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THE TECHNIQUE OF ORCHESTRATION

Second Edition

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PREFACE

This second edition, which appears some eighteen years after the first, is prompted partly by the need to bring information on instruments and orchestral practice up to date, partly by the desire to make certain changes and additions calculated to give the book greater clarity and completeness. Portions of it have been reorganized; a chapter on special devices has been added; the chapter on infrequently used instruments has been made more comprehensive; and considerable material (including examples) on twentieth-century developments in orchestration has been inserted, especially in the chapter on scoring for full orchestra.

As in the first edition, the emphasis is on the practical fundamentals of orchestration. No attempt has been made to give a detailed account of the construction of instruments, and historical background has been included only where it seemed essential to an understanding of the modern instruments or of scores of an earlier period.

Since most orchestration classes include students who are majoring in music education and who will be working with high school orchestras, certain problems involved in scoring for such groups are mentioned from time to time, and a short chapter is devoted to that subject.

It seems self-evident that a knowledge of various styles of scoring must be gained principally through a direct study of scores themselves. Consequently, this aspect of orchestration has been left largely in the hands of the individual teacher, to be undertaken as scores of different periods are taken up in class. Some thoughts concerning this phase of the work are included in the "Suggestions for the Use of This Book" that follow.

orchestral instrument on the staff of the University of Texas at Austin about questions that arose during the writing of this book. His profound thanks go to all these colleagues, past and present, whose number is now such that individual acknowledgments are unfortunately ruled out. He would also like to reaffirm his gratitude to the following persons who read the original manuscript or major portions of it and who contributed suggestions: Dr. Bjornar Bergethon, Dr. J. Frank Elsass, Harvey Biskin, Louis Lane, Mrs. Janet McGaughey, Dr. Paul Pisk, Karl Van Hoesen, and Clifton Williams. In the preparation of this second edition, similar invaluable help has been received from Gayle and Wayne Barrington, George Frock, Charles Gigante, Dr. Gordon R. Goodwin, Dr. James Riley, LaFalco Robinson, and Andor Toth.

Kent Kennan

SUGGESTIONS FOR THE USE OF THIS BOOK

Certain changes in the order of material in this book are possible. Some of these are the following:

Chapter 11 (Problems in Transcribing Piano Music) might well be taken up earlier, most logically following Chapter 4. Use of that order has the advantage of preparing students almost from the start for certain problems they will encounter sooner or later in working from piano music. If time is limited and the instructor feels that it is more important to move on to a study of the other instruments than to make actual assignments based on Chapter 11 at that point, he may wish merely to go over the material of the chapter in class; further study of this aspect may be undertaken later if time allows.

Chapters 13 and 14, on percussion instruments, could be introduced after Chapter 9. The same is true of Chapter 15, which is chiefly about the harp.

The section in Chapter 5 on the piccolo, English horn, bass clarinet, and contra bassoon might be delayed until later instead of being presented along with the material on the other woodwinds.

The section in Chapter 4 on string harmonics (always a difficult subject for the student) might also be taken up later as a separate project after the student has had more time to become familiar with the workings of stringed instruments and when he is not so busy absorbing the more basic information.

Chapter 18, on infrequently used instruments, is included chiefly for purposes of reference in the more advanced stages of orchestration study and

which should be covered if Chapter 19 on scoring for high school orchestra is assigned.

Since much of the most important material on orchestration can be learned through a study of symphonic scores, it would seem best to equip the student for score reading as quickly as possible. With that end in mind, the author recommends moving fairly rapidly through the first nine chapters of this book rather than dwelling very long on any one of them. Once the student has acquired enough knowledge of all the instruments to undertake score reading, it is always possible to return to individual instruments or sections for more concentrated work.

As far as the choice of music for score study and listening is concerned, the author feels that shorter works are preferable—at least in beginning orchestration courses, where time is generally at a premium. The student can grasp the essential characteristics of Mozart's orchestration about as well from the Overture to *The Marriage of Figaro* as he can from the C Major Symphony ("Jupiter"), for example, and the choice of shorter works allows for the study of more scores of various styles within the allotted time. As a minimum program of score study, one work from each of the following groups is suggested:

1. Haydn, Mozart, Beethoven
2. Tchaikovsky, Rimsky-Korsakoff, Wagner
3. Debussy, Ravel
4. Richard Strauss

There are, of course, many other composers (including contemporaries such as Stravinsky, Hindemith, and Bartók) whose music may also be included if time permits. Following are a few of the many scores that might be used for class study and listening:

Mozart, Overture to *The Marriage of Figaro.*
Beethoven, *Leonore* Overture No. 3; *Egmont* Overture; *Coriolanus* Overture.
Weber, *Oberon* Overture; *Der Freischütz* Overture.
Tchaikovsky, *Romeo and Juliet.*
Rimsky-Korsakoff, *Capriccio Espagnol.*
Wagner, Prelude to *Die Meistersinger;* Prelude to *Parsifal;* Prelude and Love Death from *Tristan und Isolde;* Overture to *Tannhäuser.*
Debussy, *Prelude to The Afternoon of a Faun.*
Ravel, *Bolero; Le Tombeau de Couperin; Mother Goose* Suite.
Strauss, *Till Eulenspiegel; Don Juan; Death and Transfiguration*
Stravinsky, *Fire Bird* Suite.

In this list, shorter works of the composers represented have been chosen wherever possible, for reasons mentioned earlier. As for longer or more

Berlioz, *Fantastic Symphony.*
Mussorgsky-Ravel, *Pictures from an Exhibition.*
Tchaikovsky, Symphonies No. 4, 5, and 6.
Franck, Symphony in D minor.
Brahms, the Symphonies.
Mahler, the Symphonies.
Debussy, *Ibéria; La Mer; Nocturnes.*
Ravel, *Daphnis and Chloe* Suite No. 2.
Stravinsky, *Petrouchka; The Rite of Spring;* Symphony in Three Movements.
Prokofieff, Symphony No. 5.
Hindemith, Symphony: *Mathis der Maler.*
Bartók, Concerto for Orchestra.
Schönberg, Variations for Orchestra, Op. 31.

At the end of many chapters in this book, suggestions for listening are given. These involve passages from symphonic music that make prominent use of the individual instruments or groups discussed in the respective chapters.

Also valuable for listening purposes are the numerous commercial recordings that give, on one or two disks, characteristic passages for all or most of the orchestral instruments. Some of these recordings are listed here. They (or portions of them) may be presented as they become pertinent to the material being studied.

Britten, *The Young Person's Guide to the Orchestra.* Columbia ML 4197. Variations and fugue by Britten on a theme of Purcell illustrate the various instruments. Liverpool Philharmonic Orchestra, Sir Malcolm Sargent, conductor.

First Chair. Columbia ML 4629. Soloists with the Philadelphia Orchestra, Eugene Ormandy, conductor.

The Complete Orchestra. Music Education Record Corporation, Columbia transcription, XTV 25861–25870. Wheeler Beckett Orchestra of New York, with comments by the conductor.

The Composer and His Orchestra. Mercury, SR-90175. Eastman-Rochester Orchestra, Howard Hanson, conductor and narrator. Examples from Hanson's *Merry Mount* Suite, which is also recorded in its entirety.

Instruments of the Orchestra. Capitol-Angel, HBZ-21002 (mono only), Music Educator's Series. Various artists; commentary by Yehudi Menuhin. For use in elementary and secondary education.

The Instruments of the Orchestra. Vanguard, VRS-1017/8. First desk men of the Vienna State Opera Orchestra, David Randolph, narrator.

Instruments of the Orchestra. Victor, 20522A. Members of the National Symphony, Howard Mitchell, conductor.

Meet the Orchestra. Bowmar Records, 122. Sound-Filmstrip Set. Study prints (# 121) and full color posters of instruments (#123) also available. Intended primarily for use in elementary and secondary education.

In planning this book, the author had in mind a year's course in orchestration. When the book is used for a course of only a semester's length, even a cursory covering of all the material in it will probably not be feasible. The decision as to what material to stress and what to pass over lightly (or omit altogether) must rest with the individual teacher and will be determined by the particular needs of his students.

Actual music to be used for the exercises in scoring is not included in this volume but is available in *Orchestration Workbook I* and *Orchestration Workbook II*, also published by Prentice-Hall, Inc.

CONTENTS

THE TECHNIQUE OF ORCHESTRATION

Chapter 1

INTRODUCTION

How does one go about learning orchestration? In the first place, there is a certain amount of factual information that must be acquired. Under this heading come the following:

Names of instruments and orchestral terms (including Italian, French, and German equivalents, because many scores are printed in these languages);
Order of instruments on the page;
Ranges of instruments;
Proper notation, including transpositions and special clefs;
General technical abilities and limitations of each instrument (although this does not necessarily involve the ability to *play* the instruments);
Principles of combining and of balancing instruments;
Characteristics of various "schools" of scoring.

This material can be learned from classroom explanations, from books, from talks with orchestral players or demonstrations by them, and from a close study of orchestral scores.

But there is another type of information, which can be learned only by careful and frequent listening (along with score-reading) over a considerable period of time. In this category might be listed a knowledge of these things:

The characteristic tone quality of each instrument;
The sound of various instruments in combination;
The sound of special effects.

The point here is that tone colors cannot really be described adequately

is "dark" in its lower register, but until one has actually heard the sound in question and impressed it on his "mind's ear," he has no real conception of that particular color for purposes of orchestration. Not everyone seems to be equally endowed in the matter of aural memory and aural imagination, but these qualities can be sharpened by practice.

Once this information has been acquired, it must be applied in actual exercises in scoring—transcriptions of piano or organ music or of music for instrumental groups, and so on. Students who are composers will want to go on and write directly for orchestra. That is obviously the ideal situation, in that the musical ideas are conceived with the orchestral instruments in mind, but we cannot very well expect all students to be composers. Besides, the ability to *transcribe* for orchestra is one of the most usable and important skills to be gained from an orchestration course.

It is assumed that students who are studying orchestration from this book have already had a thorough training in harmony. The writer's experience indicates that poor scoring on the part of students is more often the result of a failure to understand harmonic and general musical structure than of a faulty knowledge of orchestration. Unless the principles of good voice-leading, spacing, and doubling are applied in an arrangement, no amount of clever orchestration will make it sound well; and without an understanding of harmonic content and form, intelligent scoring is impossible. In orchestrating, it is of the greatest importance to think in terms of *lines* rather than in terms of isolated notes. Otherwise the total result will be confused and the individual players' parts will be unmusical and ungrateful to play.

Finally, it cannot be stressed too strongly that accurate workmanship, attention to detail, and a practical approach are all parts of successful orchestration. Anyone who has witnessed an orchestra rehearsal where time was wasted and tempers strained because of mistakes in the players' parts will know how costly and serious inaccuracy can be. As for attention to detail, there are a thousand small points involved in scoring—points that may seem trivial but that, taken all together, make the difference between scoring that comes off in performance and scoring that does not. This all ties in, of course, with a practical approach, which involves the ability to achieve the maximum effect with the simplest means. Orchestration is not a nebulous sort of business conditioned sheerly by "artistic inspiration" but, to a large extent, an intensely real and down-to-earth technique.

Although the terms *orchestration* and *instrumentation* are sometimes used synonymously, it might be well to point out a distinction in meaning that is generally made by musicians and that is observed in this book. Orchestration has to do with the actual process of scoring music for orchestra. Instrumentation, on the other hand, usually refers to a study of individual instruments—their construction, history, abilities, and so on. Sometimes

the word is also used in connection with the list of instruments required for a particular piece of music, as when we speak of "the instrumentation" employed in an orchestral work. Of course, anyone who sets out to learn orchestration must, in the process, learn a good deal about instrumentation. There is, then, a certain amount of overlapping between the two terms, in the sense that the second is included (at least partially) in the first.

In order to gain a general perspective before concentrating on individual instruments and sections of the orchestra, we are going to take time in this chapter for a brief look at the orchestra as a whole. "Orchestra" here means symphony orchestra but even that term is rather lacking in precision, because symphonic groups vary considerably in size and make-up. The table that follows lists the orchestral instruments and shows approximately how many of each are likely to be found in orchestras of various sizes. Parentheses around a number mean that the instrument in question may or may not be included.

The celesta and piano, though not regular members of the orchestra, may be used with any of these groups and, like the harp, are "extras," which do not belong to any one of the four sections shown.

		Small Orchestra	*Medium-sized Orchestra*	*Large Orchestra*
Woodwind Section	Piccolo		(1)	1
	Flute	1	2	2 or 3
	Oboe	1	2	2 or 3
	English Horn			1
	Clarinet	1	2	2 or 3
	Bass Clarinet			1
	Bassoon	1	2	2 or 3
	Contra Bassoon			1
Brass Section	(French) Horn	1 or 2	4	4 to 6
	Trumpet	(1)	2 or 3	3
	Trombone	(1)	3	3
	Tuba		1	1
Percussion Section	Percussion	2*	3*	4 or more*
	Harp	(1)	(1)	(1) or (2)
String Section	1st Violins	4 to 8	8 to 12	12 to 16
	2nd Violins	3 to 6	6 to 10	10 to 14
	Violas	2 to 4	4 to 8	8 to 12
	Cellos	2 or 3	3 to 6	6 to 10
	Double Basses	1 to 3	3 to 6	6 to 10

* These figures indicate the number of percussion players, including the timpanist.

Orchestras even larger than the "large orchestra" described here are sometimes called for (by Stravinsky, Strauss, and Mahler among others). In such cases, woodwinds in fours are generally required: piccolo, three flutes; three oboes, English horn; E♭ clarinet, two B♭ clarinets, bass clarinet; three bassoons, and contra bassoon. In order to supply this instrumentation, most of the major orchestras in this country have extra woodwind players on call.

Each section may play by itself or be combined with one or more of the other sections. When sections are combined, they may take the same musical material or different material. Sometimes only one instrument of a section is used, along with part or all of another section. If all the instruments of the orchestra, or most of them, play, the combination is known as a *tutti* (the Italian word for "all").

The fourth section, the percussion, is most often used for rhythmic support of other instruments, although now and then it can perform on its own to good effect.

The order in which the instruments are listed above is a standard one, which is always employed in modern scores. If an instrument is not included in a score, it will not be listed on the page, but those instruments which *are* used will still follow the standard order. In most scores, all the instruments to be used are included on the first page, whether they play at that point or not, but on succeeding pages, instruments that do not play may be omitted from the listing. When a solo instrument is involved (as in a concerto), its part is normally placed directly above the strings. The same is true of piano, celesta, and choral parts. The examples in Chapter 16 show the appearance of a page of orchestral score.

A note of explanation is necessary concerning the system used in indicating ranges throughout this book. The limits of the extreme possible range are shown in open notes, the limits of the practical or commonly used range in black notes. The reason for this distinction is that nearly every one of the orchestral instruments has notes at the bottom and/or the top of its range that, because of technical difficulties or doubtful intonation or both, are little used and then only under certain conditions. It must be remembered, though, that there is no sharp dividing line between the practical registers and the extreme possible registers, particularly since players and instruments vary. Consequently it is extremely difficult to fix exact limits for each practical range.

Although the historical development of the orchestra is not within the scope of this book, a few brief comments on that subject may help to put the present-day orchestra into better perspective.

Before the seventeenth century, composers for instrumental groups did

to do so were Giovanni Gabrieli (ca. 1557–1612) and Monteverdi (1567–1643); the latter was also an innovator in the use of special orchestral effects. By Bach's time it was usual to specify the instruments involved, but little or no distinction (apart from that of range) was made between them or, for that matter, between parts for instruments and parts for voices. Furthermore, there was as yet no standardized instrumentation; that concept was not fully in evidence until the Classical period. By the early nineteenth century, the orchestra had evolved into a more or less standard group: two flutes, two oboes, two clarinets, two bassoons, two horns, two trumpets, two timpani, and strings (the latter subdivided as they are today but fewer in number).

SUGGESTED ASSIGNMENT

Know:

1. the four sections of the orchestra.
2. the names (in English) of the instruments included in each section.
3. the number of each instrument commonly included in the "medium-sized" orchestra.
4. the format used in indicating ranges throughout this book.

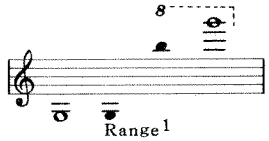
Chapter 2

THE STRINGS

THE VIOLIN

Italian:	Violino	*French:*	Violon	*German:*	Violine
(Plural)	Violini		Violons		Violinen

Ex. 1



The violin's four strings are tuned to the following pitches:

Ex. 2

These are known as the "open" strings, that is, the strings as they are when not stopped by the fingers. A chromatic scale upward is obtainable on each string by stopping the string at the appropriate points. Normally a note is

[1] All the string ranges given in this chapter may be extended upward by the use of

played on the nearest string below it; for example, the note  would usually be played on the D string. However, the G string might be chosen in certain cases in order to maintain the particular color of that string throughout a passage or to avoid a change of position. This same principle is sometimes used in connection with the D and A strings. Although notes more than a 10th above the pitch of each open string are seldom used on any one of the three bottom strings, the top string is necessarily called upon for very high notes.

Normally, the choice of string rests with the player, a particular string being indicated only in cases where a choice other than the normal one is involved. The strings are sometimes designated by Roman numerals, starting with the E string as "I" and working down. Thus, "on the G string" is often indicated by "IV" placed above the first note to be taken on that string and followed by a dotted line to show how far the direction is to apply. Another way of indicating the same thing is to write *sul G* (literally, in Italian, "on the G") above the passage. The German equivalent is *G Saite*, *Saite* meaning string.

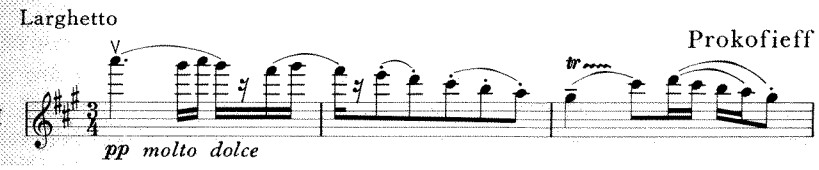
As for the colors of the various strings, the G string is characteristically full, rich, and rather dark in quality. From about  upward, its tone becomes curiously intense, as if charged with emotion. The D string is less dark and full, the A considerably brighter, and the E especially brilliant and penetrating.

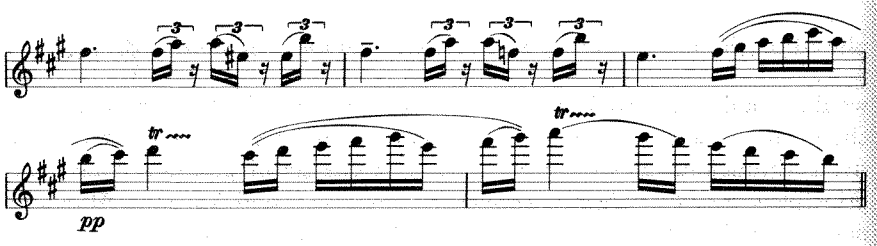
Each of the following examples illustrates the use of a particular string of the violin. Of course not all melodies lie entirely on one string, as these do; the great majority, in fact, require changes from one string to another.

EXAMPLES SHOWING THE USE OF PARTICULAR STRINGS OF THE VIOLIN

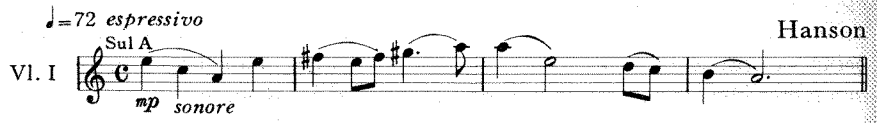
Ex. 3

(a) E string: *Classical Symphony*

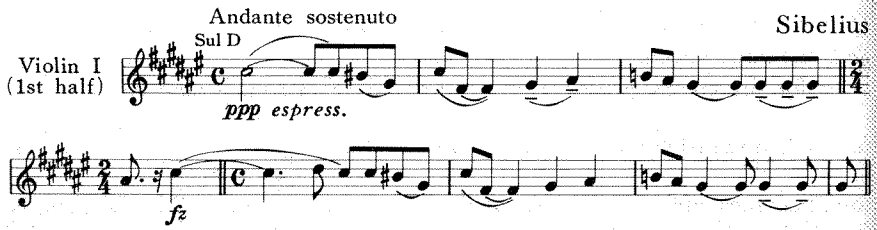




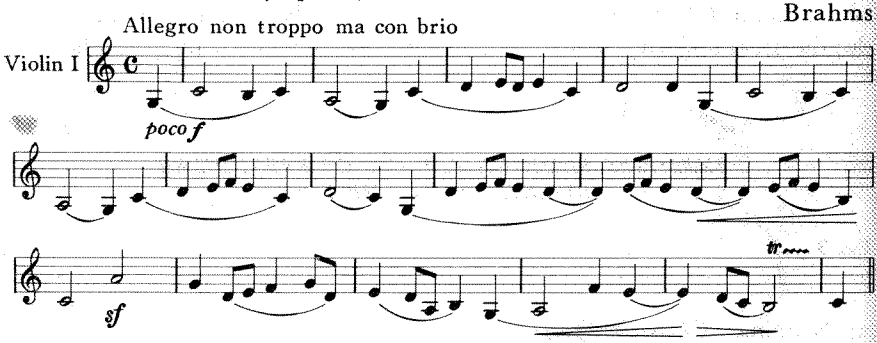
(b) A string: Third Symphony



(c) D string: Second Symphony

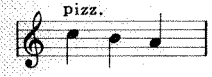


(d) G string: First Symphony

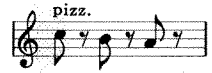


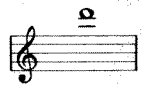
Stringed instruments may be either bowed or plucked. For these two effects the Italian words *arco* (bow) and *pizzicato* (picked or plucked) are used. *Pizzicato* is usually abbreviated to *pizz.* and written above the staff, over or near the first note of the passage concerned. When the player is to return

tions are important and must be included by the orchestrator. However, since the normal method of tone production on stringed instruments is by means of the bow, *arco* need not be included unless there has been a pizzicato passage just previously. For example, if a work starts out with a bowed passage, no *arco* direction is needed. It is not customary to use dots (to indicate short notes) in pizzicato passages; if the pizzicato direction is there, the notes will automatically be short to some degree although (particularly in the case of the double basses and the cellos, with their greater resonance) notes that are not too high can be made to ring somewhat, especially if *vibrato* is used. Under normal circumstances, the easiest notation of time values is employed, rests being omitted wherever possible; for instance,



rather than



But the second notation, accompanied by the direction *secco*, might be used if an extremely short, dry pizzicato were desired. And in passages involving longer values where the notes are to be allowed to ring, half notes or even whole notes would be helpful in suggesting that effect. (Usually the direction *vib.* is included in such cases.) As a rule, it is best not to write pizzicato passages for the violin above about  ; higher notes played pizzicato are so thin and lacking in resonance as to be ineffective for ordinary purposes. It is important to remember that there is a limit to the speed with which successions of pizzicato notes can be performed, and that very rapid changes from arco to pizzicato (or vice versa) are awkward, even impossible beyond a certain speed. Changes of this sort that must be made with scarcely any rest between the last arco note and the first pizzicato note are somewhat easier if the last arco note can be taken "up-bow" so that by the end of the bow-stroke the player's hand is close to the strings and in position to play in pizzicato fashion. Lefthand pizzicatos, though not uncommon in solo violin literature, are seldom used in orchestral parts. The usual indication is a small cross above the note.

A few names for particular parts of stringed instruments come up frequently in orchestration work. The *fingerboard* is the part of the instrument on which the fingers stop the strings. The *bridge* is a small piece of wood that keeps the strings raised and in place above the main body of the instrument. Parts of the bow that are often referred to are the *frog* (or *nut* or *heel*), which is the portion nearest the player's bow hand, and the *point* or *tip* at the opposite end. Special effects involving these and other terms are discussed later on.

A *vibrato* is normally used in playing stringed instruments and is produced

the tone is "white" and lacking in expressiveness and warmth (although this very sound is occasionally used for a particular effect in orchestral music). Because a vibrato cannot be produced on an open string,[2] players usually

Studio Gilmore, Austin, Texas

Double Bass Viola Violin Violoncello

[2] Except by artificial methods, usually involving sympathetic vibration between the open string and another string fingered with vibrato at the pitch of the open string.

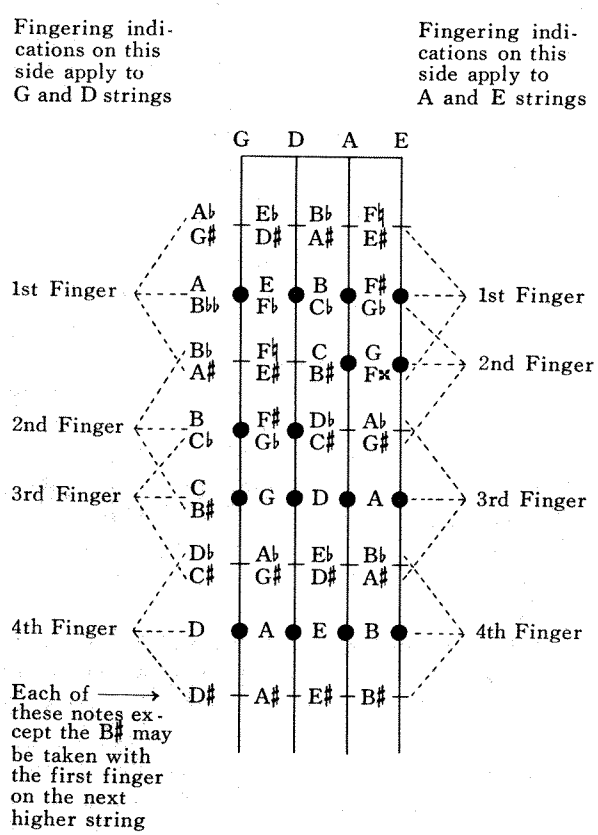
avoid the open strings in slow, *espressivo* passages where the difference in tone quality would be too apparent. A further disadvantage in such cases is that the open strings tend to ring and to be louder than stopped tones. The alternative to playing an open tone is to take the same pitch as a stopped tone on a lower string, though this is obviously not possible with the lowest open string of each instrument. The symbol for an open string is an "O" above the note (not to be confused with the symbol for a natural harmonic, which is smaller and perfectly round; harmonics will be discussed in a later chapter). The numbering of the fingers in string writing may be mentioned in passing, because it is invariably confusing to pianists. The index finger is "1"; the middle finger is "2"; and so on. Since the thumb does not figure in the stopping of the strings, no symbol is needed for it.

One frequently hears string players speak of taking a passage "in first position" or in some other position. Perhaps a few examples will serve to explain this concept of position, which is basic to string technique. If the player's left hand is placed on the D string with his first finger on E and the other fingers ready to play F, G, and A (or F♯, G, and A, or other chromatic variations of these basic pitches), he is said to be "in first position on the D string." If he were in first position on the A string, his first finger would rest on B (or B♭, or in rare cases B♯). For second position on the E string, the first finger would rest on G; for third position on the G string, it would be on C, in each case with the other fingers on (or over) the three notes immediately above. The first, third, and fifth positions are easier and more natural than the second and fourth and are consequently chosen more frequently. Positions higher than the fifth are seldom used on the three lower strings (except in solo writing), but higher positions are often needed on the E string. Although players can shift rapidly from one string to an adjacent one or from one position to another, sudden or repeated jumps *across* strings make for awkward string writing, as do sudden or repeated changes from one position to a distant position. A fingering chart for first position on the violin is given on page 12.

A point to remember, especially in writing for players of limited ability, is that the higher the player goes on a string, the closer together the notes lie on the fingerboard and the harder it is to play perfectly in tune. Because higher positions are not so often necessary on the three lower strings, the chief point of difficulty is in passages high on the top string. These can be written with safety for a professional group, but they are an almost certain invitation to disaster in a school orchestra. As a general rule it is safest not to go beyond third position in scoring for school groups. (See Chapter 19 for further comments on this subject.)

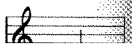
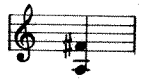
Fingering Chart

FIRST POSITION ON THE VIOLIN

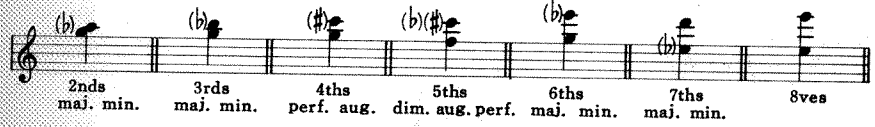


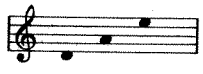
FINGERBOARD OF THE VIOLIN

Double, Triple, and Quadruple Stops

Although the violin is predominantly a single-line instrument, it is capable of playing two, three, or four notes at a time, provided that each note can be taken on a separate string and that the pitches involved can be fingered at once. If any of the notes can be played on open strings, that will make the fingering problem much easier for the player. It is obvious that two pitches cannot be played at the same time on the same string. For example  is impossible as a double stop on the violin because both notes would have to be taken on the G string. But  is quite easy, since the A can be played on the G string and the F♯ on the D string, the bow being drawn across both strings at once. The double stop  is even easier, because the D can be played on the open D string and the B on the A string. Of course the notes of a double stop must be playable on *adjacent* strings. The following may be considered practical upward limits for double stops involving intervals up to an octave (practical, that is, for the professional orchestra violinist of average ability):

Ex. 4



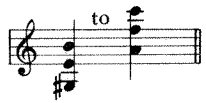
Of these intervals, 6ths are probably the most successful as double stops. Octaves, 5ths, and 4ths present a certain problem of intonation, since the slightest deviation from the correct pitch in either note is more apparent to the ear than it would be in such intervals as the 6th and 3rd, where the mathematical ratio between notes is more complex. Perfect 5ths, by the way, are played with one finger stopping both strings (assuming that open tones are not involved). Unisons, though rare, are possible and are sometimes introduced for the sake of added resonance and volume. They almost always involve an open string; that is, they are generally written on one of these three pitches:  For example, in  one of the A's would be played on the open A string, the other on the D string.

Double stops involving intervals larger than an octave are also possible in certain cases. Sometimes even such widely spaced double stops as  are used. Unwieldy as this may look to the pianist's eye, it is actually very simple, for the A is an open note and the D presents no problems. For purposes of orchestral writing, quick successions of double stops

out of the question. Usually, however, such passages are better arranged *divisi* (with the string group divided).

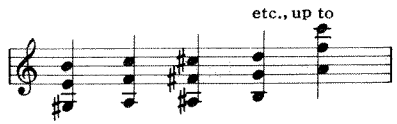
As for triple and quadruple stops, those which include at least one open string are the easiest and the most resonant, but certain other chord arrangements that contain no open note are also possible. Because of the curvature of the bridge, four notes cannot be played at exactly the same time. However, in quadruple stops the bow can be drawn so quickly over the strings that the effect is that of a four-note chord only slightly arpeggiated or broken. Examples 7 and 8 show the more commonly used three-note and four-note chords playable on the violin. (According to Forsyth, a complete catalog of all the chords possible on the violin would amount to nearly 1500 combinations!) The method used here in listing chords that contain no open notes may need a word of explanation. Instead of writing out all the possibilities in connection with each chord pattern, we have merely indicated them in the following manner:

Ex. 5



This particular example means that three-note chords arranged in this pattern are playable on every half-step within the limits shown:

Ex. 6

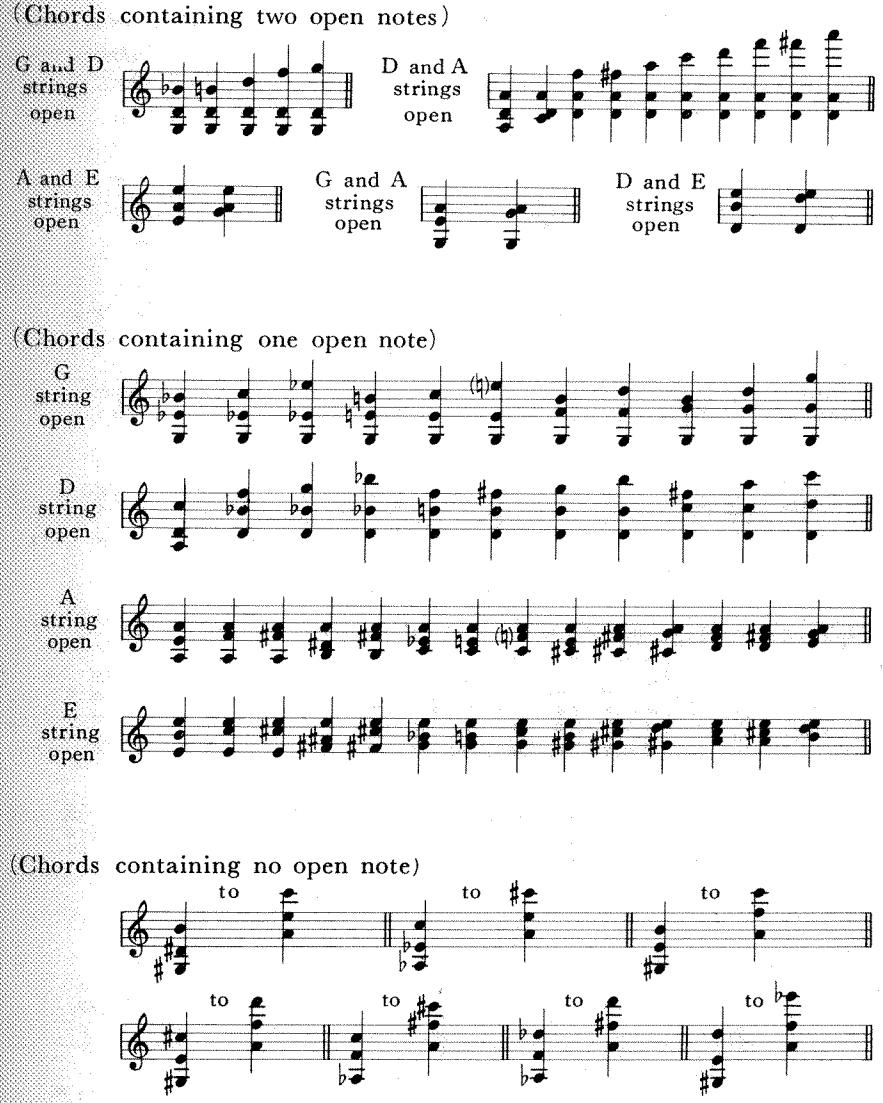


This and other upward limits given must not be thought of as hard and fast points above which the chords become impossible. All the patterns are possible in still higher positions, but at that level they become so difficult as to be impractical for normal orchestral use. The limits shown here are therefore intended merely as guides for practical usage.

Notice that the predominant intervals in these chord arrangements are 5ths and 6ths. Notice, too, that four-note chords which contain open notes in the middle with stopped notes on the outside are generally impractical

*THREE-NOTE CHORDS FOR THE VIOLIN (PARTIAL LIST)**

Ex. 7



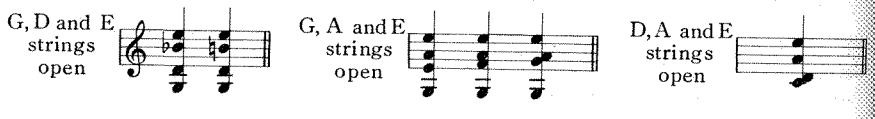
Note: Accidentals are written separately for each chord.

* This list has been limited to major and minor triads and dominant-type seventh chords

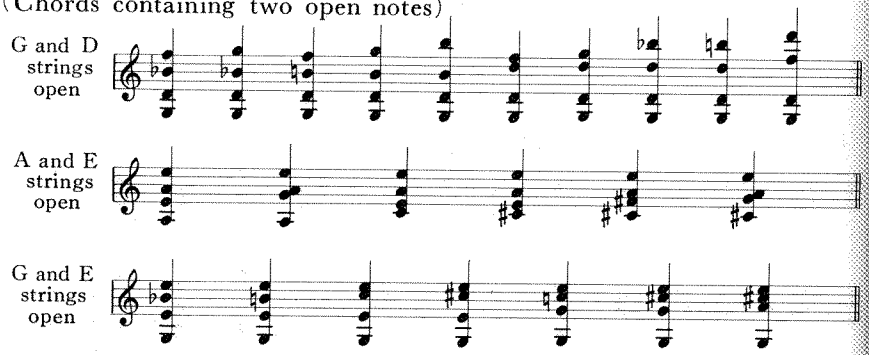
FOUR-NOTE CHORDS FOR THE VIOLIN (PARTIAL LIST)

Ex. 8

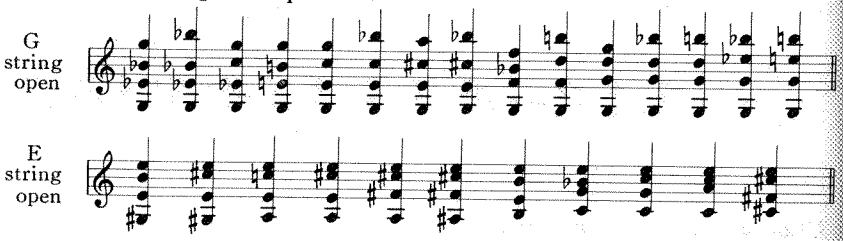
(Chords containing three open notes)



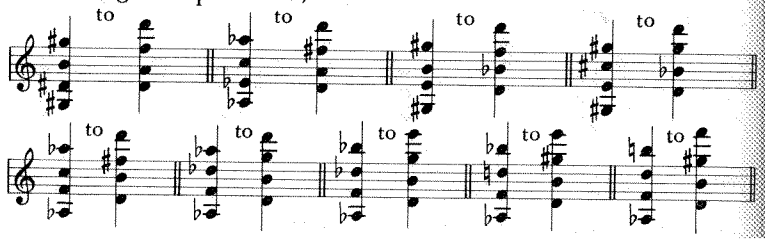
(Chords containing two open notes)



(Chords containing one open note)

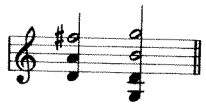


(Chords containing no open note)



Although double stops may be used effectively in sustained chords and at a low dynamic level, there is not much point in writing triple and quadruple stops except in fairly loud passages, usually in sharply detached chords where an extra degree of volume or accent is wanted. It is, however, possible to sustain the top note or the two top notes of a three-note or four-note chord:

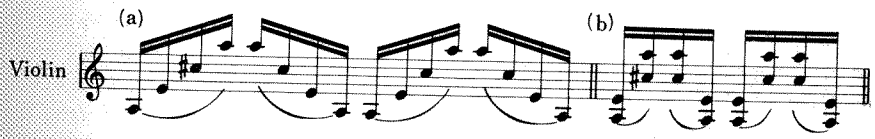
Ex. 9

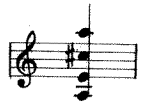


Even inner notes may be sustained, though that possibility is not of much practical use. Since the main objective in triple and quadruple stops is usually added resonance, those that contain one or more open tones are ordinarily the most effective, besides being the most comfortable to play.

Certain other string effects, although not technically triple or quadruple stops, depend on the same principle. For instance, in these passages,

Ex. 10



the player's fingers remain fixed on the quadruple stop  while the bow produces the particular effect called for.

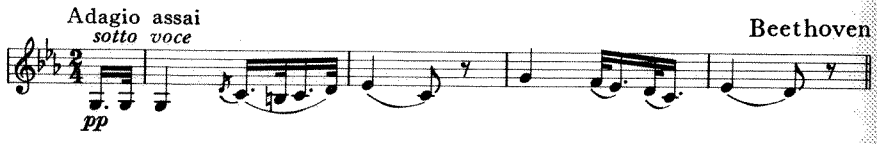
Examples 12(b) and (h) at the end of Chapter 3 illustrate the use of "multiple stops" (a term that may conveniently be used to apply to double, triple, and quadruple stops).

EXAMPLES OF PASSAGES FOR THE VIOLIN

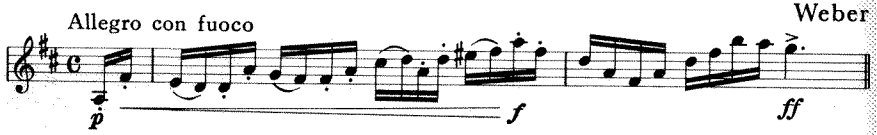
Ex. 11

(a) G minor Symphony

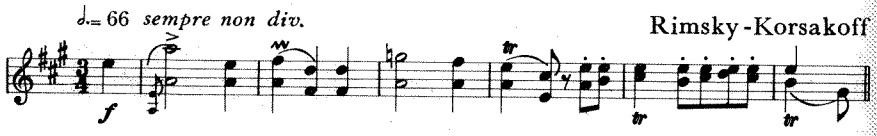
(b) Third Symphony



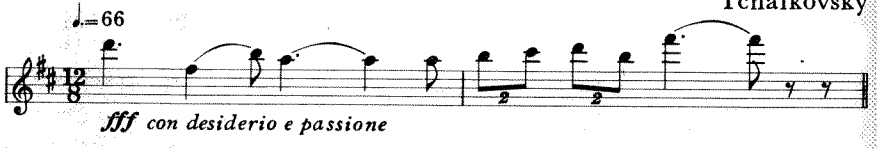
(c) Overture to *Oberon*



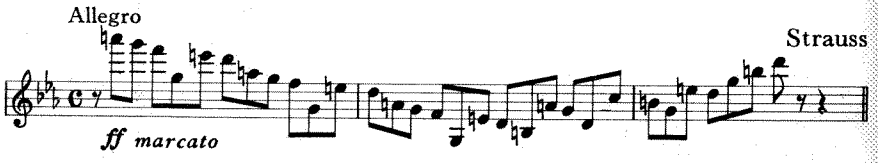
(d) *Capriccio Espagnol*



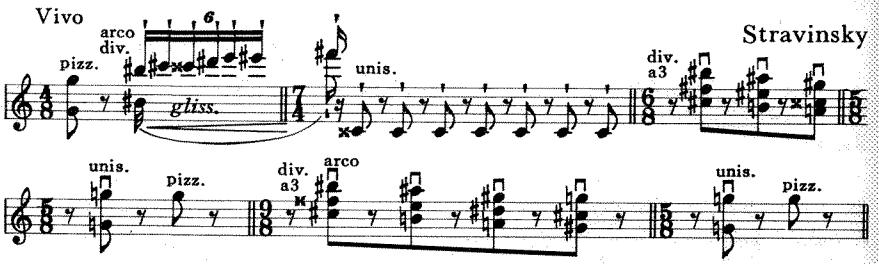
(e) Fifth Symphony



(f) *Death and Transfiguration*



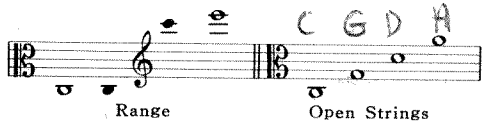
(g) *The Rite of Spring*



THE VIOLA

Italian: Viola, Viole — *French:* Alto, Altos — *German:* Bratsche, Bratschen

Ex. 12



If the material on the violin has seemed lengthy and detailed, there may be some consolation in the thought that much of it applies to the other stringed instruments as well. In the case of the viola, the chief differences to be considered are: (1) its greater size as compared with the violin; (2) its characteristic tone color; (3) its range; and (4) the use of the alto clef (viola clef).

It is not surprising that the uninitiated concert goer is apt to confuse the viola with the violin. Although the two look quite similar from a distance, the viola is somewhat larger and heavier,[3] and the distance between notes on the fingerboard is slightly greater than in the case of the violin. As for the characteristic quality of the instrument, someone once commented that the sound of the viola is to the sound of the violin what the flavor of duck is to the flavor of chicken. It is unfortunate that this attractive gaminess of tone is sometimes minimized in an effort to make the viola sound like the violin; there is no reason why the viola should not be allowed to assert its own distinctive personality.

For those who have not used the C clefs before, a note of explanation is necessary here. The alto clef,  , puts middle C on the middle line of the staff. The open strings of the viola, then, are C, G, D, and A, reading from bottom to top. Since the viola's normal register is from an octave below middle C to about a 12th above it, the use of the treble clef would require frequent ledger lines below the staff, while writing in the bass clef would involve an even more terrifying array of ledger lines above the staff. The alto clef provides a solution to the problem by placing middle C in such a location that the average viola part can be kept within the staff. If the part goes unusually high and stays there for some time, the treble clef is usually used. As a rule, it is not wise to change clef for the sake of one or two

[3] There is more variation in size among violas than among the other stringed instruments.

notes; players prefer to read a few ledger lines rather than shift their thinking from one clef to another too often. Viola parts in scores intended for high school use should not go above about 

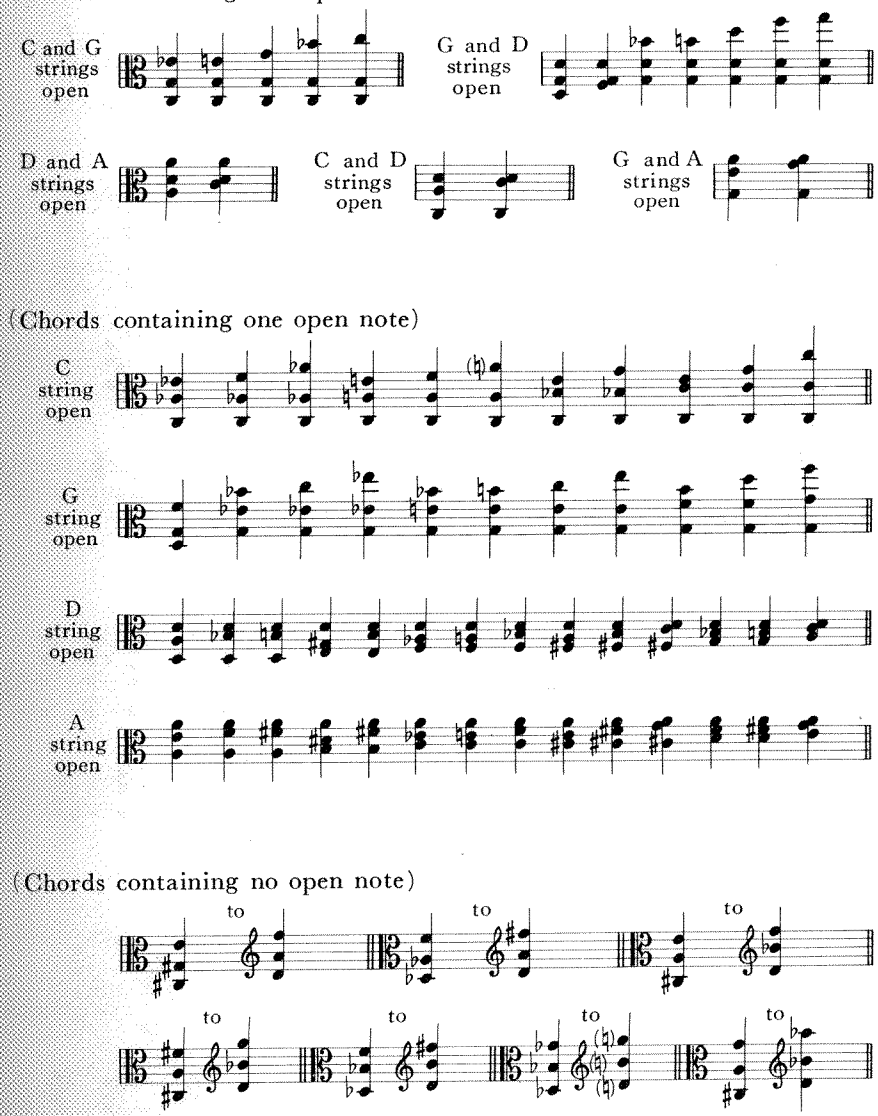
What has been observed about the quality of the strings in the case of the violin applies in a relative way to the viola. There are the same darkness and body to the lowest string, the same comparative brilliance to the top string, and the same gradations between these extremes in the two middle strings.

Too often in orchestral scoring the violas are given rather undistinguished parts: chordal figurations, sustained harmony tones, afterbeats, and the like. (This is particularly true in older music.) They are capable, however, of doing everything the violins can do, discounting differences of range, of course. As we move on to a view of the string group as a whole, it will become more apparent how valuable the viola is as a bridge between the violin and the cello.

The same patterns available as multiple stops on the violin are possible on the viola a 5th lower. However, quadruple stops in the higher positions are a bit more difficult and less effective than on the violin and are better avoided. Examples 13 and 14 show the more usable triple and quadruple stops on the viola.

*THREE-NOTE CHORDS FOR THE VIOLA (PARTIAL LIST)**

Ex. 13



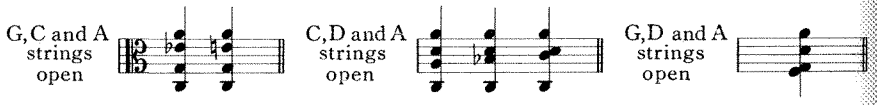
Note: Accidentals are written separately for each chord.

* This list has been limited to major and minor triads and dominant-type seventh chords

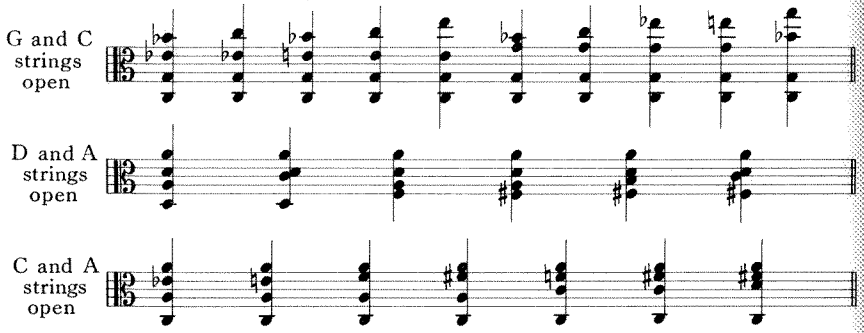
FOUR-NOTE CHORDS FOR THE VIOLA (PARTIAL LIST)

Ex. 14

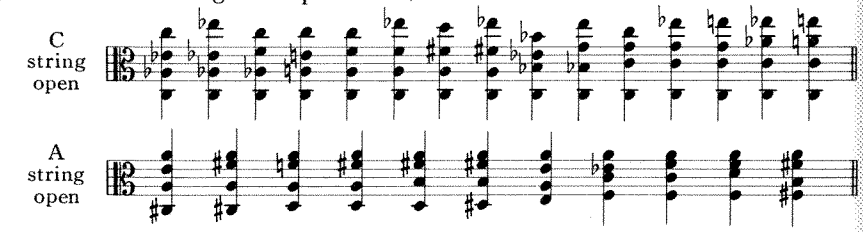
(Chords containing three open notes)



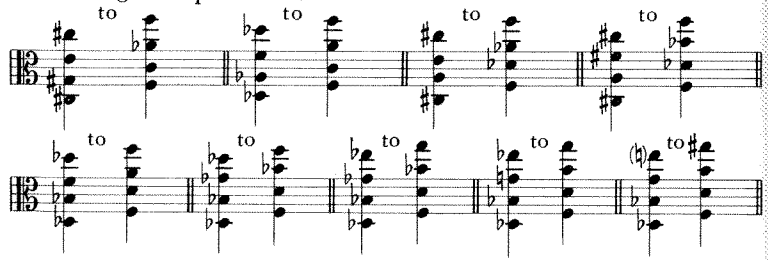
(Chords containing two open notes)



(Chords containing one open note)



(Chords containing no open note)

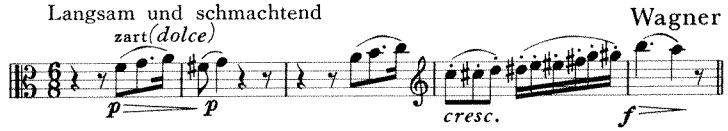


Note: Accidentals are written separately for each chord

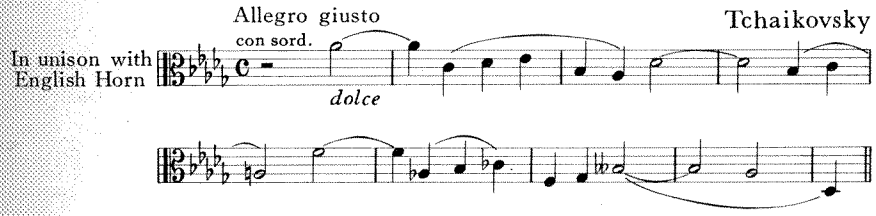
EXAMPLES OF PASSAGES FOR THE VIOLA

Ex. 15

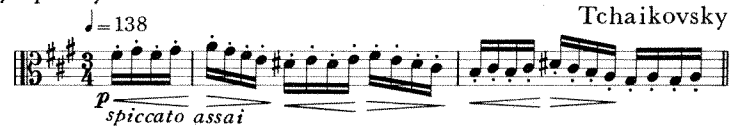
(a) Prelude to *Tristan und Isolde*



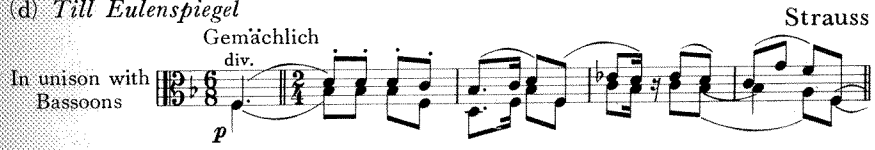
(b) *Romeo and Juliet*



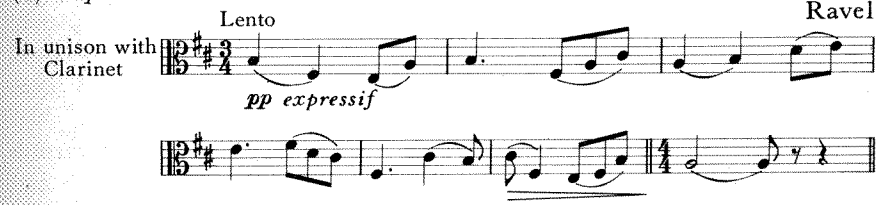
(c) Fifth Symphony



(d) *Till Eulenspiegel*



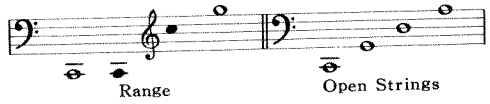
(e) *Daphnis and Chloe* Suite No. 2



THE VIOLONCELLO (CELLO)

Italian: Violoncello, Violoncelli — *French:* Violoncelle, Violoncelles — *German:* Violoncell, Violoncelle

Ex. 16



The complete name violoncello (not violincello) has been more or less abandoned today in favor of the shortened form, cello. Although the instrument is too large to be held as the violin and viola are and must rest on the floor (secured by an adjustable peg at the bottom), it operates on basically the same principles as the smaller stringed instruments, except for some differences in fingering necessitated by the fact that the notes are farther apart on the fingerboard. The open strings have the same letter names as the open strings of the viola but are an octave lower.

The normal clef for the cello is the bass clef. However, in order to avoid the use of many ledger lines in passages that lie in the upper part of the compass, the tenor clef,  , is often used. This clef places middle C on the fourth line and must not be confused with the alto clef, which is never used by the cello. If the part goes so high as to require the continuous use of ledger lines even in the tenor clef, then the treble clef will probably be substituted. One might argue that bass and treble clefs would be sufficient. That is perfectly true. But when a passage lies between the F below middle C and the F above middle C, for example, the tenor clef will keep the notes on the staff, whereas either bass or treble clef would require ledger lines. In any case, tradition and common practice dictate that the cello shall use the tenor clef for most of its higher passages. An old and fortunately obsolete custom ruled that when the treble clef was used immediately following the bass clef, the notes in the treble were to be written an octave higher than the sounds desired. Such a system appears completely pointless. It is mentioned here only because it occasionally turns up (as late as Tchaikovsky and Dvořák) and proves confusing to the uninitiated score reader.

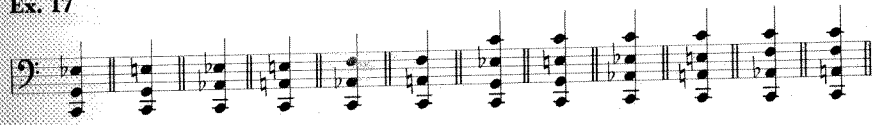
The cello has a reputation, amply deserved, for mellowness and warmth of tone. The two bottom strings (the C string in particular) are rich and full-bodied; passages played on them have a way of sounding grave and somehow reflective. The D string is brighter, with a warm and ingratiating quality, while the A string possesses a vibrant, singing tone all its own.

The upper limit of use is particularly hard to fix here. Virtuoso solo work occasionally calls for notes even higher than the top G given as the highest possible note, but for orchestral use it is best not to write above  ; even notes in that area are rather difficult from the standpoint of intonation. In school orchestras, the cello section had better not be written above

Much of the time, the cellos constitute the bass voice of the string group (often with the double basses sounding an octave lower). However, they may be used as a tenor or baritone voice, or even on the melody if it does not go too high.

There are two small limitations concerning double stops on the cello: Avoid 2nds and octaves unless one of the notes is open. Triple and quadruple stops based on the following patterns are all practical as long as the top note is no higher than  .

Ex. 17

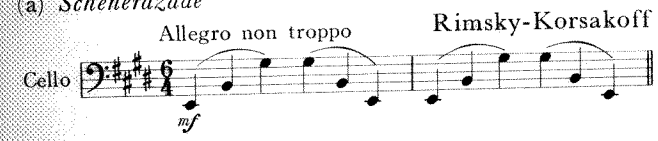


This is by no means an exhaustive list but includes the chord arrangements most frequently encountered in orchestral cello parts.

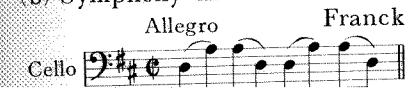
The cello section is frequently called upon to play broken-chord patterns such as the following, which (like those on page 17) are simply multiple stops in which the notes are sounded consecutively instead of at approximately the same time.

Ex. 18

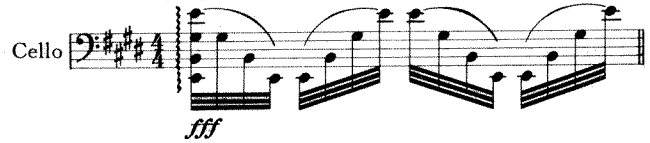
(a) *Scheherazade*



(b) Symphony in D minor



(c) Fourth Symphony — Mahler

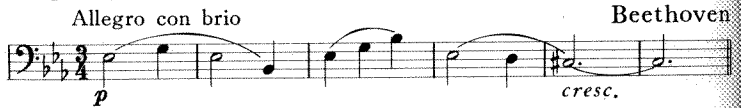


EXAMPLES OF PASSAGES FOR CELLO

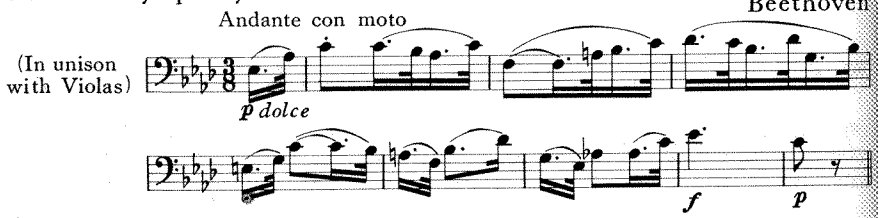
(See also the double bass examples, which include passages for cellos and basses sounding in octaves.)

Ex. 19

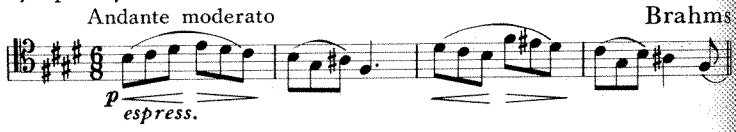
(a) Third Symphony — Beethoven



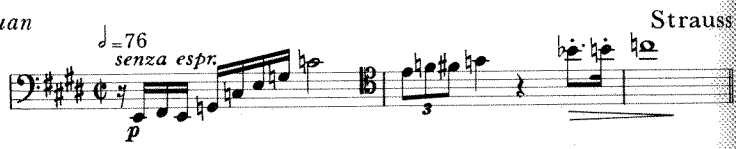
(b) Fifth Symphony — Beethoven



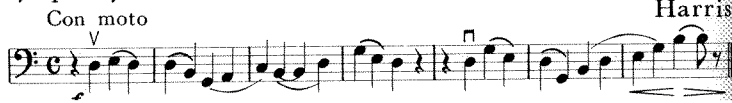
(c) Fourth Symphony — Brahms



(d) *Don Juan* — Strauss



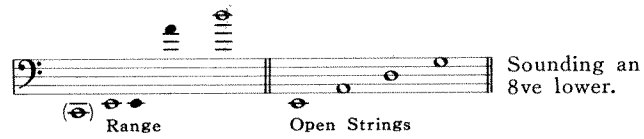
(e) Third Symphony — Harris



THE DOUBLE BASS

Italian:	Contrabasso Contrabassi	*French:*	Contre basse Contre basses	*German:*	Kontrabass Kontrabässe

Ex. 20



The double bass is known by a variety of other names: contra bass, string bass, bass viol, or simply bass. ("Bass violin" is an amateurish misnomer.)

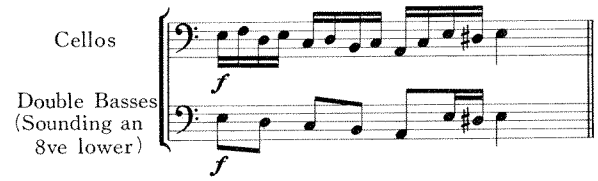
We now encounter for the first time an instrument that does not sound as written. The double bass sounds an octave lower than written, or, to state the case conversely, the notes must be written an octave higher than they are intended to sound. A glance at the lower range of the instrument will explain the need for such an arrangement. If the part were written at actual or "concert" pitch, ledger lines would be in continuous use, and the result would be cumbersome to write and awkward to read.

The double bass in standard use today has four strings, which are tuned in 4ths rather than in 5ths. The five-string bass, which is still much used in Europe but is rarely seen in the United States, tunes its fifth string to a C below the low E. In this country, the device commonly used for making these low notes possible is an extension to the fingerboard of a four-string bass. The bottom string can then be tuned down to C instead of E. In most professional orchestras, at least two or three basses have this extension, and in some orchestras the whole bass section is equipped with them. School orchestras, on the other hand, seldom include a bass with an extension. Fortunately, notes below the low E do not occur very often; where they do, they can often be played an octave higher without any serious damage to the effect. This "extended" low register of the instrument is valuable for dark color effects and for finishing out phrases that dip below the low E. But as a general rule, the double bass sounds much better when it is not kept too low. It has more incisiveness, more sense of definite pitch, in its upper and medium registers. Then, too, it has a way of sounding low even when the part appears to be moderately high. The tenor clef or the treble clef may be used in very high passages.

Because of its great size and the ponderousness of its technique, the instrument has some limitations of performance as compared with its smaller

for the player, they are apt to sound strangely "fuzzy" and unsatisfactory. In order to ease the technical problem and make for a clearer effect, the basses are sometimes given a simplified form of what the cellos—and possibly the lower woodwinds—are playing:

Ex. 21



Of course it is not necessary, or even advisable, that the basses play constantly; in fact, their effectiveness is generally in inverse ratio to the amount they play. Therefore, a possible solution, in case the passage at hand seems unsuited to their technique, is simply to give them a rest.

One point to remember in writing for the double bass is that triple and quadruple stops are completely out of the question. A few double stops—those involving one or two open strings—are possible. Usually, however, it is better to divide the section when two notes must be played by the basses. Most of the other effects discussed in connection with the violin, viola, and cello are possible on the double bass. Pizzicato passages are frequent and especially effective, because they provide support without heaviness and give a welcome relief from the bowed sound.

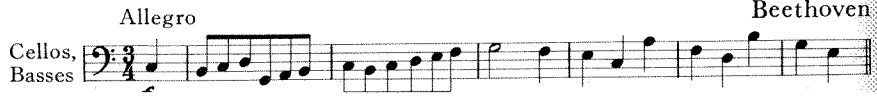
The basses are seldom called upon to play alone. Their tone is apt to be a bit dry and lacking in focus, and they do not have the *espressivo* possibilities of the cellos. But they frequently take melodic passages an octave below the cellos. Their lower register is dark, almost ominous, in quality, while the upper two strings are somewhat clearer and brighter in color.

EXAMPLES OF PASSAGES FOR DOUBLE BASS

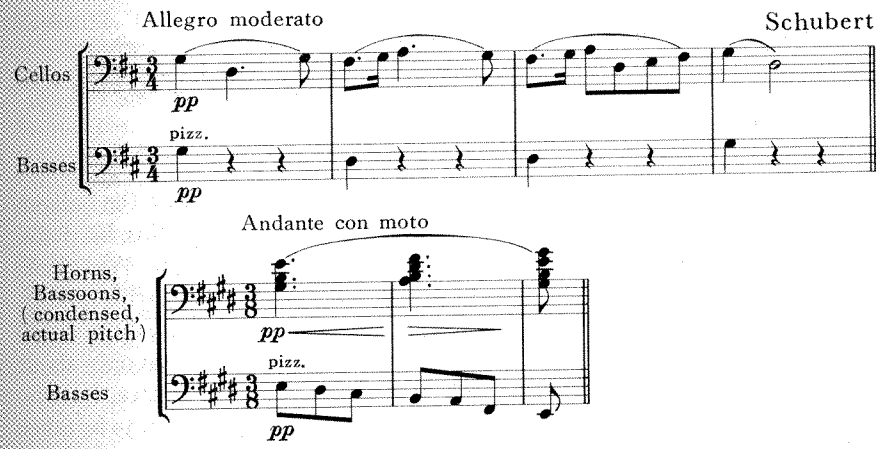
(Since the double bass sounds an octave lower than written, passages in which the cellos and basses are *written* in unison will sound in octaves.)

Ex. 22

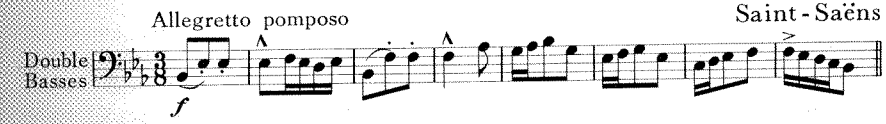
(a) Fifth Symphony



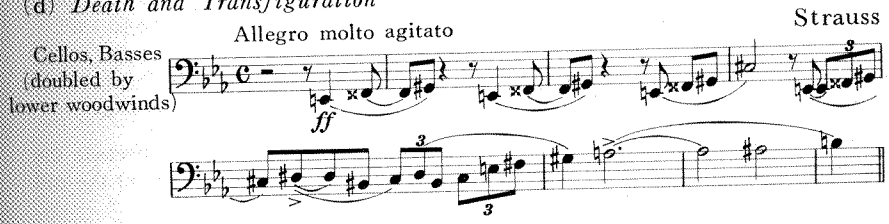
(b) Symphony in B minor *(Unfinished)*



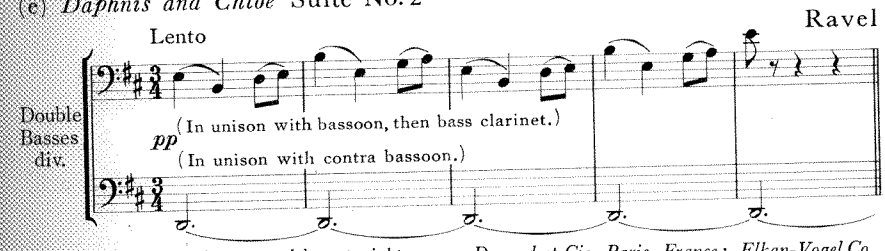
(c) *The Elephant* (from *The Carnival of Animals*)



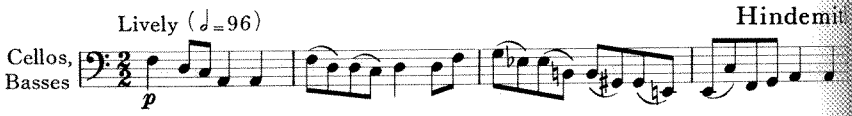
(d) *Death and Transfiguration*



(e) *Daphnis and Chloe* Suite No. 2



(f) *Symphonic Metamorphosis of Themes by C. M. von Weber*



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So far we have discussed only the more elementary material on the individual stringed instruments. It should be apparent even from this brief discussion, however, that writing for strings is a special technique. What looks easy to the pianist may prove surprisingly awkward for the string player, while there are fine string parts that would be totally impractical for woodwind or brass instruments. There is a good deal to be learned not only about combining the stringed instruments to make up a string orchestra, but also about matters of bowing and special effects. These are the subjects to be taken up next.

SUGGESTED ASSIGNMENT

Know:

1. open strings and ranges (possible and practical) of the stringed instruments.
2. correct notation in alto and tenor clef.
3. transposition used by the double bass.
4. indications for the use of a particular string.
5. general principles involved in writing double, triple, and quadruple stops.
6. Italian, French, and German names for the stringed instruments.

SUGGESTED LISTENING

Because passages for the violins are so abundant and familiar, and because the violins are heard prominently in the music for suggested listening given at the end of Chapter 4, they are not included here.

Violas

Wagner, Prelude to *Tristan und Isolde*, meas. 90.
Tchaikovsky, *Romeo and Juliet*, letter G;[4] Fifth Symphony, 3rd movt., letter E.
Strauss, *Don Quixote*, measure 18, etc.; *Till Eulenspiegel*, meas. 179 (*Gemächlich*).
Ippolitov-Ivanov, *Caucasian Sketches: In the Village.*
Ravel, *Daphnis and Chloe* Suite No. 2, figure 158.
Bartók, *Music for String Instruments, Percussion and Celesta*, beginning; 3rd movt., meas. 6.
William Schuman, *American Festival Overture*, 5 bars after figure 80.

[4] Throughout the "Suggestions for Listening" in this book, only the *beginning* point of each passage is indicated, by means of a measure number or a rehearsal letter or figure

Cellos

Beethoven, Third Symphony (*Eroica*), beginning.
Schubert, Symphony in B minor (*Unfinished*), 1st movt., 2nd theme.
Brahms, Third Symphony, 3rd movt.; Fourth Symphony, 2nd movt., meas. 41; Piano Concerto No. 2, 3rd movt., beginning.
Saint-Saëns, *The Swan* from *The Carnival of Animals* (solo cello).
Wagner, *Tristan und Isolde*, beginning of Prelude; *Love Death*, meas. 9.
Glinka, Overture to *Russlan and Ludmilla*, 2nd theme, meas. 81.
Strauss, *Don Quixote*, Variation 5.
Elgar, *Enigma Variations*, Variation 12.
Mahler, Fourth Symphony, 3rd movt., beginning and at figure 9.
Harris, Third Symphony, beginning.
Hanson, First Symphony, beginning.
Villa-Lobos, *Bachianas Brasileiras* No. 1, for eight cellos.
Bloch, *Schelomo* (virtuoso writing for solo cello with orchestra).

Double Basses

Since the double bass section seldom takes a musical idea entirely by itself, most of the examples that follow involve octave or unison doublings with other instruments.

Beethoven, Fifth Symphony, 3rd movt., beginning; also beginning of Trio; Ninth Symphony, 4th movt., meas. 8.
Franck, Symphony in D minor, beginning.
Saint-Saëns, *The Elephant* from *The Carnival of Animals.*
Goldmark, *Rustic Wedding* Symphony, beginning.
Strauss, *Also Sprach Zarathustra*, fugue in the "*Von der Wissenschaft*" section (involves four desks of basses, each desk playing a separate part); *Death and Transfiguration*, 16 bars after letter D.
Mahler, Fourth Symphony, 3rd movt., figure 9 (basses playing *pizzicato* notes); First Symphony, 3rd movt., beginning (solo bass with mute).
Stravinsky, *The Rite of Spring*, 1 bar after figure 121.
Respighi, *Pines of Rome*, beginning of Part IV (*Pines of the Appian Way*) (bottom string tuned down to low B).

Chapter 3

THE STRING ORCHESTRA

There are a good many reasons why the strings may well be considered the most important section of the orchestra:

1. As a group they possess an enormous pitch range; the orchestrator has at his command the entire compass from the highest note of the violin to the lowest note of the double bass.
2. Strings are very versatile technically. Rapid scale passages, slow *cantabile* melodies, short detached notes, long sustained tones, skips, trills, and chordal figurations are all practical and effective.
3. The vibrancy and warmth of the string tone make it especially useful. The strings can produce a particular *espressivo* quality not obtainable in the other choirs of the orchestra. And the tone is one that does not pall easily.
4. There are fewer problems of *blend* in the string section than in the other sections of the orchestra.
5. The *dynamic* range of the string section is unusually wide. Although neither strings nor woodwinds can equal the brass in the matter of sheer power, a full string section is able to produce a good, resonant *fortissimo*. At the other end of the dynamic scale, the string choir can reduce its tone to an almost inaudible *pianissimo*.
6. Unlike the woodwind and brass instruments, which must be given rests from time to time in order to allow the players to breathe and rest their lips, the strings are able to play continuously for longer periods if necessary. This is not to say that they should be asked to play indefinitely without resting, but the problem is not nearly so acute as in the case of the wind instruments.
7. The strings are sometimes spoken of as "the backbone of the orchestra."

This description is based in part on the points listed above but also on traditional usage. Since the early days of the orchestra, the strings have been called upon to carry the greatest burden of the playing. That is, if one were to count the number of measures played by the woodwind, brass, and string sections, respectively, in a large number of scores, he would find that in each work the strings played the greatest number of measures, with the woodwind section ranking second, and the brass ranking third.

The number of players in each string group is not specified in scores, except in rare cases where an extra-large string section is called for. Ordinarily the full complement of strings is implied, that is, 16 first violins, 14 second violins, 12 violas, 10 cellos, and 8 to 10 double basses. But in actual practice a good many orchestras do not include this many string players, as the table on page 3 has indicated. When scores written especially for "small orchestra" are played, the size of the string section is reduced. Also, because the orchestra of Haydn and Mozart's day included fewer string players than our modern orchestra does, many conductors prefer to use only a portion of each string group in performing music of the Classical period.

Normally, the members of each string group play a single melodic line in unison. But it is possible to divide each group into two or more parts, each part playing different notes. In that case the Italian word *divisi*, usually shortened to *div.*, is placed next to the passage, most often above the staff. In the case of division into more than two parts, the number of parts is indicated as follows: *div. a 3* or *div. a 4*, etc. (See Appendix A for the equivalents of these terms in other languages.) Ordinary *divisi* passages (two parts) are very frequent; more than two parts are less often used, while the use of more than four is apt to be risky if one is writing for anything less than a full string section or for players of limited ability. In ordinary *divisi* writing, the two parts can usually be written on the same staff. If they involve the same time values, a single stem may be used for both—provided, of course, that the *div.* indication is present so that the two notes will not be taken for a double stop. But if the time values in the two parts are different, then separate stems will be necessary, that is, stems up for the upper part, stems down for the lower part. When the two parts cannot conveniently be written on the same staff (for example, when they cross repeatedly) two staves are used. In that case, the *divisi* direction is sometimes put at the edge of the page, preceding the divided part. (All these points are illustrated in the examples of string scoring that follow.) With divisions into three or more parts, the parts may be arranged in whatever way is most convenient—two or more to a staff or each part on a separate staff. Any or all of the string groups may be divided, though the basses are divided less often than the other string groups. After a *divisi* passage, when the string group is to play in unison again, the expression *unisono*, shortened to *unis.*, is used. *Non divisi*

(*non div.*) is commonly written above passages that could be played *divisi* but are meant to be played by the use of double stops.

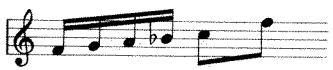
Dynamics must be indicated below each staff. This is extremely important and sometimes difficult to impress upon the beginning orchestrator. Whereas the pianist can gain a complete idea of the music he is playing from the page before him and can adjust dynamics and the weight of individual voices accordingly, the orchestral player sees only his own part. He cannot tell from it whether he is playing an important musical idea that should be brought out or a subordinate voice that must be kept in the background. Therefore, he must be told exactly how loudly to play at all times. It is quite possible that while he is playing *ff*, another instrument in the orchestra will be marked *mf* or even *pp* in order to achieve the proper effect. Crescendos, diminuendos, and any other dynamic changes, along with such directions as *espressivo* or *marcato*, must likewise be written in beneath each part they apply to.

Since matters of *tempo* normally apply to all the instruments at the same time, one tempo marking at the top of the page, above the woodwinds, and one lower down, just above the strings, are usually sufficient in the score. But these tempo indications (including any *ritardandos*, *accelerandos*, or similar markings) are included by the copyist in each part, when the players' parts are extracted from the score.

A brief reminder on a few points of notation may be in order here. Notes below the middle line of the staff have stems up; those above the middle line have stems down; notes *on* the middle line may have stems either up or down. In groups such as eighths or sixteenths, the direction of the stems is determined by the position of the majority of the notes in the group. Notice that in orchestral writing, instrumental rather than vocal notation is used. (See Ex. 1.)

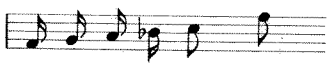
Ex. 1

(a)



not

(b)



Notice, too, that it is unnecessary to have a separate bar-line for each staff. Simply draw one long bar-line through all the parts of each section. Be sure to line up the parts so that the notes which are to sound together are in a straight line, vertically, on the page. Whole notes go at the beginning of the measure, but whole rests should be placed in the middle. Nowadays, the whole rest  may be used with any meter signature to indicate a full measure of rest.

On the first page of a score, the names of instruments are normally written out in full; after that, abbreviations are commonly used. In the case of strings, those most often seen are: "Vl." or "Vln." or just "V." for Violin (followed by "I" or "II" for "first" or "second"); "Vla." for Viola, or "Vle." (the Italian plural abbreviated) for Violas; "V-Cello" or "Vc." for Violoncello; and "D. Bass," "D.B.," "C.Bass," or "C. B." for Double Bass. The usual method of bracketing the violins and the whole string section can be observed in the examples that follow.

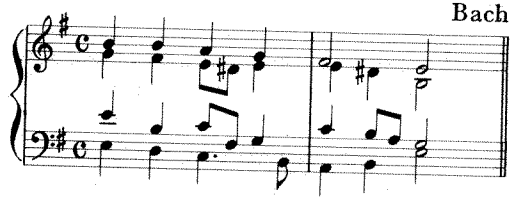
POSSIBLE ARRANGEMENTS IN SCORING FOR STRING ORCHESTRA

In order to make our first work in scoring for strings as uncomplicated as possible, a short phrase from a Bach chorale[1] has been chosen as an example:

Ex. 2

Jesu, meine Freude

Bach

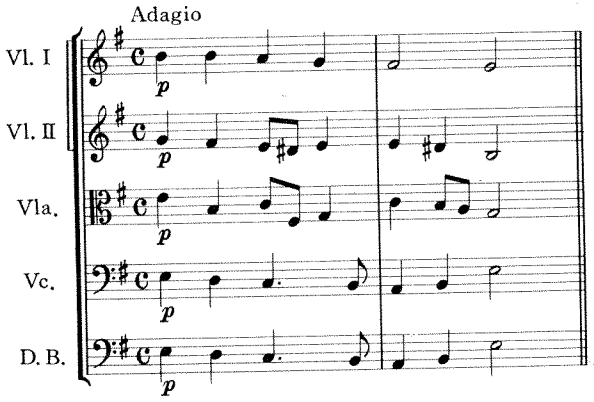


Certain obvious arrangements of the strings suggest themselves immediately: first violins on the melody, second violins on the alto part, violas on the tenor, and cellos on the lowest voice. The double basses may either rest or be given the same *written* part as the cellos, which means that they

[1] This chorale excerpt is from an *a cappella* motet. Of the arrangements shown in Examples 3–11, only Example 3 corresponds with Bach's own practice as seen in his cantatas.

will sound an octave lower than the cellos. Using the latter choice, the scored version would look like this:

Ex. 3



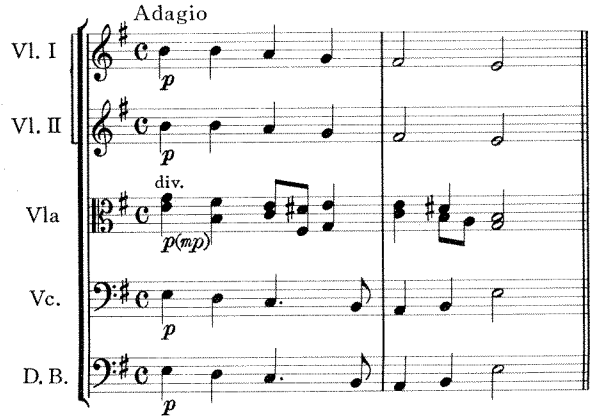
This is the most frequent arrangement of the strings and one which will sound very satisfactory, either with or without double bass.

The range of a voice is obviously a factor in deciding what instrument shall take it. For example, in this Bach excerpt the tenor line could not be taken by violins because it goes down to an F♯, one half-step lower than the violins can play. Nor could the bass voice be taken by viola, because of the notes that fall below the viola's low C.

Since no dynamics or tempo indications are included in the original Bach version, we have had to supply our own. Dynamic markings could be anything from *ppp* to *fff*, depending on the mood and general conception we give to the excerpt. Various dynamic levels have been used in the scorings shown and a tempo marking of *Adagio* chosen arbitrarily. We might decide that the music should be either *legato* or *molto marcato;* but that question will have to be put aside temporarily, for it involves problems of bowing which are being reserved for the next chapter.

Suppose we feel that the chorale melody (the upper part) in *Jesu, meine Freude* should be brought out a bit in relation to the other voices. The effect could be achieved very easily by marking the first violins a little louder than the other instruments. Or, we could arrive at an effect of greater weight and resonance on the melody by giving it to both first and second violins. In that case, we have a new problem: The three remaining voices must somehow be taken by *two* sections, the violas and the cellos. (It seems best to use the double basses only for the part they played in the first version.) The obvious solution here is to divide either the violas or the cellos to give two parts. If we divide the violas, the arrangement is as follows:

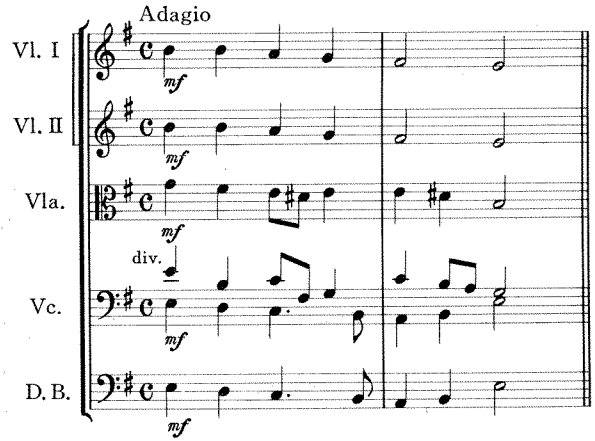
Ex. 4



With a full viola section this version would sound well; but in school and other nonprofessional groups, viola sections are apt to be "understaffed," and when they are divided in half there is simply not enough body in each half to balance the rest of the strings. In such a case, the balance could be improved by marking the violas a degree louder than the other sections, as shown in parentheses.

The other solution is to divide the cellos:

Ex. 5

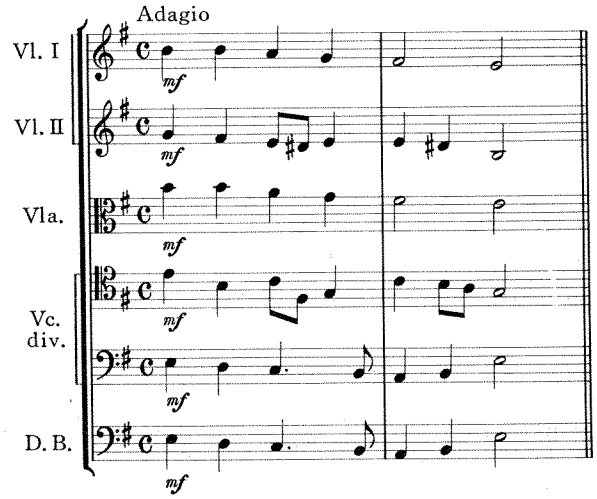


In this version the division is somewhat compensated for by the fact that the upper cellos are in their high, vibrant register where they will come

through rather prominently. If this upper part stayed high, it might well be written in tenor clef, in which case separate staves would be used for the two halves of the cello section, as in Example 6.

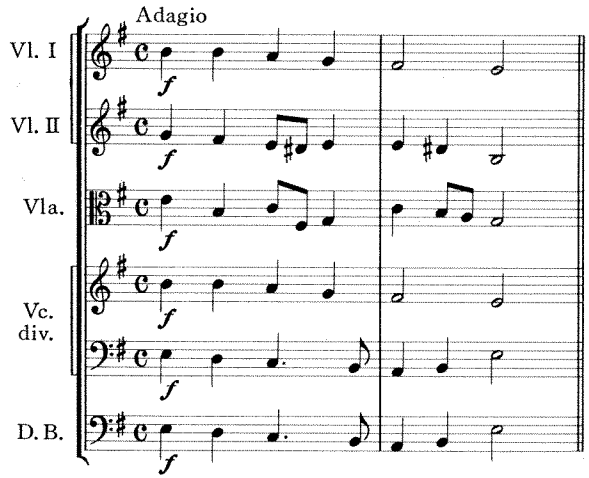
In case the particular color of violas were wanted on the melody, such an arrangement could be used. Because the tenor part in our example is too low for violins, the alto is the only line left that they could play. First and second violins together would be too heavy for the alto, so that either first or second violins should be given rests in this case. There is nothing wrong with letting a section rest, but a more effective solution might be to put violas and first violins on the melody (in unison) for greater weight and for mixed color:

Ex. 6



Half the cellos doubled in unison with violins on the melody would add poignancy and intensity to the tone. That would take the upper half of the cellos rather high, but not unreasonably so for a professional group. It should be pointed out, though, that this arrangement of the strings is by no means a common one, and that in many pieces of music it would be inappropriate or impractical (or both) to give the cello the melody, particularly at its original pitch. In fact, the high cello part in Example 7 is open to question as being too lush and romantic in this context; it is included here more with the idea of exploring various possibilities than with any implication of stylistic appropriateness. (One might add, however, that there is considerable divergence of opinion as to what *is* stylistically appropriate in scoring music of given periods.)

Ex. 7



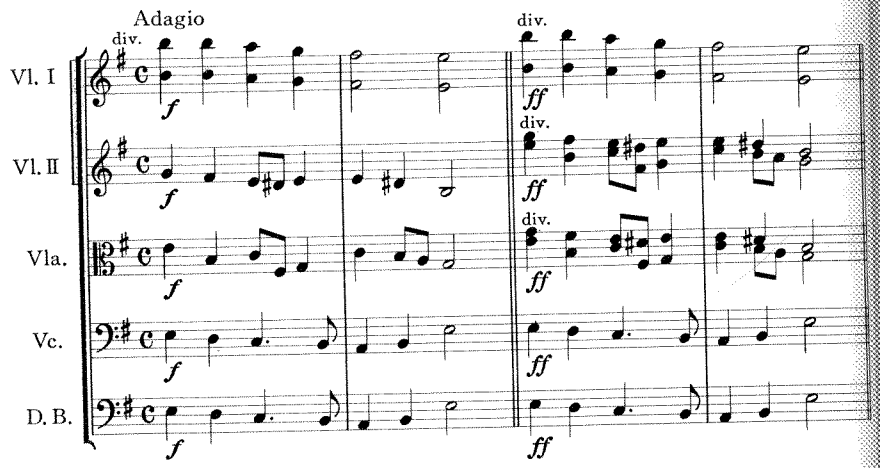
Of course it would be possible to use all the cellos on the melody, but in that case the double basses would have to play the bass at its original pitch by themselves. While that arrangement might be satisfactory if the bass section were large, it is much safer to retain half the cellos on the bass line and to write the double bass part so that it will sound an octave lower. One might suppose that dividing the double basses in octaves (on the bass and its doubling an octave lower) would work out well. In actual practice it does not; the effect is disappointing and is almost never used in orchestral scoring.

VERSIONS USING OCTAVE DOUBLINGS OF THE THREE UPPER VOICES

In having the double basses play the bass voice an octave lower than in the original, we amplified the original version slightly. Similarly, the top voice (when it is the melody) may be doubled an octave higher than in the original. The effect is somewhat more brilliant. It is also possible to fill in the octave at the top by doubling the alto and tenor voices an octave higher as well. These two versions are shown in Examples 8 and 9, respectively.

Ex. 8

Ex. 9



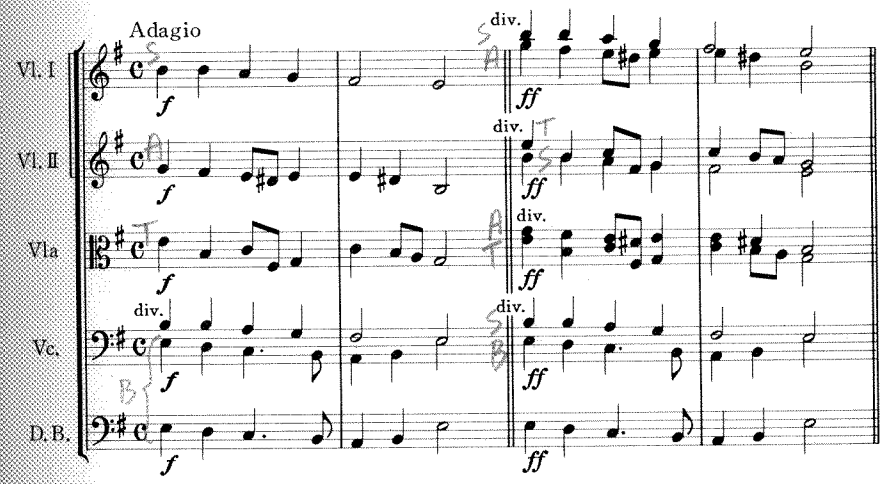
As a rule, the effect of doubling only the alto or only the tenor an octave higher is not good because of the gaps of open 4ths and 5ths that often result. In other words, it is normally best to double both alto and tenor or neither, at the octave, in scoring a four-voice composition of this sort. Doubling of inner voices an octave *lower* than the original is usually out of the question because of the muddiness that results when voices are spaced close together low in a chord.

In some music, the same objection would apply to a doubling of the melody an octave lower. In our Bach example, however, the effect of doubling it at the lower octave is not too thick; in fact, that arrangement actually improves the spacing by filling in some unnecessarily wide gaps between the tenor and bass voices. This possibility is demonstrated in Examples 10 and 11.

Example 11 also makes use of upper-octave doublings of the soprano, alto, and tenor voices; as in the preceding versions, the double basses have been written to sound an octave lower than the bass in the original. Although the layout of the divided violin sections is different in Examples 9 and 11, respectively, the sound of the combined violin sections will be approximately the same in each case.

Ex. 10

Ex. 11



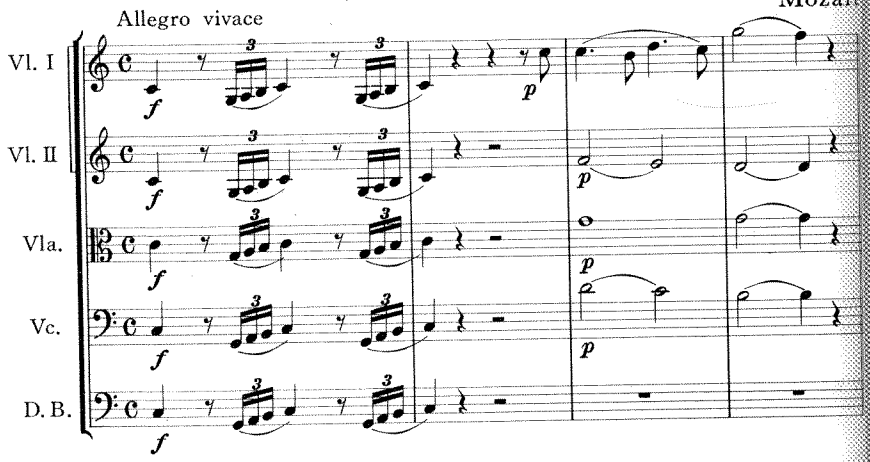
The last version is obviously the fullest, the most resonant. This is not to say that it is therefore preferable to the others, however. There are generally many effective ways of scoring a given passage, and the way chosen will be the one that seems the most telling and appropriate in context.

Example 12 shows excerpts from symphonic literature that involve the string section prominently. In (c), (d) and (g) only the strings are playing; in the remaining examples other instruments not shown here are also playing, but in each case the strings give a fairly complete idea of the musical substance. In (b) note the use of multiple stops in which the top note is held. In (c) and (g) the effect is extremely rich and warm, partly because of the harmonic fullness afforded by the division of one or more string groups, partly because the melody is taken by violins playing high on their G string. Concerning (d), the speed of the notes is about the maximum at which successive pizzicato notes can be played comfortably. Example (e) makes use of the very high register of the violin, where the quality is bright, singing and intense. In (f) harmonic background is supplied through some characteristic and effective string arpeggios based on multiple-stop patterns. In (h) the effect is heavy and savage. Woodwinds, horns, timpani and bass drum are also playing.

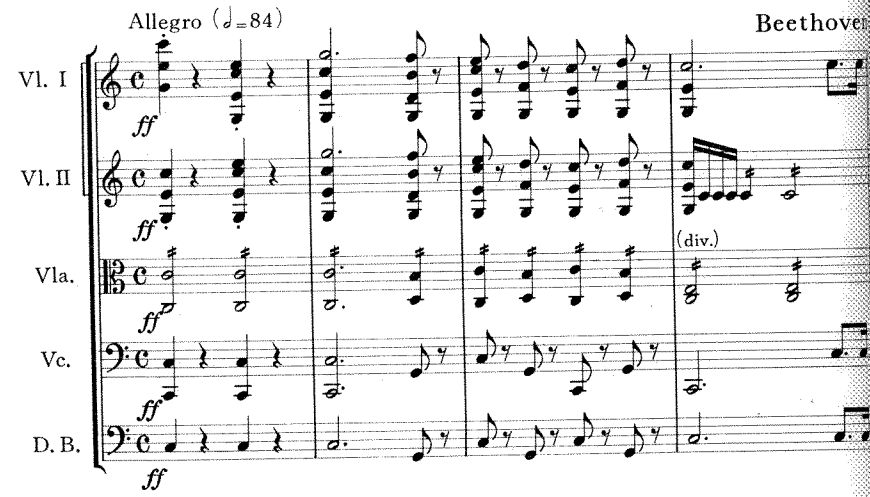
EXAMPLES SHOWING VARIOUS POSSIBILITIES IN ARRANGING THE STRINGS

Ex. 12

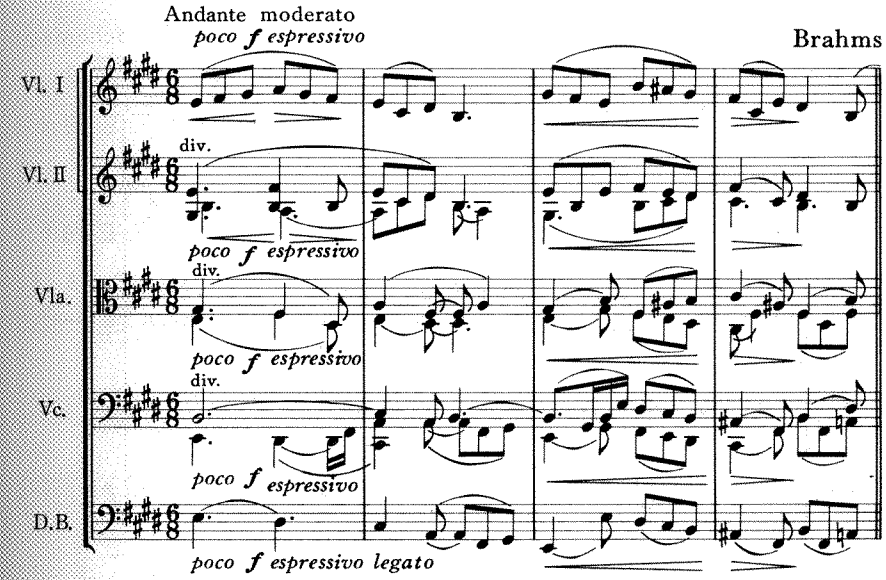
(a) C major Symphony (*Jupiter*) — Mozart



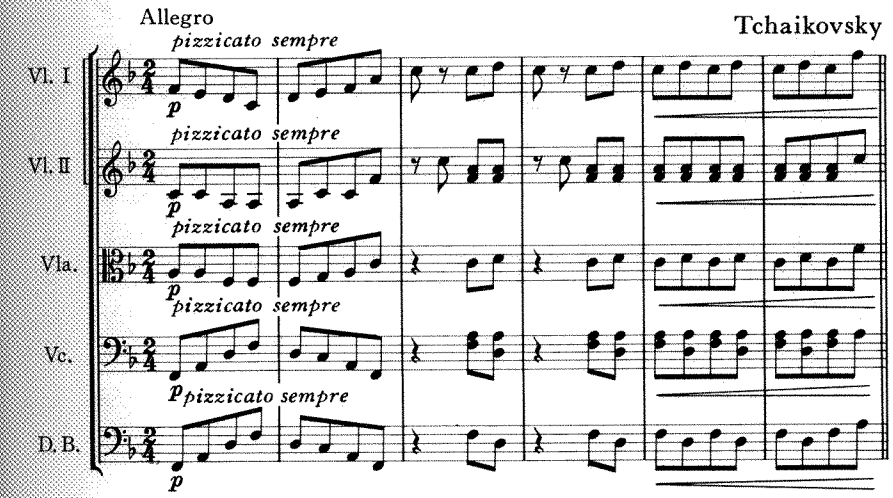
(b) Fifth Symphony — Beethoven



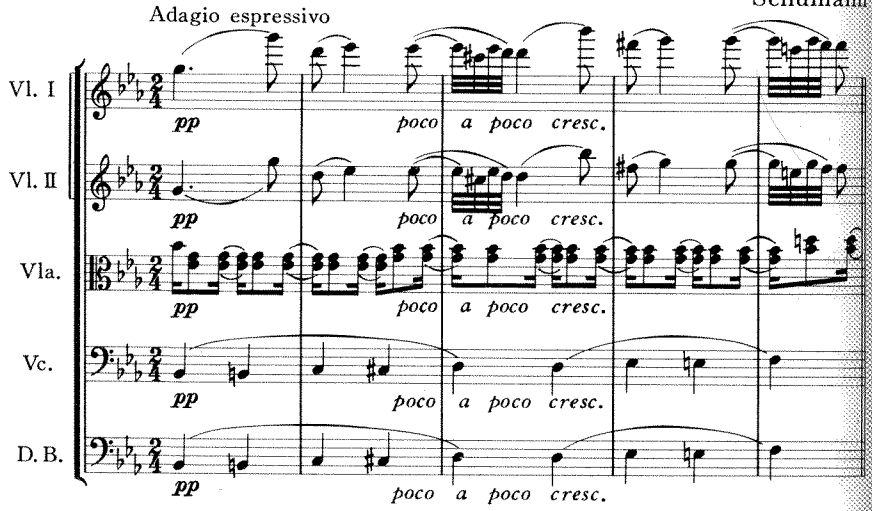
(c) Fourth Symphony — Brahms



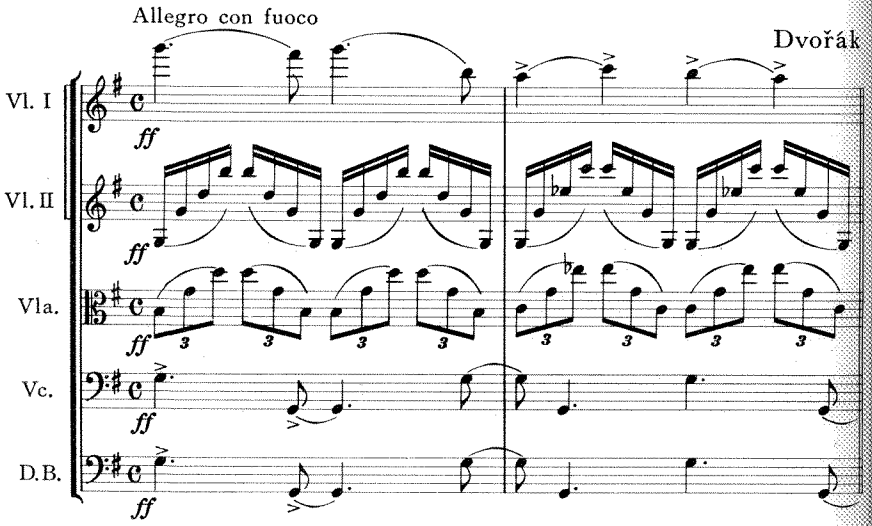
(d) Fourth Symphony — Tchaikovsky



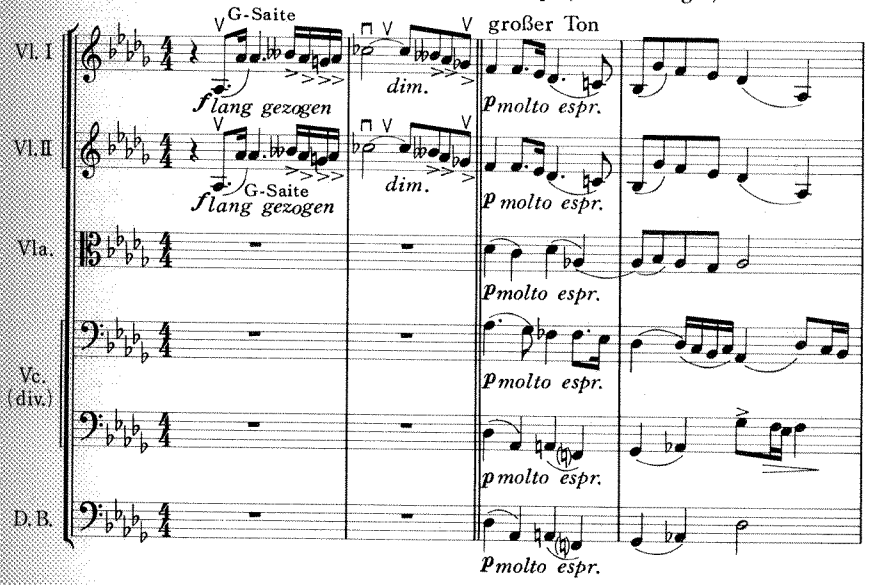
(e) Second Symphony — Schumann

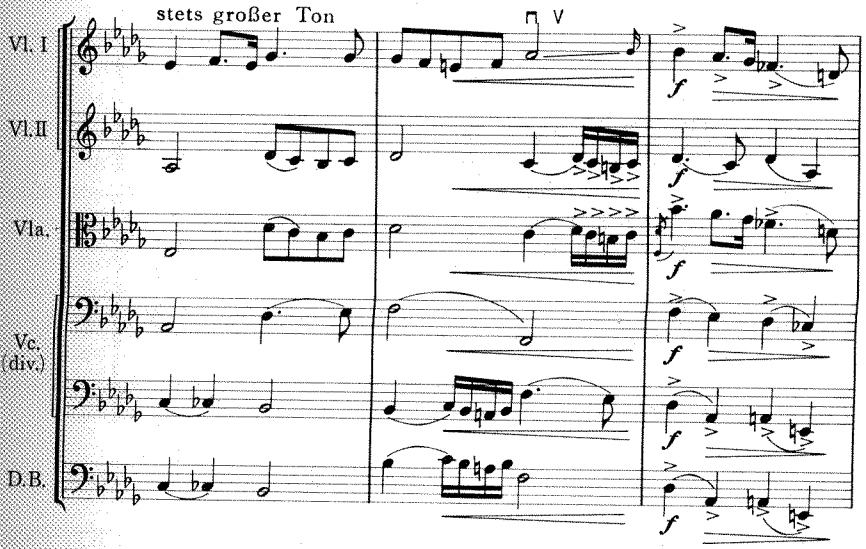


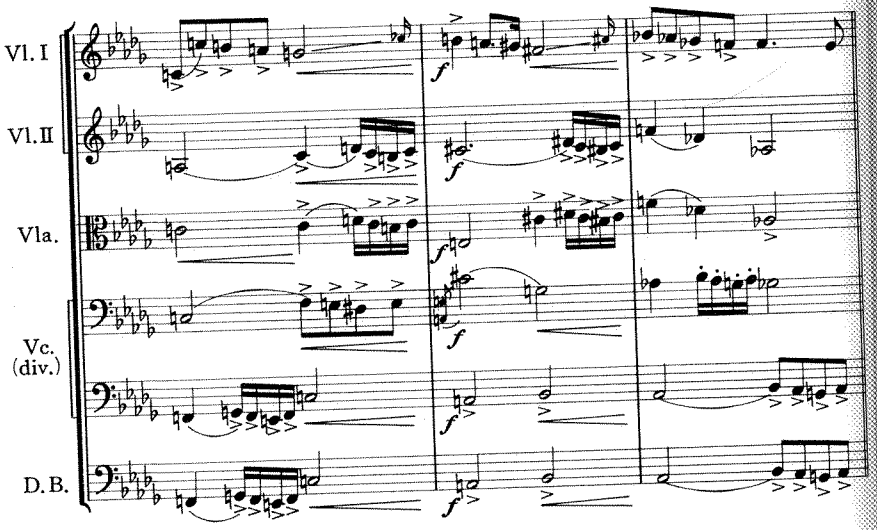
(f) Symphony in E minor *(New World)*



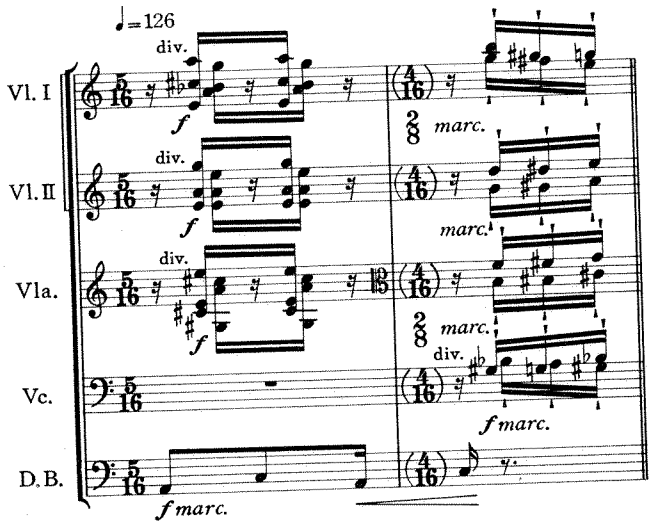
(g) Ninth Symphony — Mahler







(h) *The Rite of Spring* Stravinsky



REMARKS ON SPACING, DOUBLING, AND VARIOUS TEXTURES

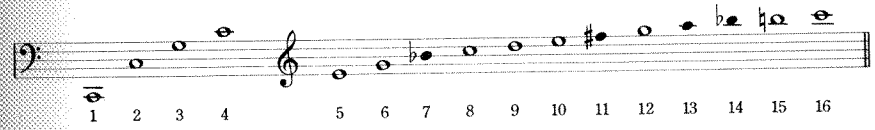
Students who are using this book as a text will normally embark on their first project in scoring for strings after reading this chapter, and there are

some points concerning spacing and doubling that they will need to keep in mind. Although these are points that they will presumably have covered in their harmony courses, the author has found that a brief review of them is often helpful.

Since we shall want to refer to the overtone series presently in connection with spacing and with string harmonics and at many other points later on in connection with wind instruments, a short commentary on that subject seems in order here.

All musical instruments make use of a vibrating body (a string, an air column, etc.), which vibrates not only as a whole, to produce the main tone or "fundamental," but in halves, thirds, fourths, and so on. These fractional vibrations produce pure sounds of higher pitch and much weaker intensity than the fundamental, the pure sounds normally being heard as part of the composite tone. Example 13 shows a fundamental (C) with its first fifteen overtones.

Ex. 13

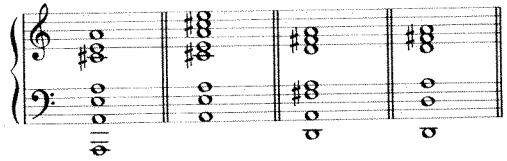


(Notes that do not correspond exactly with our equally tempered scale are shown in black.)

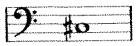
The terms "partials" and "harmonic series" are often used in connection with overtones, but they include the fundamental, whereas the term "overtone" does not. The first overtone, then, is the second partial. In Example 13 the notes have been numbered on the basis of partials; that is, the fundamental is numbered "1," and so on. Certain partials come out more strongly in some instruments than in others, with consequent differences between the respective tone qualities of the various instruments.

Normally, spacing of harmony is modeled in a general way on the harmonic series: the wide intervals are put at the bottom, the smaller intervals in the upper part of the chord. Usually it is best to leave a clear octave at the bottom, although if the chord is not too low it may be possible to begin with a 5th at the bottom:

Ex. 14

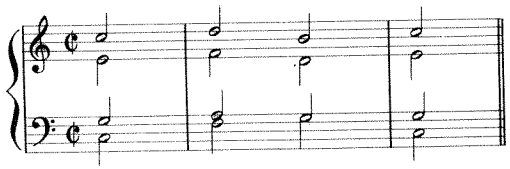


If notes are put close together in the lower portion of a chord, a thick, muddy effect results; therefore, avoid putting the 3rd of the chord too low—

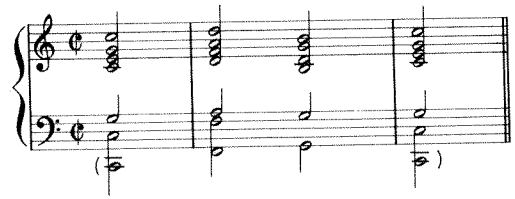
say below  (assuming the chord to be in root position).

In scoring music written originally in open spacing, it is often a wise idea to fill in the gaps between the upper parts by means of octave doublings, in effect to convert the open structure to close. For example,

Ex. 15



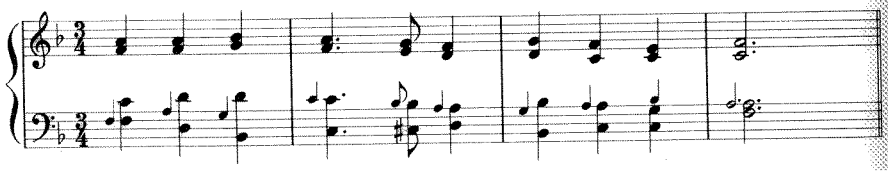
might become



While open spacing is frequently used for the strings and is not out of the question for the other instruments, close spacing is, as a general rule, more effective in the orchestra.

Even in music written in close structure it sometimes becomes necessary to add a "filler" part; that is, an extra voice introduced in order to fill in gaps between voices (most often between tenor and bass). Such a voice may double other voices part of the time, then branch off to fill in gaps where necessary; or it may take an independent line of its own, doubling chord tones at times but not actually playing the same line as any of the other voices. In the following excerpt from "America" a possible filler part is shown in small notes:

Ex. 16

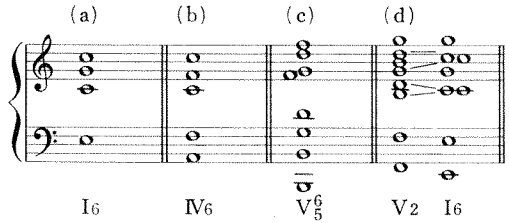


However, students will probably do well to avoid fillers except in cases of absolute necessity. Such parts are usually not very strong or interesting from a linear standpoint, and if used indiscriminately they tend to detract from the clarity of the other voices and to bring about a muddy texture. Besides, beginning orchestrators often have difficulty in maintaining good voice-leading in the orchestral parts, and the addition of an extra voice that may rove at will only complicates the problem.

Sometimes the top voice of a closely spaced chord is doubled an octave higher, leaving a gap of an octave at the top (as in Example 8). In such cases the effect is good, and there is no objection to the octave gap.

As a rule, when a primary triad (I, IV, or V) is in first inversion, the bass should not be doubled in the upper parts. The same applies to 7th chords in any inversion:

Ex. 17



(Of course the bass may always be doubled an octave *lower*.) Notice that in (d), above, proper voice-leading demands that certain notes be doubled in the tonic chord. When an "active" tone (such as the seventh scale degree) is taken by a particular instrument, the resolution of that tone must obviously occur in the same instrument.

It should perhaps be added that this material on spacing and doubling does not always apply in twentieth century music. Certain composers, Stravinsky in particular, have achieved fresh and intriguing effects by a deliberate use of unusual spacings and doublings (see page 292).

What has been said here so far applies chiefly to harmonic (chordal) music. Homophonic and especially polyphonic textures will involve different approaches. These musical situations are discussed at some length in later chapters but a few comments on them at this point may be helpful.

In scoring homophonic music, it is normally desirable that the melody stand out from the background. This may be achieved by presenting it in a contrasting color, by giving it extra weight, by marking it louder, by doubling it in octaves, or by using a combination of any of these means. Homophonic music for the piano often involves idiomatic accompaniment figures (such as wide arpeggios), which may have to be changed to patterns

better suited to the instruments concerned; and certain notes may have to be sustained in the orchestral version to approximate the effect of the piano's sustaining pedal. In general, wide gaps between the notes played by the two hands should be filled in, at least partially.

In polyphonic music, the chief objectives are balance between voices (or a calculated emphasis on one when that is appropriate) and linear clarity. The most effective way to make the voices stand out sharply from each other is to give them to different timbres. But that approach is by no means always necessary, nor is it always possible (as, for example, in scoring for one section of the orchestra alone). Concerning doublings, the upper voice can generally be doubled an octave higher and the bottom voice an octave lower without damaging the clarity of the texture; occasionally the upper voice may be doubled an octave lower. Lower-octave doublings of the inner voices are usually out of the question because of the thickness and the overlapping of the bass that may result; even upper-octave doublings of these voices may produce linear confusion.

*SUGGESTED ASSIGNMENTS**

A. Know:

1. number of players in each string group (in a full orchestra).
2. order and arrangement of the strings on the page.
3. customary abbreviations of names of stringed instruments.
4. directions for the division of a string group into two or more parts.
5. proper placing and use of indications for dynamics and tempo.
6. principles of good spacing and doubling.

B. Select a short four-voice chordal excerpt and score it in six different ways for strings. Bowing need not be indicated.

* *Music for suggested listening is listed at the end of Chapter 4.*

Chapter 4

BOWING AND SPECIAL EFFECTS

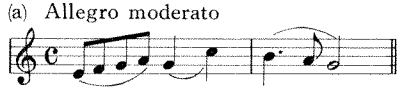
The term "bowing" may mean the actual motion of the bow over the strings, or it may mean the indications in a string part which tell the player how the music is to be bowed. Using the word in the latter sense, bowing includes: (1) slurs over each group of notes to be taken in the same bow; (2) down-bow marks (⊓) or up-bow marks (∨) at points where the use of one or the other is preferable; (3) such indications as dots or accent marks over the notes to suggest the type of bowing appropriate; and (4) actual words, such as *spiccato*, to indicate the exact type of bowing to be used. The directions *arco* and *pizzicato*, which have been discussed earlier, might also be listed under the heading of bowing.

Beginning students of orchestration invariably feel "put upon" when they are asked to include bowing in their scores. Their usual reaction is, "Why not let the string player worry about that problem? He knows more about it than we do." There are several answers to this attitude. One is that a passage may be given a number of different interpretations depending on how it is bowed; although the player may know more about bowing than the budding arranger, he does not know, without bowing marks, just what effect the arranger intended. In other words, bowing is an integral part of the music and should not be left to chance. A glance at any orchestral score will confirm the fact that slurs to indicate bowing are always included, simply as a matter of standard practice. It may be objected that the conductor or the players will probably make some changes in the bowing anyway. That is true, even in the case of standard symphonic literature. Nevertheless, the original bowing will give an idea of the basic conception of the music. Another answer is that planning of the bowing for all the groups

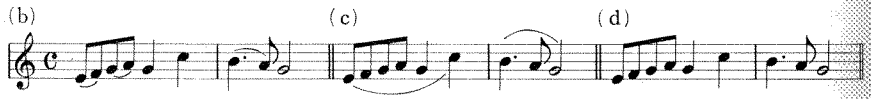
of the string section at the same time brings about a uniformity of effect that is very important and that would be hard to achieve if each group were allowed to choose its own bowing.

There is a point that needs to be clearly understood at the beginning: in string music the slur does not normally indicate broad phrase outlines as it does in piano music; instead it is used to show which notes are to be taken on the same bow. For instance, in Example 1 the first four notes are taken on one bow; then the bow reverses direction to take the next two notes and again to take the last three.

Ex. 1



The same passage might have been bowed in several other ways, three of which are shown here:



In the last version, where no slurs are shown, the player would use a separate bow (that is, change the direction of the bow) for each note. It should be emphasized that no break in sound need occur when the bow changes; however, a separation between notes *may* be made if desired.

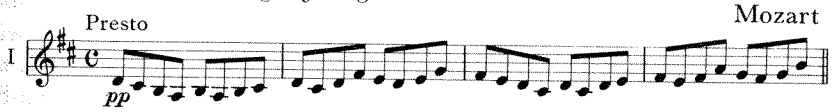
There are a few scores in which phrasing rather than bowing is indicated at certain points in the string parts, usually in long, sustained melodic lines. In such cases the bowing to be used is decided upon by the conductor or the players. Occasionally phrase marks are included in addition to bowing slurs in order to insure an even, connected effect, but the vast majority of scores rely solely on bowing slurs to project the musical structure of the string parts.

Some factors that influence bowing are the dynamics and tempo involved, the general effect desired, and such technical considerations as the need for a down-bow or an up-bow at certain places.

As for dynamics, the amount of bow "used up" varies in a general way with the volume of tone produced. Consequently, the player can take more notes per bow in a soft passage than in a loud one. But that does not mean that all soft passages should be slurred in long groups and all loud passages played with separate bows. It is perfectly possible to change bow frequently in a soft passage, even to the point of playing rapidly moving parts with a bow to a note:

Ex. 2

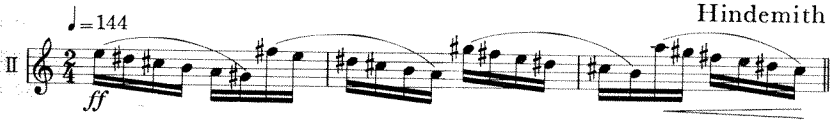
Overture to *The Marriage of Figaro*



And a reasonable number of notes may be taken on one bow even in a *fortissimo:*

Ex. 3

Symphony: *Mathis der Maler*



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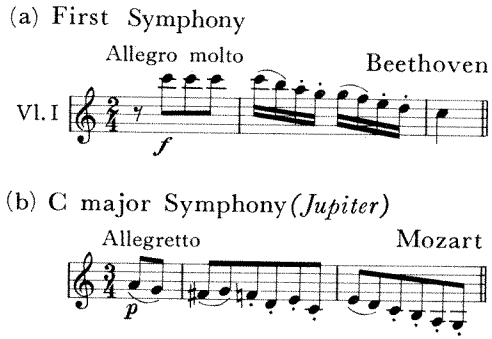
The influence of tempo on bowing is fairly obvious. The faster the tempo, the more notes the player can take comfortably on each bow.

In describing the difference between a slurred effect and a separately bowed effect, it might be said that the first is smoothly flowing, while the second gives a greater sense of articulation to each note. Fast running passages in which each note is separately bowed are particularly vigorous and sparkling. Of course, a passage need not be all bowed or all slurred. Interesting combinations of the two effects are illustrated in Example 4.

Ex. 4



In plotting bowing, it is often necessary to bring the player out on a down-bow or an up-bow at a particular point. For example, down-bows are in

order for heavily accented notes and are even preferable for strong beats in a measure. On the other hand, an anacrusis (up-beat) is best given to an up-bow, in order that the strong beat that follows may be taken down-bow. Crescendos are somewhat easier on an up-bow. A "group-staccato" bowing, to be described presently, is mainly an up-bow stroke, while the *jeté* is normally performed on a down-bow. The signs for up-bow and down-bow (∨ and ⊓) are put in, above the notes, only at points where the player would not be likely to choose that bowing automatically. For instance, it is a convention that the first note of a passage will be taken down-bow unless an up-bow mark is shown, or unless the first note is obviously an up-beat requiring an up-bow. But in any case where the proper bowing cannot be anticipated at a glance, it should be clearly indicated at the beginning of the passage. Usually it is superfluous to include alternate down-bow and up-bow signs throughout a passage, since the player must change from one bow to the other of necessity, and the slurs will tell him where to change. The important thing is to get him started on the right bow, and the rest should follow automatically.

There is another small technical point that influences bowing: if a jump from one string to a nonadjacent string is involved, the notes in question obviously cannot be taken *legato*.

TYPES OF BOWING

Perhaps no aspect of orchestration offers more chance for controversy than does the labeling of various types of bowing. There is disagreement on this subject not only among orchestration books but among players themselves. In the first place, the terminology involves a hodge-podge of languages, and there are sometimes two or three different names in each language for a particular type of bowing. To complicate matters still further, descriptions of certain bowings differ from book to book and from player to player. It should be pointed out, too, that the period and style of the music influence the interpretation of bowing marks. For example, dots over the notes in a passage by Haydn might call for one type of bowing, while the same indication in a contemporary score might suggest another type.

As a result of all this confusion, it is very difficult to write in an authoritative way on the subject of bowing types.

It is suggested that the student consult with string players in order to gain a more intimate knowledge of bowing possibilities. The list given here is a highly simplified one; many combinations and subtle variations are possible.

those in which the bow stays on the string and those in which it leaves the string.

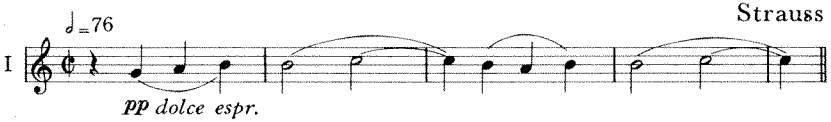
ON-THE-STRING BOWINGS

Legato

Groups of notes are slurred together; the total effect is as smooth as possible.

Ex. 5

Don Juan

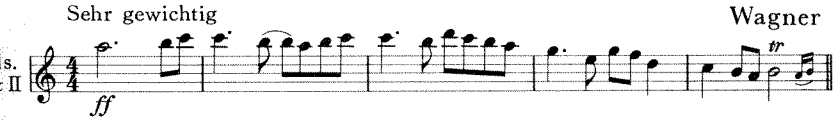


Détaché

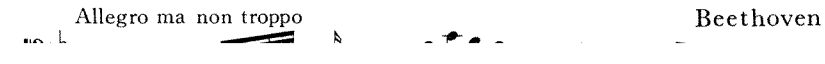
Each note is bowed separately. Although the word *détaché* suggests a break between the notes, that is not normally implied in the term as it is used by most string players in this country today. Successive notes taken *détaché* may be joined together smoothly, or the connection may be made less smooth by emphasizing the articulation that goes with the changing of the bow. An accented *détaché* is possible and effective. *Détaché* bowing can be executed at practically any speed and dynamic level. At slower tempos (especially in a *forte*), full bows may be used; at medium or faster speeds the middle or upper portion of the bow is normally involved. The point may be used for a delicate effect or, less often, the frog for a heavy one. As a rule, there is no special indication for the use of *détaché* bowing, apart from the absence of slurs. But sometimes in older music (particularly in passages where slurred and *détaché* groups alternate) dots are used to signify the *détaché* (as in Ex. 4 [a]).

Ex. 6

(a) Prelude to *Die Meistersinger*



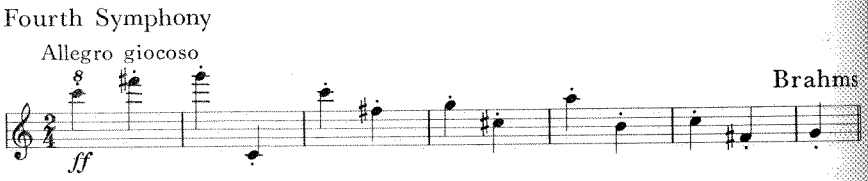
(b) Fourth Symphony



Martelé (*martellato*)

The description "hammered," which has commonly been applied to this type of bowing because of the literal meaning of *martelé*, is perhaps misleading; the bow does not strike the string from above but begins and remains on it, moving very quickly and stopping abruptly at the end of each stroke so that there is a clean-cut separation between notes. The *martelé* is most often done at the upper part of the bow but may also be done at the frog to produce a more robust effect. The indication for it may be dots, arrowheads, accents, or a combination. Occasionally the word *martelé* is written in, sometimes followed by a direction for the specific use of the frog or the point (see Appendix A for these terms in foreign languages). More often, however, the player simply chooses the *martelé* bowing as being appropriate to the music at hand. Obviously, this type cannot be used when the notes move along too swiftly; beyond a certain speed, the stopping of the bow between strokes becomes an impossibility.

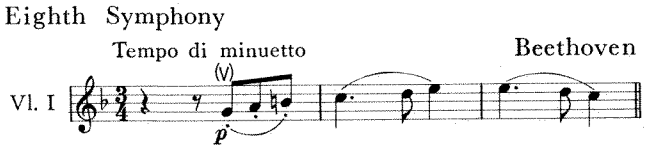
Ex. 7



Staccato

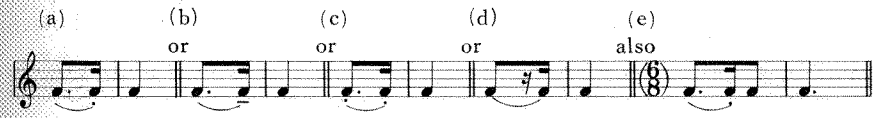
Employed in a generic sense, the word *staccato* can be applied to any bowing (off-the-string or on-the-string) in which the notes are separated from each other. However, when used as part of the term *slurred staccato*, it refers specifically to an on-the-string bowing in which a series of notes is taken (generally up-bow) with a separate "push" for each note. If many notes are involved, the stroke is so difficult as to be impractical for orchestral playing. But in a limited form, often called *group staccato*, it figures constantly in orchestral string parts. Two types may be cited. The first is primarily an up-bow stroke and consists of three or four notes (occasionally more) which are made to sound separately under the same bow, as at the beginning of Example 8.

Ex. 8



The second type (Example 9) can be performed on either an up-bow or a down-bow. It consists of two repeated notes with a separation between that is produced by a momentary stopping of the bow. Illogically, the notation usually involves a dot above or below the *second* of the two notes, although the first is actually the one that is shortened in performance. Versions (a), (b), (c), and (d) will all sound approximately alike.

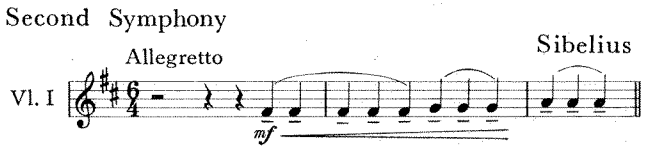
Ex. 9



Louré (*portato*)

This bowing is used chiefly in music of a slow, *espressivo* character. Two or more notes (seldom more than four) are taken on one bow, with a separate pressure and a slight initial swelling of the sound on each note. As applied in some music, the *louré* may involve an almost imperceptible break between the notes.

Ex. 10



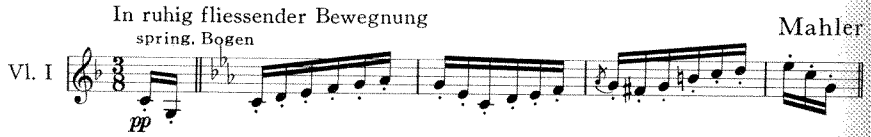
OFF-THE-STRING BOWINGS

Spiccato

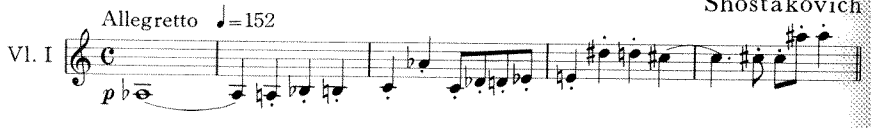
This is normally a light, middle-bow stroke in which the bow bounces off the string, taking one note to each bow. It is used very frequently in orchestral playing but is not generally practical if the dynamic level is to be louder than about *mf*. However, in passages that are not too rapid, a heavier type of spiccato done at or near the frog may be employed in case more sound is wanted. The usual indication for *spiccato* bowing is simply dots; or the word *spiccato* may be written in.

Ex. 11

(a) Second Symphony

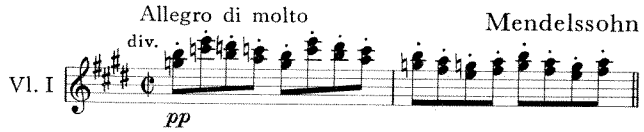


(b) First Symphony



The term *sautillé* (from the French verb "to leap") is often used interchangeably with *spiccato*. But it is better reserved for a very fast, light and delicate type of *spiccato* bowing in which the jumping of the bow results chiefly from the resilience of the stick rather than from an individual drop-and-lift motion for each note. (See Ex. 11[c].)

(c) *Midsummer Night's Dream,* Overture

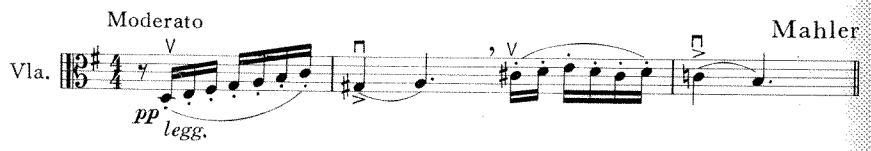


Group Spiccato

Although this term has been little used, it seems a logical one to describe a bowing similar to the group *staccato* but *off* the string. Instead of reversing direction for each note as in the ordinary *spiccato*, the bow picks up a series of short notes, usually on an up-bow. This stroke is sometimes referred to as *staccato volante* or "flying *staccato*." However, the *spiccato* designation seems to offer less chance for confusion in terminology.

Ex. 12

Fourth Symphony

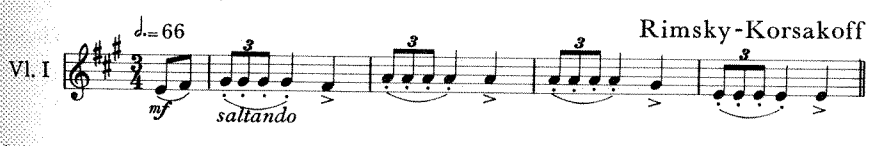


Jeté (ricochet, saltando, sautillé)

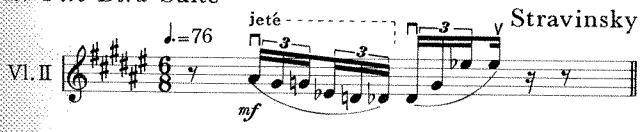
In the *jeté* (meaning "thrown" in French) the bow, in its upper half, is made to bounce on the string very rapidly with a down-bow stroke, in such a way as to sound a group of two to six notes—most often repeated notes. The notation usually consists of dots under a slur.

Ex. 13

(a) *Capriccio Espagnol*



(b) *Fire Bird* Suite

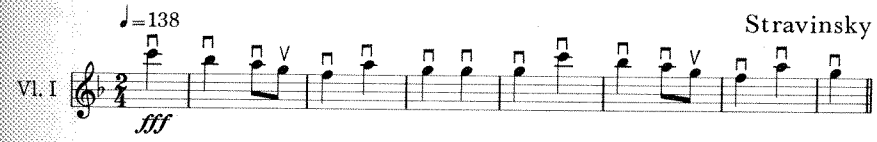


Successive Down-bows

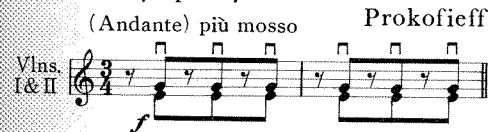
This device is sometimes used when a very decided break between notes is in order. Since the bow must be lifted and returned to the string between each two notes, the separation comes about automatically. This type of bowing is seldom employed for more than a few notes at a time, and it is not practical when the notes move along too quickly. The effect of successive down-bows is vigorous, sometimes almost savage, especially on the lowest string of each instrument.

Ex. 14

(a) *Petrouchka*

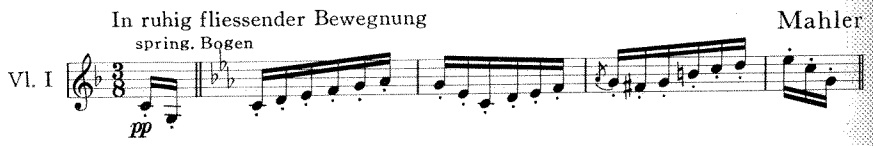


(b) Fifth Symphony

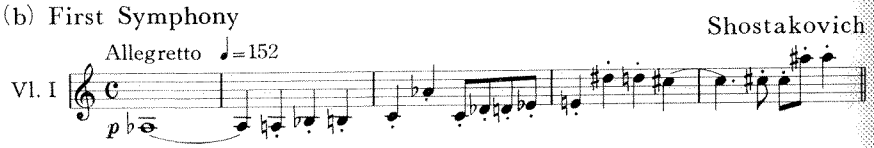


Ex. 11

(a) Second Symphony



(b) First Symphony



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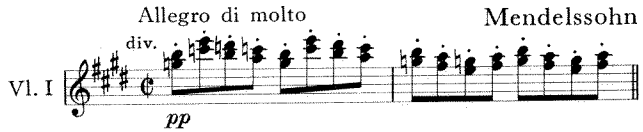

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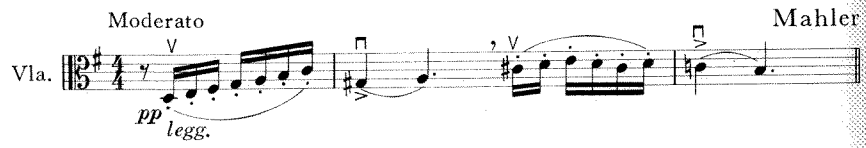
Ex. 12

Fourth Symphony



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Ex. 13

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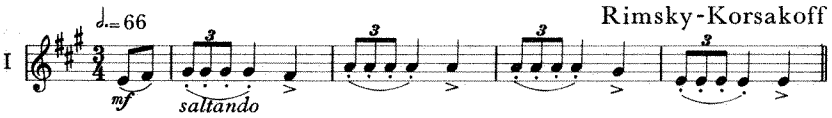
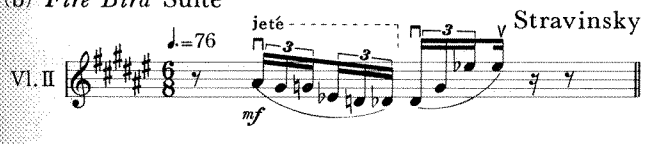


(b) *Fire Bird* Suite



Successive Down-bows

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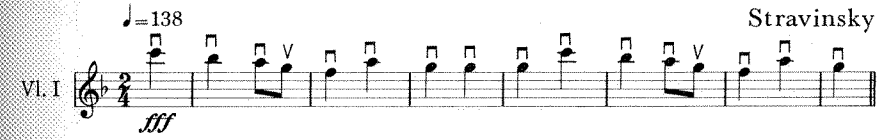
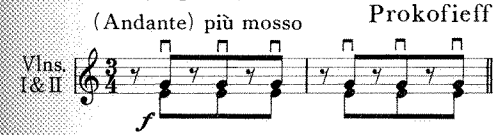
Ex. 14

(a) *Petrouchka*



(b) Fifth Symphony

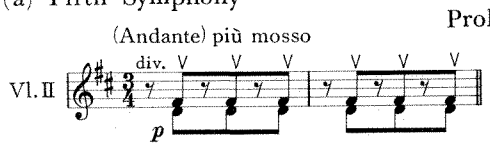


Successive Up-bows

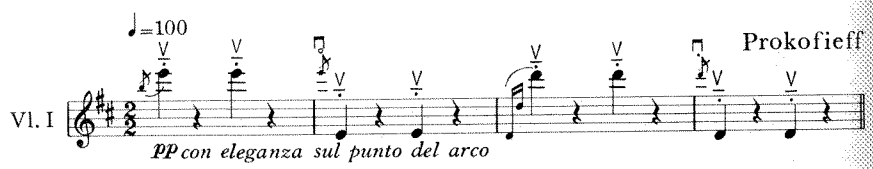
This bowing also produces a clear separation between notes, but it is useful chiefly for a more delicate effect at softer dyanmic levels. (Compare Ex. 14[b] and 15[a].)

Ex. 15

(a) Fifth Symphony



(b) Classical Symphony



SPECIAL EFFECTS

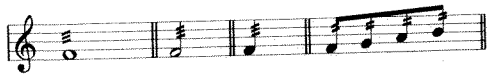
Tremolos

Although tremolos are often included under the heading of bowing-types (of the on-the-string variety), they are not actually *types* in the sense that the bowings described in the preceding pages are. The bowed tremolo is, after all, simply an accelerated version of the *détaché*, and the fingered tremolo makes use of ordinary slurred bowing while the fingers produce the distinctive effect. Furthermore, because the function of tremolos is essentially a coloristic one, there is considerable reason for grouping them with the other devices to be discussed in this section.

Bowed tremolo:

(a) Unmeasured

Ex. 16



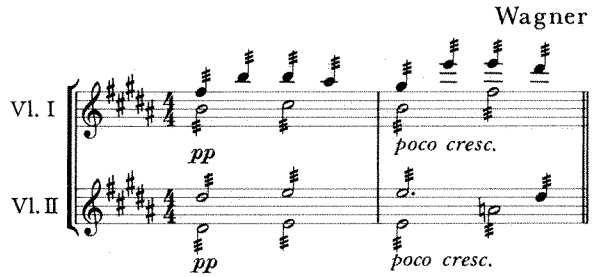
In the unmeasured form of the bowed tremolo, the bow is moved back and forth over the string as rapidly as possible. Three bars through the stem are ordinarily interpreted to mean an unmeasured tremolo, though sometimes in very slow tempo four bars through the stem are used to insure that

the notes are not played as measured thirty-seconds. It is best to write in the word *tremolo* (abbreviation, *trem.*) in doubtful cases. The expression "at point" or *punta d'arco* in tremolo passages signifies that the tremolo is to be made at the point of the bow in order to achieve a delicate, wispy sound. In some passages the unmeasured tremolo gives an effect of energy and excitement; at other times, especially when used high and softly, it can produce a shimmering, ethereal effect.

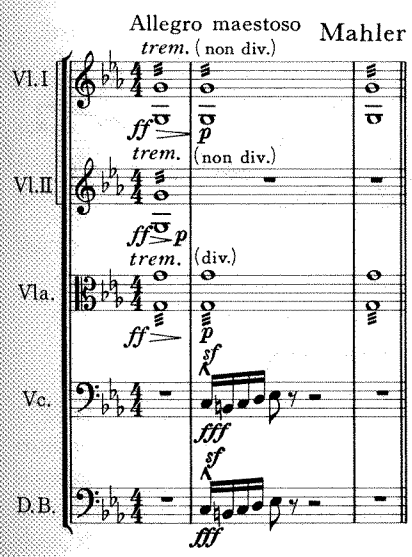
EXAMPLES OF BOWED TREMOLO (UNMEASURED)

Ex. 17

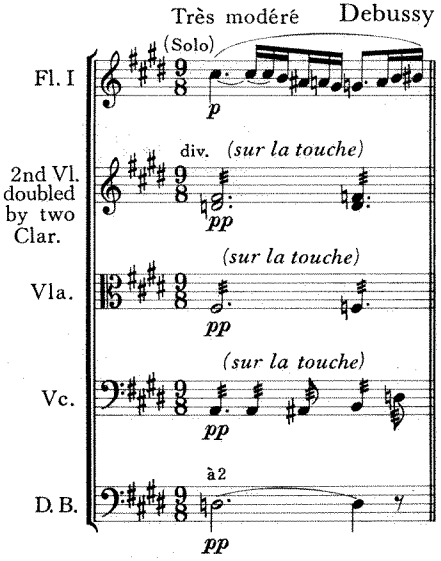
(a) *Tristan und Isolde*



(b) Second Symphony



(c) *Prelude to The Afternoon of a Faun*



(b) Measured

Ex. 18

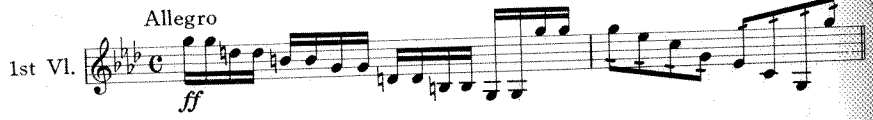
The measured tremolo, as its name implies, calls for a definite number of repeated notes, the number being shown by the notation. One line through a quarter-note or half-note stem means eighth notes; two lines, sixteenths. One line through an eighth-note stem means sixteenths; two lines, thirty-seconds; and so on. Triplets are indicated by a figure three above each note, or occasionally by three small dots placed next to the note head. Probably the safest way is to write out the actual notes involved in a measured tremolo for one measure at the beginning of the passage; after that, the simplified notation may be used. This method is shown in Example 19(a).

Tremolos (particularly the unmeasured variety) have been so over-exploited in romantic music that they have lost a good deal of their effectiveness and had better be used sparingly today.

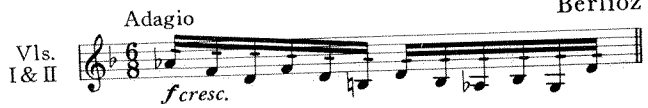
EXAMPLES OF BOWED TREMOLO (MEASURED)

Ex. 19

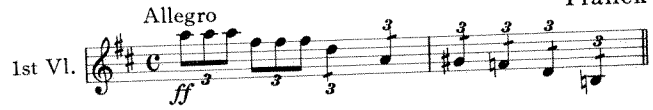
(a) Sixth Symphony — Beethoven



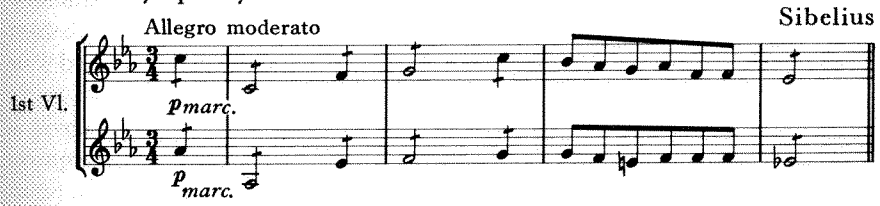
(b) *Fantastic Symphony* — Berlioz



(c) Symphony in D minor — Franck



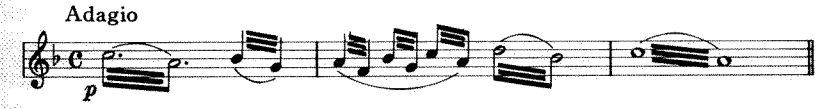
(d) Fifth Symphony — Sibelius



With special permission from Wilhelm Hansen, Copenhagen.

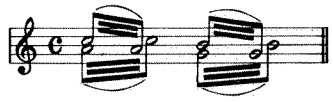
Fingered tremolo (slurred tremolo):

Ex. 20



In the fingered tremolo, which is usually unmeasured and which ordinarily involves two notes on the same string, one finger remains fixed on the lower of the two notes while another finger alternately plays and releases the upper note very rapidly so that a kind of trill between the notes results. The bow moves over the string in the normal way rather than quickly back and forth as in the bowed tremolo. The two notes involved are most often a 3rd apart, though intervals up to the diminished 5th are possible on the violin. On the viola, the limit had better be a perfect 4th, and on the cello a major 3rd. In notating fingered tremolos, each note is given twice the value it should have, mathematically speaking. Presumably, the theory is that the two notes of each pair sound so nearly at once that each note can be given full value. Frequently, fingered tremolos are written this way:

Ex. 21



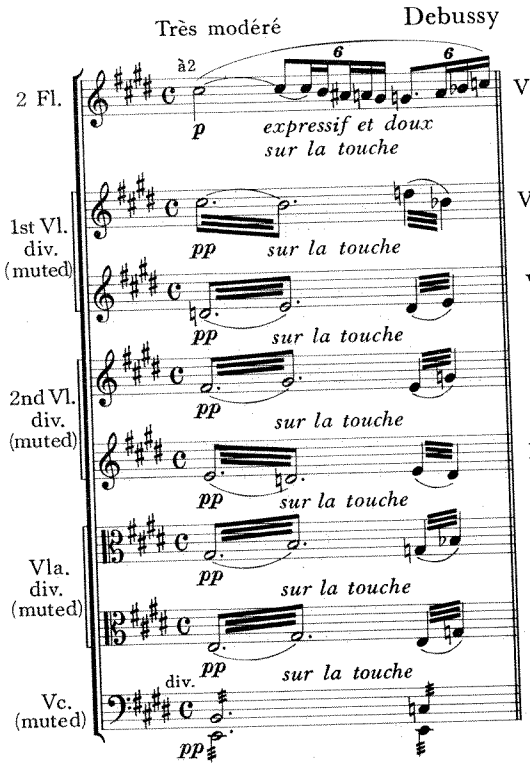
That is, the two notes of each pair are crossed with themselves. Forsyth comments that this is merely "a pretty arrangement for the eye of the score-reader" and that with a whole group of strings the same sound results whether the intervals are written upward or downward. It would appear, then, that a single-line part like the fingered tremolo in Example 20 is sufficient. The fingered tremolo gives a delicate rustling effect that is elusive and attractive. It is most often used as a background for solo passages played

by woodwinds or horn. Fingered tremolos involving notes on two different strings are possible but not very satisfactory. They are better avoided.

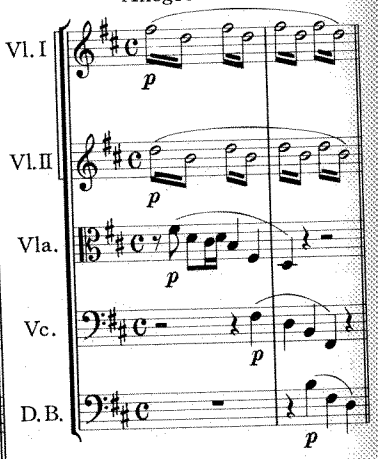
EXAMPLES OF FINGERED TREMOLO

Ex. 22

(a) *Prelude to The Afternoon of a Faun* Debussy



(b) *Fingal's Cave* Overture Mendelssohn



Example 22 (a): Permission for reprint granted by Editions Jean-Jobert of Paris, France, Copyright Owners; Elkan-Vogel Co., Inc., of Philadelphia, Pa., Sole Agents in the United States.

Other Special Effects

Muted (Italian: *con sordino* [*sordina*], abbrev., *con sord.;* French: [*avec*] *sourdine*[*s*]*;* German: *mit Dämpfer*[*n*]).

The mute, a small clamp of wood, metal, rubber, leather, or plastic which fits onto the bridge, reduces the volume of tone and gives it a veiled quality. At least two bars of moderate 4/4 time (preferably more) should be allowed for putting on mutes and at least one bar for taking them off.[1] It is usually wise to write, in the players' parts, "Put on mutes" in the rest preceding the muted passage and "Take off mutes" in the rest following it, so that players will be prepared in plenty of time for the passage to follow. A little-used effect calls for the mutes to be put on or taken off one desk at a time over a given number of measures. ("Desk" or "stand" is used to describe each group of two players; that is, the two who sit side by side and read from the same music.) The double bass uses a mute less often than the other stringed instruments, since the unmuted bass tone can be reduced to a whisper and can be made to blend fairly well with the other strings muted.

Playing with the bow at or near the bridge (Italian: *sul ponticello;* French: *sur le chevalet;* German: *am Steg*).

The resulting sound is glassy and eerie in quality. The intensity of this distinctive color varies with the proximity of the bow to the bridge. The device is probably most effective when used with a bowed tremolo. Examples can be seen near the beginning of Bartók's Concerto for Orchestra, at measure 219 of the first movement, and at measure 482 of the fifth movement. In the last instance the player is directed to return gradually to the normal sound in the course of measures 529 to 533.

Bowing over the fingerboard (Italian: *sul tasto* or *sulla tastiera;* French; *sur la touche;* German: *am Griffbrett*).

The sound is softer and less resonant. This is an effect which appears frequently in French impressionist scores. (See Ex. 22[a].) The term *flautando* directs the player to bow only very slightly over the fingerboard.

Playing "with the wood," that is, the back of the bow (Italian: *col legno*; French; *avec le bois;* German: *mit Holz*).

This is a rarely used effect and one which is generally confined to repeated-note figures, though there are a few instances of its use with legato and tremolo bowing. The sound is brittle and dry, and little volume is possible. Three examples that might be cited occur in Bloch's *Schelomo* at figure 6, in Bartók's *Music for String Instruments, Percussion and Celesta* at measure 90 of the fourth movement, and at the beginning of Holst's *The Planets.*

The direction for cancelling any of these special effects is *modo ordinario* (or simply *ord.*), meaning "in the ordinary way."

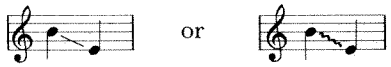
[1] The Heifetz Mute is so constructed that it can be clamped to one of the strings in the unused area below the bridge when not in use. Therefore, it can be put on and taken off more quickly than the ordinary mute.

Abnormal tuning (Italian: *scordatura*).

The player is directed to tune one or more strings higher or lower than usual. The most frequent purpose of this arrangement is to extend the range of an instrument downwards, as in Part IV of Respighi's *Pines of Rome*, where half the cellos and half the basses tune their bottom string to a low B. *Scordatura* may also be used to allow a particular pitch to be played as an open note, as in the last measure of Stravinsky's *The Rite of Spring*, where the cellos tune their A-string down to a G♯ which is then played as part of a quadruple stop. Or, rarely, the device may be employed for reasons of color: in the second movement of Mahler's Fourth Symphony the score calls for a solo violin with all four strings tuned a whole tone higher than usual, the object being to simulate the sound of a "cheap fiddle."

Glissando.

Two notes connected by a line



are played in such a way that the notes in between sound as a *glissando;* that is, the finger slides along the string instead of stopping each note separately. The glissando effect may be made very pronounced or may be reduced to an almost imperceptible connection between the notes. In the more moderate form, it is sometimes known as a *portamento* and is quite often introduced by the player, even where no direction is present, in order to give an extremely legato effect.

Half (of a string group) (Italian: *la metà;* French: *la moitié*; German: *die Hälfte*).

Occasionally the sound of a smaller-than-normal string group is wanted. In such cases the score may specify that only half of a particular string group is to play ("½ Violins I," or "½ Cellos," etc.). An example as applied to the double basses can be seen at the beginning of Strauss's *Till Eulenspiegel.*

First desk only or first two desks only, etc. (desk — Italian: *leggio;* French: *pupitre;* German: *Pult*).

The sound is reduced still further and approaches the solo quality, especially if only one desk is playing.

Solo strings.

When a more intimate, personal quality is desired, strings may be employed in a solo capacity. The direction in such cases is "1 solo violin" or "2 solo violas" (if two different parts are involved) or "4 solo cellos," as

the case may be. Such parts are usually written on a separate staff or staves just above the string group to which the solo instrument belongs, although if the rest of the string group is not playing, a separate staff need not be used (in the case of one solo instrument).

Special pizzicato effects.

In the "snap pizzicato" the string is plucked with such force that it rebounds against the fingerboard. The indication is the sign ⏀ (or ⏁) over each note to be played in this fashion. Bartók is especially fond of this device, and examples of it may be seen in his *Music for String Instruments, Percussion and Celesta* (third movement, measure 49) as well as in his Violin Concerto (first movement, measure 373).

The "nail pizzicato" (indication ⊙ or ◎) involves using the fingernail rather than the fleshy part of the fingertip to pluck the string. The resulting sound is sharply metallic. An example occurs in the Adagio movement of Bartók's Fifth String Quartet at measure 32.

Multiple stops may be played pizzicato with a back-and-forth motion of the hand, the indication being either alternating down-bow and up-bow signs, or arrows. Example 14(i) in Chapter 10 illustrates this effect. Sometimes *quasi guitara* is included. The arpeggiation in pizzicato chords may be accentuated or reduced to a minimum; if the latter effect is desired, *non arpeggiato* should be written in, or a vertical bracket before the chord may be used instead (or additionally).

NATURAL HARMONICS

Harmonics are simply overtones of the strings. They have a flutelike, silvery quality that can be highly effective as a special color. In orchestral writing they are apt to be used for isolated notes or for short melodic lines in a moderate tempo. Rapid successions of them are difficult to perform and should be avoided.

In the remarks at the end of Chapter 3 it was explained that strings, like other sounding bodies, vibrate not only as a whole but in halves, thirds, fourths, and so on at the same time, producing overtones. These are normally heard as parts of the composite tone, but we can isolate them by touching the string lightly at certain points:

1. In the middle (an octave above the pitch of the open string); the result is a harmonic an octave higher than the pitch of the open string.
2. One third of the string length from either end (either a perfect 5th above the open pitch or at the point where the note would ordinarily be played); the result is a harmonic an octave and a 5th higher than the open pitch.

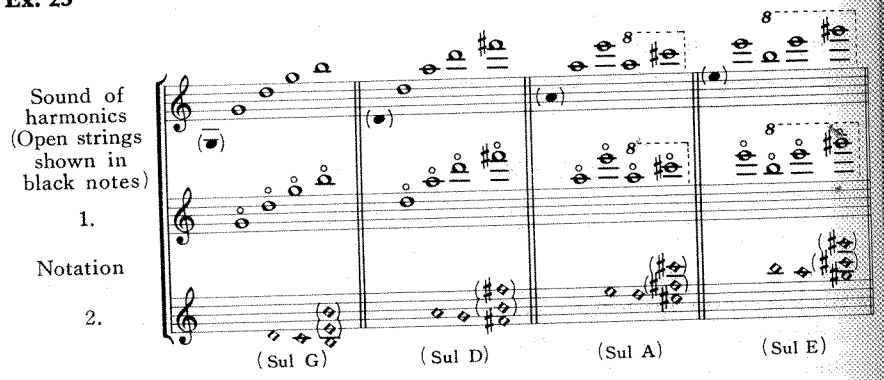
3. One fourth of the string length from either end (either a perfect 4th above the open pitch or at the point where the note would ordinarily be played); the result is a harmonic two octaves higher than the open pitch.

4. One fifth of the string length from either end (either a major 3rd above the open pitch or at the point where the note would ordinarily be played) or two fifths of the string length from either end (either a major 6th or a major 10th above the open pitch); the result is a harmonic two octaves and a major 3rd higher than the open pitch.

Other harmonics above this are possible but are seldom seen in orchestral writing. Even number 4 is used infrequently. Harmonics such as these, which are overtones of an open string, are called "natural" harmonics. Following is a chart showing the natural harmonics available on each of the violin's four strings, along with the notation involved. Notice that in some cases the same pitch occurs as a natural harmonic on two different strings.

NATURAL HARMONICS

Ex. 23



The first natural harmonic on each string, the one an octave above the open note, is always notated at actual pitch with a small circle over it. The other natural harmonics may be notated in either of two ways, depending on how they are to be played. As explained earlier, they may be produced by touching the string lightly at either one of two points (more than two in the case of the fourth overtone). Notation 1 in Example 23 is used if the string is to be touched lightly at the point where the note would ordinarily be produced. Notation 2 shows, by means of a diamond-shaped note, another point on the string which can be touched lightly to produce the same harmonic. (The actual pitch of the harmonic usually does not appear in this case, although some composers prefer to include it as well.) The string to

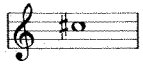
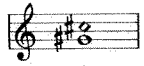
be used is often indicated below the note—for example, "sul D" or "D string" or "III."

As a general rule, this second method is somewhat easier than the first in performance. On the other hand, the playing method called for by Notation 1 is preferable in cases where the hand is already high on the string and would have to make an awkward jump to the other end of the fingerboard in order to use the second method. Some writers on orchestration recommend using Notation 1 exclusively for natural harmonics, the player then choosing the easiest method of playing the note. However, Notation 2 appears frequently in scores; consequently the author feels that students should understand it as well.

Although these points, and others in connection with harmonics, have a way of sounding complicated on paper, they can be made quite clear in a few minutes by means of an actual demonstration with a stringed instrument. The writer recommends strongly that such a demonstration be arranged at the time this material is taken up.

ARTIFICIAL HARMONICS

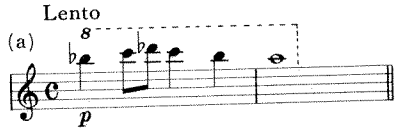
In order to produce as harmonics notes that are not overtones of the open strings, a slightly different procedure is necessary. The string is pressed down firmly by the first finger at a point two octaves below the pitch of the desired harmonic; at the same time, the fourth finger touches the string lightly at a point a perfect 4th higher, which is equivalent to dividing the unstopped portion of the string into quarters. A harmonic two octaves above the firmly fingered pitch results. (This is like number 3 of the natural harmonics, except that a stopped pitch rather than an open one is used as fundamental.)

To illustrate: if we finger  firmly, then touch the string lightly at  , the note  will sound as a harmonic. The usual notation for this would be  with the lightly touched pitch indicated by a diamond-shaped note. (The diamond-shaped note is open, no matter what the value of the lower note is.) As a rule, the actual sound is not even shown (though sometimes it is included as well, making three written notes for one sound). A question that students invariably ask at this point is: Why not avoid all these complications by simply writing the passage at actual pitch and marking it "harmonics"? This is what

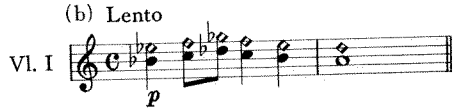
Forsyth calls "the lazy way," and it is not recommended; it saddles the player with the problem of figuring out the most convenient method for producing each harmonic—a problem that is apt to waste time in rehearsal and one that should rightfully have been solved in advance by the arranger. The same objection applies to the practice of indicating all harmonics by circles over the notes.

Let us go back, now, and review the process of writing a note as a harmonic. The orchestrator should first see whether the note is playable as a natural harmonic. If it is, that way is usually easier and therefore preferable. If the note cannot be played as a natural harmonic, the following procedure can be adopted for writing it as an artificial harmonic: measure down two octaves from the actual pitch desired and write that note (with the proper time value), then write a diamond-shaped note a perfect 4th higher. (Notice that to make a *perfect* 4th, accidentals must often be added.) For example, if the following passage were to be played in harmonics,

Ex. 24



we would write:



Here the last note, A, could be played as a natural harmonic and would almost certainly be taken that way by the player even though it is written as an artificial harmonic. This substitution of the "artificial" for the "natural" notation when number 3 of the natural harmonics occurs in a series of artificial harmonics is a license that has come to be more or less accepted.

Artificial harmonics other than those involving the stretch of a 4th are possible but are seldom used. To give just one example: if the player touches the string lightly with his fourth finger a perfect *5th* above the stopped note, a harmonic a 12th higher than the stopped tone results.

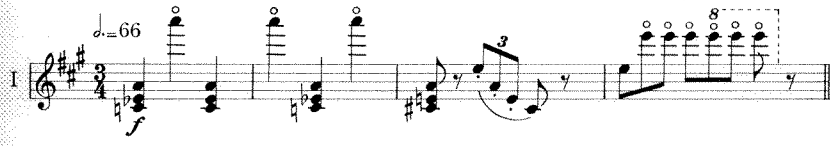
Although two artificial harmonics at a time are occasionally called for in virtuoso solo literature for the violin, that arrangement is generally too difficult for orchestral use, with the exception of two artificial harmonics a perfect 5th apart, which can be played as a double stop by pressing two adjacent strings down firmly with the first finger and touching the two strings

What has been said about harmonics on the violin applies equally to the viola. Artificial harmonics are extremely difficult for the cello and out of the question for the double bass except in the higher positions; they should therefore be ruled out for these instruments except in virtuoso solo work. Natural harmonics are practical for both, in orchestral writing, however. Certain composers, notably Stravinsky, have made extensive and highly effective use of natural harmonics in parts for the double basses.

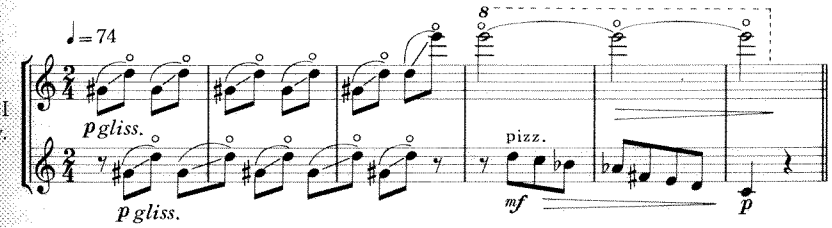
EXAMPLES OF NATURAL HARMONICS

Ex. 25

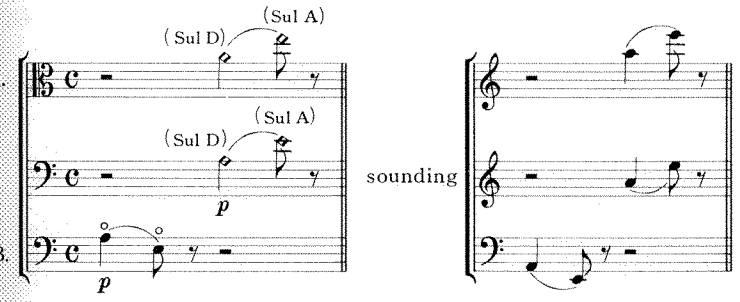
(a) *Capriccio Espagnol* Rimsky-Korsakoff



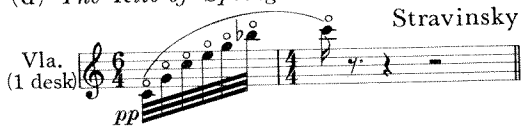
(b) Concerto for Orchestra Bartók



(c) *Pictures from an Exhibition*
Mussorgsky-Ravel



(d) *The Rite of Spring* Stravinsky

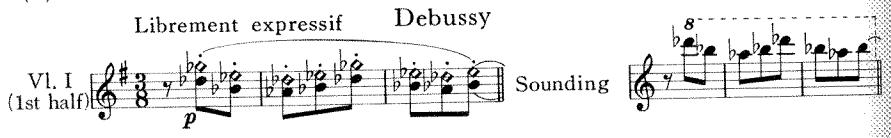


(These harmonics are performed by sliding the finger lightly over the C string between middle C and c^3. The harmonics shown result automatically.)

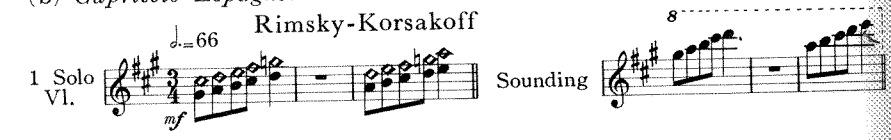
EXAMPLES OF ARTIFICIAL HARMONICS

Ex. 26

(a) *Ibéria*



(b) *Capriccio Espagnol*



SUGGESTED ASSIGNMENTS

A. Know:

1. the various types of bowing, the names commonly used for them, and the indication for each.
2. special effects obtainable on strings and the names for them.
3. principles involved in writing harmonics (natural and artifical).

B. The following are suitable as exercises in scoring for string orchestra. Include bowing indications (slurs and any other markings necessary).

1. Bach, Sarabande from First French Suite.
2. Bach, Fugue III from *The Well-Tempered Clavier*, Vol. I
3. Bach, Fugue XVI from *The Well-Tempered Clavier*, Vol. I.
4. Bach, Fugue in G minor from *Eight Little Preludes and Fugues for the Organ.*
5. Bach, Fugue VII from *The Art of Fugue.*
6. Bach, Fugue IX from *The Art of Fugue.*
7. Mozart, Sonata in B-flat major, K. 498a, 3rd movt.
8. Beethoven, Sonata, Op. 2, No. 1, 2nd movt., meas. 1–16.

9. Beethoven, Sonata, Op. 2, No. 2, 2nd movt., meas. 1–8.
10. Beethoven, Sonata, Op. 10, No. 2, 3rd movt. meas. 1–32.
11. Beethoven, Sonata, Op. 10, No. 3, 3rd movt., meas. 1–16.
12. Beethoven, Sonata, Op. 28, 2nd movt., meas. 1–8.
13. Schubert, Sonata, Op. 147, 2nd movt., meas. 1–28.
14. Schubert, Sonata, Op. 164, 2nd movt., meas. 1–16.
15. Schumann, "Träumerei", from *Scenes from Childhood.*
16. Schumann, "Curious Story" from *Scenes from Childhood.*
17. Brahms, *Romanze*, Op. 118, No. 5.
18. Tchaikovsky, "Morning Prayer" from *Album for the Young.*
19. Prokofieff, Gavotte, Op. 12, No. 2.
20. Bartók, No. 12 from *Fifteen Hungarian Peasant Songs.*
21. Hindemith, "Interludium" between "Fuga Decima" and "Fuga Undecima" from *Ludus Tonalis.*

SUGGESTED LISTENING

Strings

Vivaldi, Concerti.
Corelli, Concerti Grossi.
J. S. Bach, Suites for Strings; Brandenburg Concerti Nos. 3 and 6.
C. P. E. Bach, Symphony No. 3 in C major.
Handel, Concerti Grossi.
Mozart, *Eine kleine Nachtmusik;* Divertimenti.
Tchaikovsky, *Serenade for Strings*, Op. 48.
Arensky, *Variations on a Theme of Tchaikovsky.*
Miaskovsky, Sinfonietta.
Sibelius, Canzonetta.
Schönberg, *Verklärte Nacht.*
Bloch, Concerto Grosso for string orchestra (with piano).
Bartók, *Music for String Instruments, Percussion and Celesta.*
Vaughn-Williams, *Fantasy on a Theme of Thomas Tallis.*
Stravinsky, *Apollon Musagète.*
Barber, *Adagio for Strings.*
William Schuman, *Symphony for Strings.*
Copland, Third Symphony, 3rd movt., beginning.
Persichetti, Symphony for Strings.

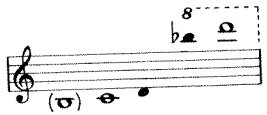
Chapter 5

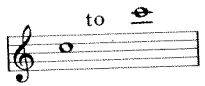
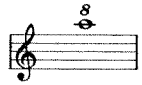
THE WOODWINDS

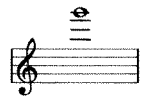
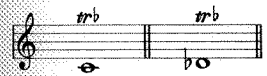
THE FLUTE

Italian: Flauto, Flauti — *French:* Flûte, Flûtes — *German:* Flöte, Flöten

Ex. 1

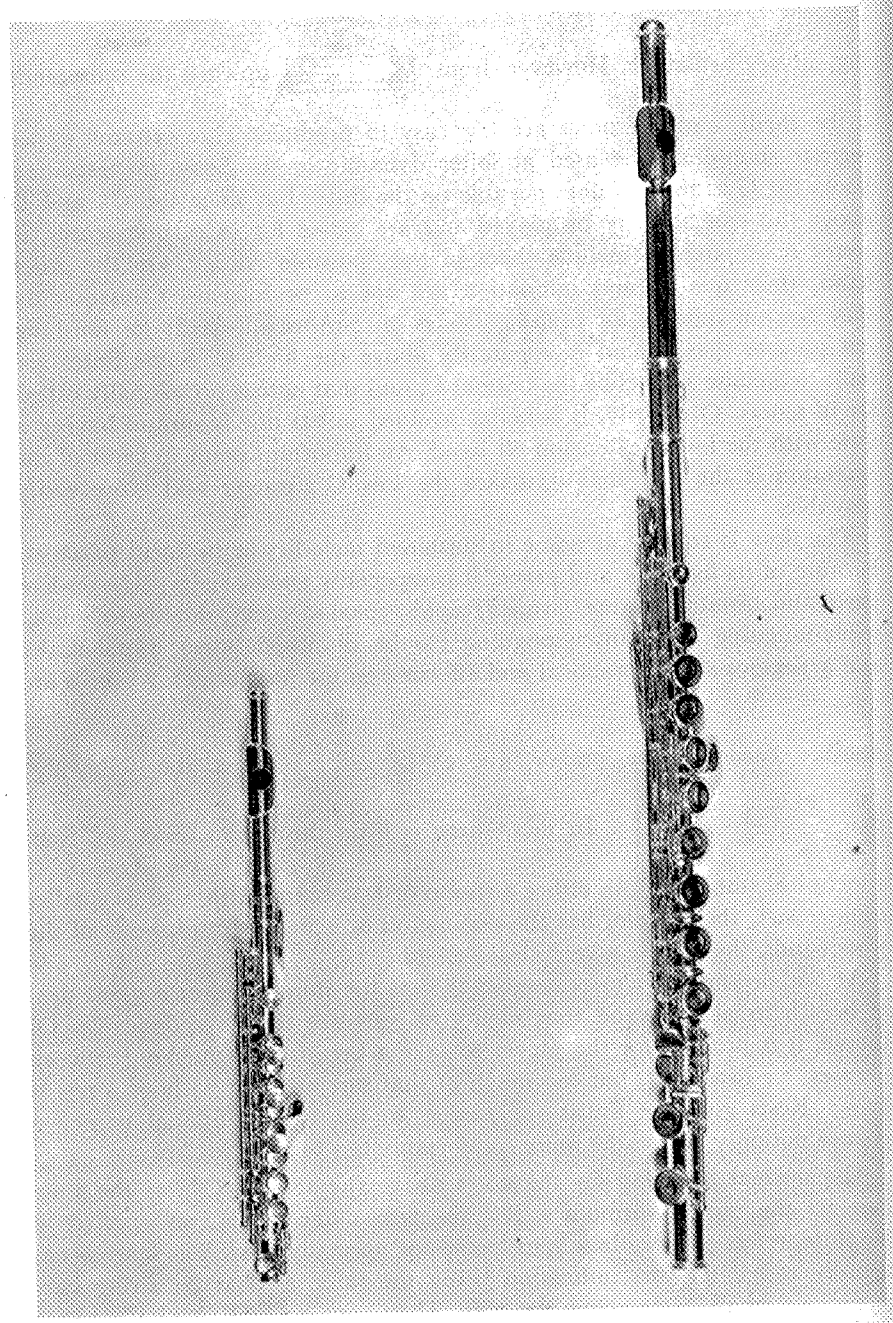


Somehow it is always difficult for the orchestration student who does not play a wind instrument to understand the wide differences in power and quality between the various registers of each woodwind. To complicate matters still more, there is no general principle that applies to all the woodwinds in this respect; some are thick and heavy in their bottom register, thin and light at the top, while others reverse this relationship. In the case of the flute, the bottom octave is weak and somewhat breathy, but it has a velvety, sensuous charm that is shown off to good advantage in such scores as Debussy's *Prelude to The Afternoon of a Faun*. Since little volume is possible in this low register, accompaniment must be kept light if the flute is to come through. From  the tone becomes progressively brighter and stronger. The notes above this have considerable strength and a haunting, silvery brilliance. However, from  upward the tone tends to be shrill, and the notes are less easy to produce. This extreme upper register should not be used at softer dynamic levels. Some orchestration books list C as the top note possible on the flute; but since the C♯ and D above this can actually be played and are called for in certain scores, it seems reasonable to include them in the "possible" range. On the other hand, their quality and intonation are apt to be inferior. Consequently they are not suitable for sustained tones but are useful chiefly for finishing out phrases that extend momentarily above the high C. Some flutes are built to include a B below the bottom C, and that note is occasionally called for in scores. Obviously, it is better avoided unless one is sure of having a flute with the low B extension on hand. An important point in favor of the extension is the fact that it makes the low C stronger and more easily playable.

The flute is equally at home in sustained melodies or in florid passages. Because of its lightness and grace, it is especially good at airy, scherzo-like parts and ornate "filigree" work. Rapid repeated notes, double-tonguing, triple-tonguing and flutter-tonguing (to be discussed later), rapid scales and arpeggios are all practical and effective on the instrument. All trills are possible except those on or above  and the following:  . In fact, there is little the flute cannot do, from a technical standpoint, in either a legato or a staccato. Although its smaller counterpart, the piccolo, has the distinction of being the most agile of the woodwinds, the flute is a very close second.

An important point to remember is that the flute requires a great deal of breath in playing and that plenty of rests are therefore desirable. Of course, it is possible for the player to take a breath very quickly (between phrases, for example), but too much of that sort of thing without a rest is tiring. Rests give the flutist—or *flautist*, to use the traditional name—a chance not only to breathe more comfortably but to relax his lips.

The normal fingering for the notes above the second C♯ on the flute involves the use of harmonics. But the term "harmonics," as applied to the flute, refers only to those harmonics not normally used. These are occasionally called for, the indication being the same as that for string harmonics—a small circle above the note. They have an odd, "white" quality useful for a particular effect but tend to be flat in pitch. Now and then flutists play one or two notes as harmonics in passages where the normal



Studio Gilmore, Austin, Texas

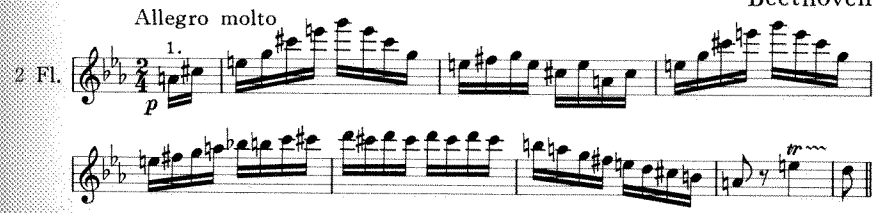
Piccolo Flute

fingering would be awkward. Example 3 in Chapter 17 includes a succession of harmonics for two flutes.

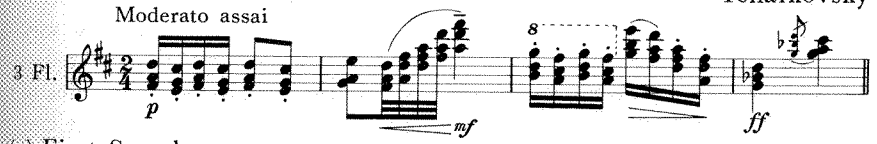
EXAMPLES

Ex. 2

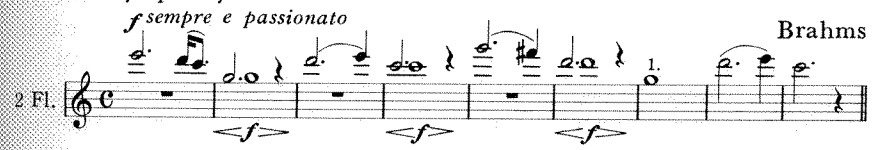
(a) Third Symphony — Beethoven



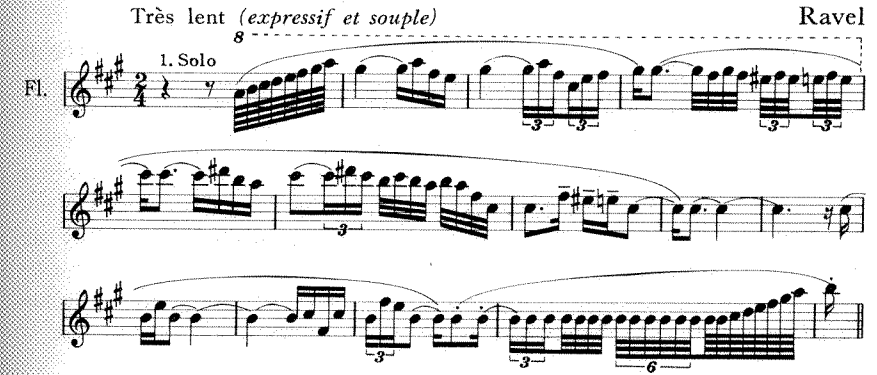
(b) *Dance of the Reed Flutes* (*Nutcracker* Suite) — Tchaikovsky



(c) First Symphony — Brahms



(d) *Daphnis and Chloe* Suite No. 2 — Ravel



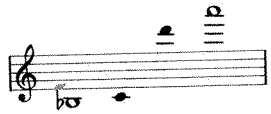
(See also the flute parts in the excerpts from Debussy's *Prelude to The Afternoon of a Faun* given in Ex. 17 [c] and 22 [a] in Chapter 4.)

THE OBOE

Italian: Oboe, Oboi — *French:* Hautbois, Hautbois — *German:* Oboe, Oboen

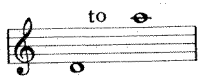
Old spelling: Hoboe(n)

Ex. 3



The oboe, along with the English horn, bassoon, and contra bassoon, belongs to the double-reed branch of the woodwind family. Its spicy, somewhat nasal tone is one of the most distinctive of orchestral colors—one which has a way of cutting through other colors and of standing out against any background. For this reason, the oboe is an ideal solo instrument. It can be poignant or light-hearted, and it is especially well suited to melodies of a pastoral nature. Although not as agile as the flute or the clarinet, it can perform with considerable speed and flexibility if need be, either legato or staccato. This is not to imply that it is valuable only in a solo role, for it is also useful in combination with other instruments. However, one must be careful about giving it a subordinate voice in a lightly scored passage, since its incisive tone may come through too prominently for background. Another point to remember is that the highly colored oboe timbre becomes tiresome to the ear if used for too long at a time.

Below about  the oboe tends to sound a bit thick and coarse —"honky," as oboe players sometimes put it. For that reason, these bottom notes, particularly the low B♭, are better avoided in any passage where the oboe is to be heard prominently. Parts that dip down into this lowest register but quickly get away from it are not objectionable; the main point is not to stress these very low notes in solo work. Occasionally, however, they are used intentionally to achieve a special effect, as in Stravinsky's *Symphony of Psalms*, where they give an ultra-reedy, primitive flavor, and in Prokofieff's *Peter and the Wolf*, where they serve admirably to personify the duck.

From 

is the oboe's most useful and characteristic reg-

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Oboe English Horn

ister. Above that the tone becomes thinner and less pungent, though quite usable up to about  . The notes above this are generally impractical for orchestral use, the high A, in particular, being extremely difficult.

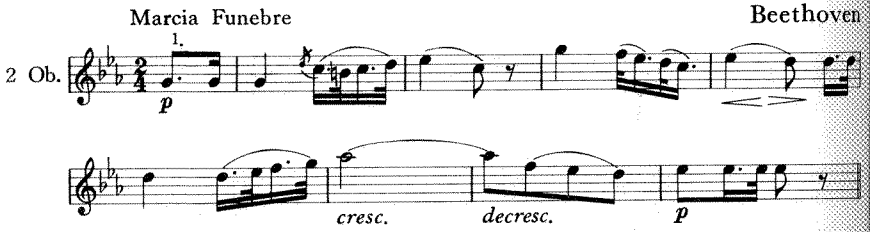
All trills are available except the half-step trill on the bottom B♭, though trills involving the top F and G are better avoided.

Double-tonguing and triple-tonguing, being very difficult on the oboe, are rarely used, but the instrument is capable of playing fairly rapid repeated notes even with single-tonguing. As intimated earlier, it should not be asked to play extremely fast or intricate passages. Unlike the flute, it requires very little expenditure of breath in performance. But the player has a different problem, that of *holding in* the air until the next breathing point while using only a small amount of it in playing. Consequently, sufficient rests are as essential in oboe parts as in flute parts, if for a different reason. In addition to being an uncommonly taxing instrument, the oboe is a sensitive and somewhat unpredictable one as well. Notes must be humored and cajoled; the reed is delicate and must be "just so"; temperature and atmospheric conditions can produce unexpected and disastrous results. In short, the oboe is something of a temperamental *prima donna*, but an indispensable one in the orchestra.

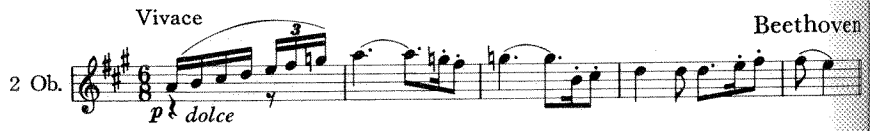
EXAMPLES

Ex. 4

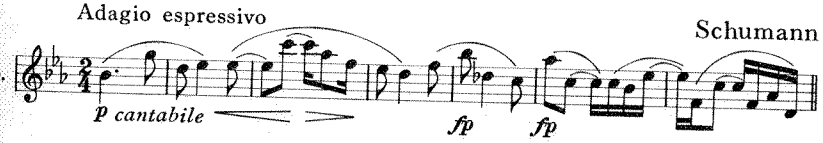
(a) Third Symphony



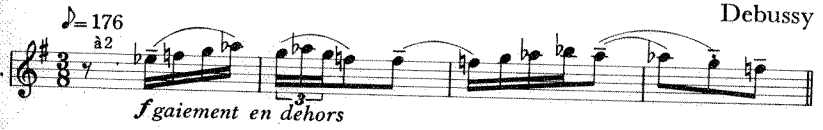
(b) Seventh Symphony



(c) Second Symphony



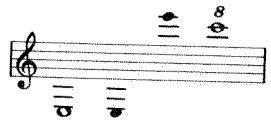
(d) *Ibéria*



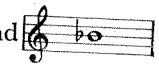
THE CLARINET

Italian:	Clarinetto Clarinetti	*French:*	Clarinette Clarinettes	*German:*	Klarinette Klarinetten

Ex. 5



In the past, clarinets pitched in various keys were used. Of these, the two chief survivors today are the clarinet in B♭ and the clarinet in A, the first being the more commonly used of the two. Both are transposing instruments; that is, they are not written at actual pitch. In the case of the B♭ clarinet, the part must be written a major 2nd (a whole step) higher than the sounds desired, while the part for the A clarinet is written a minor 3rd higher than the sounds. For the benefit of students who have not had experience with transposing instruments, let us elaborate a bit on this system and give some examples to show how it works.

The B♭ clarinet is so labeled because B♭ is the sound that results when written C is played. That is, when the B♭ clarinet player sees  on the page, he uses the fingering which will produce the sound  Consequently, if we want the B♭ clarinet to *sound*  , we must

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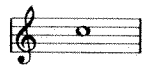
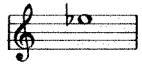
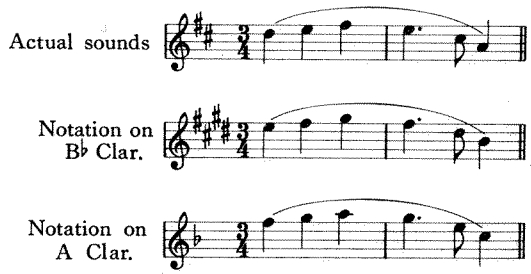
Clarinet Bass Clarinet

write  . On the A clarinet, the note A is the sound that results when written C is played. Therefore, if the sound  is wanted on an A clarinet, we must write  , a minor 3rd higher. In dealing with transposing instruments remember that the key of the instrument is the sound that results when written C is played.

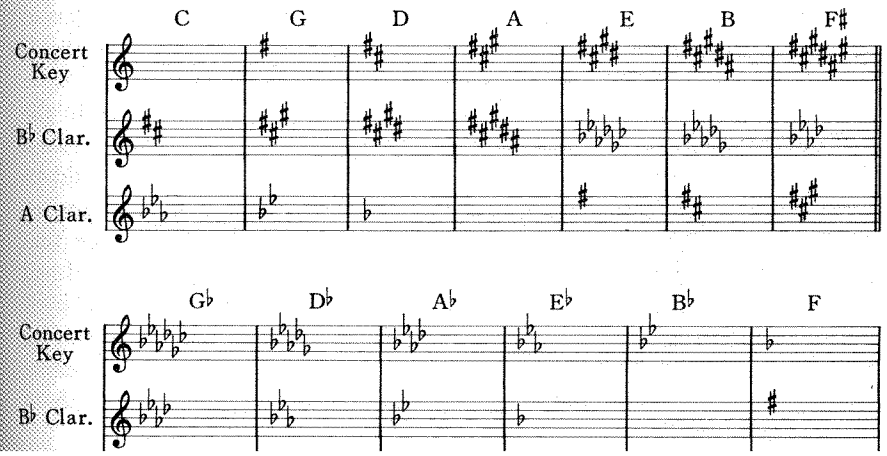
Example 6 shows how a passage (given first at actual pitch) would be written for B♭ and A clarinets respectively.

Ex. 6



Notice the inclusion of key signatures. The chart below gives the key signature that would be used by each of the two instruments in each of the major keys. The term "concert key" means the actual or sounding key. The word "concert" is also applied to notes; for example, "concert G," means the actual sound G as opposed to the written G on a transposing instrument.

Ex. 7



In dealing with transposing instruments we encounter two types of transposition: (1) the "reading" type, the kind that is involved when we are reading a score and have the problem of converting *transposed* pitches to *actual* (or concert) pitches, and (2) the "writing" type, in which we must convert *actual* pitches to *transposed* pitches. (The difference between the two types is, of course, only one of direction.) If this distinction is understood at the outset and kept in mind, a good deal of confusion can be avoided.

Considering the complications which the transposition system involves for both orchestrator and score reader, a very natural question at this point is, "Why must it be used at all?" Although a complete answer to that question would entail excursions into technical points of acoustics and fingering, certain general reasons for the use of the system can be cited here. As far as resonance and good intonation are concerned, the B♭ and A clarinets are superior to the now obsolete C clarinet. Since they started out as transposing instruments and have been treated as such ever since, a change to another method of notation now would be all but impossible. (Certain composers make a practice of writing the parts for clarinets and other transposing instruments at actual pitch in the score; but even in such cases the individual parts for the players are written in transposed form.) An advantage of the transposition principle as applied to clarinets is this: it allows for a pattern of fingering common to clarinets of different sizes; the player need not learn a new fingering in order to perform on an alto or bass clarinet, for example. Instead it is the notation which changes in each case.

As a general rule, key signatures involving flats are easier for the instruments pitched in flat keys, while instruments such as the A clarinet find the sharp keys a bit more comfortable. However, the B♭ clarinet is frequently called on to play in keys up to three or four sharps, while the simpler flat keys are perfectly practical for the A clarinet. The advantage of having the two instruments available is that if a part would involve awkward fingering on one, it can nearly always be played with relative ease if assigned to the other. In general, the B♭ clarinet is first choice, the A clarinet being selected chiefly in cases where the B♭ instrument would have to play in a difficult key.

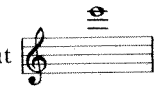
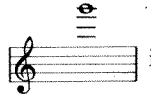
By way of illustration, let us suppose that we are to score a piece in the key of E♭ major, concert. If we use the B♭ clarinet, its part will be written in F major (an easy key for the instrument) while the A clarinet would be written in the more difficult key of G♭ major or, enharmonically, F♯ major. Obviously, the B♭ instrument is the better choice here. But suppose that the music to be scored is in A major, concert. The B♭ clarinet would call for a signature of five sharps, while the A clarinet would be written in C major. In such a case, the A clarinet would be the better choice. Of course, there are certain keys which are suitable to either instrument. For example, in music in G major, concert, the B♭ clarinet could play in A major about

as easily as the A clarinet could play in B♭ major. However, the B♭ instrument would probably be chosen here, simply because it is the more commonly used and more generally available of the two.

Sometimes parts are best written enharmonically. For instance, if we are using B♭ clarinet and we come to a section in B major, a transposition of the part up a major 2nd would bring us out in the key of C♯ major (seven sharps) whereas the enharmonic equivalent, D♭ major (five flats), would be a great deal easier from the reading standpoint and should of course be chosen. Notice that such enharmonic respellings alter the interval used in the "transposition by interval" method.

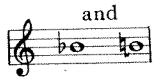
Although changes from B♭ clarinet to A clarinet (or vice versa) in the midst of a work are possible and are occasionally called for, they are not recommended; the clarinet that has been lying unused will be cold and will consequently tend to be flat in pitch and sluggish in its general response until it has had time to warm up. There is, by the way, a slight difference in tone quality between the B♭ and the A instruments, but it is scarcely apparent to any but the most sensitive ear.

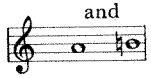
What has been said here about the use of the A clarinet does not apply in school orchestras. There the B♭ clarinet is used exclusively. The problem of difficult key signatures never arises because the concert keys are chosen with an eye to keeping the B♭ instruments in the easier keys.

The bottom octave or so of the clarinet is called the *chalumeau* register. It has a dark, strangely hollow quality. Notice that although the written range of both B♭ and A clarinets is the same, the A clarinet can go a half step lower in sound than the B♭ instrument, since the low written E sounds D on the B♭ clarinet and C♯ (or D♭) on the A clarinet. The middle register, roughly from  to  , is rather neutral in quality and not too strong, while the octave above this (sometimes known as the *clarion* register) is clear and bright. Above about  the tone is apt to be shrill and the intonation doubtful. It is true that on paper the clarinet's "possible" range extends up to a high C above this. But these very high notes are not usable, for all practical purposes. Even in band work, where clarinets are often taken higher than in the orchestra, a written  is usually considered the practical upward limit. Occasionally the very shrillness of this top register is used for humorous or grotesque effects, as in Stravinsky's

Petrouchka, where the high notes of the clarinet imitate the sounds of a peasant's reed pipe as he plays while his bear dances.

Of all the woodwinds, the clarinet is the most sensitive in the matter of dynamic range and control. It can reduce its warm, round tone to an incredibly soft whisper and can achieve the subtlest nuances of color and phrasing. These abilities make it an ideal solo instrument for *espressivo* melodies. In agility, it nearly equals the flute; it can perform rapid runs and arpeggios, skips, trills, and legato or staccato effects. However, because it is a single-reed instrument, it is somewhat limited in its ability to play rapid repeated notes.

In treatises on the clarinet, much has been made of the "break," a point on the instrument at which an awkward change of fingering is involved,[1] and of the register associated with it, which includes some notes of slightly inferior quality. From the standpoint of the fingering problem, the actual break occurs between the written notes 

or 

Passages which pass through this area in either direction cause no particular difficulty; it is only when a part involves a continuous use of these notes that the part becomes unduly awkward. As for tone quality, the three written notes  (particularly the B♭) are the weakest on the instrument and are better not stressed in solo passages. Because of modern improvements in clarinet construction, the break is now much less of an obstacle than it once was. In fact, clarinet players today seem rather unconcerned about this difficulty that was apparently something of a thorn in the flesh for players of an earlier day.

Likewise, certain trills that were once listed as "awkward" or "better avoided" in clarinet writing are now quite usable. In fact, all trills are now practical on the instrument.

Although it is not the intention here to go into the historical background of instruments, it is worth noting that the clarinet did not begin to be accepted as a member of the symphony orchestra until Mozart's day; only two of the Mozart symphonies contain clarinet parts.

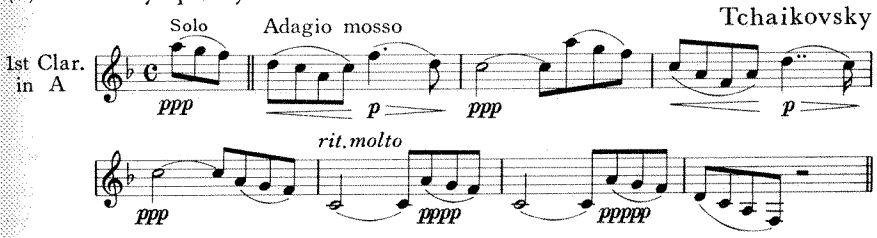
[1] In connection with this point at which the player begins to repeat his fingering pattern, it might be mentioned that the clarinet, being cylindrical, "overblows" at the 12th, whereas the oboe and bassoon, which are conical, overblow at the octave. (The flute, although cylindrical, behaves like an open pipe and consequently overblows at the octave.)

EXAMPLES

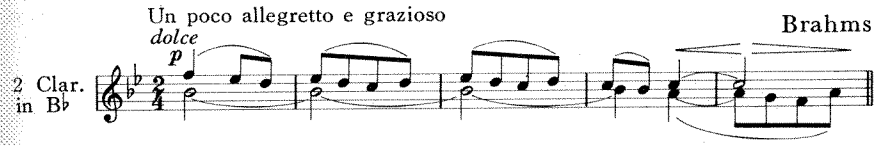
(All examples are given as written in the score. Those for B♭ clarinet will sound a major 2nd lower, those for A clarinet a minor 3rd lower.)

Ex. 8

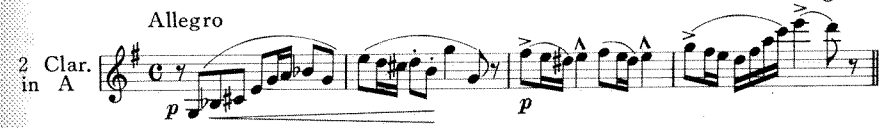
(a) Sixth Symphony — Tchaikovsky



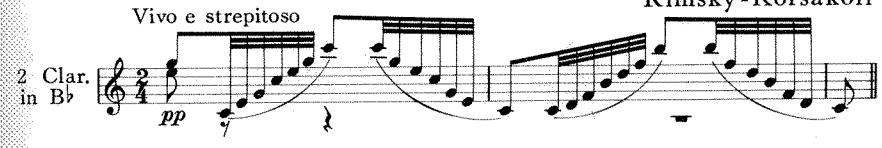
(b) First Symphony — Brahms



(c) Overture to *Tannhäuser* — Wagner



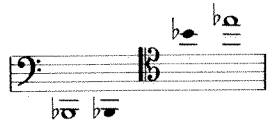
(d) *Capriccio Espagnol* — Rimsky-Korsakoff



THE BASSOON

Italian:	Fagotto	*French:*	Basson	*German:*	Fagott
	Fagotti		Bassons		Fagotte

Ex. 9



Although the bassoon is, like the oboe, a double-reed instrument, its tone is much less nasal and less highly colored than that of the oboe. In fact, its characteristic quality is a relatively neutral one, so that it is apt to be largely absorbed by any other orchestral color it is doubled with. For example, if bassoon is doubled with cellos (as it very frequently is), the cello tone will predominate but will have more body and focus than it would alone.

In the bottom octave or so of the bassoon, the tone is dark and full, even a little gruff in the bottommost notes, which are difficult to produce *pianissimo*. The next octave is middle ground, neither notably dark nor light in color, but probably the most used register of the instrument. The notes in the top octave become progressively thinner, until above about "A 440" they take on a pinched, complaining quality. Stravinsky, with his penchant for exploiting extreme registers, uses these top notes in a wonderfully effective bassoon solo at the beginning of *The Rite of Spring*. But such passages are extremely difficult, and it is better to let A or B♭ suffice as an upward limit.

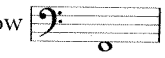
Zintgraff, San Antonio, Texas

Bassoon Contra Bassoon

When the part goes too high to be comfortably written in the bass clef, the tenor clef may be used.

The bassoon is sometimes spoken of as "the clown of the orchestra." Bassoonists resent the title, and with good reason. For while certain passages (especially *staccato* passages) have a way of sounding comical on the instrument, it can perform many other types of music effectively, including sustained melodies of a serious nature.

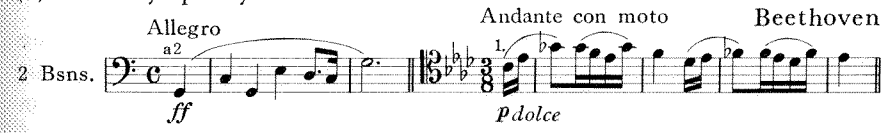
Technically, it is quite agile and is capable of making wide and sudden leaps. Because it does not have a great deal of power and because its color is so readily absorbed by that of other instruments, it is easily covered by the rest of the orchestra and should not be pitted against too heavy a background in solos. Probably its most frequent function is that of reinforcing other instruments in the bass or tenor registers.

There are a few trills to be avoided: those on D♭, E♭, or G♭ in all octaves, on  and below  .

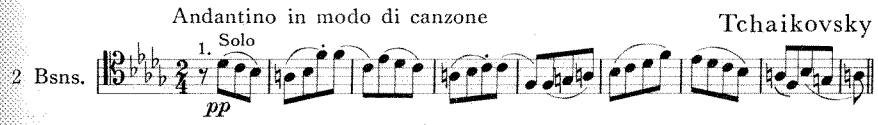
EXAMPLES

Ex. 10

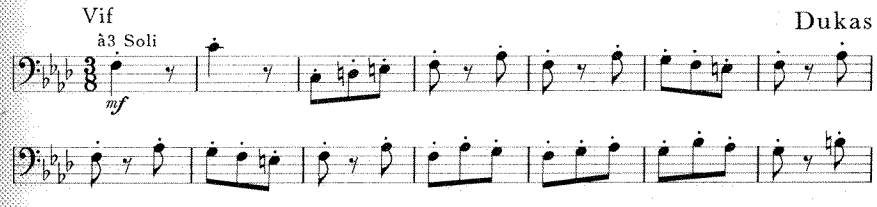
(a) Fifth Symphony

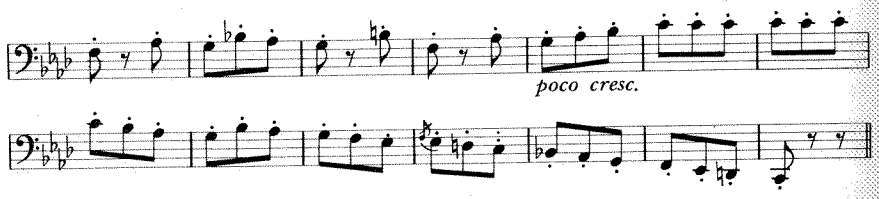


(b) Fourth Symphony



(c) *The Sorcerer's Apprentice*





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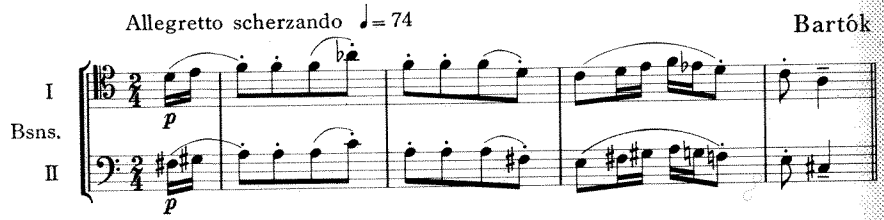
(d) Concerto for Orchestra



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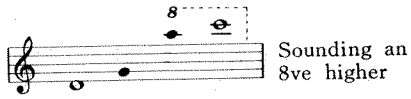
OTHER WOODWINDS

In addition to the woodwinds just discussed, there are others which are sometimes used: the piccolo, the English horn, the bass clarinet and the contra bassoon.[2] Except for the piccolo, which is generally found even in the medium-size orchestra, they are "extras" used chiefly in works scored for large orchestra. Occasionally, one or more of them may be included in smaller groups for the sake of a particular tone color or special effect.

The Piccolo

Italian: Flauto Piccolo (or) Ottavino *French:* Petite Flûte *German:* Kleine Flöte

Ex. 11

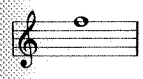


[2] The E♭ clarinet might also be included in this list, but since it appears somewhat less frequently than the other instruments mentioned here, discussion of it is reserved for Chapter 18.

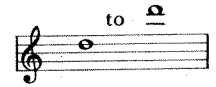
Just as the double bass is written an octave higher than it sounds in order to keep the part more nearly within the staff, the piccolo is written an octave lower than the sounds desired in order to avoid too many ledger lines above the staff. Even so, the player must often cope with three or four ledger lines; but he becomes accustomed to reading these and seems to prefer them to an "8*va*" sign over the notes written an octave lower. Although there is a D♭ piccolo that is sometimes used in bands, the instrument in C is the only one that figures in orchestral scores.

The piccolo is without doubt the most agile instrument of the orchestra, able to perform incredibly fast runs, skips, arpeggios, and elaborate figurations of all kinds. On the other hand, it is not often used for slow *cantabile* passages, though certain contemporary scores contain solos of a quiet, sustained nature that are surprisingly effective.

The bottom octave of the instrument is so weak and breathy as to be nearly useless in heavily scored passages. In fact, there is not much point in having the piccolo play at all in a *tutti* unless it is above a written



or so, for it will not have enough strength or brilliance to make any difference. Notes below this are usable when the background is not too heavy. It should be noted that the written piccolo range does not include the low C possible on the flute. The second octave, from



, is clear and bright, while notes above that are more piercing. From the high A upwards, the notes tend to be shrill, and the B♮ and C are extremely difficult to produce. They are better avoided except in cases where a phrase extends momentarily into this very high register.

Obviously the piccolo's most valuable talent is its ability to add a brilliant edge to a melodic line. It frequently doubles other woodwinds (or even strings) an octave higher. Now and then it is written so as to sound in unison with the flute to reinforce the flute's top tones. Like most brightly colored instruments, it cannot be used too continuously without losing in effectiveness; furthermore, if overused, it may give an unintentional "military band" feeling because of its long association with band music.

The fingering for piccolo is the same as that for flute, and the third flute player of an orchestra often doubles on piccolo. That is, he plays either a flute part or a piccolo part, as required; he may change from one instrument to the other several times in the course of a work, as directed by the composer or arranger. Of course such changes require at least two or three

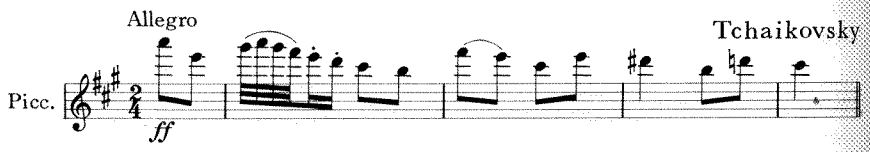
measures of rest, preferably more. This arrangement is often described at the beginning of scores by the expression "Flute III interchangeable with piccolo." If only two flutes are used, the second flute player may double on piccolo. Occasionally the piccolo part is listed below the flutes in the score in cases where the player is to change to flute III. But most often it is listed at the top of the page, and in many scores a player is assigned exclusively to the piccolo part. One hazard involved in changing from flute to piccolo (or vice versa) is that whichever instrument has been laid aside temporarily will be cold when it is picked up again; as a result, it will probably be flat in pitch and a bit sluggish in general responsiveness. Players like to have a few measures of rest in which to warm up the new instrument before actually playing.

EXAMPLES

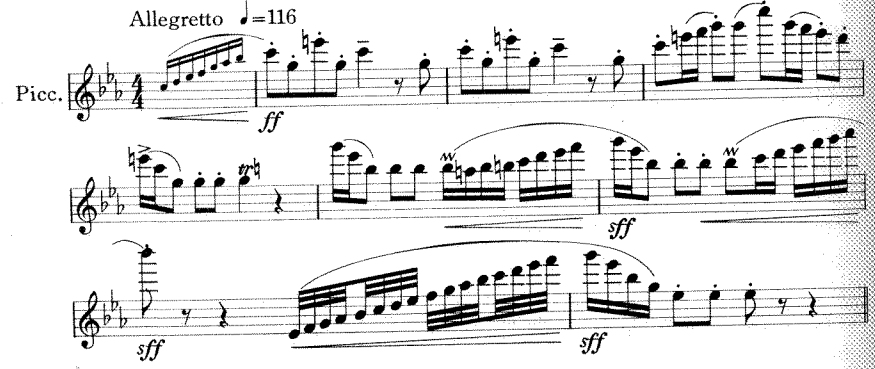
(Sounding an octave higher)

Ex. 12

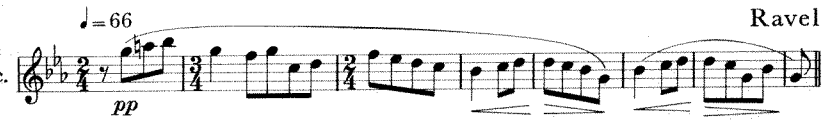
(a) Fourth Symphony



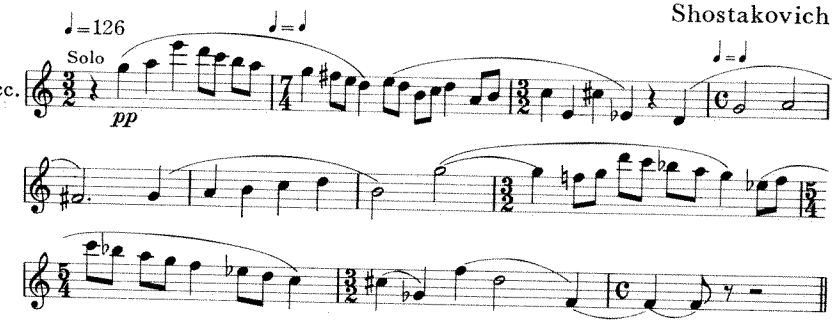
(b) *Háry János* Suite *(Viennese Musical Clock)*



(c) *Petit Poucet (Hop o' My Thumb)* from *Mother Goose* Suite



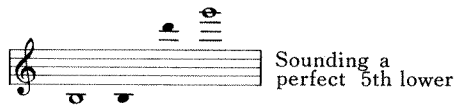
(d) Seventh Symphony



The English Horn

Italian: Corno Inglese *French:* Cor Anglais *German:* Englisch Horn

Ex. 13



Just how the English horn received its name and why it is not called "alto oboe" or some similar name are matters that have occupied writers on orchestration over the years. One theory that has been neither proved nor disproved is that because of the angle near the end of the instrument it was once called "*cor anglé*" in French, and that "*anglé*" became confused with "*anglais*" because of the similarity in pronunciation. That still leaves the term "horn" unexplained. Anyone who has ever read a program note on the English horn has been subjected to the inevitable comment that it is "neither English nor a horn."

The modern instrument, which is straight rather than "angled," differs from the oboe chiefly in being longer and having a bulbous distension at the end of the bell. The tone is akin to that of the oboe but more sonorous

and melancholy. Possibly because of this serious quality, the English horn is seldom called on to play fast, technically complicated music, and it is not a particularly agile instrument by nature. The part for it is written a perfect 5th higher than the sounds desired.

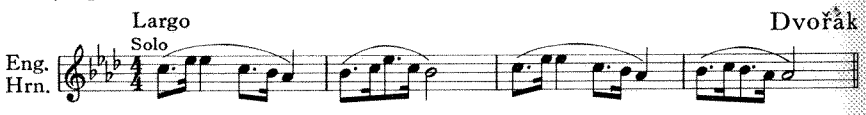
Although the low B♭ is obtainable on the oboe, the lowest written note on the English horn is a B♮, sounding E below. Now and then one comes across an instrument that has the low B♭ (concert E♭) but not often enough to justify writing the note as a general practice. The bottom notes of the English horn are not only usable but highly effective; strangely enough, they do not seem to suffer from the coarseness that afflicts the lowest tones of the oboe. There is seldom any need to take the English horn above the written note  , even though notes up to a 5th higher are possible. Moreover, the instrument loses some of its characteristic color in its topmost register and is consequently less effective there.

EXAMPLES

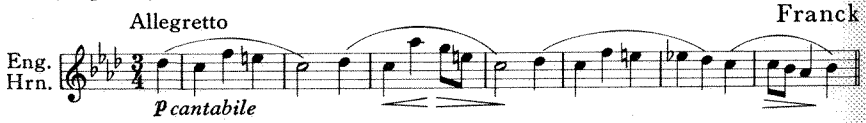
(Sounding a perfect 5th lower)

Ex. 14

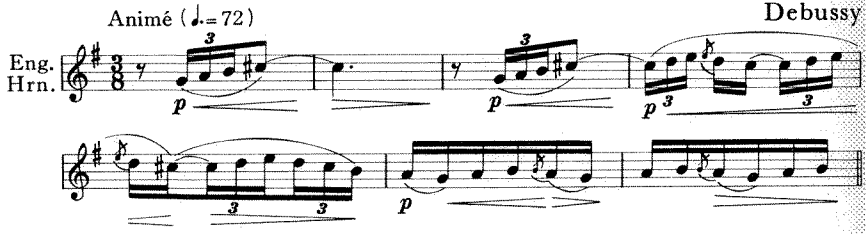
(a) Symphony in E minor *(New World)*



(b) Symphony in D minor



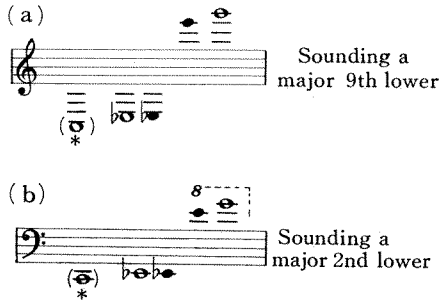
(c) *La Mer*



The Bass Clarinet

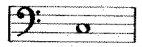
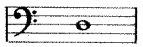
Italian: Clarinetto Basso *French:* Clarinette Basse *German:* Bassklarinette

Ex. 15



* Pitches down to the low written C (concert B♭) are possible on some bass clarinets.

The bass clarinet differs from the clarinet not only in being larger but in having a curve near the mouthpiece and an upturned bell, the whole shape being a little like that of a saxophone. Although at one time there was a bass clarinet in A, it is now extinct. Therefore, the player must use the B♭ instrument and transpose when he plays a part written for bass clarinet in A.

In approaching the notation of the bass clarinet, we come across a rather confusing convention: when written in the treble clef, the instrument sounds a major 9th lower than written; but it may also be written in the bass clef, in which case it sounds a major 2nd lower than written. To give an example of the two methods of notation, the concert pitch  would be written  in the treble clef, whereas the same sound would be written  in the bass clef.[3]

The first method is the one preferred today (perhaps because it has been used consistently in band works). But players and score readers must of course be able to read parts written either way; occasionally both systems are used at different places in the same score, as in Example 16(c).

[3] These two types of notation are sometimes known, respectively, as the "French system" (treble clef) and the "German system" (bass clef). However, these names must not be taken too literally, since there are instances of bass clef parts in French music and of treble clef parts in German music.

In its bottom octave the bass clarinet is extremely dark, almost sinister, in quality. The color becomes progressively less somber above that until, in the top octave, it is a bit strained and "white." There is little point in writing for the instrument in this top register, since other instruments can take these notes with better effect. But in its middle and lower registers the bass clarinet is valuable not only for doubling bass and tenor parts but in a solo capacity. Wagner is particularly fond of using it as a solo instrument to give a sense of gloom and impending tragedy. Other composers have exploited what Forsyth calls its "goblinesque" quality, a certain attactive grotesqueness. Although not quite so agile as the clarinet, it can move with considerable speed, and it shares the clarinet's phenomenal control of volume and dynamic nuance.

In some scores, the bass clarinet is interchangeable with the second or third clarinet; that is, the two parts are played by the same person. This is obviously a sensible arrangement where both instruments are not needed at once, and particularly where there is only a small part for the bass clarinet, or for the second or third clarinet.

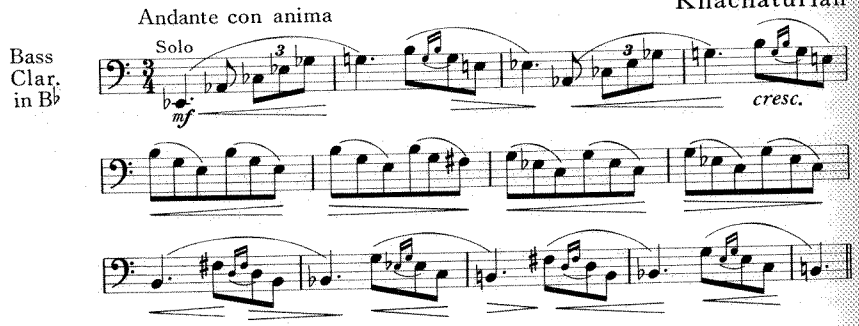
Bass clarinets built to include the written D, D♭, and C below the low E♭ are available but not widely used. It is possible to add these notes to a bass clarinet not built with them initially by means of an extension attached to the bottom joint. Such an extension, which must be fitted at an instrument factory, can be made either so as to be removable or as a permanent part of the instrument. Khachaturian's Concerto for Piano and Orchestra, quoted in Example 16(a), is an instance of a work in which the bass clarinet part calls for notes down to the low written C at certain points.

EXAMPLES

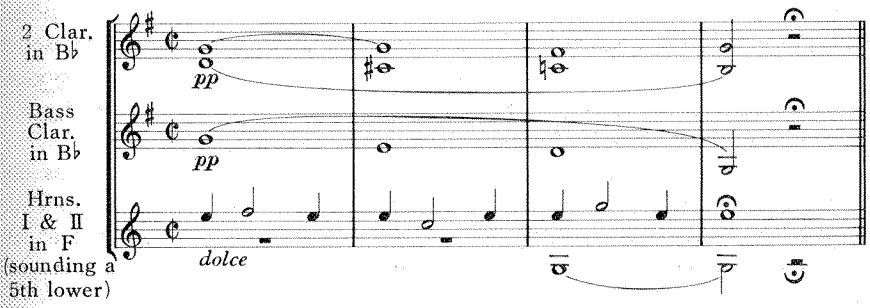
(Sounding a major 9th lower when written in the treble clef, a major 2nd lower when written in the bass clef.)

Ex. 16

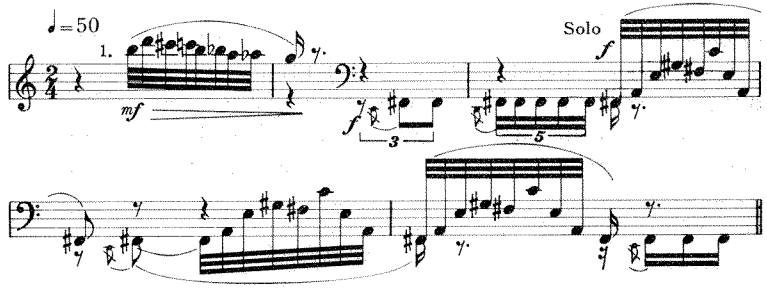
(a) Piano Concerto — Khachaturian



(b) Symphony in D minor — Franck



(c) *The Rite of Spring* — Stravinsky



The Contra Bassoon or Double Bassoon

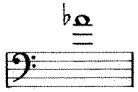
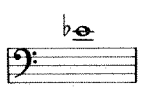
Italian: Contrafagotto *French:* Contre-basson *German:* Kontrafagott

Ex. 17

As might be expected, the contra bassoon is one of the more ponderous instruments of the orchestra, in both appearance and sound. In fact, because of its great size it must rest on the floor in performance. Its tone is somewhat rough and thick; very soft effects are difficult to achieve, especially in the lower register. As a result, the instrument is valuable chiefly for adding

volume and incisiveness to the bass parts in loud, heavily scored passages. Occasionally, it is used in other ways; for example, to add a somber tinge to low melodic lines, or as a solo instrument to produce a rather grotesque effect. There is seldom reason to use it in its upper register, since bassoons or bass clarinet are better equipped to play these notes. Like the double bass, it is written an octave higher than it is to sound.[4]

Most school orchestras and even many semi-professional orchestras do not own a contra bassoon, or, if they own one, do not have a competent player on hand. Consequently, it is always something of a gamble as to whether the part will really be played, unless one is sure of getting a major orchestra to perform the score.

Although Beethoven and Brahms wrote contra-bassoon parts that went as high as (written)  , notes above  are somewhat difficult. Heckel now makes a contra bassoon that is capable of playing the low A, one half step below the B♭ usually given as the bottom note. (Incidentally, this A is the lowest note on the piano.)

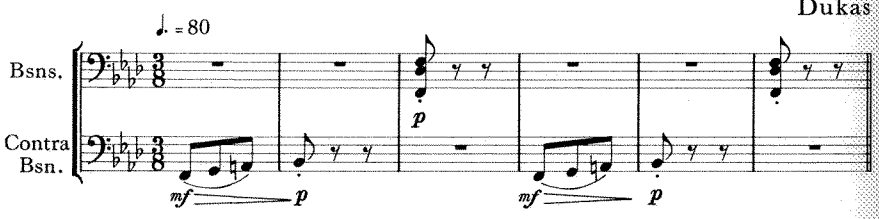
Rapid, intricate parts are not well suited to the technique of the contra bassoon. Its part should be fairly simple and should contain plenty of rests.

EXAMPLES

(Contra-bassoon parts sounding an octave lower)

Ex. 18

(a) *The Sorcerer's Apprentice*



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[4] In a few scores (Wagner's *Parsifal* and Debussy's *Ibéria* and *La Mer*, for instance) the contra-bassoon part is written at actual pitch.

(b) *Beauty and the Beast* (from *Mother Goose* Suite)

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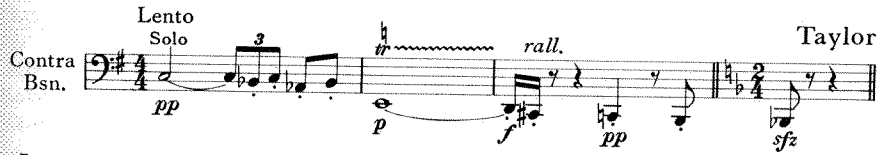
(c) *Through the Looking Glass (Jabberwocky)*



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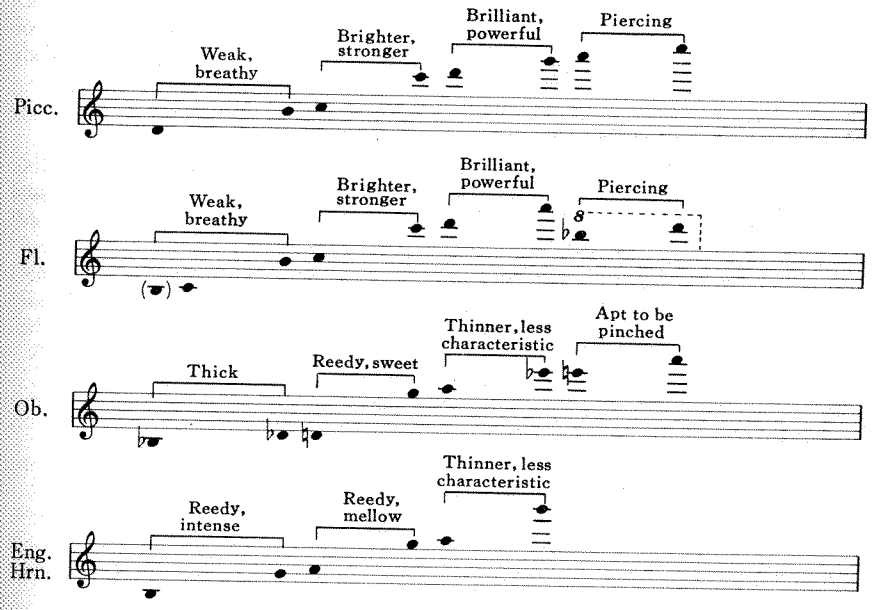
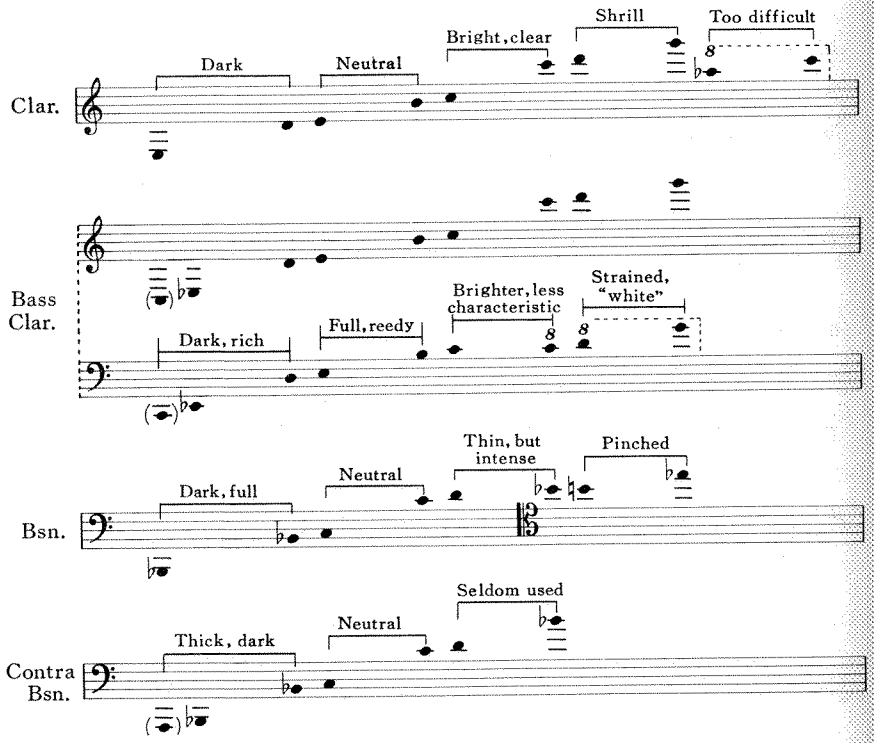
WOODWIND REGISTERS

(Written notes)

Ex. 19





SUGGESTED ASSIGNMENTS

A. Know:

1. ranges (possible and practical) of flute, oboe, clarinet, and bassoon.
2. ranges (possible and practical) of piccolo, English horn, bass clarinet, and contra bassoon.
3. transpositions where involved.
4. colors and relative strengths of the various registers of each woodwind.
5. particular abilities and limitations of each woodwind.

SUGGESTED LISTENING

Piccolo

Tchaikovsky, Fourth Symphony, 3rd movt., meas. 194.
Pierné, *Entrance of the Little Fauns* from *Cydalise*.
Debussy, *Ibéria*, Part I (*Par les rues et par les chemins*) many passages.
Ravel, *Mother Goose* Suite: II. *Petit Poucet*, figure 7; III. *Laideronette, Impératrice des Pagodes*, figure 1; *Daphnis and Chloe* Suite No. 2, figure 183.

Kodály, *Háry János* Suite, Part II (*Viennese Musical Clock*) and Part IV (*The Battle and Defeat of Napoleon*).
Shostakovitch, Seventh Symphony, 1st movt., figure 14.
Copland, Third Symphony, 3rd movt., 3 bars after figure 69; figure 71; 2 bars after figure 78; 3 bars after figure 83, etc.

Flute

Bach, Suite in B minor for flute and strings; Brandenburg Concertos Nos. 2, 4, 5.
Beethoven, Third Symphony, last movt., meas. 190, also meas. 292.
Mendelssohn, Fourth Symphony (*Italian*), last movt., meas. 6.
Brahms, First Symphony, last movt., meas. 38.
Tchaikovsky, Piano Concerto in B-flat minor, beginning of 2nd movt. (*Andantino*).
Dvořák, Fifth Symphony (*New World*), 1st movt., figures 5 and 12.
Bizet, *Carmen*, Entr'acte between Acts II and III.
Debussy, *Prelude to The Afternoon of a Faun*, beginning and many other passages.
Ravel, *Daphnis and Chloe* Suite No. 2, 3 bars after figure 176.
Kennan, *Night Soliloquy* for flute, strings, and piano.

Oboe

Bach, Brandenburg Concertos Nos. 1, 2.
Beethoven, Third Symphony, 2nd movt. (*Marcia Funebre*) meas. 8; Sixth Symphony, 3rd movt. (*Scherzo*) meas. 91; Seventh Symphony, 1st movt., meas. 300.
Schumann, Second Symphony, 3rd movt. (*Adagio espressivo*) meas. 8.
Brahms, Violin Concerto, beginning of 2nd movt.
Mahler, *Das Lied von der Erde*, beginning of 2nd movt.
Debussy, *Ibéria*, Part II (*Les parfums de la nuit*) beginning, also 4 bars before figure 40.
Ravel, *Le Tombeau de Couperin*, Trio of the *Rigaudon; La Valse*, figure 18.
Strauss, *Death and Transfiguration*, measure 30; *Don Quixote*, 8 bars before figure 3.
Shostakovitch, First Symphony, beginning of 3rd movt.

English Horn

Berlioz, *Fantastic Symphony*, beginning of 3rd movt. (*Scène aux champs*).
Wagner, *Tristan und Isolde*, beginning of Act III.
Franck, Symphony in D minor, 2nd movt., near beginning.
Dvořák, Fifth Symphony (*New World*), 2nd movt., near beginning.
Debussy, *Nocturnes:* I. *Nuages*, meas. 5; *La Mer*, figure 16.
Sibelius, *The Swan of Tuonela*.
Stravinsky, *The Rite of Spring*, section entitled *Ritual of the Ancestors*, figure 129; *Petrouchka*, 9 bars after figure 72.

Clarinet

Beethoven, Fourth Symphony, 2nd movt., meas. 26; Sixth Symphony, 2nd movt., letter D.
Weber, Overture to *Oberon*, meas. 64.
Schubert, Symphony in B minor (*Unfinished*), 2nd movt., meas. 66.
Tchaikovsky, Fifth Symphony, beginning; 2nd movt., meas. 66; 3rd movt., measure 28; Sixth Symphony, 1st movt., meas. 163, also meas. 326.

Debussy, *Ibéria*, meas. 8.
Rachmanioff, Second Piano Concerto, 2nd movt., near beginning.
Stravinsky, *Petrouchka*, figure 100.
Prokofieff, *Peter and the Wolf*, figure 11 ("The Cat").
Britten, *Four Sea Interludes* from *Peter Grimes*, I. *Dawn.*

Bass Clarinet

Wagner, *Tristan und Isolde*, Act. II, "King Mark's Song."
Tchaikovsky, *Nutcracker* Suite: *Dance of the Sugar Plum Fairy.*
Strauss, *Don Quixote*, Variation III.
Stravinsky, *Petrouchka*, figure 65 (The Moor dances).
Khachaturian, Piano Concerto, 1st movt., meas. 390; 2nd movt., beginning and meas. 220.

Bassoon

Beethoven, Fifth Symphony, 2nd movt., meas. 205.
Tchaikovsky, Fourth Symphony, 2nd movt., meas. 77; Sixth Symphony, beginning; last movt., meas. 30.
Rimsky-Korsakoff, *Scheherazade*, 2nd movt., meas. 5.
Mussorgsky-Ravel, *Pictures from an Exhibition*, beginning of Part II (*The Old Castle*).
Dukas, *The Sorcerer's Apprentice*, figure 7.
Stravinsky, *The Rite of Spring*, beginning; *Petrouchka*, 4 bars after figure 68 (end of Moor scene).
Bartók, Concerto for Orchestra, beginning of Part II (*Giuoco delle Coppie*).

Contra Bassoon

Mahler, Ninth Symphony, last movt., meas. 28.
Ravel, *Mother Goose* Suite: IV. *Les Entretiens de la Belle et de la Bête*, figure 2.
Dukas, *The Sorcerer's Apprentice*, figure 42.
Taylor, *Through the Looking Glass*, Part II (*Jabberwocky*) figure 13.
Stravinsky, *Petrouchka*, 9 bars after figure 72.
Bloch, *Schelomo*, last 5 bars.

Chapter 6

THE WOODWIND SECTION

The proportions of woodwind sections of various sizes were listed in Chapter 1, and it might be well to look over that material once again before going on with this chapter. The average woodwind section consists of two flutes, two oboes, two clarinets, and two bassoons ("woodwinds in pairs"), plus piccolo if desired. Although major orchestras also include English horn, bass clarinet, and contra bassoon, most school orchestras and some non-professional orchestras do not. Consequently, unless one is sure of getting a performance by an orchestra that does have these "extra" woodwinds, it is safer to write for woodwinds in pairs. In scoring for groups of limited size, it is a good idea to remember the possibility of letting the second flute player double on piccolo, the second oboist on English horn, and so on.

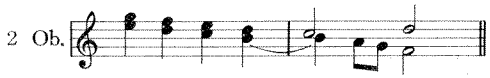
As has been mentioned earlier, the orchestra of the classical period did not regularly include clarinets. For example, the woodwind section used in the early Haydn symphonies consists of one or two flutes, usually two oboes, and one or two bassoons. But by Beethoven's time, woodwinds in pairs (including clarinets) had become the accepted arrangement.

The table on page 3 shows the standard order in which instruments are listed on the page. This consistency of arrangement is obviously a great help to the eye of the conductor or the score reader. The only possible variation in order is the placing of the piccolo part below that of flutes I and II in cases where the piccolo is interchangeable with flute III.

As a rule, each pair of woodwinds is written on the same staff. When the two instruments are playing different parts, the upper notes are normally taken by the first of the pair, the lower notes by the second. As with *divisi* string parts on one staff, a single stem for both notes may be used as long

as the time values in both parts are the same, but separate stems must be used if the time values are different:

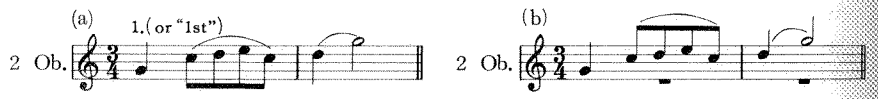
Ex. 1



(Notice the proper notation of the interval of a 2nd—with the two stems lined up.) If the parts cross briefly, both can still be written on the same staff, the abnormal arrangement of the parts being shown by the direction of the stems. But if they involve continuous crossing or are so independent as to be awkward on one staff, it is better to use separate staves.

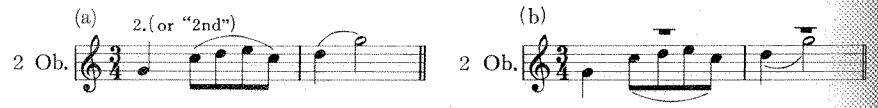
We now come to a point that should be noted very carefully, for it seems to be one that students have a hard time remembering. Whenever two wind instruments are written on the same staff and a single melodic line is involved, indications must be included to show whether the passage is to be played by the first instrument of the pair, by the second, or by both. Otherwise the part is simply ambiguous. If the first is to play, either of the following systems may be used:

Ex. 2



(The first arrangement here is the easier and more commonly used of the two.) Similarly, if the second instrument[1] is to play, the part could be written in either of these ways:

Ex. 3

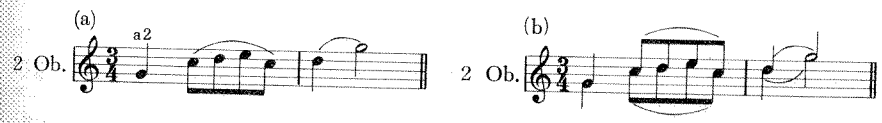


In case the passage is a solo, the word "solo" should be written in at the beginning of it. Solos are usually, but not necessarily always, given to the first of each pair. Sometimes the solo indication is used even when the passage in question is not the chief melodic idea but must be played in such a way

[1] Sometimes "1°" and "2°" are used to designate the first and second of each pair. These are abbreviations of the Italian words "primo" and "secondo," corresponding to our "1st" and "2nd."

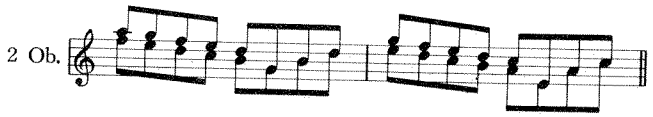
as to give it a certain prominent or important quality. If both instruments of a pair are to take a melodic line in unison, the passage can be written in either of the following ways:

Ex. 4



(Literally, "a 2" means "to two" in Italian.) Here, again, the first way is the usual one; the double-stem system used in the second version is normally reserved for passages where both instruments play in unison for just a few notes, as in the following:

Ex. 5



If a melodic line to be played by both instruments in unison is of solo quality, the word "soli" may be written in at the beginning of it. The direction "a 2," by the way, is never used for passages in which the two instruments play *different* parts; in such cases no indication is needed, since it is quite obvious that both instruments are playing.

For the benefit of students who have played in bands, it might be well to point out that although the expressions *divisi* and *unisono* are appropriate in band music where a whole section of clarinets is to divide or unite, these terms are used only for strings, never for winds, in an orchestra.

When one instrument of a pair is already playing and the other enters, it is customary to label the entering voice as being 1. or 2. and to show at what dynamic level it should enter. All dynamic markings must be shown beneath each staff, of course, just as with strings.

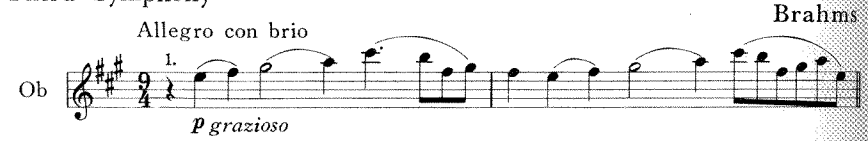
TONGUING AND SLURRING

In performing on a wind instrument it is possible to articulate each note with a separate "*tu*"[2]—in which case the note is said to be "tongued"—or to slur it with the note that precedes or follows. Where no slur mark is pre-

[2] Or variations of this syllable, such as *du, ta,* and *da,* depending on the instrument, the register, and the effect involved.

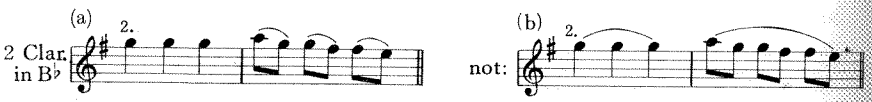
sent, the note is to be tongued. For instance, in the following passage the first two notes are slurred together, the next two are slurred, the next four are slurred, the next note is tongued separately, and so on.

Ex. 6



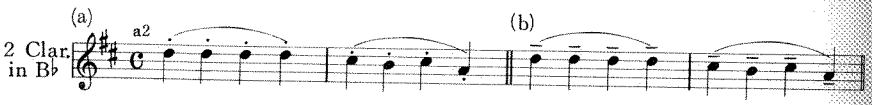
But there is no break in sound between the last note of each slurred group and the note that follows; the general effect is *legato*. For an even smoother, more *legato* effect, the whole passage could have been slurred together. Or, if a sharply *marcato* effect had been wanted, the passage might have been written entirely without slurs (each note tongued separately). And there are possibilities other than the one shown that involve alternate slurring and tonguing. When repeated notes occur, they must be tongued (though not necessarily sharply) in order to sound with a fresh attack. For example:

Ex. 7



However, slurs plus dots or slurs plus a line next to each note are sometimes used to indicate a "soft tonguing," even with repeated notes:

Ex. 8



The second type of notation here would imply a kind of pressure on each note, with less separation between notes than in the case of the dots.

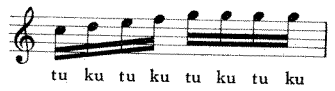
In some scores, phrasing rather than slurring is shown in the woodwind parts. But since phrasing and slurring are indicated in exactly the same way, players are frequently in doubt as to which is which, and the whole question becomes hopelessly confused. One possible solution is the use of dotted lines for phrasing, solid lines for slurring (or vice versa, as long as one way is used consistently). There has been some successful experimentation with this plan already. But until some such system comes into general use, it seems

best to indicate slurring rather than phrasing in woodwind parts. If necessary, breathing points between phrases may be indicated by the same symbol used in vocal music: ' .

A question that often arises is this: when strings and woodwinds play the same melodic line, what is the relationship between bowing in the strings and slurring in the winds? There is no hard and fast rule to follow here. In some cases the slur marks in the woodwinds will correspond with the bowing slurs in the strings, and certain composers use this approach more or less consistently. Certainly a general unity of effect is desirable; for example, a sharply *marcato* passage would undoubtedly call for separate bows in the strings along with separate tonguings in the woodwinds. But there are many cases in which the actual slurrings in the two sections will not necessarily be the same. Sometimes, for instance, several measures of a wind part will be slurred together, whereas the strings will need to change bow a good many times within the course of these measures.

In double-tonguing the player rapidly alternates *tu* and *ku:*

Ex. 9

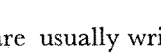
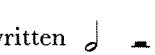


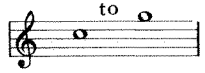
In triple-tonguing the pattern is *tu tu ku* (or *tu ku tu*), which is suited to music involving triplet figures. Both types of tonguing are useful in articulating passages which are so fast that single-tonguing would be impractical. Both are easy and effective on the flute but impractical on the clarinet and bassoon. Although most orchestration books speak of them as being out of the question for the oboe as well, some skilled oboists are able to achieve them.

Flutter-tonguing (German: *Flatterzunge*) comes under the heading of special effects. To produce it the player executes a rapid roll with his tongue. The result is a kind of eerie whir which may be applied either to sustained tones or to melodic lines. Strauss and Stravinsky, in particular, are fond of using it for very rapid scale passages. The indication is usually the same as that for unmeasured tremolos in the strings (three lines through the stem) plus the word "flutter-tongue" written in. Sometimes, especially in very fast passages, the indication "flutter-tongue" alone suffices. The effect is well suited to the flute and piccolo, possible (though less easily produced and rarely used) on the clarinet, and extremely difficult on the oboe.

There are two matters involving attack and release in wind instruments that need to be mentioned. The first is the *fp* or *sf p* effect, in which the tone is started with a strong attack and then reduced in volume immediately.

After that, it may be sustained at a constant dynamic level or allowed to diminish even more (*fp, diminuendo*) or made to increase in volume (*fp, crescendo*). In any case, the *fp* marking indicates an effect rather than a particular degree of volume and may be used at any dynamic level, from very soft to very loud. This device is of course not the exclusive property of the woodwind and brass sections, for the strings and the percussion make frequent use of it.

The other matter is a point of notation which arises constantly in orchestral scoring. In piano and vocal music sustained tones followed by a rest are usually written  or  , etc. A more usual plan in the orchestra is to write or or  , the sustained tone being tied into the beginning of the next beat. The reason is that if the first notation is used, players tend to differ as to the exact point at which they release the note (since it is difficult to cut off the sound on the last fraction of a beat), and a "ragged" effect is likely to result when a group is involved. The second notation gives an easier and more definite cut-off point and consequently leads to a cleaner, more unified release. Of course, there are cases where, for harmonic or other reasons, it would be inappropriate to tie the notes into the next beat; but for the most part this system is preferable, not only in woodwind writing but in the strings, brass, and percussion as well.

Muting possibilities in the woodwinds are few and seldom used. Because of the flute's construction, muting is not possible. The clarinet can reduce its tone to the merest whisper anyway and consequently has no need for a mute. With the oboe it is possible to achieve a muted effect (chiefly on the notes ) by inserting a chamois or cloth into the bell. However, this system has a tendency to throw certain notes out of tune. An example of muted oboes can be found in the closing measures of Stravinsky's *Petrouchka*. Muting of the bassoon can be accomplished in the same fashion or with an actual mute, and although this effect is seldom called for specifically in scores, some bassoonists employ a mute in very soft passages to reduce the volume of tone in the lower register of the instrument, especially between  and  . One disadvantage of this arrangement is that it makes the bottom B♭ unplayable.

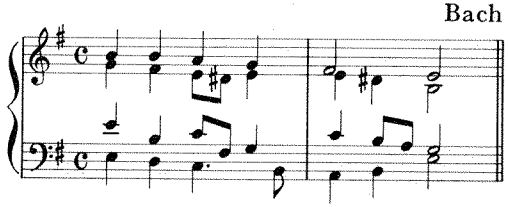
SCORING FOR WOODWINDS IN PAIRS

The same chorale excerpt used earlier for examples of string scoring has been selected for purposes of illustration here:

Ex. 10

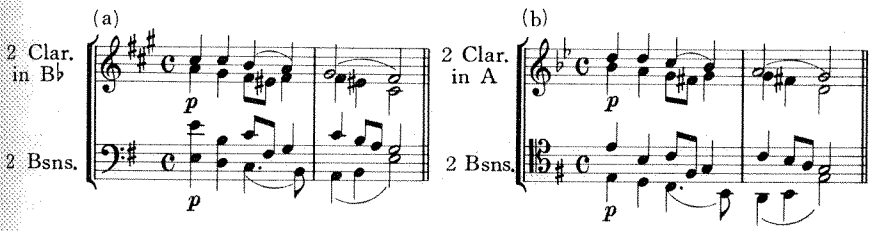
Jesu, meine Freude

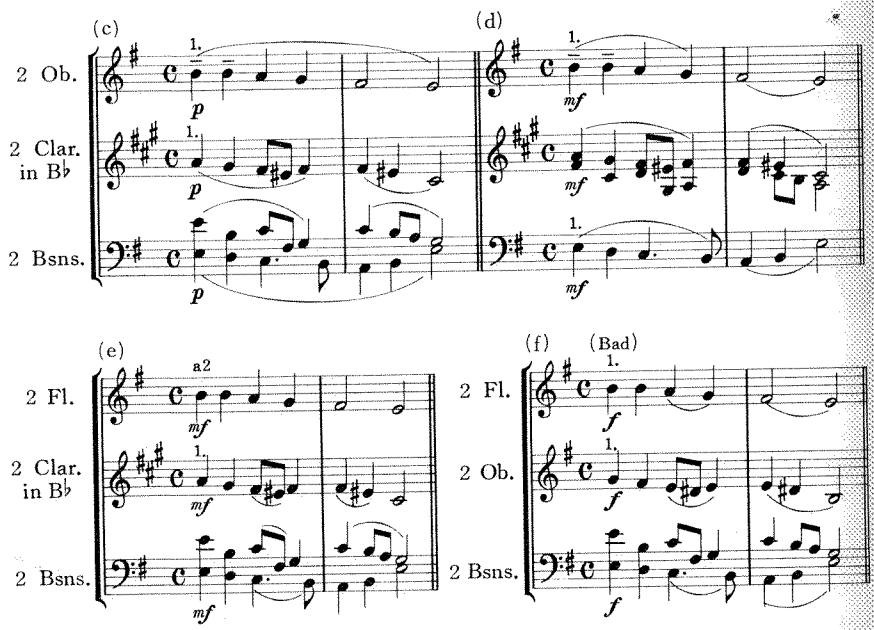
Bach



We are going to confine ourselves, at first, to a woodwind section consisting of two flutes, two oboes, two clarinets, and two bassoons. First of all, let us examine the ranges of the voices and see what instruments could take them (ruling out for the moment the possibility of transposing the excerpt). The bass could be taken only by the bassoon, since that voice goes too low for any of the other instruments. The tenor could be taken by the bassoon or the clarinet (the latter in its dark *chalumeau* register). The alto, with its B at the end, is too low for most flutes, and even if we were sure of having a flute with the low B on it, that register of the instrument is so weak that good balance would be very hard to achieve. Although the alto is within the range of the oboe, the oboe's low B tends to be a bit coarse in quality; consequently, the clarinet would be a better choice for that voice. The soprano could be taken by flute, oboe, or clarinet, though it would be relatively weak on the flute. Here are some possible scorings, then:

Ex. 11





Versions (a) and (b) would sound alike. In (b) clarinets in A have been used instead of B♭ clarinets, and the bassoons have been written in the tenor clef.

Versions (c) and (d) differ from the preceding ones in that the top voice, *in the oboe, will stand out sharply from the other voices below. Any separate color on a part will tend to produce that result, but the distinctive oboe tone has a particular way of asserting itself.*

In version (e) two flutes are used on the melody to give more body in the weak lower register of the instrument and to bring about better balance.

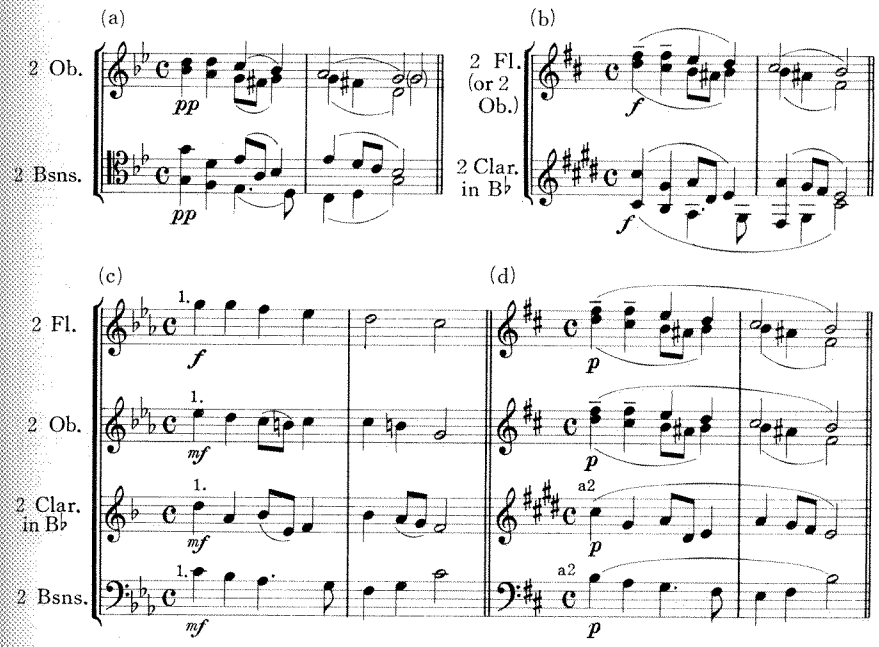
Version (f) has been included as an example of what *not* to do. The oboe would outweigh the flute in that register and would be too prominent in character for an inner voice. The doubtful quality of the low B has already been mentioned.

Various slurrings have been used here for purposes of illustration.

Assuming that there is no reason why we must retain the original key, transposition will give us a good many new possibilities. By placing certain of the instruments higher in their range, we can arrive at better resonance and blend:

One undesirable feature of (a) and some of the other versions in Example 12 is the fact that the oboes play the interval of a 4th in a sustained chord

Ex. 12



(at the end). This is not a good plan, as a rule, because the incisive oboe color accentuates the "bareness" of the 4th. Sixths or 3rds sound much better. *But if we are to give the two top voices to the oboes here, there seems to be no way of avoiding the 4th except by changing the original voice-leading* in the cadence and (in [a], for example) having the second oboe go from F♯ up to G (instead of down to D), thus omitting the 5th of the chord.

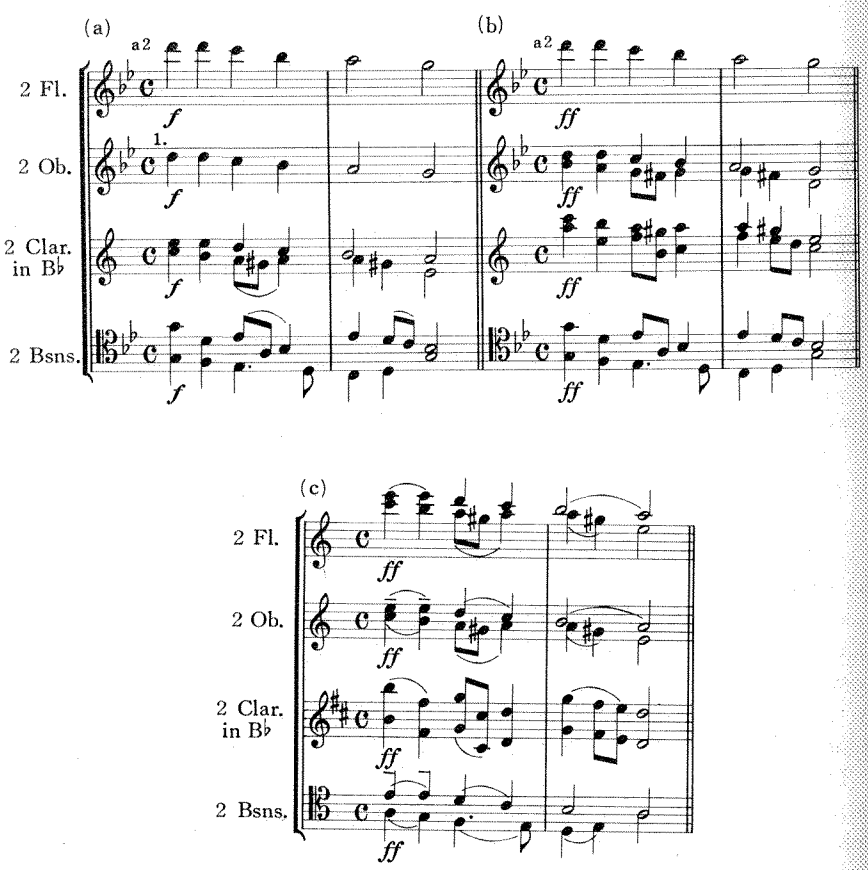
The objections that applied to version (f) in Example 11 do not apply to (c) in Example 12 because the oboe is in a sweeter, thinner register and because the flute is better able to assert itself in this higher version. Even so, the flute has been marked one degree louder than the other instruments to make doubly sure that it comes out clearly on the melody.

Version (d) in Example 12 involves the use of mixed colors (flute plus oboe) on the two top parts, whereas we have used mostly pure colors previously. Notice that two clarinets and two bassoons are indicated here, for the sake of proper balance. It would have been possible to mix clarinet and bassoon colors on the tenor and bass parts, also.

So far we have used only the original four-voice structure, with no octave doublings. Doublings of the soprano, or of all three upper voices, an octave

higher will allow the flutes and clarinets to play in a much brighter, more telling register:

Ex. 13



In Example 13 (a) the melody is doubled an octave higher in the flutes, while the first oboe doubles the melody in unison with the first clarinet. In (b) the alto and tenor are both doubled an octave higher (in the clarinets); the melody is doubled an octave higher in the flutes. In (c) the melody, alto, and tenor are all doubled an octave higher, and the melody is doubled an octave lower in the bassoon. Remember that not all pieces of music lend themselves to a doubling of the melody an octave below the original pitch. In some cases the result would be too thick.

Notice that the clarinets frequently play above the oboes, in terms of pitch, even though they are listed below them on the page. Actually, the

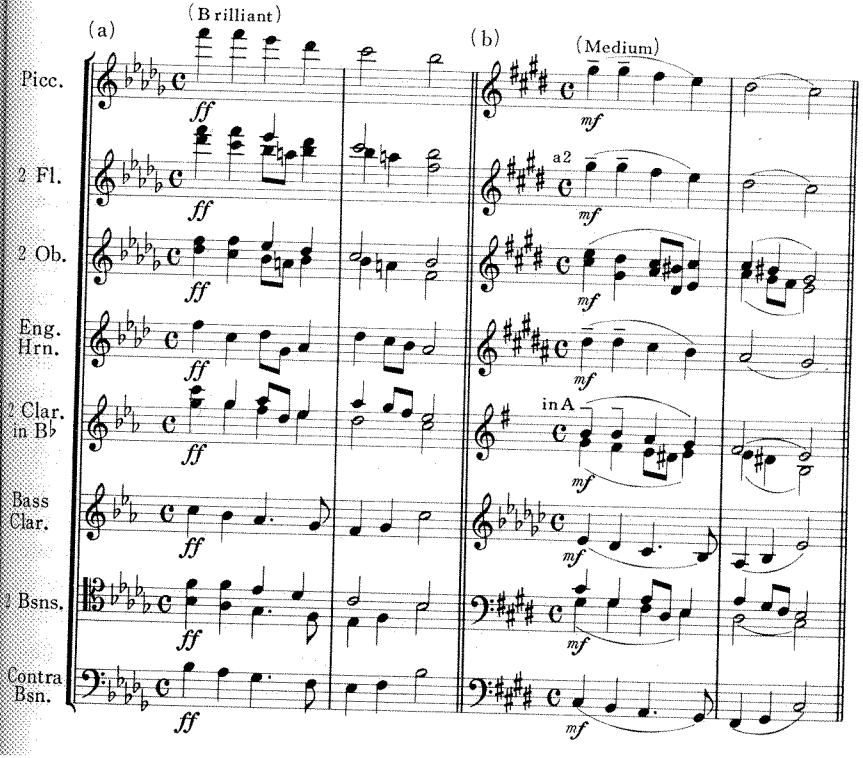
strongest register of the oboe is roughly  , while the clarinet's brightest and most solid octave is  .

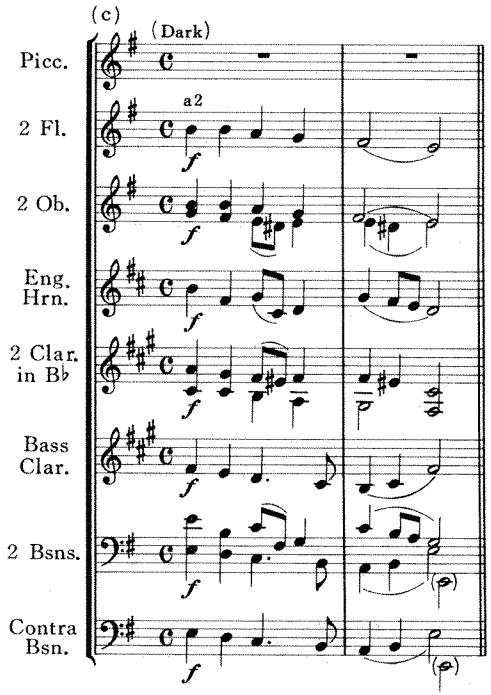
Therefore, when brilliance and power are called for, it is often better to place the clarinets higher than the oboes.

SCORING FOR A LARGE WOODWIND SECTION

Following are three possible ways of scoring the same chorale excerpt for a woodwind section that includes piccolo, English horn, bass clarinet, and contra bassoon in addition to woodwinds in pairs. Three different gradations of coloring have been aimed at: brilliant, medium, and dark. In Chapter 10, more will be said about color possibilities, woodwind doublings, and various ways of arranging the wind instruments in chords.

Ex. 14





Notice that in Example 14 (b) clarinets in A have been chosen in order to avoid a key signature of six sharps (or six flats) for the B♭ clarinet. Inasmuch as the only bass clarinet in current use is pitched in B♭, we are forced to write its part in either six sharps or the enharmonic equivalent of six flats. The latter key has been chosen here as being preferable for a B♭ instrument.

In the dark version (c) the piccolo has been given rests. Obviously the brilliance of its upper register is not wanted here, and it is so weak and breathy in its bottom octave that in this case there is no point in writing for it there.

Having learned in harmony courses that parallel 5ths are generally unacceptable in Bach style, students may wonder about the 5ths that occur in Ex. 14(c) on the second and third beats of the clarinet part. (They also occur in certain preceding versions but are not as easily seen there.) Actually, these are not parallel 5ths of the *verboten* variety at all; they are merely an inversion of the parallel 4ths in the original, brought about by the doubling of the melody an octave below the original pitch. Since they are not a part of the basic four-voice harmonization, there is not the slightest objection to them.

SUGGESTED ASSIGNMENTS

A. Know:

1. instruments involved in the "average" woodwind section and in the "large" woodwind section.
2. arrangement of the woodwinds on the page—order and grouping.
3. indications for showing whether the first or second of each pair is to play or whether both are to play.
4. indications for slurring, tonguing, and phrasing.
5. principles of balance in the woodwind section.
6. ways of achieving brilliant or darker coloring in woodwind scoring.

B. The following are suitable as exercises in scoring for woodwinds:

1. Bach, any of the chorales. Select a short phrase from one of these and score it: (a) in three different ways for woodwinds in pairs, using no octave doublings; (b) in two different ways for large woodwind section, using octave doublings.
2. Beethoven, Sonata, Op. 2, No. 1, 3rd movt. Omit trio.
3. Beethoven, Sonata, Op. 2, No. 3, 3rd movt., meas. 1–36.
4. Beethoven, Sonata, Op. 7, 3rd movt., meas. 1–24.
5. Beethoven, Sonata, Op. 53, 1st movt., meas. 196–211.
6. Beethoven, Sonata, Op. 106, 2nd movt., meas. 1–46.
7. Schubert, Sonata, Op. 122, 1st movt., meas. 1–28.
8. Chopin, Prelude in A major, Op. 28, No. 7.
9. Mendelssohn, Song Without Words No. 41 (A major). Score for large woodwind section.
10. Schumann, "Burlesque" from *Album Leaves.*
11. Tchaikovsky, "A Winter Morning" from *Album for the Young.*
12. Mussorgsky, "Tuileries—Children Quarreling at Play" from *Pictures from an Exhibition.*
13. Debussy, "The Little Shepherd" from *The Children's Corner.*
14. MacDowell, "From Uncle Remus" from *Woodland Sketches.*
15. Hindemith, "Fuga Secunda in G" from *Ludus Tonalis.*

SUGGESTED LISTENING

Woodwinds

Mozart, Divertimenti and Serenades for woodwinds.
Beethoven, Violin Concerto, 1st 9 meas.
Mendelssohn, *Scherzo* from *Midsummer Night's Dream* music, beginning and other portions.
Tchaikovsky, Fourth Symphony, 3rd movt., *Meno mosso* section (middle).
Rimsky-Korsakoff, *Russian Easter,* beginning (rare unison doubling of all woodwinds).
Wagner, Overture to *Die Meistersinger,* meas. 122–134 (E♭ major, *Im mässigen Hauptzeitmass*).
Strauss, *Don Quixote,* Variation I (imitation of rural band).
Mussorgsky-Ravel, *Pictures from an Exhibition, Promenade* preceding Part II (*The Old Castle*); Part III (*Tuileries*); *Promenade* preceding Part V; Part V (*Ballet of the Chickens in their Shells*).

Stravinsky, *Symphony of Psalms*, Fugue, beginning; *The Rite of Spring*, beginning; *Petrouchka*, number 13 (page 22 in Kalmus edition) and following.
Bartók, Concerto for Orchestra, Part V (*Finale*) meas. 148–175 (*fughetta* beginning with bassoon solo).
Copland, Third Symphony, 3rd movt., end; 4th movt., beginning.

Chapter 7

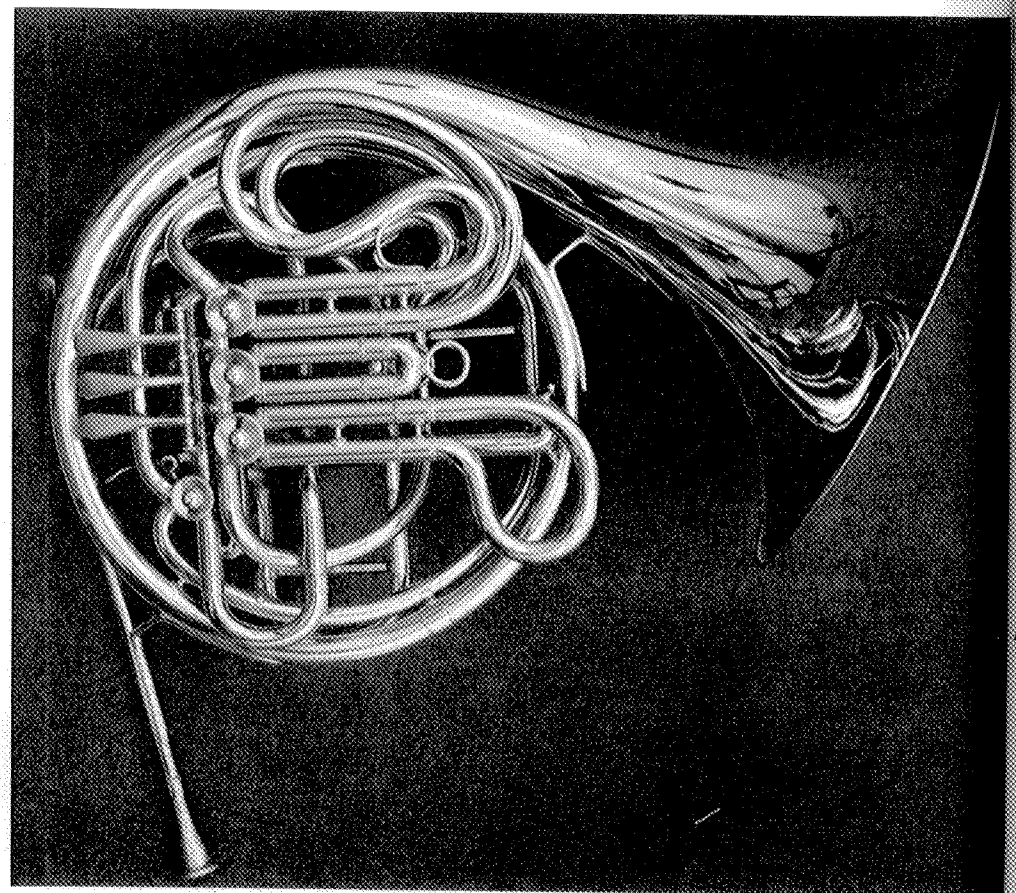
THE HORN

Italian:	*French:*	*German:*
Corno Corni	Cor Cors	Horn Hörner

The name "French horn" is seldom used by musicians. The instrument is referred to simply as "the horn," and that name is sufficient even in scores. Actually, it is difficult to understand why the adjective "French" was ever introduced into the name, since the development of the modern horn centers chiefly around Germany.

In order to understand the workings of the horn, we must know something about the basic principles on which brass instruments operate. Whereas most of the woodwinds make use of a reed, brass instruments do not, but instead involve a mouthpiece and an air column vibrating sympathetically with the player's lips. Fractional vibrations of the air column produce overtones, and a certain number of these may be made to sound by proper use of the breath and lips. The fundamental or generating tone itself is either very difficult or unobtainable on most brass instruments. If the length of tubing is altered by means of valves (or a slide, in the case of the trombone), a new set of overtones results. For purposes of initial tuning, each brass instrument is equipped with a "tuning slide" which enables the player to vary the basic tube-length of the instrument somewhat.

Although in construction and technique of performance the horn is clearly a brass instrument, its tone is capable of blending almost equally well with either woodwind or brass, and it is very often used as if it were a member of the woodwind family. Its bore is predominantly conical in shape, with the result that its sound is less sharp-edged and incisive than those of the trumpet and trombone.



Studio Gilmore, Austin, Tex.

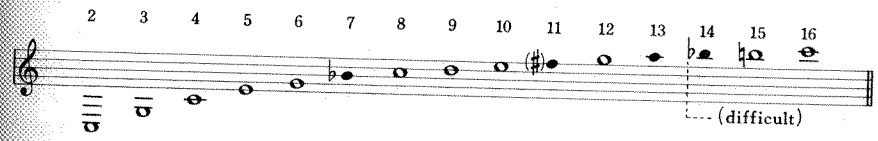
French Horn

THE NATURAL HORN

Being essentially hunting horns and valveless, the horns of Haydn's and Mozart's day could play only the notes of one harmonic series at a time, plus a few rather uncertain intermediary tones made possible by the insertion of the hand in the bell of the horn and/or by "lipping." Parts for the instrument were therefore extremely limited from a melodic standpoint; stepwise passages could be written only within a relatively small pitch area

in the upper portion of the harmonic series, and chromatic passages were out of the question altogether. To cope with the problem of music in different keys, a system of "crooks" was in use, a crook being a piece of tubing which could be inserted into the tubing of the horn to alter the pitch of its fundamental tone and thus create a new harmonic series. The crook to be chosen was indicated by a direction at the beginning of the work or movement: "Horn in E♭" or "Horn in A," etc., as the case might be, and the part was invariably written in the key of C. The written notes of the harmonic series usable on the horn were as follows (numbered on the basis of partials):

Ex. 1



The fundamental, or first partial, was normally unplayable. "Out of tune" notes (according to our system of tuning) are shown in black. The eleventh partial for example, was really something between an F and an F♯ and could be humored so as to produce either note. Of course the actual sound of the horn's notes depended on the crook being used. Following is a table to show how the instrument sounded when crooked in various keys (and notated in treble clef):

Horn in	*Sounding*
B♭-alto	a major 2nd lower than written
A	a minor 3rd lower than written
A♭	a major 3rd lower than written
G	a perfect 4th lower than written
F	a perfect 5th lower than written
E	a minor 6th lower than written
E♭	a major 6th lower than written
D	a minor 7th lower than written
C	an octave lower than written
B♭-basso	a major 9th lower than written

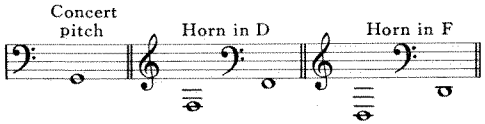
("Alto" and "basso" are used here to mean "high" and "low" respectively.)

Horns in other keys (B-alto, F♯, D♭, B-basso and A-basso) were called for only rarely. Horn in F♯ appears in Haydn's *Farewell* Symphony, and horns in G♭ and D♭ (among numerous others) in *Carmen*.

Normally, parts for the natural horn were written in the treble clef. But in the rare cases where the bass clef was employed, a curious and illogical custom applied: the pitches were notated an octave lower than they would

have been notated in the treble clef. That meant that they were *lower* than the concert pitches by the inversion of the interval that figured in the normal treble-clef transposition. For instance, in the bass clef horn in D was notated a major 2nd lower than the sounds instead of a minor 7th higher, horn in F a perfect 4th lower instead of a perfect 5th higher, and so on. Example 2 shows the notation of a specific pitch for these instruments, in treble and bass clefs, respectively:

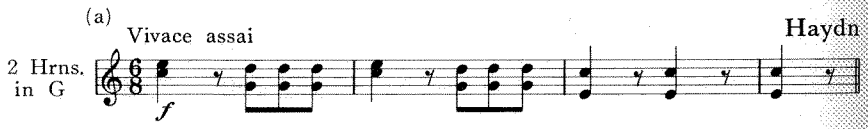
Ex. 2



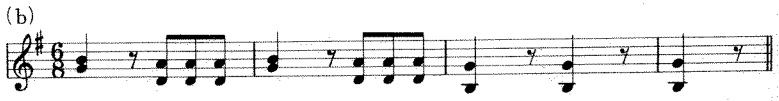
Here is an excerpt from a horn part of the Classical period:

Ex. 3

Sixth Symphony



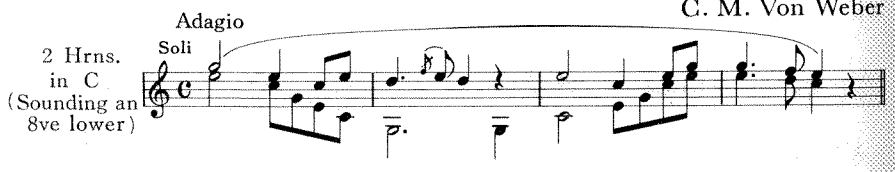
which will sound:



Another characteristic passage for natural horn is shown next:

Ex. 4

Overture to *Der Freischütz*



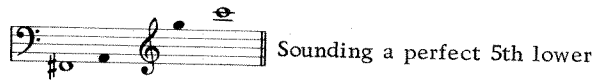
During the Classical period the usual practice was to employ one pair of horns, pitched in the home key. However, if the music was in minor, a second pair, pitched in the key of the relative major, was occasionally added

to supply certain important notes that were not available as members of the harmonic series in the home key. Later on, the device of using two pairs of horns pitched in different keys was sometimes employed even in major keys to provide richer possibilities in writing for the horns and to allow for modulations.

We are told that in the day of the natural horn the player kept an assortment of crooks hanging on his arm in order to be prepared for necessary changes! Fortunately for player, composer, and audience, the introduction of valves revolutionized the technique of horn playing and the type of part that could be written for the instrument. Instead of having only one harmonic series at a time to work with, the horn now boasted seven different series (the results of various combinations of the three valves), and a complete chromatic scale was available for the first time. As a result, the horn achieved the status of a real melodic instrument. Although the invention of valves occurred in 1813, the valve horn did not come into general use until about the middle of the nineteenth century, and even then the natural horn continued to be used with it for many years.

THE MODERN VALVE HORN IN F

Ex. 5



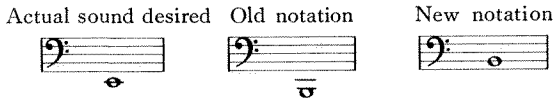
Out of the many horns once employed, the horn in F seems to have proven the most satisfactory, and it has survived, with valves added, as the one horn in general use today. When parts written originally for the natural horn are played on it, the player must transpose as he goes—unless, of course, the original part happened to be for horn crooked in F.

Most players now use the so-called "double horn" (pictured on page 118). That instrument has two sets of tubing, one in F and one in (high) B♭; a lever enables the player to switch instantaneously from one to the other. Because of its shorter tubing, the B♭ horn (that is, the B♭ part of the double horn) allows for greater facility. But its use is entirely optional with the player, and the transposition problems involved in switching to B♭ horn are his concern; the part is always written as if for F horn—a perfect 5th higher than the sounds desired. Although the B♭ horn is capable of producing certain very low pedal tones not available on the F horn, these have little practical value.

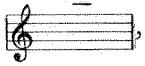
Traditionally, the horns are written without key signature, sharps and flats being written in wherever necessary. But it is possible nowadays to use a key signature, and that plan would seem to be a sensible one in scoring music of a diatonic nature. Enharmonic notation (for example, B♭ instead of A♯) is not uncommon in horn parts, especially in non-diatonic music.

Concerning notation in bass clef, the old custom of writing the F horn a 4th lower than the concert pitches persisted until relatively recently, but the current practice is to write the part a 5th higher in bass clef as well as in treble. Examples of the two systems of notation follow:

Ex. 6

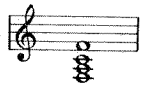


Because players have become used to the old system, it is wise to include a note in scores and parts, whenever the new system is employed, to the effect that notes in bass clef are intended to sound a 5th lower. However, the bass clef is little used, since it is needed only for extremely low tones. Horn parts should be written in treble clef wherever possible, even if several ledger lines below the staff are involved.

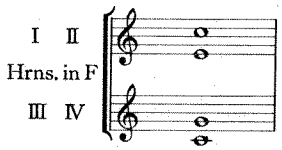
In its bottom register, up to about the written note  , the horn is inclined to be a bit unsolid in quality, somewhat lacking in focus, and often doubtful in intonation. This register is useful chiefly for sustained tones; melodic passages at this level are generally awkward and ineffective. From  up to about  (written), the tone is considerably brighter. This is the middle and most characteristic register, in which the horn does the greatest part of its playing. From  to the top  , the notes become progressively more brilliant. Just as the high notes of a tenor voice sound much higher than they would if sung at the same pitch by a soprano, the top notes of the horn give the impression of being extremely high because the player must strain somewhat to get them.

Notes above written  are difficult to produce, and they should

be led up to; that is, the player should not be asked to attack them without preparation. Because they are almost impossible to play softly, it is better not to write for the horn in this register unless it is meant to be heard prominently.

There is a certain "division of labor" among the four horns which are commonly used in the orchestra today. In order to understand this point we must first become acquainted with the traditional arrangement of the horns in harmonic passages. Horns I and II are normally written on one staff, horns III and IV on the staff below, and one might naturally suppose that in writing a four-note chord for horns, the two highest notes would be given to horns I and II and the two bottom notes to horns III and IV. But this is where tradition steps in and dicates a different procedure: the horns are written so as to interlock on paper; that is, horns I and III take the high notes, horns II and IV the low notes. For example, if we were to score an F major triad  for four F horns, it would look like this:

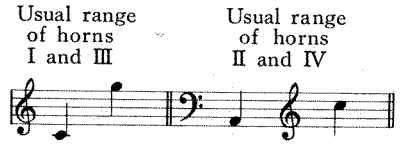
Ex. 7



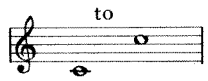
Even when only the first three horns are playing, horn III is generally placed between horns I and II (in a chord).

Because the first-horn and third-horn players are accustomed to taking the higher notes, they have become specialists in this upper register; likewise, the second-horn and fourth-horn players are especially adept at taking lower pitches. Consequently, we might divide the general range given earlier in this chapter into two "usual" ranges, one for each pair of horns:

Ex. 8



A tight, tense "lip" is required for high pitches, while lower notes call for a much looser embouchure; there is therefore a definite advantage in being able to concentrate on one general type of embouchure instead of

having to switch constantly from one kind to another. Of course there is a middle ground (roughly from written 

) in which all the horns can play equally comfortably. And it must not be inferred from this talk of specialization that each pair of horns is never asked to exceed its own "usual" range. Particularly in passages where all four horns play in unison, the second and fourth are often taken quite high along with the first and third, and it is possible, though rare, for the first or third horn to play in the very low register.

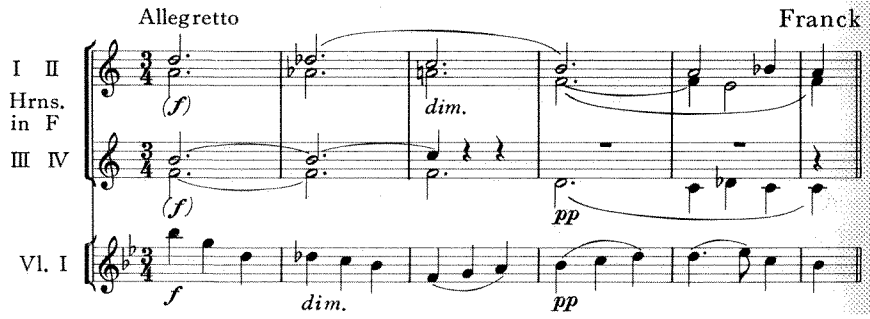
The horn is not by nature a particularly agile instrument. Very fast running passages and quick leaps are simply not in its province except, with limitations, in virtuoso solo work. And because the player must "hear" each note in his mind's ear before playing it, the melodic lines written for the instrument should be as smooth as possible and should avoid awkward leaps. There should be sufficient rests. Since the horn is undoubtedly one of the most difficult of all orchestral instruments to play, scoring for it must be approached with special care and understanding.

Horns may be employed in various ways in the orchestra. The most important of these are:

1. *On harmony parts.* In its middle register, the horn tone is ideal for background, because it can be made unobtrusive without losing in warmth or body. Usually these harmony parts are sustained, although sometimes they consist of repeated notes or repeated short figures. Incidentally, repeated notes on the horn do not sound as sharply articulated as do repeated notes on some other instruments. The effect is more that of a pulsation on the pitch involved. Example 8 shows the horns in a typical harmonic role. (The melodic line in the violins has been included in order to show how the harmony parts fit into the general musical scheme; there are many other instruments playing.)

Ex. 9

Symphony in D minor

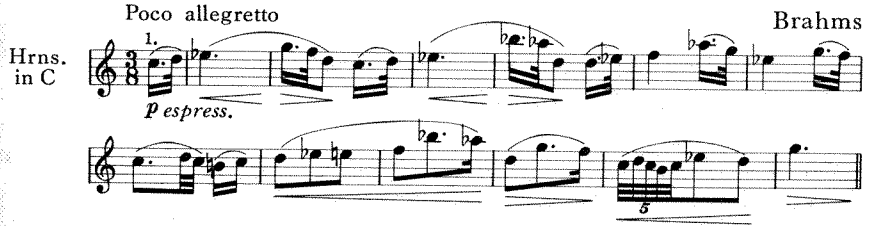


Simply because the horns can handle this sort of part so successfully, there is a temptation to use them constantly in this way, with a resulting monotony of color and general effect. It is largely this constant use of the horns on middle register harmony parts that gives orchestral music of the romantic period its characteristic plushy richness.

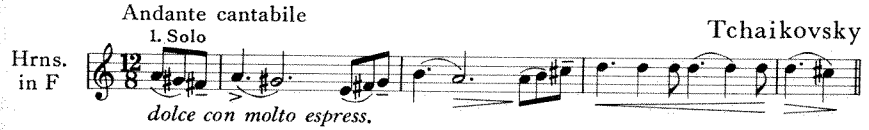
2. *In a solo capacity.* The horn is excellent as a solo instrument. It can be tender or heroic, as the music demands, and it possesses a wonderful nobility and breadth of tone all its own.

Ex. 10

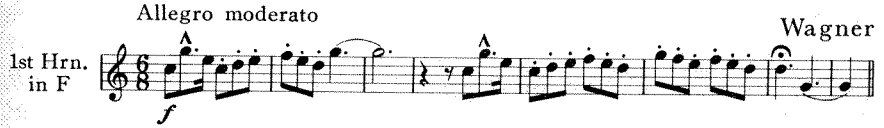
(a) Third Symphony



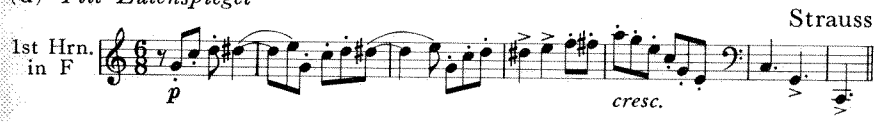
(b) Fifth Symphony



(c) *Siegfried*



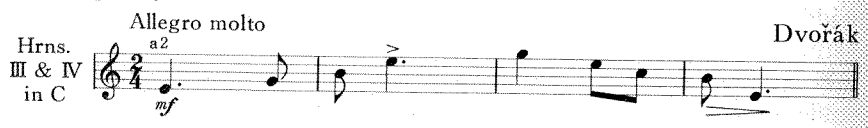
(d) *Till Eulenspiegel*



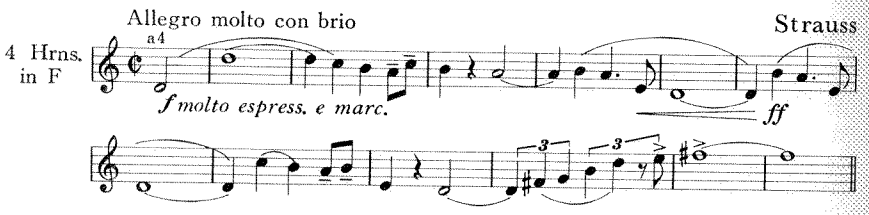
3. *Two or more horns in unison on a melodic line.* Horns are frequently doubled on a part, sometimes for purposes of volume or balance, occasionally to give a greater degree of security in difficult passages. All four horns playing in unison, *f* or *ff*, give an especially robust, heroic sound.

Ex. 11

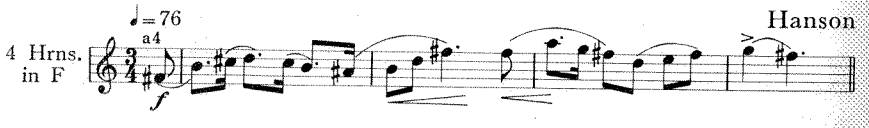
(a) Symphony in E minor *(New World)*



(b) *Don Juan*



(c) First Symphony



In cases where horns I and III play one melodic line and horns II and IV another for a considerable length of time, it may be easier to write I and III on the upper staff and II and IV on the lower, with an "a 2" indication on each staff. That way, only two melodic lines instead of four need be written for the horns.

The chamber orchestra usually includes one horn; the small orchestra, one or two. While four is the standard number employed today, it is possible, of course, to use only three if that number seems best fitted to the demands of the music in question. In most symphony orchestras one can see five horn players on the stage. This does not mean that there are five separate horn parts. The extra performer is an "assistant first horn" player; that is, he sits beside the first horn player and doubles that part at times, for added security or volume; or he may play some of the part by himself, allowing the first-horn player to save himself for important solo passages to follow.

Certain works are actually scored for more than the standard four horns. For example, Stravinsky writes for eight horns in *The Rite of Spring*, where the proportions of all sections are unusually large; and the orchestra used by Wagner in the *Ring* includes eight (four of them alternating with Wagner tubas).

It might be well to include a word about Wagner's horn notation, for it is likely to be confusing—and understandably so. The horn parts are intended to be played on valve horns, yet they are written as if for a succession of natural horns pitched in different keys. For example, we may have a passage for horn in E♭, then a few measures for horn in G, then a passage marked "Horn in F," and so on. It is difficult to follow the logic of this strange system.

In most of the examples quoted above, the horn took the chief musical idea. But it can be equally effective on subordinate countermelodies. Several horns in unison may even be allotted to such a part if considerable volume and a broad, virile effect are in order.

SPECIAL EFFECTS

The tone quality of the horn is controlled chiefly by the position of the player's hand in the bell of the instrument. Normally, the hand is inserted only part way into the bell and cupped. But there are special effects which demand a slightly different technique. Muting, for example, may be achieved by inserting the hand a little farther into the bell. Or an actual mute made of metal, wood, or cardboard may be used. Players seem to differ in their preference for one or the other of these methods; some employ both at different times: the hand method for short muted passages, a mute for longer passages. The choice depends partly on the instrument being used. In any case, this question need not be settled by the orchestrator. All he needs to do is to include the direction *con sordino* or "mute" at the appropriate spot, and the player will produce the muted effect in whichever way he prefers. As with the strings, at least a measure or two in moderate time should be allowed for putting on or taking off mutes. (With the hand-muting method the change from open to muted sound or vice versa can be made instantaneously.) The muted effect is indicated in French by *sourdine* and in German by *mit Dämpfer* or *gedämpft*. When a return to the unmuted tone is wanted, the direction is *senza sordino* or "open" (*ouvert* in French, *offen* in German). An "O" above the note is sometimes used as a symbol for "open."

Even if it were possible to describe tone color accurately in words, it would be difficult to give a description of the muted horn sound that would apply to all players and all instruments. The basic tone quality of the individual instrument, the style and technique of playing used, and the player's conception of how a muted tone should sound all enter in. But as a general comment it can be said that muting cuts down the volume of sound and veils the tone slightly. Below about a written  , muted notes are

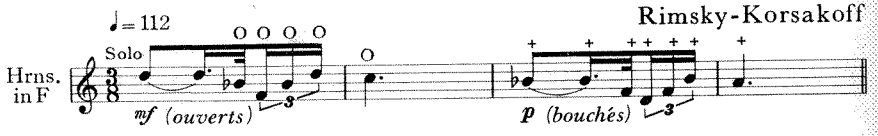
difficult, although a skilled player can mute as low as  .

An excellent example of muted horns can be found in the closing measures of Debussy's *Prelude to The Afternoon of a Faun.*

"Stopped" notes on the horn are produced by inserting the hand (or a mute) so far into the bell that the opening in it is almost completely blocked, the tones being forced out. The resulting sound is curiously nasal and metallic, with a sharp edge to it. It is especially effective for single notes, played *fp*. In both muting and stopping, the volume is reduced and, unless a non-transposing mute is used, the pitch is altered to such an extent that the player must employ fingerings that differ from those used for the corresponding open tones. But he will make this adjustment automatically, and it need not concern the arranger; stopped tones are notated in the same way as open tones, as far as pitch is concerned. There are two methods for indicating the stopped effect, either or both of which may be used: (1) The French word *bouché* (or simply "stopped" in English) is written in. The German equivalent is *gestopft*, the Italian, *chiuso*. (2) A small cross is placed above each note to be played stopped. In the following example, both indications are present.

Ex. 12

Capriccio Espagnol Rimsky-Korsakoff



Another much-used direction in horn writing is the French word *cuivré*, meaning "brassy." The brassy quality is attained chiefly by increased tension of the lips and is possible in connection with open, muted, or stopped notes. *Bouché-cuivré*, a composite term often encountered, calls for a tone that is both stopped and brassy. Where only a suggestion of brassiness is wanted, Debussy marks the passage *cuivrez légèrement* (literally translated, "brass lightly".)

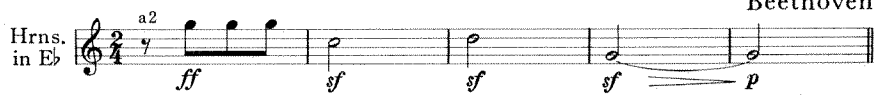
"Bells in the air" (*pavillons en l'air* in French, *Schalltrichter auf* in German) is a rarely used effect for which the horn is turned with the bell pointing upward, so that the sound is projected outward toward the audience more directly than in the normal playing position. Inasmuch as the hand cannot be used in the bell here, the tone is completely open and lacking in any subtlety of coloring. "Bells in the air" is therefore appropriate only for loud, hearty passages in which refinement of tone is not called for.

The horn has an uncanny ability to sound as if it were being played a great distance away. When that effect is wanted, the part should be marked *pp* or even *ppp*, and the word *lontano* ("distant" in Italian) may be added. To achieve this effect, some players employ a partly muted tone; others mute completely; still others play "open" but extremely softly.

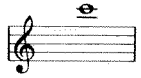
One of the most successful sounds available on the horn is the *fp* effect mentioned earlier. Used with a stopped tone it has a biting, almost snarling quality, while in open horn it is dramatic and arresting.

Ex. 13

(a) Fifth Symphony Beethoven

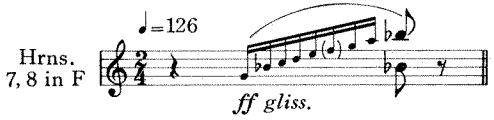


(b) Symphony in B minor (*Unfinished*) Schubert

Glissandos, which produce a loud upward rush of sound, are sometimes seen in contemporary scores. They may be written so as to involve any portion of any harmonic series, provided they do not start lower than  or end higher than  . One example may help to give an idea of the usual notation:

Ex. 14

The Rite of Spring Stravinsky



SUGGESTED ASSIGNMENTS

A. Know:

1. the extreme possible range of the horn and the usual ranges of horns I and III and horns II and IV.
2. transposition (including the old system of notation in the bass clef).

3. differences between the old "natural horn" and the modern valve horn, both as to their operation and the type of part written.
4. the color and weight of the horn in various registers.
5. the particular abilities and limitations of the horn.
6. special effects on the horn and foreign names for them.

B. Find five examples of parts for horns in keys other than F and rewrite them for F horn (a few measures will suffice for each example). Write the original version above and the rewritten version on a staff below it.

SUGGESTED LISTENING

Horns[1]

Mozart, Symphony No. 40 (K. 550), 3rd movt., Trio.
Beethoven, Third Symphony, 3rd movt. (*Scherzo*), Trio.
Mendelssohn, Nocturne from *Midsummer Night's Dream* music, beginning.
Brahms, B♭ major Piano Concerto, beginning; First Symphony, last movt., beginning of *Più Andante* section; Third Symphony, 3rd movt., meas. 40–52 and 98–110; Fourth Symphony, 2nd movt., beginning and many other passages.
Tchaikovsky, Fifth Symphony, 2nd movt., beginning.
Rimsky-Korsakoff, *Capriccio Espagnol*, section II (*Variazioni*), beginning.
Dvorák, Fifth Symphony (*New World*), 1st movt,. beginning of *Allegro molto* following introduction; last movt., 11 bars after figure 6, also numerous other passages.
Strauss, *Don Juan*, measure 311; *Till Eulenspiegel*, meas. 6; Waltzes from *Der Rosenkavalier*, especially beginning.
Ravel, *Pavane pour une Infante Défunte*, beginning.
Shostakovitch, Fifth Symphony, 2nd movt., at figures 54, 56, 70, and 72.
Hanson, First Symphony, 2nd and 3rd movts. in particular.
Britten, *Serenade for Tenor, Horn and Strings*, Op. 31.

[1] Examples of the horns in conjunction with the rest of the brass section are included in the *Suggested Listening* at the end of Chapter 9.

Chapter 8

THE TRUMPET, TROMBONE, AND TUBA

THE TRUMPET

Italian:	Tromba Trombe	*French:*	Trompette Trompettes	*German:*	Trompete Trompeten

THE TRUMPET IN THE EIGHTEENTH CENTURY

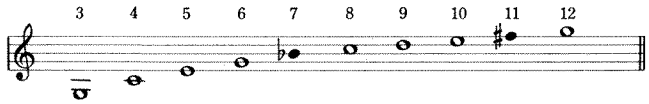
In order to understand the trumpet parts in certain works of Bach and his contemporaries, it is necessary to know that at that time there existed the art of "clarino playing," which involved producing the very high partials of the instrument. The trumpet most often used was a (large) trumpet in D. In the last half of the eighteenth century this special technique fell into disuse and disappeared entirely. Today such high trumpet parts are generally performed on a trumpet that is even smaller than the B♭ and C instruments now standard, and on which the high notes called for are relatively lower in the harmonic series and therefore easier to produce. The trumpet in D or E♭ and the trumpet in F are the two most frequent choices for such parts. (Information on these trumpets is given on page 310.)

THE NATURAL TRUMPET

Much of what was said in the preceding chapter about the natural horn applies to the natural trumpet as well. The latter's repertoire of written notes was also limited to certain members of the harmonic series on C, and crooks

of different lengths were used to produce the desired pitches in various keys. As with the horn, the fundamental was unplayable on most trumpets; but, in addition, the second partial was too doubtful in intonation to be usable, and the notes above the twelfth partial were seldom called for. Thus the written notes normally available on the trumpet during the classical period were the following, numbered here on the basis of partials:

Ex. 1



Unlike the natural horn, the natural trumpet could not fill in certain intermediate tones by the use of the hand in the bell, nor could it adjust the intonation of the seventh and eleventh partials by that method. Nevertheless, the latter notes were sometimes called for, and in such cases whatever correction of intonation was possible had to be accomplished with the lips. As a result of all these considerations, the natural trumpet was even more limited than the natural horn in the type of part it could play.

In the eighteenth century, crooks were used with trumpets of various sizes; by the early nineteenth century the trumpet in F had become more or less standard as the one to which crooks were added. In its uncrooked state it sounded a perfect 4th higher than written. That possibility and those involving the crookings then available are shown next:

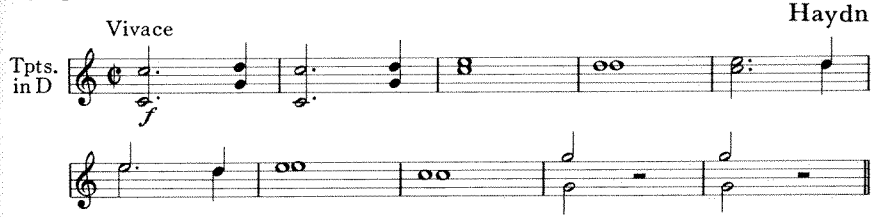
	Trumpet in	*Sounding*
Sounding higher than written	F	a perfect 4th higher than written
	E	a major 3rd higher than written
	E♭	a minor 3rd higher than written
	D	a major 2nd higher than written
	C	as written
Sounding lower than written	B	a minor 2nd lower than written
	B♭	a major 2nd lower than written
	A	a minor 3rd lower than written

Since there were not crooks for all keys, it was sometimes necessary to use a trumpet pitched in a key other than that of the music. For example, in the case of a composition in G, a trumpet in some other key (most often C) had to be employed, if trumpets were to be included. Of course it was possible to omit them altogether if the key presented too many problems. Occasionally a composer elected to use a trumpet in a key other than that of the composition even when a trumpet in the proper key was available. For instance, Beethoven's Seventh Symphony in A major uses trumpets in D, presumably to avoid a combined crooking necessary for trumpets pitched in keys lower than C.

Example 2 shows a typical trumpet part of the classical period:

Ex. 2

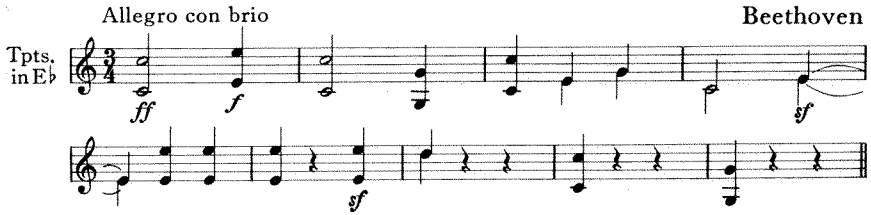
Symphony No. 101 in D major — Haydn



It can be seen that such parts necessarily tend to be repetitious and uninteresting melodically because of the limited number of notes available. Occasionally the natural trumpet was able to take portions of themes that happened to fit the harmonic series, as in the excerpt from the *Eroica* shown in Example 3.

Ex. 3

Third Symphony — Beethoven

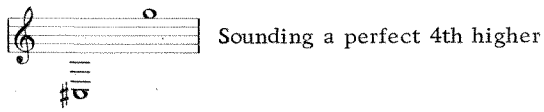


But the limitations of the instrument are all too apparent here. Beethoven apparently preferred not to risk taking the part up to a high written G in the third measure and has it descend to the lower octave of the theme instead. From the fifth measure on, the notes of the melody are not all available in the trumpet's harmonic series, so that if the instrument is to continue playing, it must take other pitches that fit in. The most serious problem, however, is illustrated in the third measure from the end. There the second trumpet should logically go down a whole step from the E to the D and then to C, in octaves with the first trumpet. But it is unable to do so because the D just above middle C is not present in the harmonic series. Instead, it jumps up a 7th to a D that *is* playable and then down a 9th, an arrangement that is far from ideal in terms of voice-leading and balance. The alternative in such cases was of course to let the trumpet simply drop out for a beat or two at the points where it had trouble supplying an appropriate note, and that

was sometimes done. But such an approach was likely to lead to a fragmentary and unsatisfactory part.

THE EARLY VALVE TRUMPET IN F

Ex. 4



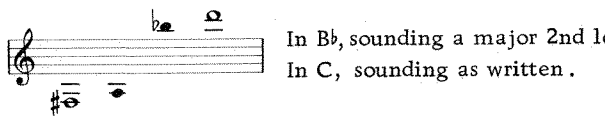
It was the F trumpet commonly used in Beethoven's day to which valves were added to produce the first valve trumpet that gained acceptance. This was apparently the only one of the "old family" (that is, the large type) to survive in valve form. Parts for it are found in many late nineteenth century scores by such composers as Franck, d'Indy, Bruckner, Mahler, and Strauss.

At the same time, parts for trumpets in other keys of the crooks continued to appear. Presumably these parts were transposed and played on the valve trumpet in F, although there is uncertainty on this point (just as there is uncertainty as to whether all the parts labeled F trumpet were actually played on *that* instrument).

In any case, the much smaller trumpets in B♭ and C succeeded the valve trumpet in F and are standard today.

THE MODERN VALVE TRUMPET

Ex. 5

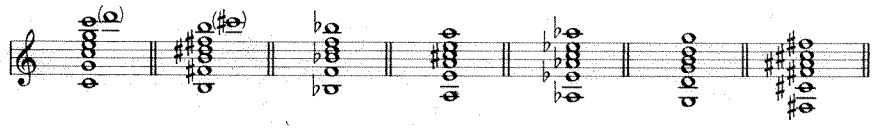


The modern trumpet is far more flexible than its ancestor, and the tone is lighter. As Forsyth says, "It is not merely that the instrument has become chromatic. It has also become, except in name, a different instrument."

The modern trumpet, in its open form, has a written harmonic series an octave higher than that of the natural trumpet. The other series available by means of valve combinations have as their bottom notes the six semitones below middle C, respectively. In each series the seventh partial (not

shown in Ex. 6) is flat and is normally avoided. The notes playable in the seven valve positions are, then:

Ex. 6



For many years the B♭ trumpet was made with a small slide which could be adjusted to pitch the instrument in A. But since the A slide brought on serious intonation problems, it was not of great value and is not included on most B♭ trumpets made today.

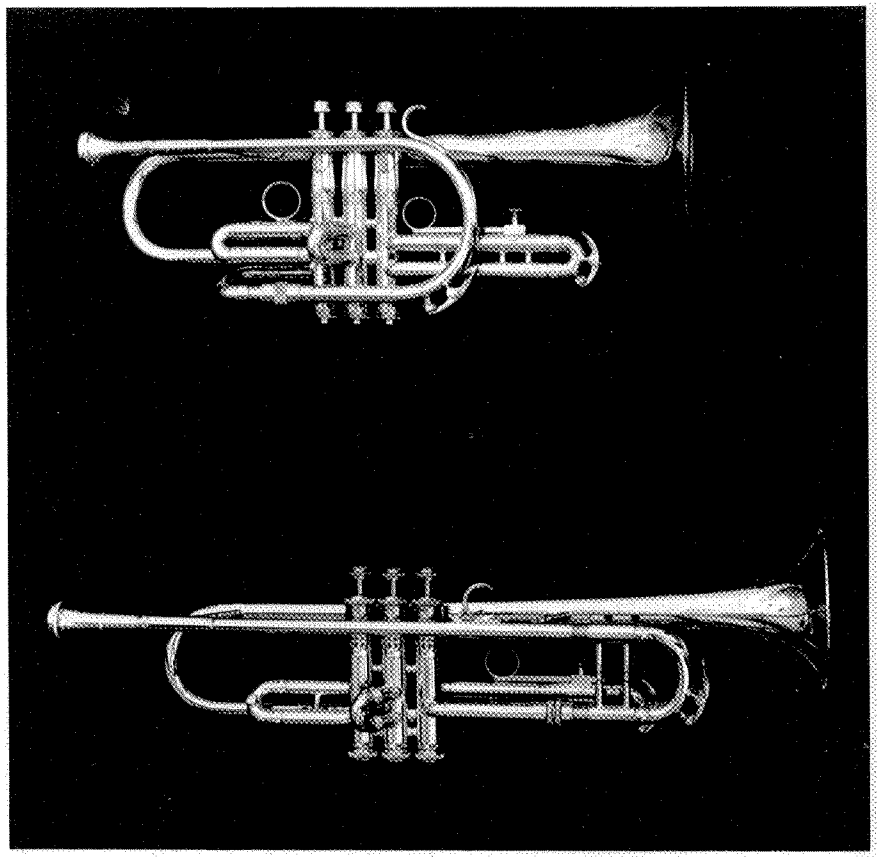
Although not so widely used as the B♭ instrument, the C trumpet seems to find favor with contemporary composers, many of whom write for it entirely. It is a bit more brilliant but its tone is generally not quite so rich. One disadvantage to writing for it is that many players own only a B♭ trumpet and must transpose to play C parts. In school orchestras the B♭ instrument is invariably used.

From about 

is the trumpet's most-used register. Notes below the C tend to be a little less penetrating, while those above the F are more difficult to produce softly and are best led up to. Although high D is given as the top note possible, symphonic trumpet parts do go as high as E♭ or E on rare occasions, but the part never stays that high. Even so, such passages are apt to be a bit uncomfortable for everyone concerned.

At this point, readers who have had some experience with trumpet playing in the dance orchestra are sure to object that the upper limit given here for the trumpet is much too conservative. It is perfectly true that some dance band trumpeters go up to  or even higher. But they usually achieve these very high notes only at the expense of tone quality; the shrillness that goes with this pitch level would normally be inappropriate in the symphony orchestra.

Obviously the trumpet is a much more agile and quick-speaking instrument than the horn. It can manage runs and arpeggios and skips as long as they are not extremely fast, but such passages should not be too extended or too frequent. Its use in fanfares is such a familiar and natural one as scarcely to require comment. (See the Beethoven and Strauss excerpts in Ex. 7.) Rapid repeated notes and double-tonguing and triple-tonguing



Studio Gilmore, Austin, Texas

Cornet
Trumpet

are particularly well suited to the character of the instrument; even flutter-tonguing is possible. Along with the trombone, the trumpet is capable of tremendous volume and has extraordinary powers of crescendo.

The trumpet lacks the noble warmth of the horn but has, instead, a bright, incisive quality that is especially effective in crisply assertive passages. While it can also play more lyrical melodies, there is a certain danger involved: if the melody is strongly romantic in feeling, the trumpet may sound overly sentimental, a little too reminiscent of the old-style "cornet solo."

Incidentally, the trumpet and the cornet must not be thought of as being one and the same instrument. The cornet, which is seldom employed in symphonic music today, is shorter and of slightly different shape (roughly two-thirds conical and one-third cylindrical, whereas these proportions

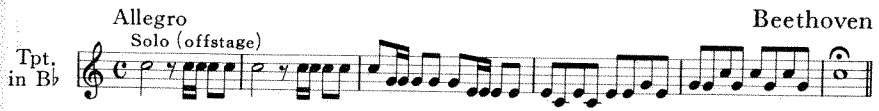
are approximately reversed on the trumpet). The cornet tone is a bit mellower and more romantically colored than the trumpet tone, though it can be made to sound very much like the latter. Some French scores contain parts for cornets, but these parts are often played on trumpets. Cornets, like trumpets, may be pitched in B♭ or (rarely) C; the B♭ instrument is standard in band work. Everything possible on the trumpet is possible on the cornet, and the two instruments have the same range.

Muting is a frequent and effective device in orchestral trumpet writing—effective as long as it is not used too often or for too long at a time. All that was said about muting in connection with the horn applies here, except, of course, that the trumpet cannot be muted with the hand as the horn can, but must use an actual mute. It has no real equivalents of the horn's *bouché* and *cuivré* effects. To the symphony player, "mute" means the straight mute unless another kind is indicated. The straight mute, made of wood, fiber, plastic, or metal, produces a cutting, nasal quality and reduces the volume of tone somewhat. So far, the many other types of mute used in the dance orchestra have been little exploited in serious symphonic music. Some of these are the Harmon, the cup, the bucket, the solotone, and the whisper mutes. There is also the possibility, usable with either open or muted trumpet, of pointing the bell of the instrument into a hat or a music stand to achieve a more subdued tone. The direction is simply "hat" or "in stand." Still another device is the use of a "plunger," which greatly reduces the volume.

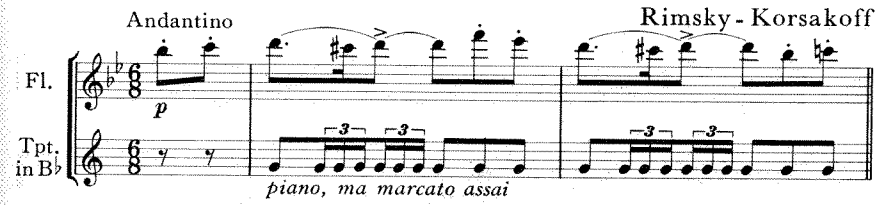
EXAMPLES

Ex. 7

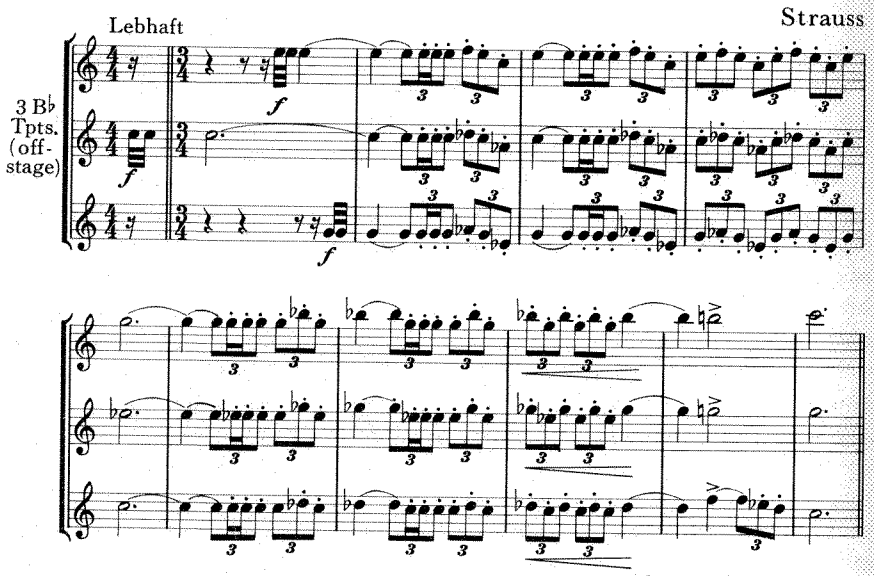
(a) *Leonore* Overture No. 3



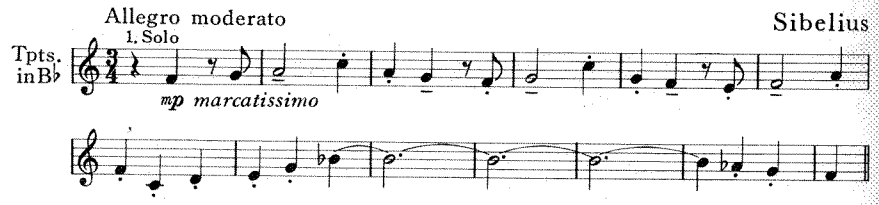
(b) *Scheherazade*



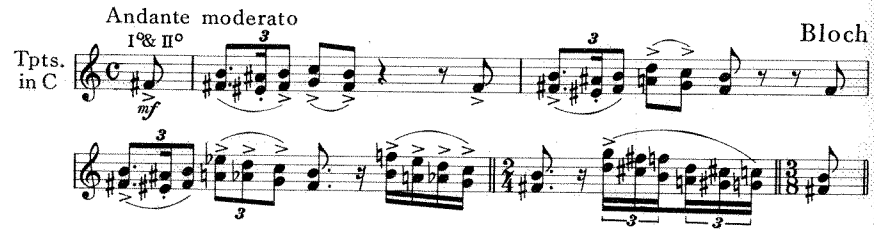
(c) *Ein Heldenleben*



(d) Fifth Symphony



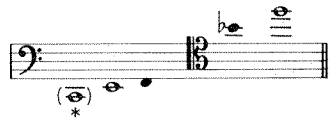
(e) *Schelomo*



THE TENOR TROMBONE

Italian:	Trombone Tromboni	*French:*	Trombone Trombones	*German:*	Posaune Posaunen

Ex. 8



* Pitches down to the low C are possible with an F attachment.

As a rule, instruments pitched in keys other than C are transposing instruments. Not so with the tenor trombone; although built basically around the harmonic series of B♭, it sounds as written. It may be notated in either bass or tenor clef, the latter being commonly chosen for higher passages in order to avoid the use of too many ledger lines. (In music for school orchestras, however, trombones rarely use the tenor clef.) The alto clef, found in some older scores, is almost never employed for the trombone nowadays. It is a hangover from the period when the alto trombone was in common use.

The mechanism of the instrument differs radically from those of the horn and the trumpet in that it includes no valves.[1] Instead, the length of tubing is varied by means of the slide. Seven different positions of the slide are possible, each one producing a different harmonic series. The seven fundamentals or generating tones of these series are shown in Example 9.

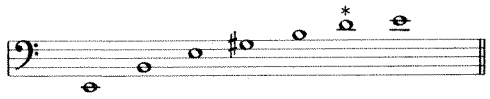
Ex. 9

The first of these "pedal tones," the B♭, is easily playable and is seen frequently in commercial scoring, much less often in symphonic music. Below that, the notes become increasingly difficult to produce and insecure in quality; A♭ or G is the bottom limit for most trombonists. In any case, pedal tones below the B♭ are called for only very rarely.

The notes available in the series on E, known as seventh position, are as follows:

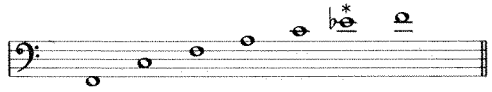
[1] Valve trombones have had a considerable vogue abroad, notably in Italy. Although they are sometimes used by jazz musicians in the United States, they have never had any wide acceptance in our symphony orchestras.

Ex. 10



In sixth position the notes playable are:

Ex. 11

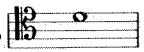


And so on, up to first position, where additional overtones may be used to stretch the upper range a bit higher:

Ex. 12

By adding a B♮ and C♯ at the top of the second position, we get a complete chromatic scale up to the second F above middle C as a possible range. But notes above  are more difficult and are rarely used in orchestral parts.

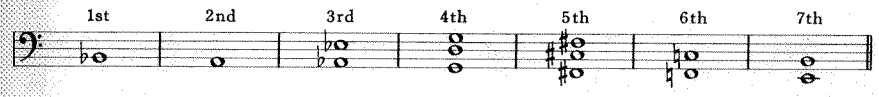
Many tenor trombones today are equipped with an "F attachment," a device which, by adding extra tubing, extends the range downward a major 3rd (to a C) and also simplifies the technical problem by eliminating certain awkward changes of position.

In music for the trombone, it is not so much distance between notes as distance between positions that determines the technical difficulty of the part. A little reflection will make it clear that certain notes can be taken in one of two or more different positions. For example,  can be taken

* The seventh partial (sixth overtone) in each position is slightly flat. However, it can be brought into tune by an adjustment of the slide, in all positions except the first. There the slide is already drawn up as far as it will go, and a raising of the flat pitch is therefore impossible.

in the first position (series on B♭) or the fourth position (series on G) or the seventh position (series on E), and the player can choose whichever position is easiest. With three choices, one of them is bound to be close to the position he is already playing in, and such cases should cause no difficulty. But certain notes, such as those in Example 13, can be taken in only one position.

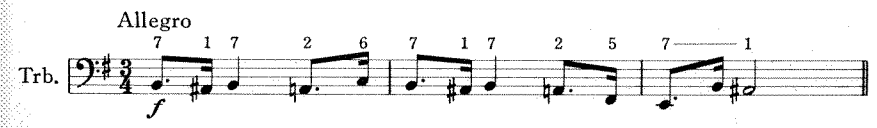
Ex. 13



For the seventh position the slide is extended its full length; for first position it is drawn up as far as possible in the other direction. Therefore, very rapid or repeated changes from first position to seventh position (or vice versa) are awkward and are better avoided. Occasional changes of this sort, when not too fast, are acceptable. Less difficult are changes involving such other distant positions as the second and sixth, but frequent use of them in a rapid tempo naturally does not make for grateful trombone writing.

In order to illustrate what *not* to write for the trombone, we have devised the diabolically awkward passage shown in Example 14. (The numbers above the notes refer to the positions involved.) An actual performance of this by a trombonist will show, very graphically, why such changes as these are best avoided. The passage is somewhat easier on a trombone with an F attachment, however.

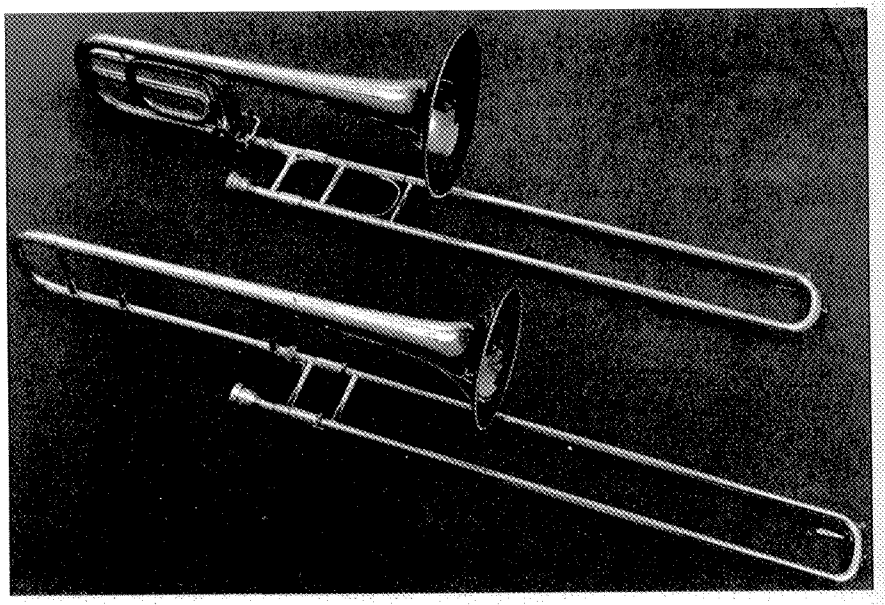
Ex. 14



It should be remembered that because the notes of the harmonic series lie closer together in the trombone's upper register, the whole problem of position becomes less acute there and the instrument therefore has a greater degree of agility in that register than it does in the lower portions of its compass.

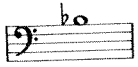
The trombone's lowest register is dark and full. The low E tends to be slightly inferior in quality and is perhaps better avoided in any prominent passage. Other than that, the entire range up to the B♭ above middle C is solid and effective, the notes becoming progressively more brilliant toward the top.

A basic problem in trombone playing is the difficulty of achieving a completely legato effect when a change of slide is involved. If the player



Studio Gilmore, Austin, Texas

Bass Trombone
Tenor Trombone

were to keep the air column vibrating continuously, he would produce not only the actual notes intended but a glissando between each two of them as the slide moved from one position to another. Consequently, he must stop the air column momentarily between notes. To give the effect of a legato connection under these circumstances would seem to be impossible, yet experienced trombonists succeed in doing it surprisingly well, especially at softer dynamic levels. The gap between notes is so slight as to be scarcely apparent to the ear. (Of course two notes in the same harmonic series, such as  and  , require no change in the position of the slide and can therefore be played *legatissimo* by means of a "lip slur".)

In its most familiar role, the trombone is an instrument that excels at loud, heroic passages. But it can also play softly, either on the chief musical idea or as background; this side of its nature is too often forgotten. Rapid running passages and light, fanciful parts that skip around a great deal are obviously not well suited either to trombone technique or to trombone quality. However, the instrument can play rapid repeated notes, including double- or triple-tonguing, and *short* figures that move quickly.

Muting on the trombone works just as it does on the trumpet, and the

effect is relatively the same. Even though the mute cuts down the volume somewhat (in addition to altering the quality), the muted trombone can still hold its own in a *tutti*.

The glissando effect mentioned earlier is normally avoided; but there are times when it is used purposely for comic or bizarre passages. The usual indication in the part is a line between the notes to be connected and the abbreviation *gliss*. This is a device which has long since lost its novelty; when used in serious music today, it has a tendency to sound merely vulgar and dated.

As a point of historical interest, it might be mentioned that although the trombone was employed as early as 1600 or so by Gabrieli and was later used by Mozart, Gluck, and others in opera, its first appearance in an actual symphony occurred in Beethoven's Fifth Symphony.

THE BASS TROMBONE

Italian: Trombone basso *French:* Trombone basse *German:* Bassposaune

Ex. 15

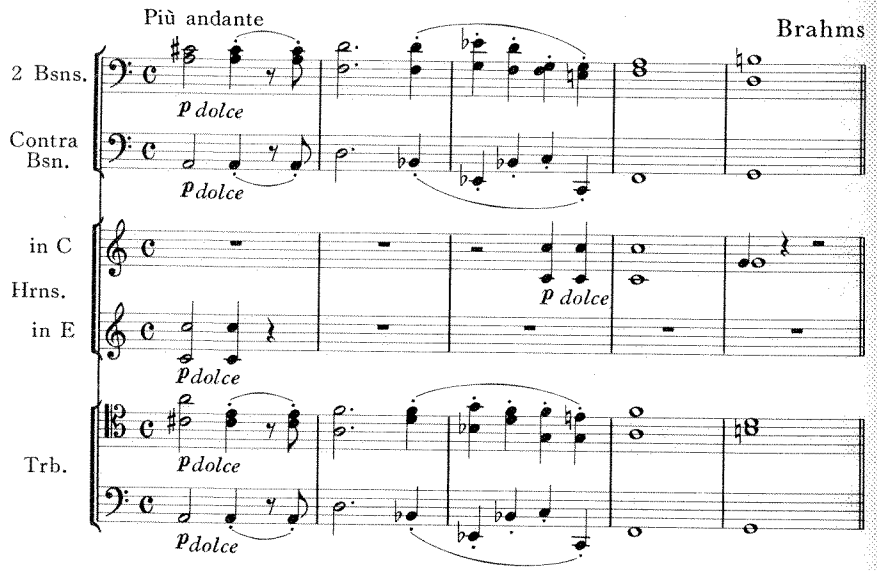
* Possible with an E attachment.

At one time there was a complete family of trombones: alto, tenor, bass, and double-bass. The alto and double-bass instruments have long since fallen into disuse, and the bass trombone in F (or G) has recently followed suit, at least in the United States. For their third trombone, most orchestras in this country now use a B♭ trombone equipped with an F attachment—and often with an E attachment as well, so that the low B♮ can be played. The instrument is usually made with a large bore and bell, and in this form it goes by the name of bass trombone. Sometimes it plays the bass, either alone or in unison or octaves with the tuba; at other times it plays the tenor voice, leaving the bass to the tuba. While its upper range is, theoretically, the same as that of the tenor trombone, bass trombone parts involve a lower tessitura and almost never go above the F shown as the top practical note. Traditionally, they use only the bass clef. Pedal tones are possible, as on the tenor trombone, and the bass trombone is, in fact, more often called upon to play them.

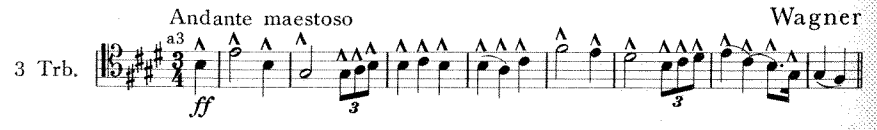
EXAMPLES

Ex. 16

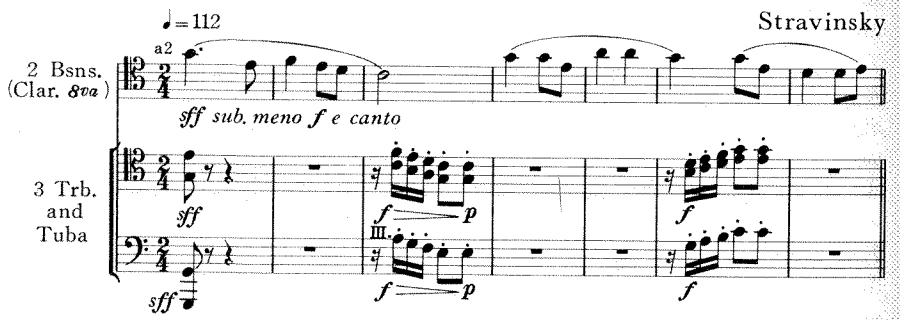
(a) First Symphony



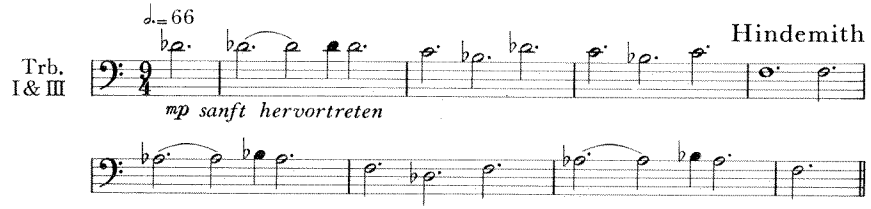
(b) Overture to *Tannhäuser*



(c) *Petrouchka*



(d) Symphony: *Mathis der Maler*

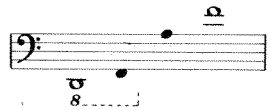


(In [a] the complete scoring [except for timpani] is included to show how the bassoons, contra bassoons, and horns are combined with the trombones to complete the harmony.)

THE TUBA

Italian: Tuba *French:* Tuba *German:* Basstuba

Ex. 17



Tubas in various keys are employed in the orchestra, those in C and BB♭ being the ones most favored today. The choice of instrument rests with the player and is determined by the range of the part, fingering problems, and personal preference, among other things. All the tubas are nontransposing (that is, sound as written) and all are four-valve instruments. While they differ slightly as to range, it seems unnecessary to catalog the individual ranges here, since in writing a tuba part we can be governed by the composite range just given, and since all tubas are capable of playing within the practical range shown.

The tuba seldom has occasion to go very high inasmuch as the notes in the upper part of its register are as a rule better given to trombone or horn.[2] The extremely low notes, those below the low F, tend to be weaker and less solid in quality and are better avoided. The instrument seems to be most effective when used neither very low nor very high but in its middle register.

[2] An exception is the amusing passage from Stravinsky's *Petrouchka*, quoted at the end of this section, where the tuba in its extreme upper register gives exactly the right "lumbering" effect for a dance by a trained bear. But this sort of thing comes under the heading of special effects and is not recommended for everyday use. The passage is frequently played by a euphonium or baritone (see page 312).

Zintgraff, San Antonio, Texas

Tuba

For such a large instrument it is perhaps more agile than might be expected, though there are definite limits to the speed and complexity of the parts it can play. Since it calls for the expenditure of a great deal of breath in performance, parts for it should not be too continuous and should include sufficient rests.

The tone quality of the instrument has been alternately praised and maligned in orchestration books. The writer's experience indicates that with a good instrument and a good player the tuba tone can be unusually velvety and pleasant in soft passages, robust and exciting in a *forte* or a

fortissimo. It differs from those of the trumpet and trombone in being "rounder" and less cutting. This difference results partly from the fact that the tuba is, like the horn, essentially conical in bore, whereas the trumpet and trombone are predominantly cylindrical. Also, the tuba bore is relatively larger than that of the other brass instruments (the horn included).

Muting of the tuba is a device which is employed only rarely. An example may be seen in the introduction of Strauss's *Don Quixote*.

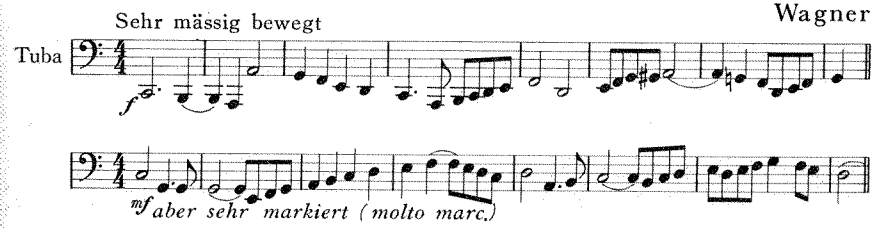
The most frequent use of the tuba in the orchestra is as a bass for the brass section; but it may also be used to strengthen the double basses or lower woodwinds. On rare ocasions, it may take the bass alone or play a solo part.

Because it is so often combined in unison with the double bass and the contra bassoon, both of which sound an octave lower than written, students have a way of insisting that the tuba should use the same transposition. At the risk of sounding repetitious, we might include a reminder to write the tuba part at its actual pitch.

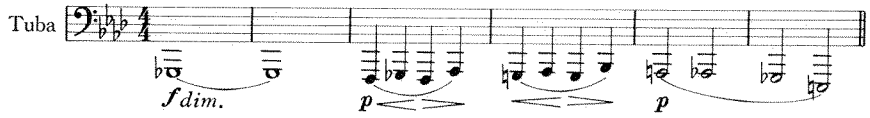
EXAMPLES

Ex. 18

(a) Prelude to *Die Meistersinger* — Wagner

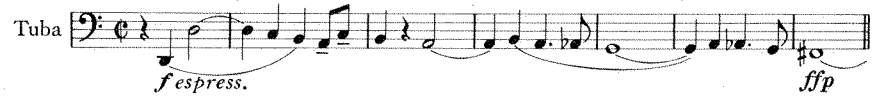


(b) *Siegfried* — Wagner



(The tuba is used here to personify Fafner, the dragon.)

(c) *Don Juan* — Strauss



(d) *Petrouchka* — Stravinsky

THE OPHICLEIDE

Certain nineteenth-century scores, including some by Wagner, Berlioz, Mendelssohn, Verdi, and Schumann, contain parts for the bass ophicleide. This was "the bass of the Keyed-Bugle," as Forsyth puts it, a metal instrument with a broadly conical upright bell, and of "coarse, powerful tone." It customarily played bass parts in the orchestra until about the middle of the nineteenth century, when the tuba began to supplant it. Since it is now obsolete, parts written for it are played by the tuba.

SUGGESTED ASSIGNMENT

Know:

1. ranges of the trumpet, trombone, and tuba.
2. transpositions where involved.
3. principles involved in the positions on the trombone and in the various harmonic series available on the other brass instruments by means of different valve combinations.
4. colors and relative weights in different registers.
5. abilities and limitations.
6. possibilities for muting and special effects.

SUGGESTED LISTENING

Trumpet

Beethoven, *Leonore* Overture No. 3, meas. 272.
Wagner, Prelude to *Parsifal*, meas. 9; *Siegfried*, scenes of Mime; *Die Meistersinger*, scenes of Beckmesser (latter two are examples of *muted* trumpet).
Scriabin, *The Poem of Ecstasy*, 4 bars after figure 32; many other passages.
Mussorgsky-Ravel, *Pictures from an Exhibition*, opening *Promenade;* also Part 6 (*Samuel Goldenberg and Schmuyle*), figure 58 (muted trumpet).
Strauss, *Ein Heldenleben*, fanfare section, figure 42; *Don Quixote*, figure 3 (muted trumpets).
Debussy, *Nocturnes:* II. *Fêtes*, 9 bars after figure 10 (3 muted trumpets).
Ravel, *Daphnis and Chloe* Suite No. 2, 2 bars before figure 204.
Stravinsky, *The Rite of Spring*, 4 bars before figure 84 (muted).
Bloch, *Schelomo*, figure 5.
Copland, Third Symphony, fanfare section near beginning of 4th movt. (figure 85).

Trombone

Mozart, Requiem, *Tuba Mirum.*
Berlioz, *Roman Carnival* Overture.
Wagner, Overture to *Tannhäuser*, letter A; *The Ride of the Valkyries.*
Rimsky-Korsakoff, *Russian Easter* Overture, letter M.

Tchaikovsky, Fourth Symphony, last movt., meas. 84; Sixth Symphony, last movt., letter L.
Strauss, *Salome*, closing scene (muted trombone).
Mahler, Third Symphony, 1st movt., figure 33.
Sibelius, Seventh Symphony, 1st movt., letter L.
Stravinsky, *Pulcinella*, Minuet movt.; *Petrouchka*, figure 112.

Tuba

Wagner, *Siegfried*, beginning of Act II.
Mussorgsky-Ravel, *Pictures from an Exhibition*, beginning of Part 4 (*Bydlo*).
Strauss, *Don Quixote*, figure 3 (muted tubas), figure 9, etc. (This work illustrates the use of both tenor and bass tubas.)
Stravinsky, *Petrouchka*, 2 bars after figure 100.
Shostakovitch, First Symphony, 3rd movt., before figures 7 and 20.

Chapter 9

THE BRASS SECTION

The brass section to be used here for purposes of illustration is the average one: four horns, two or three trumpets, three trombones, and tuba.

An accepted axiom in scoring for brass is this: if the dynamic marking is *mf* or louder, two horns are needed to balance one trumpet or one trombone; below that dynamic level, one horn will give satisfactory balance. Consequently, we must know just how loud a passage is to be before we can score it properly for brass. In the examples that follow, various dynamic markings have been assumed.

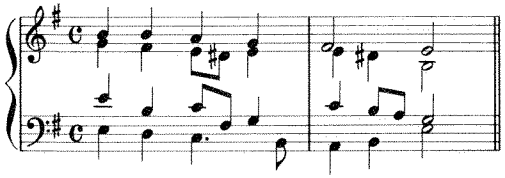
The horns have been written in some cases without key signature (the traditional way) and in others with key signature (which seems the more sensible way here). As in the examples for woodwinds, different possibilities in slurring have been shown.

Once again we have elected to use the chorale excerpt that has served for illustration in earlier chapters:

Ex. 1

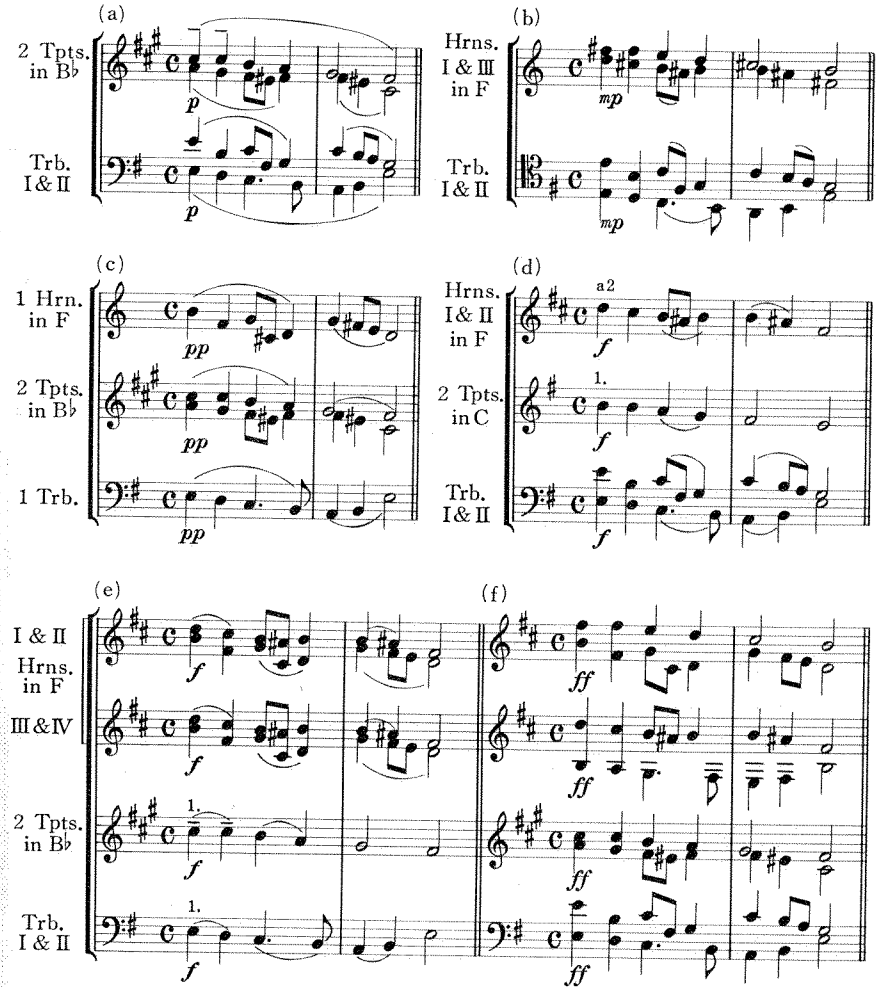
Jesu, meine Freude

Bach



Example 2 illustrates some of the many ways in which the passage could be scored for brass instruments.

Ex. 2



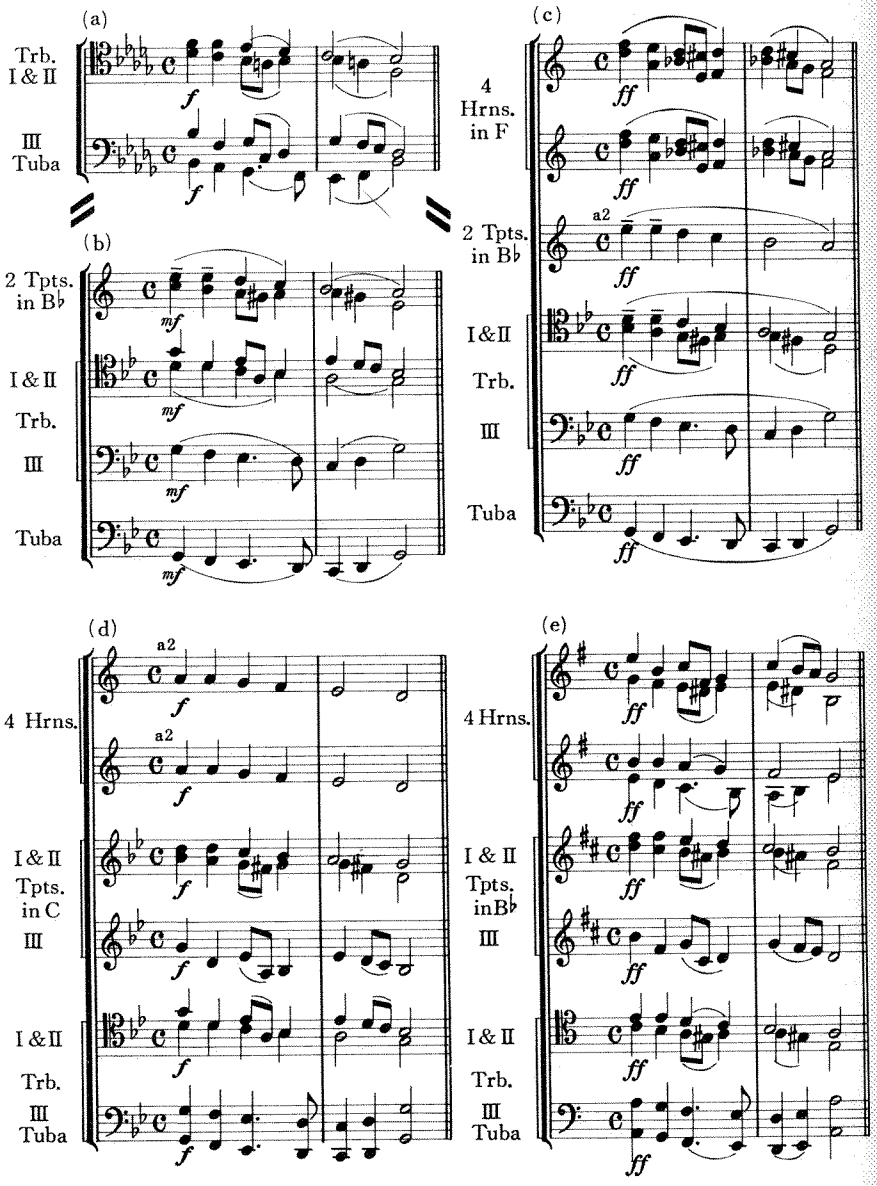
Version (c) shows how the instruments would normally be arranged in scoring for a brass quartet.

Although the arrangement of the horns in (f) may appear to be a natural and workable one, it is actually not too satisfactory. The range in most four-voice music is such that the first horn is apt to be taken uncomfortably high, while the fourth horn is so low that it may become weaker and unsolid.

With good players, this sort of arrangement is possible in certain pieces; with school groups or less experienced performers, it had better be avoided.

Unlike the versions in Example 2, those in Example 3 use keys other than the original, and all but (a) include octave doublings.

Ex. 3



In Example 3 (c) the upper octave of the chorale melody has been given to two trumpets in order to bring it out more strongly than the other voices, while in (d) the bottom octave of the melody has been weighted a great deal more heavily than normal balance would require (four horns in unison plus a trombone).

In (d) and (e) three trumpets rather than two are included. Since third trumpet parts are apt to get down into the lower, less penetrating register, it is often a wise idea to reinforce them with a trombone or a horn (or even two horns). That has been done in (d) with a trombone, in (e) with a horn. Of course if the third trumpet part lies fairly high, no such reinforcement is necessary.

In general, trumpets and horns sound better in close spacing (close position) than they do in open. Trombones may also be arranged in close spacing in their middle and upper registers. (If placed quite high, they give an effect of great brilliance.) But since they must often play the lower notes of the harmony, where close spacing would be too muddy, they are seen about as frequently in open spacing. Such arrangements as  in three trombones give a fine solid resonance.

Beginning orchestrators often make the mistake of expecting the brass instruments to enter on an extremely high note. Such entrances are risky. Even when successful, they are apt to sound unpleasantly strained and tense. The following written pitches might be set as safe upward limits for entrances, in trumpet, horn, and trombone, respectively:

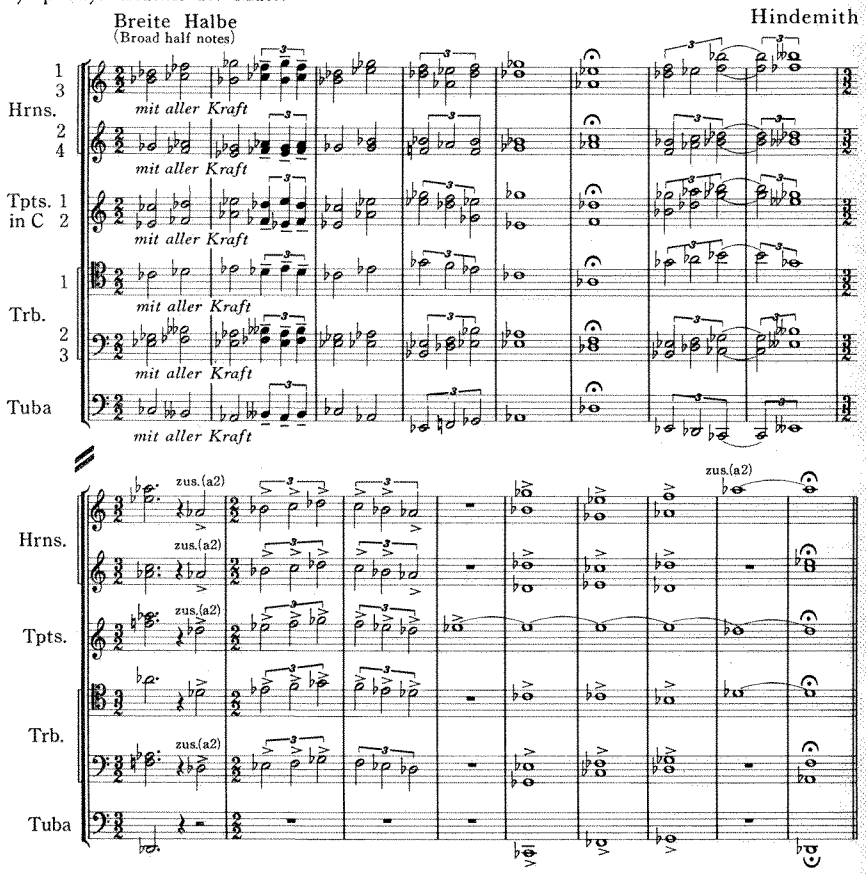
Ex. 4

Of course, higher pitches are practical when the player has a chance to lead up to them instead of having to hit them without preparation.

The excerpt in Example 5 is a good example of effective scoring for brass choir alone. The complete scoring is shown except for two chords for full orchestra which occur at the two holds. The second of these chords (the one in the last measure) is given, in condensed form at concert pitch, on page 169.

Ex. 5

Symphony: *Mathis der Maler*



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SUGGESTED ASSIGNMENTS

A. Know:

1. make-up of the average brass section.
2. arrangement of instruments on page—order and grouping.
3. principles of balance as applied to the brass section.
4. commonly used "voicings" (in brass scoring).

B. The following are suitable as exercises in scoring for brass:

1. Bach, a short excerpt from any of the chorales, to be scored for: (a) two B♭ trumpets and two trombones; (b) two C trumpets, one F horn, and one trombone; (c) full brass section, including three trumpets if desired. In this last version use octave doublings.
2. Bach, *Wachet Auf* (chorale).
3. Bach, Fugue in G minor, from *Eight Little Preludes and Fugues for the Organ.*
4. Bach, *The Art of Fugue*, Fugue I, Contrapunctus IX, many other portions.
5. Schumann, "Norse Song" from *Album for the Young.*
6. Schumann, "War Song" from *Album for the Young.*
7. Grieg, *Sailor's Song.*
8. Chopin, Prelude in C minor.
9. Franck, Prelude from *Prelude, Aria and Finale*, meas. 1–12, transposed to E♭ major or F major.
10. Mussorgsky, "Promenade," beginning of *Pictures from an Exhibition.*
11. Bartók, Folk Song No. 8, from *Ten Easy Pieces for Piano.*
12. Kabalevsky, Prelude 24 from 24 *Preludes*, meas. 46–55 (suggests inclusion of piano and percussion as well).

SUGGESTED LISTENING

Brass

Dvorák, Fifth Symphony (*New World*), last movt.
Brahms, First Symphony, last movt., "chorale" section.
Franck, Symphony in D minor, last movt., "chorale" section.
Wagner, Prelude to *Parsifal;* Funeral Music from *Götterdämmerung;* Overture to *Tannhäuser.*
Tchaikovsky, Fourth Symphony, 3rd movt., Tempo I following the *Meno mosso* section; last movt., many passages.
Rimsky-Korsakoff, *Capriccio Espagnol*, beginning of section IV (*Scena e Canto Gitano*).
Mussorksgy-Ravel, *Pictures from an Exhibition*, opening *Promenade;* Part 8 (*Catacombs*); Part 10 (*The Great Gate of Kiev*).
Kodály, *Háry János* Suite, Part IV (*The Battle and Defeat of Napoleon*).
Bartók, Concerto for Orchestra, Part I (*Introduzione*), meas. 342 (about the middle); Part II (*Giuoco delle Coppie*), meas. 123 (middle portion); Part V (*Finale*), meas. 556.
Hindemith, Symphony: *Mathis der Maler*, "Alleluia" at end (brass parts shown on page 154); also many other portions, especially 1st movt.
Stravinsky, *Fire Bird* Suite, *Finale.*
Respighi, *Pines of Rome*, last section (*Pines of the Appian Way*); *Roman Festivals.*
Copland, Third Symphony, 2nd movt., beginning; 4th movt., figure 85 to figure 88, figure 126.

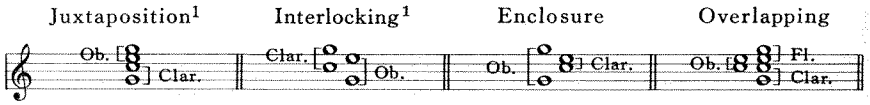
Chapter 10

SCORING OF CHORDS FOR EACH SECTION AND FOR ORCHESTRA

WOODWIND CHORDS

There are four ways in which instruments of different kinds may be combined in a chord. These are demonstrated here, using woodwinds in pairs. (All notes shown are actual sounds.)

Ex. 1



Juxtaposition is used very frequently. Pairs of instruments are simply put side by side, usually in the normal order of register.

Interlocking has the slight advantage of mixing the colors in such a way that a more homogeneous blend results. However, there are cases in which interlocking does not work well. For instance, in the following chord the second flute would be relatively weak:

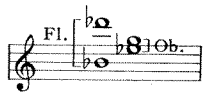
* In Rimsky-Korsakoff's *Principles of Orchestration* the translator has used the term "overlaying" rather than "juxtaposition" and "crossing" rather than "interlocking." Certain other orchestration books refer to interlocking as "dovetailing." The terms chosen here are those which seem to offer the least chance for ambiguity or confusion.

Ex. 2

A similar lack of balance would result if interlocking forced the oboe, for example, to play in an abnormally high register where it would be too thin.

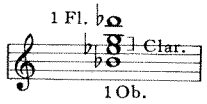
Enclosure is likely to be less successful than the first two methods in arranging woodwinds, at least when one *pair* encloses another. The difficulty is that when two instruments of a kind are spread an octave or more apart, they are likely to be playing in different registers and therefore to differ considerably from each other in strength and color; consequently, balance and blend may suffer. Consider the difference in sound between the first and second flutes in Example 3.

Ex. 3



(The second flute is obviously too weak here.) On the other hand, if a pair is enclosed by two *different* instruments, the effect may be perfectly good. (See Ex. 4.)

Ex. 4



The overlapping method, though much in vogue during the Classical period, is seen less often today. Its weakness is the fact that the outer notes (especially the bottom one) are not as strong as the others.

Whereas overlapping involves only a partial duplication of notes, there is another more complete and balanced form of duplication that is much used, as in Example 5.

Ex. 5