CLASSIFICATION OF PITCH MATERIAL
IN THREE COMPOSITIONS BY HOWARD HANSON

presented by

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to fulfill the thesis requirement for the degree of

Master of Arts

Department of Theory

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March 26, 1976
Howard Hanson has acquired recognition as a conductor, educator and composer; his achievements as a theorist, however, have often been overlooked. Hanson's theoretical writings consist of the single-volume treatise Harmonic Materials of Modern Music: Resources of the Tempered Scale (Appleton-Century-Crofts, 1960). In this book the composer has attempted to reduce the tonal resources of the twelve-tone scale to a finite number of pitch sets by means of four devices: interval analysis, involution, projection and complementary sonorities.

Although analyses of twentieth-century compositions using Hanson's methods do exist, apparently no attempt has been made to analyze the composer's own works via those methods. The purpose of this investigation was to perform such an analysis, in an attempt to determine to some degree the methodicity of Hanson's compositional procedure. To this end, the author selected the following works for study: Symphony No. 4 (1943), Mosaics (1958) and Symphony No. 6 (1967).

Since the investigation seemingly represents the first study of its kind, the author attempted to develop theoretically and aurally valid methods by which to analyze the three pieces. He subsequently developed the following procedures, each of which corresponds to a particular textural
situation: 1) analysis at each concurrence of tonal material; 2) analysis on the beat; 3) analysis of all tonal material found within the limits of a single beat; 4) analysis of all tonal material that appears with a sonority in the background; 5) analysis of all tonal material from the set with which a given texture is perceived to be saturated.

The author amalgamated, in an appendix, material pertinent to his analysis of the pieces; included are a measure-by-measure listing of the interval content symbols for each of the vertical sonorities, comments which clarify or explain particular analytical procedures, and observations relative to individual sections. In order to identify the particular pitch sets which the given symbols represent, the author has indicated the starting pitch (described as the generating tone) for each of the sonorities. The listed observations are of three types: 1) frequencies of sonorities and their involutions; 2) projections (tertian and whole step-half step projections appear in addition to Hanson's pure projections); 3) complementary sonorities.

The intervallic analysis of sonorities from the pieces indicated the following: the Fourth Symphony, first of all, exhibits an extensive use of the pandiatonic procedure and contains a predominance of tertian structures as background occurrences; Mosaics demonstrates an increased usage of non-tertian background sonorities (especially perfect fifth types), and also exhibits a disposition toward the use of techniques related to the pandiatonic procedure, whereby textures appear to be saturated with pitch sets other than dia-
monic scale; the Sixth Symphony, finally, seems to include the greatest number of non-tertian sonorities and also evinces a greater economy of tonal material than is observed in either of the two earlier works. Further, this piece demonstrates a procedure whereby a pitch set containing fewer than seven tones may be used as a tonal basis without conventional harmonic limitations; described as pan-projectional, the device frequently results in perceived saturation with the tonal material from a single projection.

Hanson's employment of involutions in Symphony No. 4 appears to be accidental. In Mosaics and the Sixth Symphony, however, many passages seem to exhibit the disposition for sonorities to appear either as involutions or not as involutions within a single section. The most frequent projections in Symphony No. 4 are the tertian and perfect fifth types; in Mosaics, on the other hand, projections based on the intervals of a major third, minor third and minor second occur with the greatest frequency, in accordance with the composer's description of the piece as a variation on the relationship of these intervals. With the exception of the first movement, the Sixth Symphony demonstrates an emphasis on non-tertian projections, including those based on the intervals of a perfect fifth and a major third. Finally, complementary sonorities appear infrequently as vertical occurrences in any of the works.
ADDENDA

Permission has been granted by Carl Fischer, Inc. to include in this thesis examples from the following works (all of which are by Howard Hanson); Symphony No. 4 (copyright 1945, 1955; Eastman School of Music of the University of Rochester); Mosaics (unpublished; available on rental only from Carl Fischer, Inc., New York, N.Y.); Symphony No. 6 (copyright 1968 by Carl Fischer, Inc.; © under U.C.C., 1974 by Carl Fischer; international copyright secured).
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Throughout history there have been many who have acquired recognition both as composer and theorist, among them de Vitry, Morley, Pux, Rameau, and in the present century, Hindemith. Attempts have been made to relate the theories expressed in the writings of some of these, notably Rameau\(^1\) and Hindemith\(^2\), to their respective compositional procedures; however, there appear to be many other theorists whose works have not yet been studied in such a manner. A contemporary example is the American composer Howard Hanson.

In the light of Hanson's many notable accomplishments as composer, educator and composer, it is unfortunate that his theoretical writings often have been overlooked. Hanson's preoccupation with theoretical topics apparently dates back to the early 1940s. On November 9, 1951, the composer reportedly presented his theories to a convention of the American Philosophical Society. In an address entitled "The Projection and Inter-Relation of Sonorities in Equal Temperament,"\(^3\) Hanson introduced the procedures by which he had

\(^1\)Vincent Lloyd Jones, "The Relation of Harmonic Theory and Practice From Rameau to 1900" (Ph.D. dissertation, Harvard University, 1934), pp. 107-09, 216.


\(^3\)"Hanson announces new musical theory," Musical America, LXXI (December 15, 1951), 23.
classified all possible sets of pitches from the twelve-tone equally-tempered scale. The material described in the presentation, which was, according to one reporter, the result of more than ten years of study, was to be published as a text the following year.\(^4\)

Due to unexplained circumstances, Hanson's theoretical writings did not receive publication until 1960, at which time the single volume entitled *Harmonic Materials of Modern Music: Resources of the Tempered Scale*\(^5\) was released. Hanson's book is intended primarily for the use of the composer, but does not, the author insists, represent a "system" or "method"\(^6\) of composition; furthermore, some of Dr. Hanson's associates have suggested that his procedures be applied to the analysis of twentieth-century music. The book is not the only existing treatise in which an attempt has been made to reduce the tonal resources of the twelve-tone scale to a finite number of pitch sets; other works, including the *Lois et Styles des Harmonies Musicales* of Edmond Costere, have been written with the identical purpose in mind. Hanson's treatise, however, is perhaps the only modern source, with the exception of Alan Forte's *The Structure of Atonal Music* (New Haven, 1973), in which the unique-


\(^5\) The book was originally published by Appleton-Century-Crofts, Inc., but is currently being released by Irvington.

\(^6\) Howard Hanson, *Harmonic Materials of Modern Music: Resources of the Tempered Scale* (New York, 1960), xi.
ness criterion for pitch sets is interval content. 7

The basic procedures that are presented by the composer in his treatise may be briefly summarized. Dr. Hanson has classified the pitch material from the twelve-tone scale by means of four devices: interval analysis, involution, projection, and complementary sonorities. The first of these devices is used to determine the intervalllic components of pitch sets. Hanson expresses a sonority’s interval content by means of a symbol in which the letters p, m, n, s, d and t are employed (in the given order) to indicate exclusive interval categories: p represents the interval of a perfect fifth or its inversion, the perfect fourth; m designates the major third or its inversion, the minor sixth; n represents the interval of a minor third or a major sixth; s designates the major second or minor seventh; d indicates the interval of a minor second or a major seventh; t represents the tritone. In addition, the composer uses a numerical exponent to indicate the number of intervals present from any given category, when the quantity is greater than one. Hence, the expression \( p^3 m^1 s^1 d^1 t^1 \) represents the intervalllic content of a pitch set which has one of each of the interval types: one perfect fifth, one major third, one minor third, one major second, one minor second, and one tritone. The symbol \( p^3 m^1 s^1 d^1 t^1 \), on the other

hand, describes an intervallic constituency which consists of three perfect fifths, one minor third, two major seconds, and none of any of the other intervals.

The next procedure discussed by the composer entails the identification of involutions. The involution of a sonority is defined by Dr. Hanson as the "projection down from the lowest tone of a given chord, using the same intervals in the order of their occurrence in the given chord . . . ."\(^8\) For any sonority, the involution may be obtained by following the procedure outlined in the definition found above. For example, given the sonority pmn with component pitches C, E, and G, there are two intervals which appear above the lowest tone (C): an interval from C to G, which is a perfect fifth, and an interval from C to E, a major third. Projecting these intervals below the tone C, one obtains the tones F and A\(^b\). The involution of the pitch set C E G is thereby found to be the triad F A\(^b\) G. In addition, sonorities which "have the same order of intervals whether considered 'up' or 'down,' clockwise or counterclockwise,"\(^9\) have been termed isometric sonorities by Dr. Hanson. Pairs of sonorities "which have the same \(\text{[Intervallic]}\) components but which are not involutions one of the other,"\(^10\) are described variously as isomeric sonorities, isomeric twins, or simply as twins.

The third device employed by Hanson, termed projection,

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\(^8\) Hanson, Harmonic Materials of Modern Music, p. 17.
\(^9\) Ibid., p. 19.
\(^10\) Ibid., p. 22.
involves, according to the composer, "the building of sonorities or scales by superimposing a series of similar \[\text{A.e. like}\] intervals one above the other."\(^{11}\) However, there are only two intervals which can be projected with total consistency through all twelve tones, namely the perfect fifth and minor second. Each of the other intervals can be projected through only a few of these tones, before the projection begins to duplicate the initial tones of the series. Further projection of these intervals is accomplished by the introduction of foreign tones, above which the initial projection is repeated until all twelve tones have been encompassed.

The construction of tonal series by intervallic superimposition is only one of the methods by which Hanson classifies pitch material through the device of projection. Other procedures include the following: 1) the superimposition of a triad on any or all of its members, resulting in the generation of pitch sets which consist of the projections of that triad at each of the triad's component intervals. With this procedure, the triad pmn may be projected at the intervals of a perfect fifth, a major third, and a minor third. The projection of this triad at the interval of a perfect fifth, for example, is expressed by either of the formulae pmn @ p or pmn/p. 2) the projection of a triad at foreign intervals (e.g. pns @ m). 3) the

\(^{11}\)Ibid., p. 28.
simultaneous projection of two (unlike) intervals. Such a projection involving two perfect fifths and three major seconds, for example, is expressed by the formula \( p^2 + s^2 \); the formula \( p^2 + d^2 \), on the other hand, expresses a projection of two perfect fifths upward and two minor seconds downward. 4) the projection of two like intervals at a foreign interval. For instance, two perfect fifths may be projected at the interval of a minor third; this occurrence is expressed by the formula \( p \otimes n \) (or \( p/n \)), which is equivalent to the expression \( n \otimes p \), since the operation \( \otimes \) is commutative. 5) projection by involution, wherewith each of a series of intervals projected above a starting tone is also projected below that tone, which tone is described as the axis of involution. The projection of a perfect fifth and a minor third both above and below a starting tone, for example, is represented by the formula \( \uparrow p^2 n^2 \); on the other hand, the projection of a major third above and below an axis of involution, with a minor second projected only above the axis is indicated by the expression \( \downarrow m^2 d^1 \).

The final procedure used by Hanson to systematize the pitch material from the twelve-tone scale involves the identification of complementary sonorities. Every sonority, notes the composer, "has a complementary sonority composed of the remaining tones of the twelve-tone scale... the complementary scale will always have the same type of inter-
vallic analysis as the original sonority. For example, every three-tone sonority will have a complementary nine-tone pitch set, and this pitch set will be found to have a predominance of the intervals which are found in its complementary triad.

Although analyses of twentieth-century compositions using Hanson’s methods do exist, apparently no attempt has been made to analyze the composer’s own works via those methods. This evident lack of research, supported by the existence of only one Ph.D. dissertation on the subject of Dr. Hanson, has led this author to an analysis of some of Hanson’s music.

The author observed the following guidelines in his selection of music: 1) the number of pieces would have to be greater than one, in order to permit comparison with other works, and no greater than three, due to the limitations of the scope of the project; 2) the choice would be limited to pieces composer after Dr. Hanson had begun to develop his pitch classification procedures; 3) the pieces would have to be of similar genre in order to facilitate a meaningful comparative analysis of the works; 4) the factor which ultimately would determine the choice of pieces was the appeal which the works held for the analyst. In accordance with these guidelines, the author finally chose the

\(^{12}\text{Ibid.}, \text{ p. 263.}\)

\(^{13}\text{Robert C. Monroe, Howard Hanson: American Music Educator (Ph.D. dissertation, Florida State University, 1970).}\)
following three pieces: *Symphony No. 4* (1943), *Mosaics* (1958), and *Symphony No. 6* (completed in 1962).

Composers and critics alike have been generous in their praise of the three works. Of the *Fourth Symphony*, Olin Downes wrote, following the New York performance, "This symphony, in our opinion, is the best work in the form that Mr. Hanson has presented his public."14 Serge Koussevitsky, further, has affirmed that the piece is "one of the noblest works ever written in America."15 The symphony, which received its first performance with the Boston Symphony on December 3, 1943, Hanson conducting, won the Pulitzer prize the following year.

*Mosaics for Orchestra* received its world premiere on June 23, 1958, in Cleveland. Composed in the form of a set of variations, this piece, Dr. Hanson has attested, is one of the works in which the influence of his pitch classification methods on his compositional procedures is most vividly illustrated.16

The *Sixth Symphony* was commissioned in commemoration of the one hundred twenty-fifth anniversary of the New York Philharmonic, and was premiered by that orchestra, under the baton of Hanson, on February 29, 1965. This piece is

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14 Olin Downes, in notes on the record jacket, *Symphony No. 4* by Howard Hanson, American Recording Society ARS-6.

15 Serge Koussevitsky, in notes on the record jacket, *Symphony No. 4* by Howard Hanson, American Recording Society ARS-6.

16 Howard Hanson, in a personal interview with the composer, March 11, 1975.
considered by the composer to be "my best work." 17

With the initial approach to the study of the three works, the author had determined to investigate both the horizontal and vertical components of the texture. It had been assumed that both aspects had to be considered if the pitch relationships in the pieces were to be comprehensively examined. The author soon realized, however, that a bidirectional approach to the analysis would magnify the proportions of the project far beyond its intended scope. For this reason, the investigation was limited to an analysis of vertical structures primarily.

Although Dr. Hanson uses simple spelling of sonorities for the identification of pitch sets, the author has frequently found this method too cumbersome for dealing with the large number of sonorities involved in this project, and therefore has devised the following system. In order to identify the tone which is the starting pitch of any projection given as the analysis of a sonority, the term generating tone (borrowed from Paul Hindemith) has been implemented. (Where isometric sonorities are concerned, the generating tone corresponds to the axis of involution). If the analysis of a sonority and its corresponding generating tone are both known, then the pitch set can be readily reconstructed by merely following the recipe indicated by the analysis. For example, given the symbol $p^{2m-2}_{nd}$, with the analysis $p/m$, and the generating
tone G, the pitch set associated with the symbol may be obtained by constructing the fifth above G and then another perfect fifth at the interval of a major third above G. In so doing, one acquires the pitches G, F, and E, and listing the pitches in order upward from G, one obtains the original pitch set G E F.

In order to differentiate between a sonority and its complement and/or twin, the asterisk was implemented as an exponent as follows: one of the sonorities was always listed without the asterisk, while its counterpart carried the asterisk superscript: the asterisk was written immediately after the interval content symbol (e.g. pmnsdt*). The pairs of isomeric sonorities which have appeared in the course of the analysis of the three pieces have been listed, and their respective derivations given, in appendix B for the convenience of the reader.

Another convention adopted by the author involves the use of letters to refer to specific locations within measures. A letter appearing immediately after a measure number indicates a particular beat of that measure as follows: "a" designates the first beat, "b" indicates the second beat of the measure, "c" represents the third beat, and so on. For example, the expression "8d" indicates the fourth beat of measure 8.

With the author's listing of sonorities throughout the paper, the Hanson symbolism was sometimes supplemented with the familiar label for a sonority in order to facilitate recognition by the reader. One particular case in point...
concerns the pitch set which has the interval content formula \( p \cdot 4 \cdot 4 \cdot 5 \cdot 2 \cdot 2 \). This sonority is described by the composer only as \( C, p \cdot m \cdot n \cdot s \cdot t \) (or as \( C, \uparrow \cdot p \cdot n \cdot 2 \); "C." is read "the complement of"). Close inspection, however, reveals the symmetrical pattern consisting of four whole steps followed by a single whole step, at the interval of a minor second (i.e., \( C, D, E, F^\#, G^\#, A, B, C \)), which is the characteristic pattern of the 4+1 scale. Another sonority, which appears recurrently in the fifth variation of Mosaics and which is analyzed by Dr. Hanson as the minor third octad, is found to be the familiar whole step-half step, or diminished, scale and has been so identified throughout the course of this paper.

The following is a brief glossary of additional terms with their definitions, which it is hoped will facilitate an understanding of the material presented in this paper:

- **concentus**: any concurrence of tonal material.
- **generating tone**: the starting tone for a sonority.
- **panchromatic**: a procedure, characteristic of much atonal music (but not exclusive to such music), which results in the perceived effect of twelve-tone saturation throughout a passage.
- **pandiatonic**: a term coined by Nicholas Slonimsky to describe "the use of the diatonic scale instead of the chromatic scale as a tonal basis without conventional harmonic limitations . . . . the absence of functional harmony usually results in a certain tonal staticity, offset by a greater interest in counterpoint, rhythm and chord spa-"
pan-projection: a procedure whereby a pitch set containing fewer than seven tones is used as a tonal basis without conventional harmonic limitations; with this procedure, all or a great number of vertical and linear sonorities can conveniently be classified in a single interval projection; as with the pandiatonic procedure, the absence of functional harmony may be offset by a great degree of contrapuntal activity, which results in a perceived saturation with the tonal material from the observed projection.

saturation: an effect which is frequently observed as a manifestation of the use of the pandiatonic, panchromatic or pan-projectional procedures; saturation occurs when tonal material from a single pitch set or projection is perceived to be present throughout a given time interval, even though not all of the material may technically be sounding at any given moment. A saturated texture, further, is a texture in which saturation has been perceived.

The computer has been of enormous assistance in the completion of this project. Mr. Alec Brinkman, of the theory faculty of the Eastman School of Music, has written a computer program designed to provide the interval analysis of all possible pitch class sets available from the twelve-tone scale. Dubbed "Exec Hanson," the program recently (October, 1975) has been made available for student use at

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the University of Rochester's computer center.

In conclusion, the author would like to express his heartfelt appreciation to the following persons, without whose kind assistance this project could never have been completed: Dr. Dorothy Payne, the advisor for the project, who graciously encouraged and guided the author through the many long hours of research and writing; Dr. David R. Williams, who assisted in the selection of the topic, and who also arranged the initial interview with Dr. Hanson; Dr. Robert Gauldin, whose suggestions greatly helped the author to define his objectives and organize his presentation and who also was instrumental in securing the use of the computer for the project; Dr. Ruth Watanabe, Dr. Klaus Speer, Mr. Charles Lindahl, and others of the Sibley Music Library staff, who offered their assistance most willingly; Mr. Donald Jones of the orchestral library, for his invaluable aid in providing scores which otherwise would not have been available for the author's perusal; Mr. Robert Weeks, who generously loaned the author his typewriter for the finishing of this paper; Mr. Aleck Brinkman, mentioned above, who secured a grant which provided for the author's use of the facilities at the computer center, and then provided invaluable training in the use of the facilities; and last, but certainly not least, Dr. Howard Hanson, who willingly gave of his time for a personal interview with this author (during which the composer offered enlightening comments on the three pieces selected for analysis), and who
further assisted in the securing of a score of *Mosaics* for
the author's personal use.
CHAPTER I

THE THREE COMPOSITIONS

The three pieces selected for analysis, Symphony No. 4, Mosaics, and Symphony No. 6, all give evidence of the traits which have earned their composer the reputation (which he proudly embraces)\(^{19}\) of neo-Romantic: appealing melodies and colorful, rich orchestrations, as well as loyalty to the principles of tonality.\(^{20}\) Although it is beyond the scope of this paper to delve deeply into stylistic considerations, a few brief observations will be made concerning the stylistic development which seems to be in evidence in these works.

**Symphony No. 4**, Op. 34, dedicated in memory of the composer's father, received its first performance with Hanson conducting the Boston Symphony on December 3, 1943; the following year, the composer was awarded the Pulitzer prize for the work. Subtitled *Requiem*, the work has four movements, each bearing a title from the Roman mass for the dead. The music, notes critic Olin Downes, "is not in any obvious or direct way of a liturgical sort, \ldots" However, Downes continues, "the moods, connoted by the Latin titles are evidently in the composer's mind, and in most of the movements


there is polyphony of a sort to be associated with liturgical rather than secular music."²¹ Contrary to the practices of so many other twentieth-century composers, Hanson has scored the piece for full orchestra. Apparently a tightly knit piece, this symphony, according to Dr. Ruth Watanabe, is unified by "four characteristic germ motives or figures, each with a distinct interval pattern: an upward octave leap, a scale-line, a descending minor third; and an augmented fifth (or, in inversion, a diminished fourth) ...‖ from these motives, Dr. Watanabe has continued, "grow other melodic ideas -- a natural musical expansion."²²

The first movement, entitled "Kyrie," has a shape which may be described as "like sonata form." (The traditional label, however, is used with apology, since the term sonata form -- and the other formal designations as well, binary, ternary, rondo, etc. -- refers to a well-defined scheme through which a Western composer of the eighteenth or nineteenth century chose to organize and articulate his musical thoughts. In describing much of the music written by Hanson and by other twentieth-century composers as well, this type of terminology can at best represent an approximation of the

²¹ Olin Downes, in notes on the record jacket, Symphony No. 4 by Howard Hanson, American Recording Society ARS-5.

The movement opens with a fourteen-measure introduction which presents two of the characteristic motives of the piece. The first theme of the exposition, which features the repetition of the minor third motive, then appears. Following an eight-measure transition, the second theme, a lyrical, winding theme, is stated. Another brief passage, transitional in character, leads to what appears to be a development section. In this section, imitation among the woodwinds of a tune which begins with an ascending scale produces the effect of seven-tone saturation; meanwhile, sustained sonorities in the horn parts provide a background of continued static harmony. An expressive tune vaguely reminiscent of the second theme then appears, and the texture thickens. A two-measure transition quickly leads into a fortissimo statement of a theme perhaps reminiscent of Tchaikovsky, which is supported by slowly moving, undulating tertian harmonies. This section, which is expository in character, can be explained only as an aberration if sonata form is understood to be the guiding principle. However, the section does exhibit one of the traits characteristic of the close of the conventional development section: in both the initial statement of the theme and its repetition, there is a sustained A pedal which may be interpreted as functioning as dominant preparation. A reversed recapitulation follows: first there is the statement of the second theme. Then, an elision of the first and second transitions forms a bridge to the "Christe Eleison," in which the first theme reappears. A codetta, which parallels the opening three bars, concludes
the movement.

The second movement, "Requiescat In pace," has been described by one critic as an "intensely lyrical elegy." In this movement, sustained tertian harmonies lend support to a linear texture whose density is continually changing. As a single diatonic line combines with one or two others, the music appears to become saturated with the seven tones of the diatonic scale. This phenomenon, also observable in certain other instances in the symphony, appears to lend a unity of mood to the second movement.

The form of this brief movement may be described as theme and variations. The theme is presented first in a solo bassoon. Following a one-measure interlude, the cellos enter with a melodic variant of the theme. Another short interlude featuring two instruments in a canon at the unison leads to the second variation, in which violins state the theme. In the third variation the original tune, transposed up a fifth and melodically varied, appears in the violins. In the following variation the harmonic background consists of repeated quarter-note sonorities, most of which are non-tertiian in construction. The theme is presented without variation and at the original pitch. The final variation, which is elided with the preceding section, is extremely contrapuntal. A short codetta concludes the movement.

The third movement, which bears the title "Dies Irae,"

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23D. H., in notes on the record jacket, Symphony No. 4 by Howard Hanson, Mercury MG 50077.
might be compared to Stravinsky's *Rite of Spring*, because of its incessant eighth-note rhythmic drive, the repetition of short, motivic ostinati in various parts, its complex polyrhythms, the exploitation of textural contrasts, and emphasis on the winds. This movement, which opens with three *sforzando* blasts by the brass, has been described as a dance of death and as a "furious and bitter scherzo." The form of the movement appears to be rondo-like (possibly a rondo-ritornello combination). The theme, which apparently consists of two phrases, is stated first (opening phrase only) by the bassoons. Because of the numerous reappearances of this theme throughout the movement, the author was tempted to describe the form as rondo. However, the sections which alternate with the returns are not truly digressive in character, as is to be expected with the familiar rondo. Rather, these alternating sections appear to be developmental and transitional in function, and are based on the same theme and motives which are to be found in the expository sections. The movement closes with a vertical statement of the minor third motive from the first theme of the "Kyrie."

The final movement is entitled "Lux Aeterna," and, as Olin Downes has observed, the "luminousness of the instru-

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25 Notes on the record jacket, *Symphony No. 4* by Howard Hanson, American Recording Society ARS-5.
momentation of the finale is tonal embodiment of its caption. Written in a ternary form, the movement opens with a theme presented by the strings alone above a stable background of tertian harmonics that are embellished with descending eighth-note scalar passages. This activity gives way to a brief chorale-like interlude in the brass which is transitional in function. The tempestuous, tripartite B section which follows is based on the pitch set of the ascending linear scale fragment $F^\#_4 G A B^b$, which is developed through imitation, repetition, sequencing, and rhythmic transformation. Tension is built by means of the superimposition of polyharmonic dissonances. A chorale-like statement by the brass follows; presently, there is a restatement of the first movement's lyrical second theme. This passage, which in the first movement had appeared at the outset of the recapitulation, here provides the retransition from the digressive middle part to the varied return of the first part. There is a brief recollection of the opening theme, and then the piece concludes with a short coda which is based on the first movement's second theme.

The strength of the Fourth Symphony, which requires a mere twenty minutes to perform, is expressed in the following words of Dr. Watanabe: "the very unity and the very compactness of the symphony emphasize its dramatic qualities . . . . The symphony stands as an outstanding work, per-

26 Olin Downes, in notes on the record jacket, Symphony No. 4 by Howard Hanson, American Recording Society AKS-6.
sonal, yet universal, expressive, yet poised, meaningful, yet succinct. "

Mosaiques for Orchestra (1948), while perhaps one of the most intellectual of Hanson's works, nonetheless is not lacking in emotional content, with its depiction of a wide variety of moods. The work was evidently inspired from Hanson's vivid recollections of the mosaics in the cathedral at Palermo, encountered during the composer's youthful stay in Rome. States Hanson: "I used the descriptive title with the idea that it might suggest to people the way mosaics seem to change color and even form as lights and shadows play upon the compositions."

Like the Fourth Symphony, Mosaiques has been scored for full orchestra and is tonal. However, in the latter piece one can observe significant stylistic differences from the symphony. The differences apparently result from the following practices: 1) a greater use of non-tertian types of sonorities, such as that analyzed as $p^2$s, in Mosaiques; 2) an increased employment of synthetic scales, especially the diminished scale, in the later work.

The form of the brief piece exhibits, according to Hanson, some of the characteristics of the passacaglia.

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28 Howard Hanson, notes on the record jacket, Mosaiques by Howard Hanson, Mercury SR90430.
chaconne, "and the broader variation forms." 29 The variations, relates Hanson, are not on the "passacaglia-like" theme which opens the composition, but rather "on the specific relationships, harmonic and melodic, which occur in that theme. From the strictly theoretical standpoint," Hanson continues, the piece may be termed "a variation on the relationship of the major third, the minor third, and the minor second." 30

The piece has been described and analyzed by Dr. Hanson on one of a series of recordings entitled The Composer and His Orchestra. 31 The narrative, somewhat abridged, has been reproduced in the following paragraphs:

The theme is presented first by the cellos and the basses of the string family and the bassoons and the contrabassoon. . . . This theme is repeated twice. . . . [There is] a bridge from the theme to its first variation.

Our first variation is in the cheerful light of early morning. The pattern of tones is essentially the same, but with a concentration on the more dissonant aspects of the theme . . . . This variation is composed of four short musical questions and answers . . . .

The second variation is perhaps in the light of the midday sun. In contrast to the first variation, it concentrates upon the consonant aspects of the theme. The sounds are warm and Romantic. It begins with a two-measure introduction . . . . A melodic phrase, in the first and second violins, occupies most of this variation. . . . the little phrase is developed. . . . woodwinds . . . repeat the introductory measure, answered by the strings, and the oboe prepares us for the next variation.

29 Ibid.
30 Ibid.
31 Howard Hanson, "Analysis, with musical examples, of Mosaics by Howard Hanson." The Composer and His Orchestra, Vol. II, Mercury MG 50267A.
The third variation sounds something like a folk dance, and is in complete contrast, concentrating upon relationships which are not present in the original theme, something like the relationship in photography of a positive and a negative. It is in three short sections. . . . The tune is repeated. . . . We place under this a little countermelody . . . . The bridge from the first section of the variation to the second section consists of a little confidential conversation among the woodwinds and the French horns . . . . The second section of the variation opens with oboe but soon adds all the woodwinds . . . . answered by the strings. The flute quickly bridges the passage to the third section of the variation, which repeats part of the first. A scale . . . completes the variation.

In the fourth variation the skies have darkened, and the mosaics appear sombre and even sinister in the evening light. It is in two parts, emphasizing the most dissonant elements of the theme. The melody is in the strings with comment by the woodwinds. The violins, in an upward thrusting passage, are answered by violas and cellos, culminating in an outburst of the brass, and then subsiding. . . . The strings begin again as before, culminating in an even more violent outburst of the brass, and again subsiding.

The fifth variation is a kind of variation on variations, employing the devices of previous variations. It begins with a mysterious murmuring figure in the violins and harp, supported by one clarinet and one bassoon . . . . This figure culminates in a distorted version of the folk dance tune from the third variation, . . and is interrupted by a short fanfare in the brass. . . . The murmuring figure begins once more, against which the rhythmic figure appears, leading again to the folk dance tune, . . . and culminating in the outburst of the brass characteristic of the fourth variation. . . . The rhythmic figure continues . . . with the sonorities gradually piling up in the brass. . . .

The brass give out a partial statement of the original theme, ending with a chord, during which the woodwinds and the strings send up a kind of musical skyrocket. . . . Another statement in the brass, another skyrocket, and the music moves quickly to its final climax. 32

32 Ibid.
Symphony No. 6 (completed, 1967), dedicated to Leonard Bernstein and the New York Philharmonic, was given its first performance by that orchestra, with Hanson conducting, on February 26, 1968, in New York. Scored for full orchestra like each of its five predecessors, this symphony nonetheless differs from each of the others in overall form. While each of the first two symphonies contains three movements apiece, the third and fourth are laid out in four movements, and the fifth ("Sinfonia sacra") is in a single movement, Hanson's latest symphony has a total of six movements.

In spite of its grand layout, the Sixth Symphony is, in the words of one critic, "one of the most tightly organized of the series."\(^{33}\) "Most of my symphonies," comments the composer, "are essentially cyclic in construction. The Sixth, in contrast, is held together by a very simple three-note 'motto' stated by the woodwinds at the outset of the first movement which, I think, unifies the entire structure."\(^{34}\)

The Sixth Symphony exhibits certain differences in style from each of the earlier two works investigated by the author. The following features seem to set this work apart from the others: 1) There seems to be an increased occurrence of

\(^{33}\) Richard Freed, notes on the record jacket, Symphony No. 6 by Howard Hanson, Vox Productions, Inc., Turnabout TV-S 34534.

\(^{34}\) Howard Hanson, as quoted by Richard Freed, in notes on the record jacket, Symphony No. 6 by Howard Hanson, Vox Productions, Inc., Turnabout TV-S 34534.
non-tertian types of sonorities in the *Sixth Symphony*. 2) The *Sixth Symphony* gives evidence of a greater conciseness of expression than do either the *Fourth Symphony* or *Masses*. The thematic statements from the *Sixth* are seemingly abbreviated and generally are developed to a lesser degree than are the statements from the earlier symphony. 3) In the *Sixth Symphony*, there appears to be an extensive employment of a procedure which represents a refinement of those techniques that in the earlier pieces had resulted in perceived seven- and twelve-tone saturation. Termed pan-projectional, this procedure employs projections of fewer than seven tones rather than diatonic or chromatic scales to bring about an observed effect of saturation. As is the case with the pandiatonic and panchromatic procedures, the use of the pan-projectional technique frequently creates a state of apparently static harmony. 4) A greater economy in the employment of tonal material seems to be in evidence in the *Sixth Symphony* than is evident in either of the other two works. For instance, there seems to be a more frequent occurrence of smaller sonorities — especially diads — in the *Sixth Symphony* than is apparent in the other pieces. Further, the employment of the pan-projectional procedure frequently results in the perceived presence of a single sonority — usually a four-tone set — for a passage's duration. 5) Textural contrasts occur with greater frequency in the *Sixth Symphony* than in the other works. 6) Finally, the *Sixth Symphony* appears to be the most vertically conceived of the three pieces. While the contrapuntal technique is
certainly not avoided in this composition (the first section of the fourth movement, for example, exhibits a two-, and occasionally a three-voice texture), one is less aware, for the most part, of the usage of scales as a melodic component.

The first movement of the Sixth Symphony is, as one would expect, in a type of single-movement sonata (i.e., sonata allegro) form. This movement, according to the composer, "asks the question."\(^{35}\) The three-note motive which opens the piece is immediately imitated among the woodwinds. The second theme, an ascending scalar line, is followed by a brief development section. The recapitulation opens with a rhythmically altered statement of the three-note motto at original pitch and concludes with a transposed involution of that statement.

The second movement, which the composer has termed a "rather sardonic"\(^ {36}\) scherzo, is evidently in the part form A A' B C A". The first part begins with a seven-measure introduction played by the percussion, which sounds like a type of vamp. Above this rhythmic background a solo oboe enters with its six-note theme, which is composed of both the opening motto (at original pitch) and the motive's untransposed involution. The theme is imitated and then is restated with the addition of a concluding neighbor-note figure. A brief transition follows. In the next section, the neighbor-note figure undergoes rhythmic variation to

\(^{35}\)ibid.\(^ {36}\)ibid.
such a degree that the passage might be considered reminiscent of Petrushka. In the third section the pan-projectional procedure has been in evidence, with the statement and imitation of a four-tone set at original pitch. Rather abruptly the Petrushka-like b section reappears and the varied return of the third section follows. With the addition of the neighbor-note figure in this section, the four-tone set has been expanded to include the characteristic tetrad's involution. Following a brief development section, a transition in which a great degree of chromaticism is apparent leads into the next part.

The second part opens with a reiterated perfect fifth pedal, above which presently there is a varied restatement of an earlier theme. A brief transition, that closely parallels the preceding one, introduces part C, in which an arpeggiated statement of a minor triad undergoes repetition and expansion. The return of the first part is introduced by an incessantly repeated pedal, that is rhythmically derived from the movement's introduction. A brief codetta concludes the movement.

The third movement, which is "quiet and contemplative" in mood, apparently has been constructed in a rounded binary form. The first part opens with a slow, unaccompanied statement which undergoes imitation. A brief transition leads directly into the second part; this section seems to be

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37 Ibid.
composed of a set of variations, the subject of which consists of the statement and manifold repetition of three sonorities in turn. The partial restatement of the first part is later introduced by a varied repetition of the opening theme, which once again is imitated. Meanwhile, in the background, a series of repeated sonorities reminiscent of the preceding section brings the movement to a close.

The fourth movement, another "sardonic" scherzo, and marked Allegro assai, is apparently in a sonata-like form. This movement begins with the statement and imitation of a brief (one-measure) theme in 12/8 time which is found to be the linear projection of the four-tone sonority characteristic of certain passages from the second movement. A transition leads directly into a few measures of static harmony; presently the flutes enter with the second theme, another one-measure tune which moves along rapidly in eighth notes and which, while predominantly diatonic in construction, appears to be based on some exotic type of scale. This theme undergoes a degree of development in a relatively lengthy transitional section. Suddenly the heretofore linear texture is abandoned, and a verticalized statement of the motto theme is introduced to provide a harmonic background for the third theme. (which merely consists of an arpeggiation of its accompanying sonorities). Following the imitation of this theme, a brief transitional passage leads to a section

\[38\] Ibid.
which apparently constitutes the development proper. A
harmonic realization of the pitch set of the first theme
later introduces the reversed recapitulation. Soon there is
an embellished statement of the motto (third theme). A
variant of the exotic second tune then appears and is imme-
diately followed by a varied and abbreviated restatement of
the transition from the exposition’s first to second themes;
the concurrence of this statement with its background harmony
recreates the pitch set of the opening theme. A descending
unison arpeggiated statement in eighth notes brings the move-
ment to a close.

The fifth movement has been described by Dr. Hanson as
"a kind of improvisatory parlando." The movement is appar-
etly in a binary form. The first part begins monophonically
with a projection of perfect fifths; at the close of this
statement there appears a succession of repeated quarter-note
sonorities which recalls the third movement’s part B theme.
A brief development of the opening statement follows. The
second part of the movement contains the repetition and vari-
ation of the quarter-note group of sonorities which had
been introduced in the first part. A climax is eventually
reached, at which point scalar passages are introduced; the
scales seem to produce seven-note saturation and also to
recall the movement’s opening. The movement proceeds without
pause directly into the finale.

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39 Ibid.
The "dynamic" finale, as Dr. Hanson has described this last movement of the *Sixth* Symphony, begins with the reiteration of a pedal that is interrupted by single upward and downward thrusts; the upward interval soon is expanded and then is imitated. This activity culminates in an extremely dissonant fanfare-like statement, and the entire section is twice repeated. The development section opens with several repetitions of a sustained sonority. All at once, an embellished statement of the motto theme's involution appears. The recapitulation begins with a series of whole-note sonorities that are given forward momentum by the offbeat repetition and imitation of a variant of the pedal/upward-thrusting interval theme. Following this activity there is a restatement of the symphony's motto theme, which concludes the piece.

Commenting on the latest of his symphonies, the composer has declared: "I am particularly happy about the architectural construction of the *Sixth*. As a matter of fact, this symphony and the fourth are my favorites among my orchestral family."\(^{41}\)

\(^{40}\) *Ibid.*

\(^{41}\) Howard Hanson, as quoted by Richard Freed, in notes on the record jacket, *Symphony No. 6* by Howard Hanson, Vox Productions, Inc., Turnabout TV-3 3453C.
CHAPTER II
METHODS OF ANALYSIS

Harmonic Materials of Modern Music: Resources of the Tempered Scale, the single-volume theoretical treatise written by Howard Hanson, presents the composer's procedures by which he has classified "all of the possibilities of the twelve-tone scale . . ."42 Many of Hanson's associates have suggested that these procedures be applied to the analysis of twentieth-century music.43 Dr. Hanson himself, while affirming that his book was "written primarily for the composer,"44 nonetheless has frequently quoted, in the text, either his own pieces or the works of others to illustrate a selection of tonal material that corresponds to one of his projections. These references, however, are fragmentary, and further seem to represent ideal situations, in which the music apparently was made to order. To this author's knowledge, the sole attempt extant to classify all the pitch material found within a single work via Hanson's procedures, is represented by the composer's discussion of his piece For the First Time (Carl Fischer, 1963). As a consequence of the evident lack of research, few (if any) guidelines exist by means of which one might reasonably apply the composer's

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42 Howard Hanson, Harmonic Materials of Modern Music, ix.
43 Ibid.
44 Ibid.
pitch classification procedures to the analysis of music. The author therefore has attempted to develop theoretically sound and aurally valid methods by which to analyze the three pieces.

A basic concern of any analytical method dealing with pitch material would seem to be the establishing of criteria by which a pitch set may be defined as a sonority in its own right. The problem of delimiting sonorities, however, is essentially an aural one, since the term sonority, by its very definition, denotes an aural phenomenon. All methods of analysis, therefore, will necessarily be characterized by some degree of subjectivity, since with the outlining of such methods one is in actuality describing his own perceptual habits. While a number of factors -- tempo, dynamics, phrasing, etc. -- seemed to the author to contribute to his perception of particular pitch sets as distinct sonorities, the aspect of texture was observed to be the primary factor in most cases. As a consequence, the author has sought to describe, in general terms, the texture types found in the three works; a listing of these types appears in the following table:

<table>
<thead>
<tr>
<th>Texture Type</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monophony</td>
<td></td>
</tr>
<tr>
<td>1. slower passage</td>
<td>A</td>
</tr>
<tr>
<td>2. faster passage</td>
<td>A'</td>
</tr>
<tr>
<td></td>
<td>A&quot;</td>
</tr>
<tr>
<td>Homophony</td>
<td></td>
</tr>
<tr>
<td>1. strictly chordal texture</td>
<td>B</td>
</tr>
<tr>
<td>2. homophonic with scalar passages</td>
<td>B'</td>
</tr>
</tbody>
</table>
Textural Type | Designation
--- | ---
Imitative | C
1. slower passage | C'  
2. faster passage | C''
Chordal Polyphony | D
Saturated | E
1. pandiatonic | E'  
2. panchromatic | E''  
3. pan-projectional | E'''

Monophonic textures were encountered on occasion in each of the works. The first type of monophony described in the above table, designated by the letter A', is readily demonstrated by the opening phrase of the theme from Mosaics (Ex. 1).

Example 1 (Mosaics, mm. 1-4)

![Musical notation](image)

The other variety of monophony (denoted A'') is in evidence at the conclusion of the third variation (see Ex. 2).

Additional instances in which the texture may by described as monophonic occasionally are found within fast, imitative passages (texture class C''); in these instances, however,

45 The author realizes that the terms pandiatonic, panchromatic and pan-projectional refer to compositional procedures rather than to distinctive texture types. However, the terms have been used here in the indicated manner for want of more suitable vehicles of expression.
no distinction in terminology has been made from that used to describe the larger context, since the mode of analysis was the same for the solo or unison interpolation as for the surrounding polyphonic passages. One further type of tectural situation which perhaps may be termed monophonic from an aural standpoint, even though background sonorities technically are present, is found in the third movement of Symphony No. 4, mm. 107-09, 112-14, 117-20, 123-26, and 171-72; (see Ex. 3). In each of the indicated places, the background sonorities have not been perceptible due to the presence of the rapid, diatonic passages in the cello parts.

Instances of homophonic textures are found in all three works. One kind of homophony, described in the table as strictly chordal and designated B', is exemplified by the first and second restatements of the theme of Mosaics (measures 12-32); a related type of texture, consisting of a melody with accompanying harmony and also designated B', appears for example in the first movement of Symphony No. 4, mm. 140ff. (also in the fourth movement, measure 86ff.; see Ex. 7, p. 25). A second kind of homophonic texture, which includes scalar passages and which is denoted B", is
Example 3 (Symphony No. 4, third movement, mm. 113-14)

found in Symphony No. 4, fourth movement, mm. 74ff.

Passages which exhibit an imitative texture occur relatively infrequently in Mosaics, but more often in the Fourth and Sixth Symphonies. Imitative textures may conveniently be distinguished on the basis of tempo, since this type of classification accords with the mode of perception of the passages. The first species of imitative texture, found in relatively slower tempi and designated C', appears extensively throughout the first movement of Symphony No. 6 (see Ex. 8, p. 26). The second variety of imitative texture, found in faster passages and designated C", appears in the following instances, among others: Symphony No. 4, first move-
The term chordal polyphony has been extracted from its usual context (the analysis of Renaissance music) in order to describe another texture type, in which two voices participate contrapuntally, contrary to a third voice (or voices). This species of texture, which by definition is a combination (i.e., chordal and also polyphonic), appears relatively frequently throughout the first and fourth movements of Symphony No. 6 (see Ex. 5), and occasionally in Mosaics (mm. 89ff).

Textures in which saturation with pitch sets for various
time intervals is in evidence constitute the following textural category (designated E). The effect of saturation generally has been perceived as a consequence of one of the following occurrences: 1) rapid scalar passages (e.g. Symphony No. 4, third movement, mm. 41-58; Mosaics, mm. 174-75; see Ex. 2, p. 20; Symphony No. 5, fifth movement, mm. 60-63). 2) a relatively great degree of contrapuntal activity, usually at a rapid pace (e.g. Symphony No. 4, first movement, mm. 51-116); 3) the continued repetition of a single linear pitch set, either through arpeggiation (see Ex. 11, p. 29), or possibly through the use of ostinati (e.g. Mosaics, mm. 224-25; Ex. 6; Symphony No. 6, fourth movement, mm. 70-71).

Numerous instances can be found in the three works in which saturation is in evidence. Saturation with the twelve tones of the chromatic scale, first of all, seems to be perceptible in the Sixth Symphony, second movement, mm. 66-68.
Example 6 (Mosaics, mm. 274-28)

Andante, poco agitato

(Ex. 11, p. 29) and mm. 80-81. Instances of seven-tone saturation, secondly, are so numerous in the Fourth Symphony as to require no examples. However, the reader will note that the author has distinguished among diverse types of pandiatonic textures through his employment of the term tertenian pandiatonic in instances where the background harmonies are generally tertian (e.g. Symphony No. 4, first movement, mm. 119-35; fourth movement, mm. 1-37). The other genre of pandiatonicism, meanwhile, is illustrated by the development section from the first movement of Symphony No. 4, mm. 51-116. Finally, saturation with pitch sets having fewer than seven tones has been observed on some occasions. In the second movement of the Sixth Symphony, mm. 32-36, for example, saturation with a four-tone set, in a texture which might otherwise be classified as imitative (type C") has led the author to describe this texture as pan-projectional (see Ex. 11, p. 29).

Due to the great number of texture types found in the three pieces, the investigation of the music has necessitated
the development of a variety of analytical procedures. These methods, all of which are concerned with modes of analysis of pitch sets, may be summarized as follows: 1) pitch sets have been analyzed at each concensus or concurrence of tonal material; 2) pitch sets have been analyzed on the beat; 3) pitch sets contain all tonal material found within the limits of one beat; 4) pitch sets contain all tonal material that concurs with a sonority in the background; 5) pitch sets contain all tonal material from a particular set with which a given passage is perceived to be saturated.

The first of the procedures delineated above generally was employed in homophonic textures, such as the first and second restatements of the theme from Mosaics (mm. 12-32). With this first method, scalar material has been excluded from the analysis, since it has been perceived to be either unessential or imperceptible (see, for instance, Symphony No. 6, fourth movement, measure 73). The first analytical procedure also has been employed when the vertical sonorities have been accompanied by a melody which has progressed so slowly that each of its tones has seemed to articulate a new sonority (see Ex. 7).

Example 7 (Symphony No. 4, fourth movement, measure 89).
A third instance of this first mode of analysis concerns imitative passages (type C’) where, due to either a relatively slow tempo or sufficiently great durations of notes, each concensus has been perceived to be a distinct sonority (see Ex. 8).

Example 8 (Symphony No. 6, first movement, mm. 3-4)

Pitch sets have been analyzed on the beat in three general cases: 1) chordal-polyphonic textures where harmonic articulations were relatively distinct (see Ex. 9); 2) textures consisting of a melody with accompanying harmony where, as a result of the tempo, each of the tones of the melody was not perceived to articulate a new sonority; 3) tertian pandiatonic passages dominated by a single species of seven-tone set (e.g. Symphony No. 4, first movement, mm. 119-35), since the employment of the usual analytical procedure would
result in the tabulation of a single seven-tone sonority for each passage, and this limited amount of information probably would be of little value to one attempting to describe his perceptions of individual events in the passages.

Each pitch set was perceived to contain the tonal material found within the limits of a single beat whenever saturation for the duration of a single beat was observed with pitch material found only within such limits. This type of perceived effect perhaps may be described as limited saturation, although the substitution procedure (discussed on p. 29), typically employed in saturated passages, is irrelevant to the present mode of analysis and therefore has not been implemented in this case. Limited saturation was apparent in passages which moved along at a relatively rapid tempo, with textural situations that generally corresponded to one of the following categories: 1) imitative, type C" texture (see Ex. 4, p. 22); 2) ostinato-dominated texture, where ostinati appeared on the beat for a full beat's duration.
(e.g. Mosaics, mm. 224-37; see, for instance, Ex. 6, p. 25).

Pitch sets were observed to include all tonal material which concurred with a sonority in the background when the texture was sufficiently dense that some type of saturation was perceived, but when, however, the components of the pitch sets were perceived continually to be changing, by means of 1) distinct harmonic articulations, and/or 2) scalar passages which progressed chromatically to such a degree that the substitution procedure was felt to be incompatible with patterns of perception (see Ex. 10; points of perceived articulations of pitch sets have been indicated by means of asterisks).

Example 10
(Symphony No. 4, fourth movement, measure 62).

Each sonority within a passage was perceived to contain all the tonal material from a particular set of tones (even though all the tones technically might not be present during the time that any one of these sonorities was sounding) whenever the passage's texture was observed to be saturated with the given tonal set. In the Sixth Symphony, second movement, mm. 30-36, for example, every vertical sonority from the
given passage was analyzed as one and the same tetrad, since the passage's texture was perceived to be saturated with a single four-tone set for the duration of that passage. (see Ex. 11).

Example 11
(Symphony No. 4, second movement, measure 35)

Other examples of saturated textures include passages, frequent in the Fourth Symphony, in which seven-tone saturation was perceived. In such instances, seven-note pitch sets generally were tabulated for each sonority in the background; the change from one heptad to another was accomplished by means of the substitution of tones from the present pitch set for chromatic variants of those tones which had appeared in the preceding heptad. For the few instances in which twelve-tone saturation seemed to be in evidence, the author
did not tabulate twelve-tone sonorities; rather, he excluded the rapid, saturation-inducing chromatic scales from the analysis of those passages in which such scales had been found: (Symphony No. 6, second movement, mm. 60-62, 80-81; see Ex. 12). As a result of this step, the author obtained Example 12 (Sixth Symphony, second movement, measure 68)

![Musical Example]

results which were more informative than those he would have acquired had he included the scales in his analysis (since chromatic passages tend to destroy the individuality of sonorities).

An additional practice has been adopted for the analysis of certain sonorities from the Fourth Symphony. In three instances (first movement, mm. 4-8, mm. 15-22b; fourth movement, mm. 155-59) a certain kind of syncopated harmonic rhythm has been in evidence in the string parts (see Ex. 13), where sonorities created by each eighth-note concentus have individually acquired, as a result of their two-fold repetition, a total length equivalent to a dotted quarter note; the harmonic rhythm generally has been delayed by one eighth
note in these instances, so that the harmonies have been perceived to change just after the beat. The author, in accordance with his perceptions, has mentally shifted the syncopated sonorities in the string parts ahead by the time value of one eighth note, so that the appearance of each sonority has coincided with the beat; as a consequence, the complexity of the texture has been greatly reduced (frequently to a simple homophonic texture type), and the analysis of the sonorities has been commensurately facilitated.

The first method of analysis was universally employed in the author's investigation of background occurrences. Background harmony has been analyzed for the entire Fourth Symphony (with the exception of a single, brief passage from
the first movement -- mm. 30d-50a -- in which background occurrences were not perceptible); the data obtained from this investigation has been included in appendix A. For the other two pieces, however, data pertaining to background events has not been listed in the appendix. The reasons are as follows. In the *Sixth Symphony*, first of all, the concept of background harmony seemed to be irrelevant for the most part. In *Mosaics*, secondly, an analysis of background sonorities was considered to be unnecessary for Variations I and III, and not feasible for any of the other variations, because of the following facts: 1) in the first and third variations, the background harmony consisted primarily of an alternation between relatively simple (i.e., three- and four-tone), tertian and perfect fifth types of sonorities, which could be analyzed readily by inspection; consequently, a statistical analysis was perceived to be superfluous in this case; 2) in the second and fourth variations, the presence of passages whose textures were chordally polyphonic rendered the determining of limits of sonorities somewhat arbitrary in some cases; 3) in the final variation, a relatively great textural density, complemented by a substantial degree of melodic and rhythmic activity in various parts, contributed to an obscuring of the background harmony throughout much of this section; consequently, a separate analysis of background sonorities was considered to be meaningless from an aural standpoint.

In most instances, the designation "No interval content"
was given to slow, monophonic passages (type A'), in addition to passages in which either a single tone or no tonal material was found. An exception was made for the theme from Von Kosenin; however, a single five-tone set was tabulated for that linear sonority because of the theme's importance throughout the piece.

Finally, while the author's analysis of sonorities was limited to the tabulation of vertical pitch sets primarily, linear sets were tabulated, and the concurrent background sonorities excluded from the analysis, in the Fourth Symphony, fourth movement, mm. 72-81. This deviation from the usual procedure was made because none of the modes of analysis associated with vertical sonorities seemed to be feasible in this passage (except the method which involves the tabulation of background sonorities).