

Preliminary Exercises & Etudes In Contemporary Techniques for Saxophone

By Ronald L. Caravan

Introduction

The tonal resources of woodwind instruments have been greatly expanded in recent years. Among the numerous unconventional techniques called for in contemporary music are multiphonics (production of more than one audible tone simultaneously), quarter tones, timbre variation, glissando, portamento, vibrato manipulation, non-traditional methods of attack and release, percussive effects, vocal sounds, and air sounds. Once the peculiarities of a few experimenters and jazz musicians, many unconventional sounds have, during the second half of the twentieth century, become accepted as viable material for contemporary serious musical composition.

The purpose of the present volume is to provide material which may assist the saxophonist in developing flexibility with some of the non-traditional techniques often required in the performance of contemporary music. The exercises and etudes contained here deal principally with three techniques which generally involve unconventional fingerings—variation of timbre, quarter-tone production, and the performance of multiple sonorities, or multiphonics. Fingering diagrams are included throughout this study material to guide the saxophonist in his execution of the various sounds as they occur in the notation, as is generally the case with most contemporary music utilizing such techniques. A key to the fingering diagrams, which are designed to be as practical and immediately communicative to the performer as possible, is provided below.

The material in this volume is divided into three basic sections. The first deals with timbre variation, the second with quarter tones, and the third with multiphonics. There is no set, prescribed manner as to how one should proceed through the book; one might work out of all three sections simultaneously, or go from the beginning to the end in order. In the event one would choose to do the latter, the effectiveness of this course might be enhanced by the fact that the first section (timbre variation) contains primarily a technical challenge (i.e., getting used to reading the fingering diagrams at sight), the second (quarter tones) adds more of an aural challenge, and the third (multiphonics) additionally introduces a much greater challenge to the performer's tone-production flexibility.

For the fairly advanced student who possesses good basic playing habits, the material in this volume may be able to serve as appropriate introduction to the unconventional sounds involved. In my own teaching experience, utilizing many of these exercises and etudes in this way, I have even had students utilize some of the etudes as performance material at the studio-recital level, in what has often been a good introductory experience for them in performing with sounds which are generally quite new to them.

There is an important warning which I feel must be rendered to the student saxophonist who may be approaching unconventional techniques such as these, perhaps for the first time. I suggest that material such as this is not something to be dealing with unless there already exists, presumably through more traditional studies and disciplines, a reasonable degree of solidification of basic saxophone tone production and technique. Particularly with regard to the study of multiphonics, these unconventional sounds often involve significant and complex deviations from normal tone-production habits—potentially healthy deviations if built on a well-established, disciplined technique, and potentially unhealthy deviations if added to an unsolidified, inconsistent tone production. The student who is undergoing or has yet to undergo a solidification with basic aspects such as proper breathing and the abdominal support, embouchure, or light staccato tonguing, may be well advised to delay studies in unconventional sounds until a later time.

About the Author

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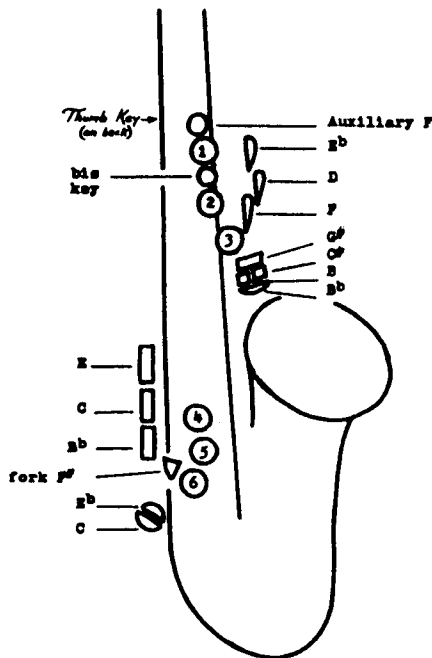
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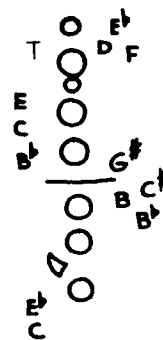
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Guide to Fingering Diagrams

Keys and Open Holes on Instrument



As Diagrammed



- - Open hole or undepressed key.
- - Hole closed or key depressed with an appropriate finger.
- () - Optional for considerations of tuning or timbre.
- N. - Use normal or regular fingering.

A Selected List of Extensions of Technique for Saxophone

- I. Timbre Variation.
 - A. Changing timbre while sustaining or repeating a pitch.
 - B. Changing timbre of successive pitches.
 - C. Timbre trills.
- II. Quarter Tones.
- III. Multiphonics.
 - A. Use of conventional fingerings with distorted tone production.
 - B. Use of special fingerings.
 - 1. Isolated and combined multiphonics.
 - 2. Multiple sonorities linked to single tones.
 - 3. Multiphonic trills.
 - C. Use of the voice.
- IV. Vibrato Manipulation.
 - A. Variation of rate.
 - B. Variation of width.
- V. Glissando. (Rapid chromatic or possibly diatonic movement)
- VI. Portamento. (Sliding movement)
- VII. Variation in Articulation.
 - A. Flutter tonguing.
 - B. Slap tonguing.
 - C. Smorzato. (Attack & decay with embouchure pressure; no tonguing)
 - D. Reverse envelope of attack and decay.
 - E. Glissando attack and release. (Or portamento)
- VIII. Percussive Effects.
 - A. Key clicks.
 - B. Key Pops (Key slaps).
 - C. Hand pops.
- IX. Air Sounds.
- X. Vocal Sounds.
- XI. Mouthpiece Alone.
- XII. Lip Buzz.

An Important Note Concerning the Fingerings in this Book—

All of the fingerings contained in this volume for timbre variation, quarter tones, and multiphonics have been derived and thoroughly tested utilizing the E-flat alto saxophone. This does not preclude the possibility of using other sizes of saxophones, such as soprano or tenor, in these study materials, but in many cases fingering adjustments may be necessary for tuning purposes in the timbre-variation and quarter-tone fingerings; some of the multiphonic fingerings may not respond well at all on saxophones other than the alto. It is also noteworthy that the actual pitch content of the multiphonics will often differ from one performer and/or instrument to another.

Timbre Variation

The issue of timbre, or tone quality, as a parameter which can be predictably manipulated by the performer suggests a wide range of manifestations. The development of a performer's characteristic tone quality is itself, in the final analysis, the development of his ability to achieve and consistently manifest his tonal concepts throughout the pitch and dynamic ranges of the instrument. But, of course, this tone quality is not a single timbre resulting from a fixed pattern of harmonics (overtones) throughout the range of the instrument. The harmonic spectrum, and hence the timbre, changes with every pitch and dynamic nuance which is played. (Other elements which enter into the acoustically complex issue of timbre are formants, phase, noise elements, presence of inharmonic partials, transients, and radiation properties of the instruments. Additionally, there are moment-to-moment changes in the balance of harmonics in a humanly-produced sustained tone.)

For all of the variables involved in the tone-production processes of the individual saxophonist (e.g., embouchure components, tongue positions, air pressure), an effectively consistent tone quality is generally achieved by the more mature player (the frustrations of different reeds, mouthpieces, and even instruments notwithstanding!). However, it would be futile to attempt to define precisely the exact effects of these variables, with their complex interactions, in even one player, not to mention from one player to the next.

The fact emerges that the most effective and most easily standardized method of achieving a variety of tone colors on a particular pitch on the saxophone is to employ several fingering combinations, in addition to the most conventional one, which produce different harmonic spectra from one to the other and hence, varied timbres. Using alternate fingerings is the most predictable method of varying tone color on the saxophone since the different resonances inside the instrument which result are more predictable than the human components which enter into the tone-production process.

The *Etudes on Timbre Variation* which follow exploit some of the possibilities for tone-color variation through the use of various fingering alternatives. Many of the alternate fingerings employed may seem awkward at first, but the performer should experience no difficulty once he is used to adjusting his fingers to the unconventional patterns involved. It will probably be necessary for the saxophonist to focus his eyes more on the fingering diagrams than on the music notation in the course of playing, at least in the early stages.

With regard to changes in embouchure, oral cavity, or air speed components in the course of performing tone-color variations with alternate fingerings, there are at least two circumstances when tone-production adjustments might be appropriate. First, some of the unconventional fingerings will result in minute pitch variations as well as tone-color changes; by careful "favoring," the performer might be able to minimize pitch fluctuation in a succession of timbre changes involving different fingerings. A second and more subtle consideration is that of utilizing one's tone-production flexibility to complement the tendency of a given alternate fingering. For example, a slight amount of supportive tone-production adjustment added to a succession of fingerings on a constant pitch going from "dark" to "bright" can enhance the effect of the overall gesture.

With the possibility of predictable timbre variations through the use of alternate fingerings, the potential also exists for producing trills between two different tone qualities (where the fingerings employed are plausible for rapid alternation). Timbre trills are utilized in the fourth and sixth of the etudes which follow; the graphic undulating line above the staff indicates relative trill speed.

Etudes on Timbre Variation for Saxophone

$\text{♩} = 72-80$

I

The musical score consists of four systems of notation, each featuring a treble clef staff with a key signature of one flat (Bb) and a 4/4 time signature. The tempo is marked as quarter note = 72-80. The dynamics range from *pp* (pianissimo) to *mf* (mezzo-forte). The first system begins with a *pp* dynamic and a crescendo leading to a *mp* dynamic. The second system starts with a *pp* dynamic and a crescendo. The third system starts with a *mf* dynamic and a crescendo. The fourth system starts with a *mf* dynamic and a crescendo. Fingering diagrams are provided for each system, showing fingerings for the right hand (circles) and left hand (squares) for various notes and chords. The diagrams include specific fingerings for notes like Bb, Eb, and chords like T (Tritone).

II

$\text{♩} = 88-96$

Musical staff 1: Treble clef, 4/4 time signature. Notes: E4, Bb4, A4, G4, F4, E4, D4, C4. Dynamics: *mf*. Includes guitar chord diagrams for T and Eb.

Musical staff 2: Treble clef, 4/4 time signature. Notes: Bb4, A4, G4, F4, E4, D4, C4, Bb4, A4, G4, F4, E4, D4, C4. Dynamics: *mf*. Includes guitar chord diagrams for T, Eb, and C#.

Musical staff 3: Treble clef, 4/4 time signature. Notes: Bb4, A4, G4, F4, E4, D4, C4, Bb4, A4, G4, F4, E4, D4, C4. Dynamics: *f*, *mp*. Includes guitar chord diagrams for Eb, C#, and C.

Musical staff 4: Treble clef, 4/4 time signature. Notes: Bb4, A4, G4, F4, E4, D4, C4, Bb4, A4, G4, F4, E4, D4, C4. Dynamics: *pp*, *mf*. Includes guitar chord diagrams for T, Eb, G#, and C.

III

♩ = 60-66

Musical staff with treble clef, key signature of one sharp (F#), and a tempo marking of ♩ = 60-66. The staff contains a melodic line with slurs and accents. The dynamic marking *pp* is present. Below the staff are guitar chord diagrams for the first system, including chords with a trill (T) and natural (N) markings.

Musical staff with treble clef, continuing the melodic line. The dynamic marking *mf* is present. Below the staff are guitar chord diagrams, including a trill (T) and natural (N) marking.

Musical staff with treble clef, continuing the melodic line. The dynamic marking *mp* is present, followed by *pp sempre*. Below the staff are guitar chord diagrams, including a trill (T) and natural (N) marking.

Musical staff with treble clef, concluding the melodic line. The dynamic marking *mf* is present. Below the staff are guitar chord diagrams, including a trill (T) and natural (N) marking.

IV

$\text{♩} = 104-112$

Staff 1: Treble clef, starting with a piano (*p*) dynamic. The melody consists of eighth notes with a trill (*tr*) on the final note. Below the staff are five fretboard diagrams for the guitar, each labeled 'N.' and showing a specific fingering pattern.

Staff 2: Treble clef, starting with a mezzo-forte (*mf*) dynamic. The melody features a trill (*tr*) on the first note and a trill (*tr*) on the final note. Below the staff are three fretboard diagrams, with the second one labeled 'T' and the third one labeled 'tr E'.

Staff 3: Treble clef, starting with a piano (*p*) dynamic and moving to mezzo-piano (*mp*). The melody consists of eighth notes. Below the staff are three fretboard diagrams, each labeled 'N.', with specific notes like C# and Bb indicated.

Staff 4: Treble clef, starting with a mezzo-forte (*mf*) dynamic and moving to mezzo-piano (*mp*). The melody features a trill (*tr*) on the first note and a trill (*tr*) on the final note. Below the staff are four fretboard diagrams, with the second one labeled '(bis)' and the third one labeled 'tr B'.

V

♩ = 69-76

ff T N N N pp

mp *molto* T N T B T N

mf N B C N

mf ff pp T N N N

Musical notation for the first system, featuring a treble clef, a melodic line with a slur, and a fingering diagram below. The fingering diagram shows a vertical column of seven circles with a horizontal line between the second and third circles, and the letter 'N.' to its right. Dynamics include 'f' and 'cresc.'

Musical notation for the second system, featuring a treble clef, a melodic line with various dynamics and a slur, and multiple fingering diagrams below. Dynamics include 'fff', 'molto', 'p', and 'f'. Fingering diagrams include 'TOD', 'N.', 'C', and '(T)'.

Quarter Tones

Without making structural adjustments to the conventional saxophone key mechanism, quarter-tone intervals can be played on the instrument through the use of special fingerings to produce the pitches between the conventional tones of the chromatic scale. However, since the standard key mechanism was not made to produce intervals smaller than a semitone, the production of quarter tones on the saxophone will generally involve using numerous "cross fingerings," some of which can be quite complicated from an acoustical as well as mechanical standpoint. [The term "cross fingering" describes that situation in which there are one or more closed holes below an open hole (which for all practical purposes terminates the tube length) and then additional open holes below that (e.g., low F-sharp on the saxophone, not employing the chromatic, or "fork" fingering.)]

While the entire semitonal chromatic scale can generally be played on the saxophone without the use of any cross fingerings, few quarter tones are available which do not require them. Since cross fingerings affect the resonances in the air column in such a way as to reduce the harmonic content of the pitch being sounded (or otherwise distort the spectrum compared with the non-cross fingerings), wide timbre differences may occur between the quarter-tone fingerings and the conventional fingerings. Generally, the practical result is that the quarter-tone fingerings produce "darker" or "duller" tone qualities. The performer, by means of tone-production adjustments (e.g., embouchure, tongue position), can minimize these tone-color disparities to some extent in the context of a given melodic line. But it should be realized that some timbre deviation in passages involving quarter tones is simply characteristic of the instrument.

Although playing quarter tones should not place many additional technical demands on saxophonists, there are certain aspects which deserve particular attention. The most important consideration is the refinement of the performer's interval discrimination. One must be able to hear and imagine the interval of a quarter tone accurately enough to be able to adjust the tone production for intonation purposes. The quarter-tone fingerings are no different from conventional fingerings in respect to this. The player will have to be prepared to temper pitch frequently. (This may be conceptualized very differently among different players, with the manifestation of these adjustments taking on such descriptions as "lipping," "focusing," "voicing," and so forth.)

The fundamental challenge is that compared with hearing in the traditional semitonal chromatic system, a greater degree of pitch sensitivity will be necessary for accurate quarter-tone playing. An excellent course of practice for the purpose of familiarity is for the performer to play isolated quarter-tone intervals or successions of adjacent quarter tones for a while, subsequently turning to other melodic progressions involving quarter tones.

as the etudes provided in this section. Among other things, the effect of psychological conditioning will soon become apparent. This is perhaps best evidenced when a succession of adjacent quarter tones is played for a few moments followed immediately by the playing of a semitone. The half step will probably seem larger than it ever has at that point!

In order to facilitate this type of activity, the quarter-tone fingering chart which precedes the quarter-tone etudes is provided primarily as a raw material from which the creative saxophonist might fashion his own preliminary exercises. While an activity as basic as simply playing ascending and descending quarter-tone scales can be very profitable, not all such preliminary exercises with the new quarter-tone fingerings necessarily need to involve quarter-tone intervals. It might be quite profitable, from an aural as well as tone-production standpoint, to utilize just the quarter-tone fingerings to play more conventional chromatic or diatonic successions or patterns.

A final note of introduction is given in regard to the accidentals employed in this volume for quarter tones. For the notation of sharps in quarter-tone increments, the conventional sharp symbol (\sharp) is assumed and each vertical line is taken to represent one quarter of a tone. Hence, the quarter sharp is represented by \sharp and the three-quarters sharp is notated as $\sharp\sharp$. This further relates to a conventional, but less-frequently used double sharp, $\sharp\sharp$, which involves four verticals. For the notation of quarter tones in flats, the use of the filled-in, or black flat (\flat) to represent a quarter tone, or half of a semitone (open, or white flat) draws its relationship from the conventional use of a black note head to represent a quarter note and a white note head for a half note. The musician, already conditioned to the idea that the filled-in symbol is half the value of the open one, will have no trouble adjusting to this system. Since the conventional symbol for a double flat is $\flat\flat$, it is logical that the flat symbols for the quarter-tone intervals be \flat , \flat , $\flat\flat$, and $\flat\flat$.

Quarter-Tone Accidentals

Enharmonics

$\frac{1}{4}$ sharp $\frac{3}{4}$ sharp $\frac{1}{4}$ flat $\frac{3}{4}$ flat

Quarter-Tone Fingerings for Saxophone

The first staff shows an ascending quarter-tone scale starting on middle C, with notes marked as $\frac{1}{4}$ sharp, $\frac{3}{4}$ sharp, $\frac{1}{4}$ flat, and $\frac{3}{4}$ flat. Below each note is a vertical column of dots representing fingerings. The second staff shows a descending quarter-tone scale starting on G4, with notes marked as $\frac{1}{4}$ sharp, $\frac{3}{4}$ sharp, $\frac{1}{4}$ flat, and $\frac{3}{4}$ flat. Below each note is a vertical column of dots representing fingerings.

Supplemental Quarter-Tone Fingerings
For Soprano Saxophone

The following fingerings for selected quarter tones may be found to be more feasible for use on most soprano saxophones, compared with their counterparts on the main chart.

Quarter-Tone Etudes for Saxophone

I

$\text{♩} = 84-92$

p

mp *mf*

mp *f*

mp *p*

II

$\text{♩} = 48 (\text{♩} = 96)$

Musical staff 1: Treble clef, 3/2 time signature. Dynamics: *p*. Includes fingering numbers (1, 2, 3, 4) and slurs. Below the staff are two vertical fret diagrams labeled 'T' and two wedge-shaped dynamic markings.

Musical staff 2: Treble clef. Dynamics: *mp*, *pp*. Includes slurs and wedge-shaped dynamic markings. Below the staff are four vertical fret diagrams labeled 'T' and one vertical fret diagram labeled 'C' with 'E^b' below it.

Musical staff 3: Treble clef. Dynamics: *p*, *mp*. Includes slurs and wedge-shaped dynamic markings. Below the staff are two vertical fret diagrams labeled 'T' and two vertical fret diagrams labeled 'T'.

Musical staff 4: Treble clef. Dynamics: *mf*, *pp*. Includes slurs and wedge-shaped dynamic markings. Below the staff are two vertical fret diagrams labeled 'T' and one vertical fret diagram labeled 'C' with 'E^b' below it.

III

♩ = 100-108

mf

f

mf

mf

p mp mf

IV

$\text{♩} = 72-80$

Musical staff 1: Treble clef, notes E4, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5. Dynamics: *p* (under E4), *mp* (under F#4). Chord diagrams: T C (under E4), T C (under Bb4), T D Eb (under F#4).

Musical staff 2: Treble clef, notes E5, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5. Dynamics: *mf* (under E5), *crepac.* (under F#4), *f* (under E4). Chord diagrams: T (under E5), T Eb (under Bb4), T(♭) D (under F#4), T(♭) D (under E4), T(♭) D (under Bb4), T(♭) D (under F#4).

Musical staff 3: Treble clef, notes E5, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5. Dynamics: *p* (under E5), *f* (under E4). Chord diagrams: T D (under E5), T(♭) D Eb (under Bb4), T(♭) D (under F#4), T(♭) D (under E4), T (under Bb4), T (under F#4).

Musical staff 4: Treble clef, notes E5, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5, F#4, E4, Bb4, F#4, Bb4, E5. Dynamics: *mp* (under E5), *p* (under E4), *pp* (under F#4). Chord diagrams: T D Eb (under E5), T C (under Bb4), T C (under F#4).

V

$\text{♩} = 92-100$

Staff 1: Treble clef, key signature of one flat. Dynamics: *f*. Chord diagrams: T, C, G, G#.

Staff 2: Treble clef, key signature of one flat. Dynamics: *mf*, *p*. Chord diagrams: T, C#m, tr, Cm, C.

Staff 3: Treble clef, key signature of one flat. Dynamics: *f*, *pp*. Chord diagrams: D, G#m, B, C, Cm, C#, Bb, Eb.

Staff 4: Treble clef, key signature of one flat. Dynamics: *f*. Chord diagrams: D, Eb, T, C, G, tr.

VI

$\text{♩} = 112-120$

tr
p *cresc.* *mf*

Diagram 1: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 2: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 3: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 4: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 5: T, 4, 3, 2, 1, 0, 0, 0, 0, 0

mp *mf* *mp*

Diagram 1: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 2: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 3: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 4: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 5: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 6: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 7: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 8: T, 4, 3, 2, 1, 0, 0, 0, 0, 0

f *mf*

Diagram 1: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 2: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 3: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 4: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 5: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 6: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 7: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 8: T, 4, 3, 2, 1, 0, 0, 0, 0, 0

f

Diagram 1: T, 4, 3, 2, 1, 0, 0, 0, 0, 0
Diagram 2: T, 4, 3, 2, 1, 0, 0, 0, 0, 0

The image shows a musical staff in treble clef, 6/4 time signature. The first measure contains a melodic line with a slur and a fermata. The second measure is a whole rest. The third measure contains a trill (tr) with a slur and a fermata. Below the staff, there are five fingering diagrams. The first diagram is labeled 'molto' and shows two fingerings: one with the thumb (T) on the first hole, and another with the thumb on the first hole and the index finger (F) on the second hole. The second diagram is labeled 'p' and shows the thumb on the first hole. The third, fourth, and fifth diagrams show the thumb on the first hole with various combinations of fingers on the second and third holes.

Multiphonics

Among the numerous unconventional sound resources which began to appear in saxophone literature during the second half of the twentieth century, perhaps the most fascinating and acoustically intriguing is the simultaneous production of more than one audible tone. The composite sounds resulting from this sort of production have been referred to as "multiple sonorities," "multiple sounds," or "multiphonics."

Aside from equipment modification, there are two basic ways of achieving multiple sounds with the saxophone. One technique is to combine conventional saxophone tone production with vocal tones produced simultaneously by the performer. The other basic source for the simultaneous production of more than one tone does not lie in introducing another tone generator (*i.e.*, the voice), but in altering the resonance of the air column inside the instrument so that two or more tones are rendered rather than just one.* This can be executed by the performer utilizing a maximum of tone-production distortion (*e.g.*, embouchure, oral cavity, air speed) on fingerings as unlikely as normal, traditional single-tone fingerings, or by utilizing special unconventional fingerings which tend to enhance these more complex resonances, often requiring a minimum of tone-production adjustment. (In general usage, it is this type of sound rather than the simultaneous use of the instrument and the voice which is usually thought of as multiphonic production.)

The text and preliminary exercises which precede the etudes in this section are divided into three areas. The first section deals with the production of multiple sounds through the use of conventional single-tone fingerings with distorted tone production. Although this is generally a more difficult method of multiphonic production compared with utilizing special multiphonic fingerings, it provides very advantageous study material because of the flexibility with tone production which the performer must attain to gain even minimal results. The second section deals with multiple sounds using special fingerings, and the third provides an introduction and study material in singing while playing.

*For some basic introductory acoustical information on multiphonics, see: Ronald L. Caravan, *Extensions of Technique for Clarinet and Saxophone*, Unpublished D.M.A. dissertation, Eastman School of Music of the University of Rochester, 1974, Chapter II, "Acoustical Properties of Multiple Sonorities," pp. 95-120. (Available through University Microfilms, P.O. Box 1307, Ann Arbor, Michigan, 48106, No. 75-578.)

Multiphonics—

I. - Use of Conventional Fingerings with Distorted Tone Production

In producing multiple sounds from conventional single-tone fingerings, probably the most frequently employed as well as most approachable procedure is for the saxophonist to use a fingering for an upper-register (second partial) tone and cause it to produce a fundamental as well as a second-partial tone. Often, one or more higher tones (i.e., higher than the second-register tone associated with the fingering) are also heard as part of the composite sonority. From an acoustical standpoint, what basically happens is that the performer's distorted tone production affects the resonances in the instrument in such a manner that the open register key acts as a tube-length determinant (causing the fundamental-register "undertone") at the same time that it acts as a register vent (causing the upper partial or partials).

In the preliminary exercises which follow, the saxophonist is provided with a framework for practicing the production of fundamental-register tones with the register key depressed as well as the simultaneous production of fundamental and second-partial tones. These exercises can easily be expanded to include other parts of the second-partial register as well as third, fourth, fifth partial fingerings, and so on (altissimo range).

These preliminary exercises constitute the only material in this volume where multiphonics are derived from normal single-tone fingerings; the etudes which complete this section utilize special multiphonic fingerings exclusively.

Preliminary Exercises

1. Fundamental-register tones with octave key depressed.

The first exercise is written on a single treble clef staff in C major, 4/4 time. It consists of two measures of music. The first measure contains a half note G4 (G) and a half note A4 (A), both marked with a piano (*p*) dynamic. The second measure contains a half note B4 (B) and a half note C5 (C), both marked with a pianissimo (*ppp*) dynamic. Below the staff, fingering diagrams are provided for each note. For G, the fingering is 1-2-3-4 (thumb, index, middle, ring). For A, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). For B, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). For C, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). The diagrams for B and C include a 'T' above the notes, indicating the octave key is depressed. A note 'N.' is placed above the first two notes, indicating normal fingering. A note 'G#' is placed above the final note of the second measure, indicating a fingering for the second partial of C. The text "(Continue with these fingerings)" is written to the right of the diagrams.

The second exercise is written on a single treble clef staff in C major, 4/4 time. It consists of two measures of music. The first measure contains a half note G4 (G) and a half note A4 (A), both marked with a mezzo-forte (*mf*) dynamic. The second measure contains a half note B4 (B) and a half note C5 (C), both marked with a pianissimo (*pppp*) dynamic. The third measure contains a half note D5 (D) and a half note E5 (E), both marked with a simile (*simile*) dynamic. Below the staff, fingering diagrams are provided for each note. For G, the fingering is 1-2-3-4 (thumb, index, middle, ring). For A, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). For B, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). For C, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). For D, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). For E, it is 1-2-3-4-5 (thumb, index, middle, ring, pinky). The diagrams for B, C, D, and E include a 'T' above the notes, indicating the octave key is depressed. A note 'N.' is placed above the first two notes of the first measure and the first two notes of the second measure, indicating normal fingering. A note 'G#' is placed above the final note of the second measure, indicating a fingering for the second partial of C.

[N - Use normal or regular fingering]

2. Slurring from fundamental to second register with octave key depressed.

Musical notation for exercise 2, first staff. It shows a treble clef with a key signature of one sharp (F#) and a 4/4 time signature. The melody consists of four slurred pairs of notes, each pair spanning an octave. The notes are: G4 (quarter), G5 (quarter); A4 (quarter), A5 (quarter); B4 (quarter), B5 (quarter); and C5 (quarter), C6 (quarter). The first pair has a handwritten '(h)' above the G5 note. The second pair has a handwritten '#' above the A5 note. The third pair has a handwritten '(h)' above the B5 note. The fourth pair has a handwritten '#' above the C6 note. Dynamics markings are *p*, *pppp*, *p*, and *simile*.

Fingering diagrams for exercise 2, first staff. Each diagram shows a vertical column of five circles representing the five fingers. A horizontal dashed line is drawn between the second and third circles. Above the top circle is a 'T' (thumb). The diagrams show the following fingerings: 1. *p*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 2. *pppp*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 3. *p*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 4. *simile*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 5. *N.*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 6. *N.*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth, with a G# symbol next to the fifth circle.

Musical notation for exercise 2, second staff. It shows a treble clef with a key signature of one sharp (F#) and a 4/4 time signature. The melody consists of four slurred pairs of notes, each pair spanning an octave. The notes are: D4 (quarter), D5 (quarter); E4 (quarter), E5 (quarter); F#4 (quarter), F#5 (quarter); and G4 (quarter), G5 (quarter). The first pair has a handwritten '#' above the D5 note. The second pair has a handwritten '#' above the E5 note. The third pair has a handwritten '#' above the F#5 note. The fourth pair has a handwritten '#' above the G5 note.

Fingering diagrams for exercise 2, second staff. Each diagram shows a vertical column of five circles representing the five fingers. A horizontal dashed line is drawn between the second and third circles. Above the top circle is a 'T' (thumb). The diagrams show the following fingerings: 1. *T*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 2. *T*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 3. *T*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 4. *T*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth, with a G# symbol next to the fifth circle.

3. Slurring from second to fundamental register with octave key depressed.

Musical notation for exercise 3, first staff. It shows a treble clef with a key signature of one sharp (F#) and a 4/4 time signature. The melody consists of four slurred pairs of notes, each pair spanning an octave. The notes are: G5 (quarter), G4 (quarter); A5 (quarter), A4 (quarter); B5 (quarter), B4 (quarter); and C6 (quarter), C5 (quarter). The first pair has a handwritten '#' above the G5 note. The second pair has a handwritten '#' above the A5 note. The third pair has a handwritten '#' above the B5 note. The fourth pair has a handwritten '#' above the C6 note. Dynamics markings are *p*, *pppp*, and *simile*.

Fingering diagrams for exercise 3, first staff. Each diagram shows a vertical column of five circles representing the five fingers. A horizontal dashed line is drawn between the second and third circles. Above the top circle is a 'T' (thumb). The diagrams show the following fingerings: 1. *p*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 2. *pppp*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 3. *simile*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth. 4. *T*: T on top, 2 on second, 3 on third, 4 on fourth, 5 on fifth, with a G# symbol next to the fifth circle.

Musical notation for exercise 3, second staff. It shows a treble clef with a key signature of one sharp (F#) and a 4/4 time signature. The melody consists of four slurred pairs of notes, each pair spanning an octave. The notes are: D5 (quarter), D4 (quarter); E5 (quarter), E4 (quarter); F#5 (quarter), F#4 (quarter); and G5 (quarter), G4 (quarter). The first pair has a handwritten '#' above the D5 note. The second pair has a handwritten '#' above the E5 note. The third pair has a handwritten '#' above the F#5 note. The fourth pair has a handwritten '#' above the G5 note.

(Continue with these fingerings)

4. Introduction of fundamental and second register tones simultaneously.

A musical staff in treble clef with a key signature of one sharp (F#). The staff contains four measures of music. The first measure starts with a *ppp* dynamic, followed by a *mf* dynamic. The second measure is marked *simile*. The notes are: Measure 1: F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter); Measure 2: A4 (quarter), B4 (quarter), C5 (quarter), D5 (quarter); Measure 3: B4 (quarter), C5 (quarter), D5 (quarter), E5 (quarter); Measure 4: C5 (quarter), D5 (quarter), E5 (quarter), F#5 (quarter). Each note has a slur above it.

Four fingering diagrams, each labeled 'T' at the top. Each diagram shows a vertical line of five circles representing the five fingers. The first three diagrams show the top circle filled, with the second, third, and fourth circles also filled. The fourth diagram shows the top circle filled, with the second circle filled and labeled 'G#', and the third and fourth circles also filled.

A musical staff in treble clef with a key signature of one sharp (F#). The staff contains four measures of music. The notes are: Measure 1: F#4 (quarter), G4 (quarter), A4 (quarter), B4 (quarter); Measure 2: A4 (quarter), B4 (quarter), C5 (quarter), D5 (quarter); Measure 3: B4 (quarter), C5 (quarter), D5 (quarter), E5 (quarter); Measure 4: C5 (quarter), D5 (quarter), E5 (quarter), F#5 (quarter). Each note has a slur above it.

----- (Continue with these fingerings)

Multiphonics—

II. - Use of Special Fingerings

Generally, the most easily produced, most dependable, and most manageable multiphonics for saxophone are those which are produced by means of unconventional fingering configurations which seem to encourage the peculiar balance of resonances in the air column which result in more than one audible tone. Multiphonics produced with special fingerings usually require less deviation from normal playing technique, depending on how efficiently the fingering patterns affect the air column.

However, for saxophonists inexperienced at producing multiple sounds, utilizing a specific multiphonic fingering may not necessarily lead to immediate success. As in the production of single tones, while a particular fingering may enhance the possibility that a specific sound will result, this in and of itself is not totally adequate for the production of that exact sound. The performer must be able to affect the result by manipulating the air stream in various ways just before it enters the instrument. For multiphonic production, some degree of adjustment in tongue position, embouchure, and/or air speed will probably be necessary, and the extent and nature of these adjustments is likely to vary substantially among different multiphonic fingerings.

In approaching the production of multiphonics (as well as numerous other unconventional techniques), it is important that the performer possess an adequate flexibility with the tone-production processes. He must gain the capacity to substantially manipulate the embouchure, tongue position, and air speed.

Often, it is the aspect of oral-cavity manipulation (*i.e.*, tongue position) which the saxophonist has experienced the least. Among various activities one might use in working toward greater flexibility with tongue position, a valuable procedure can be the practicing of harmonic, or overtone exercises. Typically, this involves sounding a tone in the lowest, or fundamental register and then, with no change in fingering, sounding as many of the overtones as can be achieved. On saxophone, a good starting point is probably the lowest B-flat. A second-partial B-flat, third-partial F, and perhaps fourth-partial B-flat would be the overtones to aim toward producing initially. (The third-partial F will probably be attained most easily.)* Use a breath attack rather than attempting to tongue or slur from the fundamental register.

If one experiences initial difficulty producing the overtones after the fundamental, perhaps a productive approach would be to play the third-partial tone with the normal fingering, then release the register key and sustain a decrescendo. When this can be executed successfully without having the tone change partials at some point in the long decrescendo, the necessary tongue position has probably been achieved and a widened flexibility has already begun.

Another activity which can be very profitable for achieving and exercising a greater tongue-position flexibility is that of tone bending. This involves sustaining a tone and then, with no change of fingering, bending it down in pitch as far as possible. For the saxophonist, it is probably best to use tones around C just above the staff or higher. A related activity aimed toward helping to develop the same flexibility would be to use the mouthpiece alone (or possibly the mouthpiece and barrel alone) and practice producing a portamento or even a scale.

In approaching flexibility activities such as these, it is important to realize that the key factor is oral-cavity manipulation as determined by varying the tongue position. Slight embouchure variations will doubtlessly enter into procedures such as these, but there should be little if any conscious emphasis of this. It is the flow of the air stream which must be affected, and this is done mainly in the oral cavity.

In addressing the issue of multiphonic production, as well as that of undertaking such activities as overtone exercises, perhaps the most important consideration of all is that of developing the aural flexibility. As important as the physical flexibilities may be, the performer who does not possess a clear aural concept of the sound which he seeks to produce has a much lower potential for success in his endeavors. He must be able to imagine the sound—visualize it—actually hear it in his mind before attempting to produce it. While success with multiphonics will in great part depend on how flexible the performer can be in his approach to blowing the instrument, this finely sensitized tone production presupposes the existence of a clear mental image of what is to be played in advance of the actual execution. This factor of aural imagery cannot be overemphasized.

*For a comprehensive approach to overtone exercises, see Sigurd M. Rascher, *Top Tones for the Saxophone*, Carl Fischer Inc.

Use of Special Multiphonic Fingerings - Preliminary Exercises

1. Approaching multiphonics from second-register tones.

The first exercise consists of two staves of music in 6/8 time. The first staff contains three measures of music, each with a multiphonic chord indicated by a slur and a handwritten fingering. The second staff contains three measures of music, also with multiphonic chords and handwritten fingerings. Below each staff are three diagrams illustrating the fingerings. Each diagram shows two vertical columns of five dots representing strings. The left column is labeled 'T' (Tone) and the right column is labeled 'N.' (Normal fingering). A dashed line connects the two columns. The diagrams show how the 'T' column is shifted relative to the 'N.' column to create multiphonic effects.

2. Approaching multiphonics from fundamental-register tones.

The second exercise consists of a single staff of music in 6/8 time, containing six measures of music. Each measure features a multiphonic chord with a slur and a handwritten fingering. Below the staff are six diagrams illustrating the fingerings. Each diagram shows two vertical columns of five dots representing strings. The left column is labeled 'N.' (Normal fingering) and the right column is labeled 'T' (Tone). A dashed line connects the two columns. The diagrams show how the 'T' column is shifted relative to the 'N.' column to create multiphonic effects.

[N - Use normal or regular fingering]

b)

Handwritten musical notation for guitar, including a treble clef, a 4/2 time signature, and a sequence of chords with fingerings. The notation is divided into two systems, each with a treble clef and a 4/2 time signature. The first system contains 10 chords, and the second system contains 10 chords. Each chord is accompanied by a diagram showing the fretting hand positions on the strings.

Chord diagrams for system b):

- Chord 1: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 2: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 3: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 4: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 5: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 6: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 7: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 8: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 9: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 10: Fret 2, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.

c)

Handwritten musical notation for guitar, including a treble clef, a 4/2 time signature, and a sequence of chords with fingerings. The notation is divided into two systems, each with a treble clef and a 4/2 time signature. The first system contains 6 chords, and the second system contains 4 chords. Each chord is accompanied by a diagram showing the fretting hand positions on the strings.

Chord diagrams for system c):

- Chord 1: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 2: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 3: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 4: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 5: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 6: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 7: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 8: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 9: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.
- Chord 10: Fret 1, strings 2, 3, 4, 5, 6. Fingering: 1, 2, 3, 4, 5.

Preliminary Exercises in Linking Multiphonics and Single Tones

1. Linking multiphonics and single tones with no fingering change.

a)

The exercise is written in 4/2 time. The first staff shows a melodic line with multiphonics and single tones. The second staff shows a diagram with a dashed line and notes B^b and C. The third staff shows a similar diagram with notes C and B^b. The fourth staff shows a melodic line with multiphonics and single tones. The fifth staff shows a diagram with a dashed line and notes C and E^b. The sixth staff shows a similar diagram with notes E^b and C.

b)

Musical staff with notes and chords. Chords are labeled with 'b' and 'D'. Below the staff are two vertical chord diagrams with dashed lines connecting them to the notes above.

Musical staff with notes and chords. Chords are labeled with 'b', 'D', and '#'. Below the staff are three vertical chord diagrams with dashed lines connecting them to the notes above.

Musical staff with notes and chords. Chords are labeled with 'D', 'b', and 'E'. Below the staff are three vertical chord diagrams with dashed lines connecting them to the notes above.

2. Linking multiphonics and single tones with fingering change.

a)

Musical staff for exercise a) in 4/2 time. It contains four measures of music. Each measure has a single note with a multiphonic effect indicated by a vertical line through the note. Handwritten annotations above the notes show fingering changes: $\begin{matrix} b \\ a \end{matrix}$ for the first measure, $\begin{matrix} a \\ b \end{matrix}$ for the second, $\begin{matrix} \# \\ a \end{matrix}$ for the third, and $\begin{matrix} b \\ a \end{matrix}$ for the fourth. Arched lines connect the notes across measures, and arrows indicate the direction of the multiphonic effect.

Fingering diagrams for exercise a). Each diagram shows a vertical line representing a string with five dots representing finger positions. The diagrams are labeled with 'N' and finger numbers: 1, 2, 3, 4, and 5. The diagrams show the specific fingerings for each note in the exercise.

Musical staff for exercise a) showing notes with multiphonics and fingering changes. This staff continues the exercise with four more measures, each featuring a note with a multiphonic effect and handwritten fingering annotations.

Fingering diagrams for exercise a). This set of diagrams shows the fingerings for the second four measures of exercise a), with labels 'N' and finger numbers 1, 2, 3, 4, and 5.

b)

Musical staff for exercise b) in 4/2 time. It contains four measures of music. Each measure has a single note with a multiphonic effect indicated by a vertical line through the note. Handwritten annotations above the notes show fingering changes: $\begin{matrix} b \\ a \end{matrix}$ for the first measure, $\begin{matrix} a \\ b \end{matrix}$ for the second, $\begin{matrix} \# \\ a \end{matrix}$ for the third, and $\begin{matrix} a \\ b \end{matrix}$ for the fourth. Arched lines connect the notes across measures, and arrows indicate the direction of the multiphonic effect.

Fingering diagrams for exercise b). Each diagram shows a vertical line representing a string with five dots representing finger positions. The diagrams are labeled with 'N' and finger numbers: 1, 2, 3, 4, and 5. The diagrams show the specific fingerings for each note in the exercise.

Musical staff for exercise b) showing notes with multiphonics and fingering changes. This staff continues the exercise with four more measures, each featuring a note with a multiphonic effect and handwritten fingering annotations.

Fingering diagrams for exercise b). This set of diagrams shows the fingerings for the second four measures of exercise b), with labels 'N' and finger numbers 1, 2, 3, 4, and 5.

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Multiphonics—

III. - Singing while Playing

By producing tones with the voice in combination with normal playing on the saxophone, harmonic intervals as well as simultaneous melodic lines can be performed. Singing while playing has been utilized extensively over the years by woodwind performers in the jazz idiom where a "growling tone," or "buzz tone" is often produced by singing an unspecified pitch while performing a melodic line on the instrument. Composers of music other than jazz have made use of this type of sound in the recent past, and occasionally the performer is even called upon to coordinate the production of tones of the instrument with specific tones produced by the voice.

The simultaneous production of tones in this manner is often difficult for the saxophonist who has done little or no experimenting with this technique. Typically, the most difficult hurdle is getting used to the feel of singing and blowing into the instrument at the same time. (The demand on the air stream is substantial, and correct breathing habits are essential.)*

The exercises which follow are intended to assist the saxophonist's earliest efforts in attempting to coordinate the voice and playing the instrument. Even prior to attempting these examples, the saxophonist might find it beneficial to improvise some vocal-coordination exercises such as producing isolated harmonic intervals, a succession of harmonic intervals where the voice holds a pedal tone against moving saxophone tones, or perhaps vocal manipulations (including portamento) while the saxophone holds a constant pedal. To expand material for practice beyond the exercises provided here, the saxophonist could vary these examples in different ways (e.g., transposition) or create similar ones of his own.

Once the performer has achieved some initial success in coordinating the voice with his instrumental production, attention should be directed toward careful balancing of the two sources. In performing two melodies simultaneously in this manner, the most common difficulty is keeping the sung part loud enough and/or the played part soft enough to assure appropriate balance. Regarding the balancing of two parts, it might be advisable for the saxophonist to employ the aid of a tape recorder in practicing. Since he hears in part through bone conduction while he is playing, listening to a playback of himself might be most revealing.

Concerning the notation of the preliminary exercises as well as the "duet" sections in the etude section, all of the pitches, whether intended for the instrument or the voice, are transposed and written in the treble clef. Because of individual differences in vocal range and tessitura, it may be necessary or simply beneficial for the saxophonist to transpose the exercises and etudes entirely in order to accommodate his or her particular voice. (Use of different sizes of saxophones is another way of effecting upward or downward transposition.)

*Probably the larger sized saxophone used, the more difficult this technique will be due to the greater volume of air required.

Use of the Voice while Playing - Preliminary Exercises

1. Matching Pitches.

Play Upper
Sing Lower

The first staff of exercise 1 shows a melody on the upper line and a bass line on the lower line. The second and third staves continue the exercise with similar melodic and bass line patterns. The exercise is designed for a student to play the upper part and sing the lower part to match pitches.

2. Scale with Pedal (slowly, tune each interval).

Alternate Parts

The exercise consists of a scale on the upper line and a pedal point on the lower line. The exercise is designed for a student to alternate between playing the upper part and singing the lower part to tune each interval.

3. Scale in Parallel Thirds.

Alternate Parts

The exercise consists of a scale on the upper line and a scale on the lower line, with the two scales in parallel thirds. The exercise is designed for a student to alternate between playing the upper part and singing the lower part to tune each interval.

4. Scale in Thirds, Canonic Treatment.

Alternate Parts

5. Suspension Chain.

Alternate Parts

6. Retardation Chain.

Alternate Parts

7. Expanding Intervals

Alternate Parts

8. Contracting Intervals

Alternate Parts

Musical notation for exercise 8, showing two staves. The top staff is in treble clef with a common time signature. It contains a melodic line with a slur over the first six notes and a fermata over the last two. The bottom staff is in bass clef with a common time signature, containing a bass line with a slur over the first six notes and a fermata over the last two. The notes in both staves are connected by curved lines, indicating contracting intervals.

9. More Melodic Leaps.

Alternate Parts

Musical notation for exercise 9, showing two staves. The top staff is in treble clef with a common time signature. It contains a melodic line with a slur over the first four notes and a fermata over the last two. The bottom staff is in bass clef with a common time signature, containing a bass line with a slur over the first four notes and a fermata over the last two. The notes in both staves are connected by curved lines, indicating melodic leaps.

10. Atonal Melody with Vocal Accompaniment.

Play Upper
Sing Lower

Musical notation for exercise 10, showing two staves. The top staff is in treble clef with a common time signature. It contains a melodic line with a slur over the first four notes and a fermata over the last two. The bottom staff is in bass clef with a common time signature, containing a bass line with a slur over the first four notes and a fermata over the last two. The notes in both staves are connected by curved lines, indicating atonal melody with vocal accompaniment.

Multiphonic Etudes for Saxophone

I

♩ = 72-80

First musical staff with dynamics *f* and *mp*. Includes fingering diagrams for two saxophones (T and C) with fingerings 1-2-3-4-5 and 1-2-3-4-5.

Second musical staff with dynamics *mf* and *f*. Includes fingering diagrams for two saxophones (T and C) with fingerings 1-2-3-4-5 and 1-2-3-4-5.

Third musical staff with dynamics *p*, *cresc.*, and *mf*. Includes fingering diagrams for two saxophones (T and C) with fingerings 1-2-3-4-5 and 1-2-3-4-5.

Play

Sing *ppp*

continue hum

accel.

fff

Slightly Slower

pp

p

II

$\text{♩} = 88-96$
Play
p *mp*
Sing

The first system of music consists of two staves. The upper staff is labeled 'Play' and contains a melodic line with a dynamic marking of *p* (piano) at the beginning and *mp* (mezzo-piano) later. The lower staff is labeled 'Sing' and contains a vocal line. Both staves have a tempo marking of $\text{♩} = 88-96$ at the start. The music is written in treble clef with a key signature of one sharp (F#).

The second system continues the musical piece. It features two staves with piano and vocal lines. The piano line includes several slurs and dynamic markings. The vocal line continues with a melodic line. The key signature remains one sharp (F#).

The third system concludes the musical piece. It features two staves with piano and vocal lines. The piano line includes a dynamic marking of *mp* and a large slur. The vocal line continues with a melodic line. The key signature remains one sharp (F#).

III

♩ = 72-80

Sing

Play

pp

p

p

mp

mf

p

p

IV

♩ = 92-100

Musical staff 1: Treble clef, 4/4 time. The first measure has a dynamic marking of *mp*. The second measure has a dynamic marking of *mp*. The third measure has a dynamic marking of *mf*. Fingerings are indicated by numbers 1-4. A slur covers the first two measures, and another slur covers the last two measures. A fermata is placed over the final note.

Musical staff 2: Treble clef, 4/4 time. The first measure has a dynamic marking of *pp*. The second measure has a dynamic marking of *p*. The third measure has a dynamic marking of *ppp*. Fingerings are indicated by numbers 1-4. A slur covers the first two measures, and another slur covers the last two measures. A fermata is placed over the final note. A note is marked with a '2'.

open with tip of R.H. thumb

Musical staff 3: Treble clef, 4/4 time. The first measure has a dynamic marking of *f*. The second measure has a dynamic marking of *f*. Fingerings are indicated by numbers 1-4. A slur covers the first two measures, and another slur covers the last two measures. A fermata is placed over the final note.

Musical staff 4: Treble clef, 4/4 time. Fingerings are indicated by numbers 1-4. A slur covers the first two measures, and another slur covers the last two measures. A fermata is placed over the final note.

The image shows a musical score for a single staff. The staff begins with a treble clef and a common time signature (C). The melody consists of several notes, some of which are beamed together. There are three distinct chord diagrams positioned below the staff, each connected to a specific point in the melody by a vertical line and a large, stylized 'V' shape. The first chord diagram shows a sequence of notes with a 'B' below the second note. The second and third diagrams show similar sequences of notes. The third diagram includes a dashed horizontal line extending to the right.

V

♩ = 92-100

sempre *p*

Chord diagrams for the first system:
1. Bass clef, notes: C, E^b, G, A, C.
2. Bass clef, notes: C, E^b, G, A, C.
3. Bass clef, notes: C, E, G, A, C.
4. Bass clef, notes: C, E, G, A, C.

mf

Chord diagram for the second system:
1. Bass clef, notes: C, E, G, A, C.

ff *pp* *f*

Chord diagrams for the third system:
1. Bass clef, notes: C, E^b, G, A, C.
2. Bass clef, notes: C, E^b, G, A, C.
3. Bass clef, notes: C, E, G, A, C.
4. Bass clef, notes: C, E, G, A, C.

ff *mf* short

Chord diagrams for the fourth system:
1. Bass clef, notes: C, E^b, G, A, C.
2. Bass clef, notes: C, E, G, A, C.

Musical notation on a staff. The first measure is marked *sempre p*. The second measure is marked *P*. The notation includes notes with accidentals (sharps and flats) and slurs.

Fingering diagram for the first measure. It shows a vertical line with five dots representing strings. The bottom dot is labeled 'C'. A dashed line connects this to a second vertical line with five dots, where the second dot from the bottom is labeled 'B^b'.

Fingering diagram for the second measure. It shows a vertical line with five dots representing strings. The bottom dot is labeled 'C'. A dashed line connects this to a second vertical line with five dots, where the second dot from the bottom is labeled 'B^b'. The diagram is flanked by 'N.' on both sides.

VI

♩ = 116-126

Musical staff 1: Treble clef, 4/4 time signature. Notes: G4 (sfz), A4 (sfz), B4 (mp), C5 (mp), D5 (mp), E5 (mp), F5 (mp), G5 (mp), A5 (mp), B5 (mp), C6 (mp). Dynamics: sfz, sfz, mp. Performance markings: accents, slurs, hairpins.

Fingering diagram 1: Vertical sequence of notes with fingerings. Notes: G4 (1), A4 (2), B4 (3), C5 (4), D5 (1), E5 (2), F5 (3), G5 (4), A5 (1), B5 (2), C6 (3). Fingerings: 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3.

Musical staff 2: Treble clef, 4/4 time signature. Notes: G4 (mp), A4 (mp), B4 (mp), C5 (mp), D5 (mp), E5 (mp), F5 (mp), G5 (mp), A5 (mp), B5 (mp), C6 (mp), D6 (mp), E6 (mp), F6 (mp), G6 (mp), A6 (mp), B6 (mp), C7 (mp). Dynamics: mp, f, mf. Performance markings: accents, slurs, hairpins.

Fingering diagram 2: Vertical sequence of notes with fingerings. Notes: G4 (1), A4 (2), B4 (3), C5 (4), D5 (1), E5 (2), F5 (3), G5 (4), A5 (1), B5 (2), C6 (3), D6 (4), E6 (1), F6 (2), G6 (3), A6 (4), B6 (1), C7 (2). Fingerings: 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2.

Musical staff 3: Treble clef, 4/4 time signature. Notes: G4 (tr.), A4 (tr.), B4 (tr.), C5 (tr.), D5 (tr.), E5 (tr), F5 (tr), G5 (tr), A5 (tr), B5 (tr), C6 (tr), D6 (tr), E6 (tr), F6 (tr), G6 (tr), A6 (tr), B6 (tr), C7 (tr). Dynamics: f, mp. Performance markings: trills, accents, slurs, hairpins.

Fingering diagram 3: Vertical sequence of notes with fingerings. Notes: G4 (1), A4 (2), B4 (3), C5 (4), D5 (1), E5 (2), F5 (3), G5 (4), A5 (1), B5 (2), C6 (3), D6 (4), E6 (1), F6 (2), G6 (3), A6 (4), B6 (1), C7 (2). Fingerings: 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2.

Musical staff 4: Treble clef, 4/4 time signature. Notes: G4 (mp), A4 (mp), B4 (mp), C5 (mp), D5 (mp), E5 (mp), F5 (mp), G5 (mp), A5 (mp), B5 (mp), C6 (mp), D6 (mp), E6 (mp), F6 (mp), G6 (mp), A6 (mp), B6 (mp), C7 (mp). Dynamics: mp, mf. Performance markings: accents, slurs, hairpins.

Fingering diagram 4: Vertical sequence of notes with fingerings. Notes: G4 (1), A4 (2), B4 (3), C5 (4), D5 (1), E5 (2), F5 (3), G5 (4), A5 (1), B5 (2), C6 (3), D6 (4), E6 (1), F6 (2), G6 (3), A6 (4), B6 (1), C7 (2). Fingerings: 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2, 3, 4, 1, 2.