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HARRY PARTCH:  
"AND ON THE SEVENTH DAY PETALS  
FELL ON PETALUMA"

THESIS

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By

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Nicholl, Matthew J. Harry Partch: "And on the Seventh Day Petals Fell on Petaluma." Master of Music (Theory), August, 1982, 105 pp., 19 tables, 21 illustrations, bibliography, 57 titles.

Harry Partch's tuning system is an important contribution to tuning theory, and his music is original and significant.

Part One of this study presents a brief biography of Partch, a discussion of his musical aesthetics (Monophony and Corporeality), and a technical summary of his tuning system. These elements are placed in historical perspective.

Part Two presents a comprehensive analysis of "And on the Seventh Day Petals Fell on Petaluma," discussing the organization of formal, textural, rhythmic, linear, and tonal elements in the thirty-four "verses" of the work. Part Two concludes by showing how large-scale structure in the work is achieved through an overlay process.

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## CHAPTER I

### HARRY PARTCH

#### A Biographical Outline

Harry Partch was born in Oakland, California, in 1901. His parents, missionaries in China for over twenty years, left the East and withdrew from Christian mission work at roughly the same time as the onset of the Boxer Rebellion. The family moved to California in time for their son's birth. Soon after the family's return to the United States, they moved to the outskirts of a small mining town in Arizona.

Chinese culture pervaded the Partch household.<sup>1</sup> Because Harry's father spoke and read Chinese, there were many Oriental texts in the family library, and Partch's parents received many Mandarin speaking guests. Partch recalled the presence of Yaqui Indians in and around his home town, though it is doubtful that he heard the Yaqui Spring Ritual, which he cited as a strong musical influence, until much later.<sup>2</sup>

Partch's earliest musical experiences were of the singing of Christian hymns and Chinese tunes (in Chinese). Both his

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<sup>1</sup>Harry Partch, Genesis of a Music, (New York, 1974), p.viii.

<sup>2</sup>Ibid., p. ix.

sister and brother played musical instruments, many of which the family obtained through mail-order catalogues. Partch first heard recorded music at the age of ten on Edison cylindrical records. He eloquently described the deep impact made upon him by music he later found out to be from Hebrew chant, Chinese theater, and Congo ritual.<sup>3</sup>

Partch began composing in 1915. Although there are no references to early musical training, it is evident, from Partch's many disparaging remarks on the subject of the pedagogy of music in Western culture, that he must have had some initial contact with music education.<sup>4</sup> In 1919 Partch began what would become a solitary, lifetime study of music. Partch claimed to be entirely self-taught, pursuing his own research in public libraries. This is the first sign of those traits which were manifested again and again throughout his life: an intense self-motivation, a deep self-confidence, and an essential alienation from society as a whole.

In 1927 Partch's studies culminated in the first draft of what would later become an expostulation of the totality of his musical and aesthetic theories, Genesis of a Music. Soon after, Partch burned all his previous works and began the expression of his newly codified philosophies through the compositional medium. The earliest remaining examples of his work were written between 1930 and 1933, during which time

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<sup>3</sup>Partch, Genesis, p. ix.      <sup>4</sup>Ibid., p. 96.



he began having his music performed for public and private audiences in California and New York. These pieces consist of music for voice and Adapted Viola (Partch's first experiment in the application of his theories of tuning and temperament to musical instruments). This first body of works is also his initial expression of the aesthetics of Monophony and Corporeality, which will be discussed later in this chapter.

Partch completed two more drafts of Genesis..., the second under a grant from the Carnegie Foundation in 1934.<sup>5</sup> From 1935 to 1943 Partch lived a hobo's life and composed very little. His itinerant experiences culminated in his first major work, "The Wayward" (1941-43), scored solely for instruments he had designed and built, and incorporating visual and dramatic elements.

Partch was the recipient of a Guggenheim Fellowship in 1943 to finish a draft of Genesis... for submission to the University of Wisconsin Press. During the three years that Partch held a non-academic post at this university, he completed the sixth and seventh drafts of Genesis.... The seventh draft was finally published there in 1946. Partch received a second Guggenheim Fellowship in 1950.<sup>6</sup>

Between 1952 and 1962 Partch composed several major works, many of which he recorded and released privately on

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<sup>5</sup>Paul Earls, "Harry Partch: Verses in Preparation for Delusion of the Fury," Annuario--Yearbook 3, Inter-American Institute for Musical Research (Tulane University, 1967), p. 1.

<sup>6</sup>Ibid., p. 1.

Gate 5 Recordings. At this time Partch also found the Gate 5 Ensemble and began performing these works in the Los Angeles and San Francisco areas. Composers' Recordings Inc. re-pressed the master tapes of several of the Gate 5 recordings and in 1964 released "From the Music of Harry Partich." It was through these early recordings and performances of his work that Harry Partch began to come to the attention of the general public.

Although Partich had settled in Sausalito in 1952, he held non-academic posts at the University of Illinois from 1956 to 1957 (as a recipient of a grant from the Fromm Foundation), and from 1959 to 1962. By this time Partch had designed and built more than twenty generic musical instrument types.

In 1962 Partch began composing studies for what would be his last major work, the result of a lifetime of cogitation and composition, "Delusion of the Fury." These studies, performed in the Los Angeles area under various titles, or simply as "Verses," eventually received the appellation "And on the Seventh Day Petals Fell on Petaluma." Because the primary functions of these Verses were experiments in instrument combinations, bi-tonalities, and "bi-rhythms," "Petals..." contains no dramatic elements. In August of 1966 Partch completed the final version of "Petals....," which was published in the following year in Source.<sup>7</sup> A revision of a 1964 manuscript, this was Partch's first published score. A recording of this work, which won the

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<sup>7</sup>Harry Partch, "And on the Seventh Day Petals Fell on Petaluma," Source: Music of the Avant Garde, edited by Larry Austin, I (July, 1967).

American Award for Recorded Composition, was released by Composers' Recordings in 1967.<sup>8</sup> Also in this year, Partch completed and recorded "Delusion of the Fury" for Columbia Records. It is this work for which Partch is generally most well known. Partch made a final revision of Genesis... which was published by Da Capo Press in 1974.

Harry Partch died two years later at the age of seventy-five. He had composed some twenty major works, including eight film scores, written nine articles in addition to his massive study, Genesis of a Music, and designed and built over twenty-five generic musical instrument types.

#### Partch's Musical Aesthetic

Harry Partch totally rejected the concept of music as abstract art. Partch's deep affinity for the musical-dramatic philosophy of the ancient Greeks caused him to formulate his own contemporary and highly personal concepts of "Monophony" and "Corporeality." The nature of these concepts thus necessitated the creation of a new musical medium.<sup>9</sup> Because Partch believed the inherent power of music rests in acoustically true intervals, he rejected the impure intervals of equal temperament and devised a highly rational system of intonation based on just intervals. Throughout his life, Partch dedicated himself exclusively to the composition of Corporeal music

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<sup>8</sup>Harry Partch, "Petals," Composers' Recordings, Inc., 213, 1967.

<sup>9</sup>Wilfrid Mellers, Music in a New Found Land, (New York, 1965), p. 169.

in his Monophonic intonation system, and to the creation of a body of instruments capable of manifesting these aesthetic concepts.

### The Monophonic Intonation System

The single most important concept on which Partch's intonational system is based is that small-number ratios (which represent acoustically "true" intervals) express consonance.<sup>10</sup> But the Monophonic system is not merely a return to a just intonation based upon ancient Greek music theory. Partch believed that the evolution of man's musical consciousness made necessary an expansion of the tonal system on which Western art music of the common practice period is based.<sup>11</sup> Partch used Greek theory only as a point of origin in the formulation of the Monophonic intonational system.

The Monophonic system represents the culmination of the science of intonation from the beginning of recorded history to the early twentieth century. The following is a general summary of the important developments which form the basis of Partch's system.

Pythagoras.--1) The concept that musical intervals are a reflection of the inherent proportions found in all things, and expressed in mathematics. To Pythagoras, the number "3"

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<sup>10</sup>Partch, Genesis, p. 87.    <sup>11</sup>Ibid., p. 94

represented the embodiment of perfect proportion.<sup>12</sup> As will be demonstrated in the subsequent portion of this chapter, Partch presented proportions up to and including the number "11." 2) The concept of a Unity, or reference pitch, to which all other intervals in an intonational system relate.<sup>13</sup>

Ptolemy.--The mathematical presentation of scale theory, including the derivation of the just diatonic scale and scales including microtonal scale steps.<sup>14</sup>

Zarlino.--The concept that major and minor tonality are the expression of the harmonic and arithmetic mean, respectively.<sup>15</sup> Partch also based his derivation of minor tonality on the arithmetic mean, or proportion, showing minor tonality to be the intervallic inversion of major tonality.<sup>16</sup>

Mersenne.--The concept that the overtone series is a fundamental acoustical phenomenon.<sup>17</sup> The overtone series produces the same series of intervals as the harmonic mean, or proportion. Partch understood the overtone series to be a

<sup>12</sup>William Guthrie, The Earlier Presocratics and the Pythagoreans, Vol. 1 of A History of Greek Philosophy (Cambridge, Mass., 1962), p. 224.

<sup>13</sup>Partch, Genesis, p. 75.

<sup>14</sup>J. Murray Barbour, Tuning and Temperament (East Lansing, Michigan, 1951), p. 16.

<sup>15</sup>"Arithmetic and harmonic mean," Harvard Dictionary of Music, 2nd ed. (Cambridge, 1972).

<sup>16</sup>Partch, Genesis, p. 89.

<sup>17</sup>Mersenne, Marin, "The New Grove Dictionary of Music and Musicians (London, 1980).

manifestation of inherent laws of nature around which musical materials can be organized.<sup>18</sup>

The specific ways in which Partch incorporated these concepts into his system will be dealt with later. However, it is important to understand what makes Partch's system unique. Partch extended the concept of consonance to include the just seventh, ninth, and eleventh of a major or minor chord. Partch established his forty-three-note scale to allow for twelve just major and minor hexads which are complete through the eleventh chord tone. In addition, there are sixteen major and minor tonalities which are complete at least through the fifth of the chord. The important thing to realize is that while Partch's system is microtonal, it differs from the microtonal experiments of contemporary composers such as Varese, Bartok, or Ives in that the Monophonic system is a tonal system of intervallic hierarchical relationships. Of Partch's contemporaries, similar microtonal scalar organization is found in the work of Lou Harrison, Ben Johnston, La Monte Young, Alois Haba, Ivan Wyschnegradsky, Jullian Carrillo, Hans Barth, and Kathleen Schlessinger.<sup>19</sup>

The most important historical precedents to Partch's approach to tuning are found in the works of certain Italian

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<sup>18</sup>Partch, Genesis, p. 71

<sup>19</sup>Ben Johnston, "Microtones," Dictionary of Contemporary Music (New York, 1974).

composers of the sixteenth century. At this time, long before equal temperament was a practical reality, madrigal composers such as Nicola Vicentino and Carlo Gesualdo turned to chromaticism for greater expression.<sup>20</sup> The problems of instrumental tuning and the necessity of a theoretical basis for the chromatic compositions of these composers, coupled with the general revival during the Renaissance of interest in all things Greek, led to a renewal of interest, especially on the part of Vicentino, in the chromatic and enharmonic genera first presented by Ptolemy in 140 A.D.<sup>21</sup>

The careers of Harry Partch and Nicola Vicentino are similar in many ways. Like Vicentino, Partch derived a micro-tonal intonational system based on ancient Greek theory. Like Vicentino, Partch published his formulated theories, constructed instruments capable of reproducing his scale pitches, and composed music illustrating the viability of his tuning system. Also, their efforts met with little acceptance among their contemporaries.<sup>22</sup> Partch's career differs from that of Vicentino's only in degree. The Monophonic system includes theoretical advances made after Vicentino's time, and is also based on rational tonal concepts. While Vicentino built two instruments, Partch constructed over twenty-five generic instrument types. While Vicentino composed a small body of

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<sup>20</sup>Howard M. Brown, Music in the Renaissance (Englewood Cliffs, New Jersey, 1967), p. 358.

<sup>21</sup>Barbour, Tuning and Temperament, p. 117.

<sup>22</sup>Claude Palisca, Baroque Music, (Englewood Cliffs, New Jersey, 1981), p. 49.

music to illustrate his tuning system, Partch devoted a lifetime to the composition of music with the Monophonic system as a medium.

There is another distinct and important connection between Italian Renaissance composers and Harry Partch. The Florentine composers in the late sixteenth century felt that the music of the ancient Greeks was based on a perfect union of words and music.<sup>23</sup> Partch, like the Florentines, adapted to his own music the Greek monophonic aesthetic espoused by Plato in his Republic. At the core of the Greek aesthetic is the concept that music must serve to enhance the expression of the text. Partch's similar belief in the inherent dramatic power of words wedded to music forms the basis of his concept of Corporeality.

#### Corporeality

Partch's Corporeality is the antithesis of abstraction. The literal definition of corporeal, "of, or pertaining to, the body,"<sup>24</sup> as manifested in the music of Harry Partch means that all actions--musical, vocal, and dramatic--are inextricably fused in the expression of the individual. When any one of these parameters becomes subordinated, or when the expression of the individual is submerged in a mass expression, "the drama and intimacy of the individual are superceded by a

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<sup>23</sup>Partch, Genesis, p. 29.

<sup>24</sup>"corporeal," American Heritage Dictionary, 1973 ed.



different aesthetic or ideological quality."<sup>25</sup> Partch found this abstract aesthetic abhorrent.

Partch was strongly affected by the rituals of non-Western cultures, such as the Cong puberty rite and the Yacqui spring ritual, because he believed these rituals represent the elemental dramatic union between action, word, and music. Partch's work also draws from the dramas of the ancient Greeks, the Noh plays of Japan, and the mythology of non-Western cultures. But a work by Partch is no more a Noh play or a Congo ritual than his intonation system is Greek. Partch fused the fundamental aesthetic concepts of these seemingly disparate musical cultures, including singularly American elements, into a uniquely and timely personal expression.

Every aspect of Partch's major works expresses the element of drama. Partch's instruments, played onstage, resemble sculptures. The movements of the costumed instrumentalists are choreographed. The actors and actresses sing and dance. Every performer has a unique part: seldom is there more than one to an instrumental or vocal line.

Partch's intonation system and its practical ramifications are the factors which most severely limit the general acceptance and performance of his work. The music of Harry Partch can only be played on his instruments, and only then by musicians who have committed themselves to gaining mastery

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<sup>25</sup>Partch, Genesis, p.7.

over the technical and notational peculiarities of those instruments. At present, there exists only one complete set of Partch's instruments. During his life, Partch was able, through sheer force of will and persistence, to organize a body of performers dedicated to the realization of his music. Now that Partch is no longer alive, the continuity of his music as a living tradition is necessarily in doubt.<sup>26</sup> Because Partch's major contributions are in his theatrical works, which form the great majority of his output, recordings alone are scarcely appropriate to convey an accurate idea of what Partch attempted to accomplish.

Whatever one's personal opinion of his music, the very existence of the music of Harry Partch poses several fundamental questions. For example, must our intonation system remain static? Should we, as composers, performers, or theorists, accept traditions which are perhaps no longer the most appropriate medium for our expressions? What is our relationship to the music of other cultures? And, perhaps most importantly, just what is music? While the answers to these rather general philosophical questions are necessarily beyond the scope of this thesis, it is the intent of this study to present an analysis of "And on the Seventh Day Petals Fell on Petaluma" by Harry Partch, whereby some underlying

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<sup>26</sup>Ben Johnston, "The Corporealism of Harry Partch," Perspectives in New Music, XIII (Spring-Summer, 1975), pp. 96-97.

principles in the organization of the parameters of form, texture, rhythm, and pitch in this work may be manifested.

Harry Partch is an example of one who, as if inescapably confronted with the ancient Greek axiom "know thyself," asked himself the questions cited above, and formulated his own deeply personal answers. If nothing else, Harry Partch is an example of a man who accepted no limits other than those self-imposed.

#### The Monophonic System of Intonation

Unity, Limit, and consonance.--The two Pythagorean concepts of Unity and Limit are the basis of the Monophonic system of intonation derived by Harry Partch.<sup>27</sup> Partch arbitrarily fixed the unity, or reference pitch, of his system at 392 c.p.s (pitch class "G").<sup>28</sup> All pitches in the Monophonic system exist in a relationship with this pitch. Pitches are expressed as ratios which represent the interval they form with the unity, 1/1.

Partch applied the concept of Limit to the continuum of vibrational sound which surrounds the unity. In Monophony, eleven is the largest prime number which may exist in a ratio expressing a pitch. In this sense, the Limit of 11 determines the quality and number of pitches included in the Monophonic scale.

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<sup>27</sup>Guthrie, The Earlier Presocratics and the Pythagoreans, (Cambridge, 1962), p. 236.

<sup>28</sup>Partch, Genesis, p. 117.

Partch imposed Limit on his intonational system because he believed that small-number ratios represent comparative consonance. A tonal hierarchy is then created, beginning with absolute consonance, the unity, and progressing, through larger-number ratios within the 11 Limit, to dissonance.<sup>29</sup>

Ratio notation.--Every pitch in the Monophonic scale is expressed by its relationship to the unity in ratio form. For example, a tone of 702 c.p.s may be expressed as the ratio 702/392 (392=1/1), which may be reduced to the ratio 3/2. In other words, the interval between "G" (392) and "D" (702) is a 3/2, or a perfect fifth. Since "G" is always 1/1, "D" is always represented by the ratio 3/2, its interval distance from the unity. A ratio in Partch's system, then, represents both a pitch and an interval. Because the twelve pitch classes of the equal-tempered scale are inadequate to express the forty-three pitches in the Monophonic scale, Partch used letter names only to indicate general regions of pitches.

The Harmonic and Arithmetic Proportion.--The representation of musical intervals as ratios is a concept which existed long before there was a means to measure the frequency of a given pitch. The two ancient formulae which use ratios to express intervals are essential to an understanding of

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<sup>29</sup>Partch, Genesis, p. 94.

Partch's Monophony, and they can be stated as follows;

1. Harmonic Proportion; the division of the difference between two quantities into successive fractional proportions;  $1/1$ ,  $1/2$ ,  $1/3$ ,  $1/4$ ,  $1/5$ , etc.<sup>30</sup>

The application of the Harmonic Proportion to string lengths produces a series of tones corresponding to the overtone series.

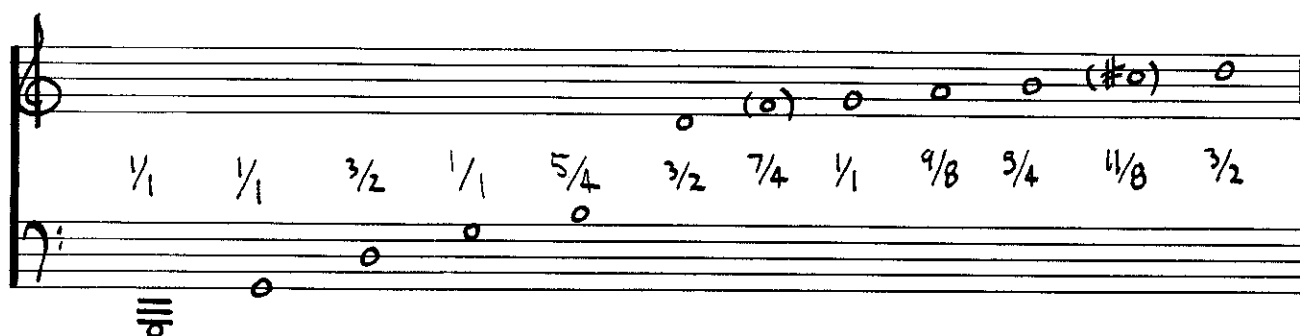


Fig. 1--The Harmonic Proportion. Ratios are given for each pitch. Parentheses indicate approximated pitches.

2. Arithmetic Proportion; the division of the difference between two quantities into exactly equal portions of a predetermined number.<sup>31</sup>

The application of the Arithmetic Proportion produces a series of tones in the exact inversion of the Harmonic Proportion, and for this reason is sometimes termed the "undertone" series. Figure 2 shows the application of the Arithmetic Proportion based on the division of the string into twelve parts.

<sup>30</sup>Partch, Genesis, p. 89.

<sup>31</sup>Barbour, Tuning and Temperament, p. ix.

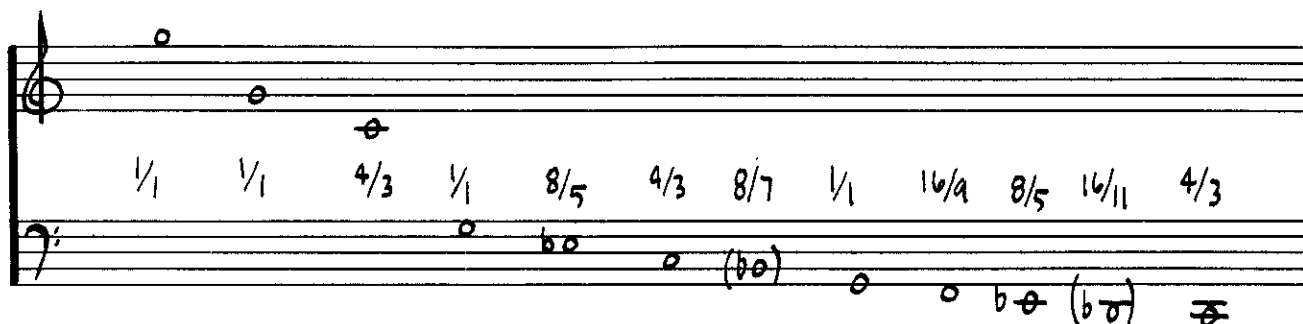


Fig. 2--The Arithmetic Proportion based on the division of the string into twelve parts. Ratios are given for each pitch. Parentheses indicate approximated pitches.

The Limit of 5.--By placing an arbitrary Limit of 5 on the largest prime number which may exist in a ratio expressing a pitch, Partch derived the first seven tones of his scale.<sup>32</sup> The following ratios, reduced to within an octave, are the maximum number of ratios possible within the 5 Limit:

$$1/1 \quad 6/5 \quad 5/4 \quad 4/3 \quad 3/2 \quad 8/5 \quad 2/1$$

Notice that a symmetry is inherent in a scale generated in this manner. Each ratio expresses an interval up from 1/1, and down from 2/1 (the octave). The 6/5, a minor third, has as its inversion the 8/5, a minor third down from 2/1. The following example represents the placement of these ratios in the twelve pitch regions of the equal tempered octave.

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<sup>32</sup>Partch, Genesis, p. 109.

|               |    |   |               |               |               |    |               |               |               |   |    |               |
|---------------|----|---|---------------|---------------|---------------|----|---------------|---------------|---------------|---|----|---------------|
| $\frac{1}{1}$ |    |   | $\frac{6}{5}$ | $\frac{5}{4}$ | $\frac{4}{3}$ |    | $\frac{3}{2}$ | $\frac{8}{5}$ | $\frac{5}{3}$ |   |    | $\frac{2}{1}$ |
| .             | .  | . | .             | .             | .             | .  | .             | .             | .             | . | .  | .             |
| G             | G# | A | A#            | B             | C             | C# | D             | D#            | E             | F | F# | G             |

Fig. 3--Ratios Within the Limit of 5.

The Limit of 11.--The extension of the Limit to 11 yields twenty-nine ratios.<sup>33</sup> Partch subdivided comparatively large intervals within the resulting scale by the inclusion of ratios which are the multiples of ratios within the 11 Limit. These new ratios were chosen from the large number of possible ratios because of their tonal implications and their relatively early occurrence in the theoretically infinite series produced by the Harmonic Proportion.<sup>34</sup>

The Forty-three-note Scale.--Like the scale generated from the application of the 5 Limit, the Forty-three-note Scale is symmetrical. Every ratio up from the unity has its complement at the corresponding part of the scale down from the octave. The last twenty-two scale steps are therefore the retrograde inversion of the first twenty-two steps. Within each half of the scale, successive interval sizes vary. There are thirteen interval sizes. The largest is 38.8 cents, and the smallest is 14.4 cents.<sup>35</sup> Noteworthy is the fact that the scale is non-cyclic; no successive

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<sup>33</sup>Partch, Genesis, p. 127.    <sup>34</sup>Ibid., p. 129.

<sup>35</sup>Cent--A unit of measure introduced by A. J. Ellis. There are 100 cents in a semitone, 1200 cents in an octave.

multiplication of any interval produces steps within the scale. Figure 4 places the forty-three ratios in the twelve pitch regions of the equal tempered octave. Ratios above the line represent small-number ratios within the 11 Limit, ratios below the line represent multiple-number ratios.

Tonality within the 11 Limit.--Partch postulated that tonality within the 11 Limit is expressed by a Monophonic hexad. He defined tonality as "the psychological phenomenon of finality around a single tone or chord."<sup>36</sup> A monophonic hexad is a chord built in the various just thirds up or down from a pitch. If the denominators in all the ratios comprising a hexad are 1, or an even multiple of 1, the numerators are the odd numbers 1, 3, 5, 7, 9, 11, or multiples thereof. The denominators in this case are an expression of the unity, since they share a common number 1 or are in the series of geometric doublings of 1 (2, 4, 8, 16). Because the numerators are the odd numbers which do not share a common number other than 1, they express the quality of the tonality.

If the tonality of a hexad is expressed in the "over numbers" of the ratios, as described above, Partch called the aural result "Otonality."<sup>37</sup> Otonality corresponds roughly to major tonality within the equal tempered scale, and is generated from the Harmonic Proportion. An Otonality is built up from a pitch. The following example places the six ratios,

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<sup>36</sup>Partch, Genesis, p. 160.      <sup>37</sup>Ibid., p. 88



Small-Number Ratios

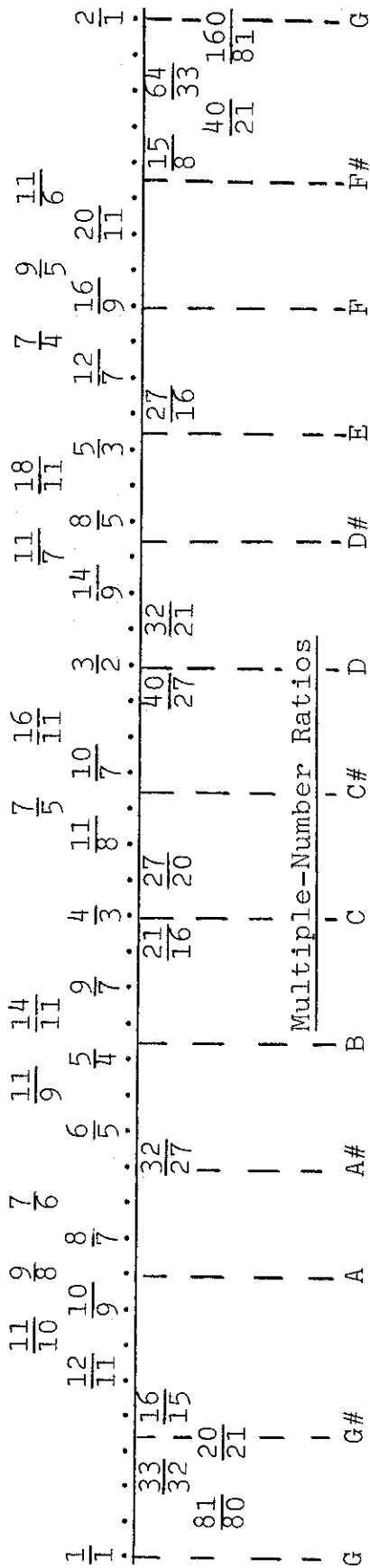


Fig. 4--The Forty-three Note Scale. Though the ratios are shown in the order they appear in the scale, no attempt has been made to show comparative sizes of scale steps.

or "Identities," of the 1/1 Otonality in their approximate locations on the five line-staff.

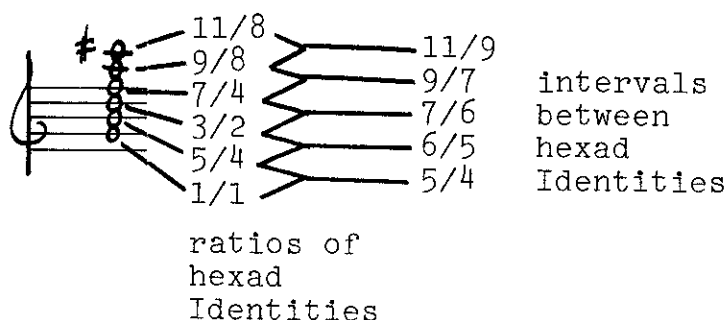


Fig. 5--The 1/1 Ononality.

If the numerators of the ratios in a hexad represent the unity, the denominators (or the "under numbers") express the quality of the tonality. Partch termed this aural result "Utonality."<sup>38</sup> Utonality corresponds roughly to minor tonality within the equal tempered scale, and is generated from the Arithmetic Proportion. An Utonality has the same intervallic structure as an Otonality, but is built down from a given pitch. In the same way that the Arithmetic Proportion produces a series of pitches which are the inversion of the series produced by the Harmonic Proportion, an Utonality is the intervallic inversion of an Otonality. The following example places six Identities of the 1/1 Utonality in their approximate locations on the five-line staff.

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<sup>38</sup>Partch Gensis, p. 89.

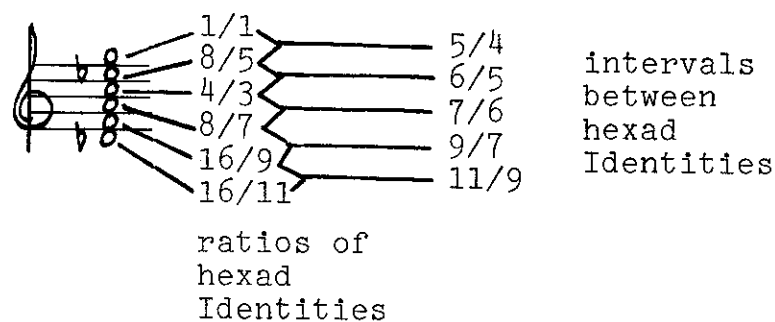


Fig. 5--The 1/1 Utonality.

Primary and Secondary Tonalities.--Within the Forty-three Note Scale one can construct twelve different "just hexads" based on the primary ratios within the 11 Limit.<sup>39</sup> Six of these hexads are Otonalities and six are Utonalities. The sixteen Secondary Tonalities were so termed because they include multiple-number ratios within the 11 Limit, and because none of these tonalities include 1/1 as a hexad member.<sup>40</sup> In addition, some of the Secondary Tonalities are incomplete--all six Identities are not possible within the Monophonic scale. Tables I-A and I-B present the Primary and Secondary Tonalities.

Hexad Identities 1, 3, 5, 7, 9, and 11 are given for each tonality. One must remember that the 3 Identity of a hexad represents the ratio a 3/2, or perfect fifth, away from the 1 Identity. The 5 Identity represents the ratio

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<sup>39</sup>Partch, Genesis, p. 158.      <sup>40</sup>Ibid., p. 160.

a  $5/4$ , or a major third, away from the 1 Identity. The 7, 9, and 11 Identities correspond generally to the 7th, 9th, and 11th of a chord in the equal-tempered scale (though the equal-tempered 7th and 11th are 17.5 and 48.7 cents "false," respectively, in comparison with their Monophonic counterparts).<sup>41</sup>

TABLE I

## A. PRIMARY TONALITIES

| Otonalities   |               |               |               |               |                |
|---------------|---------------|---------------|---------------|---------------|----------------|
| 1<br>Identity | 3<br>Identity | 5<br>Identity | 7<br>Identity | 9<br>Identity | 11<br>Identity |
| 1/1           | 3/2           | 5/4           | 7/4           | 9/8           | 11/8           |
| 16/9          | 12/9          | 10/9          | 14/9          | 9/9           | 11/9           |
| 8/5           | 6/5           | 5/5           | 7/5           | 9/5           | 11/10          |
| 16/11         | 12/11         | 20/11         | 14/11         | 18/11         | 11/11          |
| 4/3           | 3/3           | 5/3           | 7/6           | 9/6           | 11/6           |
| 8/7           | 12/7          | 10/7          | 7/7           | 9/7           | 11/7           |
| Utonalities   |               |               |               |               |                |
| 1<br>Identity | 3<br>Identity | 5<br>Identity | 7<br>Identity | 9<br>Identity | 11<br>Identity |
| 1/1           | 4/3           | 8/5           | 8/7           | 16/9          | 16/11          |
| 9/8           | 9/6           | 9/5           | 9/7           | 9/9           | 18/11          |
| 5/4           | 5/3           | 5/5           | 10/7          | 10/9          | 20/11          |
| 11/8          | 11/6          | 11/10         | 11/7          | 11/9          | 11/11          |
| 3/2           | 3/3           | 6/5           | 12/7          | 12/9          | 12/11          |
| 7/4           | 7/6           | 7/5           | 7/7           | 14/9          | 14/11          |

<sup>41</sup>Partch, Genesis, p. 124.

TABLE I  
B. SECONDARY TONALITIES

| Otonalities   |               |               |               |               |                |
|---------------|---------------|---------------|---------------|---------------|----------------|
| 1<br>Identity | 3<br>Identity | 5<br>Identity | 7<br>Identity | 9<br>Identity | 11<br>Identity |
| 3/2           | 9/8           | 15/8          | 21/16         | 27/16         | 33/32          |
| 6/5           | 9/5           | 3/2           | 21/20         | 27/20         | .....          |
| 9/5           | 27/20         | 9/8           | .....         | 81/80         | .....          |
| 16/15         | 8/5           | 4/3           | .....         | 6/5           | .....          |
| 32/21         | 8/7           | 40/21         | 4/3           | 12/7          | .....          |
| 32/27         | 16/9          | 40/27         | .....         | 4/3           | .....          |
| 7/5           | 21/20         | 7/4           | .....         | .....         | .....          |
| 27/20         | 81/80         | 27/16         | .....         | .....         | .....          |

| Utonalities   |               |               |               |               |                |
|---------------|---------------|---------------|---------------|---------------|----------------|
| 1<br>Identity | 3<br>Identity | 5<br>Identity | 7<br>Identity | 9<br>Identity | 11<br>Identity |
| 4/3           | 16/9          | 16/15         | 32/21         | 32/27         | 64/33          |
| 5/3           | 10/9          | 4/3           | 40/21         | 40/27         | .....          |
| 10/9          | 40/27         | 16/9          | .....         | 160/81        | .....          |
| 15/8          | 5/4           | 3/2           | .....         | 5/3           | .....          |
| 21/16         | 7/4           | 21/20         | 3/2           | 7/6           | .....          |
| 27/16         | 9/8           | 27/20         | .....         | 3/2           | .....          |
| 10/7          | 40/21         | 8/7           | .....         | .....         | .....          |
| 40/27         | 160/81        | 32/27         | .....         | .....         | .....          |

Modulation and resolution.--Each Identity in a hexad has a "field of attraction."<sup>42</sup> The lower hexad Identities,

<sup>42</sup>Partch, Genesis, p. 184

1, 3, and 5, have relatively large fields of attraction. The 7, 9, and 11 Identities have diminishing degrees of attraction. Once the tonality has been established through the Identities of an Otonality or Utonality, tension is created by the introduction of Identities from another tonality. If these foreign Identities are not resolved to the hexad Identities of the original tonality to which they are in closest proximity, but to hexad Identities in another tonality, a modulation is said to have been effected.<sup>43</sup>

Interval qualities.--Partch reduced the Monophonic intervals to four main types:

1. Intervals of Power; the octave, the perfect fifth, and the perfect fourth.
2. Intervals of Suspense; the tritone intervals between the perfect fifth and the perfect fourth.
3. Intervals of Emotion; the various just thirds and sixths.
4. Intervals of Approach; the various just seconds and sevenths.

The grouping of Monophonic intervals into these categories establishes the criteria for melodic and harmonic intervallic resolution.<sup>44</sup>

Monophonic functional concepts.--Harry Partch created a highly complex scale fabric. While this scale is radically different from the equal-tempered scale, the concepts of

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<sup>43</sup>Partch, Genesis, p. 183.      <sup>44</sup>Ibid., p. 156.

tonal function within the Monophonic system, described above, are highly similar to the functional harmonic concepts which form the basis of western music of the common practice period. However, Partch communicated none of the specific ways in which he established tonality or effected modulations in his music. In addition, once a tonality has been established, there are thirty-seven Monophonic pitches outside that tonality. It is necessary to look at Partch's music to understand how these "non-harmonic" tones function in the context of an Otonality of Utonality. Therefore, one must demonstrate Monophonic functional applications through analysis of Monophonic music.

## CHAPTER II

### "AND ON THE SEVENTH DAY PETALS FELL ON PETALUMA"

Harry Partch completed "And on the Seventh Day Petals Fell on Petaluma" in 1966. The score to the work was published the following year in Vol. 1, no. 2, of Source. Though written primarily as a study for "Delusion of the Fury," "Petals..." is a complete and original work, the study of which may bring one closer to an understanding of the musical world of Harry Partch.

"Petals... ," a tape piece, is scored for twenty-three instruments, all of which Partch designed and built, or adapted from existing instruments. While no number of performers is specified in the score, Partch stated that the recording of the work was performed by six players.<sup>1</sup> "Petals..." consists of thirty-four Verses which are each one minute in length. The first twenty-three Verses are duets and trios. In Verses twenty-four through thirty-three, recordings of successive pairs of the duets and trios were edited together, resulting in eight quartets, and two quintets. Verse 34, a combination of Verses 21, 22, and 23, is a septet.

Each Verse has a pickup or "monitor" bar which served as cues for the recording engineer. The monitor bars, though

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<sup>1</sup>Partch, Genesis, p. 348.



present in the score, were edited out of the recording, and so will not be discussed in the subsequent analysis of the work. Throughout this thesis, measures are numbered only within each Verse; the first full bar of each Verse, excluding the monitor bar, is measure one of the Verse.

While the bi-meters, bi-tonalities, and instrument combinations resulting from the "overlay process" described above were Partch's primary concern in the composition of "Petals...", this study will present a comprehensive analysis of the work.

#### Internal Form and Texture

Although the form of each duet and trio is unique, the basic structural unit in all but one of the Verses is the phrase. The internal characteristics of the phrase and the ways in which groups of phrases are combined form the criteria for the determination of formal structure within the individual Verses.

#### Phrase Characteristics

Internal structure.--Structure within the phrase is achieved in one of two ways: by the successive repetition of short motivic material within the phrase, or by internal consistency of linear and rhythmic elements. The type of phrase structure is consistent within each Verse. Figures 7 and 8 are examples of the two types of internal phrase structure. The use of internal repetition of material is

the device which most often creates phrase structure.

Fig. 7--Phrase structure through internal repetition.  
Verse 5, mm. 1-2; Mazda Marimba (above), and Boo (below).

Fig. 8--Phrase structure through internal consistency.  
Verse 4, mm. 1-6; Chromelodeon II, Koto not shown.

Phrase length and regularity.--The most common phrase

length is three bars, though there are a substantial number of four and five bar phrases. Phrases of six or more bars are relatively few.

Eight of the Verses contain regular patterns of phrase length. In all the remaining Verses except Verse 11, which contains no clear phrase divisions, the lengths of the phrases vary greatly. Table II shows the type of internal phrase structure and use of regular or non-regular phrase lengths within each Verse.

TABLE II  
PHRASE CHARACTERISTICS

| Verse | Internal Structure   | Phrase Lengths         |
|-------|----------------------|------------------------|
| 1     | internal consistency | regular; 3-3-3-3-3-5*  |
| 2     | " "                  | regular; 5-3-5-3-2-2-3 |
| 3     | motivic repetition   | non-regular            |
| 4     | internal consistency | " "                    |
| 5     | motivic repetition   | regular; 3-3-3-3-3-5   |
| 6     | " "                  | " "                    |
| 7     | " "                  | non-regular            |
| 8     | " "                  | " "                    |
| 9     | " "                  | " "                    |
| 10    | " "                  | " "                    |
| 12    | " "                  | regular; 3-3-3-3-3-5   |
| 13    | " "                  | regular; 4-4-4-2-5     |

\*Arabic numbers indicate the number of measures in successive phrases.

TABLE II--CONTINUED

| Verse | Internal Structure   | Phrase Lengths       |
|-------|----------------------|----------------------|
| 14    | motivic repetition   | non-regular          |
| 15    | internal consistency | regular; 5-4-4-4-5   |
| 16    | motivic repetition   | non-regular          |
| 17    | " "                  | " "                  |
| 18    | " "                  | " "                  |
| 19    | internal consistency | " "                  |
| 20    | " "                  | " "                  |
| 21    | motivic repetition   | regular; 3-3-3-3-3-5 |
| 22    | " "                  | regular; 5-5-4-5-6-5 |
| 23    | " "                  | non-regular          |

Phrase endings.--Many Verses have no cadences to separate one phrase from another. In Verses 1, 5, 6, 10, 12, 16, 21, and 23 phrases are merely presented successively; there is no feeling that a definite cadence has occurred or been elided. The internal elements of the individual phrases are the only criteria upon which the division of the Verse into phrases can be made. In the Verses listed above, this type of phrase juxtaposition occurs consistently. Figure 9 is an example of phrase juxtaposition.

In the remaining Verses (except Verse 11), definite cadences occur which are indicated by obvious fluctuations in rhythmic and linear activity; there is a definite aural

end of phrase 4                      beginning of phrase 5

Fig. 9--Phrase juxtaposition. Verse 5, mm 12-13; Mazda Marimba (above) and Boo (below).

sensation that one unit of material has come to an end and another is beginning. Because of the contrapuntal texture of many of the duets and trios, phrase endings are often slightly overlapping. Figure 10 is an example of an overlapping cadence.

end of ph. 3                      beginning of ph. 4

end of ph. 3                      beginning of ph. 4

Fig. 10--Overlapping Cadence. Verse 4, mm. 20-22; Chromelodeon II (above), and Koto (below).

Because the phrase endings of the individual parts found in overlapping cadences occur in close proximity to one another, there is a strong feeling (as in the juxtaposed phrases) that the individual parts function together to create phrase structure.

Introductory and closing material.--Several of the Verses contain material that serves the function of a final cadence, but is not motivically related to the preceding phrases of the Verse. This material is labelled in Table III-A as the coda of the individual Verse. Only one Verse contains introductory material.

#### Phrase Groups

The Verses are organized internally through the use of the phrase in two ways: two or three individual phrases, or phrases very similar to those phrases, are repeated in patterns which create expanded two and three part forms, or successive phrases of unique material create through-composed forms. Table III-A presents an analysis of those Verses bases upon patterns of phrase repetition. Table III-B shows the phrase successions in the through-composed Verses. Because Verse 11 has no clear phrase divisions, this Verse is not included in either table.

Three of the through-composed Verses contain small fragments, or "cells," of material which recur throughout the Verse in a limited, random fashion. The measure numbers of the

TABLE III-A  
EXPANDED TWO AND THREE PART FORMS

| Verse | Levels of structure* |      |       |       |       |       |       |       |
|-------|----------------------|------|-------|-------|-------|-------|-------|-------|
| 3     | Intro.               | A    |       |       |       | A'    |       |       |
|       | 1-3                  | a    | a'    | b     | a'    | a'    | Coda  |       |
|       |                      | 4-8  | 9-16  | 17-20 | 21-24 | 25-27 | 28-30 |       |
| 4     | A                    | B    | C     | A     | Coda  |       |       |       |
|       | 1-8                  | 9-15 | 16-21 | 22-27 | 28-30 |       |       |       |
| 5     | A                    |      |       |       |       |       |       |       |
|       | a                    | b    | c     | d     | a'    | c'    |       |       |
|       | 1-3                  | 4-6  | 7-9   | 10-12 | 13-15 | 16-20 |       |       |
| 6     | A                    |      |       |       | A'    |       |       |       |
|       | a                    | b    | c     | d     | a'    | d'    |       |       |
|       | 1-3                  | 4-6  | 7-9   | 10-12 | 13-15 | 16-20 |       |       |
| 7     | A                    |      |       |       | A'    |       |       |       |
|       | a                    | b    | c     | b     | a     | a     | b     | b     |
|       | 1-4                  | 5-7  | 8-11  | 12-14 | 15-18 | 19-22 | 23-25 | 26-30 |
| 8     | A                    |      | A'    |       | A''   |       |       |       |
|       | a                    | b    | c     | b     | d     | b     |       |       |
|       | 1-4                  | 5-9  | 10-13 | 14-18 | 19-24 | 25-30 |       |       |
| 9     | A                    |      | B     |       | Coda  |       |       |       |
|       | a                    | a    | b     | b'    | 28-30 |       |       |       |
|       | 1-5                  | 6-9  | 10-18 | 19-27 |       |       |       |       |
| 12    | A                    |      |       | A'    |       | Coda  |       |       |
|       | a                    | b    | c     | a'    | b     | 16-20 |       |       |
|       | 1-3                  | 3-6  | 7-9   | 10-12 | 13-15 |       |       |       |
| 13    | A                    |      |       | B     |       |       |       |       |
|       | a                    | b    | c     | b'    | a'    |       |       |       |
|       | 1-4                  | 5-8  | 9-12  | 13-14 | 15-20 |       |       |       |

\*Information is ordered vertically; uppercase letters represent groups of phrases; lowercase letters represent individual phrases, and Arabic numbers indicate measure numbers within the Verse.

TABLE III-A--Continued

| Verse | Levels of structure |       |       |       |       |       |       |
|-------|---------------------|-------|-------|-------|-------|-------|-------|
| 14    | A                   |       | B     |       | C     |       |       |
|       | a                   | a'    | b     | c     | d     | d'    |       |
|       | 1-7                 | 8-11  | 12-16 | 17-21 | 22-26 | 27-30 |       |
| 17    | A                   |       | B     |       |       |       | Coda  |
|       | a                   | b     | c     | c'    | c''   | c'''  |       |
|       | 1-4                 | 5-10  | 11-13 | 14-16 | 17-19 | 20-24 | 25-30 |
| 18    | A                   | B     | Coda  |       |       |       |       |
|       | 1-11                | 12-26 | 27-30 |       |       |       |       |
| 21    | A                   |       | B     |       |       |       |       |
|       | a                   | a'    | b     | c     | c'    | c''   |       |
|       | 1-3                 | 4-6   | 7-9   | 10-12 | 13-15 | 16-20 |       |

TABLE III-B  
THROUGH COMPOSED FORMS

| Verse | Phrases* |      |       |       |       |       |       |
|-------|----------|------|-------|-------|-------|-------|-------|
| 1     | 1        | 2    | 3     | 4     | 5     | 6     |       |
|       | 1-3      | 4-6  | 7-9   | 10-12 | 13-15 | 16-20 |       |
| 2     | 1        | 2    | 3     | 4     | 5     | 6     | 7     |
|       | 1-3      | 4-8  | 9-11  | 12-16 | 17-18 | 19-20 | 22-24 |
| 10    | 1        | 2    | 3     | 4     |       |       |       |
|       | 1-8      | 9-13 | 14-18 | 19-24 |       |       |       |
| 15    | 1        | 2    | 3     | 4     | 5     | 6     | 7     |
|       | 1-5      | 6-9  | 10-13 | 14-17 | 17-18 | 19-20 | 22-24 |

\*The lower set of numbers within each horizontal column represents measure numbers within the Verse. The upper set of numbers merely indicate the number of the Phrase within the Verse.



TABLE III-B--CONTINUED

| Verse | Phrases   |           |            |            |            |            |
|-------|---|-----------|------------|------------|------------|------------|
| 16    | 1<br>1-5<br>Cells in Koto;  | 2<br>6-10 | 3<br>11-16 | 4<br>17-20 | 5<br>21-25 | 6<br>26-30 |
|       | a. m.11--m.17--m.18--m.21--m.24--m.29<br>b. m.15--m.19<br>c. m.21--m.23                       |           |            |            |            |            |
| 19    | 1<br>1-3<br>Cells in Pollux;  | 2<br>4-8  | 3<br>9-12  | 4<br>13-20 | 5<br>21-26 | 6<br>27-30 |
|       | m.9--m.11--m.30      b. m.2--m.13<br>c. m.6--m.15      d. m.10--m.14<br>e. mm.22,23--mm.25,26 |           |            |            |            |            |
| 20    | 1<br>1-4<br>Cells in Koto;  | 2<br>5-9  | 3<br>10-13 | 4<br>14-19 | 5<br>20-25 | 6<br>26-30 |
|       | a. m.1--m.10--m.28<br>b. m.3--m.12<br>c. m.6--m.15--m.23                                      |           |            |            |            |            |
| 22    | 1<br>1-5  | 2<br>6-10 | 3<br>11-14 | 4<br>15-19 | 5<br>20-25 | 6<br>26-30 |
| 23    | 1<br>1-5  | 2<br>6-9  | 3<br>10-13 | 4<br>14-20 | 5<br>21-24 | 6<br>25-30 |

recurring cells and the instruments in which they occur are given in Table III-B. Because of the sporadic and inconsistent nature of the repetition of these cells, cell recurrence is not considered to have much structural signification.

#### Texture

Relationship of instrumental parts.--Within the majority of Verses instrumental parts are independent from one another. Though the instrumental parts comprising a Verse are related

in their phrase characteristics, each part can be considered a separate voice. In Verses 3, 15, 18, and 19, however, one instrument predominates as a solo voice, while the other instrument exists in a supportive or accompanying role.

Rhythmic activity.--Rhythmic activity is an important component of texture. Rhythmic density, expressed as the average number of attacks per second in the composite rhythm of the instrumental parts, is a general criterion by which the rhythmic activity of the individual Verses can be compared.

In Table VI, rhythmic activity is described as either fast (more than 6.1 attacks per second), medium (between 3.5 and 6.0 attacks per second), or slow (less than 3.5 attacks per second). Rhythmic density will be discussed in greater depth in the subsequent section of this chapter dealing with aspects of rhythm.

### Timbre

Instrument usage.--There are twenty-three instruments used in "Petals..." Ten are chordophones, nine are idiophones, and four are aerophones (see below). Most instruments are used at least twice, and some three or four times. The instrumental combination in each of the duets and trios is unique, though the most common combination is that of chordophones and idiophones. Table IV-A shows how many times each instrument is used. Table IV-B presents various ways in which

the instrument types are combined in the Verses.

TABLE IV-A  
INDIVIDUAL INSTRUMENT USAGE

|                               |  |
|-------------------------------|--|
| Instruments used once.....    | Gourd Tree and Cone Gongs,<br>Gubagubi, Drone Devils, Adapted<br>Guitar.   |
| Instruments used twice.....   | Crychord, Kithara II, Surrogate<br>Kithara, Bass Marimba, Mazda<br>Marimba, Marimba Eroica, Cloud<br>Chamber Bowls, Chromelodeons<br>I and II, Blue Rainbow. |
| Instruments used 3 times..... | Zymo-Xyl, Diamond Marimba,<br>Spoils of War.   |
| Instruments used 4 times..... | Harmonic Canon I, Koto.  |

TABLE IV-B  
INSTRUMENT TYPE COMBINATIONS

| Type        | Duets and Trios                 | Compound Verses(24-34) |
|-------------|---------------------------------|------------------------|
| C(only)     | 3, 9, 16, 20*                   | none                   |
| I(only)     | 5, 6, 8, 10, 21                 | 26                     |
| C and I     | 1, 2, 11, 12, 13,<br>14, 17, 18 | 24, 28, 29, 30, 32     |
| C and A     | 4, 7, 15, 19                    | 25, 31, 33             |
| I and A     | 22                              | none                   |
| C, I, and A | none                            | 27, 34                 |

C=chordophones  
I=idiophones  
A=aerophones

\*These numbers represent the Verses  
in which the instrument types occur.

Instrumental timbral characteristics.--The instruments comprising each family are related in timbre because the vibrating material of the instruments within each family are similar. All of the aerophones utilize a metal reed. Most of the chordophones have metal strings and wood resonating cavities. The majority of the idiophones are made from wood and are struck with wooden mallets. The Gourd Tree and Cone Gongs, the Spoils of War, and the Zymo-Xyl, however, are made of more than one vibrating material and thus have several possible timbres when struck.

There is a notable absence of aerophonic instruments, such as the flute or trumpet, in which correct intonation depends on the skill of the player. There are also no non-pitched percussion instruments.

Table V presents the individual timbral aspects of each instrument.

Attack and decay characteristics.--Attack and decay characteristics are variable within the instrument families. Of the aerophones, the Bloboy, the Chromelodeon I, and the Chromelodeon II have no attack or decay characteristics to speak of; these instruments are either on or off and have unlimited sustaining capacity. The Drone Devil, which is an adapted Jew's Harp, has a percussive attack and a rapid decay.

Chordophonic instruments are either plucked with the fingers, with a plectrum, or struck with a mallet. Those

TABLE V

## INSTRUMENTAL TIMBRAL ASPECTS

| Aerophones           |  |  |
|----------------------|--|--|
| Instrument Name      | Vibrating Material                       | Method of Sound Production   |
| Bloboy               | metal reeds                              | foot activated bellows   |
| Chromelodeons I & II | "  | foot activated bellows, pitch controlled by keyboard                                     |
| Drone Devils         | "  | struck, mouth as resonator   |
| Chordophones         |  |  |
| Instrument Name      | Vibrating Material                       | Method of Sound Production   |
| Adapted Guitar       | guitar and cello strings, wood resonator | Plucked with fingers, movable plastic rod determines string length                       |
| Blue Rainbow         | guitar strings wood resonator            | plectrum, or struck with felt-tipped dowel   |
| Castor & Pollux      | guitar strings wood resonator            | plectrum, or struck with felt-tipped dowel, movable plastic rod determines string length |
| Crychord             | steel wire wood resonator                | struck with felt-tipped dowel or plucked with fingers                                    |
| Bubagubi             | steel wire                               | plectrum or fingers  |
| Harmonic Canon I     | guitar strings wood resonator            | plectrum, movable plastic rod determines string length                                   |

TABLE V--CONTINUED

| Instrument Name                       | Vibrating Material               | Method of Sound Production  |
|---------------------------------------|----------------------------------|---|
| Kitharas I & II,<br>Surrogate Kithara | guitar strings<br>wood resonator | plectrum and fingers, movable plastic<br>determines string length |
| Koto                                  | nylon strings<br>wood resonator  | plectrum  |
| Idiophones                            |                                  |   |
| Instrument Name                       | Vibrating Material               | Method of Sound Production  |
| Bass Marimba                          | wood                             | struck with various mallets                                       |
| Boo                                   | bamboo                           | struck with various mallets                                       |
| Cloud Chamber Bowls                   | glass                            | struck with light, soft mallets                                   |
| Diamond Marimba                       | wood                             | struck with various mallets                                       |
| Gourd Tree and<br>Cone Gongs          | gourds, metal                    | struck with bamboo mallets and heavy<br>mallets                   |
| Marimba Eroica                        | wood                             | struck with heavy mallets   |
| Mazda Marimba                         | glass                            | struck with very light mallets                                    |
| Spoils of War                         | metal, glass, bamboo,<br>gourds  | struck with various mallets                                       |
| Zymo-xyl                              | wood, metal, glass               | struck with various wood mallets                                  |

instruments which are struck (see Table IV), have a percussive attack and a generally quicker decay than the plucked chordophones. Depending on the manner of performance, plucked chordophones can have either a "soft" attack or a percussive attack. With several of the chordophones a plastic rod is used to determine string length. This produces a slow decay and a sustained timbre similar to that of a Hawaiian Guitar.

All of the idiophones have a percussive attack except the Cloud Chamber Bowls. Only the Cloud Chamber Bowls, the Cone Gongs, and the Spoils of War are capable of producing sustained tones.

Table VI lists the Verses in sequence. Horizontal columns describe the relationship of instrumental parts, the relative rhythmic density, and the timbral aspects of each Verse. Within the category of timbre, the instrument family of each instrument is given, along with the attack characteristics (soft or percussive), and the decay length (short, medium, or long) of that instrument. The above parameters combine to form the textures of the first twenty-three Verses.

The overlay process.--The second column of Verse numbers in Table III shows how the textural elements of the first twenty-three Verses combine to form the textures of the last ten Verses. The overlay process causes the compound Verses to have greater textural density than the duets and trios from which they are formed. Three-, four-, five-, and seven-voice

textures result. Timbral variety is broader in the larger ensembles. Rhythmic activity in each of the compound Verses is increased to varying degrees, depending on the metric relationships between paired Verses. The metric and tonal aspects of the overlay process are important to the experimental quality of "Petals...", and will be dealt with at length later in this chapter.

TABLE VI  
TEXTURE

| Verse   | Relationship of parts     | Rhythmic Activity | Timbre     |                |                       |
|---------|---------------------------|-------------------|------------|----------------|-----------------------|
|         |                           |                   | Inst. type | Attack         | Decay length          |
| 1<br>24 | independent               | slow              | I<br>C     | perc.<br>perc. | short<br>medium       |
| 2       | independent               | fast              | I<br>C     | perc.<br>perc. | medium<br>short       |
| 3<br>25 | dominant &<br>subordinant | slow              | C<br>C     | soft<br>perc.  | long<br>medium        |
| 4       | independent               | slow              | A<br>C     | soft<br>perc.  | long<br>medium        |
| 5<br>26 | independent               | fast              | I<br>I     | perc.<br>perc. | short<br>short        |
| 6       | independent               | fast              | I<br>I     | perc.<br>perc. | medium<br>short       |
| 7<br>27 | independent               | medium            | C<br>A     | perc.<br>soft  | medium<br>long        |
| 8       | independent               | medium            | I<br>I     | perc.<br>perc. | short-med.*<br>medium |
| 9<br>28 | independent               | slow              | C<br>C     | perc.<br>perc. | long<br>medium        |
| 10      | independent               | fast              | I<br>I     | perc.<br>perc. | short<br>short        |



TABLE VI--CONTINUED

| Verse | Relationship of Parts  | Rhythmic Activity | Timbre     |        |              |
|-------|------------------------|-------------------|------------|--------|--------------|
|       |                        |                   | Inst. type | Attack | Decay length |
| 11    | independent            | slow              | C          | perc.  | medium       |
| 29    |                        |                   | I          |        |              |
| 12    | independent            | medium            | C          | soft   | medium       |
|       |                        |                   | I          |        |              |
| 13    | independent            | slow              | C          | soft   | medium       |
| 30    |                        |                   | I          |        |              |
| 14    | independent            | fast              | C          | perc.  | medium       |
|       |                        |                   | I          |        |              |
| 15    | dominant & subordinant | slow              | A          | soft   | long         |
| 31    |                        |                   | C          |        |              |
| 16    | independent            | fast              | C          | perc.  | medium       |
|       |                        |                   | C          |        |              |
| 17    | independent            | fast              | C          | soft   | long         |
| 32    |                        |                   | I          |        |              |
| 18    | dominant & subordinant | slow              | C          | soft   | long         |
|       |                        |                   | I          |        |              |
| 19    | dominant & subordinant | medium            | C          | perc.  | medium       |
| 33    |                        |                   | A          |        |              |
| 20    | independent            | slow              | C          | soft   | medium       |
|       |                        |                   | C          |        |              |
| 21    | independent            | fast              | I          | perc.  | short-med.   |
|       |                        |                   | I          |        |              |
| 22    | independent            | medium            | I          | soft   | long         |
| 34    |                        |                   | A          |        |              |
| 23    | independent            | fast              | C          | perc.  | medium       |
|       |                        |                   | I          |        |              |

\*Instruments made of more than one vibrating material can have several possible decay lengths.

While Partch mentioned the experimental nature of "Petals..." particularly with regard to instrument combinations, bi-tonalities, and "bi-rhythms," he made no reference to "bi-formal" experimentation.<sup>1</sup> An examination of Verses 24 through 34 reveals that structural elements coincide only in Verse 26, in which Verses 5 and 6 share the same meter and phrase structure. In the remaining Verses, formal elements are combined to create a feeling of polarity rather than coherence between the duets and trios from which the compound Verses are formed. Formal structure in the last ten Verses, with the exception noted above, seems to be the random result of the overlay process.

#### Rhythm

The bi-metric aspects of the compound Verses are the result of a carefully planned succession of Verses in specific meters and tempos. While there is a large scale organization of meters and tempos, the specific rhythmic material of each Verse is unique.

#### Meter and Pulse

There are ten different meters in the Verses of "Petals...." The Verses can be grouped into five categories in terms of the number of pulses per bar. Seventeen of the Verses have either two, three, four, or five pulses per bar.

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<sup>1</sup>Partch, Genesis, p. 348.

The remaining six Verses are in a three bar composite meter. The Verses in the composite meter are comprised of five cycles of  $5\frac{1}{2}$ - $6\frac{1}{2}$ - $7\frac{1}{2}$  meter ending with five bars of  $4\frac{1}{2}$ , with a quarter note unit pulse. Figure 11 shows the organization of the Verses in composite meter.

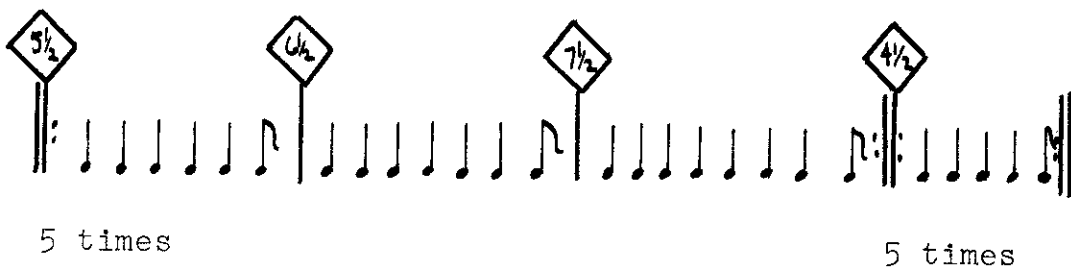


Fig. 11--The composite Meter.

In several instances, fragments of the linear-rhythmic motives are repeated in additive patterns in the successive measures within one cycle of the composite meter. In these instances the linear-rhythmic material of the  $6\frac{1}{2}$  and  $7\frac{1}{2}$  bars is the same material of the  $5\frac{1}{2}$  bar with certain fragments repeated. Figure 12 is an example of this type of reiteration from Verse 5. Small letters represent fragments of the measure one quarter note in duration.

Patterns of reiterated fragments are not used consistently throughout any of the Verses, but occur at least once in all the Verses in composite meter except Verse 1. Patterned fragment reiteration occurs in phrase 5 of Verse 5, phrases 1 and 5 of Verse 6, phrases 1, 3, and 4 of Verse 12, phrase 1

of Verse 13, and phrase 1 of Verse 21.

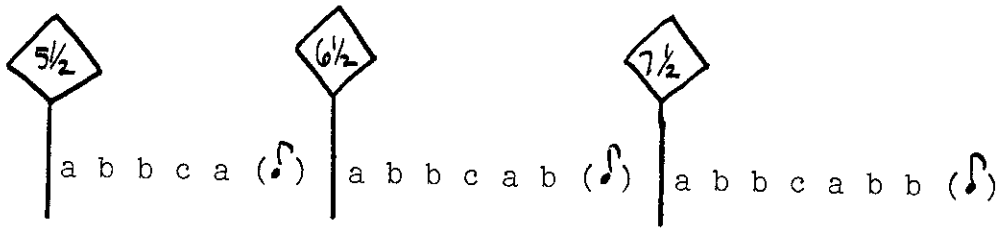


Fig. 12--Fragment reiteration. Verse 5, mm.1-3; Mazda Marimba.

### Subdivisions of the Pulse

The pulse is most commonly divided into even values, and remains in even values throughout the majority of the Verses. Only four Verses have both even and odd divisions of the pulse. Verse 4, for example, contains both sixteenth notes and sixteenth note triplets. Most of the Verses contain two levels of pulse subdivision, though several Verses have three levels of subdivision. An unusual rhythmic feature is the subdivision of the pulse into five parts in Verses 2, 10, and 18.

### Rhythmic Activity

There are three kinds of rhythmic activity in "Petals..." The first is that which remains consistent throughout the entire Verse, occurring only on one rhythmic level. Verses with this type of activity contain either steady quarter notes or steady sixteenth notes. Figure 13 shows the rhythmic values of a measure from Verse 10 which characterizes the rhythmic activity of the entire Verse.

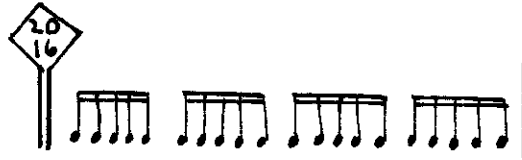


Fig. 13--Verse-constant rhythmic activity. Verse 10, m. 1.

The second type of rhythmic activity is that which remains consistent only within a given phrase. In Verses organized in this manner the rhythmic components of the entire phrase are either identical or very similar to the rhythmic ideas presented in the first bar of that phrase. Successive phrases contain contrasting rhythmic ideas. Figure 14 shows the rhythmic values of the first phrase and the beginning of the second phrase of Verse 12. Notice that the rhythmic material of measure one is repeated in measures two and three, and that this material differs from that found in the beginning of phrase two.

The third type of rhythmic activity is that which varies within the phrase and within the Verse; rhythmic ideas are freely presented with no patterned repetition of rhythmic motives. Figure 15 is an example of this non-patterned type of rhythmic activity.

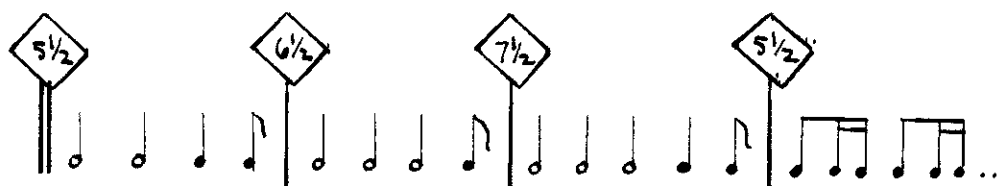


Fig. 14--Phrase-constant rhythmic activity. Verse 12, mm.1-4; Spoils of War.



Fig. 15--Non-patterned rhythmic activity. Verse 11, mm.1-7; Marimba Eroica.

Table VII shows the subdivision of the pulse and the rhythmic activity of each Verse. The Verses are grouped according to the number of pulses per bar. The levels of subdivision of the pulse are given for each Verse. The rhythmic activity of each Verse is described as either Verse-constant, phrase-constant, or non-patterned.

#### Bi-metric Aspects

The different meters and tempos of successive pairs

TABLE VII  
METER, PULSE, AND RHYTHMIC ACTIVITY

| Pulses per Bar | Meter     | Value of Pulse | Subdivision of Pulse | Rhythmic Activity | Verse |
|----------------|-----------|----------------|----------------------|-------------------|-------|
| 2              | 6/4       |                |                      | ph/constant       | 14    |
|                | 10/8      |                |                      | " "               | 18    |
|                | 6/8       |                |                      | " "               | 19    |
| 3              | 3/4       |                | none                 | vs/constant       | 3     |
|                | 3/4       |                |                      | non-patterned     | 4     |
|                | 18/16     |                |                      | " "               | 8     |
|                | 3/4       |                |                      | ph/constant       | 9     |
|                | 3/4       |                |                      | non-patterned     | 11    |
|                | 3/4       |                |                      | vs/constant       | 15    |
| 4              | 20/16     |                |                      | ph/constant       | 2     |
|                | 20/16     |                |                      | vs/constant       | 10    |
|                | 4/4       |                |                      | ph/constant       | 17    |
|                | 4/4       |                |                      | " "               | 22    |
|                | 4/4       |                |                      | non-patterned     | 23    |
| 5              | 10/8      |                |                      | non-patterned     | 7     |
|                | 5/4       |                |                      | " "               | 16    |
|                | 5/4       |                | none                 | " "               | 20    |
| additive       | composite |                |                      | non-patterned     | 1     |
|                | "         | "              |                      | ph/constant       | 5     |
|                | "         | "              |                      | " "               | 6     |
|                | "         | "              |                      | " "               | 12    |
|                | "         | "              |                      | " "               | 13    |
|                | "         | "              |                      | " "               | 21    |

of the duets and trios form several levels of bi-metric relationships in the compound Verses. In the first level, the bars of the individual Verses forming the compound Verses are of equal duration. Within the bar, the different meters and tempos of the individual Verses form bi-metric relationships of 5 against 3, 5 against 4, or 5 against 6. Figure 16 shows a 5 against 3 relationship between Verses 7 and 8--the Verses comprising Verse 27. The pulses for the meters of each Verse are shown. The first level of bi-metric organization is therefore one in which the periods of the metric cycles of the two Verses are equal in length.

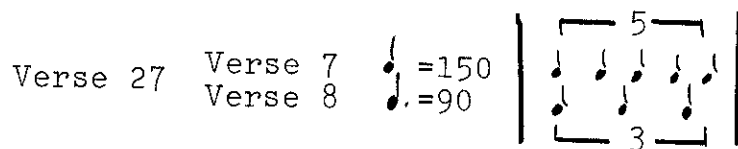


Fig. 16--Bi-metric relationship; 5 against 3.

In the second level of bi-metric organization, found only in Verse 28, the relationship extends beyond the bar. In this Verse, three measures of 20/16 (Verses 9), are equal in length to five measures of 3/4 (Verse 10). In Verse 28 the length of the bi-metric cycle is consequently longer than the lengths found in the cycles in level one.



The relationships between the meters of the individual Verses comprising Verses 24, 29, 30, and 34 extend beyond the Verse. In other words, there is no point within these Verses at which the downbeats of the individual Verses coincide. In all of these compound Verses, one of the individual Verses is in the composite meter. The final beats of the Verses forming these compound Verses are simultaneous only because of the careful planning of meters and tempos that resulted in all the Verses being exactly one minute in length.

In Verses 29 and 30 there is a simple bi-rhythmic relationship between the quarter notes of the individual Verses (3 against 4, and 2 against 3, respectively), but the added eighth note in every bar of the composite meter causes a constant shifting of these relationships.

Verses 24 and 34 represent the highest level of rhythmic polarity between the individual Verses of these compound Verses. While all instrumental parts in these Verses share a common subdivision of the pulse--the sixteenth note (480 per minute), there is no periodic relationship between the overlaid meters within the Verse.

With the exception of Verses 24 and 34, the individual Verses forming each compound Verse are in simple relationships to one another. These bi-metric relationships can all be expressed by small-number ratios. In Monophonic terms, the bi-metric relationships of Verses 27, 28, 29, 30, 31, 32, and 34 are within the 5 Limit; 5 is the highest odd number found

in a ratio expressing a bi-metric relationship. Partch's postulate that small-number ratios represent comparative consonance can be used to describe the bi-metric activity of the compound Verses. The bi-metric relationships expressible in small-number ratios represent comparative "bi-metric consonance," while those relationships which can only be expressed in large-number ratios--extending beyond the duration of the Verse--represent comparative "bi-metric dissonance."

Table VIII presents the bi-metric aspects of the compound Verses. Because Verses 25 and 26 are not bi-metric, they are not included in the table.

TABLE VIII  
BI-METRIC ASPECTS
































| Compound Verses              | Individual Verses | Meter | Tempo  | Relationship  |
|------------------------------|-------------------|-------|--|---|
| Relationships Within the Bar |                   |       |  |   |
| 27                           | 7                 | 10/8  |  =150 | 5(  ) against 3(  ) |
|                              | 8                 | 18/16 |  =90  |   |
| 31                           | 15                | 3/4   |  =90  | 5(  ) against 3(  ) |
|                              | 16                | 5/4   |  =150 |   |
| 32                           | 17                | 4/4   |  =120 | 4(  ) against 5(  ) |
|                              | 18                | 10/8  |  =60  |   |
| 33                           | 19                | 6/8   |  =180 | 6(  ) against 5(  ) |
|                              | 20                | 5/4   |  =150 |   |
| Relationships Beyond the Bar |                   |       |  |   |
| 28                           | 9                 | 3/4   |  =120 | 3 measures of 20/16=<br>5 measures of 3/4.  |
|                              | 10                | 20/16 |  =96  |   |

TABLE VIII--CONTINUED

| Compound Verses                | Individual Verses | Meter | Tempo  | Relationship   |
|--------------------------------|-------------------|-------|--|--|
| Relationships Beyond the Verse |                   |       |  |  |
| 29                             | 11                | 3/4   |  =90  | 3(  ) against 4(  ) |
|                                | 12                | comp. |  =120 |  |
| 30                             | 13                | comp. |  =120 | 2(  ) against 3(  ) |
|                                | 14                | 6/4   |  =180 |  |
| 24                             | 1                 | comp. |  =120 | .....  |
|                                | 2                 | 20/16 |  =96  |  |
| 34                             | 21                | comp. |  =120 | .....  |
|                                | 22                | 4/4   |  =120 |  |
|                                | 23                | 4/4   |  =120 |  |

#### Rhythmic Density

As mentioned earlier regarding texture, rhythmic density is a means by which it is possible to compare the rhythmic activity of the various Verses (see p. 36). The density of each Verse is unique, pointing out the variety of rhythmic organization in the Verses. Table IX-A presents the rhythmic densities of the first twenty-three Verses.

Fourteen of the Verses have a non-fluctuating rhythmic density; the level of rhythmic activity remains constant throughout the Verse. In nine of the Verses, presented in Table IX-B, rhythmic density is consistent within the phrase, but fluctuates from phrase to phrase.

For the eight Verse in Table IX-B which are in expanded two or three part forms, the levels of structure are shown above the density of the phrase. In some Verses the changing

TABLE IX-A

RHYTHMIC DENSITY OF VERSES 1 THROUGH 23

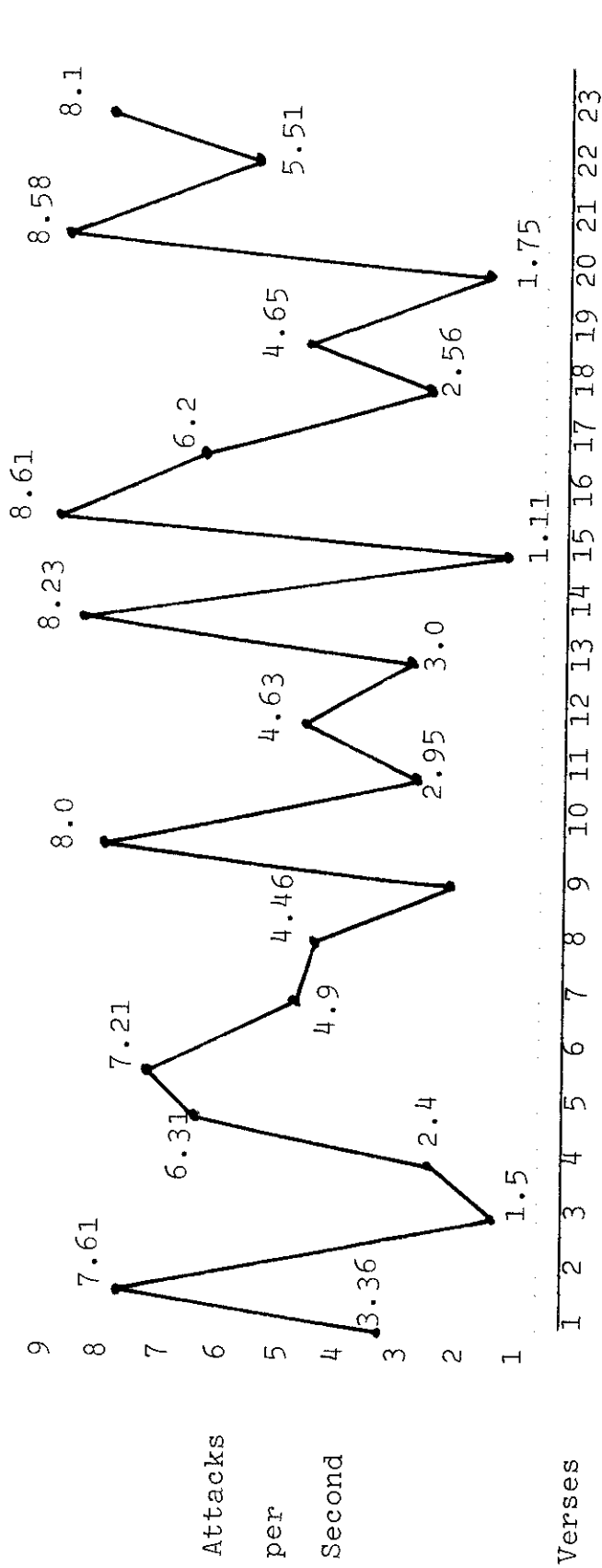
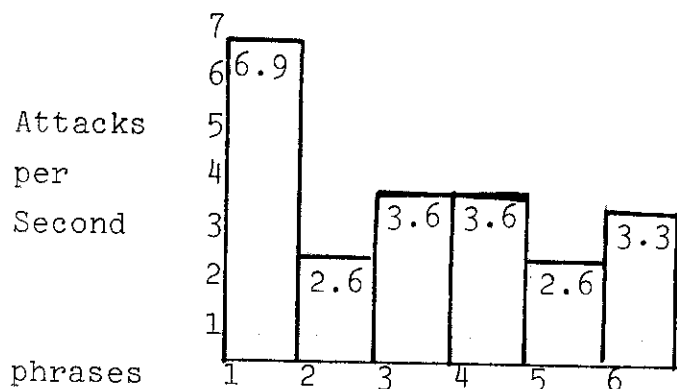
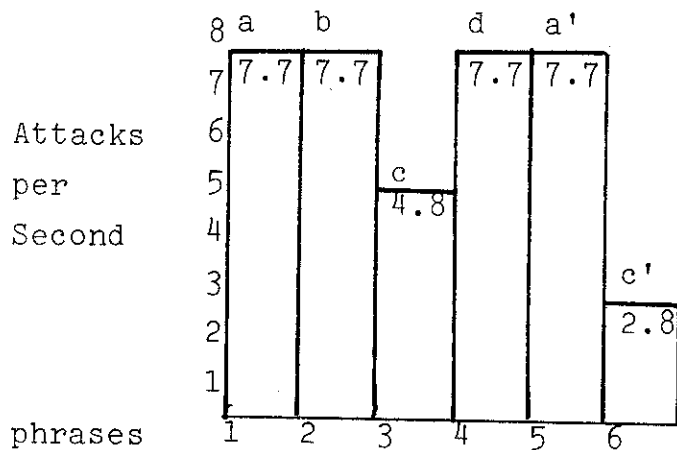


TABLE IX-B  
FLUCTUATING RHYTHMIC DENSITIES

Verse 1



Verse 5



Verse 6

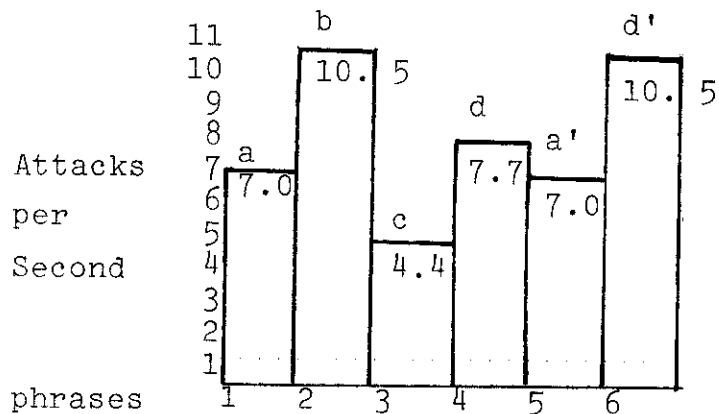
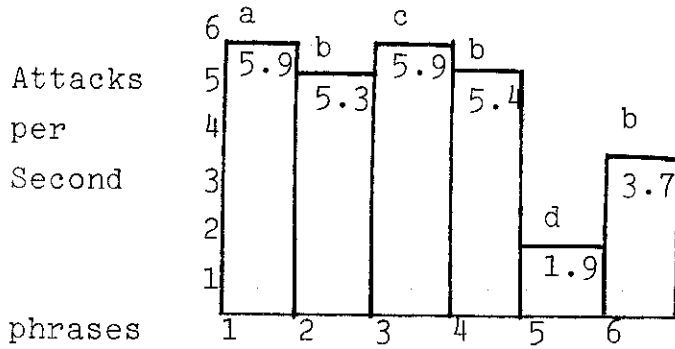
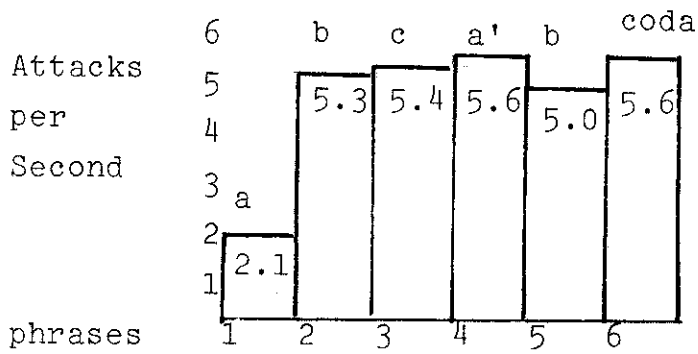


TABLE IX-B--CONTINUED

Verse 8



Verse 12



Verse 14

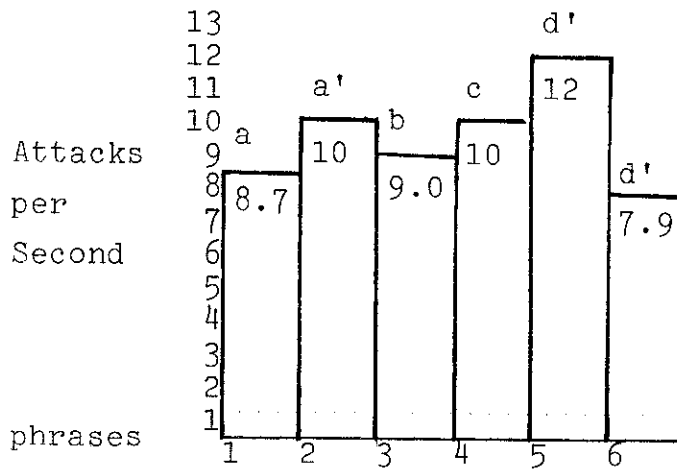
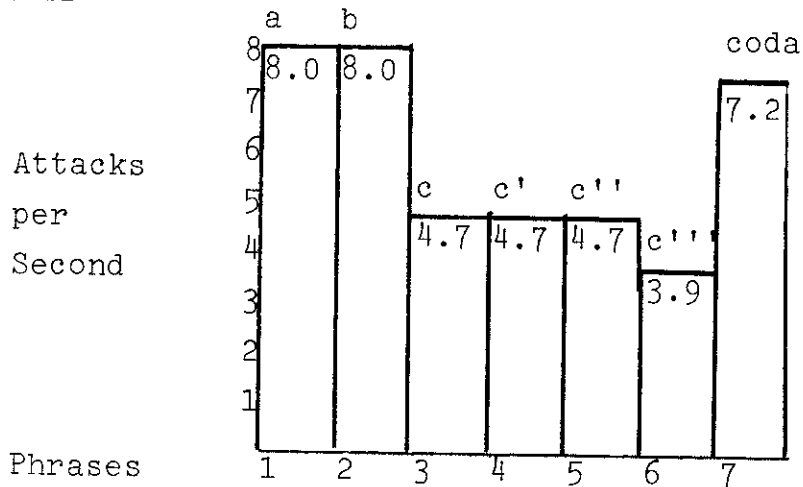
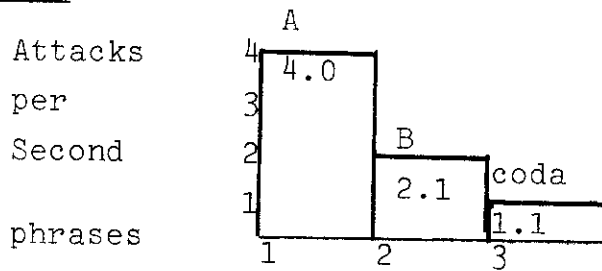
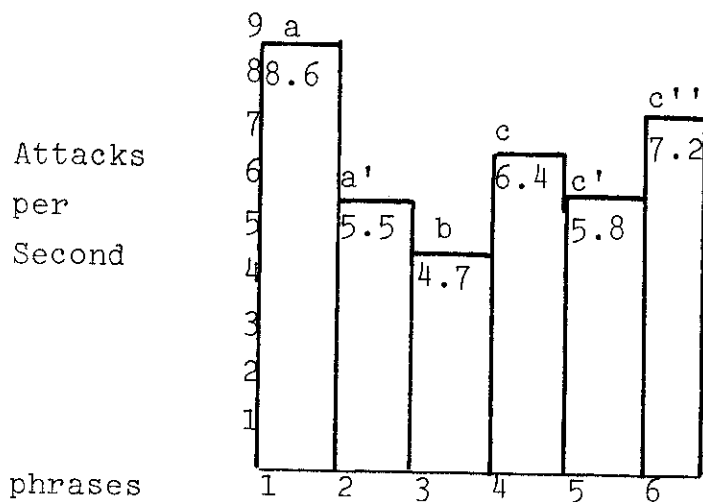


TABLE IX-B---CONTINUED

Verse 17Verse 18Verse 21

densities of successive phrases manifest closely the overall structure of the Verse. In Verse 17, for example, the density values of three of the four phrases labelled "c" are identical. This indicates the exact, or very nearly exact, repetition of material in this Verse. In Verse 14, however, the density values of phrases of similar material differ significantly. In Verse 14, then, the rhythmic treatment of similar material is freer than in Verse 17. It is interesting to note that the density values of Verse 1 are the same for phrases two and five, and for phrases three and four, though the linear-rhythmic material of each of these phrases is unique.

#### Rhythmic Density in the Compound Verses

The three levels of rhythmic density presented earlier in Table VI are low (less than 3.5 attacks per second), medium (between 3.5 and 6.0 attacks per second), and high (more than 6.0 attacks per second). Table IX-C presents the compound Verses as comprised of individual Verses of one of these three density levels.

The most common combination of Verses in Table IX-C is of Verses with contrasting rhythmic densities. Five of the compound Verses are formed by a Verse with a low rhythmic density and a Verse with a high rhythmic density. Of the remaining compound Verses, there is one each of a combination of two low densities, two medium densities, and two high densities. Verse 34 contains the only combination of medium and high densities.



TABLE IX-C  
RHYTHMIC DENSITY IN THE COMPOUND VERSES

| Compound Verses | Individual Verses | Density Combination |
|-----------------|-------------------|---------------------|
| 24              | 1                 | low                 |
|                 | 2                 | high                |
| 25              | 3                 | low                 |
|                 | 4                 | low                 |
| 26              | 5                 | high                |
|                 | 6                 | high                |
| 27              | 7                 | medium              |
|                 | 8                 | medium              |
| 28              | 9                 | low                 |
|                 | 10                | high                |
| 29              | 11                | low                 |
|                 | 12                | medium              |
| 30              | 13                | low                 |
|                 | 14                | high                |
| 31              | 15                | low                 |
|                 | 16                | high                |
| 32              | 17                | high                |
|                 | 18                | low                 |
| 33              | 19                | medium              |
|                 | 20                | low                 |
| 34              | 21                | high                |
|                 | 22                | medium              |
|                 | 23                | high                |

low--less than 3.5 attacks per second

medium--between 3.5 and 6.0 attacks per second

high--more than 6.0 attacks per second

## Pitch

Linear Elements

The pitch material of each of the twenty-four duets and trios of "Petals..." is unique; there is no large scale organization of material which unifies the Verses. As in the areas of form and rhythm, the phrase is the basic structural unit of linear material. Within the phrases, pitch sequences are not "melodic" in the sense of being horizontal progressions in which each tone has "function and significance."<sup>2</sup> Linear elements are structured around "focal" pitches. Non-focal pitches, which function as embellishments or elaborations of the focal pitches, are generally part of linear shapes which characterize the contours of the phrases. These secondary pitches supply the tonal surroundings from which a sense of tonality around the focal pitches emerges. The linear elements of the Verse, then, are created through the succession of the focal pitches and contour components of the juxtaposed phrases.

Focal pitches.--Focal pitches are given prominence within the phrase in several ways. Most commonly, the focal pitch occurs more than any other single pitch and tends to fall on stressed beats. In Figure 17, the focal pitch is circled each time it appears. Of the twenty-nine notes in the example, six are repetitions of the focal pitch. No other pitch in the

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<sup>2</sup>"Melody," Harvard Dictionary of Music, 2nd ed., (Cambridge, 1972).

phrase occurs more than four times. The focal pitch also occurs on all the accented beats of the measure except beats one and five.



Fig. 17--Focal pitch through repetition and rhythmic stress. Verse 5, m. 3; Mazda Marimba. Symbols below the staff are tablature symbols.

On the instruments capable of producing sustained tones, the focal pitch is often of longer duration than other pitches in the phrase, as shown by Figure 18.



Fig. 18--Sustained focal pitch. Verse 7, mm. 3-4; Chromelodeon II.

As in both of the above examples, focal pitches are often

stressed by the contour of the phrase. In Figure 17, the line rises to the focal pitch, fluctuates around that pitch, and ends there. The sustained tone of Figure 18 is the final pitch of the phrase; the contour of the line progresses to, and ends on, this pitch.

Instrumental pitch characteristics.--Not all of the instruments used in "Petals..." are capable of producing all forty-three tones of the Monophonic scale. The Zymo-xy1, the Spoils of War, and the Cloud Chamber Bowls all produce pitches found in the Monophonic scale, but these pitches are the random result of inherent limitations of the vibrating materials these instruments are made of. The scales of these instruments, none of which have more than twenty-three tones, include both small-number and multiple-number ratios. The tonal resources of these instruments are therefore randomly limited.

Partch designed several instruments to produce only part of the Monophonic scale. The scales of these instruments include primarily the small-number ratios. The tonal resources of these instruments are consequently limited to the Primary Tonalties, which have only small-number ratios as hexad members.

Table X gives the range of each instrument and describes the scale of the instrument as "chromatic," if it includes all forty-three tones of the Monophonic scale, or as "limited," if it does not include all the Monphonic scale tones.

TABLE X  
INSTRUMENT TUNING AND RANGE

| Instrument                   | Scale     | Range*                 |
|------------------------------|-----------|------------------------|
| Adapted Guitar               | chromatic | C-c''                  |
| Bass Marimba                 | limited   | C-b flat               |
| Bloboy                       | " "       | e flat-e flat''        |
| Blue Rainbow                 | " "       | F-g''                  |
| Boo                          | chromatic | b flat-a flat''        |
| Castor and Pollux            | " "       | F-?                    |
| Chromelodeon I               | " "       | f-c#''                 |
| Chromelodeon II              | " "       | G <sub>1</sub> -f#'''' |
| Cloud Chamber Bowls          | limited   | c#'-b flat''           |
| Crychord                     | not given | variable               |
| Diamond Marimba              | limited   | c#-c#''''              |
| Drone Devil                  | " "       | variable               |
| Gubagubi                     | not given | not given              |
| Gourd Tree and<br>Cone Gongs | limited   | F-g''                  |
| Harmonic Canon I             | chromatic | F-f''''                |
| Kithara I                    | " "       | G-b flat''             |
| Kithara II                   | " "       | G <sub>1</sub> -f'     |
| Kithara(Surrogate)           | " "       | D-f#'                  |
| Koto                         | " "       | F-c''                  |
| Marimba Eroica               | limited   | A <sub>0</sub> -A      |
| Mazda Marimba                | " "       | c-b flat''             |
| Spoils of War                | " "       | A <sub>1</sub> -d''''  |
| Zymo-xyl                     | " "       | b flat'-g''''          |

Ratios are given the name of the nearest tone of the twelve-tone equal tempered scale. Helmholtz octave notation is used.

Instrumental contour characteristics.--Though there is variety within the contour of each Verse, the components of linear contour are, to a certain degree, specific to each instrument type. While most linear shapes are possible for all instruments, the idiomatic usages of the instruments affect the contour of each Verse.

The idiophones are used most often in rapid, single-line passages. Figure 7 (see p. 28) is an example of a characteristic idiophonic contour. Chordophones are used most often to play chords or pitches in a comparatively slower rhythmic context, and pitches are often smoothly connected with the use of the pyrex rod. Though the aerophones (with the exception of the Drone Devil) can produce many simultaneous pitches, aerophonic passages are usually monophonic or contrapuntal. Figure 18 is an example of a characteristic aerophonic passage.

Linear contour components.--As discussed earlier in this chapter, the formal structure of the phrase is achieved through either internal repetition of linear-rhythmic motives, or through internal consistency of linear-rhythmic elements. If there is internal repetition within the phrase, a consistent linear contour is created by the character of the repeated motives. Figure 19.a is an example of a phrase structured through motivic repetition. Figure 19.b shows the essential component of Figure 19.a which generates the the linear contour of that phrase.



Fig. 19.a--Phrase structured through motivic repetition.  
19.b--Essential contour component of Fig. 19.a.

Contour is consistent in a less specific way in phrases without internal repetition, as in Figure 8 (see p. 28). While there is no actual repetition of material in this example, there is a relatedness of internal components which creates a somewhat unified contour.

However the phrase is structured, the essential contour of the phrase can be illustrated graphically. Table XI gives the linear shapes which characterize phrase contour. Examples in traditional notation are given where possible. A verbal description is given if the shape cannot be represented on the five-line staff.

Notational problems.--Because Partch devised a different tablature notation for each instrument, the transcription

TABLE XI  
LINEAR CONTOUR COMPONENTS

| Component Name             | Example  | Symbols |
|----------------------------|--|---------|
| Pedal Tone                 |  |         |
| Embellished Pedal Tone     |  |         |
| Terrace Figure             |  |         |
| Multiple Auxiliary Tones   |  |         |
| "Chromatic" Scale Passage* | <p>A. Rapid passages of successive scale pitches in chromatic inst.<br/>           B. Pyrex rod moved along string of chordophone.</p> |         |
| "Limited" Scale Passages*  | <p>A. Conjoint steps on "limited" inst.<br/>           B. Small, non-chromatic steps on chromatic inst.</p>                            |         |
| Chordal Glissando*         | <p>Pyrex rod moved along string of chordophone after chord is struck.</p>  |         |

\*These shapes can move up, down, or in any combination of successive directions.



of the individual instrumental parts is contingent upon the amount of information given in the section of Genesis... dealing with the instruments and their notation. Due to the lack of information on certain tablature symbols in the notation of the Koto, the Blue Rainbow, the Spoils of War, Chromelodeon I, and the Castor and Pollux, portions of Verses 4, 7, 8, 12, 15, 16, 19, 20, and 23 are not transcribable. Also, in Verse 4, there is no indication of which stops on the Chromelodeon II are open, making transcription of this part impossible. In addition, it is not possible to determine the linear elements of the improvised parts in Verses 1 and 19.

A more complex problem is encountered in the notation of the Harmonic Canon I. In the description of this instrument in Genesis..., Partch did not include the ratios which result through the movement of the pyrex rod along the string. It is also not clear what the sounding pitch of the instrument is when the pyrex rod is used on the string in the secondary tunings of the instrument, as found in Verse 9 and 13. These factors combine to make accurate transcription of Harmonic Canon I parts impossible without further information.

Table XII shows the focal pitches and linear contours of each Verse which can be transcribed. Solid horizontal lines represent the octaves of the pitch class "G," ordered vertically from lowest pitch to highest pitch. Focal pitches





are shown as noteheads without stems in their approximate locations within the appropriate octave. The ratio of each focal pitch is given near the notehead. A focal chord is represented by a stemmed notehead. An upward stem indicates an Otonality and a downward stem indicates an Utonality. The ratio of the 1 Identity of the chord is given near the notehead. Contour is notated as described in Table XI and summarized in the key to Table XII. Vertical dotted lines divide the Verses into the phrases presented in Table III-A and III-B.

Table XII provides a visual representation of the organization of linear material. A comparison of Table XII and Table III-A reveals the phrase repetition of linear material in Verses in expanded two and three part forms. A comparison of Table XII and Table III-B shows the through-composed nature of linear material in Verses 1, 2, 10, 16, 19, 20, 22, and 23.

The compound Verses.---The contours of the compound Verses are formed by the contour components of the duets and trios. By examining in Table XII the comparative ranges of Verses 1 and 2 (which form Verse 24), Verses 7 and 8 (which form Verse 27), Verses 9 and 10 (which form Verse 28), Verses 11 and 12 (which form Verse 29), and Verses 17 and 18 (which form Verse 32), it becomes evident that care was taken

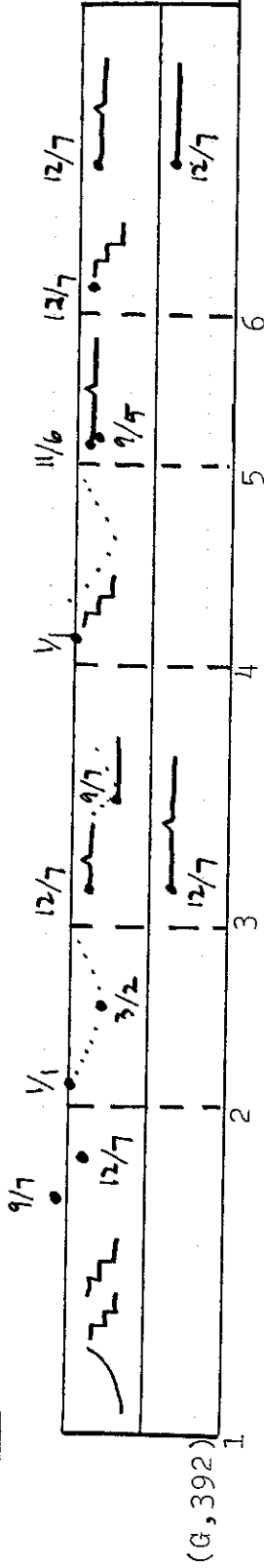
TABLE XII

MELODIC CONTOUR--FOCAL PITCHES

Key; Pedal Tone — Embellished Pedal Tone — Terrace Figure   
 Multiple Auxiliary Tones  Chromatic Scale Passage   
 Limited Scale Passage . . . . . Chordal Glissando   
 Focal Pitch • Otonality ! Utonality |

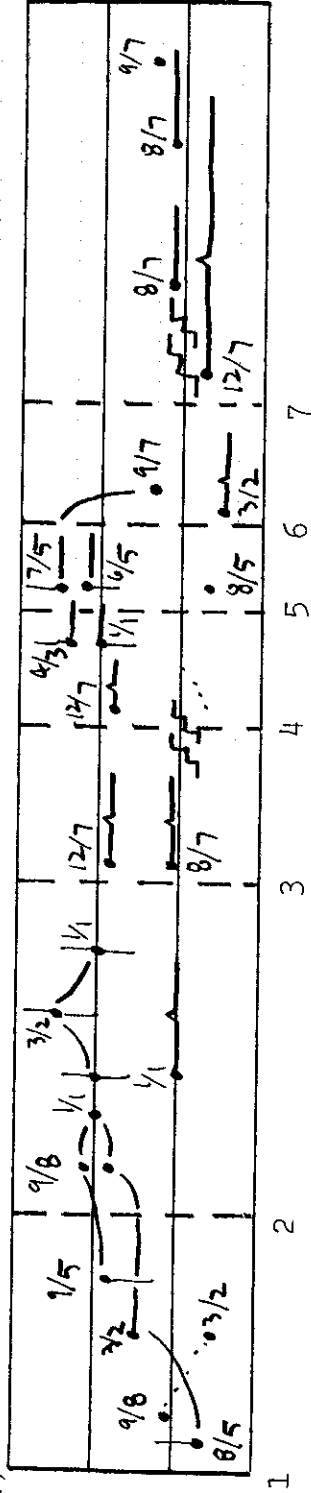
Verse 1\*

(G, 392)



Verse 2

(G, 392)



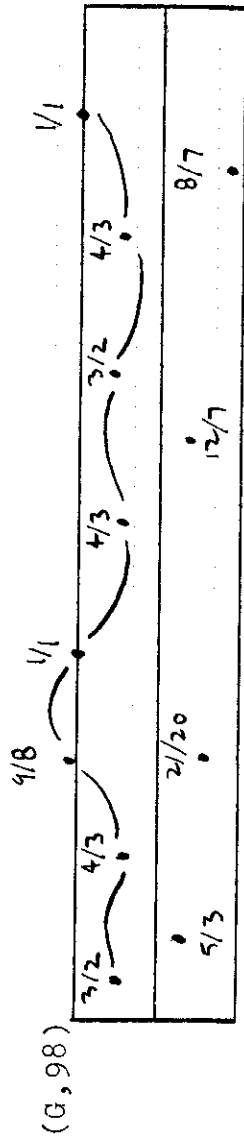
\*Indicates Verses in which portions are not transcribable.



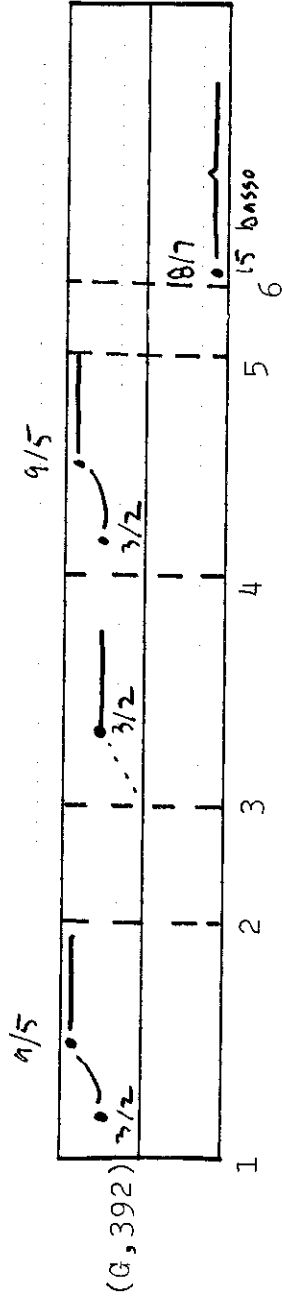


TABLE XII--CONTINUED

Verse 11



Verse 12\*



Verse 13\*

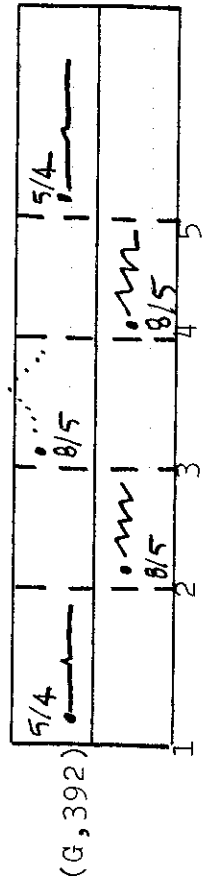
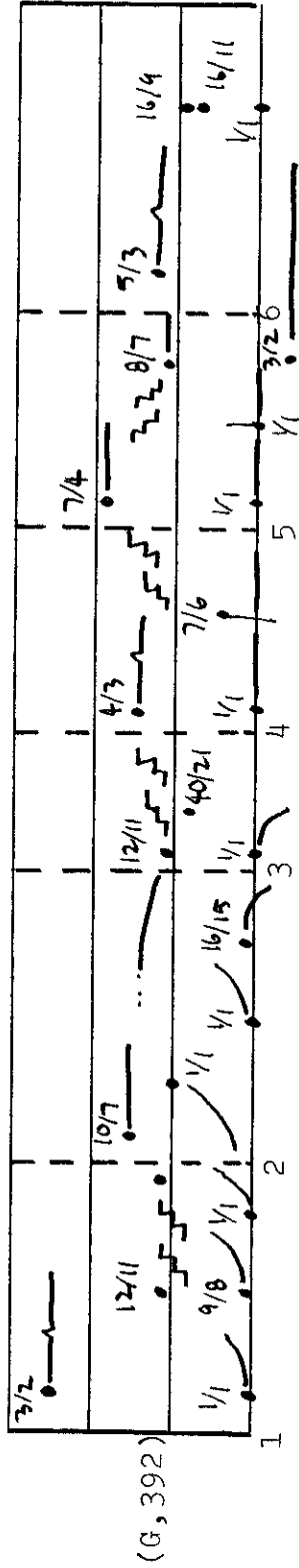
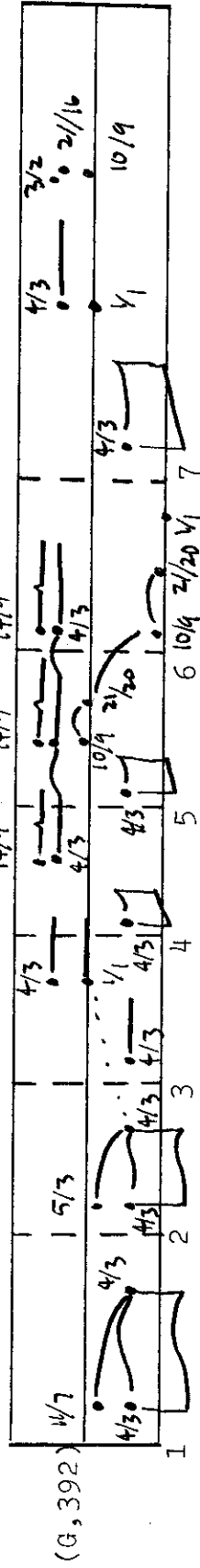


TABLE XII--CONTINUED

Verse 14



Verse 17



Verse 18\*

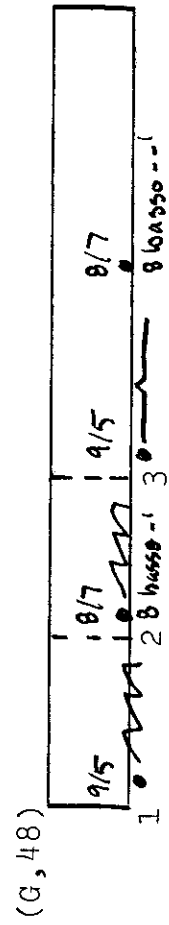
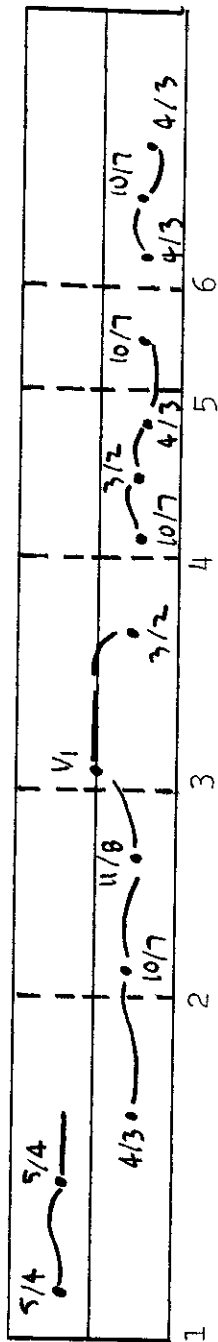


TABLE XII--CONTINUED

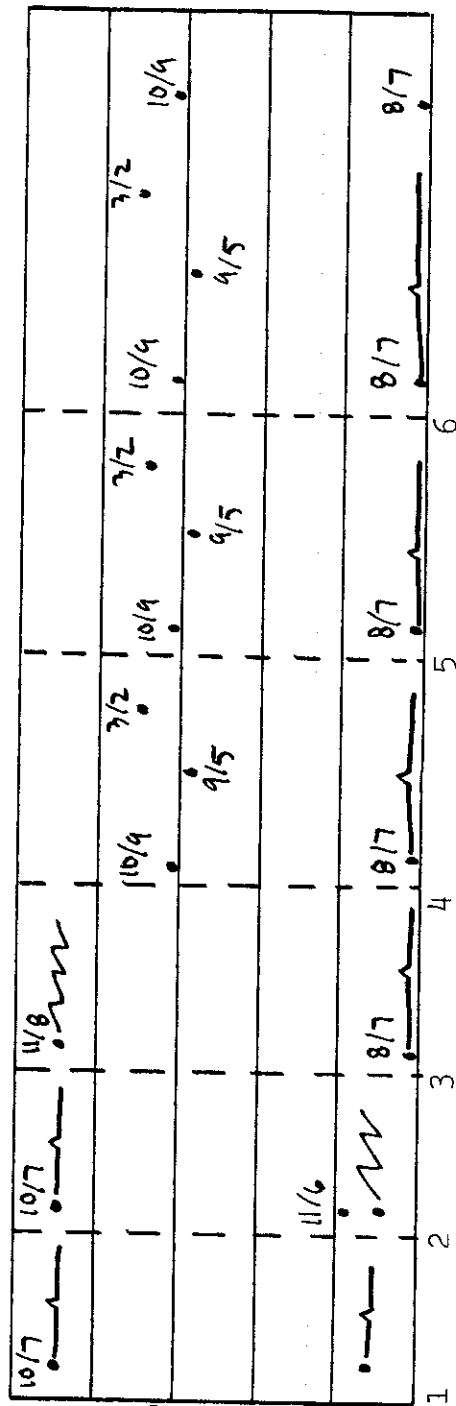
Verse 20\*

(G, 196)



Verse 21

(G, 392)







to insure that the ranges of the individual Verses would be complementary. Because the linear elements of the Verses described above do not overlap so far as range is concerned, the duets and trios which comprise these compound Verses retain a strong identity. In Verses 5 and 6 (which form Verse 26), Verses 13 and 14 (which form Verse 30), and Verses 21, 22, and 23 (which form Verse 34), ranges overlap, making the aural separation of the contours which comprise these compound Verses more difficult.

#### Tonal Elements

Tonality in the Verses arises from the relationships of focal pitches to one another and to their immediate pitch surroundings. Based on the organization of linear material, it is possible to group the pitch material within a Verse into separate areas of specific tonal identities. Each phrase of a Verse represents at least one "tonal area." Some phrases have several tonal areas. Tonal areas can be evaluated by determining their level of tonal stability.

Tonal stability.--There are five basic levels of tonal stability in the Verses of "Petals...." Any given segment of pitch material can be included in one of these categories. The five levels are listed below in order of decreasing stability.

1. Areas in which all focal pitches are Identities in the same tonality, and the surrounding pitches are limited to the small-number ratios of the Primary Tonalities. This is the most stable level of tonal activity.

2. Areas in which all focal pitches are Identities in the same tonality, but the surrounding pitches are "chromatic" (including all forty-three tones of the Monophonic scale). Areas in this category are less stable than the areas described in Level 1 because the surrounding pitches support the prevailing tonality less strongly.

3. Areas in which one tonality is strongly suggested by focal pitches and pitch surroundings, but one focal pitch is not a member of that tonality and acts as an unresolved dissonance to the prevailing tonality.

4. Areas in which two different tonalities are simultaneously suggested by focal chords, focal pitches, and pitch surroundings.

5. Areas in which no tonality is suggested. In tonal areas in this category, focal pitches which are not members of the same tonality, do not suggest any tonality.

Levels 1 and 2 describe tonal areas which are essentially stable. Levels 3, 4, and 5 describe areas which are essentially unstable.

Determining tonal areas.--By examining the Verses in Table XII, one can see areas in which one or more focal pitches

dominate the pitch material of a phrase, or of a portion of a phrase. By locating the ratios of the focal pitches in Table I-A or I-B (Primary and Secondary Tonalities), it is possible to determine what tonality, if any, the focal pitches are included in. For example, in phrase 1 of Verse 1, the focal pitches are  $9/7$  and  $12/7$ . In Table I-A, both of these pitches are Identities in the  $8/7$  Otonality. An examination of the score reveals that the surrounding pitches are limited to the small-number ratios of the primary Tonalities. Therefore phrase 1 of Verse 1 is a Level 1 tonal area, manifesting the  $8/7$  Otonality. A Level 2 tonal area would be found in the same way, except that an examination of the score would reveal chromatic pitch surroundings.

An example of a Level 3 tonal area is phrase 2 in Verse 17. The first part of the phrase has a  $4/3$  Utonality focal chord with a  $5/3$  focal pitch. The  $4/3$  Utonality, found in Table I-B, does not have a  $5/3$  as a hexad member. While the  $4/3$  Utonality is the prevailing tonality, the focal pitch  $5/3$  acts as a dissonance which resolves later in the phrase.

In phrase 4 of Verse 2, it is indicated in Table XII that the  $4/3$  Otonality and the  $4/3$  Utonality sound simultaneously. This portion of the phrase is therefore an example of a Level 4 tonal area.

The opening phrase of Verse 21 has two focal pitches. By locating these pitches in Table I-A and I-B it is evident that these pitches are not members of the same hexad.

An examination of the surrounding pitches in the score reveals that neither pitch strongly suggests its identity in any tonality. Phrase 1 of Verse 22, then, is an example of a Level 5 tonal area.

Tonal function.--Function is created from the horizontal relationship between tonal areas. The movement from instability to stability can be considered the process of resolution from areas of tension to areas of repose. The relationship between stable and unstable areas can be measured by the interval quality between the focus of a stable area and the foci of an unstable area. In the Monophonic system of intonation, the focus of an Otonality or an Utonality is its 1 Identity. Unstable areas have more than one focus (hence their instability). By reducing the interval quality between the foci of any two successive tonal areas to Partch's "Interval Quality" types, it is possible to abstract functional tendencies from the variety of tonal activity in the Verses.

Figure 20 shows the movement of a Level 4 tonal area, labelled "A" in the example, to a Level 1 tonal area, labelled "B." The foci of area "A" are  $8/5$  and  $9/8$ , the 1 Identities of the two tonalities present in area "A." The interval from  $8/5$  to  $1/1$  (the focus of area "B") is a minor third, or an "Interval of Emotion." The interval between  $9/8$  and  $1/1$  is a major second, or an "Interval of Approach."

|            |                         |          |
|------------|-------------------------|----------|
| <u>A</u>   |                         | <u>B</u> |
| 9/8 Ot.--- | Interval of Approach--- | 1/1 Ot.  |
| 8/5 Ot.--- | Interval of Emotion---  |          |

Fig. 20.--Movement from an unstable tonal area to a stable tonal area.

This same technique can be used in describing the relationship between successive areas of tonal stability. In Figure 21, two level 1 tonal areas are shown. The 8/7 Otonality, labelled "A" in this example, moves to the 32/21 Otonality, labelled "B." The interval between 8/7 and 32/21 is a perfect fifth, or an "Interval of Power."

|            |                      |           |
|------------|----------------------|-----------|
| <u>A</u>   |                      | <u>B</u>  |
| 8/7 Ot.--- | Interval of Power--- | 32/21 Ot. |

Fig. 21--Movement between two tonally stable areas.

Common tone relationships.--An important relationship exists between successive tonal areas which share common tones. All Primary Tonalities have 1/1 as a hexad member; therefore movements between the Primary Tonalities all have 1/1 as a common tone. In Figure 20, an even stronger common tone relationship is shown. The 9/8 in area "A" is a hexad member of the 1/1 Otonality in area "B." While tonalities may share other Hexad members as common tones, tonal areas sharing the strongest Identity of either tonality--the 1 Identity--are the

most closely related. This type of common tone relationship is important in the subsequent analyses of the tonal nature of the Verses.

Table XIII presents the tonal areas of each Verse which can be either wholly transcribed, or in which enough of the pitch material can be transcribed to give an accurate representation of tonal activity. Table is therefore limited to analyses of Verses 1, 2, 5, 6, 7, 8, 14, 17, 21, 22, and 23.

Functional tendencies.--An examination of the interval qualities between tonal areas, shown in Table XIII, reveals two important resolution tendencies. The first is that Intervals of Approach and Emotion commonly occur together in the movement to stability. This type of resolution, predominant in Verses 2, 5, 10, and 14, usually occurs in the middle of the Verse. The second tendency is that the stronger Intervals of Power and Suspense occur most often in the final resolution of the Verse, as in Verses 2, 5, 8, 17, and 22. Common tone relationships, found in Verses 2, 5, 7, 10, 14, 22, and 23, exist in both resolution tendencies described above.

Verse tonality.--The tonality of a Verse can be discovered by considering its areas of tonal stability. On the basis of tonal activity, the Verses analyzed in Table XIII are of three types. In the first type, which includes Verses 1, 7, 8, 10, 14, and 22, one tonality prevails throughout the entire Verse.

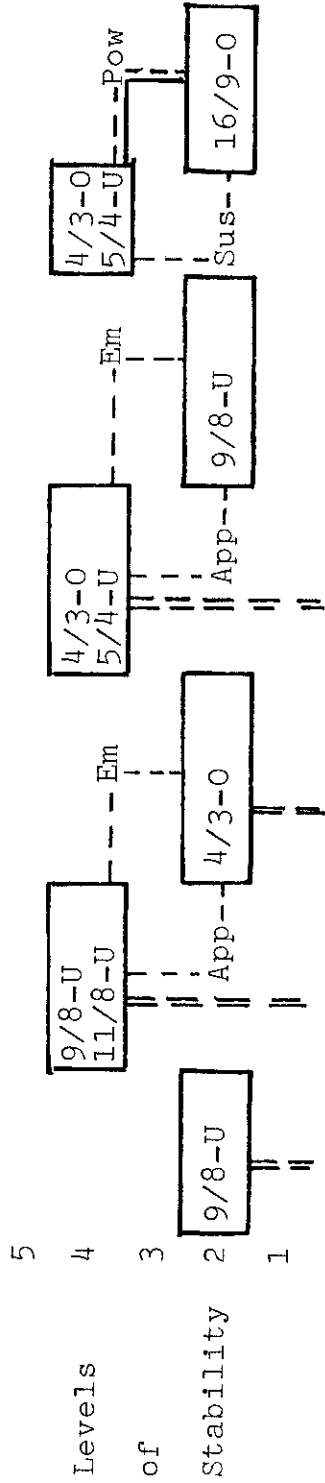




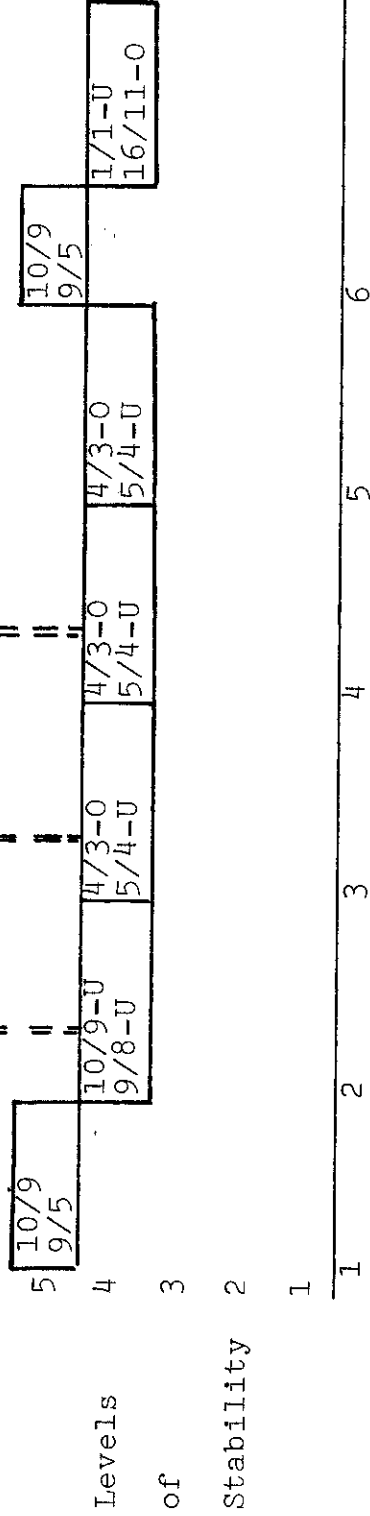


TABLE XIII--CONTINUED

Verse 5



Verse 26

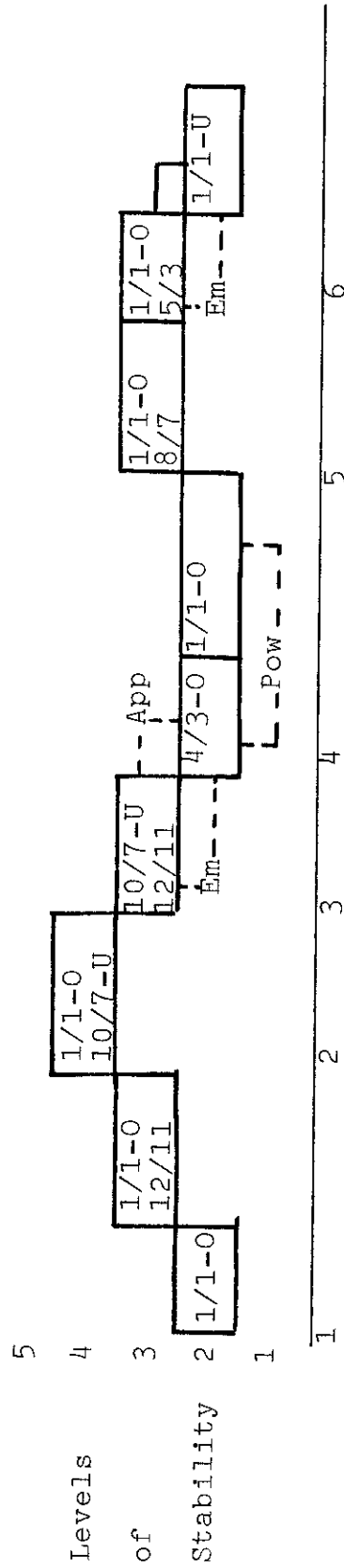


Verse 6



TABLE XIII--CONTINUED

Verse 14



Verse 17

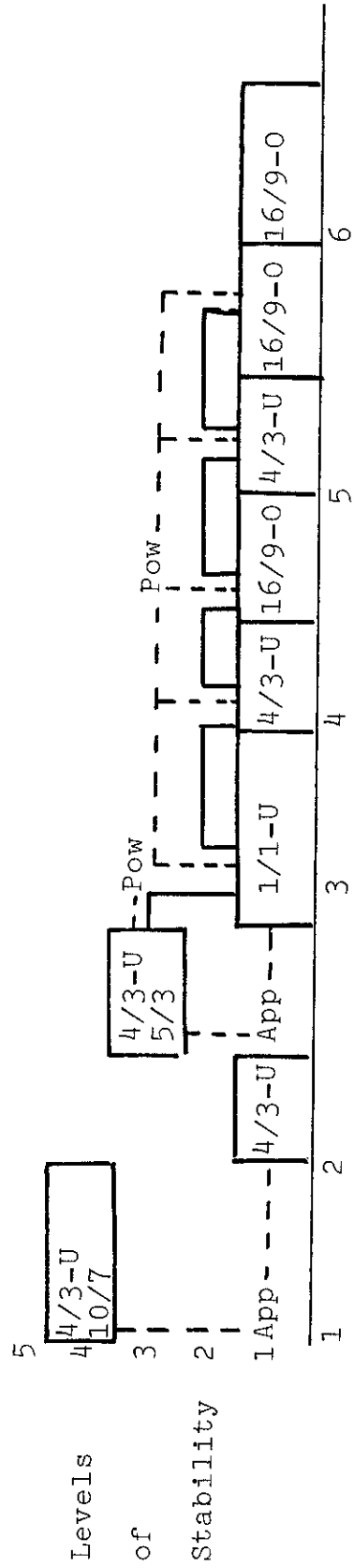
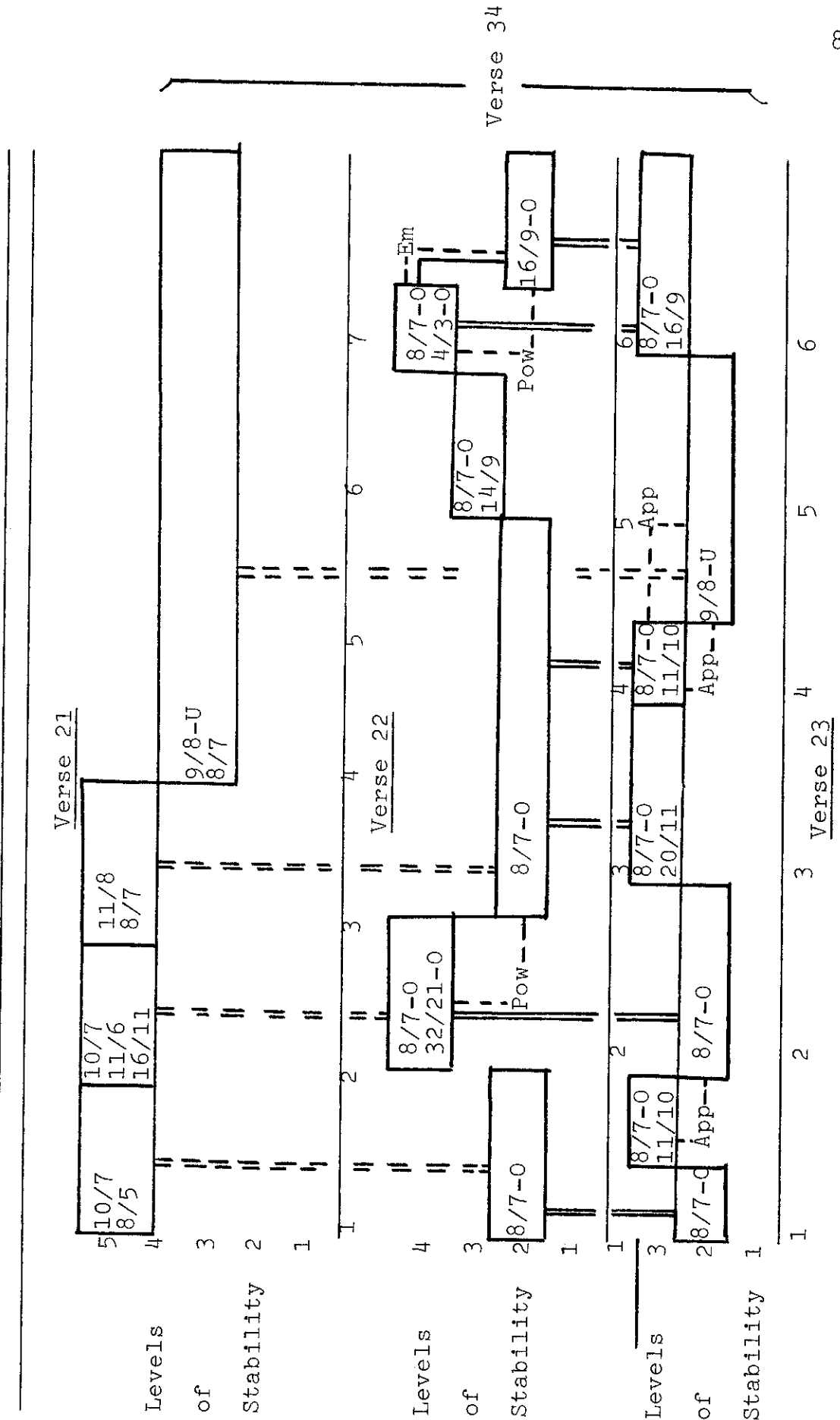


TABLE XIII--CONTINUED



In Verse 8, for example, it is evident that the 8/7 Otonality is the overall tonality of the Verse. The 8/7 Otonality, which is the only stable tonality present, occurs frequently and is suggested even in areas of tonal instability. Though there is movement among several tonalities in Verses 1, 7, 10, 14, and 22, one tonality prevails in each of these Verses.

The second type of tonal activity, found in Verses 2, 5, and 17, is characterized by movement between two strong tonalities. These Verses begin in one tonality and move through stable or unstable areas to a second tonality. The first two phrases of Verse 2, for example, are in the 1/1 Otonality. The remainder of the Verse is in the 8/7 Otonality.

Common tone relationships are the basis of "deceptive" resolutions in several of the Verses described above. Verses 5, 7, 8, 14, 17, and 22 cadence in a tonality foreign to the rest of the Verse. Each of these deceptive resolutions contains a common tone relationship between the final two tonal areas. In addition, each of these resolutions occurs either at an Interval of Suspense (the tritone) or the Interval of Power (the perfect fifth).

The third type of tonal activity, found in Verses 6 and 21, is essentially unstable throughout the entire Verse. By examining Table XIII, it is evident that neither of these Verses contain a Level 1 or Level 2 tonal area. These Verses both contain movement only among several unstable areas.

Tonality in the compound Verses.---The tonal analysis of many of the compound Verses is limited due to the notational problems described earlier. A relatively complete analysis is only possible for Verses 24, 26, and 34.

In Table XIII, tonal correspondence between the Verses which form the compound Verse is indicated by a double solid line. The double solid line represents the same tonality occurring simultaneously in specific tonal areas of the overlaid Verses. Double dotted lines indicate a specific type of common tone relationship which will be discussed presently.

Verse 24 is basically in the 8/7 Otonality. Tonally stable areas in both of the Verses comprising this Verse are either the 1/1 Otonality of the 8/7 Otonality. Tonalties correspond in phrase 2 of both Verses (the 1/1 Otonality), phrase 3 of both Verses (the 8/7 Otonality), and in the final phrase of both Verses (the 8/7 Otonality). Tonal correspondence is clear between these Verses because they share the same phrase structure.

Verses 5 and 6 also share the same phrase structure. However, the compound Verse 26, comprised of Verses 5 and 6, is essentially unstable tonally, as is Verse 34. In both Verse 26 and 34, one of the individual Verses comprising the compound Verse is not in a stable tonality.

Verse 27 is the only compound Verse which can be described as bi-tonal. Of the Verses comprising this compound Verse, Verse 7 is in the 1/1 Utonality and Verse 8 is in the

8/7 Otonality. These tonalities are an Interval of Approach apart, as are the concluding phrases of Verses 22 and 23, which form part of Verse 34.

The double dotted lines represent tonal complementarity between areas which are not of the same tonality. Often, the unstable area of one of the Verses comprising a compound Verse is supported by the tonality of the stable area in the other Verse. For example, the first phrase of Verse 21 is a Level 5 tonal area with the non-harmonic tones 10/7 and 8/5. 10/7 is a hexad member of the 8/7 tonal area of the first phrase of Verse 22. When considered together, only the 8/5 is left as a dissonance to the 8/7 Otonality. These phrases, then, act together to create a Level 3 tonal area. This type of complementarity occurs in Verse 27, between two unstable areas.

It is not possible to draw any definite conclusions regarding the bi-tonal nature of the compound Verses as a whole. However, three types of tonal structure in the Verses described above can be discerned: 1) Verses in which overall tonalities correspond (Verse 24); 2) Verses in which overall tonalities do not correspond (Verses 27); and, 3) Verses in which tonal stability is combined with tonal instability (Verses 26 and 34).



### An Analytic Overview

The formal structure, instrumental combinations, rhythmic activity, and pitch organization of each Verse of "Petals..." are unique. Partch organized the duets and trios to explore the limits of these parameters. The compound Verses necessarily reflect this diversity of organization. In addition, with the aid of modern recording techniques, Partch explored the limits of bi-tonal and bi-metric relationships in the compound Verses. By reducing the parameters of form, rhythm, and pitch to three or four basic levels of organization, one can see how these parameters interact to form the unique character of each Verse.

### Form

Formal structure within the duets and trios is achieved in four ways, which result in four levels of structural stability. The higher the level of organization, the more stable the structure of the Verse. From lowest to highest, the four levels of structural stability are represented by

- 1) Verses in which phrases of regular lengths are repeated in patterns creating expanded two and three part forms;
- 2) Verses in which phrases of non-regular lengths are repeated in patterns creating expanded two and three part forms;
- 3) Verses in which through-composed material is presented in phrases of regular lengths; and
- 4) Verses in which through-composed material is presented in phrases of non-regular lengths.

There is polarity between the formal structures of the duets and trios in all but one of the compound Verses. However, a high level of structural stability in at least one of the duets or trios lends an aurally perceptible structural foundation to the compound Verse. From highest to lowest, the levels of structural stability in the compound Verses are represented by 1) compound Verses in which the duets or trios share the same meter and phrase structure; 2) compound Verses in which the duets or trios share the same meter, but not the same phrase structure; 3) bi-metric compound Verses in which at least one of the duets or trios has a high level of structural stability; and 4) bi-metric compound Verses in which both duets or trios have a low level of structural organization.

### Rhythm

The most conspicuous aspect of the rhythmic organization of "Petals..." is rhythmic density. As stated earlier, most of the Verses have non-fluctuating rhythmic densities, reflecting the consistent treatment of rhythmic materials. In the Verses with fluctuating rhythmic density, the treatment of rhythmic materials is consistent within the phrase. The organization of these rhythmic materials is unique in each Verse, and is inextricably fused with linear and formal elements. As such, the specific organization of rhythmic materials in each Verse is reflected in the levels of formal

structure described above.

There are four kinds of metric relationships in the compound Verses. The different bi-metric relationships result in different levels of polarity between the duets and trios forming a compound Verse. From lowest to highest, the four levels of bi-metric polarity are represented by 1) compound Verses in which the meters and tempos of the duets or trios are the same (Verses of this type having no polarity between the rhythmic identities of the duets or trios); 2) compound Verses in which the bi-metric relationship is within the bar (see p. 50); 3) compound Verses in which the bi-metric relationship is beyond the bar; and 4) compound Verses in which the bi-metric relationship extends beyond the duration of the Verse.

#### Pitch

The organization of linear material, like the organization of rhythmic materials, is reflected in the preceding levels of formal structure. There are three levels of tonal stability caused by the tonal implications of linear material. In the duets and trios the levels of tonal stability, from highest to lowest, are represented by 1) Verses in which one stable tonality predominates throughout; 2) Verses in which there is movement among several stable tonalities; and 3) Verses in which no stable tonality or tonalities predominate.

In the compound Verses the levels of tonal stability

are the result of the overlay process. From highest to lowest the three levels of tonal stability are represented by 1) Verses which are the combination of duets or trios in the same tonality; 2) Verses in which the stable tonality of one duet or trio supports the unstable nature of the other duet or trio, existing in a tonally complementary relationship (see p. 89); and 3) Verses in which the duets or trios are in different tonalities.

Table XIV gives a graphic representation of the organization of formal, rhythmic, and tonal elements in each Verse. Duets and trios, shown to the left of the dotted line, are graphed in the values described above and presented to the left of the dotted line in the Key to the Table. Compound Verses, shown to the right of the dotted line, are graphed in the values described above and presented to the right of the dotted line in the Key to the Table.

It should be noted that values above the horizontal sequence of Verse numbers represent rhythmic parameters. Values below the Verse numbers represent structural parameters. The higher the level of structure, the further below the Verse numbers the values extend. Formal elements are graphed in this manner to visually represent the stronger structural foundations of Verses with a high level of formal organization. The three different shadings represent tonal parameters.

KEY TO TABLE XIV

Individual Verses

FORM

Levels of Structural Stability

- 1) regular phrase lengths, 2 or 3 part form.
- 2) non-regular phrase lengths, 2 or 3 part form.
- 3) regular phrase lengths, through-composed.
- 4) non-regular phrase lengths, through-composed.




RHYTHM

Rhythmic Density

The average number of attacks per second in the composite rhythm of the instrumental parts. at the top of Verse values indicates fluctuating rhythmic density.

PITCH

Levels of Tonal Stability\*

- 1)  one predominant tonality.
- 2)  movement among several tonalities.
- 3)  tonally unstable.

\*Unshaded areas not transcribable.

Compound Verses

Levels of Structural Stability

- 1) same meter, same phrase structure.
- 2) same meter, different phrase structure.
- 3) bi-metric, Verses structurally stable.
- 4) bi-metric, Verses structurally unstable.

Levels of Bi-Metric Polarity

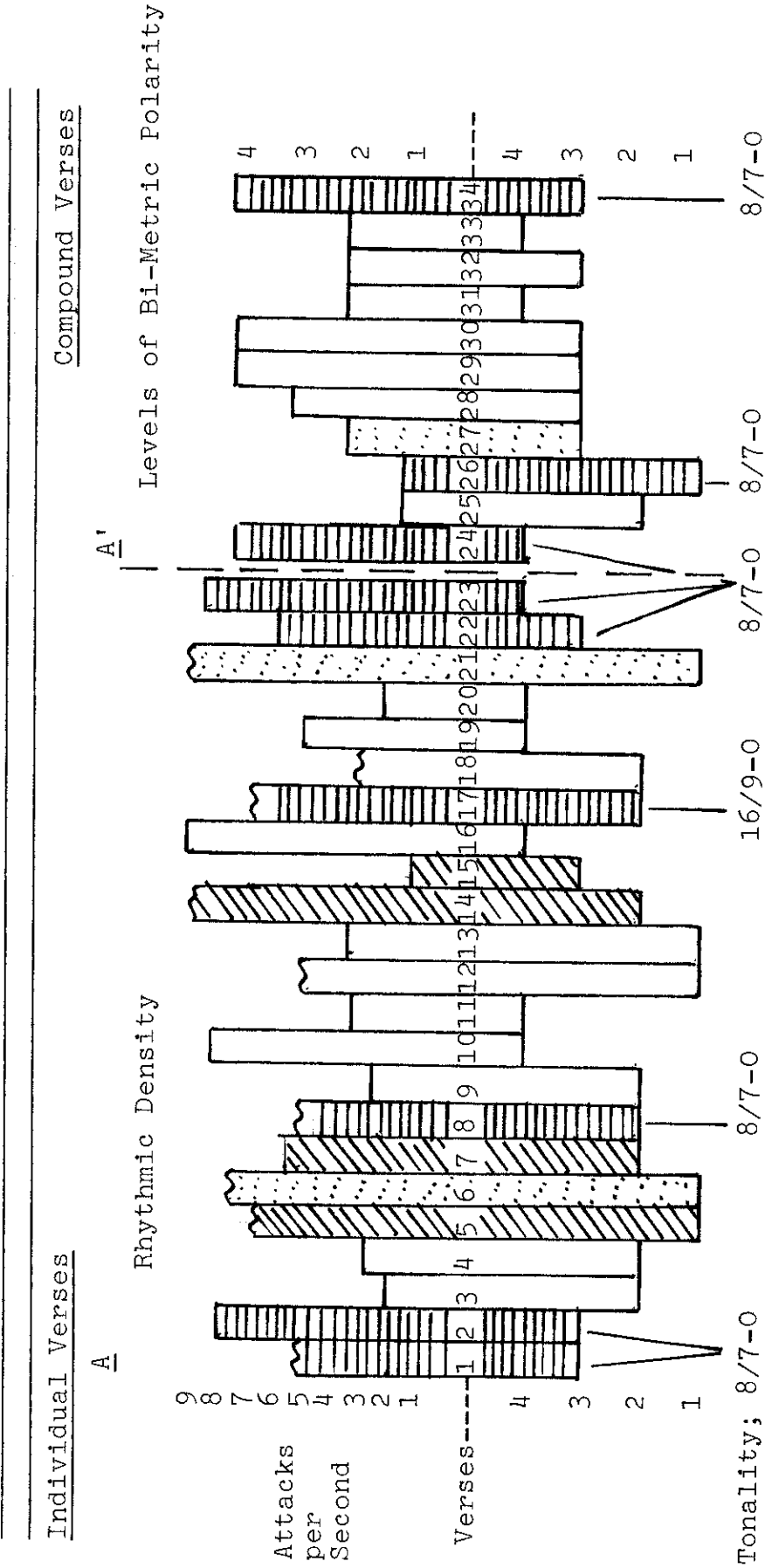
- 1) Verses in same meter.
- 2) bi-metric relationship within the bar.
- 3) bi-metric relationship beyond the bar.
- 4) bi-metric relationship beyond the Verse.

Levels of Tonal Stability\*

- 1) Verses in same tonality.
- 2) Verses in complementary relationship.
- 3) bi-tonal.

TABLE XIV

ANALYTIC OVERVIEW



Levels of Structural Stability

### Large-Scale Organization

Because of the overlay process, the textural, rhythmic, and tonal qualities of the compound Verses are much different than those of the duets and trios. The aurally obvious differences between the first twenty-three Verses and the compound Verses creates a large two part form. Also, the compound Verses, containing the exact material of the duets and trios (but obscured by the overlay process), function partly as a recapitulation. However, in addition to their larger ensembles, the greater textural, rhythmic, and tonal complexity of the compound Verses makes it necessary to consider the compound Verses as essentially different from the duets and trios of which they are formed.

Though notational problems prohibit a complete harmonic analysis of the work, it is possible to postulate that "Petals..." is in the 8/7 Otonality. The piece begins in the 8/7 Otonality and returns to this tonality at several structurally important points. In addition, the 8/7 Otonality is the only tonality (within the analyzable group of Verses) which occurs more than once as the stable tonality of an entire Verse. The predominant tonality of the stable Verses is presented at the bottom of Table XIV.

An examination of Table XIV reveals that there is greater fluctuation of rhythmic densities in successive Verses just after the midpoint of section A (Verses 13 through 16).

It is also evident that, as the Verses approach section A', there is a general tendency toward less structural stability. These two factors combine to create an increase in tension toward the end of section A.

There is also an increase in tension toward the end of the piece. The trend toward structural instability at the end of section A" is a compression of the structural instability at the end of section A. The graded increase in bi-metric polarity in Verses 25 through 30 creates tension in the middle of section A'. The piece ends at a high level of bi-metric polarity following three Verses of relatively low polarity. The larger ensemble of Verse 34 (this Verse is the only septet in "Petals..."), and its relatively stable tonal nature further create a feeling of climax and conclusion.

As stated earlier, "Petals..." was written as an experimental work in which Partch sought to explore bi-meters, bi-tonalities, and instrument combinations. Table XIV and the above comments attempt to show that Partch manipulated basic compositional parameters within an experimental framework to create a certain feeling of unity and direction within the work. Because the Verses are each miniature forms one minute in length, one aurally perceives a parallel relationship between them. The fluctuations of the various parameters throughout the work are controlled to give the work dynamic direction. The prominence of the 8/7 Otonality at the beginning and end of section A, and at the beginning of section A' creates the aural sen-



sation of tonal resolution in the final Verse. And most importantly, the overlay process and the recapitulation-like nature of the compound Verses neatly bind the Verses together in a large two part form.

#### Corporeality in "Petals..."

It is perhaps ironic that "Petals...", one of only two major works by Harry Partch with published scores, contains no overt manifestation of the Corporeal aesthetic. Because "Petals..." was written essentially for the recorded medium, there are, of course, no visual elements in the work. In "Petals...", Partch exploited the possibilities of the recording studio as an essential aid to experimentation with bi-tonalities and bi-meters. Partch recognized that recordings inhibit the Corporeality of a work, yet he felt the recording medium to be, in some cases, a practical necessity.<sup>3</sup>

"Petals..." is also unique among the body of Partch's works in that it is purely instrumental. However, "Petals..." does contain some Corporeal elements. Implicit in all Partch's music is the concept that each performer, whether an instrumentalist or vocalist, "sings" a unique part. Within the ensembles of "Petals...", each instrumental part is ideally the Corporeal expression of the individual playing that part.

Partch's decision to call the movements of the work "Verses" is significant. The word "verse" has its origin in

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<sup>3</sup>Partch, Genesis, p. v.

poetic forms. The historical connotations of the word are linked to the monophonic music of both the early Christian Church and ancient Greeks.<sup>4</sup> Perhaps by titling the movements "Verses," Partch attempted both to emphasize the relationship of the movements to one another, and to subtly underscore the connection between his music and the monophonic music of the past.

Though "Petals..." is not an obvious expression of Partch's Corporeal aesthetic, it remains a significant and highly original work.

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<sup>4</sup>"Monophony," Harvard Dictionary of Music, 2nd ed., (Cambridge, 1972).

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