will be absurd enough to contend. And if it has an effect, what more natural effect is there than this developing of our perception of the meaning of inflections, qualities and modulations of the voice; and giving correspondingly increased power of using them?"

Composers of ability, perhaps unconsciously, have ever been influenced by the relation of sounds in their variety of utterance, to states of mind. From the moment that the aesthetic and emotional qualities obtained precedence over mechanical, polyphonic forms, the tendency has been to illustrate those qualities by tone painting. How nearly composers have approached the lines of philosophic truths, as deduced by Spencer, may be learned from examination of operatic, symphonic, and other scores. Tone poems, so called, are expressions of those truths in artistic forms.

The emotional force of musical tones corresponding to states of mind, must, therefore, be regarded as an element of transcription indicating the selection of the mediums to express their varying qualities as influenced by mental and correlative neurotic conditions.

In the parallel columns on pages 94-96, are given the views of several writers on orchestration, as to the special qualities of wind instruments. The writers represent the four nationalities, French, German, English and American, and their opinions are worthy of serious consideration, with the view to applicability in practise.

They furnish illustrations, in concrete form, of the imaginative process in operation, as the authors thought and wrote, and in conjunction with the other views bearing upon this subject, are certainly valuable guides, in the effort to associate instrumental tones with musical ideas in harmony one with the other. Further, they are of use to stimulate the imagination to seek other qualities than those expressed, and, by comparison of the descriptions of instruments, one with another, indicate their blending possibilities.

Parallels are constantly drawn between music and colors as pigments, and analogies instituted between orchestrations and pictures. Architecture is also used for comparison, and has been referred to as "frozen music." The terms employed to designate the assumed connection are "Tone color," "Clang-tint," "Timbre," or "Klang-farbe."

To illustrate the prevalence of the idea that some kind of physical analogy lies between music and color the following quotations are made, viz:

"The orchestration of a piece of music is like the painting of a picture; the combination of the instruments like the mixing of colors according to the tint we wish to obtain. Moreover, there is light and shadow." — *Rubinstein*.

"Presentation of musical effects by arranging the quality of tone used and by blending together different tone qualities, is called tone coloring, because the effects depend upon modified forms of vibration. Colors change at the rates at which light vibrations impinge upon the retina, any change in the rate being appreciated as a change in time or color." — *Hanchette*.

Identical physical causes produce similar effects in music.

"Separately, the instruments are like the paints on a palette, and the result of the composer's effort, like that of the painter's, depends upon what he has to express and his knowledge of how to use his materials in trying to express it." — *Gustave Kobbe*.

“Variety is produced by mixing tints. For example, a passage played by a flute alone changes color when an oboe sings in unison with the flute. Another tint results when a clarinet is added.” — *Henderson*.

“What his box of colors is to the painter, that the instruments of the orchestra are to the musician, and every great composer, like every great painter, has his own peculiar style of coloring.” — *Proul*.

Referring to tones themselves, a writer in the *Encyclopedia Britannica* remarks:—

“As light comprises all the colors of every gradation between each color and the next, but yet seems spotless, so every musical sound comprises all other sounds, but yet seems to be one musical note, the blue or the red, or the yellow or any other ray is separated from its prismatic brotherhood and seems then a complete and independent object to the vision, and so any sound is separated from the harmonic column and then seems all in all to the sense of hearing.”

The foregoing quotations and many other of similar tenor, which may be brought together, illustrate the idea obtaining among very many musicians that music and color are correlated in their individual characteristics and powers of blending to produce composite results, and corresponding effects upon the organs of hearing and perception. Instrumental tone colors may be isolated, or they may be mixed one with the other just as may be done with paints, but it must be remembered that, if we are to maintain the analogy between them, there is a law that two complementary colors placed side by side increase each other in intensity, which, similarly, should govern the use of instruments used as complementary tones in juxtaposition. In consequence, any scheme which purports to assign a specific color as the parallel of a certain instrument, should lend itself to a form of treatment similar with that pursued by an artist. Further, the assumed colors of instruments in such a scheme, should permit of intermixture, or blending to produce results analogous with those obtained by mixing two or more colors.

Lavignac in his “*Music and Musicians*” gives such a scheme, from which the following, relative to wind instruments, is selected:—

Oboe—Green, rather crude tint. Bassoon—Dark brown, not a clear color. Clarinet — 1st register brown, 2nd vandyke red, 3rd garnet. Flute — blue, fine blue pure and luminous as the azure sky. French horn — yellow, brilliant coppery yellow. Trumpet — crimson, with horn orange. Cornet — very ordinary red, ox blood or lees of wine.

	Berlioz	Jadassohn	Prout	Elson
Oboe	Candor, artless grace or the grief of a fragile being, a certain degree of agitation is also within its powers of expression.	Youthful cheerfulness, bright simplicity, playful roguishness of the innocent coquette. Also pastoral.	Melancholy, tenderness, gaiety.	Grief and pathos, artless innocence, rustic gaiety.
Bassoon	Its sonorousness is not very great and its qualities of tone absolutely devoid of brilliancy or nobleness; has a tendency towards the grotesque.	Low register broad, middle dull, feeble and obscured, highest tones thin, strained and anxious.	Middle register, cold, cadaverous. Low register, grotesque.	Earnest and sombre. Low register, grotesquely comical.
Contra Bassoon	This very ponderous instrument is only suitable for grand effects of harmony. It is very valuable for large wind instrument bands.		Magnificent instrument.	Deep, impressive, organ-like.
Clarinet	The clarinet is little appropriate to the <i>Idyl</i> ; it is an epic instrument like the horn trumpet and trombone. Its voice is that of heroic love. This beautiful soprano instrument, so ringing, so rich in penetrating accents when employed in masses — gains as a solo instrument in delicacy, evanescent shadowing, and mysterious tenderness what it loses in powerful brilliancy. A very beautiful instrument.	First register gloomy, second particular charm, third equal delicacy and great strength, fourth brilliant, harsh shrill.	Capable of most range of expression.	Eloquent and tender. Low register spectral.
Alto Clarinet				
Bass Clarinet	This instrument may borrow that wild quality of tone which distinguishes the bass notes of the ordinary clarinet,	Serious. Added to the middle tones of the bassoon, it greatly enhances fullness and stability, producing a nobler tone.	Richer and mellower than the clarinet. Rich and effective.	Sombre.

<p>Flute</p>	<p>or that calm, solemn, sacro-dotal accent belonging to certain registers of the organ.</p> <p>The flute is well nigh devoid of expression, which may be used anywhere and everywhere. Accent of desolation but of humility. Gives a softened shade of a dark coloring to cor-anglaises and clarionet.</p>	<p>Low register rather hollow and feeble, portraying mystery, anxiety and gloom. Upper register, mild, delightful, bright.</p>	<p>Lower octave sweet. Upper penetrating.</p>	<p>Gentle, melancholy. High, brilliant.</p>
<p>Piccolo</p>	<p>Excellent for violent tearing effects; in a storm, or in a fierce or infernal character. United to the stroke of the cymbal, it cuts and rends like the stab of a poignard.</p>	<p>Low notes shrill and penetrating in F, gloomy in P. Higher notes wild joy, fendish laugh of scorn.</p>	<p>Vulgar if injudiciously treated.</p>	<p>Wild frenzied gaiety. Used in infernal effects.</p>
<p>French horn</p>	<p>Is a noble and melancholy instrument; the expression of its quality of tone and of its sonoroussness, are nevertheless not those which fit it for figuring in any kind of a piece.</p>	<p>Resonant, sweet, joyful, or may express melancholy, grief, and pity of distress.</p>	<p>Noble, rather melancholy, dreamy.</p>	<p>Romantic as in forest scenes or hunting calls, evil and repulsive when its tones are muted.</p>
<p>Trumpet</p>	<p>The quality of tone is noble and brilliant; it suits well with warlike ideas, with cries of vengeance as with songs of triumph, it lends itself to the expression of all energetic lofty sentiments and to the majority of tragic accents. It may even figure in a jocund piece provide the joy assume a character of impulse, or of pomp and grandeur</p>	<p>Noisy, strong.</p>	<p>Brilliant, penetrating.</p>	<p>Martial, bold.</p>

	Berlioz	Jadassohn	Prout	Erlson
Cornet	Has neither the nobleness of the horn, nor the loftiness of the trumpet. Snapping, noisy and bold.		Coarse and vulgar.	
Trombone	Is the true chief of epic instruments. Nobleness and grandeur. Deep, powerful accents of high musical poetry, from the religious accent, calm and imposing to the wild clamours of the orgy.	Magnificent, brilliant and may express terror. Grave, solemn.	Grand, noble, sonorous and pompous in F, rich and full in p to ppp.	Solemn or menacing.
Saxophone	Soft and penetrating in the higher part, full and rich in the lower part, their medium has something expressive. It is in short a quality of tone <i>svi generis</i> presenting vague analogies with the sounds of the violoncello of the clarinet and coranglais and invested with a brazen ting which imparts quite a peculiar accent.	Pleasant tone, easy speaking.		
Tympani	For picturesque and dramatic effects. Suitable to picolots of brilliant character or warlike impulse.	Pompous, festive.	Rhythmic and dynamic.	
Tuba				Brutal, powerful.

Trombone — crimson, with horn orange. Tympani — great black holes. Side drum — grayish. Triangle — silvery.

The list is incomplete, but sufficient to illustrate the principles underlying the scheme. If those colors may really be considered to represent the tones of the instruments with which they are associated, it is difficult to assert positively, and still more so to demonstrate satisfactorily. Yet, if they be taken individually and considered as the artist would his paints, it can be shown most conclusively that the colors named will blend well, by twos and threes and so on, and that the instruments may be mixed with quite as good results. For instance, green and brown, representing oboe and bassoon, will, if mixed, produce an olive tint, showing the power of the lighter to heighten the darker color, which effect is observable by analogy, if the two instruments be played together. Three clarionets playing together in the registers named, should produce the effect of a reddish brown, which would harmonize with themselves and also with the oboe.

However, the borrowing of the nomenclature of a sister art does not necessarily imply that the terms are to be taken as literally describing the phenomena referred to by some designation in particular. They are employed to call up mental pictures, and thus place before the mind's eye illustrations, by analogy, of an effect it would otherwise be most difficult to describe. Use for the color scheme might be found of value, if, by comparison, it can be shown to correspond in values with the descriptions given in the parallels before quoted. As a matter of fact, the colors do, measurably, describe the tonal effects on the ear of the several instruments. The bassoon is sombre, therefore, brown; the trumpet is virile, high-strung, therefore fits description as crimson, etc.

Each transcriber, while guided by general fundamental principles, will infuse his own individuality into his work. It may differentiate from the results obtained by others and yet be equally good. Nevertheless, it is desirable that students shall at the outset and until they have gained considerable experience be guided by the directions laid down by masters in the art. For that reason and as previously intimated, to incite the imagination, the ideas, opinions and theories already quoted have been collated.

CHAPTER XIII

GROUPING OF INSTRUMENTS FOR TRANSCRIPTION

Instruments may be grouped for duos, trios, quartets, quintets, etc., and so on up to the full limit of the wind band. In such groupings it is required to give attention to the following essentials, viz: compass, possibilities of technique, dynamic intensity, tonal affinity, or judicious contrast, and suitability to express the character of the music under consideration.

Two, three, or four instruments of the same family are always effectively played together in music suited to their character; light, graceful, even florid works for the flute, single and double reed families; song-like and broader forms for the cupped mouthpiece tribe. Mixtures of the different families may also be made with good results, providing the essentials above pointed out be regarded. The flute, clarinet, oboe, and bassoon combine well, and may be employed in connection with the French horn. Saxophones should not be used as voices in a quartet with clarinets, but the flute may be joined with them. They are suitable for mixture with brass, affording contrast, but not too great. Cornets are best adapted for combination with E \flat altos and baritone, or euphonium. Trumpets unite well with tenor and bass trombones, all being of the same family. French horns form a quartet themselves, complete and effective, but there is something so accommodating in their tones as to place them on friendly relation at once with any group into which they may enter.

Some of the great masters wrote chamber music, so called, for wind instruments, notably Beethoven and Mozart.

The former wrote an Octet (op. 103, E \flat major) for 2 oboes, 2 clarinets, 2 horns, and 2 bassoons; also a Sextet (op. 71, E \flat major) for 2 clarinets, 2 horns, 2 bassoons, and a trio for 2 oboes and cor anglais. Mozart contributed the following: "Divertissement" in E \flat and B \flat for 2 oboes, 2 clarinets, 2 cor anglais, 2 horns, and 2 bassoons, a "Serenade" in E \flat major and C minor for 2 oboes, 2 clarinets, 2 horns, and 2 bassoons; and another "Serenade" for 2 oboes, 2 clarinets, 2 basset horns, 4 French horns, 2 bassoons, and contra bassoon. As studies of effective combination (see Chapter XIV) the works named are of value, but otherwise, in light of modern wind instruments their structural and mechanical development, they have archaic interest only.

Some years since a party of English wind instrumentalists of the first rank appeared quite frequently at London concerts in the following quintet: flute, oboe, clarinet, horn, and bassoon. They rendered much delightful music with that combination. Many, if not all, the compositions played were specially written for the quintet, or were adaptations from existing works. Further, a party of accomplished New York musicians led by the famous flautist, George Barrere, has intermittently given concerts of wind instrument chamber music with great effect. Unlike the English group they extended the range of instrumentation and produced works of more varied combinations, even more than those referred to in the preceding paragraph. The wind instrument chamber music department of composition has been much neglected of late, a fact to be regretted. It offers a good field for development along artistic lines. Compositions of that character would be welcome, as adding zest to concerts and stimulating interest in wind instrument playing.

The foregoing grouping for special employment will serve as indications of their uses in transcriptions for the band as a whole, where they may be written for in isolation, or in unison with accompaniments fitted to support their characteristic voicing, not too heavy and absorptive, neither of contrast so great as to distract attention from the essential combination of the leading parts. Accompaniments to solos, duos, trios and quartets must always be subordinate thereto, in strength, color, and interest. Unless they be that, they cease to be accompaniments.

Again, the single reed element may be grouped, as contrasting with that of the double reed, or with the brass as a whole, or with divisions of that family. Mixtures may, also, be made, by combining one group with another, or only several of each group. This plan of procedure will add interest to the score and afford pleasure to those who hear it interpreted.

Ordinarily, the wind-band is spoken of as a military, or reed-band, or as a brass band. As the wind-band is not always associated with military bodies, nor is it ever composed of "reeds" only, neither of the two names just mentioned can be considered suitable. The term brass band is more apt, as applied to an organization consisting of brass instruments, yet that name should be qualified by insertion of the word "wind," and appear as "Brass wind-band," which would be specific and not in conflict with the designation wind-band as signifying the combination of wind instruments of all kinds.

Up to the present, there is no recognized standard of instrumentation for the wind-band proper. It varies with country, and the preferences of bandmasters. France and Belgium have the best form, for greater variety of voicing obtains there, than in other countries. England comes next, Germany third, with the United States as a disciple.* In the two last named countries the value of a wind-band is rated on the basis of tone strength, and not of artistic utility.

There are exceptions in every country, but, as is usual, they prove the rule. English and German arrangements do not include saxophones or sarrusophones, but those of the United States have parts for saxophones. Those parts are mere duplications of others and rarely written as though the instruments possessed individuality, or art value; but are employed to reinforce parts printed under other names. Where oboes and bassoons are included, they are written for on the same plan. The method is pernicious and opposed to the principles of art; for, thereby, the wind-band becomes as a monochrome instead of a polychrome. Denied the opportunity to exhibit its manifold diversity of tone color, it is reduced to expression at the monotonous level of one prevailing tone, and that one of muddy consistency.

The wind-band should be written for on principles identical with those employed for the orchestra, where each instrument is treated as a distinct color, utilized in the foreground, middle distance, or background, as a high light or shadow, as a whole tone or mezzo tint, as a principal or complementary color to fit the varying requirements of a composition, and, by so doing, express the artist's ideal.

Consideration of the wind-band upon a high plane of artistic utility does not of itself imply forgetfulness of its great usefulness on lower levels where, becoming associated with pageant and picture, pomp and politics, it takes part in the daily life of the people. On the contrary, remembering those functions, it is sought to better the quality of the music by seeking to improve the process of transcription for the wind-band proper. For, as the great includes the less, so the concert wind-band, as an organic whole, includes all the diverse partitions of which it is susceptible. Therefore, any influence brought to bear to improve it as a whole, must necessarily include those partitions, and in this way transcription for all functions of the wind-band be bettered.

* See Chap. 4. When the instrumentation authorized by the U. S. War Department for Army bands becomes general throughout the country, our bands will compare more than favorably with those of any other country.

As intimated in a previous chapter, the mass of clarionets employed in a concert wind-band should be in comparable proportions with the violins as against the other instruments of an orchestra. For works such as the concerto and symphony the old masters always kept that principle of balance in view and, although they may have introduced modifications here and there, they maintained a strict balance between the parts. Modern usage, though extending the orchestral area in order to embrace a greater variety of wind instruments, follows the example thus set as to proportions. The symphonies by Haydn may be effectively performed by 12 first violins, 10 second violins, 6 violas, 5 violoncellos and 4 double basses, combined with 1 flute, 2 oboes, 2 bassoons, and 2 horns, from which it is seen the stringed instruments exceed the wind at about 4:1. Addition of another flute or piccolo, 2 more horns, 2 trumpets, 2 or 3 trombones, tuba, contra fagotto, and cympani creates demand for corresponding increase of the stringed instruments, for, although the added voices are employed occasionally only, the tutti of the orchestra, wherein all are united, provides the standard whereby to gauge their proportionate balance. Hence it is found necessary to double the number of stringed instruments for interpretation of a score calling for the employment of a more extended wind-band section. If then, it be desired to parallel the above conditions for purposes of wind-band transcription, the organization should be regarded as of two divisions, that is, clarionets and brass, representing respectively the stringed and wind instruments of an orchestra. Thus, clarionets would be divided into 1st, 2nd, and 3rd to represent 1st and 2nd violins: E \flat alto clarionets to reproduce the viola, B \flat bass clarionet to personate the violoncello, and contra bass clarionet to parallel the stringed bass. But, while, in practice, the numerical proportion of the upper clarionets, as 4:1 with the cornet, the lower ones may be reduced in numbers if desired, and other instruments of single or double reed type employed to make up the tone value; a plan of procedure that, of course, would change the timbre of the voices. Considering the clarionets in that light and balancing cupped mouth-piece and other instruments against them in grand orchestra proportions, a complete organization may be deduced as follows:

30 B \flat clarionets, and 2 in E \flat , 9 alto E \flat clarionets and 9 bass clarionets, 6 contra bass clarionets, as representing the string quartet (more accurately quintet); then, 1 piccolo, 2 flutes, 2 oboes, 2 bassoons, 4 B \flat trumpets (or cornets), 2 E \flat , or F trumpets, 4

French horns, 1 baritone, 2 tenor trombones, 1 bass trombone, 1 euphonium, 1 E \flat tuba, and 2 contrabasses, as well as 3 instruments of percussion (tympani, snare and bass drums).

A wind-band of those proportions would afford wonderful possibilities and produce tonal effects, richly voiced and sonorous, or, on the other hand, capable of extremes of delicacy and lightness of tone. But the effectiveness would be greatly enhanced by addition of a double quartet of saxophones and a single quartet of sarrusophones. The former would number eighty-seven, and with addition of those just named a total of ninety-nine instruments. An organization of this variety and magnitude would be quite equal to render any form of composition and might aptly be named a symphony wind-band. Smaller bands can be formed from the foregoing plan, by similar adjustment of balance to suit conditions and requirements of a composition.

A brass wind-band usually comprises the following: E \flat and B \flat cornets, E \flat altos, baritone, trombones, euphonium, E \flat and BB \flat basses, and drums, and, regarded as a monochrome, may be written for as such, always providing for completeness of harmony. The proportion of cornets is about six to one with baritone, not for reason of disparity in strength of tone, but in order that the 1st E \flat and B \flat cornets may play the parts assigned them without fatiguing their performers. This combination is essentially masculine and virile and, as such, excellently adapted to express music of heroic mould. For the outdoor pageant, it is incomparable.

Some of the many combinations possible to groups, having already been pointed out and the manner of writing for them indicated, it now remains to consider the wind-band tutti, that is, those portions of a composition in which all the instruments are employed at the same time.

The clarinet family should contain all the elements of the tutti and be complete in harmony, rhythm and melody. Other groups, as nearly as possible, should be patterned on the same plan, the high instruments playing the melody and other parts in progression downwards, according to the voice character of the instruments. Modifications in transcription are required when the divisions are in contrast, as in the case of sustained tones or interweaving designs among the wind, as opposed to melodic figures among the violins, or vice versa, or similar features in the inner parts, against likeness or identity of high wind and violins and in many other ways. Union of melody etc., in several octaves will thus be brought about, but if required to give the melody still greater

prominence, some one, or more loudly voiced instrument may be extracted from the harmony series and impressed for such service. The introduction to Act III of "Lohengrin" furnishes a good illustration of such treatment. When the melody is florid and suitable only to instruments of light calibre and offering facilities for playing rapid passages, the baritones, euphoniums, and trombones as well as some of the larger reeds, should reinforce the harmony, or be provided with a part or parts contrapuntally fitted to that form of melody. Again, rhythmic contrasts and imitations between the groups, forming a duologue or triologue, may be written, but care must be taken to avoid confusion, by keeping the parts as they appear in the original, at an octave from each other, thus obviating possibility of objectionable conflict and crossings.

CHAPTER XIV

ON COMBINATIONS

Before proceeding to lay out some possible combinations, it may be advisable to give consideration to several points from the angle of their connection with acoustics.

Because the clarinet is devoid of harmonics other than those at a 12th from the fundamentals, their ratio being stated as 3:1, it acts as a stopped pipe and its tone is characteristically hollow. This is noticeable when it is played alone, or in the family group, and not combined with any other instrument. When united with others on the open pipe principle, the character changes, for the reason that the harmonics missing from its own series are added in by those incidental to the series of the instrument with which it is united. Also, a resultant tone is created by unison of the clarinet with the latter. For instance, c' of the trumpet is its second harmonic, g' its third, c'' its fourth, e'' its fifth, g'' its sixth, and so on. The clarinet c' is — in common with all other notes in its first octave — a fundamental and its second harmonic, in ratio 3:1 is g'' a twelfth above. The following examples will show the fundamentals and harmonics referred to, viz:



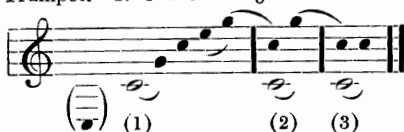
(1) represents the clarinet, (2) the trumpet, with its fundamental. A casual glance will be sufficient to make clear why (1) the clarinet tone is hollow, (2) the trumpet tone richer, (3) the benefit accruing to the clarinet from combination with the trumpet. Incidentally, but not the least important, the explanation and examples indicate change of "clang" as resulting from the union of two instruments.

Continuing to assume the combination of clarinet with trumpet, the 6:4 of the latter corresponds with the 3:1 (or more precisely 12:1) of the clarinet as heretofore shown. The 6th harmonic of any series cannot be considered a primary as to strength, it is too remote from the fundamental, but the 3:1 of the clarinet falling within that classification, adds in where the trumpet begins to weaken and thus reciprocates the harmonic favor it has received from that instrument. Again, if the two instruments play a sustained c' , it will be obvious that the harmonic g'' would be of double strength, a reinforcement so emphatic as to suggest the existence of a differential, or resultant tone. According to acoustic law, that differential is c'' , thus c' equals 256, and g'' equals 768 vibrations at philosophic pitch, gives as the difference 512, the vibration number of c'' , thus strengthening the 4th harmonic of the trumpet. As that result arises from the combined clang of the two instruments, its color must differ from those of the other harmonics.

From the foregoing, it is obvious that the union of a clarinet with the open pipe, cupped mouthpiece instrument is much to its benefit. A moment's thought will show it to be the logical union of sex as applied to instrumental tone quality and that it offers an explanation of and supports the views expressed by Berlioz as to the gender of the clarinet.

Now a few words as to the union of other instruments of the open pipe class, such as flute and oboe, with the clarinet. Comparison of the harmonic support given by the trumpet to the clarinet with that furnished by either flute or oboe, makes clear that it gains more from the former than it does from the latter. In one case the hollowness disappears, in the other it remains present. The reason is simple. The flute, oboe, and clarinet will each give c' as one of their succession of fundamentals. On the two first named, the second and third harmonics are c'' and g'' . But in case of a clarinet (being considered as in C for present purposes) the upper 3:1 harmonic, g'' , corresponds with the third of both flute and oboe. Thus three enriching harmonics — present in the trumpet blend — are missing from the clarinet, flute, and oboe combination. The examples will illustrate.

1. Trumpet. 2. Clarionet. 3. Flute and oboe.



The tone texture of the combinations is evidently of richer quality when the trumpet is used. This fact becomes more evident if it be remembered that the dissonant 7th harmonic of the trumpet which gives virile clang to that instrument and influences the combination already referred to is too remote in case of the flute and oboe to exercise a very appreciable influence on the clarionet in combination. The dissonant 7th harmonic here referred to would be b''' flat in alt above the 4th harmonic, c''' . Also, it must be remembered the harmonics of the flute are feeble at their best, becoming more and more so in their upward succession. Further, its primaries are also weak as against those of the oboe which are fairly strong and vibrant. The flute and oboe form an effective union as between themselves. The oboe brings little in the way of harmonics to the combination with the clarionet, but the pronounced vibrancy of its double reed, apparent in its primaries, and the piquancy of its upper overtones create effects not always felicitous. In fact those overtones are apt to emphasize the inherent shrillness of the high range clarionet tones. On the other hand the stronger individuality of the clarionet absorbs the weaker flute qualities, which though adding what it can of strength, contributes little, if any to difference of clang in its combination with the clarionet. To feel the distinctive flute quality as against that of the clarionet, their tones must be some intervals apart. This is not the case with the somewhat dominating oboe as opposed to the inflexible resistance of the clarionet clang. Yet, by judicious selection of registers, it is possible to unite the three instruments in chords of colorful harmony. The "throat" — though nasal — and chalumeau registers of the clarionet are more yielding in quality than are the clarion and high. Further, the low fundamentals of the chalumeau contribute their harmonic 12ths to that part in the scale of flute and oboe where their weight is of value to the clang of those instruments.

It might not be out of place at this point to remark that "damping" the tone of the trumpet by means of a mute and combining it with a flute, creates a clang much resembling that of an oboe. The balance of tone must be as perfect as possible.

Students are advised to bear in mind that structural form of instruments exercises great influence on their clang. The fact that a clarinet, cylindrical bore, acts as a stopped pipe, and the saxophone, conical bore, acts as an open pipe, each being a single reed instrument, affords an illustration of divergent results brought about by structural difference in the form of tubes. Nowhere else among musical organics does so great a difference result. Nevertheless, though less pronounced and without effecting change of fundamental conditions, clang of instruments differs as do the form of their tubes. Tone quality of instruments conical throughout, as the saxophone, French horn, oboe, bassoon, sarrusophone, flügel horn, differs much from that of the trumpet, trombone, alto, baritone, euphonium, and basses, whose bore is two thirds cylindrical, and one third conical. Vibratory principle, whether it be single or double reed, mouth hole, or cupped mouthpiece, creates much difference but not all. Taper of the cone and diameter of tube constitute the mould in which the air column vibrates. According to dimensions, whether the cone be of long taper, as in the French horn, bassoon, sarrusophone, or short with rapidly diverging walls, as in the flugel horn and saxophone, or the narrow cylindrical tubing of the trumpet and trombone, or the wider tubing of the alto, baritone, euphonium, and basses, so the clang of each varies. The six representative instruments last named have conical bell joints for one third their length, differing in taper appropriate to the width of their cylindrical bore. Conical bell joints, according to form, modify clang to greater or less extent, strengthening or weakening primary tones and overtones as the result of that difference, as exemplified by the trumpet, cornet, and flügel horn — the latter being conical thruout — and the corresponding vibration in the clang of their primaries. Their overtones are in similar ratio and are co-incident as to position.

A band consists of many individual instruments, of assemblage of groups of related instruments, or such as are in tone affinity with each other, and finally the union in mass and fusion into a substantial, homogeneous tone structure including all its elements. The transcriber may dispose those elements at will, produce much variety of clang, investing sections, phrases, and periods with greater interest by judicious selection and adaption of their possibilities. But, to be certain that his combinations will produce the effects he may have in mind, it is necessary that he shall be familiar with the material he has to work with, from the practical, as well as the theoretical points of view. Thus

confident from prior acquisition of knowledge, his technique is in no wise limited nor halting. On the contrary, it is applied with the certainty that his ideas will be realized, and the means to the end fully justified.

It is well to remember that richness of color develops from below, that is, it results from the harmonic elements set free by primary tones, employed as nearly as possible, as nature teaches in the harmonic scale. With that principle firmly established in the mind, the transcriber will avoid the turbidness and confusion arising from use of material, applied experimentally or without knowledge that art is, after all, science glorified and not the exploitation of uncontrolled empiricism and unlicensed vagaries, which, today, finds all too ready acceptance among certain musicians and their followers.

On page 108 will be found some of the many combinations of instruments possible in the wind-band.

Solo instruments may be drawn from any combination. Those most usually employed are flute, piccolo, clarinet, trumpet, trombone, and euphonium. Those occasionally employed are oboe, E \flat alto saxophone, alto clarinet, and E \flat bass. In each instance the accompanying instruments should be selected and adjusted appropriately, with tone color and balance in mind.

As the clarinet group, with contra bass sarrusophone added, parallel the string group, instrument for instrument as employed in the orchestra, and as all other instruments used in that organization are also used in the wind-band, transcription from orchestra score for band purposes presents little difficulty. The only exception is in choice of some instruments to take the place of the orchestral clarionets, which however, is not insuperable. The army band instrumentation includes an E \flat clarinet, also soprano and alto saxophones, which may be employed as substituted, or the E \flat clarinet with one B \flat clarinet taken from the body of clarionets, may be employed. Either would be preferable to the employment of B \flat trumpets or cornets, suggested by an English writer, as substitutes for orchestral clarionets. Other band instruments not found in the conventional orchestra score may be used to enhance color effects, and to develop intensities, as indicated by dynamic markings. While the clarinet group of the band must necessarily be viewed and used as the equivalent of the string group of the orchestra, that dictum must not be permitted to operate as taboo against use of any other than the contrabass sarrusophone, to function

as bass for that group. The bass saxophone, cupped mouthpiece E \flat and contra BB \flat basses may be also used, of course, with judgment.

PRIMARY

SECONDARY

- | | |
|---|--|
| 1. Flutes, oboes, and bassoons. | Add in —
French horns and contrabass sarrusophone. |
| 2. Clarinet group. | Add in —
(a) Flutes, oboes, and bassoons.
(b) French horn and contrabass sarrusophone. |
| 3. Saxophone group. | Add in —
(a) Flutes, oboes, and bassoons.
(b) French horns and contrabass sarrusophone.
(c) Clarinet group. |
| 4. Trumpets and trombones. | Add in —
(a) Flutes, oboes, and bassoons.
(b) French horns and contrabass sarrusophone.
(c) Clarinet group.
(d) Saxophone group. |
| 5. French horn quartet. | Add in —
(a) Flutes, oboes, bassoons, and contrabass sarrusophones.
(b) Clarinet group.
(c) Saxophone group.
(d) Trumpets and trombones. |
| 6. Flügel horns, baritone, and euphonium. | Add in —
(a) Flutes, oboes, bassoons, French horns, and contrabass sarrusophone.
(b) Clarinet group.
(c) Saxophone group.
(d) All instruments previously mentioned. |
| 7. Baritone, euphonium, E \flat and contra BB \flat basses. | Add in —
(a) Trumpets and trombones.
(b) French horns, flügel horns, and contrabass sarrusophone.
(c) Clarinet and saxophone groups, separately or combined.
(d) Full band (ensemble). |
| 8. Tympani, bells, xylophone, snare and bass drum, cymbals. Not listed for combination. | Percussion instruments may be added for character effects as required — but sparingly — with any combination. |

Concerted pieces and movements are always interesting played by groups, or well selected combinations of wind instruments. Our arrangers of band music do not employ that feature as much as they should.

Does the neglect result from fear of weakness on part of players, or of their own knowledge? Whichever the reason, the tone color of our wind-bands suffers from the neglect. Their performances much too

Composer	Flute	Oboe	Clarinet	Horn	Bassoon	Contra Bassoon	Corno di Bassetto	Trumpet	Piano	Cor Anglais
TRIOS										
Beethoven.....	2				I					
Beethoven.....			2		I					
Beethoven.....	2				I					
Bayer.....		I	I		I					
Stark.....			2				I			
Vogt.....		2								I
QUARTETS										
Hughes.....	I	I	I		I					
Kolleschowsky.....			2		2					
Lange.....		2			I					I
Paquis.....	I	I		I	I					
Spies.....	I		I	I	I					
Weis-Ostborn.....				2	2					
Wetzel-Muller.....		I	I	I	I					
QUINTETS										
Beethoven.....		I	I	I	I					I
Barthe.....	I	I	I	I	I					
Carl.....	I			4						
Hughes.....	2	I	I		I					
Lefebvre.....	I	I	I	I	I					
Mozart.....			2				3			
SEXTETS										
Mozart.....			2		I					
Beethoven.....			2	2	2		3			
SEPTETS										
Pierné, Op. 40.....	2	I	I	I	2					
D'Indy.....	I	I	2	I	2					
OCTETS										
Jadassohn.....	2	2		2	2					
Beethoven, Mozart, and Scarlatti, each.		2	2	2	2					
Reinecke.....	I	I	2	2	2					
SMALL ENSEMBLE										
Scarlatti.....	2	2	2	3	2	I				
Mozart.....		2	2	4	2	I	2			
Gounod.....	I	2	2	2	2					I

often represent monochrome pictures, with little attempt at shading, instead of, as they should, pictures animate with color in all degrees of intensity, or varied as the subject requires to suit the mood and purpose of the composition being rendered.

The tabulation of chamber music on page 109 for wind instruments by composers of repute will illustrate at a glance what may be achieved by combinations of instruments. The student is advised to obtain and study as many as possible of the scores referred to.

CHAPTER XV

CONTRAST AND SIMILARITIES

CONTRASTS. The painter has in his color box many pigments differing fundamentally one with the other. He employs them in their primary forms from time to time, but very frequently, to carry out his color scheme, mixes one, or more with another, or others, thus varying their values and creating new visual effects. What the painter may accomplish for the sight sense by deft use of his colors, the musician as composer or transcriber, may parallel by use of characteristics in general and peculiar to each instrument, employing them singly, by groups, or combination of individuals, or intermixtures of individual instruments, or by combination of groups. The musician's appeal is to the sensory nerves influenced by the brain, which receives its impulse to act thru the aural organism as the result of atmospheric vibrations, propagated by innumerable instrumental agencies. The effect being neurotic and mental, it is readily discernible that pitch, tone color, and dynamic intensity must exercise very great influence upon the emotions by operation of the sensory apparatus and manner in which, thru its different parts, it affects them.

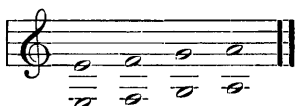
The power of the characteristic tone quality of different instruments over human emotions has been recognized for ages. Among the ancient Egyptians, Babylonians, Grecians, instruments, according to their tone qualities, were assigned to various social purposes, the trumpet to pomp, pageant, and war; the gingsras (ancestor of the oboe) for lamentations; the flute — of many varieties — to many moods; the drum, timbrel, and others to festive use, and so on.

Composers of recognized ability have employed wind instruments and others in their efforts to illustrate the meaning of their works and — especially in case of symphonic and operatic writers — have employed certain of them to depict particular moods and impulses in keeping with the character of those works. The compositions of Beethoven, Mendelssohn, Wagner, Dvořák, and others, past and present, furnish numerous instances of application of the characteristic tone color peculiar to wind instruments as means to emphasize the sentiment they endeavor to portray, as definitely and with as full intent as a painter employs his colors, or a poet selects his words for their powers of appeal, description, pathos, dramatic effect, etc.

Broadly speaking, there are seven primary tone color values among instruments of the wind-band; (1) mouth hole instruments, as the flute; (2) single reed stopped pipe principle, as the clarinet; (3) single reed, open pipe, as the saxophone; (4) double reed, open pipe, including oboe; cor anglais, bassoon, and the sarrusophone group; (5) cupped mouthpiece instruments, open pipe, two thirds cylindrical, and one third conical, as trumpet, cornet, altos, trombone, euphonium, and basses; (6) cupped mouthpiece instruments, open pipe, conical thruout, as French horns, and flugel horns; (7) percussion instruments, parchment disc variety, and those having metal bodies. Each of the foregoing has a tone color in contrast with all others, and so may be employed to differentiate tones and emotional effects. A description in general of their tone qualities is given in Chapter XII under the caption "Character of Tone." It is advisable to give close study to those contrasts of, what may be termed, the primary color values in order to be thoroughly familiar with their individual powers of contrast. But it must be remembered there exists contrast of one distinct from the other brought into combination with another, or, again, of two or more of the same group, the same being extremely palpable, say, when, for instance, a flute, oboe, and clarinet, or three trumpets are playing a sound, each an octave from the other. There, and in many similar instances, contrasts are evident as of characteristic individual color, the tint or shade induced by register and that of the differentiating pitch, or vibratory ratio among the several sounds. At the same time it is valuable to note the new quality brought about by the fusion of the tone color of each instrument, of those first mentioned with the other which, justly balanced, creates a collective sound, quite new and offering a parallel with the mixture of three primary colors by a painter. In case of the trumpets, the fusion and

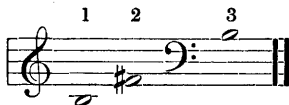
resultant variation in the collective tone quality is the product of the difference in range and pitch only, and not of contrasting individuality. The foregoing remarks apply to combinations of other instruments with equal force.

Contrast of unisons, brought about by producing sounds at identical pitch in specific family groups or among groups of other instruments whatever their vibratory principle is not given the attention with respect to tone coloring in the band, that the subject deserves. A unison, say, of two instruments, by way of illustration, in which one of the sounds issues from the middle range and the other from, say, the low range of the two instruments is not of the same color, as though produced by two instruments at the same range. For instance, take a B \flat clarinet, and a bass clarinet by way of illustration. Let the unison sounds to be played in unison be small e, f, g, a concert, the notation required for the two instruments will be



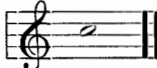
The upper notes for bass clarinet.
The lower notes for B \flat clarinet.

Those played by the B \flat clarinet are free speaking and fully vibrant, while those played by the bass clarinet issue at a part of the instrument where the tone is "throaty," and of quality quite different from those of the other. Two conditions enter here, (a) tube position of the sounds, (b) lip tension. Any one who reflects on these causes will recognize even without a practical test, that the tone color of such a unison must have a "clang" differing from the unison of two B \flat clarinets playing the lower octave together. A similar condition applies as between the E \flat clarinet and the alto clarinet, also as between the oboe, cor anglais, and bassoon, at a point in their compass where possible to produce them. For instance



1 2 3

played together upon the three instruments named, (1) oboe, (2) cor anglais, (3) bassoon, would produce a unison, the clang of which would differ from that of three oboes playing small b concert, or three each of the other instruments playing the notes above indicated for them.

Similar differences resulting from conditions of range and tension are obtainable throughout the compass of all instruments, and are not confined to any in particular. Unisons between trumpet and baritone, trumpet and alto, or French horn, trumpet and trombone, and so on, differ in clang from the unison produced by any two instruments of the same name.  on the baritone is the same pitch as middle c, written an octave lower for the trumpet. The two sounding together are in unison as to pitch, but not as to quality of tone. Tube positions and tension create the difference here similar with that referred to in the case of reed instruments. These range contrasts properly employed offer the transcriber many tints and shades of tone color with which to enrich his work. But to effectively employ them he must be able to mentally "auralize" them, just as a painter can mentally "visualize" his colors, and similarly with the latter, he must develop (if he does not already possess) imagination.

SIMILARITY. All wind instruments are theoretically and scientifically speaking reed instruments; for where the actual material reed is not employed as the vibratory medium to set the air column in action, the lips themselves act as reeds in manner somewhat similar with that of the vocal cords. In the case of all reed instruments, the "reedy" quality is most strongly discernible in their low registers. In cupped mouthpiece instruments the lips acting as reeds, impart a pronounced "reedy" quality to the first octave at least of their sounding range, that is, from the lowest tone possible with combination of valves 1, 2 and 3, on valve instruments, of the 7th position of trombones, in each case upwards, or from their octaves downwards. From this it will be apparent that, to some extent, similarity exists between all instruments when played in their lowest register. It must not be inferred from this statement that the similarity is so great that one instrument cannot be distinguished from another, for such is not the case, as a very casual test will make clear. What is intended to be brought to notice is, the degree or degrees of similarity which do exist may be so utilized as that among the sections, or groups, into which a band is divided, or in the ensemble a tone, sonorous, sympathetic, homogeneous but distinctly "reedy" quality of tone may be effected by fusing the tones of the several instruments in due proportions.

This leads to the remark that the lower reed fundamentals may be strengthened by a well considered addition of the low tones of cupped mouthpiece instruments, played with regard to balance of tone as cupped

mouthpiece instruments should be played, in their relation to reed instruments. Low register unisons of French horn with bassoon, alto, tenor, or baritone sarrusophone, or saxophone; or those of trombone or euphonium with bass, or alto clarinet, saxophone or sarrusophone; or $E\flat$ or contra $BB\flat$ basses with bass saxophone, contra sarrusophone or contra bass clarinet are always effective.

In the medium band range of tonality points of similarity are less obvious owing to the difference of the lip tension required as between brass and reed instruments in that as well as in the upper ranges. The action of the lips for brass is to become more tense proportionately than does the reed on reed instruments. For instance, as between the trumpet and soprano saxophone, or alto and alto saxophone, from the note once lined c' to its octave though the first few sounds on the trumpet or alto may continue with reed quality once the fourth is passed the tone substance begins to lose its reediness, taking on more compactness, whereas the saxophone continues that quality with but slight, if any, loss. It may not be out of place to call attention at this point to the fact that the sounds produced from the upper part of the saxophone cone require less lip tension than those produced from its lower part. Non-recognition of this fact results in the notes first mentioned being played too sharp. The low tones of saxophones are usually played too flat, resulting from the mental attitude of the player towards low notes and slack lips, as well as the tendency to overblow those notes.

The $E\flat$ alto saxophone from small b to twice lined f''' can be caused to emit tone quality very similar with that of the bassoon at corresponding pitch. The cor anglais has sympathy with a certain range of the French horn. It is an instrument of pathos and in that combines with the latter, which, too, possesses a jocund quality, not possible to obtain from the former. Certain notes on the clarinet, especially that in $E\flat$, may be employed effectively to strengthen the low notes on the flute. The $E\flat$ clarinet possesses dramatic qualities as far as its range of compass permits, with the piccolo. Trumpet, cornet, and flügel horn, as has elsewhere been explained, have similar but not identical tone qualities. The trumpet extends the trombone quality, the cornet is more appropriately considered — but not without misgiving as to acoustic propriety — as connected with the alto, the lower extension of which are the baritone, euphonium, $E\flat$ tuba, and contra $BB\flat$ bass, while the flügel horn connects legitimately with the French horn. Its tone, if well produced, has quite a flute-like quality

in its range. Muted trumpet, cornet and trombone may be effectively employed to bring about similarity between oboe and bassoon, or played naturally the trumpet in its range from c'' to c''' possesses somewhat the quality of the $B\flat$ clarinet in the same octave.

These few remarks do not cover the field of similarities, but should be sufficient to direct attention to that field as one of great possibilities in the matter of obtaining many and various shades of tone color.

CHAPTER XVI

ARRANGEMENT OF THE SCORE

Transcription for a full wind-band involves more manual labor than does arrangement for an orchestra, because there are more instruments to be written for individually in the former than in the latter.

Instruments should be arranged in groups, as nearly as possible according to the number of instruments to be employed in the score. This plan is convenient for reference, and keeps the different voices or tone colors, incidental to each of them in full view, for observation of mixtures and contrasts. The score must be neatly written, the notes being placed directly one under the other on each staff for the several instruments, so that the eyes of the conductor may grasp them, reading upwards or downwards as though traversing vertical lines. To facilitate reading the harmonics, it is a good plan to place the horns and trumpets in $E\flat$ immediately above the brass instruments reading in the bass clef. Reference to Chapter VI will show why that is desirable.

The instruments may be arranged as on page 116, names being written opposite the staff intended for its part.

NOTES. The brass section follows beneath the list of reed instruments. Modifications may be made in this layout by deletion of instruments not to be included. The reed contra-basses may be written on the same staff with the brass basses, and further, if the number of staves on the page be still too few, the saxophones and sarrusophones may be placed in a supplementary score by themselves.

Arrangement of instruments for a wind-band of average type will occupy less space. Flutes and piccolo might be written together, sarrusophone, contra-bass reed instruments, $E\flat$ trumpets, and tympani

eliminated, as also, most probably, E \flat alto, B \flat bass, and contrabass clarionets. It may be remarked here that when scoring a military march the B \flat clarionets should be divided as 1st and 2nd only. For parade purposes it is preferable to increase the strength of the 1st clarionets by accession of the 2nd, and then cause the erstwhile 3rd clarionets to play the 2nd part. That plan adds much needed strength to the melody without unduly sacrificing that of the accompaniment. But, on general principles, it is advisable to maintain full sonority, and equality of balance in the middle or accompanying parts of the band. Thinness there is always noticeable and invariably injurious to its ensemble.

The score for a brass wind-band makes less demands on space and labor than either of the foregoing, and music suitable for it is much less complex and difficult. It may be arranged as on page 117.

FULL WIND-BAND

<p style="text-align: center; margin-left: 40px;">REED</p> <p>Piccolo</p> <p>Flutes</p> <p>E\flat clarionets, 1st and 2nd</p> <p>B\flat clarionets, solo and 1st</p> <p>B\flat clarionets, 2nd</p> <p>B\flat clarionets, 3rd</p> <p>E\flat alto clarinet</p> <p>Bass clarinet</p> <p>Contra bass clarinet</p> <p>B\flat soprano saxophone</p> <p>E\flat alto saxophone</p> <p>B\flat tenor saxophone</p> <p>E\flat baritone saxophone</p> <p>E\flat alto sarrusophone</p> <p>B\flat tenor sarrusophone</p> <p>Contra bass sarrusophone</p> <p>Oboes, 1st and 2nd</p>	<p>Bassoon, 1st and 2nd</p> <p>Contra-Bassoon</p> <p style="text-align: center;">BRASS</p> <p>B\flat cornet or B\flat trumpet 1st</p> <p>B\flat cornet or B\flat trumpet 2nd and 3rd</p> <p>Baritone</p> <p>E\flat French horns, 1st and 2nd</p> <p>E\flat French horns, 3rd and 4th</p> <p>E\flat trumpets, 1st and 2nd</p> <p>Tenor trombones, 1st and 2nd</p> <p>Bass trombones</p> <p>Euphonium</p> <p>Basses</p> <p style="text-align: center;">PERCUSSION</p> <p>Tympani</p> <p>Side and bass drums</p> <p>Traps</p>
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In some American publications the E \flat alto sax-horns are divided as solo, 1st and 2nd, and 3rd altos, and there usually is no part for bass trombone included.

Music for a brass wind-band should be confined to that of a more simple structural character, than that easily played by the full wind-

band. Military marches are about the measure of its powers to overcome digital intricacies. Broad effects, without many incursions of florid passages are best suited to its capabilities.

BRASS WIND-BAND

E♭ cornets, 1st and 2nd
B♭ cornets, solo
B♭ cornets, 1st
B♭ cornets, 2nd and 3rd
B♭ baritone
E♭ alto saxhorn, 1st and 2nd
E♭ alto saxhorn, 3rd and 4th
B♭ tenor trombones, 1st and 2nd
Bass trombone
Euphonium (B♭ bass) — Basses — Drums and traps.

And now, having considered the varied requirements of the transcriber for a wind-band, it must be insisted that the work be undertaken with more earnestness of purpose, and greater elevation of ideals than has been the custom in the past. It possesses possibilities far beyond the conception of the ordinary musician and greatly exceeding public conception. But to exhibit those possibilities needs practical demonstration, and that will be forthcoming, only, after educated transcribers, feeling the burden of their responsibility to art, have provided works of a higher class and treatment than are now to be obtained from our publishers of band music.

In the meantime, bandmasters devoted to their work, will gain artistic and intellectual profit, as well as applause of the true, music loving elements of the public, by making transcriptions of meritorious compositions, suitable to the instrumentation of their own organizations. For that purpose, and the instruction of aspiring students it is hoped that the exposition of the principles underlying transcription given in this book will be found of service.

CHAPTER XVII

HINTS ON TRANSCRIPTION

1. Examine instruction books and studies for each band instrument. The latter especially will broaden the conception as to what is possible on wind instruments. Almost anything is possible in these days of greatly perfected mechanism, structure, intonation, and tone.

2. Latent talent for arranging may be cultivated and developed by reading and copying good scores, noting closely the methods of the writer with the view to profit by his example. Study of even a poor score may be profitable in its examples of what to avoid. Cherubini, one of the great masters, amid all his activities as head of the Paris "Conservatoire de Musique" and composer of many great works, made it a daily practice to copy a page or more from the "Score" of some other writer to improve his own technique thereby.

Wherever and whenever possible make it a point to attend good musical performances, taking with you a "score" of the work to be rendered. Don't be afraid to pencil the score as the effects appeal to you. Study them at home, mentally tag or label them for future reference. Try out the effects you have noted, if in the orchestra, of strings or intermixtures, and endeavor to produce an effective color balance by experimenting with wind instruments alone.

3. Do not narrow your views by confining your study or reading of any subject to one book. Learn to look at it from the point of view of different authors, one of whom may possess the happy knack of presenting the most puzzling problems in clear understandable style. Again, points omitted by one author may be treated more or less fully by others. There are books by Berlioz, Gevaert, Jadassohn, Prout, Kling, Miller, Griffiths, and others, on transcription, or instrumentation, so called; from each something may be gained to round out your knowledge, and give more complete comprehension of the subject.

4. Instrumentation implies knowledge of the capabilities of instruments. It is the mechanical side of the art of transcription, arranging, or orchestration which deals with the aesthetic qualities of the adaptation of instrumental tone values, and color, and their judicious distribution among the parts of the composition under treatment. Study of instrumentation may run concurrently with other subjects, but tran-

scription, which makes demands on the higher branches of musical knowledge, as advanced harmony, counterpoint, fugue, forms and applied acoustics, should, properly speaking, occupy the last place in a well devised course of instruction, as is the case at institutions, such as the Royal Academy of Music, London, the Conservatoire de Musique, Paris, and others of similar standing elsewhere, in which familiarity with the mechanics (or tools) of art is taught as preliminary to their use in building an aesthetic structure, solid, graceful, vigorous, refined, well balanced in its elements, picturesque as to tone color, and theoretically correct.

5. Instrumentation can be studied to the best advantage by actual practice of each of the instruments used in the band or orchestra, as is done by students at the U. S. Army Music School, Governor's Island, N. Y., and the Royal Military School of Music (Kneller Hall) England. Such a plan assures knowledge of the technical possibility (fingering and dynamic power) of each instrument; familiarity with its limitations of compass; of its tone color as a whole, or in its several registers, or ranges, and transpositions requisite to unite one with the other or others.

6. It must never be forgotten that the rules governing the resolution of dissonances, preparation and resolution of suspensions, progressions, false relations, etc., etc., in part writing must be observed when laying out the basic parts of a transcription. Resolutions should be made to the proper note following, either in the voice (instrumental part) in which the dissonant interval appears, or, if for color effect, in some other voice where the pitch is the same as required in case of the original voice. Exceptions are made in upper or lower parts, caused, for effects' sake to cease, while the basic parts of the original voices, or others to which they may have been temporarily transferred continue the composition.

7. Care should be exercised when adding instruments, or changing from one to the other during progress of a composition to diversify and enhance the effects of tone color, that the point of entry of such addition or change shall conform absolutely to the phrasal structure of the work. Where, as at times, it becomes necessary to extend the compass of some one instrument or other instruments, continuing it upwards by aid of another or others, great care should be taken that the requirement above stated be observed. Phrases are often ruined by neglect of such precautions. Entry of drums in a general way should

conform to the foregoing requisite. Discipline yourself to write correctly in your early studies. The habit will grow to your later advantage.

8. Do not try to paint an artistic picture with a white-wash brush; the effort so to do will waste time and material and prove futile. Employ smaller brushes and less paint, according to the colors to be laid on to perfect the color scheme of the picture.

9. Band instrumentation offers choice from among many primary tone colors, and an almost interminable number of tints, shades, and blends by judicious intermixture of those tones with each other. Careful selection of tone color, its adaption to sentiment, produces variety, lends interest, enhances effect, and displays artistic feeling and ingenuity on the part of a transcriber. Heavy "scoring" — exception where necessary — is the opposite of the foregoing, exhibiting carelessness, deficient knowledge, and lack of musical appreciation and temperament.

10. Develop the clang of each group, vary it, by addition of that of another group, or part of a group, combine groups or parts of several groups, but employ the heavy brush and thickly laid on paint for the ensemble only, or when dramatic incident demands it. "Experience is the best teacher." Acquire from it by numerous experiments how to adjust balance and to combine clang-like tints with certainty that causes set in motion will correspond with the sentiment of the composition and be productive of good effects. For solo work, contrast the color of accompanying parts with that of the solo instrument when possible to do so. Remember that the solo is the point of attraction; do not crowd it with accompaniments, or variegation of color to the extent of distracting attention from its personality. By such means the charms of tone color will be appreciated in a good composition, while even one of less merit will gain from the deft color handling of the transcriber.

11. A tone color scheme for concert music should be well thought out before beginning a transcription, and logically applied in its development. Such a scheme is as essential to music as it is to pictures. Lack of it conduces to patch work, crazy quilt effects, muddiness, etc. Where all instruments, or the greater part of them are insistently employed without justification, the work is despoiled of delicacy of phrasing, picturesque coloring, and those sympathetic qualities natural to the sentiment that the composer may have sought to convey.

12. Injudicious tone painting ruins a good composition. The opposite may be said as applied to a poor one, for whatever of merit it

possess will certainly be enhanced by well considered "clang" treatment. Military marches, quicksteps, and similar pieces require heavy treatment; but even there the proper adjustment of clang benefits the composition.

13. It is of great importance that the transcriber should be familiar with rhythm in all its details, in order to avoid the mutilation of any of the elements entering into the construction of melodies, such as the motive, subsection, section, phrase or period, by introducing improperly another instrument to reinforce the part being played either at the unison or the octaves, or with the intent to cause contrast of tone color. Study of, at least, the elements of composition is not only useful, but, also, is necessary to acquire a clear concept of the importance of the subject of rhythm and the influence it exercises on the correct construction of melodies, their accentuation and clearness in enunciation. It should be remembered, in this connection, that pitch, intensity, and tone color, each and all, have their bearing on rhythm; hence should receive due consideration. Rhythms are the divisions of a melody into those smaller parts which create a momentary or transient feeling of rest, similar with the movement of a pendulum about to make its return spring, and usually experienced harmonically as cadences. Their development is guided by certain rules which, formulated as the result of examination of the works of masters, are consonant with the practice of folk singers of earlier days. The underlying requirement of the integral portions of a melody is uniformity of structure so far as quantity, or duration values, are concerned. Variation in the divisions of notes may appear, but quantity as to time value between sections, phrases, their responses, and parallels must be observed. Rhythms may begin on or after any beat in a measure, but the value of notes preceding the first strong pulse or beat must be deducted from their ending. Exceptions, of course, occur but such are easily discernible by the intelligent transcriber. Neglect to practice the rules of rhythm when transcribing, serious as it may be in monophonic music, is more so when dealing with polyphonic compositions, for there it produces confusion and destroys interest in the — as should be — concurrent voices.

14. If it be remembered that a section comprises two phrases, and that a phrase includes two feet of one or two accented beats, the elemental form of the melodic, rhythmic germ will be understood, and recognized as the motive or inspirational beginning from which a composition is

developed. To reduce them to their simplest form, and classify them for mental reference, it is convenient to adopt a nomenclature from classic verse, which refers to different kinds of "foot," as —

- | | | |
|---|---|--|
| 1. Iambic — Non-accent, preceded by accent. | 2 | |
| 2. Trochaic — Accent, followed by non-accent. | 2 | |
| 3. Dactylic — Accent, followed by 2 non-accents. | 3 | |
| 4. Anapaestic — Accent preceded by 2 non-accents. | 3 | |
| 5. Amphibrachic — Accent between 2 non-accents. | 3 | |

One and two are usually employed in duple and quadruple, and three, four, and five in triple times.

15. DYNAMIC MARKING. In a former chapter on "Relative dynamic values of wind instruments," the power of all wind instruments at normal degree of pressure is stated in units. Attention is here called to the foregoing, for the purpose of advising the arranger or transcriber to adjust his dynamic marks, no matter how they may appear in the original, so that the degrees of strength established by units will conduce to balance in performance, and thus the composer's real intention be attained. As the table and chart, included in the chapter above referred to, rate the tone strength by units, there should be no difficulty to reach a decision as to the comparative marking of *p*, *mf*, *f*, or any similar indications in the several instrumental parts so as to create a uniformity of balance thruout the band.

CHAPTER XVIII

DIRECTING

From the view point of the average auditor at a concert, the task of a man waving a baton before a body of musicians appears to be a most simple affair, such as might be undertaken by any person possessing even a small amount of musical knowledge.

The task may be undertaken by any person equipped with a modicum of musical intelligence, but, unless, far and beyond the layman's concept of the requirements, the conductor, or director, possess full knowledge of the theory of the musical art, practical acquaintance with the instruments before and around him, in band or orchestra, and, most important, he be endowed by nature, or there be developed in him by training, the power of control, a quick resourceful mind, the instinct to do the right thing at the right moment, that task cannot be satisfactorily accomplished.

The act of "time beating" is a mechanical process, operated under certain rules and directions as to the proper course of the baton for this, or that, beat in the several kinds of time employed in music. So far this manifestation of movement might be performed by automatic means, but, as music, though theoretically precise and well ordered in detail, makes appeal to the neurotic tendency in mankind, by the mysterious influence of its vibrations and subtle impulse aroused by swing of its rhythms, it is necessary to regard the process as under control of human intelligence, which, in turn, obeys the emotional impetus incited by united operation of various factors entering into musical expression.

There be many who beat time with stiffness and precision, pedantically square cut and automatically mechanical; their efforts leave the auditor unimpressed and cold. Such a one has failed to close circuit the magnetic currents in the composition, himself, musicians, and audience, which, with enthusiasm as the key, should have aroused corresponding emotions in all. There be others full of emotional impulse, ill guided, badly regulated, who indulge its manifestation by license, riot, and extravagance in action as time beaters.

Neither one is a safe model from which to pattern a good conductor, as distinct from the time beater pure and simple. The good conductor possesses temperament controlled by reason and judgment directed by education. The time beater knows too little of the acquirements necessary to be able to realize his shortcomings, or perhaps, by nature is devoid of those warm, vivifying qualities evident in the work of the born conductor and eloquent of his temperament.

In short, the excellent conductor, like the poet or successful leader of men, is born possessing instincts conducive to fitness for his career. To say that he is not made is a fallacy. He must acquire knowledge of his art by education, but, with born aptitude, acquisition is easy to

him. This must not be permitted to discourage the student conscious of less fitness. On the contrary, it should stimulate his efforts to succeed. Bacon is quoted as saying "There is no stone nor impediment in the way but may be removed by fit study." This sentence, by one of the great philosophers of the ages, is worthy of remembrance, especially at those times, when, fagged and dispirited, as the result, perhaps, of over much study and fearful of poor progress, a student is disposed to relinquish his gains to the insidious prompting of a nerve robbing sense of despair.

TIME BEATING. The purpose of time beating is to cause the players in a musical organization to perform together, with uniformity as to accent and precision of attack. The indications are made with a baton and each movement, executed with promptness, must mark each metrical accent in the measure with great exactness, no matter what the speed of the tempo may be.

RULES

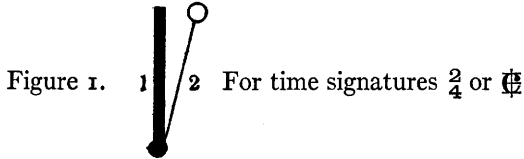
1. Avoid all unnecessary movements.
2. With each beat let the baton come momentarily to rest before proceeding to indicate the following accent.
3. Grasp the baton firmly, at its thick end, in the right hand.
4. All movements should be made — as nearly as possible — by and from the elbow joint and wrist, from the latter especially when indicating subordinate accents and for other purposes when the full half-arm movement would be inexpedient.
5. Practice the following exercise in front of and looking into a full size mirror, correcting ungainly and ungraceful movements of the arm and positions of the body.
6. Let the body position be perfectly erect, and the legs brought close together. Slouchy body position and spreading legs are ungainly in appearance, and are really marks of disrespect to the organization and audience. This rule applies whether the conductor be standing or sitting.
7. Practice the exercises with the metronome ticking, setting it at different degrees of speed. This will help to attain steadiness of beating and impress upon the mind the various speeds in tempo.

MOVEMENTS OF THE BATON (EXERCISE I)

1. On the command "Ready" let the arm be bent at the elbow joint, the forearm inclining upward toward the left so that the hand, grasp-

ing the baton, is thus brought on a level with the chin, from which it should be separated at the distance of about six inches. By this movement the baton should be brought to an upright position parallel with an assumed line drawn downward between the eyes to the chin.

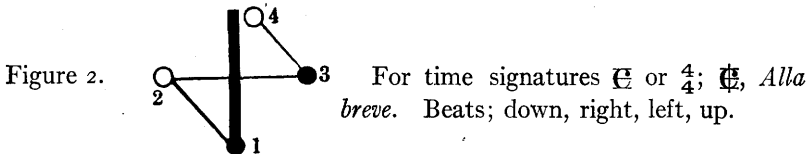
2. Command "One," bring the baton down smartly in a straight line to rest, at the waist line, from which the forearm, hand, and baton will extend outward; "Two," beat upward, thus returning to the original position.



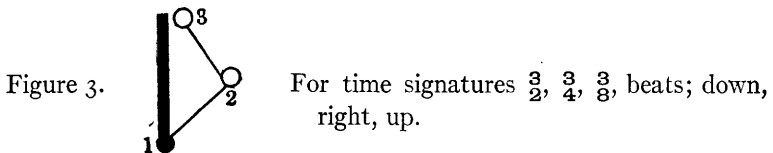
(NOTE. — Leading metrical accents are indicated ●; secondary accents, ○).

3. This exercise, marking two beats to the measure, should be practised until the movements are performed with graceful precision. This rule applies to all succeeding exercises.

4. Command "One," beat down to waist line; "Two," beat, slightly diagonal, across the body to the left; "Three," across the body, straight to the right; "Four," beat to the left, until the hand comes to position in front of the face.

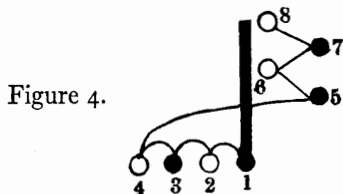


5. Command "One," beat down as before; "Two," beat diagonally upward to the right; "Three," beat diagonally upward to the left, and come to original position.



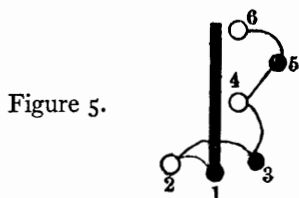
NOTE. The foregoing indications are for tempo at normal speed. Occasionally the time is slowed down to such an extent that the number of beats in each measure must be doubled; thus for $\frac{2}{4}$ or $\frac{3}{4}$ in slow time the beats will be as in Figure 2. For eight beats, slow $\frac{6}{4}$, $\frac{4}{4}$ or $\frac{3}{2}$ the indications will be, to leading accents by movement of the forearm, to subordinate accents by slight wrist movements.

6. Command "One," beat down; "Two," slight wrist movement to the left, baton describing a small semicircle; "Three," direction still to the left, larger semicircle, to accent ●; "Four," slight wrist movement, still to the left; "Five," long sweep by forearm across the body to the right to accent ●; "Six," a short diagonal beat upward to the left; "Seven," a similar beat to the right to ●; "Eight," beat diagonally upward to first position.



For time signatures $\frac{6}{4}$, $\frac{4}{4}$ or $\frac{3}{4}$ (all in very slow time.)

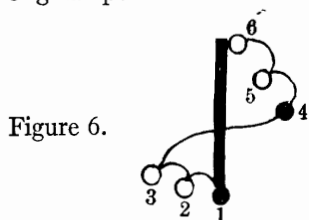
7. Command "One," beat down; "Two," slight wrist movement to left; "Three," a curve by the forearm to the right; "Four," short curve, wrist movement, upward to left; "Five," short diagonal beat upward to right; "Six," curve upward inclining to the first position.



For signatures, $\frac{3}{2}$, $\frac{3}{4}$, $\frac{3}{8}$ in very slow time.

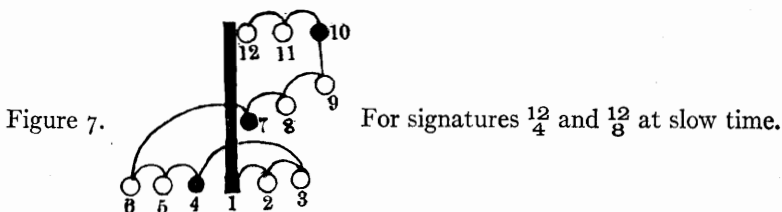
8. Compound duple time signatures are $\frac{6}{4}$, $\frac{6}{8}$, $\frac{12}{4}$, $\frac{12}{8}$, which, at average speed tempo, may be indicated as at Figures 1 and 2. But, in slow time, the beats differ, being divided by wrist movements.

9. Command "One," beat down; "Two," and "Three," wrist movements to the left; "Four," by forearm across the body to the right; "Five and Six," wrist movements inclining inward, and upward, to original position.



For signatures $\frac{6}{4}$ and $\frac{6}{8}$ at very slow time. (Compare with Par. 7, which, also, indicates six beats to the measure.)

10. Command "One," beat down; "Two" and "Three," wrist movements to the right; "Four," swing of forearm to the left; "Five" and "Six," wrist movements to the left; "Seven," swing of arm to the right across the body; "Eight" and "Nine," wrist movements to the right; "Ten," direction straight line upward; "Eleven" and "Twelve," wrist movements toward original position.



11. Exceptional time signatures as $\frac{5}{4}$ or $\frac{7}{4}$ are beaten according to the rhythmic contents of the measure. At times, for $\frac{5}{4}$, two beats then three, or vice versa, three beats then two. In $\frac{7}{4}$ the divisions may be four then three, or three then four.

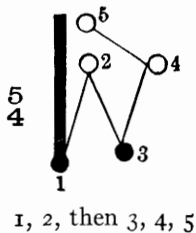


Figure 8.

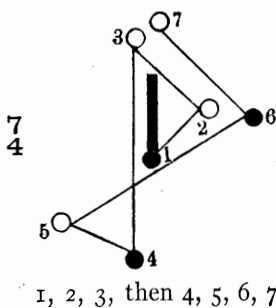
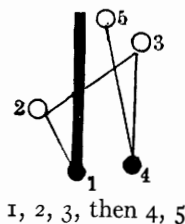
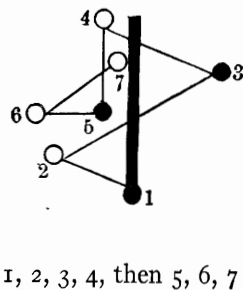


Figure 9.



Practice, care, and experience are required to attain the faculty for maintaining steady tempo, which, in march and dance music, is absolutely indispensable. But, while unmeaning vacillations of time in other and more serious classes of music are reprehensible, it must be

fully understood and appreciated that musical aesthetics demand variations, fluctuations, and modifications of tempo, as certainly as they require undulations in height and depth, or sharp contrasts in pitch, or changes of dynamic intensity for the expression of their beauties. Sometimes changes, that is, modifications, are indicated by use of certain qualifying terms, and those the director is bound to understand and to develop their full significance in performance. At other times, though not noted, there appears a quality in the music which appeals to the director with temperament. It grips him, and willy-nilly, he cannot resist the impulse to modify the tempo in order to create concord of sentiment between speed, intensity, pitch, color, and melodic flow. To disregard the potency of such complete union, to exaggerate or undervalue any one or more of those qualities amounts to perpetration of an offense against art. The stiff, pedantic director who rigidly adheres to metronomic accuracy is an offender of that type, and, no matter how perfect other qualities may be developed, the impression created by the performance under his control is unsatisfactory, for grace of outline is marred and internal emotional impulse lies undeveloped. On the other hand, the erratic director, who constantly varies time in manner such as neither logic nor sentiment can justify, is equally if not more guilty than the former, whose renderings, if chilly and stiff are, at least, chaste. Performance by the director of erratic tendency savors of the influence of liquors freely but unwisely imbibed, displaying that unsteadiness of tempo, which Schumann likened to the "shambling gait of a drunken man."

Extremes must be avoided and performances of compositions by band or orchestra should present concrete evidence to auditors that the director has studied his score, is fully in accord with every phrase and phase of its sentiment, and brings to its rendition fine intelligence, reasonable interpretation, and warmth of an artistic temperament.

The rules and remarks on time beating, above laid out, deal with the operations of the right arm and hand, by which the baton is caused to make out certain patterns to indicate definite time signatures, their accentuation, and speed of tempo. As previously intimated, there should be no waste of movement, intelligent conservation of energy must regulate it. Even though the mechanical operation be incessant and tiring, there are still many indications necessary for guidance which must be expressed by means other than supplied by use of the baton. Those auxiliary aids may be furnished by use of the left

hand, each movement of which should be pregnant with meaning. Unless the left arm and hand be required to convey some signal of warning, or encouragement, they should remain quiet at their normal position. But when their employment is required, the action should be prompt, decisive, and graceful.

A system of signals for the left hand, to be practiced by directors and understood and obeyed by musicians, has never yet to the knowledge of the author been devised. The usefulness of such a system cannot be gainsaid, neither should the attempt to plot one be frowned upon as unnecessary because musicians past and present have got along without it. Experience of the writer has demonstrated that certain timely movements of the left hand may be made eloquent and effective in results, once musicians have grasped the significance of the signals which their director makes, and his purpose in making them.

The following are advanced merely as suggestions:

1. For a *crescendo*, let the hand and arm start from the normal position and more or less gradually, assume an extended position, in line with the head, the hand being held open palm up. If the crescendo is to be abruptly terminated, turn the hand, thumb up, and let hand and arm fall swiftly to the normal position with knife like cleavage of the air.
2. For *decrescendo*, extend hand, palm down, and arm in an elevated position and cause it to descend as required slowly, or quickly, to normal.
3. For the *puntato*, elevate the hand, extend the index finger, close the thumb and other fingers, then employ the index finger as though actually plucking a stretched string. The hand should be held with the thumb closed over the 2nd, 3rd, and 4th fingers, the latter being in the lowest position.
4. For the *staccato*, turn the hand, knuckles down, and cause the extended index finger to imitate the act of striking a key on a pianoforte.
5. To correct intonation, if certain instruments be "too flat," extend the hand, palm up, in direction of the delinquents, and motion as though lifting a weight; if "too sharp," turn the hand palm down, and act as though pressing, say, a piston down. Let each of the motions be executed by a series of jerks until the desired effect be attained.
6. To play with more force or precision, extend the arm, close the fist, and make intermittent motions as though punching some object.
7. To secure better balance of tone, raise and extend the arm, with hand open, palm down, and exact a smoothing process, by moving the

hand laterally right and left, until the caution has become effective.

8. For improved legato, or slurs, extend hand and arm at convenient elevation at an angle with and somewhat to the left of the body, and perform a series of undulatory movements, to the right, then back to the left, repeating as often as necessary.

9. Acquire the power to use the eyes as means of control in connection with the foregoing motions or signals. It is a physiological fact that concentration of the eyes — that is, looking fixedly on some one or more persons — will eventually attract attention. Precisely at that moment — the meaning of the signals having been previously explained — the cautionary movements will be understood and obeyed.

The foregoing are some of the expedients that may be employed to assist the director to maintain control over his musicians, when as a result of his position he cannot rap his stand to gain attention nor make verbal demands for better observance of certain details of performance.

But, after all, and in spite of the aids above suggested, it remains as a fact, that the less display a director makes in public of the means by which he maintains control of his musicians, the greater will be the credit given to him for possession and exercise of that power. Charlatanism and mountebank tricks in directing may delude certain unthinking persons and lead them to believe that without such erratic gyrations and genuflexions the band or orchestra, as the case may be, could not give a decent performance; but the intelligent are differently impressed. They reasonably infer that if such abnormal actions be necessary in public, the director has failed in his duty in the rehearsal room. There is no extravagance in true art. A modest but confident, firm, masterful demeanor on the part of a director when he appears before the public affords sure indication that his preparatory work "behind the scenes" has been faithfully performed.

The director should know his "score" so thoroughly that at a public performance his mind will be free to observe the work of his musicians. He will know all its details, and be watchful for entries at the proper moment, for correct nuance and emphases, enunciation, dynamic intensities, phrasing and many other details of the composition. The fact that he is on the alert and knows every requirement of the score spurs his men to do their work well, and his confidence inspires them to achieve high results in performance.

Finally, students are advised to read works by Berlioz and Wagner on "Conducting."

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