



POLYRHYTHMS

THE MUSICIAN'S GUIDE



BY

PETER

MAGADINI



EDITED BY

WANDA

SYKES



HP

Hal Leonard Publishing Corporation

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V

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This publication was originally written in two volumes.
These volumes are now referred to as Part One and Part Two, which begins on page 31.

This book is dedicated to
DON BOTHWELL

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ABOUT THE AUTHOR

Peter Magadini is a professional percussionist, drummer, author and teacher.

Mr. Magadini holds a Bachelor of Music degree from the San Francisco Conservatory of Music and a Master of Music degree from the University of Toronto. In addition, he has studied with the North Indian master, Mahapurush Misra.

ABOUT THE BOOK

This book is a method designed to teach the creative musician and music student the art of playing polyrhythms. Literally, the word "polyrhythm" means "many rhythms." In common use the term means two or more rhythms played simultaneously, or *against* each other. Polyrhythms can also be thought of as two different meters (time signatures) played against (or more accurately, *with*) each other.*

*AUTHOR'S FOOTNOTE:

At the time volumes one and two of the original "Musician's Guide to Polyrhythms" were written, the word "*against*" was used to describe one rhythm simultaneously being played with another. During that period the word was used by musicians to describe very basic polyrhythmic functions (i.e. 3 against 2). However, to be more precise and accurate, the word "*against*" is better defined when thought of as meaning a rhythm that goes "*over*," "*under*" or "*with*" another rhythm which is played at the same time.

PART ONE

PAGE

- 4 Section 1:** 3 against 2 or 6 against 4 (mathematically $1 \frac{1}{2}$ beats against 1).
- A. Polyrhythmic patterns and variants in graduated exercise form.
 - B. Combinations of the variants as short etudes.
 - C. Solos utilizing all the material learned in the section.
- 11 Section 2:** 3 against 4 (mathematically $\frac{3}{4}$ beats to 1).
- A. Polyrhythmic patterns and variants in graduated exercise form.
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- A. Polyrhythmic patterns and variants in graduated exercise form.
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 - C. Solos utilizing all the material learned in the section.
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HOW TO USE THIS BOOK

METER (Beat):

To achieve the best results, the basic beat or meter must be kept absolutely consistent and unwavering. A metronome should be employed at the beginning of each section so the musician can concentrate fully on the counter rhythm. The relationship of the rhythms to each other will soon be heard and felt. The musician will then be able to use his own rhythm "feel" without the aid of the metronome.

COUNTING:

It is important to count each section as indicated. Many exercises will have two meters and, as a result, two counting patterns, occurring simultaneously. Counting as indicated is extremely important to the overall understanding of the exercise.

In order to understand a polyrhythm completely, the musician should try to count one rhythm aloud while playing the other. When the rhythmic relationships are fully understood and felt the process should be reversed, i.e., count the rhythm which was being played and play the other.

EXAMPLE:



LISTENING:

The musician should memorize the sound of the basic counter rhythm against the basic meter as played on the same surface. He should also play on two different surfaces pitched an octave apart.

HOW TO PRACTICE

This book is adaptable for all instruments or none at all, whichever the musician prefers.

WITHOUT AN INSTRUMENT: To establish and understand polyrhythms without using a particular instrument, I suggest the musician clap his hands or use one hand on a flat surface to play the counter rhythm while a metronome maintains the basic pulse. When working without a metronome, use both hands - one for the counter rhythm and the other for the basic pulse. Two different sounding surfaces are suggested if this last method is used. The musician may also clap or sing one rhythm while his foot taps out the second rhythm.

PERCUSSION AND DRUMS: It is suggested that the student begin these studies on the drum pad using alternate sticking while the metronome maintains the basic meter. After the drummer feels secure with a particular section, he should then apply that section to the drum set using his feet, hi-hat and bass drum to keep the basic pulse. The drummer may also create his own combinations around the drums working out solo patterns from the book.

STRING AND WIND INSTRUMENTS: Here the musician should work out scale patterns and melodic ideas to fit the counter rhythms of the exercises in the book. The basic pulse can be maintained with a metronome or even by tapping the foot. The advantage of doing this is that the instrumentalist has a chance to apply and practice melodic ideas at the same time he is learning polyrhythms. Following is an example of how an exercise may be worked out:

EXAMPLE:

The example consists of two musical staves. The top staff is a treble clef staff with a key signature of one sharp (F#). It features a sextuplet of eighth notes, indicated by a bracket with the number '6' above it. The notes are: G4, A4, B4, C5, B4, A4. The bottom staff is a bass clef staff with the same key signature. It features a basic pulse of four quarter notes: G3, F#3, E3, D3. A bracket with the number '6' is placed above the first six notes of the top staff, and a bracket with the number '6' is placed above the first six notes of the bottom staff, indicating that the sextuplet and the basic pulse are to be played simultaneously for six measures.

The top line of 12 notes is played as a sextuplet. The lower line of four notes represents the basic pulse in 4/4 meter. The example above simply applies a chromatic scale to the counter rhythm. The imaginative instrumentalist will soon discover the infinite melodic possibilities inherent in these counter rhythms.

PIANO: The pianist should follow the same general rules as those suggested for winds and strings. After the pianist feels sufficient confidence in his understanding of any rhythmic combination, he can use the right hand to play a melodic line corresponding rhythmically to the counter rhythm. The left hand will then play the basic pulse in either chordal or single line accompaniment. The reverse of this procedure also presents intriguing possibilities for improvisation.

The author's intent in writing this volume is to offer new and fresh ideas to any creative musician. If conscientious effort is applied, these rhythmic concepts cannot help but broaden horizons for the imaginative instrumentalist.

PART TWO

PAGE

- 33 Section 5:** 7 against 4.
- 41 Section 6:** 11 against 4.
- 51 Section 7:** 13 against 4.
- 57 Section 8:** Exercises combining 7, 11, and 13.
- Section 9:** Solo Exercises - 7, 11, and 13.
- 59 Section 10:** Solo Exercises combining 6, 3, and 5
(from Part One) and 7, 11, and 13.
- 64 Section 11:** Polyrhythmic Time Signatures.

***AUTHOR'S FOOTNOTE:**

Volume two, in its original form was dedicated to the memory of John Coltrane and Eric Dolphy. I would like to add the name Bob Yeager, the original publisher of these volumes.

SECTION I

THREE AGAINST ONE

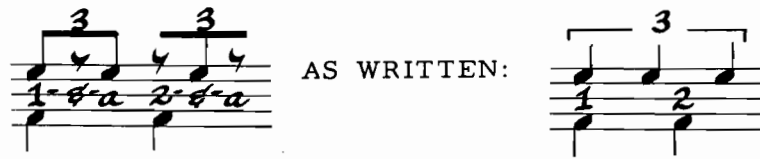
TRIPLETS: *Counter rhythm:* 

Count: 

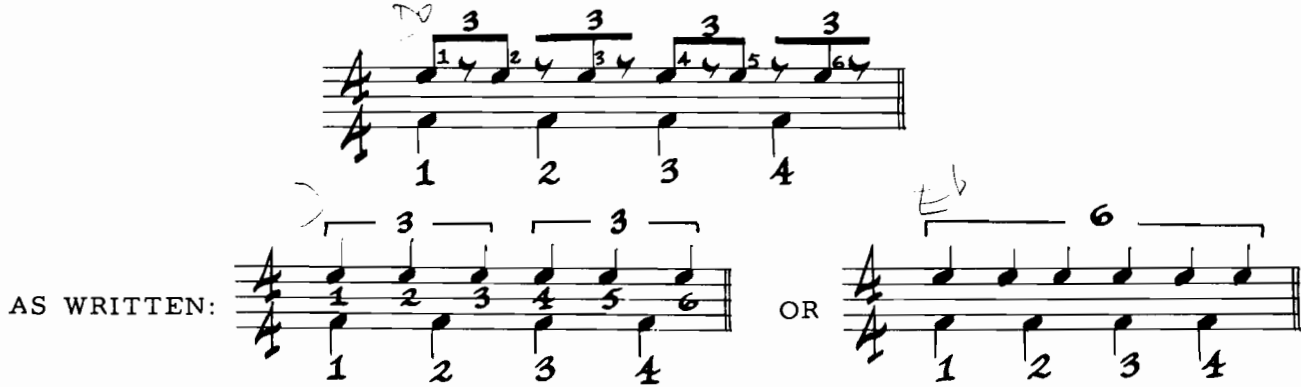
Basic pulse: 

QUARTER NOTE TRIPLETS

THREE AGAINST TWO



THREE AGAINST TWO = SIX AGAINST FOUR



EXERCISES

Vary tempos (slow, medium, fast)

Keep beat steady



EIGHTHS

EIGHTHS ADDED

EXERCISES

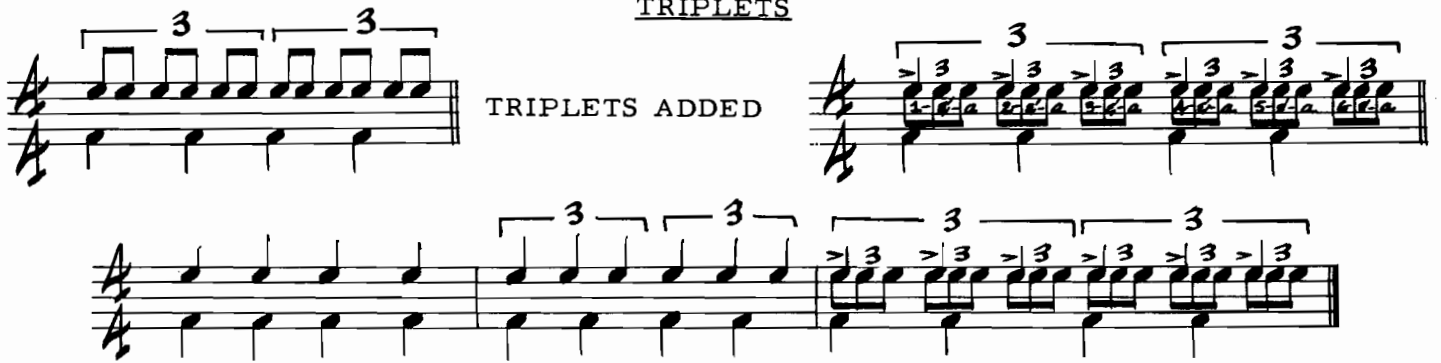
Vary tempos

I

II

TRIPLETS

TRIPLETS ADDED



EXERCISES

Vary Tempos

I



II



SIXTEENTHS

SIXTEENTHS ADDED

EXERCISES

I

II

COMBINATIONS*

I

II

III

IV

*The bar lines have been purposely omitted in some Exercises and Solos so the musician can feel and understand each of these exercises as a continuous phrase.

MIXED COMBINATIONS *

The image displays eight staves of musical notation, numbered 1 through 8. Each staff consists of two staves: a top staff with a treble clef and a bottom staff with a bass clef. The top staff of each exercise contains a melodic line with various rhythmic patterns, including triplets and sixteenth-note runs. The bottom staff of each exercise contains a 'Basic Pulse' line, which is a series of quarter notes. In some exercises, the 'Basic Pulse' line is omitted, leaving only the melodic line. The exercises are arranged in a vertical column, with each exercise starting on a new line of music.

* You will note that the lower line of notes, the "Basic Pulse" has been omitted in some exercises and solos. The omission is intentional. The "Basic Pulse" or "Beat" must be played whether written or omitted.

SOLO

Flowing

The musical score is written on three staves. The first staff begins with a sixteenth-note triplet (labeled '6') followed by another sixteenth-note triplet (labeled '6'), then a sixteenth-note triplet (labeled '3'), and ends with two more sixteenth-note triplets (labeled '3'). The second staff starts with a sixteenth-note triplet (labeled '3'), followed by a sixteenth-note triplet (labeled '3'), then a sixteenth-note triplet (labeled '3'), a sixteenth-note triplet (labeled '3'), a sixteenth-note triplet (labeled '3'), a sixteenth-note triplet (labeled '3'), and ends with a sixteenth-note triplet (labeled '3'). The third staff begins with a sixteenth-note triplet (labeled '3'), followed by a sixteenth-note triplet (labeled '3'), then a sixteenth-note triplet (labeled '3'), a sixteenth-note triplet (labeled '6'), a sixteenth-note triplet (labeled '3'), a sixteenth-note triplet (labeled '3'), a sixteenth-note triplet (labeled '3'), and ends with a sixteenth-note triplet (labeled '3'). The piece concludes with a final note and a double bar line.

SECTION II
THREE AGAINST FOUR

HALF NOTE TRIPLETS

1-4-a 2-4-a 3-4-a 4-4-a

AS WRITTEN

1 2 3 4

1 2 3 4

EXERCISES

I

II

QUARTERS

EXERCISES

IMPORTANT: Do not count 6!
 Count only "1-and-2-and-3-and"
 stressing accents.

EIGHTHS

The 'EIGHTHS' section consists of two systems of musical notation. The first system contains two measures of eighth-note triplets. The first measure has a bracket over three eighth notes with a '3' above it, and a fingering '1-2-3' below. The second measure has a bracket over three eighth notes with a '3' above it, and a fingering '2-3-4' below. The second system also contains two measures of eighth-note triplets with a '3' above each and a fingering '1-2-3' below. To the right of the second system is a section labeled 'WRITTEN' with a single measure of eighth-note triplets, a '3' above, and a fingering '1-2-3' below.

EXERCISES

The 'EXERCISES' section is divided into two parts, I and II. Part I consists of two systems. The first system has two measures of eighth-note triplets with a '3' above and a fingering '1-2-3-4' below. The second system has two measures of eighth-note triplets with a '3' above and a fingering '1-2-3-4' below. Part II consists of four systems. The first system has two measures of eighth-note triplets with a '3' above and a fingering '1-2-3-4' below. The second system has two measures of eighth-note triplets with a '3' above and a fingering '1-2-3-4' below. The third system has two measures of eighth-note triplets with a '3' above and a fingering '1-2-3-4' below. The fourth system has two measures of eighth-note triplets with a '3' above and a fingering '1-2-3-4' below.

SIXTEENTHS

1 2 3 4

EIGHTHS DOUBLED

1 2 3 4

WRITTEN

EXERCISES

Not too fast!

I

EXERCISES (Cont.)

II

TRIPLETS

(Half note triplets divided in quarter note triplets.)

DIVIDE HALF NOTE INTO
QUARTER NOTE TRIPLETS:

NINE AGAINST FOUR

WRITTEN

COMBINATIONS

The 'COMBINATIONS' section consists of three systems of musical notation. The first system has two staves: the upper staff contains quarter notes with triplet markings over groups of three notes, and the lower staff contains a steady eighth-note accompaniment. The second system also has two staves; the upper staff features sixteenth-note triplets with accents, while the lower staff continues with eighth notes. The third system has two staves; the upper staff contains sixteenth-note triplets with accents, and the lower staff continues with eighth notes.

MIXED COMBINATIONS

(Count carefully.)

The 'MIXED COMBINATIONS' section consists of five systems of musical notation. The first system has two staves with quarter notes and triplet markings. The second system has two staves with quarter notes and eighth-note triplets. The third system has two staves with quarter notes and sixteenth-note sextuplets. The fourth system has two staves with sixteenth-note triplets and quarter notes. The fifth system has two staves with quarter notes and sixteenth-note sextuplets.

SHORT COMBINATIONS

The image displays seven rows of musical notation, numbered 1 through 7 on the left. Each row consists of two staves: a treble clef staff on top and a bass clef staff on the bottom. The music is written in a common time signature (C). Each row features a sequence of rhythmic patterns and triplets. The patterns include quarter notes, eighth notes, and sixteenth notes, often grouped together with a '3' above a bracket to indicate a triplet. Some patterns are marked with a slash and a vertical line (|/), indicating a measure boundary. The notation is clean and professional, typical of a music textbook or exercise book.

SOLO

The 'SOLO' section consists of four systems of music. Each system has a piano accompaniment on the bottom staff and a solo line on the top staff. The solo line features a variety of rhythmic patterns: the first system includes a quarter note followed by a triplet of eighth notes, then a triplet of eighth notes with an accent, followed by two more triplets of eighth notes, and finally four groups of sextuplets of eighth notes. The second system continues with a triplet of eighth notes, a triplet of eighth notes with an accent, a triplet of eighth notes, and a triplet of eighth notes followed by a sextuplet of eighth notes. The third system features a triplet of eighth notes, a triplet of eighth notes with an accent, a triplet of eighth notes, and a triplet of eighth notes. The fourth system begins with a triplet of eighth notes and ends with a quarter note and a half note.

VARIED MIXED COMBINATIONS

The 'VARIED MIXED COMBINATIONS' section consists of four systems of music. Each system has a piano accompaniment on the bottom staff and a solo line on the top staff. The solo line features complex rhythmic patterns and fingerings: the first system includes a triplet of eighth notes with fingerings 1-2-3, 1-2-3, and 1-2-3, followed by a triplet of eighth notes with fingerings 1-2-3-4 and 3-4-5. The second system features a triplet of eighth notes with fingerings 1-2-3-4-5-6, a triplet of eighth notes with fingerings 1-2-3-4-5-6, and a triplet of eighth notes with fingerings 1-2-3-4-5-6. The third system features a triplet of eighth notes, a triplet of eighth notes, and a triplet of eighth notes. The fourth system features a triplet of eighth notes, a triplet of eighth notes, and a triplet of eighth notes.

SOLO

Do not count any measures in 6!

The basic Polyrhythm is:

SECTION III
FIVE AGAINST FOUR

AS WRITTEN

The first part shows two alternative rhythmic patterns for the exercise. The first pattern is labeled with fingerings: 1, 2-d, 3+, 4-a, 5. The second pattern is labeled with fingerings: 1, 2-d, 3-d+, 4-d+a, 5. Both patterns are shown on a grand staff with a treble clef and a bass clef. The word "OR" is placed between the two patterns. To the right, the notation is labeled "AS WRITTEN" and shows a grand staff with a treble clef and a bass clef. A bracket labeled "5" spans five notes in the treble clef, and a bracket labeled "4" spans four notes in the bass clef.

It is important to try to learn to count 4 while playing 5. This is difficult.

This part shows a single rhythmic pattern for the exercise. It is written on a grand staff with a treble clef and a bass clef. A bracket labeled "5" spans five notes in the treble clef, and a bracket labeled "4" spans four notes in the bass clef.

EXERCISES

The exercises are arranged in two groups, I and II. Group I contains two exercises. The first exercise in Group I is written on a grand staff with a treble clef and a bass clef. It features a bracket labeled "5" spanning five notes in the treble clef and a bracket labeled "4" spanning four notes in the bass clef. The second exercise in Group I is also written on a grand staff with a treble clef and a bass clef. It features a bracket labeled "5" spanning five notes in the treble clef and a bracket labeled "4" spanning four notes in the bass clef. Group II contains four exercises. The first exercise in Group II is written on a grand staff with a treble clef and a bass clef. It features a bracket labeled "5" spanning five notes in the treble clef and a bracket labeled "4" spanning four notes in the bass clef. The second exercise in Group II is also written on a grand staff with a treble clef and a bass clef. It features a bracket labeled "5" spanning five notes in the treble clef and a bracket labeled "4" spanning four notes in the bass clef. The third exercise in Group II is written on a grand staff with a treble clef and a bass clef. It features a bracket labeled "5" spanning five notes in the treble clef and a bracket labeled "4" spanning four notes in the bass clef. The fourth exercise in Group II is written on a grand staff with a treble clef and a bass clef. It features a bracket labeled "5" spanning five notes in the treble clef and a bracket labeled "4" spanning four notes in the bass clef.

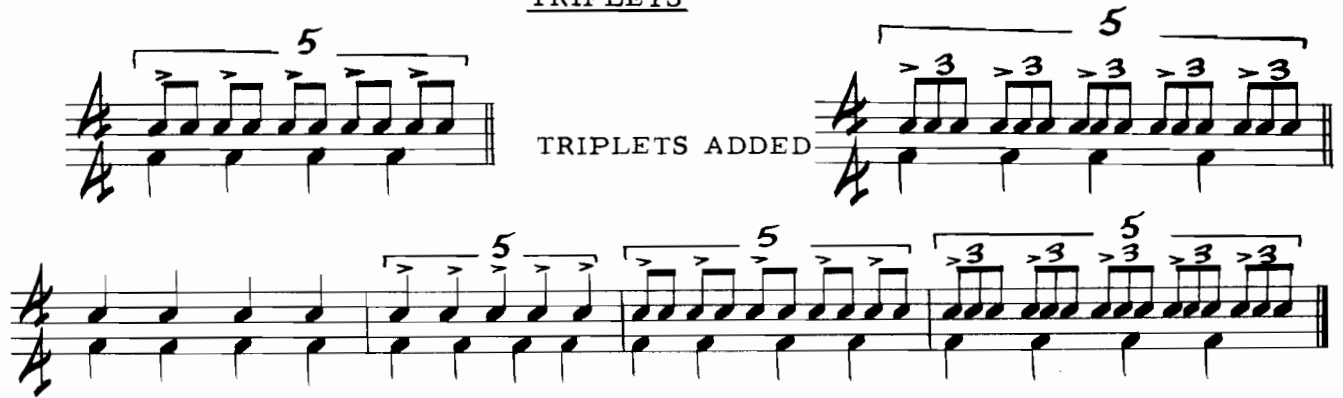
EIGHTHS

Musical notation for two exercises. The first exercise, labeled "EIGHTHS", shows a treble clef with a 5-finger scale and a bass clef with a 4-finger scale, both in eighth notes, with a bracket labeled "5" above the treble staff. The second exercise, labeled "EIGHTHS ADDED", shows a treble clef with a 5-finger scale and a bass clef with a 4-finger scale, with a bracket labeled "5" above the treble staff and five slanted eighth notes (1-♯, 2-♯, 3-♯, 4-♯, 5-♯) above the treble staff.

EXERCISES

Six musical exercises, each consisting of two staves (treble and bass clef). Exercise I features a treble staff with a 5-finger scale and a bass staff with a 4-finger scale, with a bracket labeled "5" above the treble staff. Exercise II features a treble staff with a 5-finger scale and a bass staff with a 4-finger scale, with a bracket labeled "5" above the treble staff. Exercise III features a treble staff with a 5-finger scale and a bass staff with a 4-finger scale, with a bracket labeled "5" above the treble staff. Exercise IV features a treble staff with a 5-finger scale and a bass staff with a 4-finger scale, with a bracket labeled "5" above the treble staff. Exercise V features a treble staff with a 5-finger scale and a bass staff with a 4-finger scale, with a bracket labeled "5" above the treble staff. Exercise VI features a treble staff with a 5-finger scale and a bass staff with a 4-finger scale, with a bracket labeled "5" above the treble staff and four slanted eighth notes (3, 3, 3, 3) above the treble staff.

TRIPLETS



Musical notation for the 'TRIPLETS' section. It consists of two systems of two staves each. The first system shows a single staff with a quintuplet of eighth notes and a second staff with a triplet of eighth notes. The text 'TRIPLETS ADDED' is written between the two systems. The second system shows a single staff with a quintuplet of eighth notes and a second staff with a triplet of eighth notes, with the text 'TRIPLETS ADDED' written above the first staff.

EXERCISES



Musical notation for the 'EXERCISES' section, divided into two parts labeled 'I' and 'II'. Part I consists of two systems of two staves each. The first system has a quintuplet of eighth notes on the top staff and a triplet of eighth notes on the bottom staff. The second system has a triplet of eighth notes on the top staff and a quintuplet of eighth notes on the bottom staff. Part II consists of four systems of two staves each. The first system has a quintuplet of eighth notes on the top staff and a triplet of eighth notes on the bottom staff. The second system has a triplet of eighth notes on the top staff and a quintuplet of eighth notes on the bottom staff. The third system has a quintuplet of eighth notes on the top staff and a triplet of eighth notes on the bottom staff. The fourth system has a triplet of eighth notes on the top staff and a quintuplet of eighth notes on the bottom staff.

SIXTEENTHS

SIXTEENTHS ADDED

EXERCISES

I

II

SHORT COMBINATIONS

Musical notation for 'SHORT COMBINATIONS' in G major, 2/4 time. The piece consists of two systems of two staves each. The first system features a melody with a five-note slur and a five-note triplet. The second system features a melody with four triplets and a five-note slur, with accents over the notes of the final triplet.

MIXED COMBINATIONS

Musical notation for 'MIXED COMBINATIONS' in G major, 2/4 time. The piece is divided into two parts, I and II, each with two systems of two staves. Part I features a melody with five-note slurs and triplets. Part II features a melody with five-note slurs and triplets, with accents over the notes of the final triplet.

MIXED COMBINATIONS (Cont.)

First system of musical notation. The upper staff contains two groups of triplets (marked '3') followed by a quintuplet (marked '5'). The lower staff contains a sequence of quarter notes.

Second system of musical notation. The upper staff contains a quintuplet (marked '5'), followed by two triplets (marked '3'), and another quintuplet (marked '5'). The lower staff contains a sequence of quarter notes.

Third system of musical notation. The upper staff contains a quintuplet (marked '5') with a triplet (marked '3') underneath it, followed by another quintuplet (marked '5') with a triplet (marked '3') underneath it. The lower staff contains a sequence of quarter notes.

Fourth system of musical notation. The upper staff contains a quintuplet (marked '5') with a triplet (marked '3') underneath it, followed by another quintuplet (marked '5'). The lower staff contains a sequence of quarter notes.

Fifth system of musical notation. The upper staff contains three quintuplets (marked '5') separated by rests. The lower staff contains a sequence of quarter notes.

SOLOS

First system of the 'SOLOS' section. The upper staff contains eighth notes with accents (>). The lower staff contains a sequence of quarter notes.

Second system of the 'SOLOS' section. The upper staff contains eighth notes with accents (>), followed by a quintuplet (marked '5'). The lower staff contains a sequence of quarter notes.

Third system of the 'SOLOS' section. The upper staff contains eighth notes with accents (>), followed by a quintuplet (marked '5') and another quintuplet (marked '5') with triplets (marked '3') underneath it. The lower staff contains a sequence of quarter notes.

Fourth system of the 'SOLOS' section. The upper staff contains eighth notes with accents (>), followed by a quintuplet (marked '5'). The lower staff contains a sequence of quarter notes.

Fifth system of the 'SOLOS' section. The upper staff contains eighth notes with accents (>), followed by a quintuplet (marked '5'). The lower staff contains a sequence of quarter notes.

NO BAR LINES

II

5 5 5 5 5 5 5

5 5 3 5 3 3 5

3 3 3 3 3 3 3 3 3 3 3 3 3 3

3 3 3 3 3 3 3 3 3 3 3 3 3 3

5 3 5 5

Practice slowly at first.

III

5 5 5

5 5 5

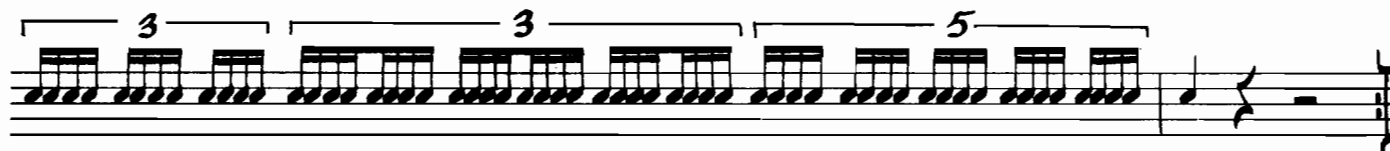
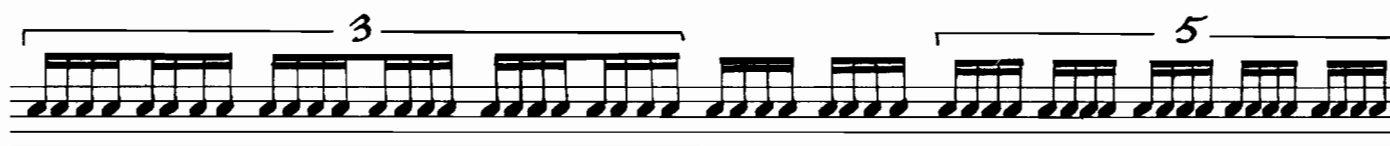
5 5

3 3 3 3 3 3 3 3 5 5 5

SECTION IV - SOLOS

Combines Sections I, II, and III.

Keep Solos flowing.



SOLOS (Cont.)

IV

Staff IV: A musical staff with a treble clef. It contains a sequence of eighth notes. The first two notes are grouped with a bracket and the number '3'. The next two notes are grouped with a bracket and the number '3'. The following two notes are grouped with a bracket and the number '6'. The next two notes are grouped with a bracket and the number '3'. The final two notes are grouped with a bracket and the number '3'. There are also some ungrouped notes between these groups.

Continuation of Staff IV: This staff continues the sequence from the previous one. It features similar groupings of eighth notes with brackets and numbers '3', '6', '3', '3', '5', and '3'. The piece concludes with a double bar line and repeat dots.

V

Staff V: A musical staff with a treble clef. It contains a sequence of eighth notes. The first three notes are grouped with a bracket and the number '3'. The next three notes are grouped with a bracket and the number '3'. The final three notes are grouped with a bracket and the number '3'.

Continuation of Staff V: This staff continues the sequence with eighth notes. It features groupings of six notes with brackets and numbers '6' and '5'. The piece concludes with a double bar line and repeat dots.

VI

Staff VI: A musical staff with a treble clef. It contains a sequence of eighth notes. The first six notes are grouped with a bracket and the number '6'. The next five notes are grouped with a bracket and the number '5'. The final three notes are grouped with a bracket and the number '3'.

Continuation of Staff VI: This staff continues the sequence with eighth notes. It features groupings of three notes with brackets and numbers '3' and '6'. The piece concludes with a double bar line and repeat dots.

Final Staff VI: A musical staff with a treble clef. It contains a sequence of eighth notes. The first five notes are grouped with a bracket and the number '5'. The piece concludes with a double bar line and repeat dots.

SOLOS (Cont.)

VII

Should be memorized.

VIII

MORE ABOUT POLYRHYTHMS

Until recently, polyrhythmic concepts have been considered only incidental to western musical thought. The composers and performers who explored this facet of music to any degree usually gained their recognition through other aspects of their contributions to the art. True rhythmic freedom and polyrhythmic understanding, however, can finally be considered intrinsic elements in the music of our culture. Rhythmic studies are finally conceded to be important in the education of the serious music student.

In the 20th century, expanding awareness of cultures other than our own brought new musical and rhythmic conceptions to our attention. Studies of two widely different - yet curiously similar - musical cultures helped shape and advance the rhythmic sensitivity of the western musician. The first was the series of studies of the native music of Africa. These musical expeditions resulted in many magnificent recordings which were then made available to anyone interested. Westerners had previously thought of the music of Africa as only naive "drumming," nothing more than a primitive accompaniment to tribal ceremonies of a superstitious and unlettered people. A careful ear turned to the new recordings soon proved the fallacy of this attitude. The music, though almost exclusively percussion, revealed itself to be highly sophisticated, enormously complicated, exciting and beautiful.

Naturally there are great regional differences in the music of Africa, but some generalizations can nevertheless be made. Basically, the music is polyrhythmic. One finds every degree of complexity from a simple 6-against-4 Chant to extremely elaborate patterns of polymetric and polyrhythmic relationships between "voices." Frequently, more than two rhythms sound simultaneously creating contrapuntal layers of different meters and cross rhythms. Each layer flows at its own tempo and seems to be quite independent. The complex underlying structural organization is apparent when the layers of rhythm meet precisely and perfectly at predetermined points in the music.

Another equally important influence on western musical and rhythmic thought resulted from studies of the music of East India. The serious, contemporary music of East India derives from 4,000 years of musical tradition. The Master Musician in India dedicates his entire life to his art. This devotion results in a fantastic wealth of formal musical knowledge, a good part of which is the ability to improvise with extraordinary rhythmic and polyrhythmic dexterity and creativity. The music of India is delicate, beautiful, complex, and more demanding on the musician than any in the world.

Both these highly sophisticated forms of musical expression have influenced "Polyrhythms." The intention of this book, however, is to suggest rather than imitate the music of other cultures. The intention is also to present a practical method to extend the musical knowledge and sensitiveness of the contemporary musician by developing polyrhythmic techniques.

SECTION 5

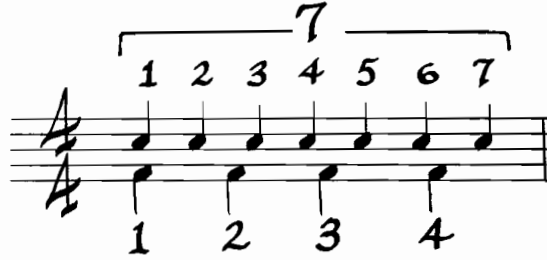
SEVEN AGAINST FOUR

Count: → 1 2-a 3 4-ε 5 6-e-ε 7

Counter rhythm: 

Basic pulse: 

Count: → 1 2 3 4

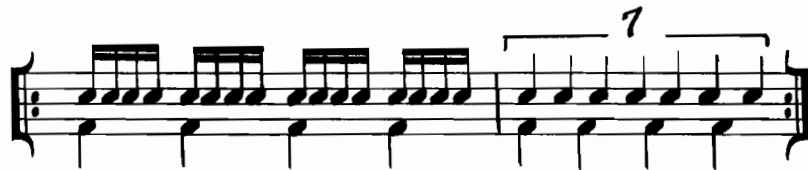
AS WRITTEN: 

IT IS IMPORTANT TO LEARN TO COUNT 4 WHILE PLAYING 7.



EXERCISES



EXERCISES (Cont.)

Four musical exercises in 4/4 time, each consisting of two staves. The first exercise has a 7-measure slur over the first staff. The second exercise has a 7-measure slur over the first staff. The third exercise has a 7-measure slur over the first staff and four groups of three eighth notes (trios) in the second staff. The fourth exercise has a 7-measure slur over the first staff and sixteenth-note runs in the second staff.

EIGHTHS

Two musical exercises in 4/4 time, each consisting of two staves. The first exercise has a 7-measure slur over the first staff. The second exercise has a 7-measure slur over the first staff and a 7-measure slur over the second staff. The text "EIGHTHS ADDED" is written between the two exercises.

EXERCISES

Vary Tempos

I

II

Detailed description of the musical exercises: The page contains two main exercises, I and II, each consisting of four staves of music. Exercise I is written in treble and bass clefs. The first staff starts with a treble clef and a 7-measure slur. The second staff is in bass clef with a 7-measure slur. The third staff is in bass clef, featuring four 3-measure triplets followed by a 7-measure slur. The fourth staff is in bass clef with a 7-measure slur. Exercise II is also in treble and bass clefs. The first staff starts with a treble clef and a 7-measure slur. The second staff is in bass clef with a 7-measure slur and a double bar line with a slash. The third staff is in bass clef with a 7-measure slur, a double bar line with a slash, and four 3-measure triplets. The fourth staff is in bass clef with a 7-measure slur, a double bar line with a slash, and a 7-measure slur.

TRIPLETS

TRIPLETS

ADDED

EXERCISES

I.

EXERCISES (Cont.)

II.

Four systems of musical notation for exercise II. Each system consists of two staves. The first staff of each system contains a sequence of eighth notes with triplets and a group of seven notes. The second staff contains a sequence of quarter notes. The systems are separated by repeat signs.

SIXTEENTHS

Musical notation for 'SIXTEENTHS ADDED' exercise. It shows two systems of two staves each. The first system shows a sequence of eighth notes with a group of seven notes, followed by a sequence of sixteenth notes with a group of seven notes. The second system shows a sequence of eighth notes with a group of seven notes, followed by a sequence of sixteenth notes with a group of seven notes.

EXERCISES

I.

II.

Detailed description of the musical exercises: The page contains two sets of exercises, labeled I and II. Each set consists of four staves of music. Exercise I is in 4/4 time. The first staff is in treble clef with a key signature of one sharp (F#). The second and third staves are in bass clef. The fourth staff is in bass clef with a key signature of one flat (Bb). Each staff in exercise I features a seven-measure phrase indicated by a bracket and the number '7'. The first staff includes four triplets of eighth notes. Exercise II is also in 4/4 time. The first staff is in treble clef with a key signature of one sharp (F#). The second and third staves are in bass clef. The fourth staff is in bass clef with a key signature of one flat (Bb). Each staff in exercise II features a seven-measure phrase indicated by a bracket and the number '7'. The first staff includes four triplets of eighth notes.

COMBINATIONS

I.

Exercise I consists of two systems of music. The first system has a treble staff with a 7/8 note pattern and a bass staff with a 3/8 note pattern. The second system has a treble staff with a 7/8 note pattern and a bass staff with a 3/8 note pattern. The exercise concludes with a final 7/8 note pattern in the treble staff.

II.

Exercise II consists of two systems of music. Both systems feature a treble staff with a 7/8 note pattern and a bass staff with a 3/8 note pattern. The exercise concludes with a final 7/8 note pattern in the treble staff.

III.

Exercise III consists of two systems of music. The first system has a treble staff with a 7/8 note pattern and a bass staff with a 3/8 note pattern. The second system has a treble staff with a 7/8 note pattern and a bass staff with a 3/8 note pattern. The exercise concludes with a final 7/8 note pattern in the treble staff.

IV.

Exercise IV consists of two systems of music. Both systems feature a treble staff with a 7/8 note pattern and a bass staff with a 3/8 note pattern. The exercise concludes with a final 7/8 note pattern in the treble staff.

MIXED COMBINATIONS

The image displays eight numbered musical staves, each containing a sequence of rhythmic exercises. Each staff begins with a treble clef and a key signature of one sharp (F#). The exercises are as follows:

- Staff 1:** A sequence of eighth notes with brackets above indicating groups of 7 notes and 3 notes.
- Staff 2:** Similar to Staff 1, but with a final group of 3 notes.
- Staff 3:** Similar to Staff 1, but with a final group of 3 notes.
- Staff 4:** Similar to Staff 1, but with a final group of 3 notes.
- Staff 5:** Similar to Staff 1, but with a final group of 3 notes.
- Staff 6:** Similar to Staff 1, but with a final group of 3 notes.
- Staff 7:** Similar to Staff 1, but with a final group of 3 notes.
- Staff 8:** Similar to Staff 1, but with a final group of 3 notes.

Each staff is numbered 1 through 8 on the left side. The exercises consist of eighth notes, with brackets above indicating groups of 7 notes and 3 notes. The final group of 3 notes in each staff is often marked with a '3' above it, indicating a triplet or a specific rhythmic pattern.

SOLO

Three staves of musical notation. The first staff begins with a treble clef and a key signature of one flat. The music consists of eighth and sixteenth notes. Brackets above the notes indicate groups of seven notes, with some groups containing a triplet of three notes. The second and third staves continue this rhythmic pattern.

SECTION 6

ELEVEN AGAINST FOUR

1 2 3-a 4 5 6-4 7 8 9-e-8 10 11

1
2
3
4

AS WRITTEN:

11

1 2 3 4 5 6 7 8 9 10 11

1 2 3 4 5 6 1 2 3 4 5

Two counting possibilities

EXERCISES

Keep an even tempo!

I.

Musical notation for exercise I, first system. It consists of two staves in 4/4 time. The top staff has a melodic line with an 11-measure slur. The bottom staff has a bass line with an 11-measure slur. The first measure of the slur contains a triplet of eighth notes.

II.

Musical notation for exercise II, first system. It consists of two staves in 4/4 time. The top staff has a melodic line with an 11-measure slur. The bottom staff has a bass line with an 11-measure slur. The first measure of the slur contains a triplet of eighth notes. The system ends with a double bar line and repeat signs.

Musical notation for exercise II, second system. It consists of two staves in 4/4 time. The top staff has a melodic line with an 11-measure slur. The bottom staff has a bass line with an 11-measure slur. The first measure of the slur contains a triplet of eighth notes. The system ends with a double bar line and repeat signs.

Musical notation for exercise II, third system. It consists of two staves in 4/4 time. The top staff has a melodic line with an 11-measure slur. The bottom staff has a bass line with an 11-measure slur. The first measure of the slur contains a triplet of eighth notes. The system ends with a double bar line and repeat signs.

Musical notation for exercise II, fourth system. It consists of two staves in 4/4 time. The top staff has a melodic line with an 11-measure slur. The bottom staff has a bass line with an 11-measure slur. The first measure of the slur contains a triplet of eighth notes. The system ends with a double bar line and repeat signs.

EIGHTHS

EIGHTHS
ADDED

EXERCISES

I.

EXERCISES (Cont.)

II.

11

11

11

3 3 3 3

11

TRIPLETS

11

TRIPLETS ADDED:

11

3 3 3 3 3 3 3 3 3 3

11

3 3 3 3 3 3 3 3 3 3

SIXTEENTHS

Two musical exercises in 4/4 time. The first exercise shows a treble and bass staff with a sequence of quarter notes in the bass and eighth notes in the treble, followed by a bracketed section of 11 sixteenth notes in the treble. The second exercise is similar but includes a section of 11 sixteenth notes in the treble. The text "SIXTEENTHS ADDED:" is written below the first exercise.

SIXTEENTHS ADDED:

EXERCISES

Four musical exercises in 4/4 time. The first exercise is marked with a first ending bracket (I.) and features a sequence of quarter notes in the bass and eighth notes in the treble, followed by a bracketed section of 11 sixteenth notes in the treble. The second exercise is similar but includes a section of 11 sixteenth notes in the treble. The third exercise includes a section of four triplets of eighth notes in the treble, followed by a bracketed section of 11 sixteenth notes in the treble. The fourth exercise is similar but includes a section of 11 sixteenth notes in the treble.

EXERCISES (Cont.)

II.

The musical score consists of four systems, each with two staves. The first system is marked with a piano (p) dynamic and features eighth-note runs in the upper staff, with a double bar line and a fermata. The second system features sixteenth-note runs in the upper staff, also with a double bar line and a fermata. The third system features eighth-note triplets in the upper staff, with a double bar line and a fermata. The fourth system features sixteenth-note runs in the upper staff, with a double bar line and a fermata. Each system is marked with a double bar line and a fermata at the end of the first measure of the second half.

SHORT COMBINATIONS

1.

11

11

3 3 3 3

2.

11

3

11

3 3 3 3 3 3 3 3 3 3

3.

3

11

3

11

MIXED COMBINATIONS

1.

4/4

11

3

11

11

2.

4/4

11

3

3

3

3

3

3

3

3

3.

4/4

11

3

11

3

MIXED COMBINATIONS (Cont.)

This section contains three systems of musical notation for piano exercises. Each system consists of two staves. The first system is marked with a '4.' and a treble clef. The exercises feature a sequence of eighth notes, followed by a bracketed section of 11th intervals, and then two triplet eighth notes. The second system follows a similar pattern with 11th intervals and triplets. The third system also features 11th intervals and triplets, ending with a double bar line and repeat dots.

SOLOS

This section contains four systems of musical notation for piano exercises, each starting with a first ending bracket labeled 'I.'. The first system features a sequence of eighth notes followed by a bracketed section of 11th intervals. The second system follows a similar pattern with 11th intervals. The third system features a sequence of eighth notes followed by a bracketed section of 11th intervals. The fourth system features a sequence of eighth notes, followed by a bracketed section of 11th intervals, and then a sequence of seven triplet eighth notes.

SOLOS (Cont.)

II.

The first staff begins with a double bar line and a key signature of one flat. It contains a sequence of notes with a bracket above it labeled '3' over the first three notes, another '3' over the next three notes, and a '11' over the remaining eight notes. The second staff continues with a '11' bracket over the first eight notes. The third staff has '3' brackets over the first three and last three notes, with a '11' bracket over the middle eight notes. The fourth staff has '3' brackets over the first three and last three notes, with a '11' bracket over the middle eight notes. The piece concludes with a double bar line.

SECTION 7

THIRTEEN AGAINST FOUR

1 2 3 4-e-5 5 6 7-f 8 9 10-a 11 12 13

13

1 2 3 4

AS WRITTEN:

1 2 3 4 5 6 7 1 2 3 4 5 6

The notation shows a melodic line with a '13' bracket above it. Below the first staff, the numbers 1, 2, 3, and 4 are written under the first four notes. The second staff shows a sequence of notes with a '13' bracket above it and numbers 1 through 6 below the notes. The text 'AS WRITTEN:' is placed to the left of the second staff.

EXERCISES COMBINING 7, 11, and 13.

In all the following Exercises and Solos, all the counter rhythms are written against the "Basic Pulse" of four:

Diagram illustrating counter rhythms written against a "Basic Pulse" of four. The rhythms shown are 13, 11, 7, 5, 3, and 6. Below the diagram is a musical staff in 4/4 time, showing a "Basic Pulse" of four notes. A bracket labeled "3" is placed over the first three notes of the pulse.

I.

Staff I shows a musical staff with a "Basic Pulse" of four notes. A bracket labeled "11" is placed over the first seven notes, and a bracket labeled "13" is placed over the last seven notes.

Staff II shows a musical staff with a "Basic Pulse" of four notes. A bracket labeled "7" is placed over the first five notes, and a bracket labeled "11" is placed over the last seven notes.

II.

Staff II shows a musical staff with a "Basic Pulse" of four notes. A bracket labeled "7" is placed over the first five notes.

Staff III shows a musical staff with a "Basic Pulse" of four notes. A bracket labeled "7" is placed over the first five notes, and a bracket labeled "11" is placed over the last seven notes.

Staff IV shows a musical staff with a "Basic Pulse" of four notes. A bracket labeled "7" is placed over the first five notes, and a bracket labeled "11" is placed over the last seven notes.

Staff V shows a musical staff with a "Basic Pulse" of four notes.

EXERCISES COMBINING 7, 11, and 13. (Cont.)

III.

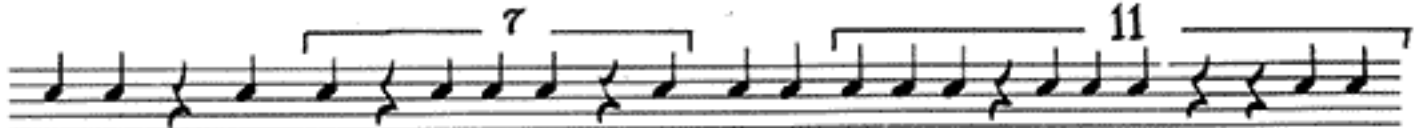
IV.

EXERCISES WITH RESTS

I.



Musical exercise I, first system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '7' and consists of seven eighth notes. The second group has a bracket above it with the number '11' and consists of eleven eighth notes. There are rests between the groups and at the end of the line.



Musical exercise I, second system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '7' and consists of seven eighth notes. The second group has a bracket above it with the number '11' and consists of eleven eighth notes. There are rests between the groups and at the end of the line.



Musical exercise I, third system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '13' and consists of thirteen eighth notes. The second group has a bracket above it with the number '11' and consists of eleven eighth notes. There are rests between the groups and at the end of the line.

II.



Musical exercise II, first system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '7' and consists of seven eighth notes. The second group has a bracket above it with the number '7' and consists of seven eighth notes. There are rests between the groups and at the end of the line.



Musical exercise II, second system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '11' and consists of eleven eighth notes. The second group has a bracket above it with the number '7' and consists of seven eighth notes. There are rests between the groups and at the end of the line.



Musical exercise II, third system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '7' and consists of seven eighth notes. The second group has a bracket above it with the number '7' and consists of seven eighth notes. There are rests between the groups and at the end of the line.



Musical exercise II, fourth system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '11' and consists of eleven eighth notes. The second group has a bracket above it with the number '7' and consists of seven eighth notes. There are rests between the groups and at the end of the line.



Musical exercise II, fifth system: A five-line staff with a treble clef. It contains two groups of eighth notes. The first group has a bracket above it with the number '7' and consists of seven eighth notes. The second group has a bracket above it with the number '7' and consists of seven eighth notes. There are rests between the groups and at the end of the line.

EXERCISES WITH RESTS (Cont.)

III.

3 3 3 11 3 3 3

3 3 3 7 3 3 3

3 3 3 11 3 3 3

3 7 3 3 3

IV.

7 7

11 7

7 7

7

MIXED EXERCISES

I.

11

7

7

II.

3

7

3 3 3 3 3 7

11

SECTION 9

SOLO EXERCISES - 7, 11, and 13.

I.

7 3 3 3

3 3 3 7

7 3 3

3 3 7 3 3

7 3 3

3 3 3 7

II.

11 3

7 13

3 11 3 3

7

SOLO EXERCISES (Cont.)

III.

The image displays six staves of musical notation, each representing a different exercise. The exercises are characterized by various rhythmic patterns and fingerings:

- Staff 1:** Features a sequence of eighth notes with a bracketed group of seven notes labeled '7' and another bracketed group of seven notes labeled '1'.
- Staff 2:** Shows a sequence of eighth notes with three groups of three notes labeled '3', followed by a group of eleven notes labeled '11', and then three more groups of three notes labeled '3'.
- Staff 3:** Contains a sequence of eighth notes with a group of seven notes labeled '7', followed by a group of three notes labeled '3', and then three groups of three notes labeled '3'.
- Staff 4:** Displays a sequence of eighth notes with a group of eleven notes labeled '11', followed by three groups of three notes labeled '3'.
- Staff 5:** Shows a sequence of eighth notes with a group of seven notes labeled '7'.
- Staff 6:** Features a sequence of eighth notes with two groups of three notes labeled '3', followed by three groups of three notes labeled '3', and a final group of thirteen notes labeled '13'.

SECTION 10

SOLO EXERCISES COMBINING 6, 3, 5, 7, 11, and 13.

1.

The musical score consists of five lines of music on a five-line staff. The first line begins with a treble clef and a common time signature. The exercise is marked with a '1.' on the left. The notation includes eighth notes, quarter notes, and sixteenth notes, often grouped with slurs and fingerings (3, 4, 5, 6). The first line contains fingerings 4, 3, 3, 6, and 3. The second line contains 6, 3, 6, 3, and 5. The third line contains 3, 5, and 3, with some notes marked with accents. The fourth line contains 3, 3, 3, and 3. The fifth line contains 3, 3, 3, and 3. The exercise concludes with a double bar line.

SOLO EXERCISES (Cont.)

II.

The page contains ten staves of musical notation, each representing a different exercise. The exercises are as follows:


- Staff 1: Quarter notes with slurs and fingerings 3 and 5.
- Staff 2: Quarter notes with slurs and fingerings 6, 7, and triplets of 3.
- Staff 3: Quarter notes with slurs and fingerings 5, 11, and 6.
- Staff 4: Quarter notes with slurs and fingerings 13, 7, and triplets of 3, 5, 3, 3, 3.
- Staff 5: Sixteenth-note patterns with slurs and fingerings 3, 3, 3, 3, 3, 3, 5.
- Staff 6: Sixteenth-note patterns with slurs and fingerings 3, 3, 3, 7, 3, 3, 3, 11.
- Staff 7: Sixteenth-note patterns with slurs and fingerings 3 and 7.
- Staff 8: Sixteenth-note patterns with slurs and fingerings 3, 3, 3, 3, 3, 11, 3, 3, 3, 3, 3.
- Staff 9: Sixteenth-note patterns with a slur and fingering 11.

This page of musical notation consists of ten staves of music, each containing a sequence of notes with various rhythmic patterns and fingerings. The notation is as follows:

- Staff 1: A sequence of notes with fingerings 3, 3, 3, 3, 5.
- Staff 2: A sequence of notes with fingerings 3, 7, 3.
- Staff 3: A sequence of notes with fingerings 6, 3, 3, 3, 11.
- Staff 4: A sequence of notes with fingerings 3, 3, 3.
- Staff 5: A sequence of notes with fingerings 5, 3, 7.
- Staff 6: A sequence of notes with fingerings 3, 6.
- Staff 7: A sequence of notes with fingerings 11, 3.
- Staff 8: A sequence of notes with fingerings 3, 3, 3, 3, 5, 3, 3.
- Staff 9: A sequence of notes with fingerings 3, 7, 3, 3.

SOLO EXERCISES (Cont.)

IV.  Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of seven notes, with the number '7' centered above the slur.

 Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of eleven notes, with the number '11' centered above the slur. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. There are two slurs: the first covers three notes with the number '3' above it, and the second covers five notes with the number '5' above it. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. There are two slurs: the first covers three notes with the number '3' above it, and the second covers six notes with the number '6' above it. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of five notes, with the number '5' centered above the slur. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of eleven notes, with the number '11' centered above the slur. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. There are two slurs: the first covers seven notes with the number '7' above it, and the second covers five notes with the number '5' above it. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of three notes, with the number '3' centered above the slur. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of seven notes, with the number '7' centered above the slur. Musical exercise on a five-line staff. It consists of a continuous sequence of eighth notes. A slur above the staff covers a group of eleven notes, with the number '11' centered above the slur.

SOLO EXERCISES (Cont.)


IV.

The exercise consists of three staves of music. The first staff begins with a triplet of eighth notes, followed by a quarter note, and then a group of five eighth notes. The second staff starts with a quarter note, followed by a group of seven eighth notes, and then a quarter note. The third staff begins with a triplet of eighth notes, followed by a quarter note, and then a group of three eighth notes. The notation includes stems, beams, and slurs to indicate the groupings.

SECTION 11


POLYRHYTHMIC TIME SIGNATURES

Polyrhythmic notation, as can be seen in the preceding pages, is usually accomplished by the use of brackets over the counter rhythm. Traditional time signatures make the bracket method an absolute necessity. It is possible, however, to add the information about the counter rhythm to the time signature. Admittedly, this would force a return to the restrictions of the bar line. If, however, the bar line were used only at points where a meter change occurred, it would, in effect, only stress those points where Basic Pulse and Counter Rhythm meet. The examples which follow are suggested as a logical method of indicating the metrical values of both voices of a polyrhythm in one time signature.

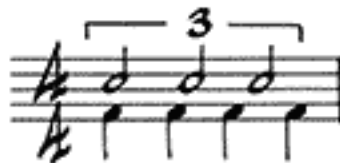

 6 beats in Counter Rhythm.
 4 beats in Basic Pulse.
 Metrical unit of the basic pulse is the quarter note. When counter rhythm has more beats than the basic pulse, both are written in the same metrical unit. In this case the counter rhythm will be written as six quarter notes or the equivalent.

is identical with:




 3 beats in Counter Rhythm.
 4 beats in Basic Pulse.
 Metrical unit of the basic pulse is the quarter note.
 Should the counter rhythm be written in quarter notes, the measure would contain too few beats. When the counter rhythm contains fewer beats than the basic pulse, it must be written using the next longest metrical unit. In this case the counter rhythm would be written in half notes or the equivalent.

is identical with:



$\frac{3}{5}$ 3 beats in Counter Rhythm.

$\frac{5}{8}$ 5 beats in Basic Pulse.

8 Basic pulse uses a metrical unit of eighth notes.

Counter rhythm will be written in quarter notes since it contains fewer beats than the basic pulse. (see above.)

is identical to:



$\frac{6}{4}$ or $\frac{6}{C}$ = Six quarters, or the equivalent, in a four/four measure.

$\frac{5}{4}$ $\frac{7}{4}$ $\frac{11}{4}$ etc.

$\frac{3}{2}$ or $\frac{3}{C}$ = Three half notes, or the equivalent, in a four/four measure.

$\frac{3}{8}$ = Three quarters, or the equivalent, in a four/eight measure.

$\frac{2}{3}$ $\frac{3}{5}$ etc.

$\frac{4}{6}$ = Four quarters, or the equivalent, in a six/eight measure

$\frac{3}{2}$ = Three quarters, or the equivalent, in a two/four bar.

$\frac{5}{2}$ $\frac{7}{2}$ etc.

$\frac{5}{8}$ = Five eighth notes, or the equivalent, in a four/eight measure.

$\frac{7}{4}$ $\frac{9}{5}$ etc.

$\frac{3}{2}$ or $\frac{3}{4}$ = Three half notes, or the equivalent, in a two/two (cut-time) measure.

$\frac{6}{4}$ $\frac{5}{2}$ etc.

$\frac{3}{4}$ = Three eighths, or the equivalent, in four/sixteen measure.

$\frac{3}{2}$ $\frac{5}{4}$ $\frac{11}{4}$ etc.

$\frac{7}{4}$ = Seven Sixteenths, or the equivalent, in a four/sixteen measure.

EXERCISES WITH POLYRHYTHMIC TIME SIGNATURES.

1. $\frac{4}{4}$ $\frac{3}{2}$

$\frac{3}{4}$ $\frac{5}{4}$

$\frac{6}{4}$

2. $\frac{6}{8}$ $\frac{6}{4}$ $\frac{5}{8}$

$\frac{5}{4}$ $\frac{3}{8}$ $\frac{3}{4}$