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DOCTOR OF MUSIC EDUCATION

BY

JAKE MANZANARES

1969

A TRIAL OF THE CONTROLLED READER

AS APPLIED TO MUSIC READING

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DEDICATION

This research study is dedicated to my parents, Mr. and Mrs. Carlos Manzanares, Jr., in appreciation for their love and sacrifice in providing an education for their son and to all members of my family and my friends for their encouragement throughout the entire program.

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CHAPTER I

INTRODUCTION

Background and Need for the Study

The available knowledge gained by psychologists about the sight-reading of musical notation has been, for the most part, neglected by those who develop teaching materials for the improvement of sight-reading. Clyde Nobel states:

> Sight-reading is a complex type of neuromuscular activity requiring a high degree of perceptual-motor skill with two major functions or processes: (a) rapid visual discrimination of the musical notation, and (b) proper coordination of a variety and sequency of motor movements. From a psychological point of view, the acquisition of sight-reading skill is a practical problem in transfer of training. The carry-over effect of practice under one set of conditions to performance under another (sic).[1]

He advocates that the student must train for transfer as shown in his principle of transfer:

> 1. Training for sight-reading should involve practicing by the whole rather than the part method.

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[1]Clyde E. Nobel, "Sight Reading Psychology," Music Journal, XVIII (September, 1960), pp. 74-75.

2. Reading through entire sections of unfamiliar material should be executed without concentrating on details.

3. The student should acquire skill in hunting behavior, to look ahead, not stopping for errors.[2]

The importance of teaching music reading along with performing technique justifies more research and experimentation. Unlike music reading, verbal reading has been subject to continuous research applied in reading laboratories in many high schools and universities. The reading laboratories have training programs designed to increase perception span, rate of speed, and comprehension. With the increase of these factors, the fixation pause is minimized so that the reader fixates only twice during one line of print.

A successful reading program like the one employed at the University of Oklahoma's reading laboratory uses a variety of pacing machines such as the Keystone Tachistoscope, Shadowscope Pacer, and the Controlled Reader. In this reading program the students are given a battery of tests to provide them as well as the instructor with a comprehensive record of their reading abilities or disabilities. The students then receive instruction on how to fixate, perceive, and group words together. Along with class instructions, the students practice individually with the various pacing devices in an effort to create new reading habits.

Music reading and verbal reading are similar in that the eye moves from left to right. For single-line instruments reading

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[2]Ibid.

is executed one line at a time, the same as in verbal reading. Another similarity existing between both forms of reading is that the reader must have a working knowledge of vocabulary in one and of musical notation in the other. Common to both forms of reading is phrasing and interpreting. In verbal reading, phrasing occurs by grouping several words into a meaningful statement. Musical phrasing is done by grouping several notes to form a figure; successive figures form a motive and successive motives form a phrase. Interpretation is very similar for both forms of reading in that the overall meaning of a text or composition can only be perceived through careful analysis of interpretation.

Although verbal reading and music reading have many common factors, music reading differs significantly from verbal reading. The three major aspects of music reading that are not aspects of verbal reading are rhythm, melody, and harmony. Each of these factors presents a different task not found in verbal reading. Rhythm, for example, has two different functions. In prose rhythm is related to tempo while i music, rhythm means the number of definite pulsations that each note receives in a given measure. It is possible for a measure of music of four pulsations to have several different notes, each requiring different rhythmic time values. Melody differs greatly in music because of the larger peripheral field of vision required by the system of musical notation. In verbal reading, the line of prose remains constant, and the melodic aspect is provided by the inflections

of the voice, which do not require that the eyes move in an up and down fashion. The harmonic structure of piano music creates for the reader an especially difficult task not experienced in verbal reading. A person reading piano music must see several notes vertically and horizontally on two different clefs, look for tempo and dynamic markings, and execute these symbols simultaneously.

Delimitations of the Study

This investigation was confined to the testing and training of sixteen university music majors, using the Controlled Reader for the purpose of reducing the number of fixation pauses and pause durations and increasing the perception span. The purpose of the study was to evaluate the Controlled Reader as an instrument for developing better sight-readers. The study also involved the musical factors of accuracy of pitches, accuracy of rhythm, articulation, and dynamics--all necessary for the development of good sight-reading. Other musical factors involved in general musicianship but not directly connected with sight-reading were intonation, phrasing, technical facility, and tone quality. The training program was designed to develop only those factors which were necessary to increase sight-reading ability.

More experimentation is needed in developing better methods of reading music based on the available findings on perception span, fixational pause, and pause durations. The need for this study grew out of the awareness of this writer

that in order to develop a systematic method of reading music, more insight into perception span with the aid of the most advanced reading machines is needed. This led to the development of an eight-week training course based on the principles of the reading laboratory at the University of Oklahoma, using the Controlled Reader with musical notation.

Statement of the Problem

The problem of this study was to evaluate the Controlled Reader as an aid for increasing perception span when applied to music reading. A subproblem was an evaluation of the performance of college music majors on their instruments after they had broken old reading habits and adjusted to the concept of perceiving a whole measure of music in one fixation pause.

Definition of Terms

For the purpose of this study the following definitions were used:

Perception span -- The amount of material seen at each fixation.

Fixation pause -- A point in time when the eyes focus on the reading material. During this fixation pause, recognition of the material occurs.

Pause duration -- The length of time the eyes remain in a fixation pause.

Tachistoscope -- A film strip projector that projects words or phrases at exposure times varying from several seconds to one one-hundredth of a second.

Tachistoscopic Training -- A method of inducing the eye to perceive more material in less time by projecting the material at timed intervals.

Controlled Reader -- A film strip projector that presents reading matter under conditions that impose constraint on eye movements and rate of reading by regulating the number of words presented per minute.

Hypothesis of the Study

Music reading and verbal reading have significant elements in common that allow Controlled Reader training to develop more efficient sight-readers in less time than with conventional methods. (The eight null hypotheses formulated to test the basic hypothesis will appear in Chapter III.)

Review of Related Literature

Studies germane to the present project can be grouped as follows: (1) investigations of the general matter of visual perception and fixation pause in eye movements related to both verbal and music reading and (2) investigations of the particular matter of using tachistoscopic techniques. This summary deals with the major findings in both categories.

In 1929, Tinker[3] completed a study on eye habits in reading. He investigated the role of fixation-pause duration in reading by conducting experiments with dots and single letters. His findings indicated that the proportion of reading

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[3]Miles A. Tinker, "Visual Apprehension and Perception in Reading," Psychological Bulletin, XXVI (1929), pp. 223-236.

time to pause duration averaged 92.7 percent while the proportion of reading time to eye movements was only 7.3 percent. The percentages varied with the comprehension requirements but, in no case, did the pause take less than 90 percent of the reading time. He further concluded that the pause duration had no significant relation to fixation frequency or regression frequency.

In a study completed in 1951, Tinker[4] described objective reading as a narrow visual fixation in which few letters were apprehended per exposure. The reader recognized dominant parts first and was influenced very little by total forms in perceiving words. On the other hand, subjective reading was characterized by a wide field of vision and a perception of total forms. The total form appeared to be the important element in word perception.

In 1928, Tinker[5] found that the time taken for fixational pauses plus the time taken for eye-movements gave the total reading time for any selection. The largest portion of reading time was devoted to fixational pauses; thereby, he concluded, that perception in reading occurred only during the fixational pauses. In reading algebra and chemistry formulae (reading that more closely parallels music reading), the

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[4]Miles A. Tinker, "Fixation Pause Duration in Reading," Journal of Educational Research, XLIV (1951), pp. 471-479.

[5]Miles A. Tinker, "Eye Movement Duration, Pause Perception and Reading Time," Psychological Review, XLV (1928) pp. 385-397.

number of fixations was about 50 percent greater than the number of fixations in reading prose.

Sisson[6] described two approaches to the question of the relation between Oculo-motor and Central eye movements in reading: (1) In Oculo-motor reading, one must discover whether or not movements are amenable to practice and, if they are, whether or not the clinician can institute proper eye-movements through training; (2) In Central, one must decide whether or not eye-movements are sympotomatic of the reading processes. In his results, he concluded in favor of Central by declaring that eye-movements are not explanations of reading ability but are symptoms of underlying processes of assimilation.

Van Nuys and Weaver[7] were concerned with the influence of the rhythmic and melodic factors in music upon measurable aspects of ocular and manual behavior. An attempt was made to study and determine the relative difficulty of rhythmic and pitch relations and their influence on the durations of reading pauses. The immediate memory span was used as the criterion of difficulty because the span depends upon the amount of material that can be visually explored, organized, and retained until executed by the hands. In their experiment

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[6]E. D. Sisson, "The Role of Habit in Eye-Movements in Reading," Psychological Record, I (1937), pp. 157-168.

[7]K. Van Nuys and H. E. Weaver, "Memory Span and Visual Pauses in Reading Rhythms and Melodies," Psychological Monographs, LV (1943), pp. 133-150.

they used three different kinds of reading material: (1) selections in which only the time values varied; (2) selections composed of different pitch intervals but having notes of only one time value; and (3) selections made by combining some of the rhythmic and melodic from the first and second selections.

The Dodge method[8] of photographing eye movements was used. Light was reflected from the cornea of the reader's eye to the lens of a magnifying camera. While the subject was reading, the light was focused on 35mm film at a continuous rate of 5.6 cm per second.

Their results indicated that (1) melodic factors constitute the limiting conditions for memory span, (2) increased memory span depends upon improvement in ability to apprehend pitch patterns as melodic segments of a composition, and (3) rhythmic factors constitute the limiting conditions for rate of reading or average pause duration. According to these results, the improvement in ability to group rhythmic figures must occur before an increase in rate of reading is indicated.

Dallenback[9], supplementing the experiments of Whipple and Foster, in which they scientifically examined the results of Catherine Aiken's exercises in visual apprehension, trained second grade children with flash cards composed of seven types

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[8] Ibid.

[9] Karl M. Dallenback, "The Effect of Practice Upon Visual Apprehension in School Children," Journal of Educational Psychology, V (1949), pp. 321-324, 387-404.

of material: (1) numerals, (2) letters, (3) combined numerals and letters, (4) words, (5) combined numerals, letters, and words, (6) geometrical figures, and (7) various materials combining all of the above.

A rapid improvement occurred in the beginning, but the improvement leveled off to a slower rate. The children classified as poor made a slower and more prolonged improvement, but they ultimately surpassed the group classified as medium. The effects of the drill were still present after 41 weeks of no practice, and boys had a greater visual apprehension than did girls.

Weaver,[10] in comparing word-reading and music-reading, found that one musical note is the equivalent to one word. The average perceptual span for music symbols varied between three and five notes for different kinds of note arrangements. In relation to the perception span, the rhythmic and tempo requirements of music made the reading rate far different from word-reading. The average pause durations were generally longer in music reading than in verbal reading with a higher correlation existing between reading time and pause duration than between reading time and the number of pauses.

Lannert and Ullman[11] tested several subjects in order to identify any distinct factors, to determine how important these

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[10]H. E. Weaver, "Studies of Ocular Behavior in Music Reading," Psychological Monographs, LV (1943), No. 249, pp. 1-19.

[11]V. Z. Lannert and M. Ullman, "Factors in Reading Piano Music," American Journal of Psychology, LVIII (January, 1945), pp. 91-99.

factors are, and to discover methods of improving sight reading. The factors investigated were:

1. Counting eye movements from musical score to keyboard;

2. Reproducing scales, arpeggios, and chords with eyes closed in order to test familiarity of keyboard;

3. Stating of time, key, and modulations by the subjects in order to check for guessing;

4. Checking for span of reproduction by giving students a short time to look over the score before playing;

5. Checking of reading ahead by having subjects read the first measure and then play it again while reading the second measure.

The factors indicated from the results of the testing that the better readers had the largest perception span and tonal imagery.

Smith[12] reported that in the teaching of music reading auditory imagery should be given a great deal of consideration as one of the factors influencing the efficiency of music reading. He made some experiments in mental perception of word sounds and mental concepts of musical sounds.

From the results of his testing, Smith concluded that auditory imagery is present in the music reading complex and is developed simultaneously with development of skill in music reading. He suggested that auditory imagery seems to increase

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[12]Gustavus H. Smith, "Auditory Imagery in Music Reading," Unpublished Master's thesis, Stanford University, 1947.

efficiency in sight-reading music and that ear training will develop more auditory imagery.

Thompson[13] analyzed and compared errors made by performers in four different levels of performing ability using accidentals, key, pitch, and rhythm as the testing criteria. Because of their importance to the orchestra and band, the violin and clarinet were used as the performing instruments. This study provided a possible diagnosis of reading difficulties to be used as a basis for remedial teaching as well as for the development of better methods of instruction.

The results of the study indicated that the major source of difficulty in sight-reading was rhythm with accidentals secondary. It also showed that the size of the intervals had little effect on the relationship to the number of errors made by performers.

Petzold[14] stated that the following areas of music reading were relatively unknown to musicians: (1) adequate identification of the learning process as it applies to music reading; (2) development of effective procedures for teaching music reading; (3) design of effective instruments to measure and evaluate music reading competence; and (4) the determination of reasonable levels of music reading competence for

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[13]Albert G. Thompson, "An Analysis of Difficulties in Sight-Reading Music for Violin and Clarinet," Unpublished Ph.D. dissertation, University of Cincinnati, 1953.

[14]Robert G. Petzold, "The Perception of Music Symbols in Music Reading by Normal Children and by Children Gifted Musically," Journal of Experimental Education, XXVIII (June, 1960), p. 271.

children representing various grade levels and various degrees of musical ability. In his study of perception of music symbols by normal and gifted children, he concluded that (1) instrumental instruction does not seem to be a factor in the music reading abilities of either average or gifted children, and (2) training will exert a greater influence if greater emphasis is placed on the meaning of musical notation rather than mechanical responses to visual stimuli.

Wheeler and Wheeler[15] tested 243 fifth and sixth grade pupils of the Sylvania Heights School, Miami, Florida, in an effort to establish the relationship between music reading and language reading abilities. Testing of musical skill was done by the Knuth Achievement Test in Music. The results and conclusions were:

1. There were no sex differences in the ability to read music;

2. Approximately three-fourths of the children had no opportunity to learn to read music except through the public school music program;

3. Pupils taking private instruction read music better than those engaged in public school music only;

4. Achievement in music reading was much lower in respect to grade norms than achievement in language reading;

5. There was a low correlation between language and music reading but not sufficient to justify and assume that

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[15]Lester R. Wheeler and Viola D. Wheeler, "The Relationship Between Music Reading and Language Reading Abilities," Journal of Educational Research, XLV (1952), pp. 439-450.

the techniques involved in reading music were closely related to verbal reading;

6. Language reading ability was more closely related to intelligence than was music reading ability.

Renshaw,[16] investigating the effects of the tachistoscope on visual perception and reproduction of forms, used tachistoscopic training sessions to improve the span of recognition of various sizes of digits. From this training, he concluded that tachistoscopic training with digit patterns produced an increase in reading speed and comprehension and at the same time enlarged the vertical and horizontal meridian.

Jacobsen[17] completed research in analyzing eye-movements in reading music at the University of Chicago in 1926. The purpose of his investigation was to determine the eye-movements in reading music and to apply the findings, if of any value, to the teaching of music reading. The results of this study brought out three characteristics of the span of recognition in reading music: (1) vertical as well as horizontal movements must be considered; (2) the content of the area rather than the extent is important; and (3) the retention ability of the reader influences the size of the span of recognition.

He suggested forcing quicker perception by the use of a metronome and other devices as an incentive. He also implied

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[16]Samuel Renshaw, "The Visual Perception and Reproduction of Forms by Tachistoscopic Methods," Journal of Psychology, XX (1945), pp. 217-232.

[17]Irving O. Jacobsen, "An Analysis of Eye-Movements in Reading Music," Unpublished Ph.D. dissertation, University of Chicago, 1926.

that the span of recognition can be enlarged 42 percent and the rate of recognition 32 percent. Jacobsen also warned that eye movements are symptoms rather than causes of mature and immature reading and that the error of teaching eye movements should not be made. He suggested that reading which results in the desired eye movements should be taught.

In a further study, Jacobsen[18] attempted to determine the habits of readers in various stages of training as shown by eye movements characteristic of the different stages in transition from immaturity to maturity in reading music. All material used was original, consisting of 18 short vocal and instrumental selections.

Photographic records were made by reflecting a pencil beam of light from the cornea of the subject's eyes through an electrically driven tuning fork vibrating at 25 vibrations per second. The vibration of the tuning fork produced on film a line of dots, indicating a pause in the reading.

Characteristics of the immature reader consisted of many fixation pauses of long duration with numerous regressive movements. Many unnecessary pauses were made because of the slowness of recognition of the notation. The mature reader, on the other hand, made fewer pauses of shorter duration, with no regressive movements. The perception span for the immature reader was one note per fixation. It was one to four notes per fixation for the mature reader.

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[18]Irving O. Jacobsen, "An Analytical Study of Eye-Movements in Reading Vocal and Instrumental Music," Journal of Musicology, III (1941), p. 3.

Jacobsen,[19] using the results from his research, formulated the following useful techniques for school music training:

1. Training in methods to improve perception, including two or more notes for every pause;

2. Simple reading material for immature readers, consisting of diatonic notes first with a gradual introduction of accidental signs;

3. Determining the extent of recognition through content rather than the size of the area;

4. More drill in rhythms for quicker recognition;

5. More material designed especially for beginners and immature readers.

Dodge[20] in his study of visual fixation concluded that the tendency to reduce the physical exposure time to a minimum by tachistoscopic methods was a methodological mistake based on a psycho-physical misconception. To introduce unusual conditions foreign to natural fixations could lead to a distorted analysis of the processes of apprehension and make the conclusions of normal perception valueless and false. He was very much against the use of the tachistoscope as an attempt to transfer the effects of minimal exposure to the normal processes of apprehension.

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[19]Irving O. Jacobsen, "An Analytical Study of Eye-Movements in Reading Music and the Bearing of That Study Upon Methods and Procedures in School Music Training," Music Supervisors National Conference, Twenty-First Yearbook, (1928), pp. 284-289.

[20]Raymond Dodge, "An Experimental Study of Visual Fixation," Psychological Review, VIII (1907), N. 35, p. 32.

Bean,[21] investigating the visual, auditory, and kinesthetic imagery in the transfer of musical notation to the piano keyboard, used a five step testing procedure:

1. The Seashore tonal memory and rhythm test was given to determine the clearness of the auditory impressions;

2. The same material was presented tachistoscopically to compare the clearness of visual and auditory impressions of the same material;

3. A succession of tones and rhythms similar to Seashore's, but slightly altered, were given and the subject named the altered tone or rhythm;

4. The subject, on a silent piano, played the tones that he thought he heard;

5. The same material was given with enough time for the subject to see the pattern and then play it.

From the results of the testing the following conclusions were evident:

1. Visual imagery was easier than auditory imagery;

2. None of the readers could translate seen notes into heard notes, but some were vaguely aided by what they thought the notes should sound like;

3. In reading situations a note meant the act of pressing a key, not a sound;

4. Rhythmic figures were also interpreted in terms of action, but a few readers heard them at sight;

5. A low degree of both visual and auditory imagery resulted in reading disability.

Bean found that if an individual could not perform accurately the tasks requiring the use of visual and auditory imagery, he was aided very little in his reading.

Wheelwright,[22] experimenting with the perceptibility and spacing of music symbols, studied the effect of spacing these symbols in consistent relationship to time values while sight-reading at the piano.

The differences of speed and accuracy of perception between traditional spacing and spacing in ratio to time values indicated that boys are helped by spaced symbols. Girls had an advantage with traditional methods of spacing. The same process given tachistoscopically proved that girls exceed the boys in accuracy, but the differences were made when the symbols were spaced in proportion to their time values rather than when spaced in the traditional manner. This offered psychological advantages to the reader not provided by music that was traditionally spaced.

Weaver[23] investigated the number of musical symbols that could be seen at a single fixation of the eyes by tachistoscopic techniques. The subjects indicated the number of musical symbols that they saw by writing and playing the total number of notes seen at a single fixation. The results of this study indicated that there was little or no correlation

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[22]Lorin F. Wheelwright, An Experimental Study of the Perceptibility and Spacing of Music Symbols (New York: Bureau of Publications, Teachers College, Columbia University).

[23]Homer E. Weaver, "An Experimental Study of Music Reading," Unpublished Ph.D. dissertation, Stanford University, 1930.

between the results of tachistoscopic studies and the average number of notes seen per pause during ordinary reading.

Robinson[24] evaluated the tachistoscope as a measure of the psychological limit to determine the upper levels of reading perception. The eye movements of 51 college students were photographed to measure perception span. The width of fixation was found by dividing the number of fixations made into the total number of words read; perception span was found by taking the average number of words perceived in 30 tachistoscopic presentations.

He concluded that the tachistoscope was not a good measure of average span used in reading and that reading meaningful material was a better measure of reading span.

Stephenson,[25] in his evaluation of the tachistoscope as an aid in teaching rhthmic reading, experimented tachistoscopically with 58 eighth grade students. After thirty drill sessions with the control and experimental groups, the findings indicated that the mean scores were higher for the experimental group, but not sufficiently higher to determine positive gains by using the tachistoscope.

Results of the experiment differed from results obtained in other fields for the following reasons: (1) subjects may

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[24]F. P. Robinson, "The Role of Eye Movement Habits in Determining Reading Perception," American Journal of Psychology, XLVI, (1934), pp. 132-135.

[25]Loran D. Stephenson, "An Evaluation of the Tachistoscope as an Aid in Teaching Rhythmic Reading," Unpublished Master's thesis, Brigham Young University, Provo, Utah, 1955.

not have had sufficient training to exercise the visual function essential for achieving better results; (2) music reading differs from other visual activities in that it is restricted to an arbitrary time schedule which handicaps tachistoscopic training that is dependent on speed; and (3) the control group received special training over the experimental group. Stephenson concluded that the tachistoscope was useful as a supplement but not as a substitute for traditional methods.

Bean[26] used a twin tachistoscope mounted on a piano to check the reading habits of professional, student, and amateur musicians. A close analogy between verbal and music reading was brought out from the results of the experiment. The good music readers grouped notes into meaningful units related to their context just as readers reading prose do. Practice with the tachistoscope demonstrated that part readers became pattern readers if their response to notes became sufficiently antonatized. It was also noted that the span of perception increased before accuracy did.

Buegel,[27] using a short exposure technique in determining the difference and delimiting factors in reading piano scores, concluded that notes are read through the organization of single notes into higher perceptual units. Certain combinations

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[26]Kenneth L. Bean, "An Experimental Approach to the Reading of Music," Psychological Monographs, L (1938), p. 226.

[27]Herman F. Buegel, "Differences and Delimiting Factors in Reading Piano Scores," Unpublished Master's thesis, University of North Dakota, 1934.

of tones were recognized by special characteristics, and familiarity was a factor in recognition span.

Stokes,[28] using junior high school students from the general music classes, orchestra, and band, experimented with the effects of tachistoscopic training on short exposures of musical units of increasing difficulty. Training consisted of sequential short musical units projected by a flashmeter at one tenth of a second. A gradual increase of difficulty in the musical units occurred.

The study showed significant results in method of instruction and of transfer from training in a narrow function to skill in a broader function. In improving the recognition span for short musical excerpts, tachistoscopic training had no general effect and did not improve the reading performance of music in general.

Wiley,[29] attacking the problem of rhythm in sight-reading, attempted to develop a method of teaching rhythmic reading with the aid of a tachistoscope. Two fifth grade classes were selected as experimental and control groups, tested for rhythmic sight-reading ability, and put through a four month training program. Both groups covered the same material and participated in both the conventional and tachistoscopic methods being

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[28]Charles F. Stokes, "An Experimental Study of Tachistoscopic Training in Reading Music," Unpublished Ph.D. dissertation, University of Cincinnati, 1944.

[29]Charles A. Wiley, "An Experimental Study of Tachistoscopic Techniques in Teaching Rhythmic Sight-Reading in Music," Unpublished Ed.D. dissertation, University of Colorado, 1962.

tested. The study produced the following results and conclusions:

1. Both groups made significant gains;

2. Tachistoscopic techniques were not more effective than conventional methods;

3. Tachistoscopic techniques were not more effective for those above average in aptitude for rhythmic recognition;

4. Tachistoscopic techniques were not superior for those either above or below the mean intelligence quotient;

5. Tachistoscopic techniques were not superior to conventional techniques for developing rhythmic sight-reading ability at the fifth grade level.

In his study, Bargar[30] attempted to establish a basis for research in the development of programs for training musicians in music reading skills. A tachistoscopic recognition test consisting of intervals, chords, and scales was designed to test skills on visual recognition of note patterns. Students were asked to notate the perception of note patterns projected at one twenty-fifth of a second.

The results of his findings indicated that visual recognition skills are substantially different from other skills and that utilizing the tachistoscopic techniques would make a significant contribution in the training of students in music reading skills.

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[30]Roscoe R. Bargar, "A Study of Music Reading: Groundwork for Research in the Development of Training Programs," Unpublished Ph.D. dissertation, Ohio State University, 1964.

Conclusions

A number of conflicting conclusions emerge from studies concerned with perception span, fixation pause, and tachistoscopic techniques in music reading. The following conclusions can be stated with confidence since they are based upon evidence resulting from carefully conducted research in music reading:

1. An increase in the rate of reading depends upon improvement in ability to grasp rhythmic figures;

2. Eye movements are symptoms rather than causes of mature and immature reading;

3. The fixation pauses of the immature reader are of extremely long duration and unnecessary;

4. Two methods for improving rate of reading are (1) decreasing the number of pauses and (2) decreasing the duration of pauses;

5. Differences between ability to perceive a tonal configuration aurally and the visual perception of the same configuration are not significant.

6. Rhythmic and tempo requirements of music reading make it significantly different from verbal reading;

7. Practice with the tachistoscope demonstrates that part readers become pattern readers;

8. A few studies conclude that programs using tachistoscopic techniques make significant contributions to music reading;

9. The majority of the studies conclude that tachisto-

scopic techniques are not superior to conventional methods.

While several conflicting studies on the use of a tachistoscope in music reading have been done, studies using the Controlled Reader as an aid to increase perception span have not been reported. This study will extend the research of early tachistoscopic studies by introducing the latest developments and applying them to music reading.

CHAPTER II

PROCEDURES OF THE STUDY

This investigation involved six major steps: (1) the selection of the subject; (2) the use of the Controlled Reader; (3) the administration of the pre-test; (4) the construction of a training program; (5) the administration of the post-test; and (6) the tabulation of the raw data.

Selection of the Subjects

Subjects for the study were college students majoring in music at the University of Oklahoma's School of Music, Norman, Oklahoma. All students used in the study were wind instrument players who read treble clef music. Four trumpets, four clarinets, four flutes, and four saxophones were selected from two groups--freshmen-sophomore and junior-senior--to participate in this study. A control and an experimental group were established from a random sampling of the students involved in the study.

All sixteen students were currently enrolled in private instruction on their major instrument with no control in regard to sex, intelligence, and socio-economic status. The students in the control group operated under the guidance of

their respective applied teachers, using conventional methods designed by this writer. The experimental group embarked on an eight week training program using the Controlled Reader and a speed reading machine under the supervision of this writer.

The Controlled Reader

The Controlled Reader, a speed reading machine currently used in the reading laboratory at the University of Oklahoma, presents a visual stimulus under conditions that impose constraint on eye movements and rate of reading (see Illustration 1, page 27). Special music was selected and written of specially designed staff paper and photographed in sequence to make the specialized film strips. Each film strip contained 36 pages of music with eight lines of music for each frame. The problems of a predetermined rhythm and tempo created a need to delay the presentation of new material until the entire line of music previously projected had been completed. This led to a special design in which a line of music (that required four seconds to execute) was projected on a screen. The subject was given only two seconds to perceive and execute the entire musical line. The predetermined speed of the Controlled Reader made it necessary to insert a blank space in the film after each visual stimulus was projected. This allowed the subject sufficient time to complete the musical line before a phrase appeared (see Figure 1, page 28).

Presenting the material in this fashion allowed for a continuous execution of an entire composition and made the

ILLUSTRATION 1

THE CONTROLLED READER

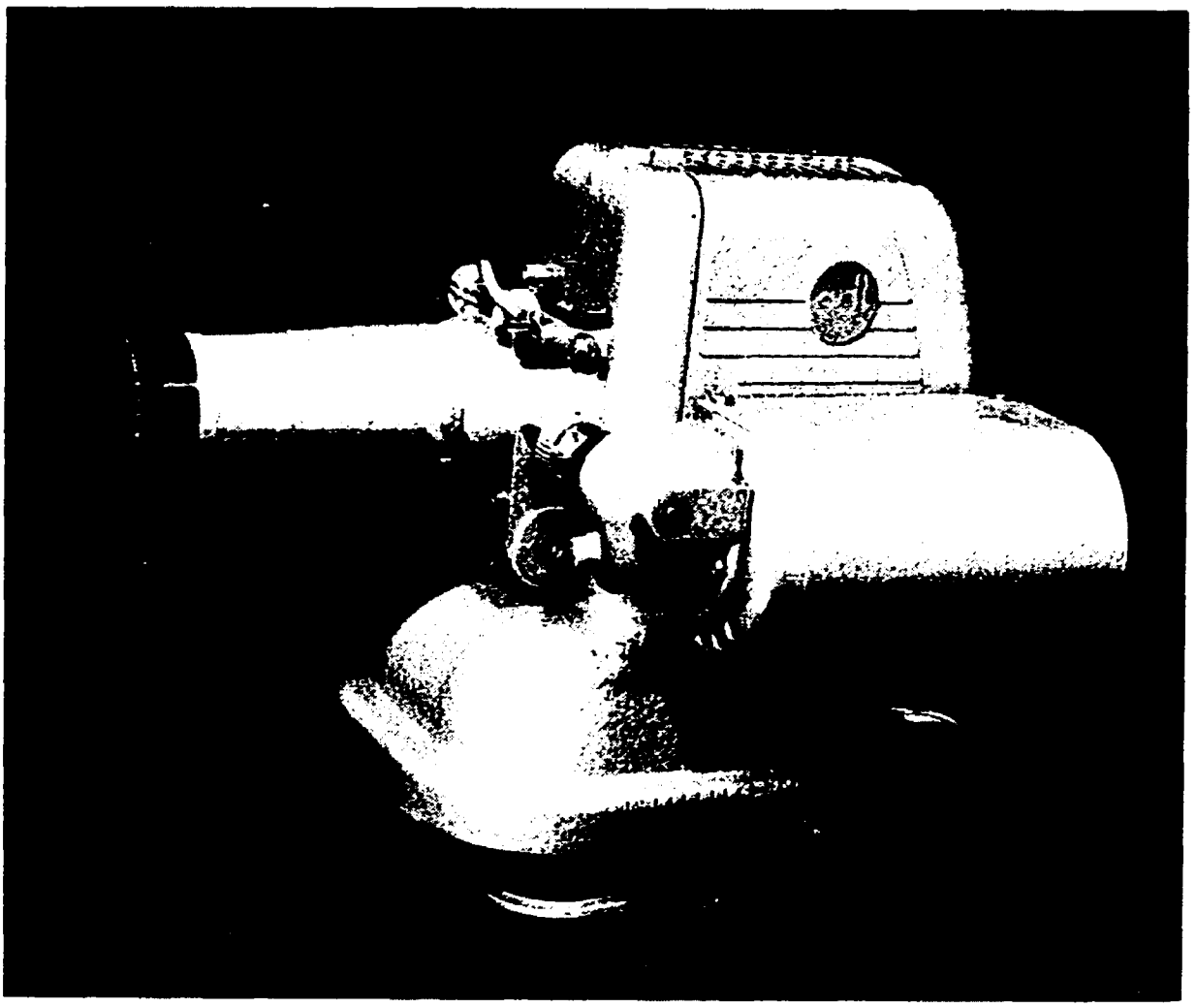
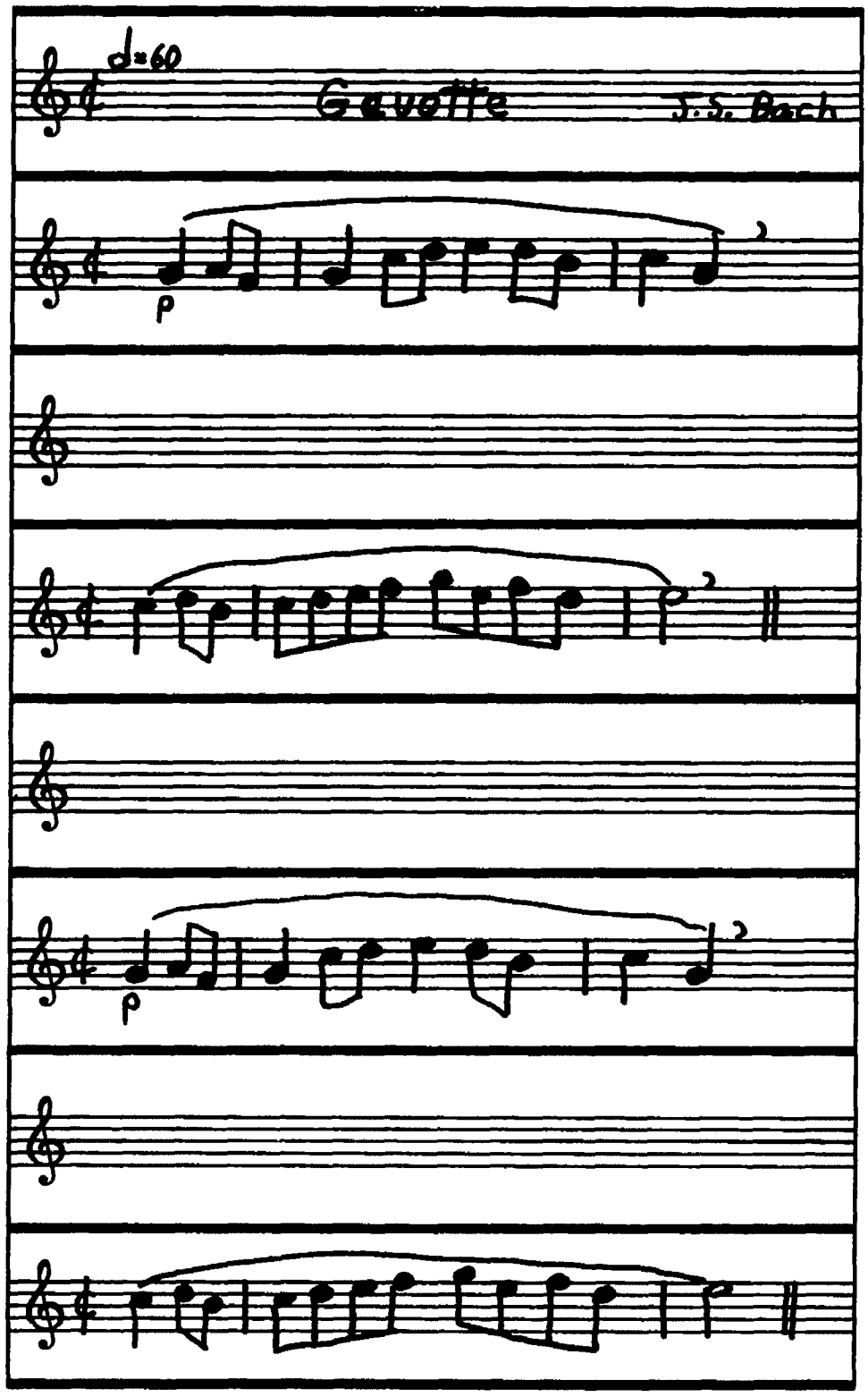


FIGURE 1

SPECIAL MUSIC SCORE PHOTOGRAPHED

FOR CONTROLLED READER



material more meaningful than older tachistoscopic methods of single phrase projections. The ultimate aim of this particular tachistoscopic method of reading music was to create a new technique of perceiving an entire phrase of music and to execute that phrase while fixating on the following phrase. Unlike conventional methods, the Controlled Reader forces the subject to look ahead, allowing no opportunity for regressive movements. With the goals firmly established and with the experimental group sufficiently trained, the carry-over into conventional reading should establish for the student an appreciable amount of perception span increase. If perception span is increased, it is safe to predict that sight-reading accuracy will increase.

Administration of the Pre-Test

A sight-reading pre-test of five musical examples selected from a list of ten short excerpts was given to each student. The musical excerpts were selected from a representative sampling of the conventional literature of the musical instruments used in the study (see Appendix A). The subjects sight-read the five musical examples before a committee of four faculty members in order to get an indication of their sight-reading abilities. The adjudicating committee indicated their estimation of each student's sight-reading ability by indicating a score of from 1 to 5 on the pre-test scale (see Figure 2, Appendix G).

The total score for each classification was totaled for

each committee member and totaled again for all the adjudicators in order to ascertain a composite indication of each student's sight-reading ability.

Design of a Training Program

The training program for the control group consisted of sight-reading instruction in conventional methods by their respective applied faculty members. A total of five minutes for each half hour of private instruction was devoted to instruction and assignment of material to be sight-read at the next lesson time. The student sight-read a predetermined musical excerpt related to the assignment given the previous week. The excerpt was graded by the instructor in the same manner, using the 1-to-5 test scale illustrated in Figure 2. The weekly sight-reading musical excerpts were designed and taken from other instrumental literature foreign to the instruments used in the study (see Appendix B). Each student in the control group was required to practice sight-reading a total of one and one-half hours weekly to insure comparable training with that given to the experimental group.

The experimental group trained with the Controlled Reader a total of three thirty-minute sessions per week. This group covered one film strip each week. The films were designed in such a way as to allow the student to increase gradually the perception span for each eye fixation.

The beginning of each film strip contained scales in various articulations in order to acquaint the student with

the method and sequence of later material to be projected by the Controlled Reader. After the students had completed the warm-up portion of the film, they were shown short musical compositions of elementary and intermediate difficulty. These compositions were introduced in their original tempo. Because relatively easy material that was familiar to the student was used, he was able to fixate an entire phrase of music. Thus, the students were able to form new habits that facilitated their reading more rhythmically and melodically complex music.

The last portion of each filmstrip contained a rapid musical excerpt in a double or triple meter. The music was projected as if the student were reading in a conventional method with no blank spaces between musical lines. The student, in order to execute the musical excerpt, had to maintain pace with the Controlled Reader. By using the Controlled Reader in this manner, the student was afforded the opportunity for regressive eye movements or to correct melodic and rhythmic errors.

Members of the experimental group trained with the Controlled Reader individually on their own time for a period of eight weeks. After completing all eight film strips, both of control and experimental groups were given a post-test. The results of the post-test when compared statistically with the results of the pre-test indicated the effects of training with a speed reading machine. Furthermore, the information indicated the feasibility of this type of training as a substitute or merely as an aid to conventional reading methods.

Administration of the Post-Test

In order to answer the following questions, a post-test was given to all members of the control and experimental groups.

1. Can a new approach to music reading be developed?

2. Can relatively advanced students break old reading habits, develop new ones, and improve their sight-reading abilities?

3. Can perception span be increased sufficiently for more effective reading?

4. Can more accurate reading be affected by increasing perception span?

5. Can tachistoscopic training reduce regressive eye movements that cause ineffective reading?

6. Is tachistoscopic training with the Controlled Reader superior to conventional training methods?

The post-test was designed and tailored individually to each particular musical instrument in an effort to control the problems of range, articulation, and style which were encountered on the pre-test. The music involved included examples from the instrumental literature in repertoire as well as an original example. The original example was designed to test the reactions of each student's ability to perform unusual rhythmic and melodic figures.

Each student was asked to sight-read four conventional examples and two tachistoscopic examples. The tachistoscopic portion of the post-test included a familiar German folk song

and an original composition. Each example was projected twice, once with blank spaces between lines to guage perception span and once with no blank spaces to guage the facility of the performer in his reaction to rapid stimuli.

Treatment of Raw Data

When each student had been tested, the same faculty committee graded the tape recording for each student on the same 1 to 5 test scale shown in Figure 2. The individual results of the testing for all sixteen students used in the study are recorded in Appendix B for examination. The raw data were tabulated and analyzed statistically to test the hypotheses of the study. The results for both the pre-test and post-test were compared to give an indication of the value of tachistoscopic training with the Controlled Reader. The analysis is presented and discussed in the following chapter.

CHAPTER III

ANALYSIS OF THE DATA

This study was conducted to determine whether or not music majors at the University of Oklahoma could develop better sight-reading techniques by training with the Controlled Reader than with traditional methods. The experiment was designed specifically to increase perception span, reduce fixation pause, and reduce the number of fixations for every projected stimulus. The projected stimulus of musical notation required four seconds to complete but the reader was allowed only two seconds to perceive the entire phrase.

The basic data used to make the statistical evaluation of 16 university music majors were raw scores derived from a pre- and post-test produced by conventional and experimental methods. The plus or minus gains for each student were recorded and tabulated for each classification: (1) accuracy of rhythm, (2) accuracy of pitches, (3) articulation, (4) dynamics, and (5) general sight-reading. The Kendall Coefficient of Concordance Test was used to gain concordance between judges from the raw scores, defined as the average for each judge across each subject for each of the variables. The total scores were pooled and averaged for each subject across

each variable for both pre and post measures. The Mann-Whitney U test was used to test differences between subject gain scores in the following ways: (1) the range of significance between the pre and post measures; (2) the range of significance between the traditional method and the experimental film method; and (3) the range of significance between the freshman-sophomore and junior-senior populations. The Sign test was used across the pre and post measures for the experimental group only. This provided a test for the null hypothesis of gains from film 1 in the pre-test to film 1 in the post test.

The statistical computations provided tests of the eight null hypotheses stated below.

1. There is no significant difference in accuracy of rhythm for post minus pretest gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

2. There is no significant difference in accuracy of pitches for post minus pretest gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

3. There is no significant difference in articulation for post minus pretest gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

4. There is no significant difference in dynamics for post minus pretest gains for each subject when trained for

eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

5. There is no significant difference in general sight-reading for post minus pretest gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

6. There is no significant difference between the experimental and control group for conventional minus experimental post-test gains across all 5 variables for each subject when trained for eight weeks using the Controlled Reader versus those trained in the same time period.

7. There is no significant difference between freshmen-sophomore and junior-senior groups for post minus pre-test gains across all five variables for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

8. There is no significant difference between film I and film II for post minus pre-test gains for each subject in the experimental group across all five variables when trained for eight weeks using the Controlled Reader.

Analysis of Data

The Kendall Coefficient of Concordance test was used to find concordance between all judges. The scores for each subject across each variable for all judges were computed and tabulated. The following formula $\sum (R_j - \frac{\sum R_j}{N})^2$ was used to compute W, the coefficient of concordance. To find W, all

the individual scores were totaled for each subject R_j across all judges. The composite scores for all 16 subjects were totaled again and divided by 16. The second step was to subtract $\frac{R_j}{N}$ from R_j to provide the sum difference between them ($R \frac{R_j}{N}$). The third step was to square the sum difference $(R_j - \frac{R}{N})^2$ for each subject. The fourth step was to tabulate a composite total for all subjects and compare totals on the R table for coefficient of concordance.[31]

The same procedure was used in the pre and post measures for all of the following variables: (1) accuracy of rhythm; (2) accuracy of pitches; (3) articulation; (4) dynamics, and (5) general sight-reading. Upon completing the Kendall Coefficient of Concordance test for all judges across each variable for each subject, the R table of concordance showed that no significant difference occurred among judges. Therefore, the Kendall Coefficient of Concordance test provided statistical concordance among all judges.

The function of the Mann-Whitney U test for this particular study was to provide a test that would show any significant difference at the .05 level of significance between the experimental and control groups across all five variables after eight weeks of training. The procedures involved were: (1) to pool all of the scores for variable 1 accuracy of rhythm, across all judges, for each student; (2) to divide by

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[31]Sidney Siegel, Nonparametric Statistics for the Behavioral Sciences. (New York: McGraw-Hill Book Company, Inc., 1956), p. 231.

4 and get an average for variable 1 across pre and post measures; (See Table 3 Appendix C) (3) to subtract the pre-test average from the post-test average for plus or minus gains; (See Table 3 Appendix C) (4) to rank each score on the gain column from the lowest to the highest score for variable 1 across each subject; (See Table 4 Appendix C) (5) to rank the scores in rank order between the control and experimental groups and the number of ranks for each group totaled; (See Table 5 Appendix C) (6) to compare total scores on table J p. 273[32] for level of significance at the .05 level of significance; and (7) to recapitulate the same procedure for all five variables for both pre and post measures.

The Mann-Whitney U test was used to test null hypothesis 1 which states: There is no significant difference in accuracy of rhythm for post minus pre-test gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same period. The range of significance for accuracy of rhythm was .520. Accuracy of rhythm was not significant at .05 level of significance. Therefore, for accuracy of rhythm the null hypothesis 1 was accepted as stated. (See Table 5 Appendix C)

The Mann-Whitney U test was used to test null hypothesis 2 which states: There is no significant difference in accuracy of pitches for post minus pre-test gains for each subject

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[32] Ibid., p. 273.

when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period. The range of significance for accuracy of pitches was .480. Accuracy of pitches was not significant at the .05 level of significance. Therefore, for accuracy of pitches the null hypothesis 2 was accepted as stated. (See Table 5 Appendix C)

The Mann-Whitney U test was used to test null hypothesis 3 which states: There is no significant difference in articulation for post minus pre-test gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period. The range of significance for articulation was .520. Articulation was not significant at the .05 level of significance. Therefore, for articulation the null hypothesis 3 was accepted as stated. (See Table 5 Appendix C)

The Mann-Whitney U test was used to test null hypothesis 4 which states: There is no significant difference in dynamics for post minus pre-test gains for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period. The range of significance for dynamics was .221. Dynamics were not significant at the .05 level of significance. Therefore, for dynamics the null hypothesis 4 was accepted as stated. (See Table 5 Appendix C)

The Mann-Whitney U test was used to test null hypothesis 5 which states: There is no significant difference in general sight-reading for post minus pre-test gains for each subject

when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period. The range of significance for general sight-reading was .323. General sight-reading was not significant at the .05 level of significance. Therefore, for general sight-reading the null hypothesis 5 was accepted as stated. (See Table 5 Appendix C)

The Mann-Whitney U test was used to test null hypothesis 6 which states: There is no significant difference between the experimental and control group for conventional minus experiment post-test gains across all five variables for each subject, when trained for eight weeks using the Controlled Reader versus those trained in the same time period. The Mann-Whitney U test for this particular hypothesis was carried out by averaging the experimental film and subtracting from the conventional post-test scores to provide the plus or minus gains. (See Table 6 Appendix D). These scores were then ranked from the lowest to the highest and tested by the Mann-Whitney U test. (See Table 7 Appendix D)

The range of significance for accuracy of rhythm was .191. Accuracy of rhythm was not significant at the .05 level of significance. Therefore, for accuracy of rhythm hypothesis 6 was accepted as stated. The range of significance for accuracy of pitches was .253. Accuracy of pitches was not significant at the .05 level of significance. Therefore, for accuracy of pitches hypothesis 6 was accepted as stated. The range of significance for articulation was 360. Articulation

was not significant at the .05 level of significance. Therefore, for articulation hypothesis 6 was accepted as stated. The range of significance for dynamics was .041. Dynamics was significant at the .05 level of significance. Therefore, for dynamics the null hypothesis 6 was rejected. The range of significance for general sight-reading was .080. General sight-reading was not significant at the .05 level of significance. Therefore, for general sight-reading the null hypothesis 6 was accepted as stated. (See Table 8 Appendix D)

The Mann-Whitney U test was used to test null hypothesis 7 which states: There is no significant difference between freshmen-sophomore and junior-senior groups for post minus pre-test gains across all five variables for each subject when trained for eight weeks using the Controlled Reader versus those traditionally trained in the same time period.

The range of significance for accuracy of rhythm was .164. Accuracy of rhythm was not significant at the .05 level of significance. Therefore, for accuracy of rhythm hypothesis 7 was accepted as stated. The range of significance for accuracy of pitches was .080. Accuracy of pitches was not significant at the .05 level of significance. Therefore, for accuracy of pitches hypothesis 7 was accepted as stated. The range of significance for articulation was .025. Articulation was significant at the .05 level of significance. Therefore, for articulation hypothesis 7 was rejected. The range of significance for dynamics was .139. Dynamics was not significant at the .05 level of significance. Therefore, for

dynamics hypothesis 7 was accepted as stated. The range of general sight-reading was not significant at the .05 level of significance. Therefore, for general sight-reading hypothesis 7 was accepted as stated. (See Table 11 Appendix E)

The Sign test was used to test null hypothesis 8 which states: There is no significant difference between film I and film II for post minus pre-test gains for each subject in the experimental group across all five variables when trained for eight weeks using the Controlled Reader. The Sign test was formulated to test any significant gains by the experimental group after 8 weeks of training with the Controlled Reader.

The range of significance for accuracy of rhythm was .008. Accuracy of rhythm was significant at the .05 level of significance. Therefore, for accuracy of rhythm hypothesis eight was rejected. The range of significance for accuracy of pitches was .227. Accuracy of pitches was not significant at the .05 level of significance. Therefore, for accuracy of pitches hypothesis 8 was accepted as stated. The range of significance for articulation was .016. Articulation was significant at the .05 level of significance. Therefore, for articulation hypothesis 8 was rejected. The range of significance for dynamics was .145. Dynamics was not significant at the .05 level of significance. Therefore, for dynamics hypothesis 8 was accepted as stated. The range of significance for general sight-reading was .227. General sight-reading was not significant at .05 level of significance.

Therefore, for general sight-reading hypothesis 8 was accepted as stated. (See Table 14 Appendix F).

Discussion of Data

When the 16 subjects used in this experiment completed the 8 week testing and training program, the raw data disclosed that both groups were in a very tight distribution. The data, when individual scores were compared, showed that the better subjects peaked out while the slower subjects indicated a bigger improvement. Statistically, neither group displayed a significant advantage in sight-reading by having trained either conventionally or experimentally. Of the five variables, the two most important, accuracy of rhythm and accuracy of pitches, failed to show statistical advantage over each other.

Therefore, the basic hypothesis that music reading and verbal reading have significant elements in common which would allow Controlled Reader training to develop more efficient sight readers in less time than with conventional methods is not supported by the evidence gained in this study, and the hypothesis is not a promising assumption on which to proceed in developing teaching procedures for teaching instrumental music sight-reading.

CHAPTER IV

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was designed to determine whether or not music majors at the University of Oklahoma could improve sight-reading techniques more efficiently by training with the Controlled Reader than with traditional methods during the same time period. A subproblem was the determination of whether or not perception span could be increased sufficiently by training and testing the following variables: (1) accuracy of rhythm, (2) accuracy of pitches, (3) articulation, (4) dynamics, and (5) general sight-reading. The prime objective was to establish a method of instruction which would diminish unnecessary eye movements in music reading by making part readers into whole readers through tachistoscopic projected stimuli.

The subjects were sixteen university instrumental music majors at the University of Oklahoma's school of music. All subjects were currently enrolled in private instruction on their major instrument with a minimum of eight years' experience in instrumental music education. The subjects were

divided at random into two groups: a control group which trained with conventional methods for eight weeks and an experimental group which trained with the Controlled Reader for eight weeks. All subjects were pretested for sight-reading abilities and tested again at the conclusion of the eight week training period. The results of the post-test when compared with the pre-test provided the raw data for statistical evaluation by the Mann-Whitney U test and the Sign test.

An instrument consisting of six training films was constructed for specific training on the Controlled Reader. The predominant features of tachistoscopic projections were: (1) allowed no regressive movements; (2) forced perception of an entire phrase; (3) minimized fixational pause; and (4) allowed execution of one phrase while fixating on the following phrase. The control group was exposed to the same material using conventional methods. Five variables--accuracy of rhythm, accuracy of pitches, articulation, dynamics, and general sight-reading--were used to test the validity of tachistoscopic training.

The primary statistical treatment employed to evaluate the data obtained for this study was the Mann-Whitney U test and the Sign test. The findings which resulted from the evaluation are summarized below. Each statement corresponds in number to a hypothesis in the study.

1. There was no statistically significant difference for accuracy of rhythm in post minus pre-test gains after eight

weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

2. There was no statistically significant difference for accuracy of pitches in post minus pre-test gains after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

3. There was no statistically significant difference for articulation in post minus pre-test gains after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

4. There was no statistically significant difference for dynamics in post minus pre-test gains after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

5. There was no statistically significant difference for general sight-reading in post minus pre-test gains after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

6. There was no statistically significant difference between the experimental and control group for conventional minus experimental post-test gains for accuracy of rhythm, accuracy of pitches, articulation, and general sight-reading after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period. There was a statistically significant difference between the experimental and control group for conventional minus experimental post-test gains for dynamics after eight weeks of

training with the Controlled Reader versus those traditionally trained in the same time period.

7. There was no statistically significant difference between freshmen-sophomore and junior-senior groups for accuracy of rhythm, accuracy of pitches, dynamics, and general sight-reading in post minus pre-test gains after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

There was a statistically significant difference between freshmen-sophomore and junior-senior groups for articulation in post minus pre-test gains after eight weeks of training with the Controlled Reader versus those traditionally trained in the same time period.

8. There was no statistically significant difference between the experimental group's film I and film II in post minus pre-test gains for accuracy of pitches, dynamics, and general sight-reading after eight weeks of training with the Controlled Reader.

There was a statistically significant difference between the experimental group's film I and film II in post minus pre-test gains for accuracy of rhythm and articulation after eight weeks of training with the Controlled Reader.

Conclusions

On the basis of the results obtained in this study of tachistoscopic training in music reading to advance sight-reading techniques more efficiently, certain conclusions were warranted.

1. Tachistoscopic training in music reading for university music students after eight weeks of training was insignificant in developing more efficient sight-reading techniques.

2. The better students peaked out while the weaker students showed a decidedly marked improvement on the post minus pre-test gains. This was due to a weakness in the pre-test coupled with significantly more difficult material in the post-test. The better students displayed a 4.5 average for the pretest on the 5 point scale which allowed a very small degree for improvement.

3. Tachistoscopic training should be carried out for a much longer period of time to insure better results from the advantages of continuous projected stimuli.

4. Tachistoscopic training with the Controlled Reader for eight weeks indicated that projected stimuli was not superior to conventional methods but at least equivalent for a short period of time.

5. Tachistoscopic training with the Controlled Reader indicated strongly that such training might prove superior with elementary beginners over a long-term period.

Recommendations

The findings of this study did not support or substantiate many of the hypotheses advanced by people in favor of tachistoscopic training. On the other hand, conventional training was not superior in any way to tachistoscopic training.

From the findings of this study, it seems justifiable to recommend the following:

1. Until more research in Controlled Reader training is done, conventional methods should be used as a primary source for teaching music reading.

2. A duplication of this study should be made with improved testing methods to substantiate the findings herein.

3. Parallel studies should be conducted at the elementary level for at least a thirty-week training period to allow sufficient time to substantiate the findings.

4. Similar studies should be conducted at the elementary level using only like instruments to allow class instruction and to minimize the problems of range.

5. Tachistoscopic projected stimuli should be used as a supplement to conventional methods to diminish regressive eye movements and to increase perception span.

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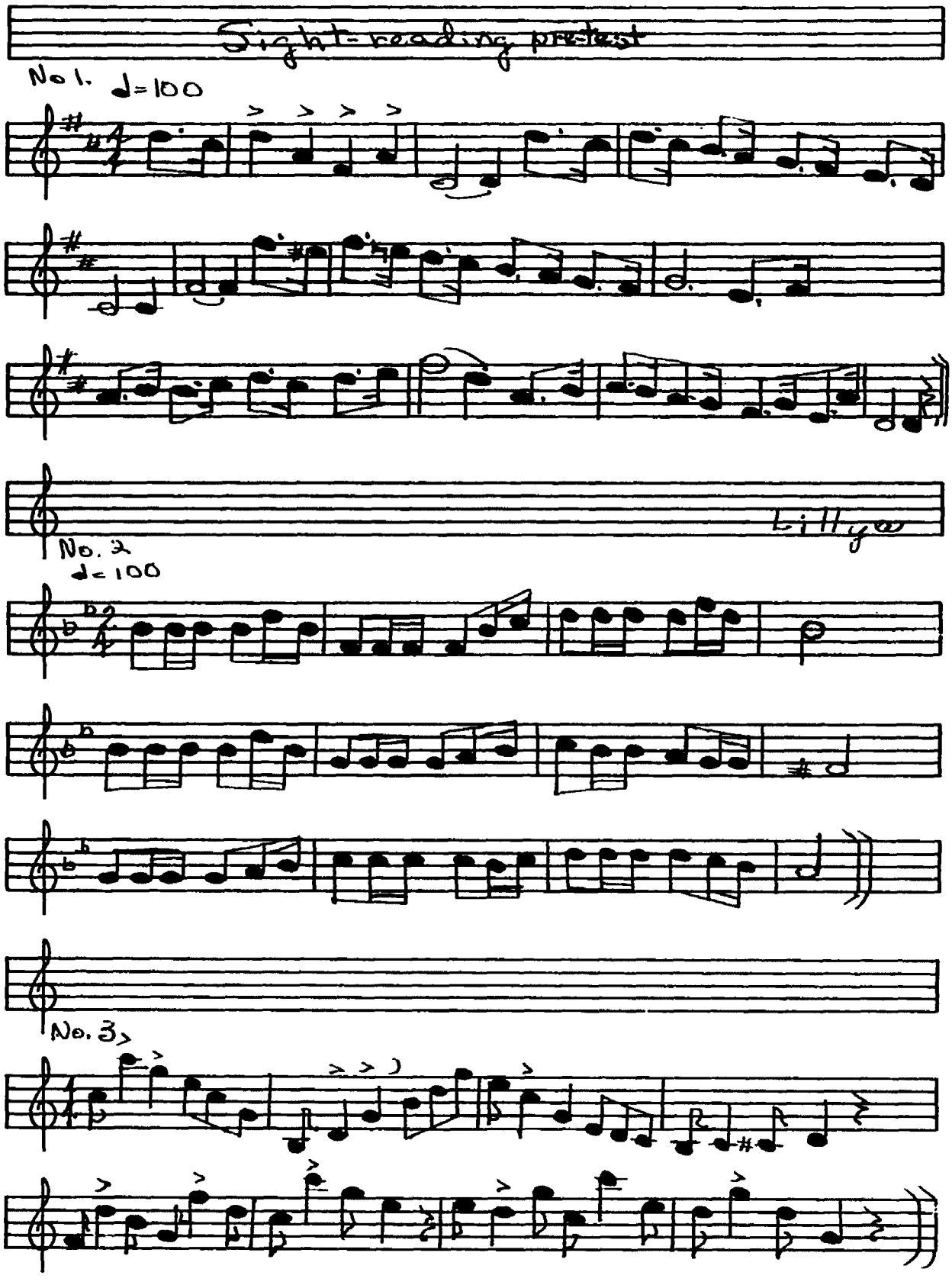
APPENDIX A

MUSIC FOR PRE-TEST

MUSIC FOR CONTROLLED READER TRAINING

MUSIC FOR CONVENTIONAL TRAINING

MUSIC FOR POST-TEST


Sight-reading pretest
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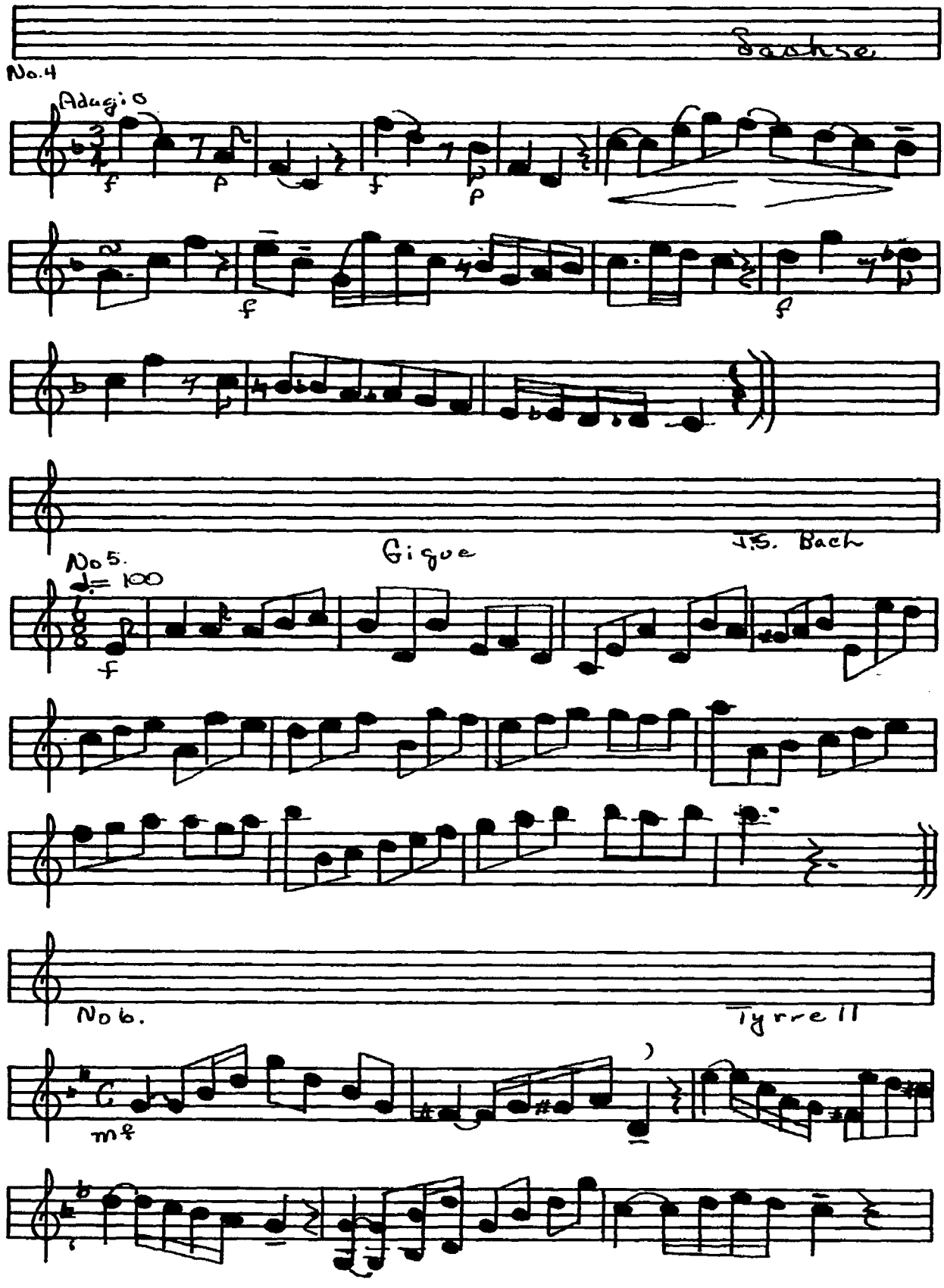
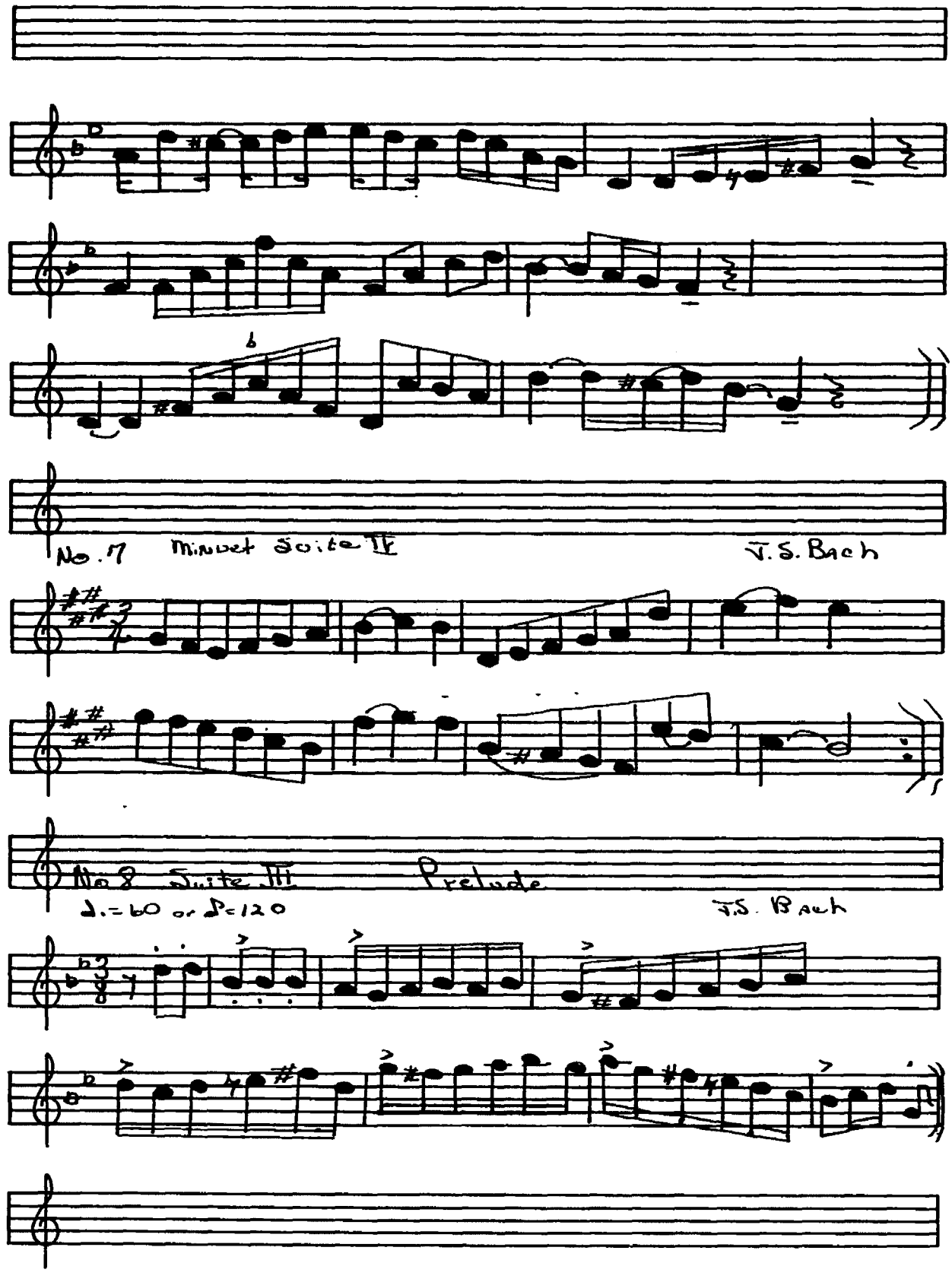
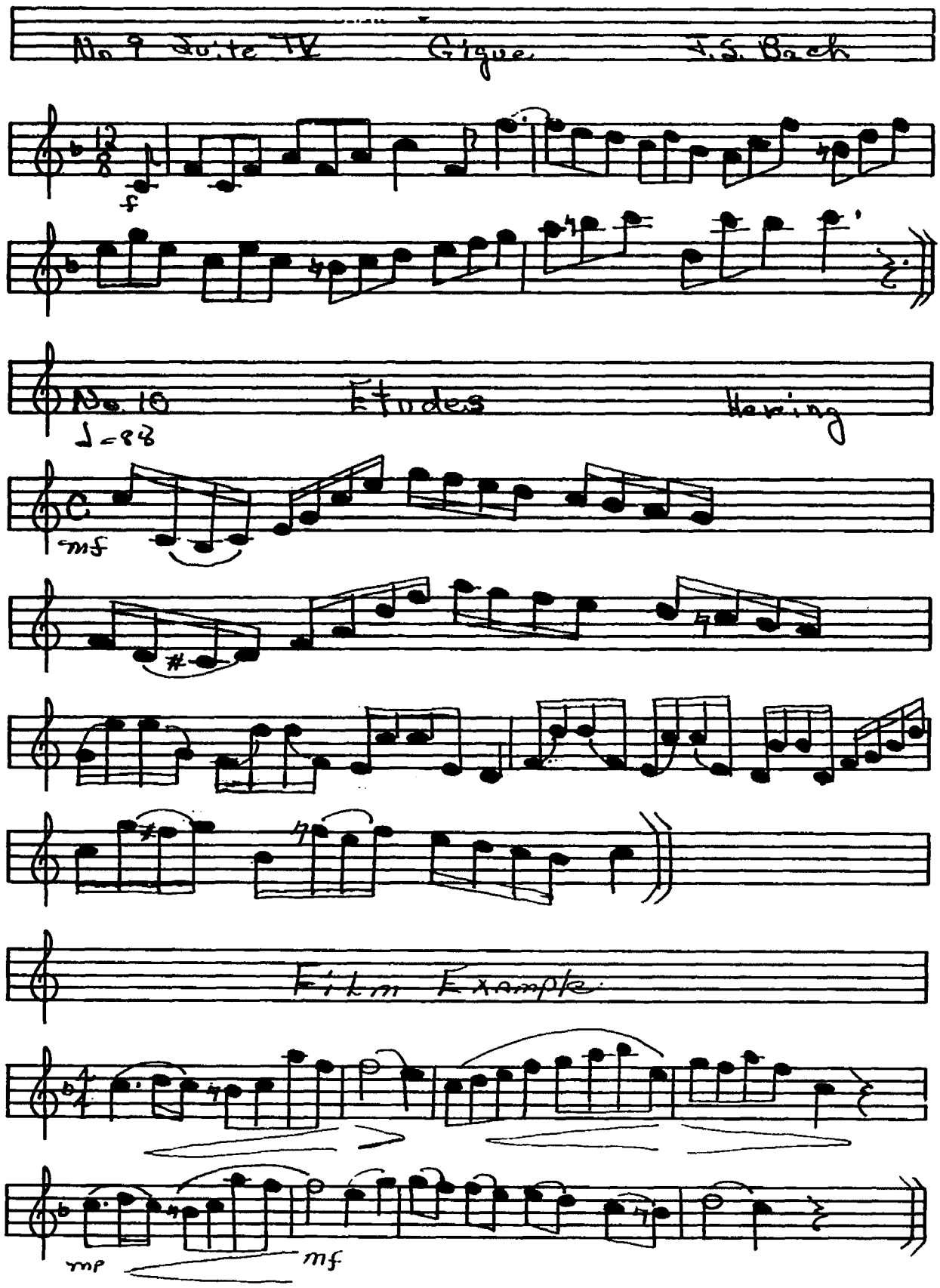
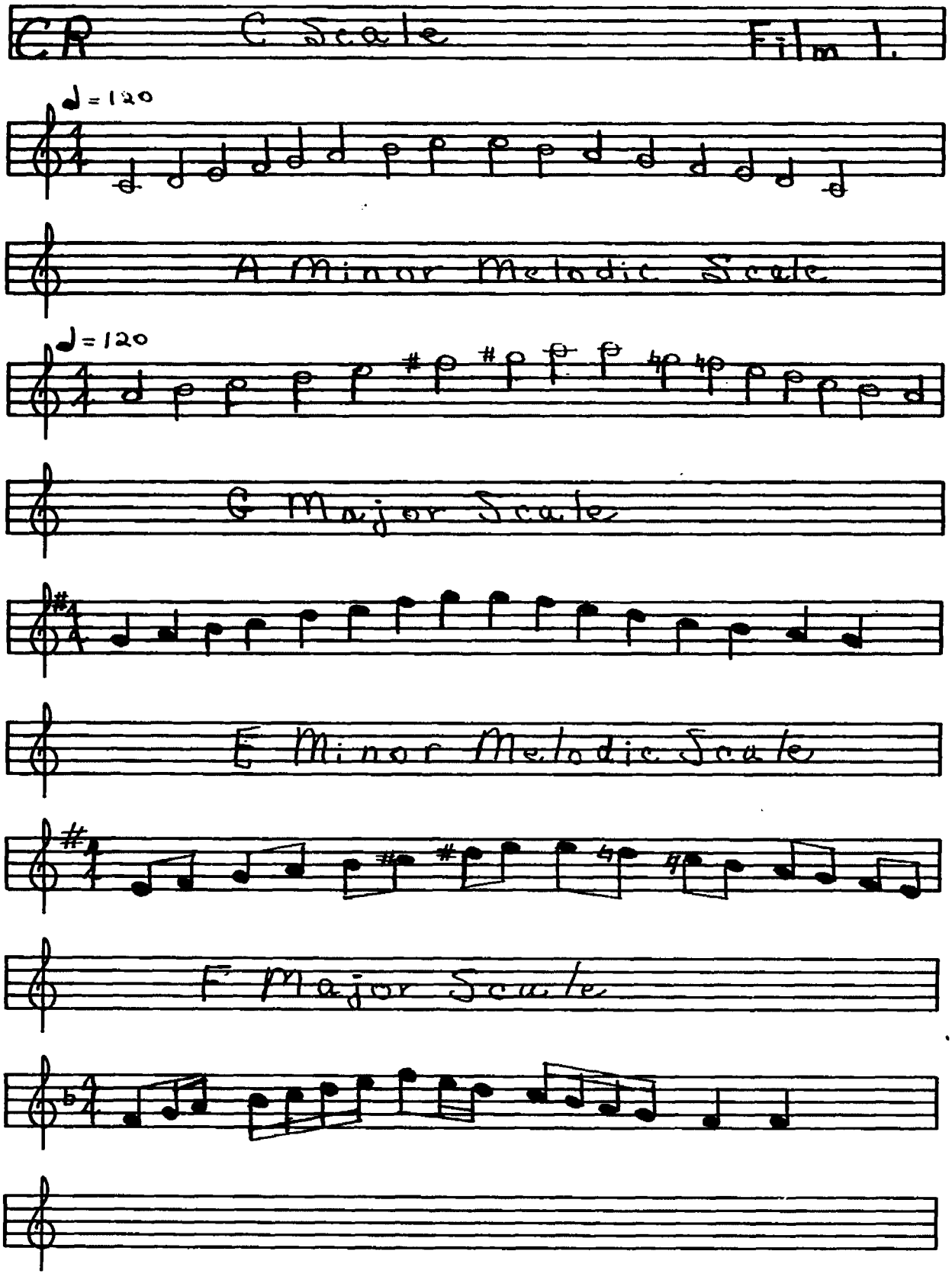
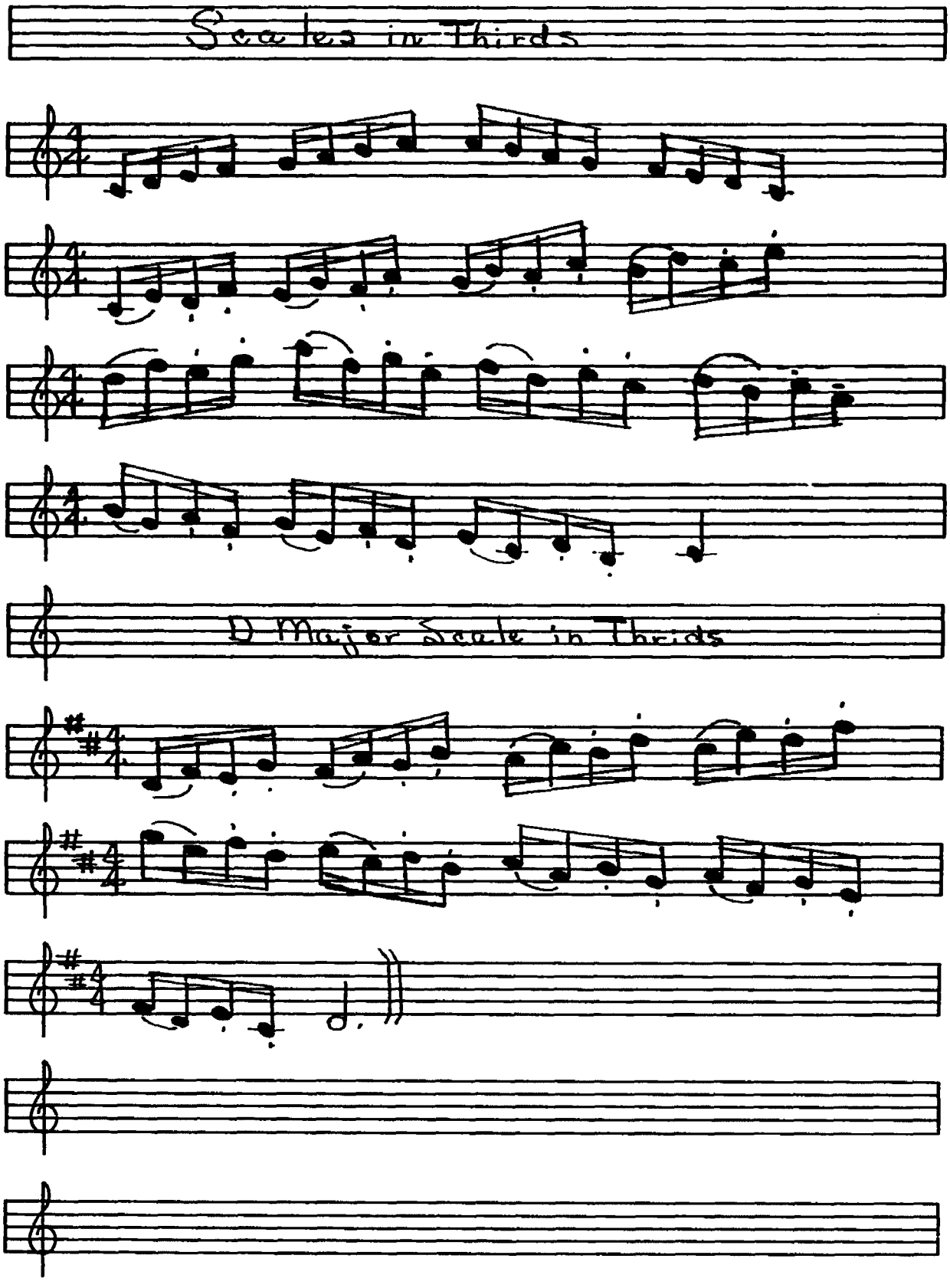
No. 2
♩=100
No. 3

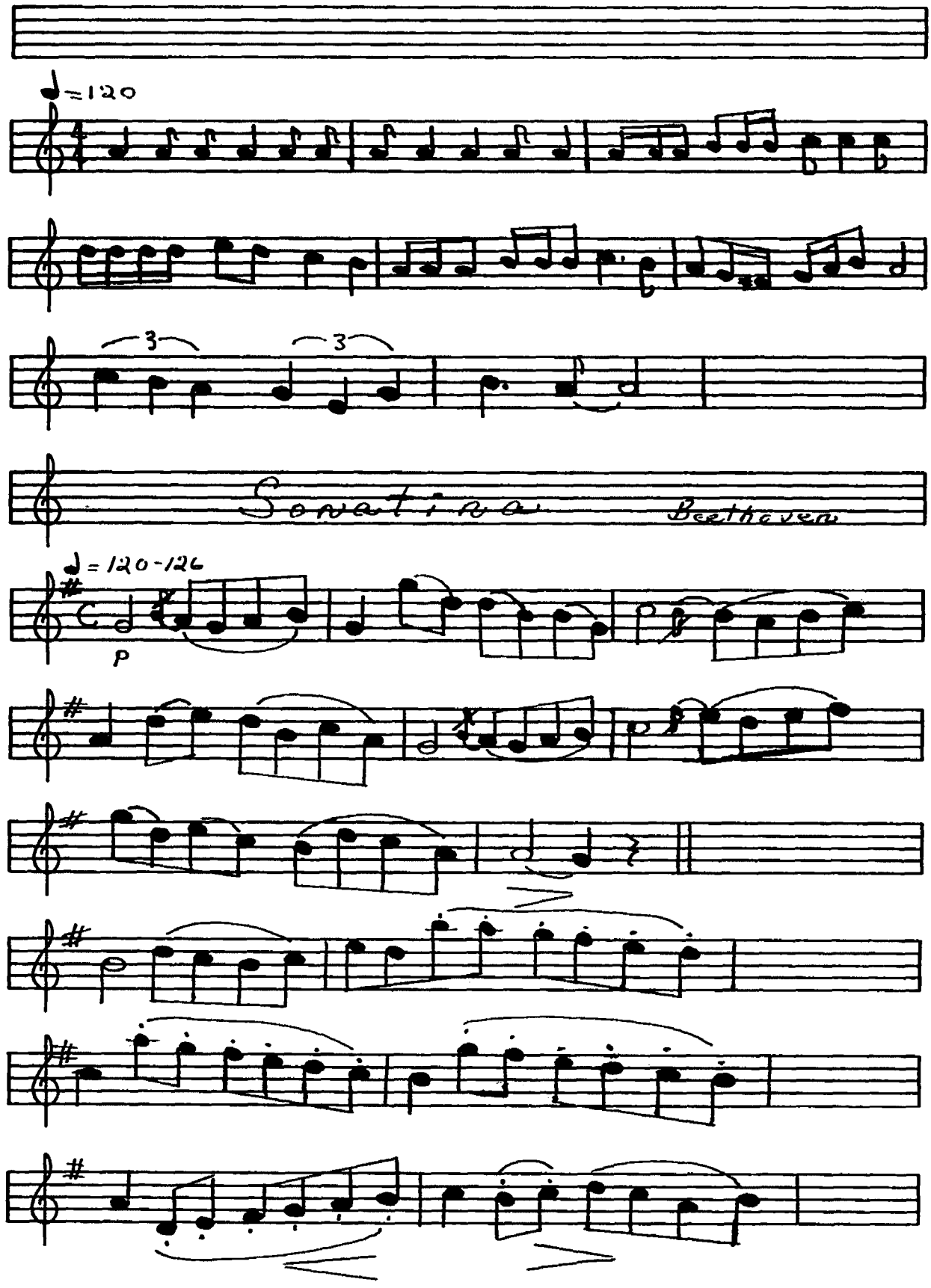

Saxhse.
No.4
Adagio
f
p
f
p
f
f
Gigue
J.S. Bach
No 5.
♩= 100
f
No 6.
Tyrrell
mf

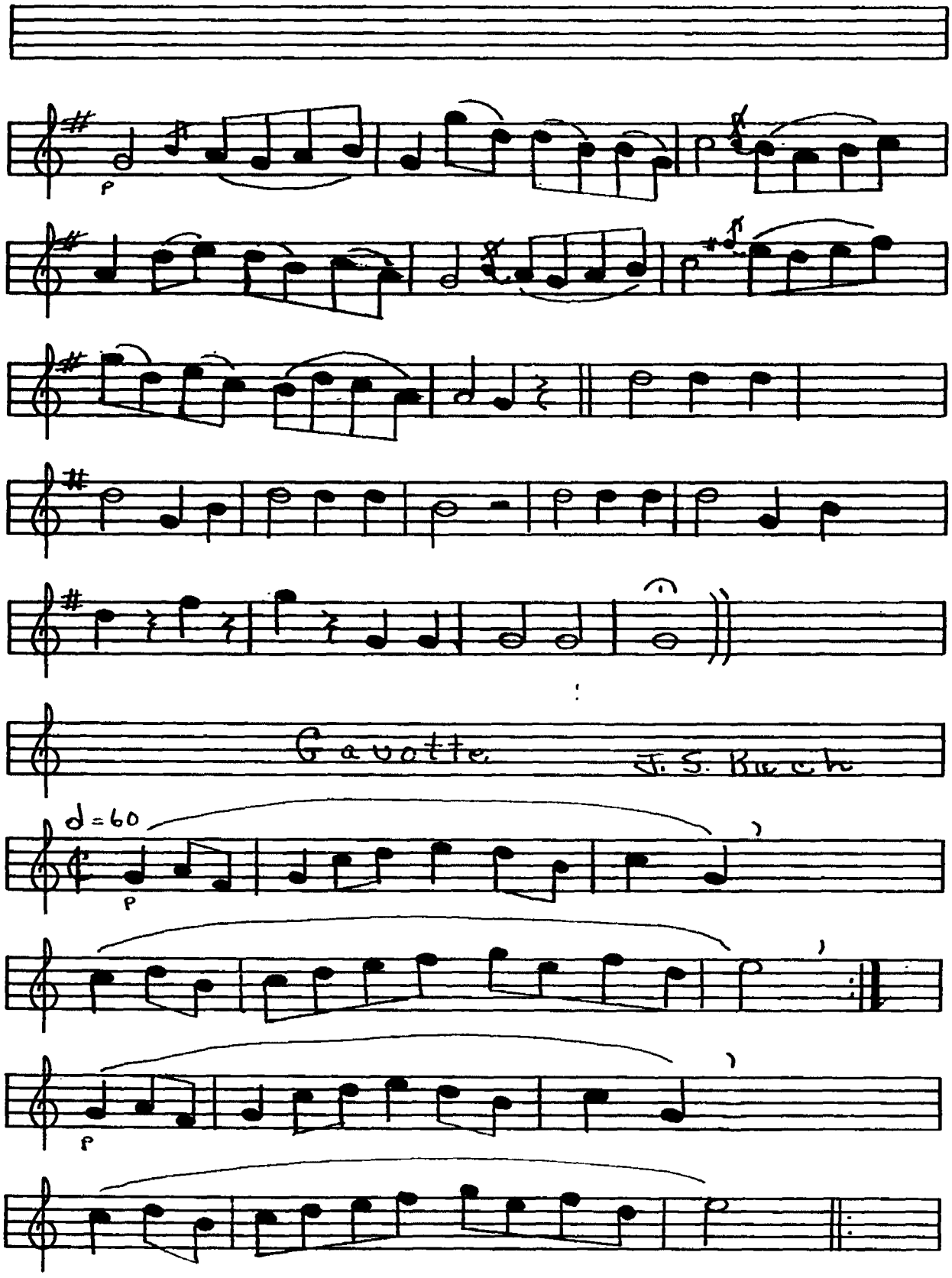

No. 7 Minuet Suite IV
J. S. Bach
No 8 Suite III Prelude
♩.= 60 or ♪= 120
J.S. Bach


No 9 Suite IV Gigue J.S. Bach
f
No 10 Etudes Hering
mf
Film Example
mp
mf

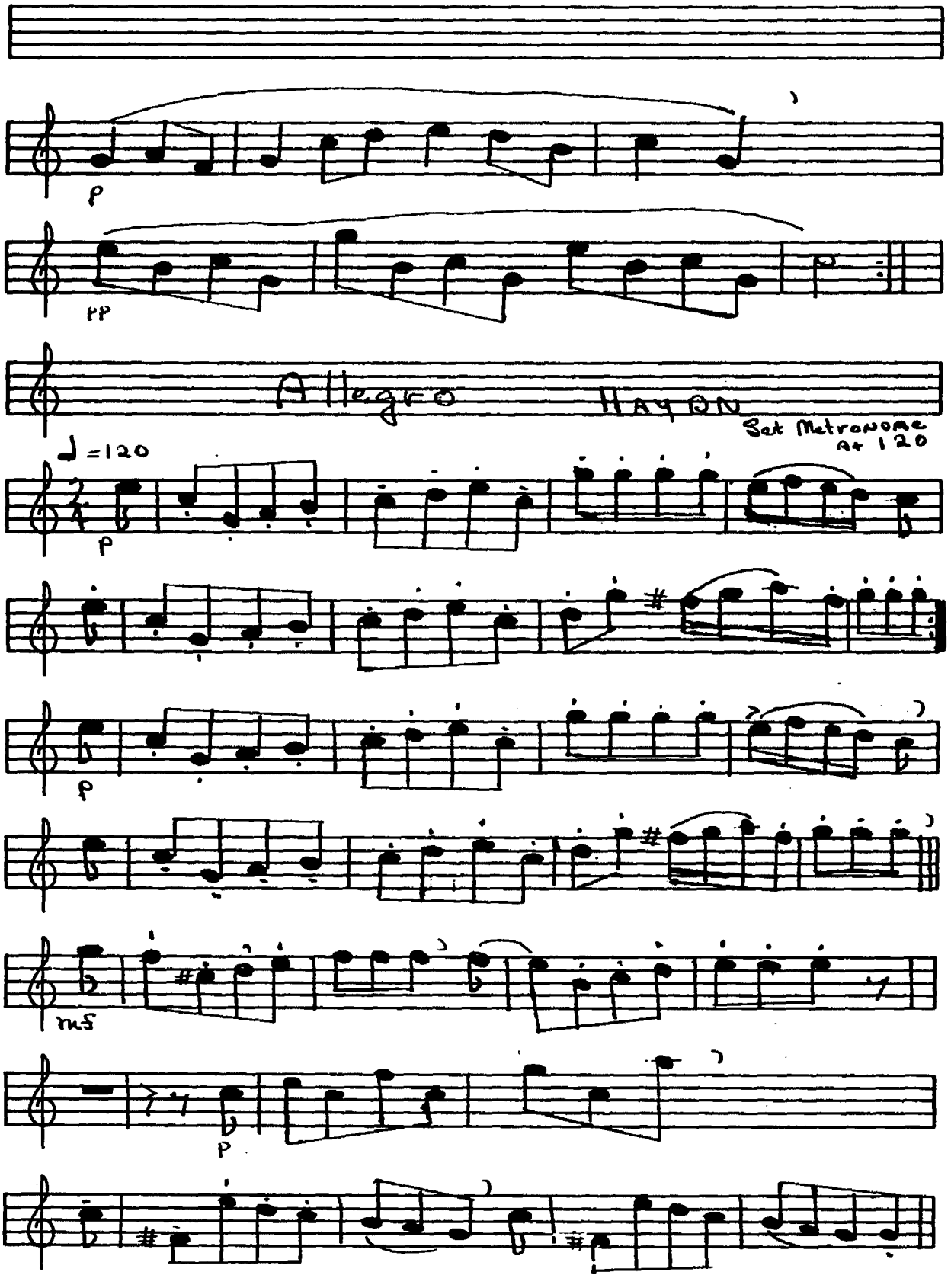

C.R
C Scale
Film 1.
♩ = 120
A Minor Melodic Scale
♩ = 120
G Major Scale
E Minor Melodic Scale
F Major Scale

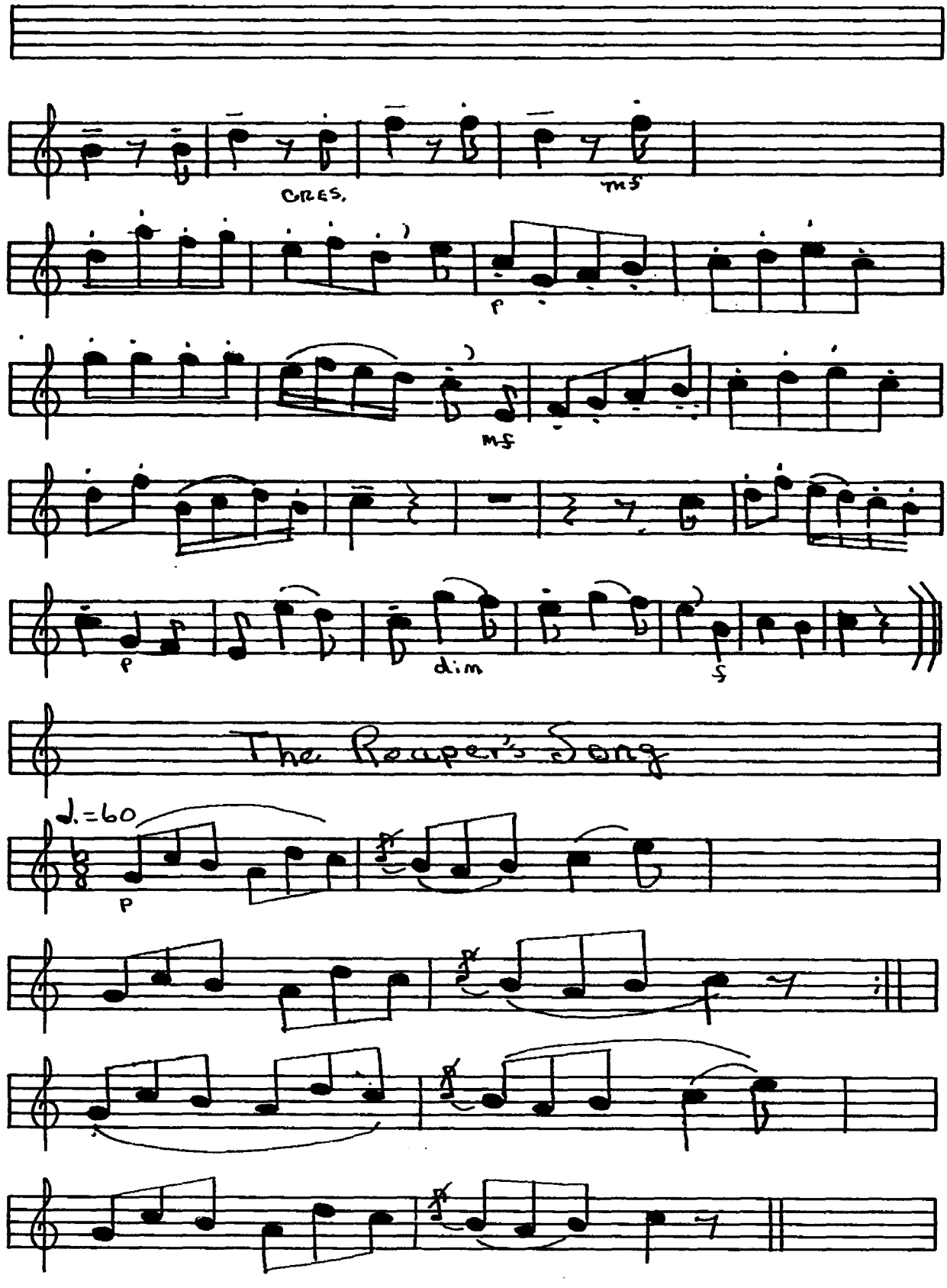

Scales in Thirds
D Major Scale in Thirds

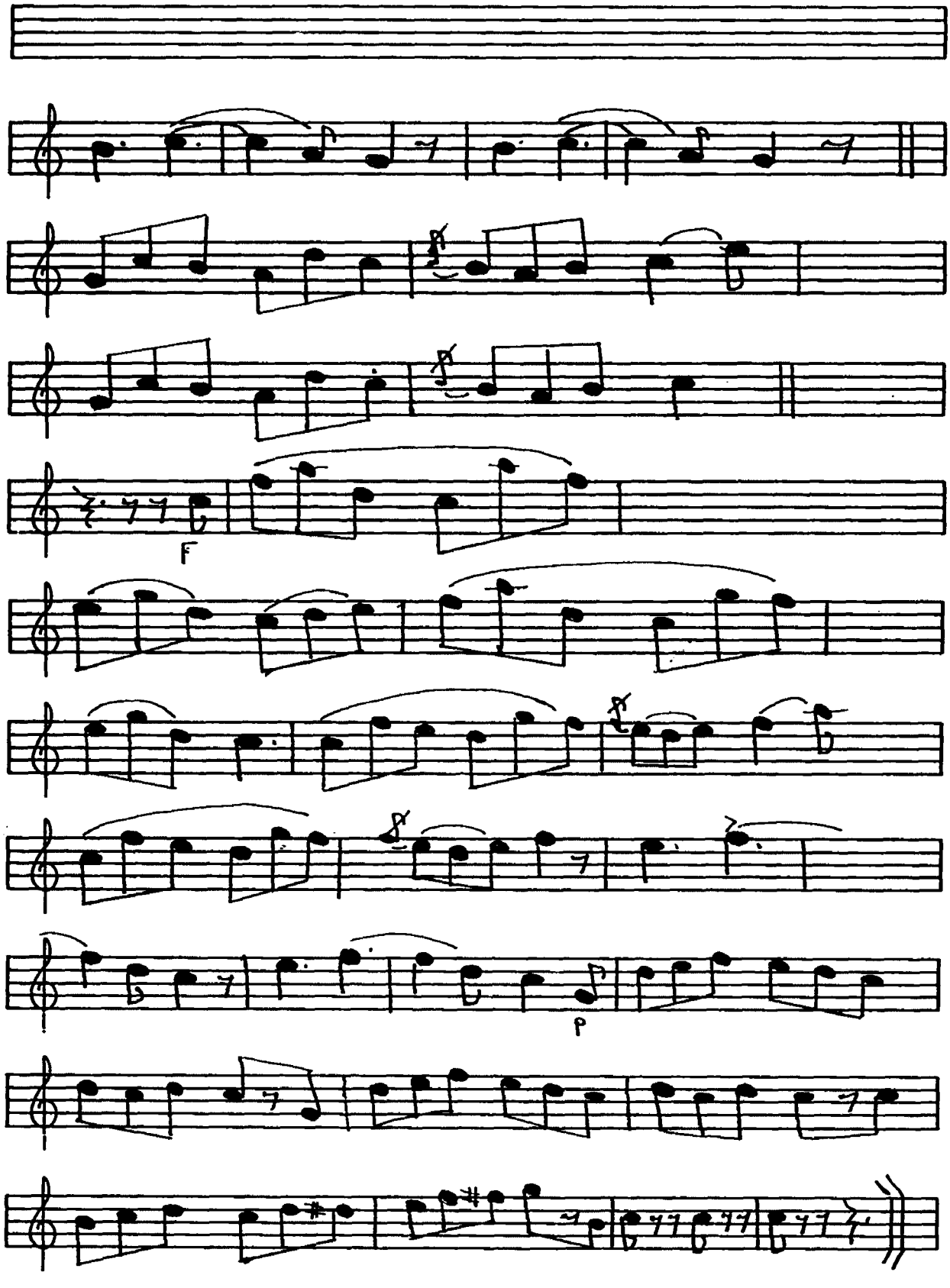

♩=120
3
3
Sonatina
Beethoven
♩=120-126
p

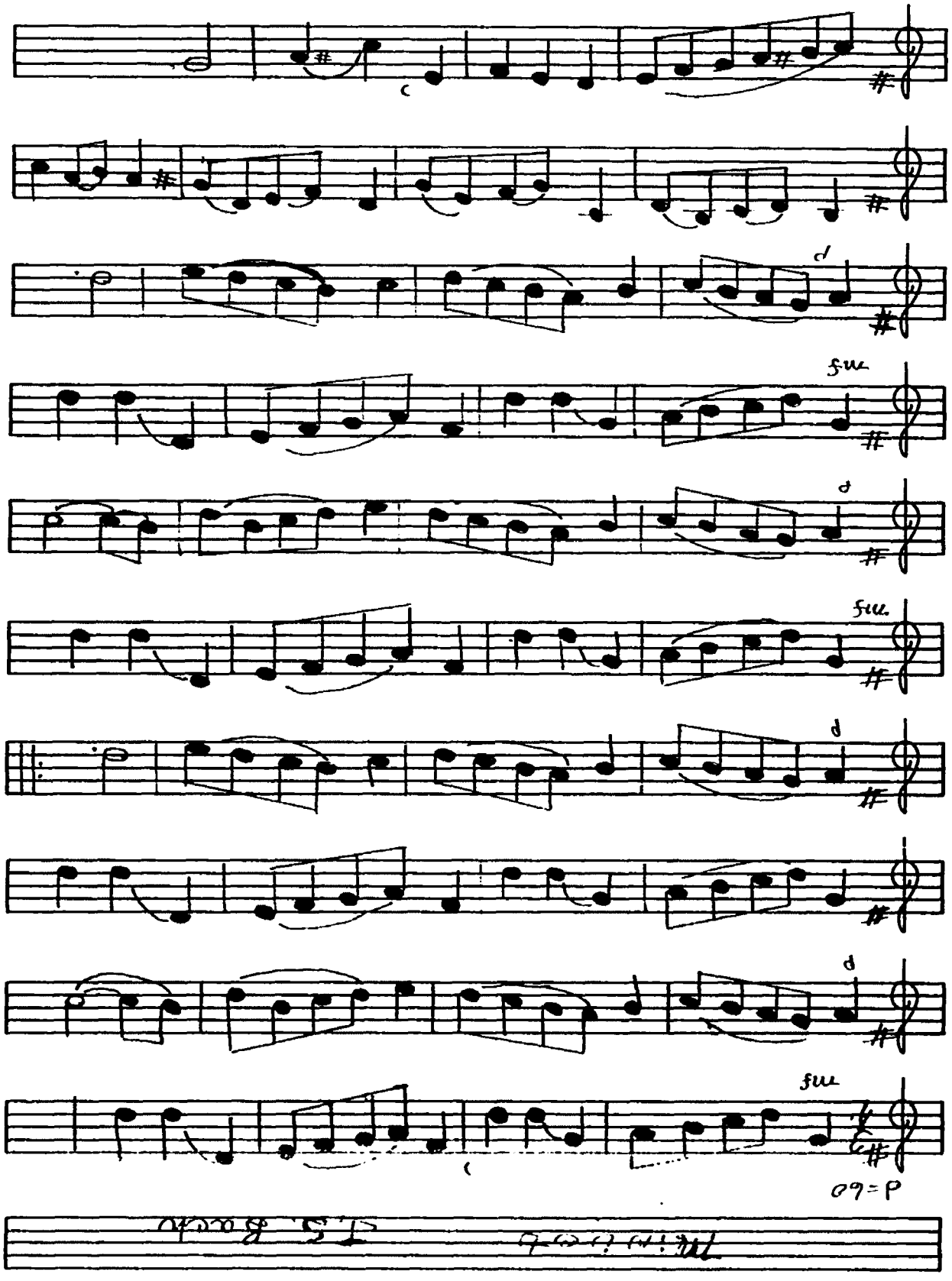

Gavotte
J. S. Bach
♩=60
p
p

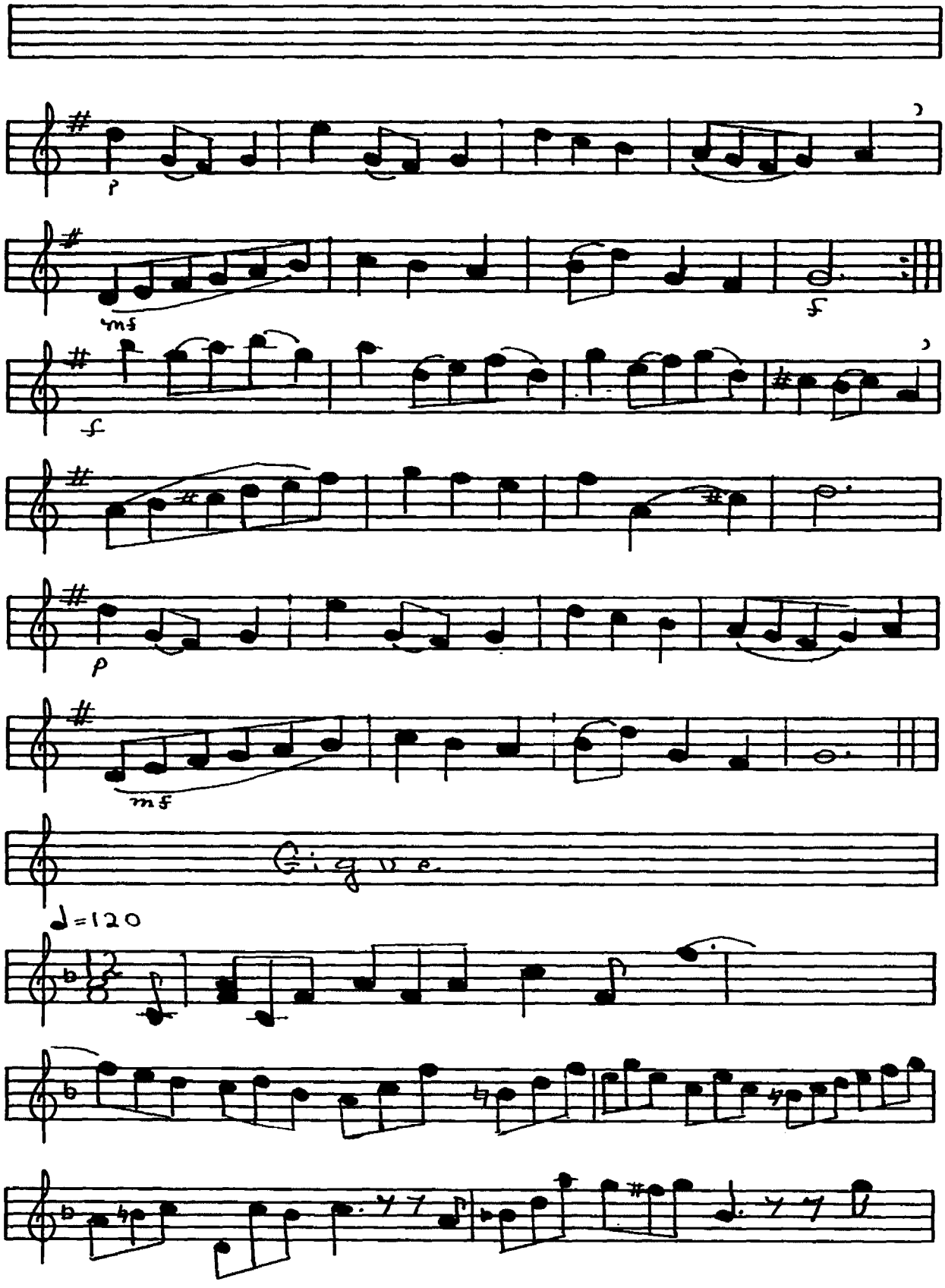
mf
mf
p
pp
mf
mf

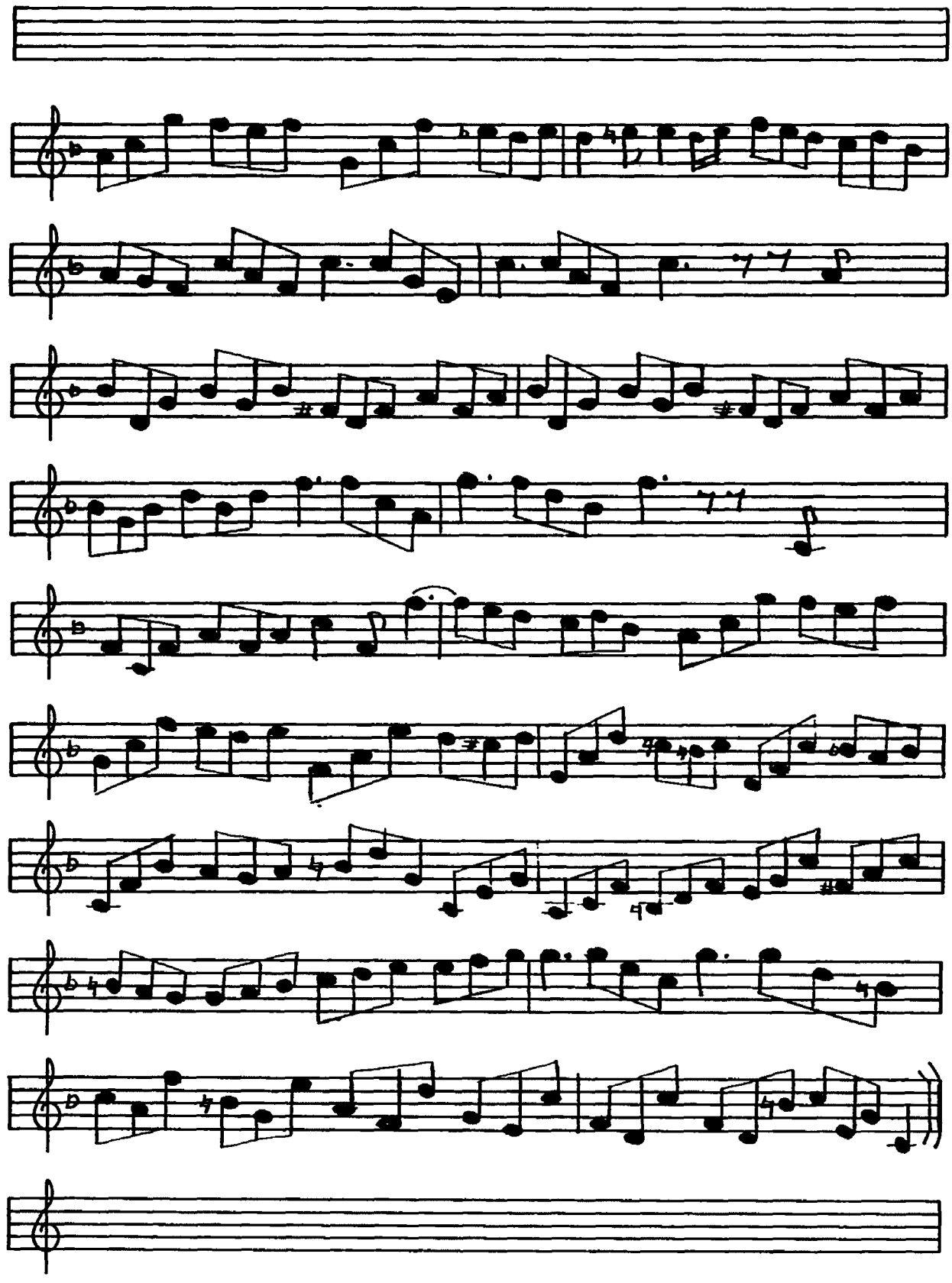

p
pp
Allegro
Haydn
Set Metronome
At 120
♩=120
p
p
mf
p

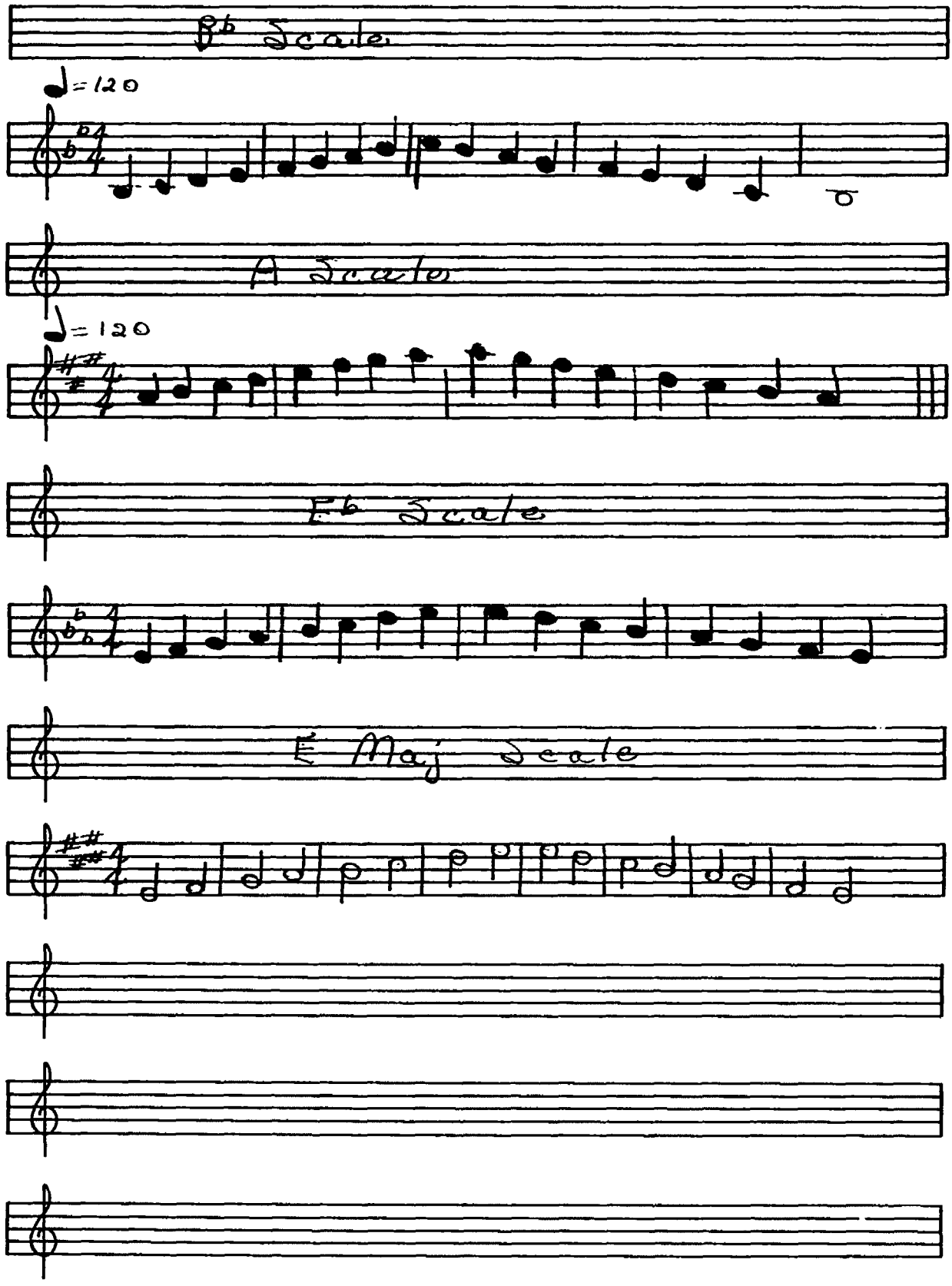

CRES.
mf
p
mf
p
dim
p
The Reaper's Song
♩.=60
p

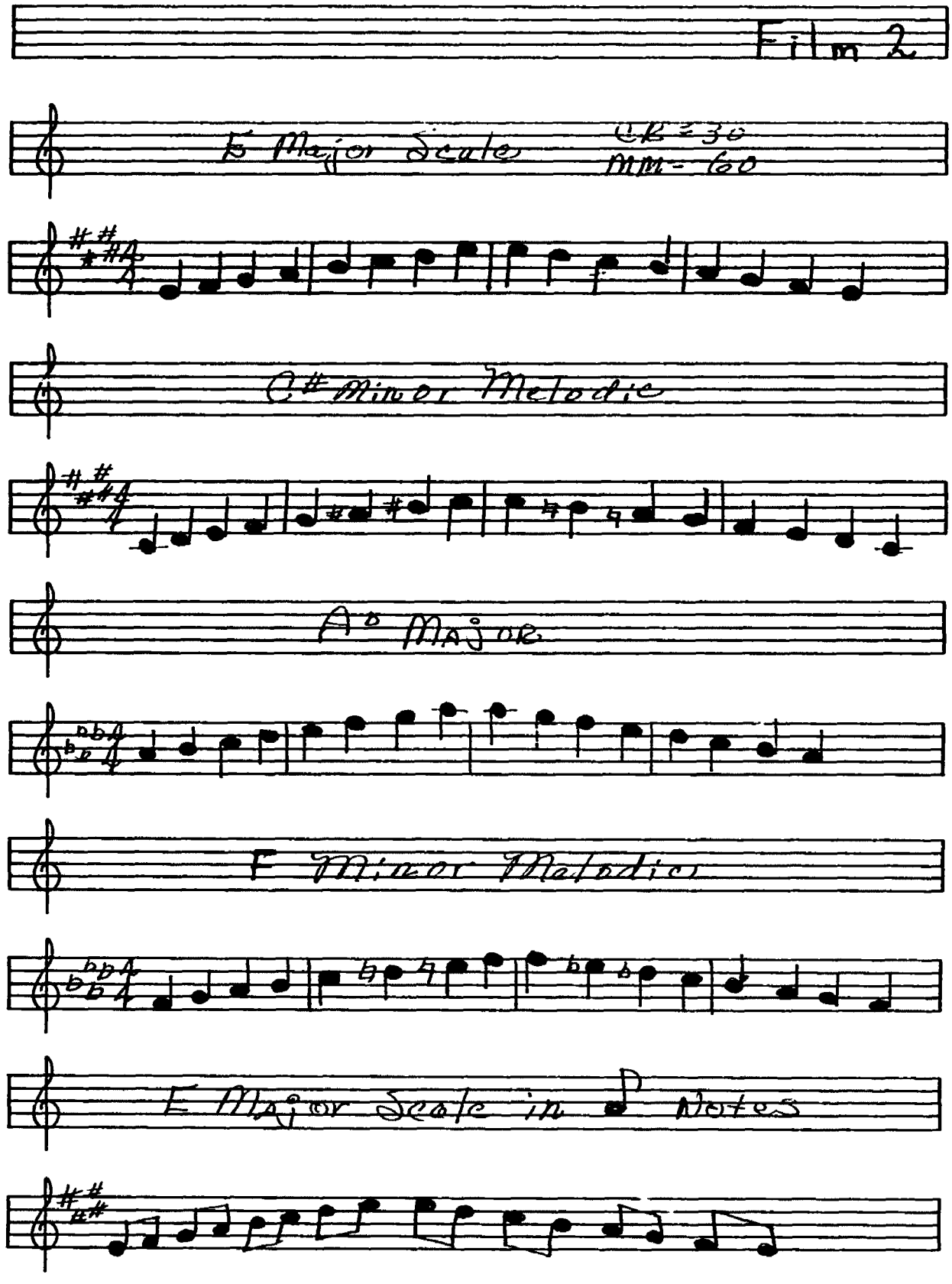

F
P

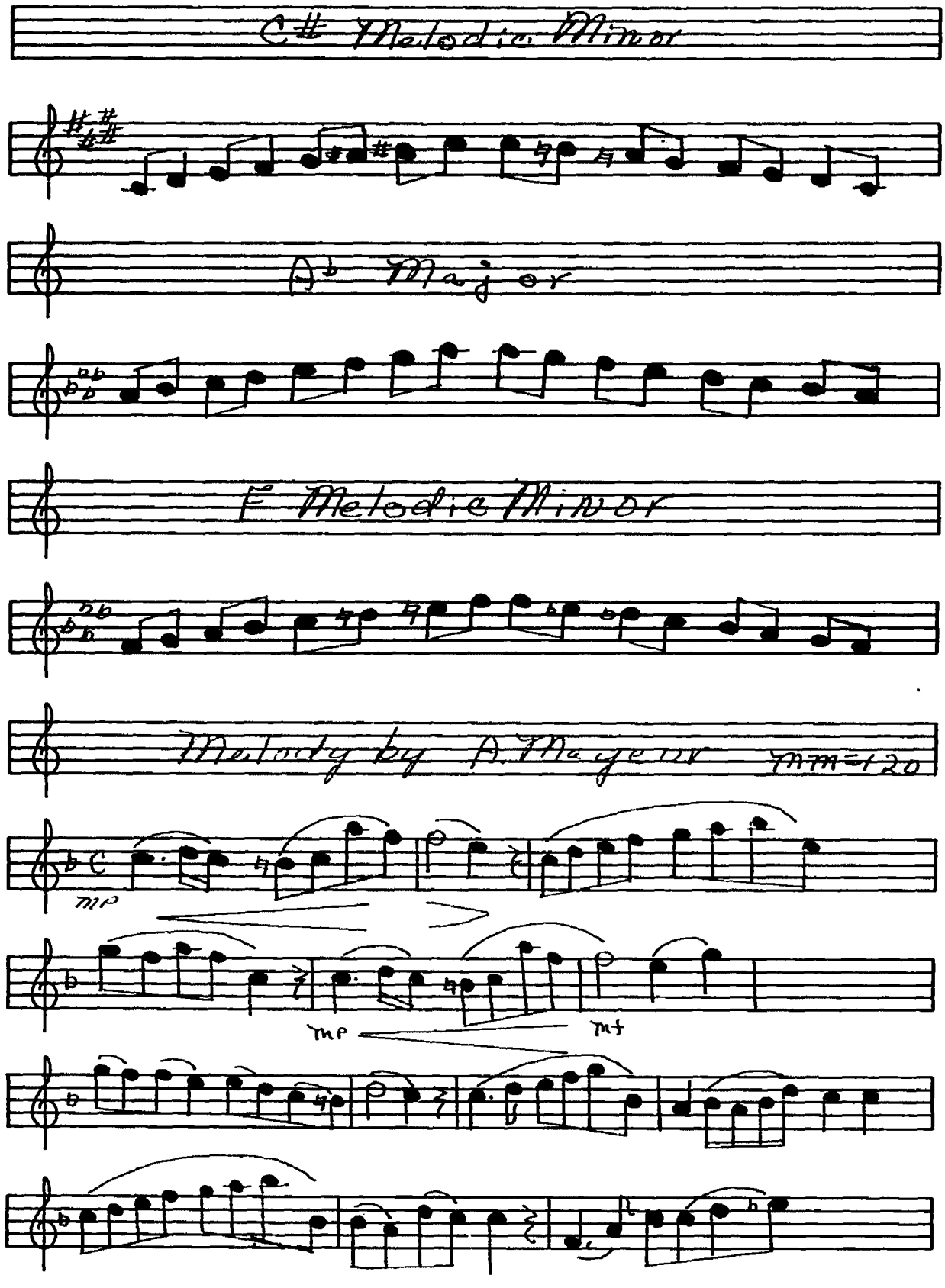

c
d
fine
d
fine
d
fine
d
fine
09=P

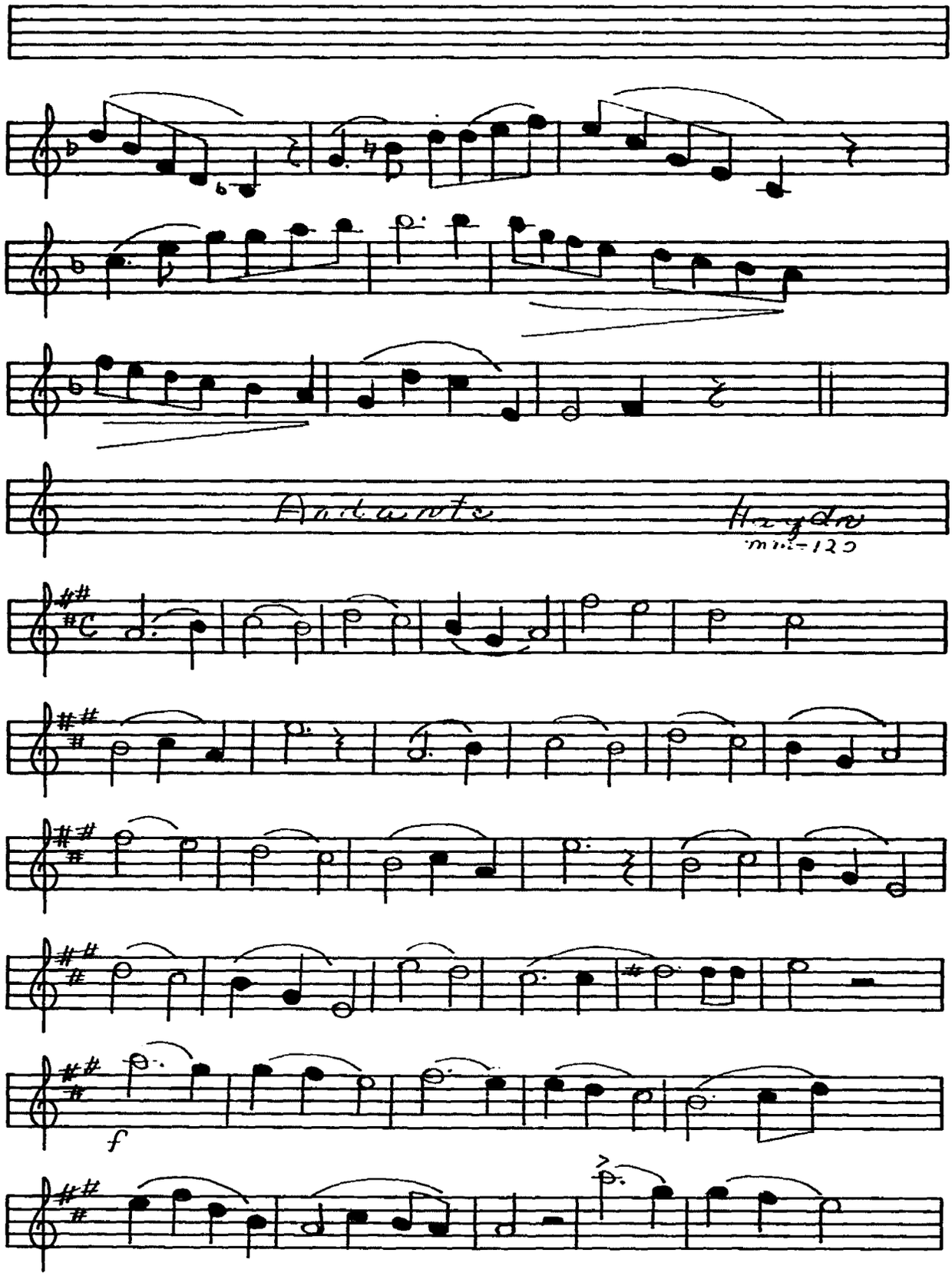

p
mf
f
f
p
mf
Giga
♩=120

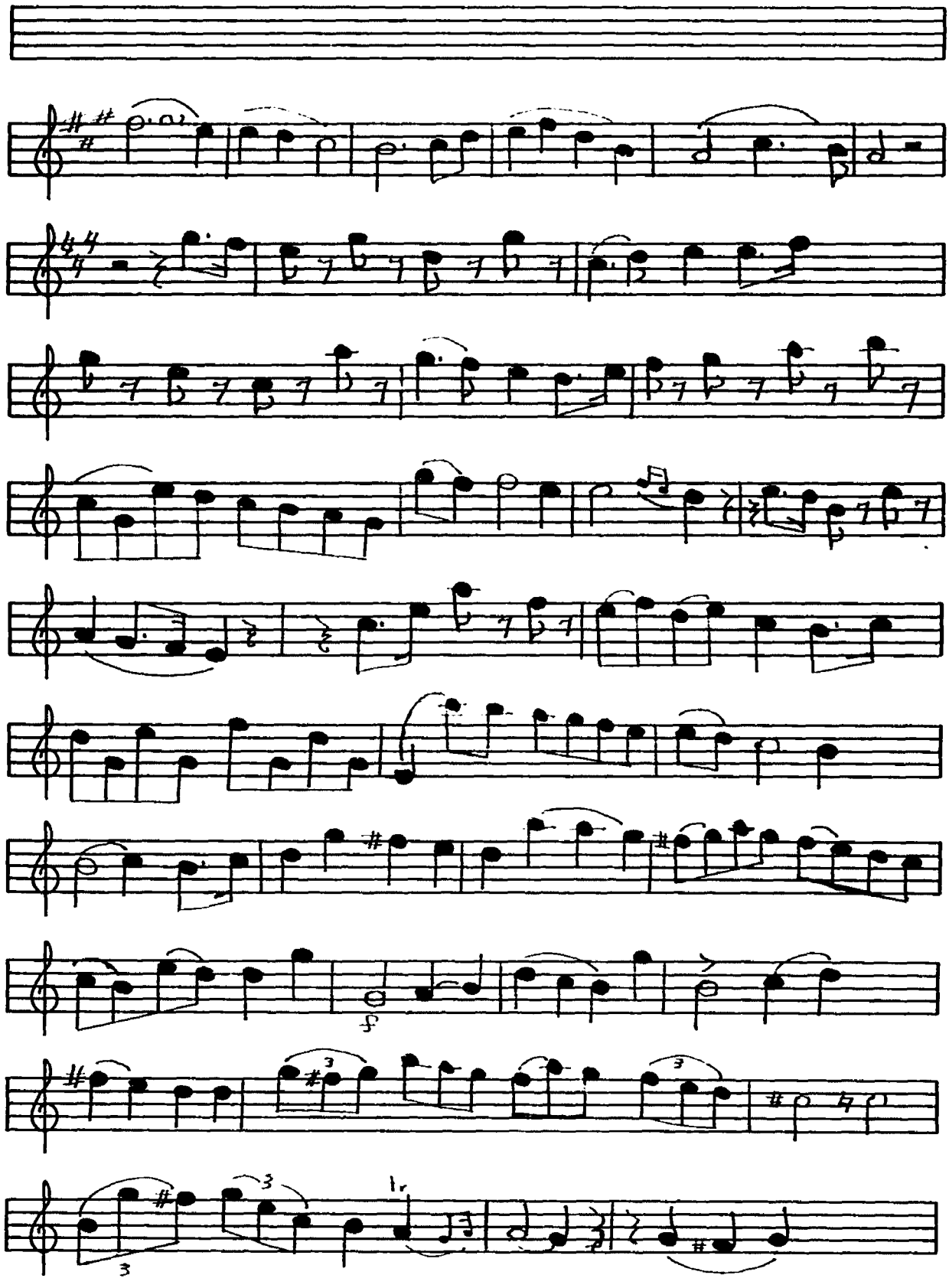


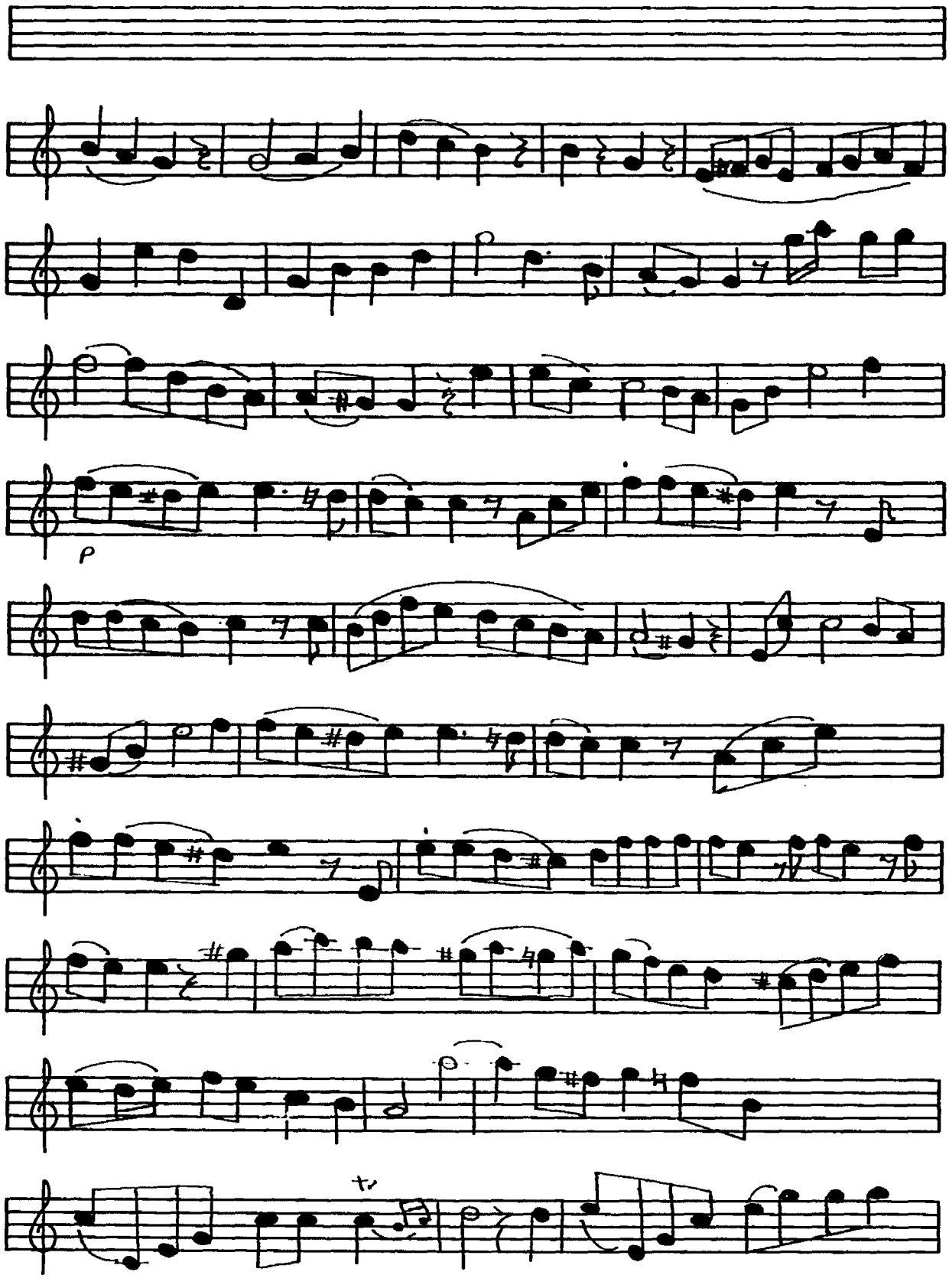

Gb Scale
♩=120
A Scale
♩=120
Eb Scale
E Maj Scale

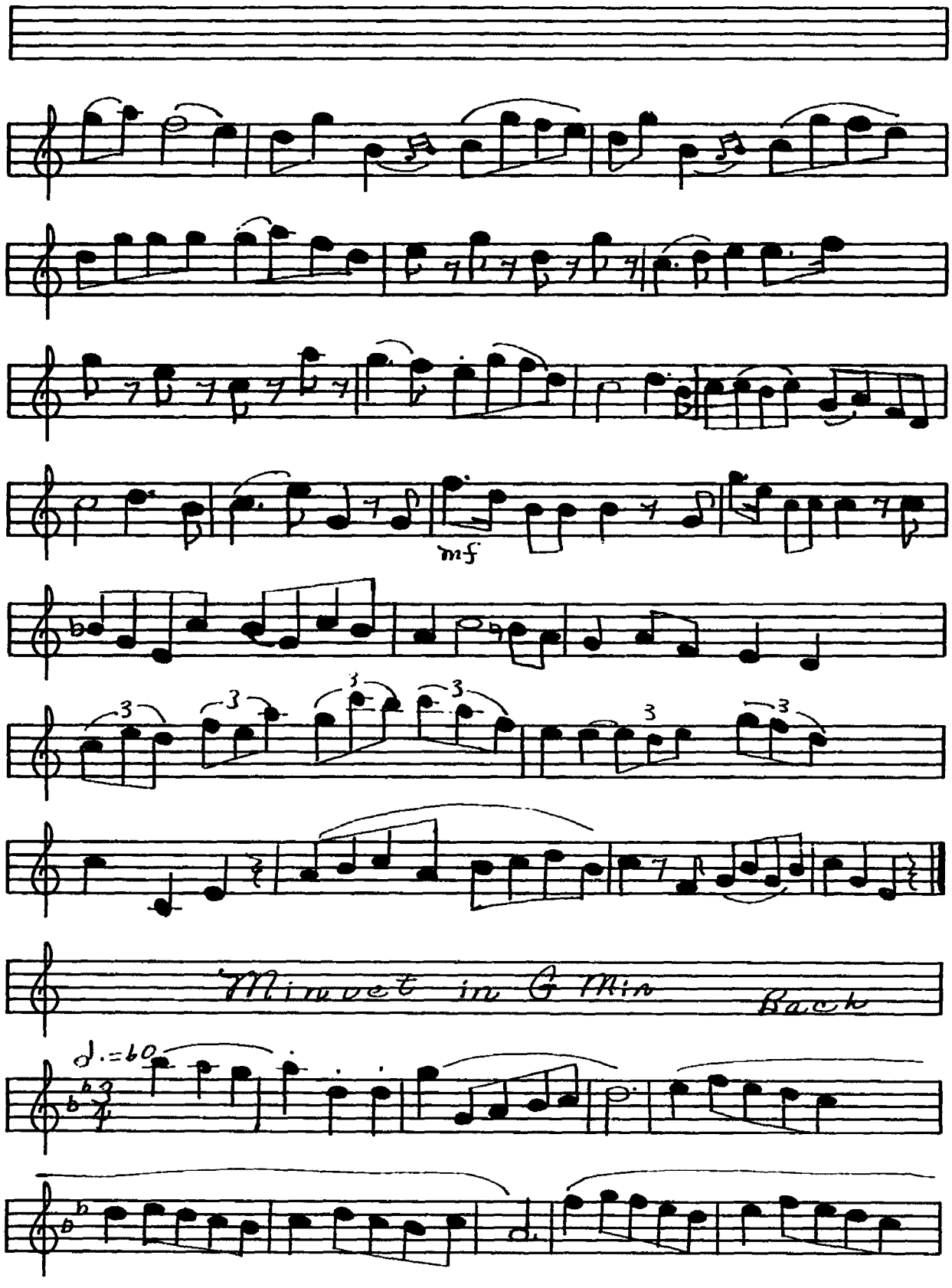

Film 2
E Major Scale
C# Minor Melodic
A♭ Major
F Minor Melodic
E Major Scale in 8 Notes

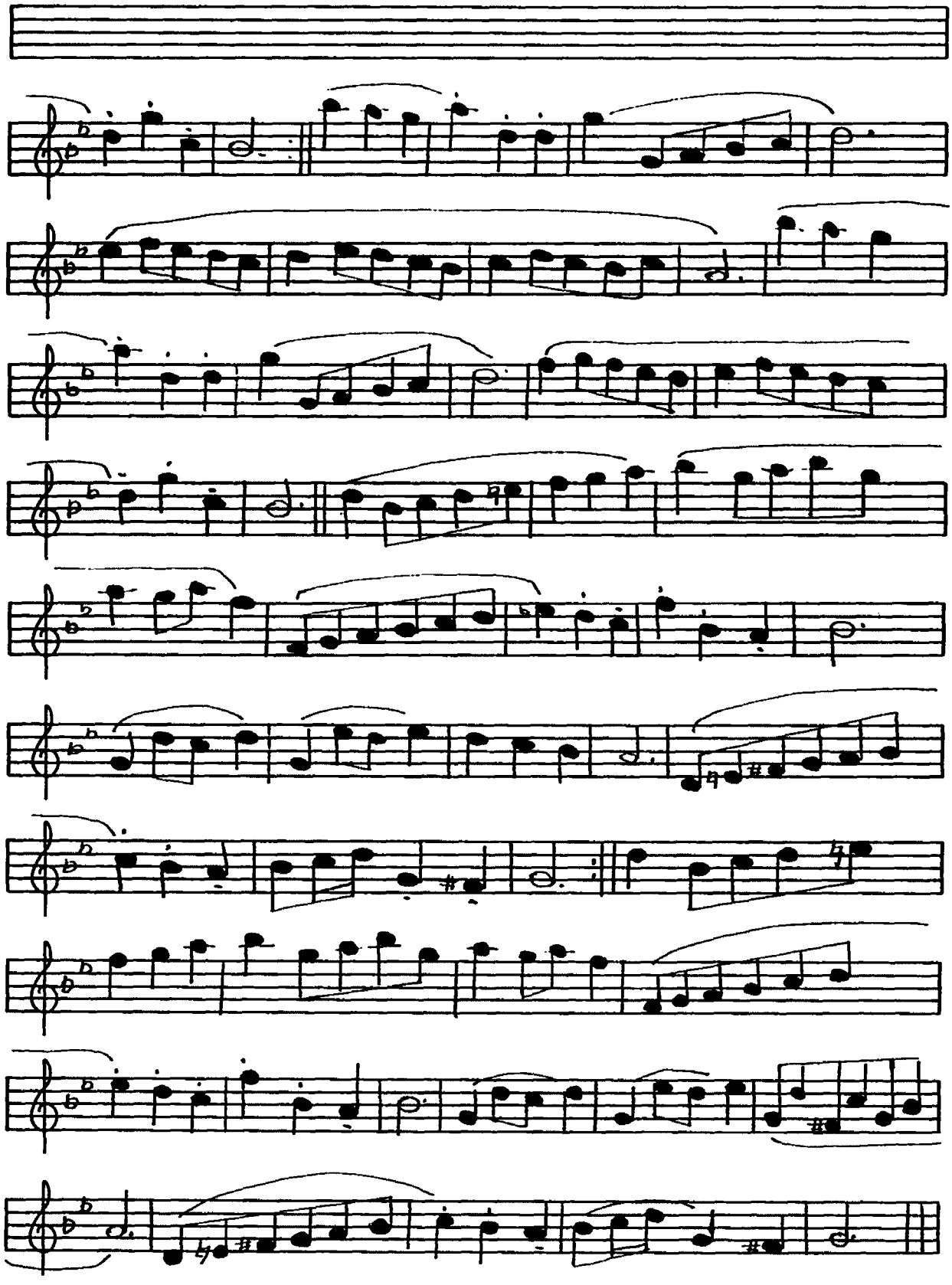

C# Melodic Minor
Ab Major
F Melodic Minor
Melody by A. Mayer
mm=120
mp
mp
mf

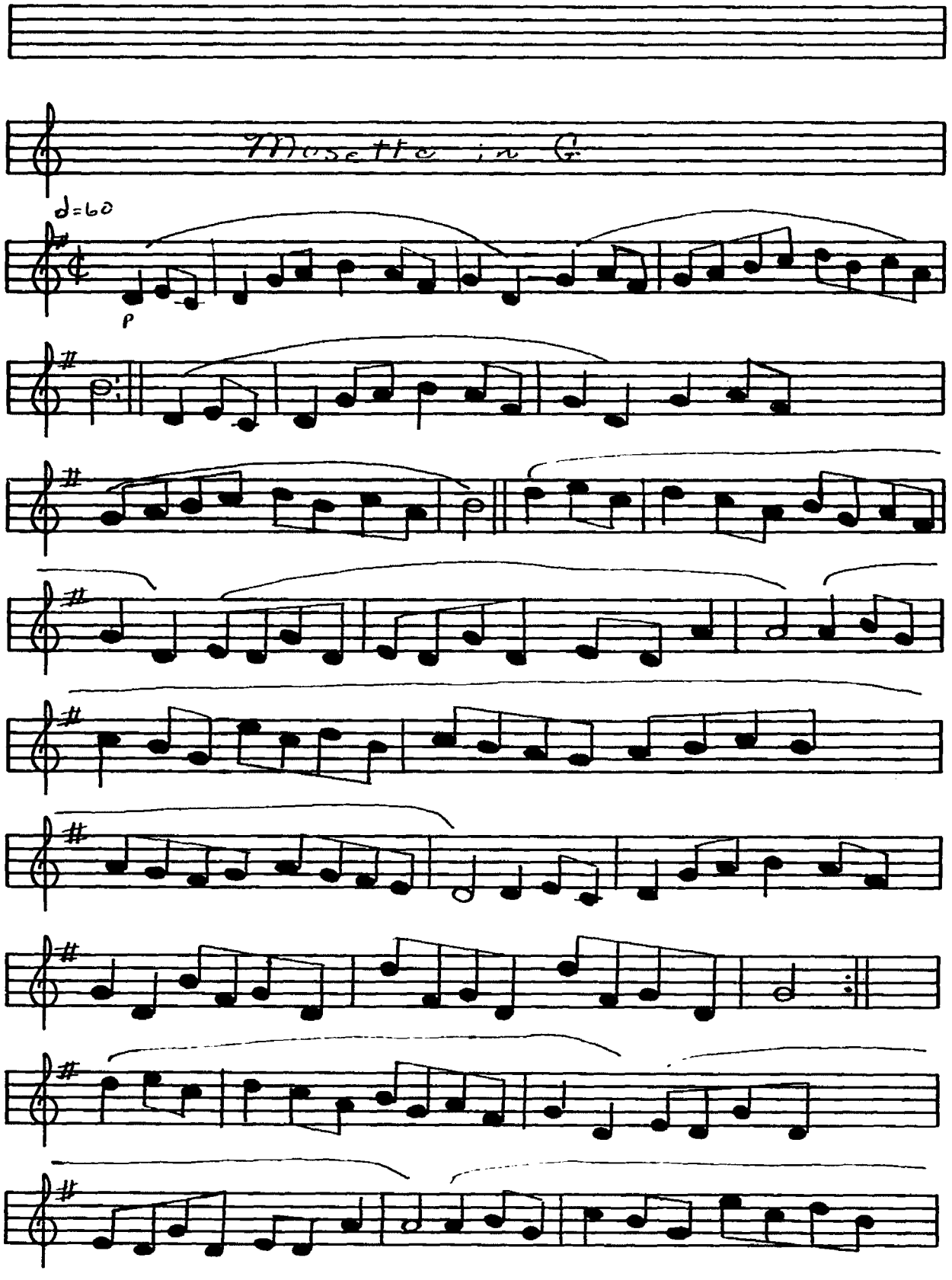

Andante
Haydn
m.M.=120
f

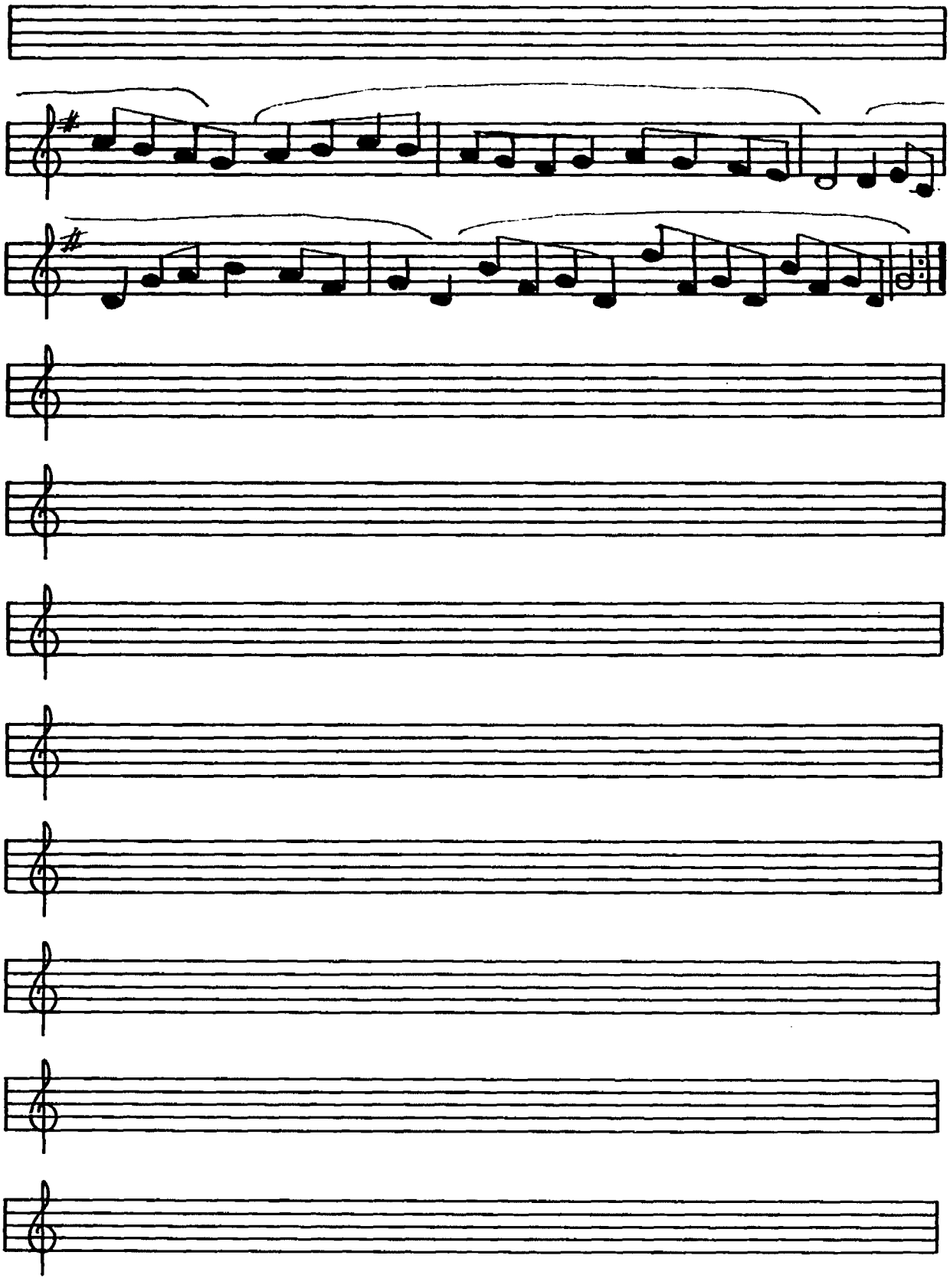


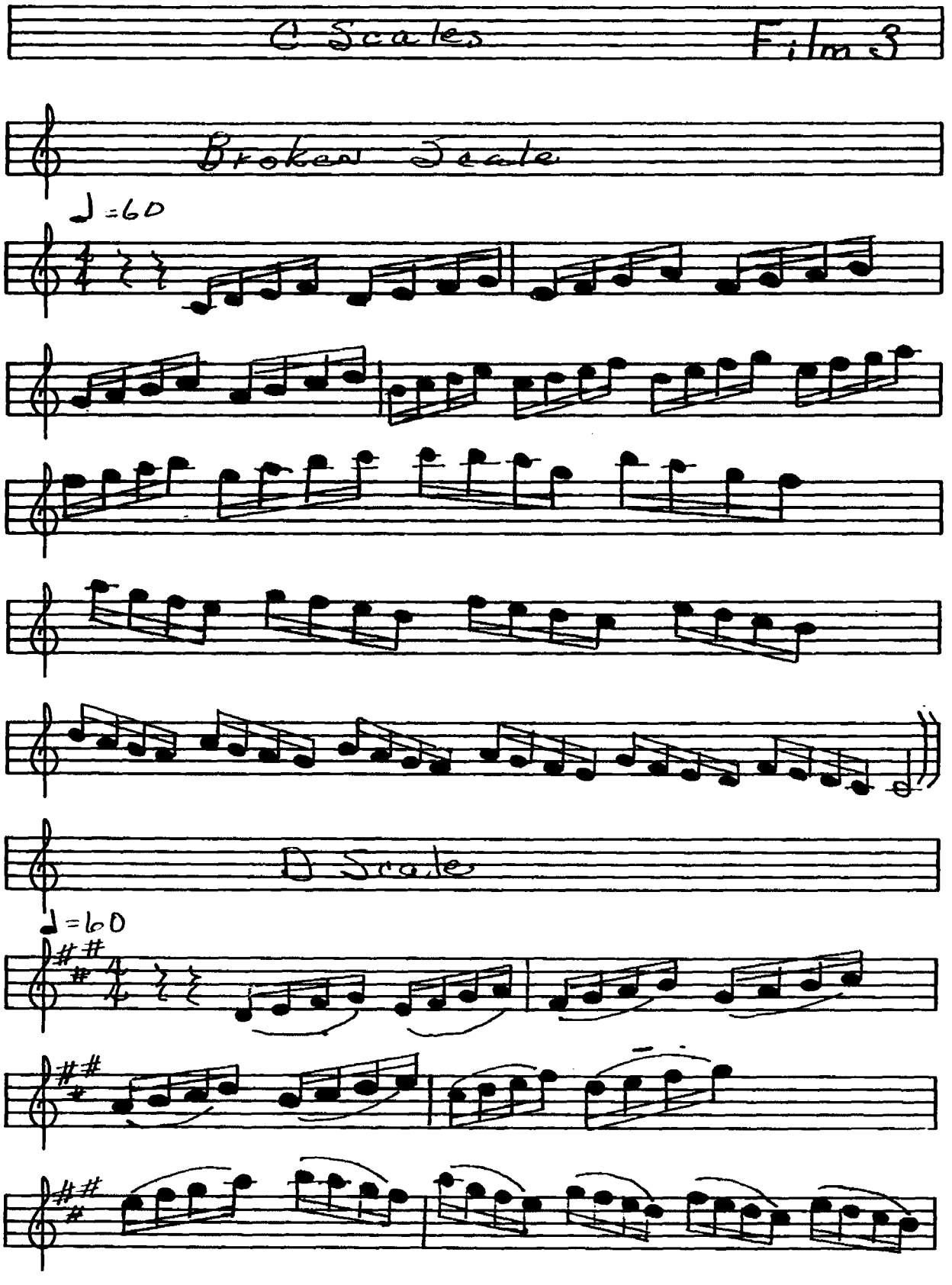

p
tr

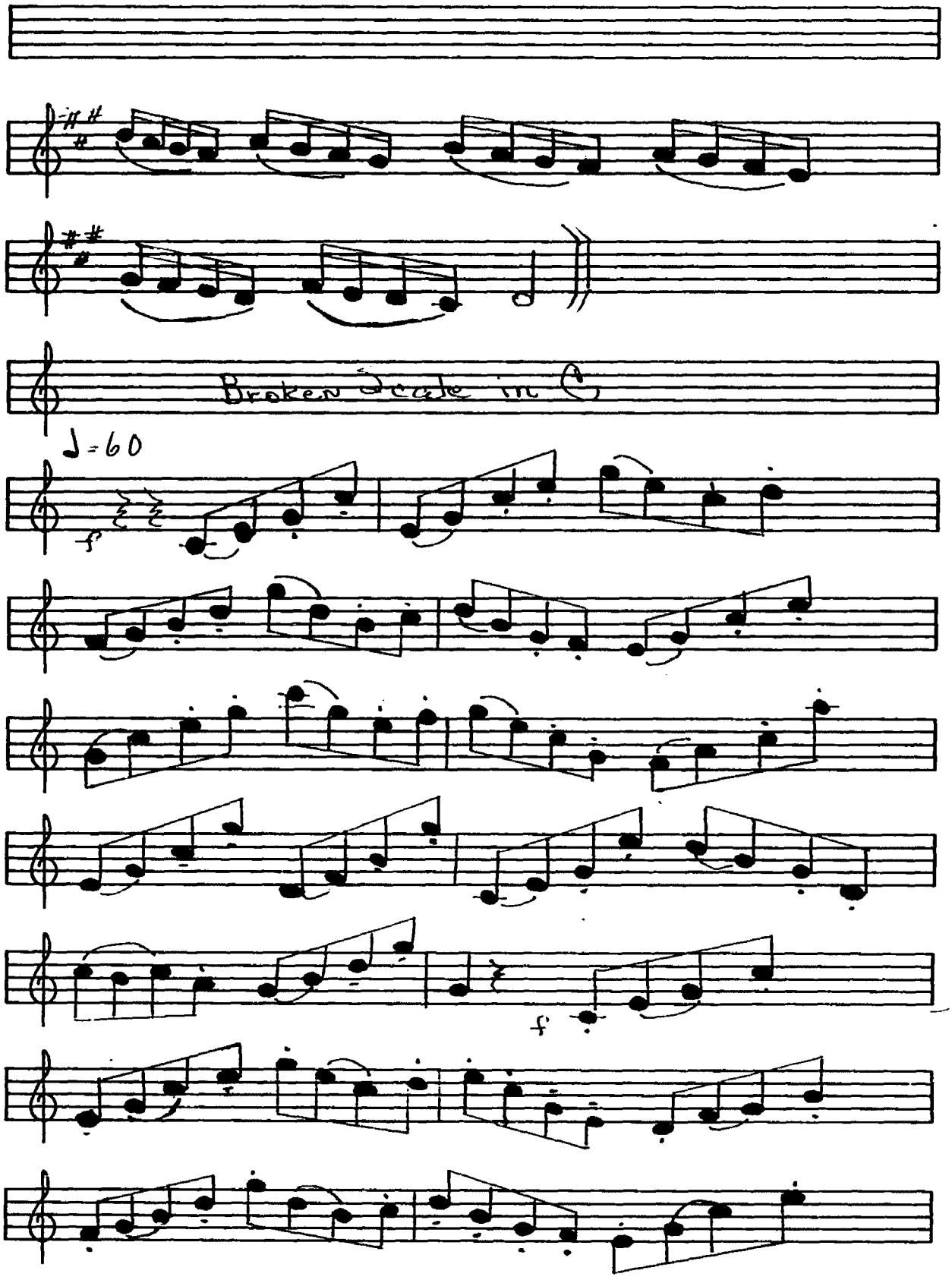

mf
Minuet in G Min
Bach
♩.=60

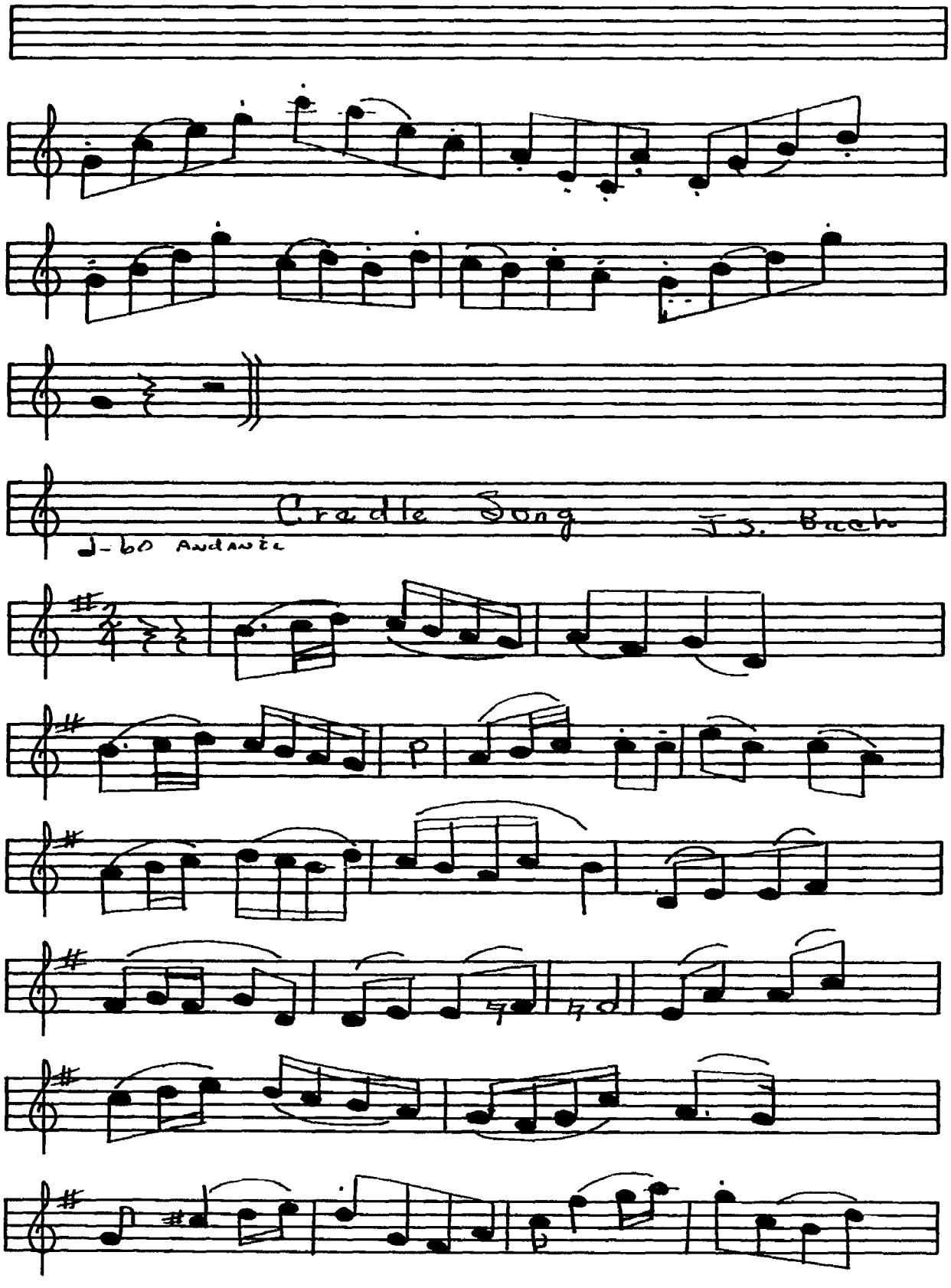


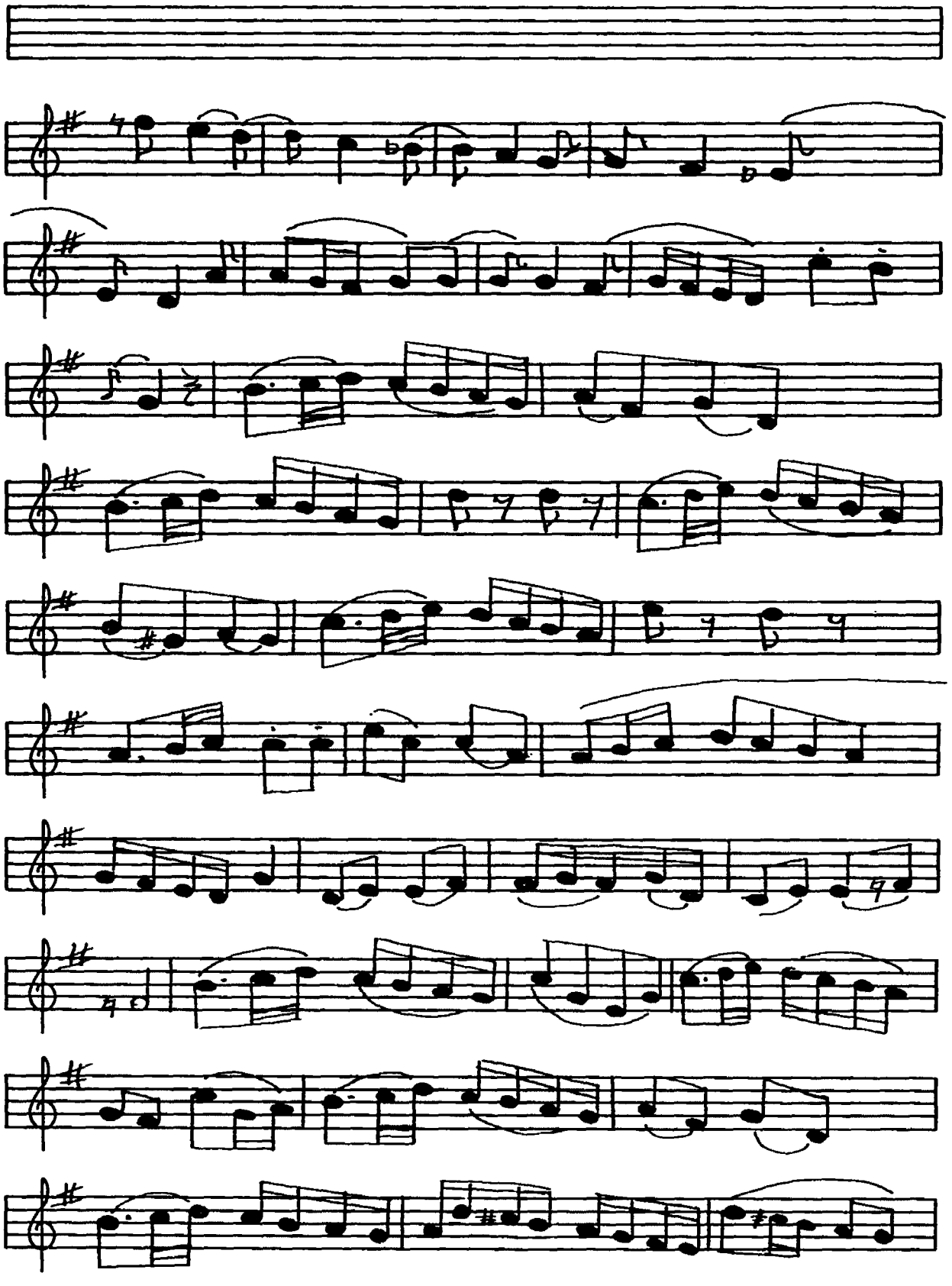

Musette in G
♩=60
p

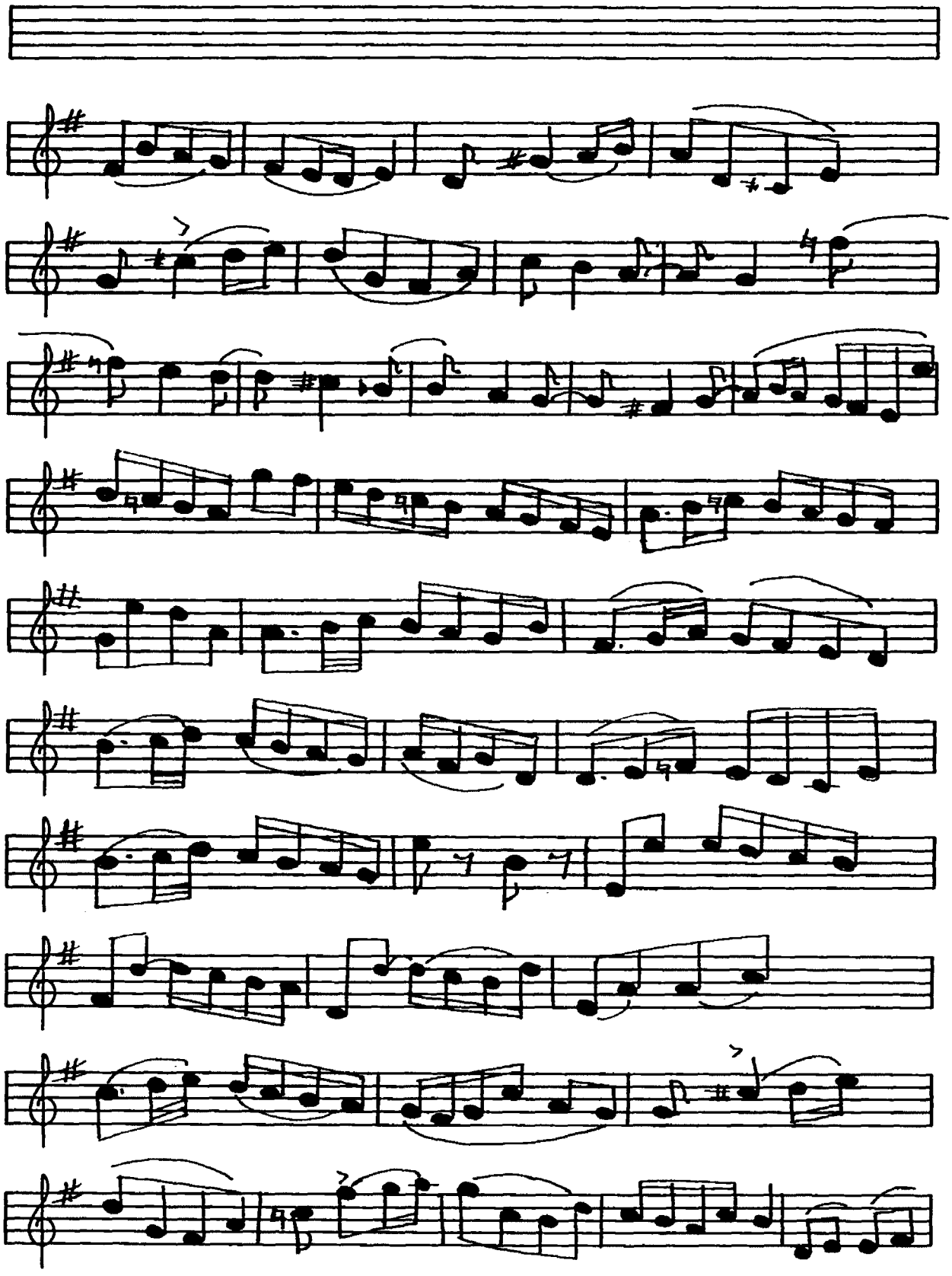



C Scales
Film 3
Broken Scale
♩=60
D Scale
♩=60

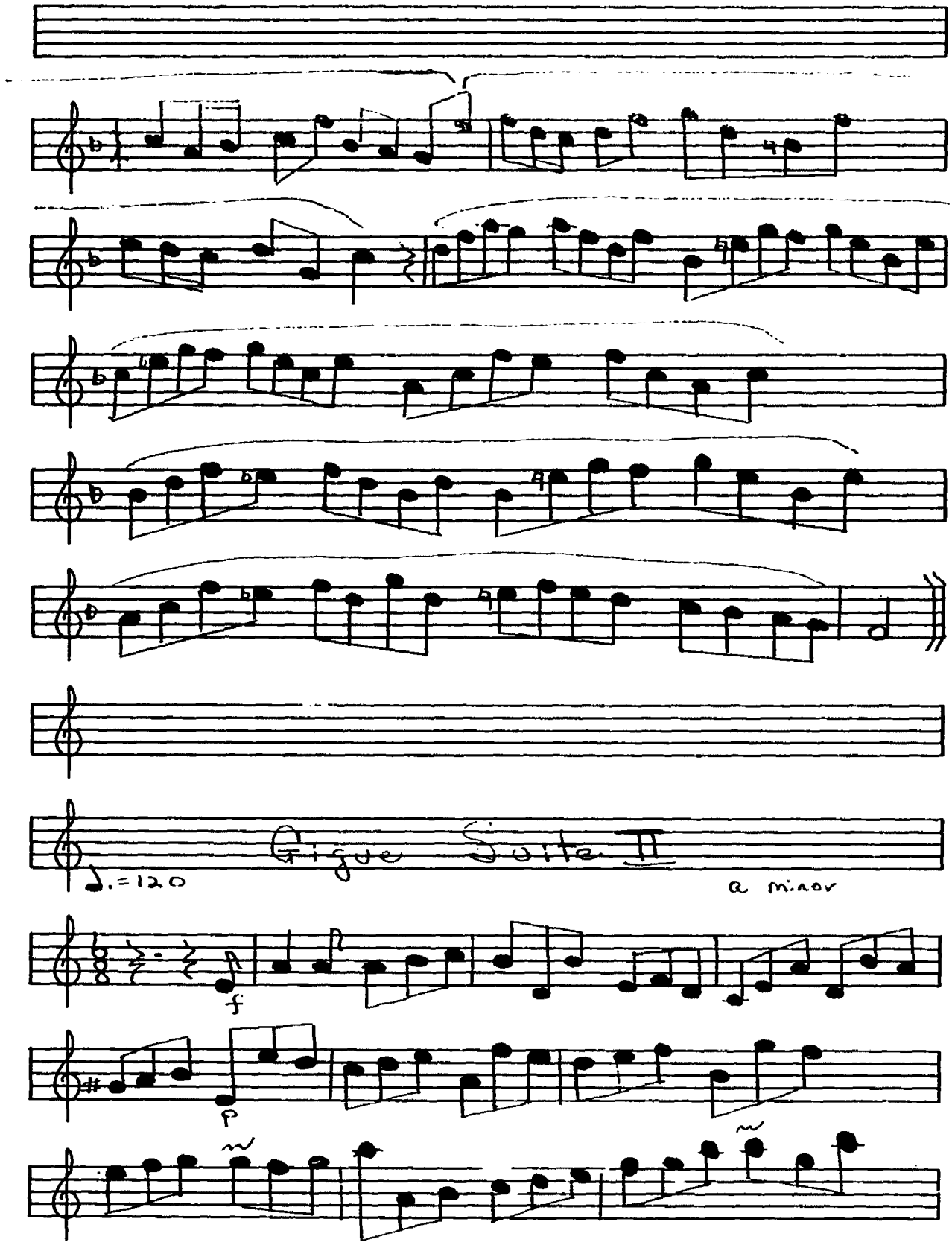

Broken Scale in C
♩=60
f
f

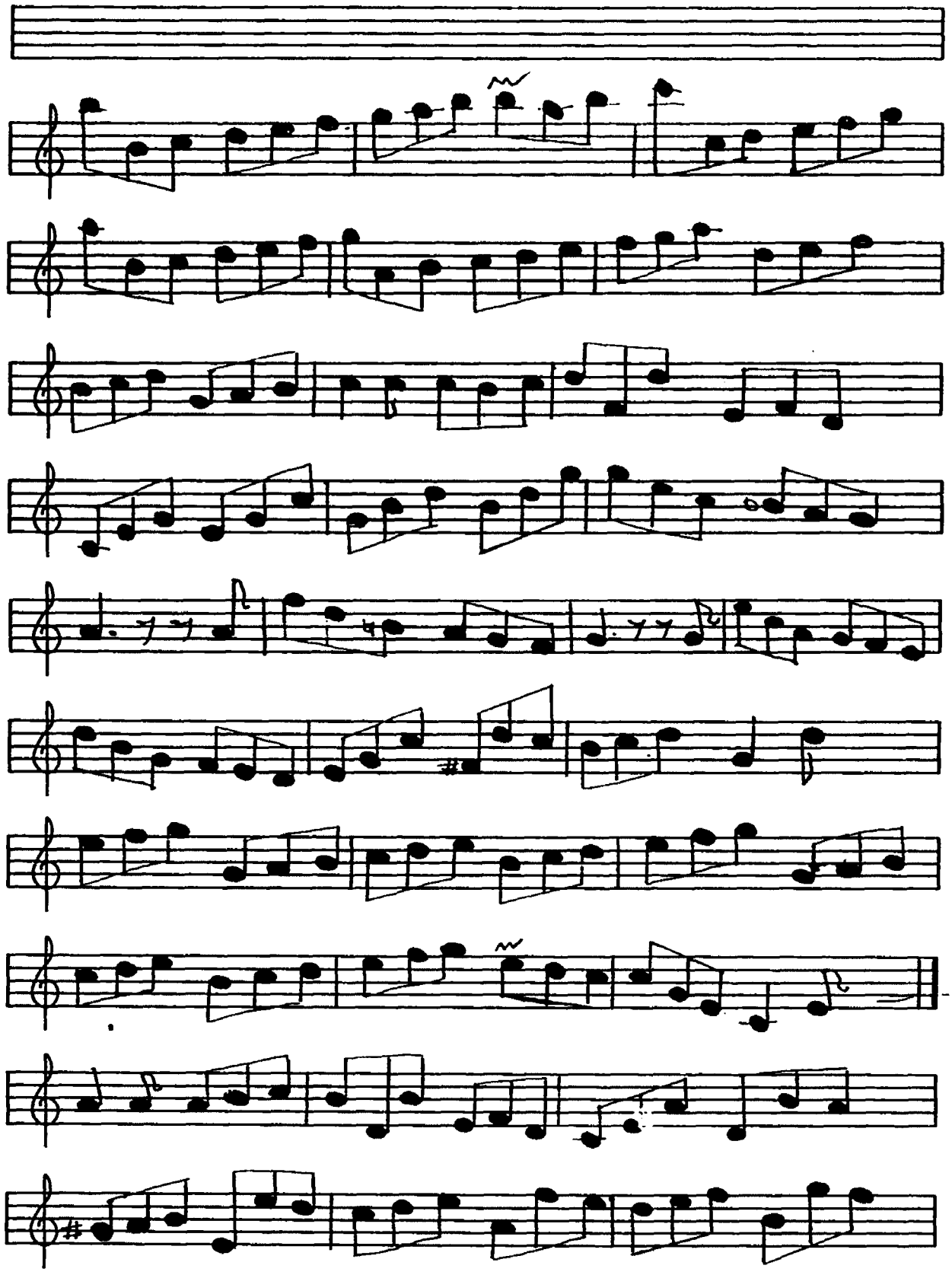

Cradle Song
J. S. Bach
♩-60 Andante

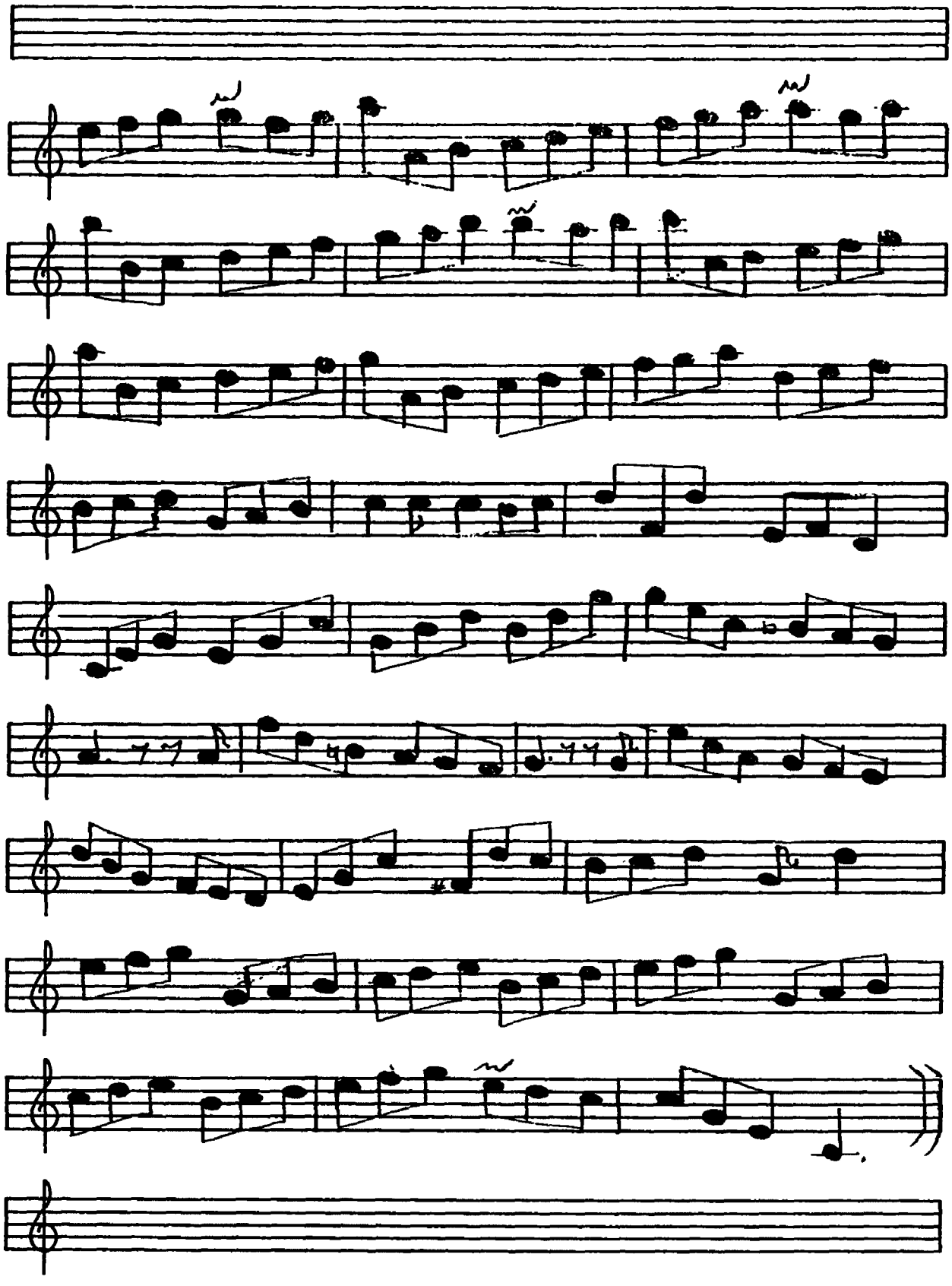


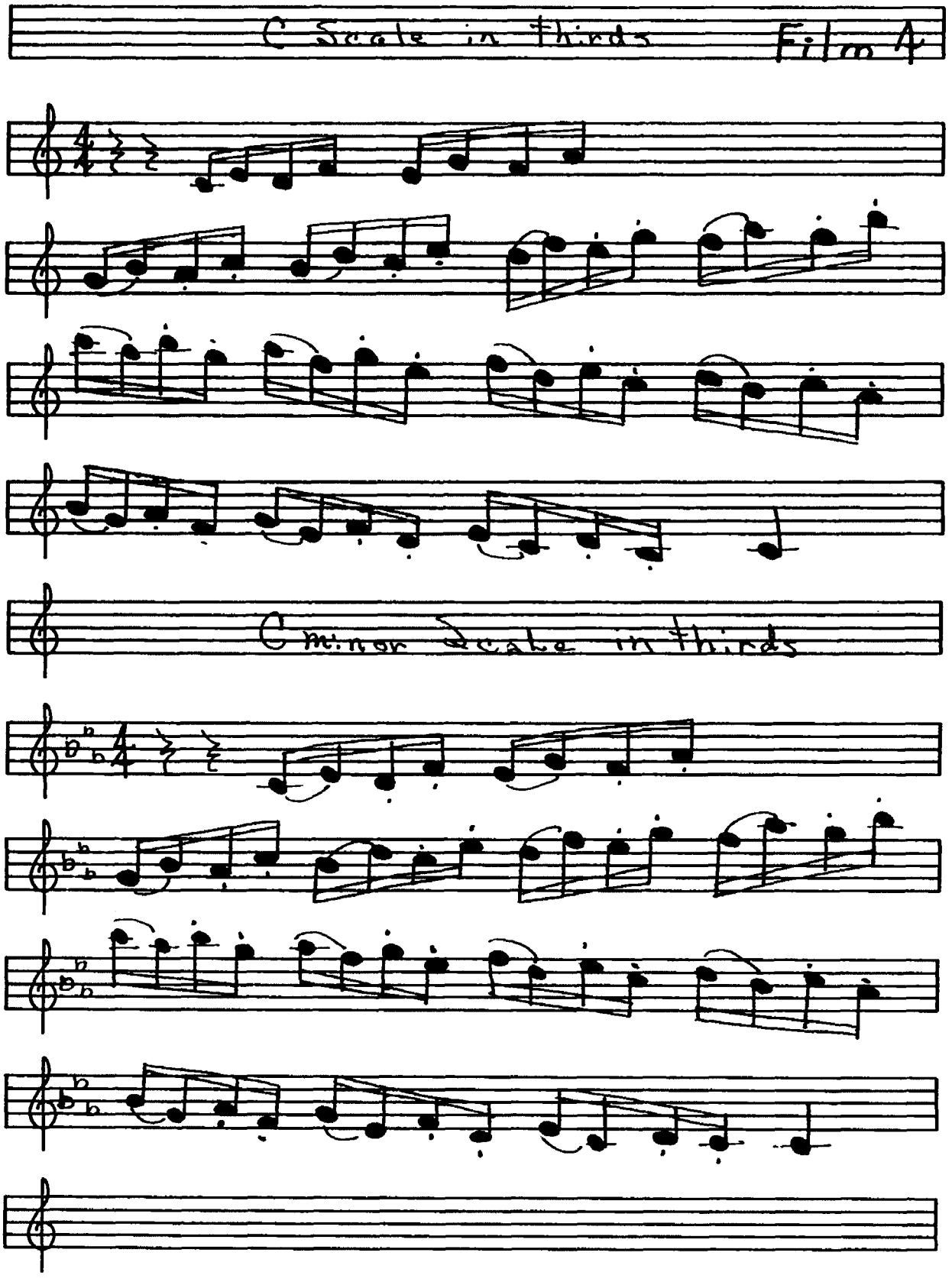


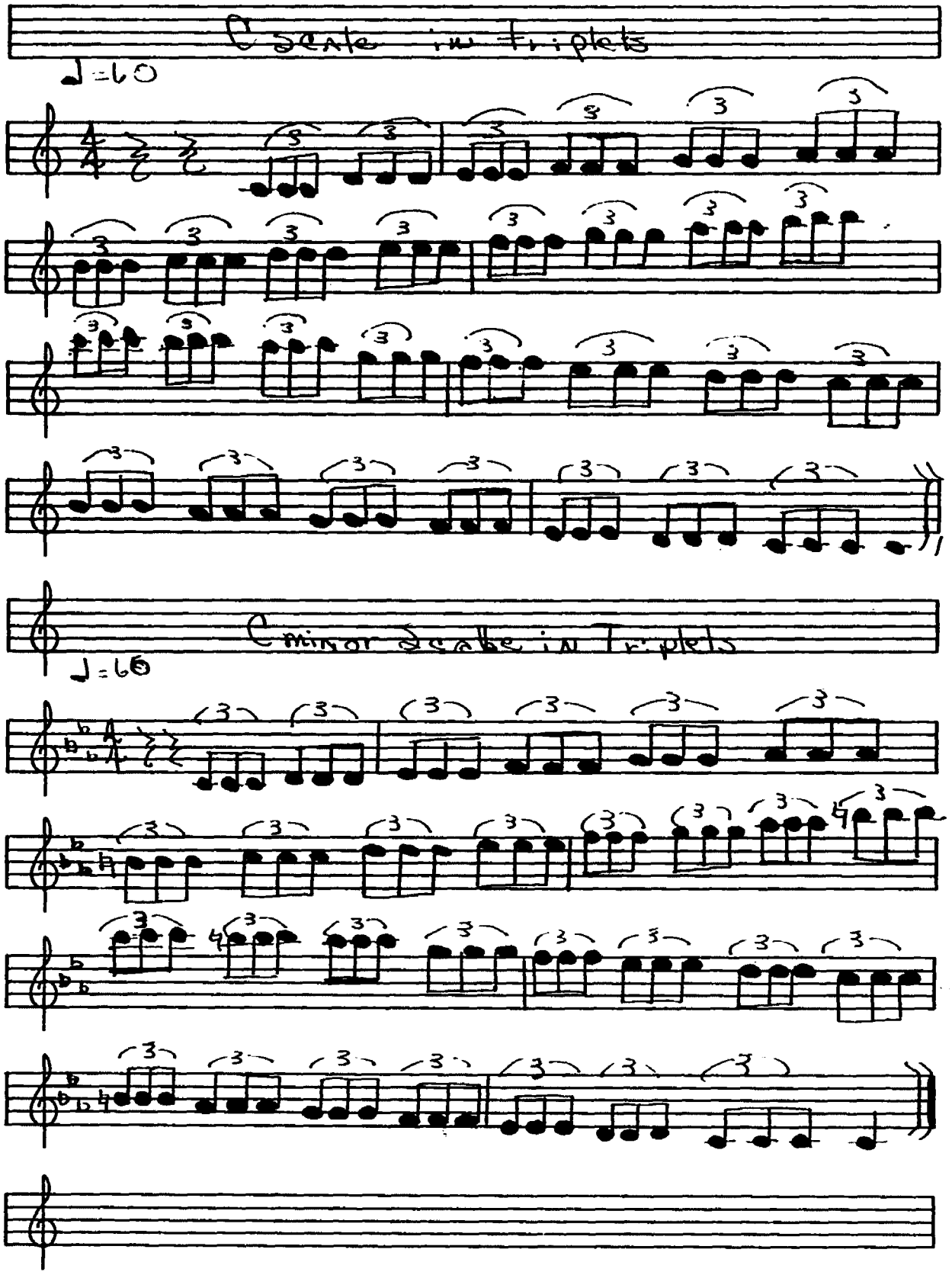
My Heart Flies Again
♩= 69

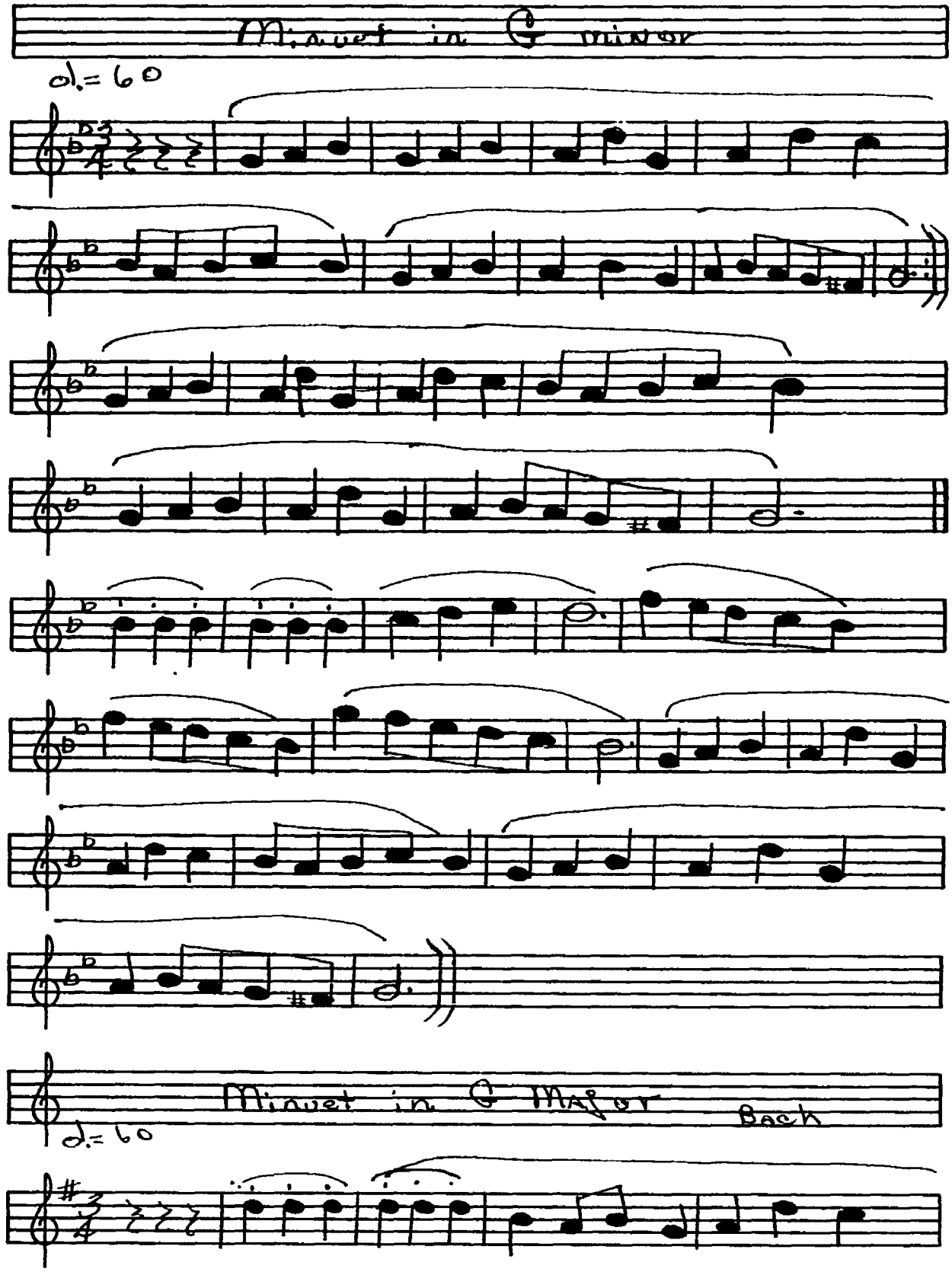

Gigue Suite II
♩.=120
a minor
f
p

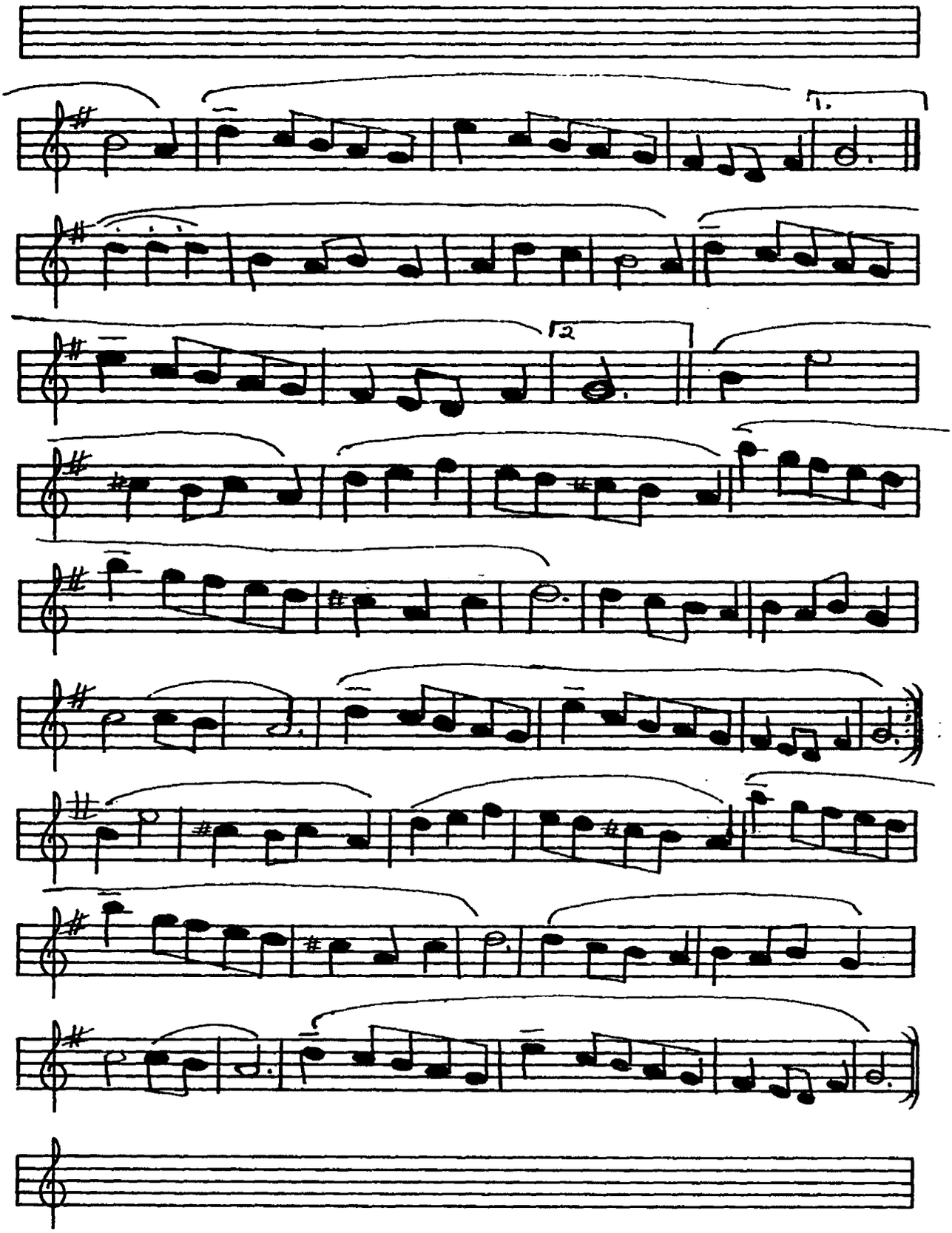


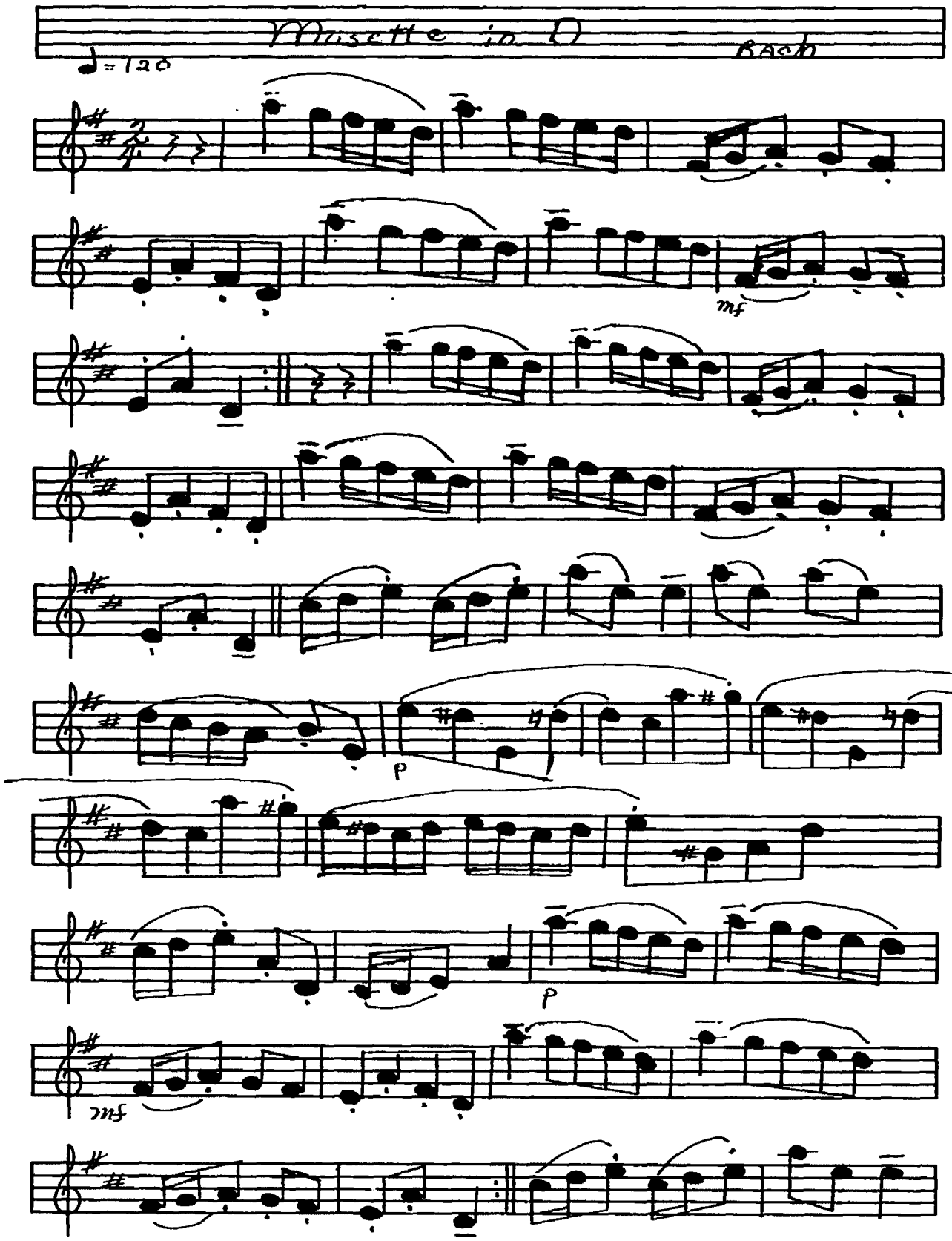


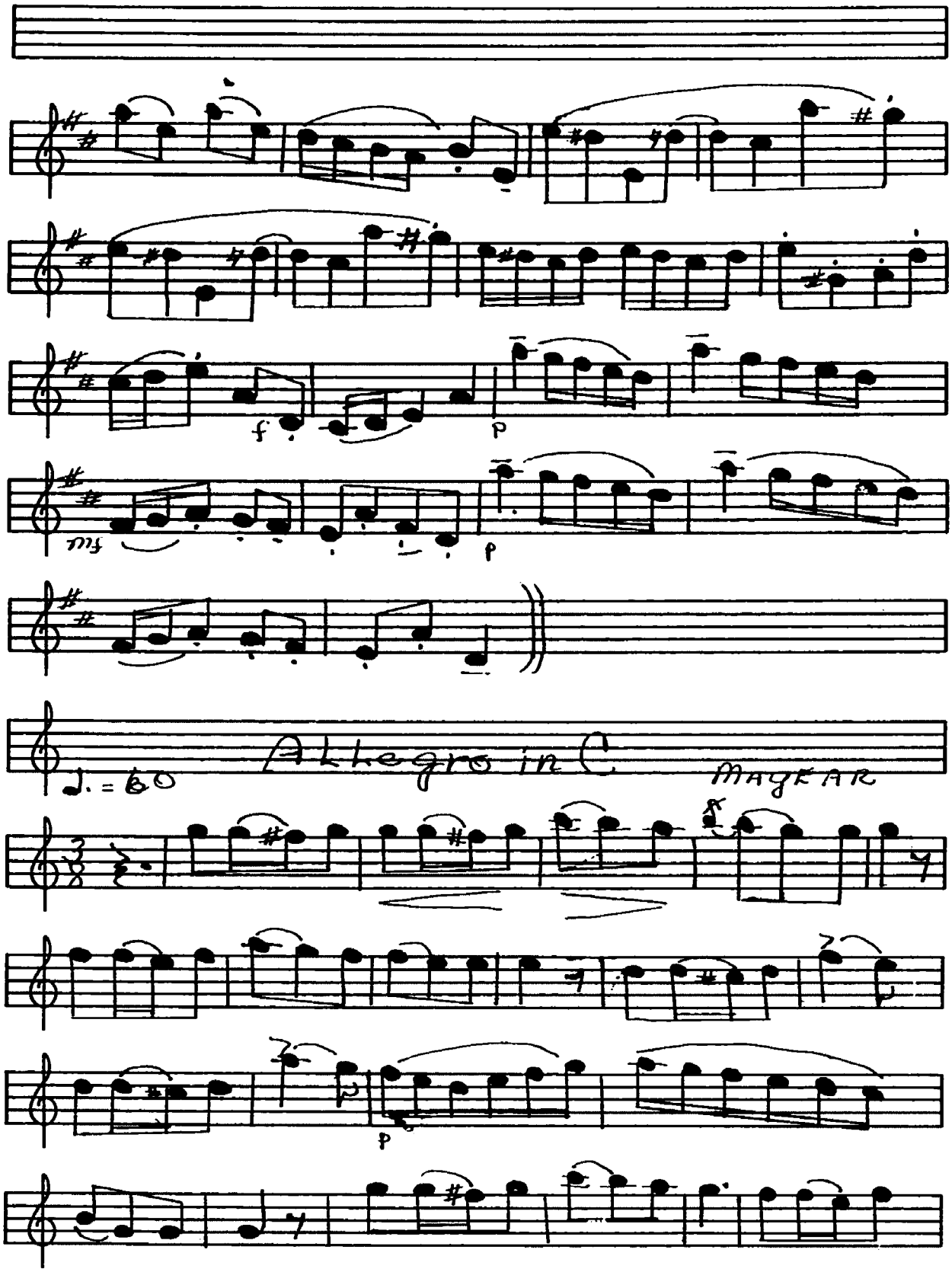

C Scale in thirds
Film 4
C minor Scale in thirds

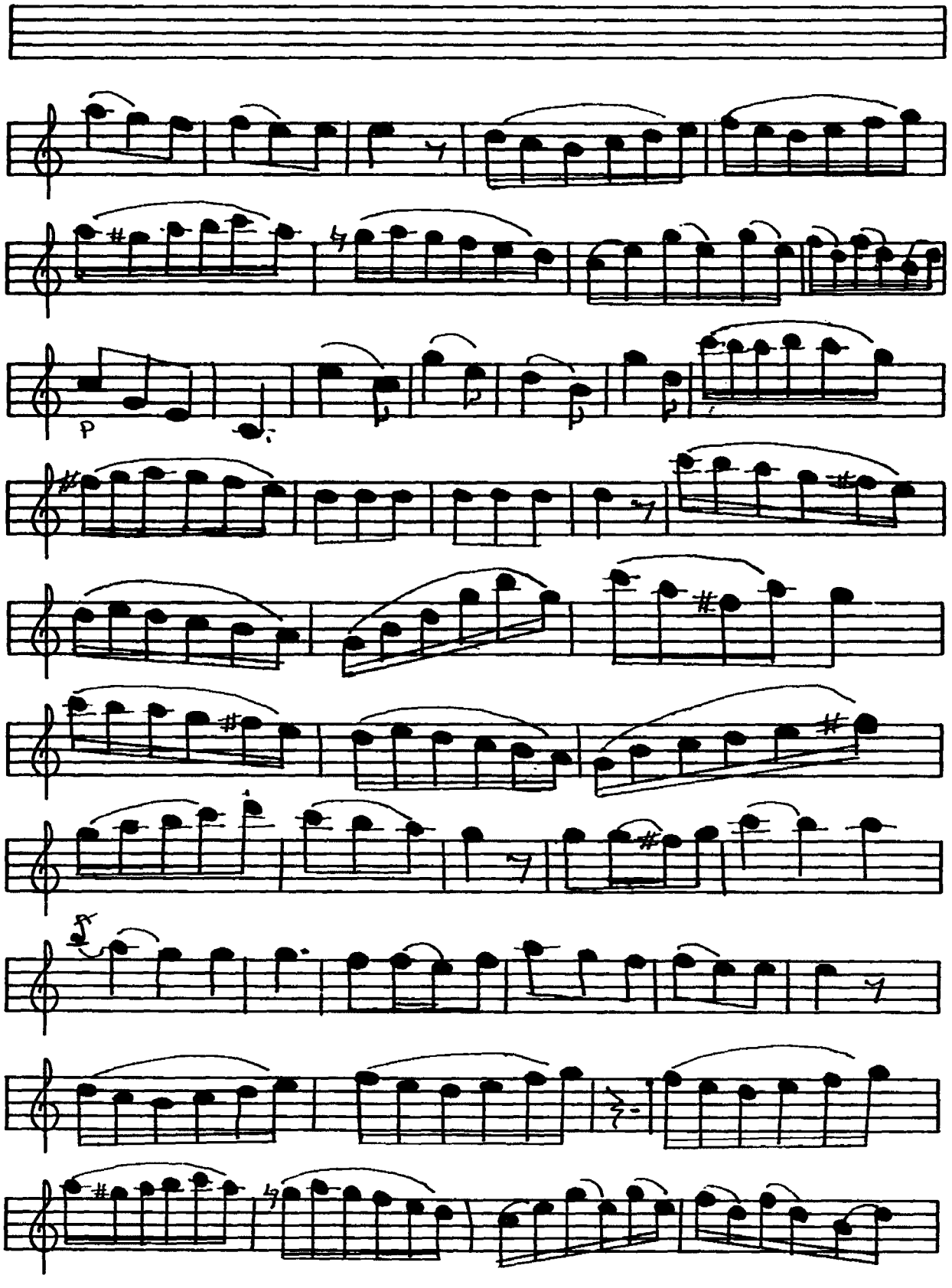

C Scale in Triplets
♩=60
C minor Scale in Triplets
♩=66

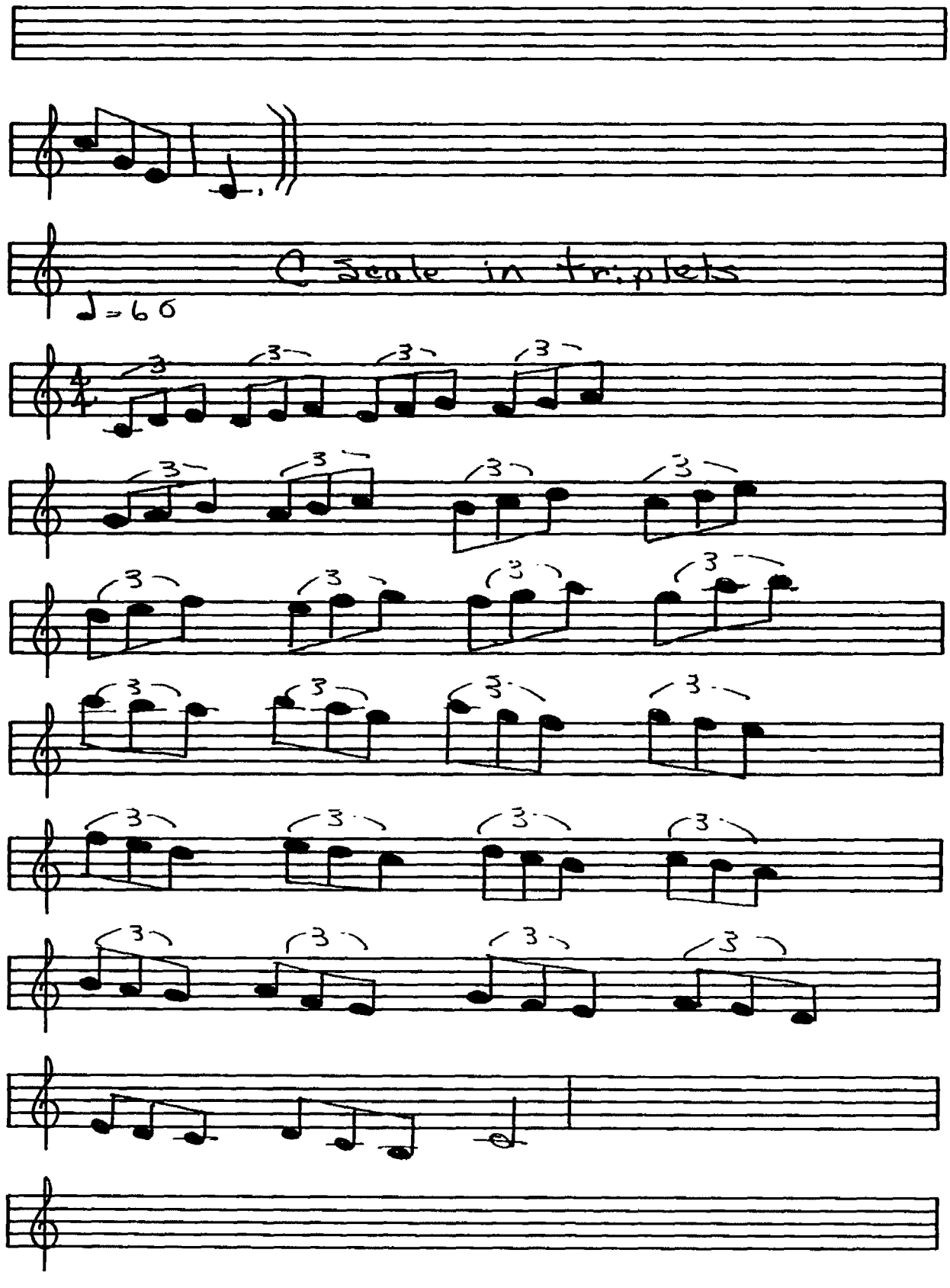

Minuet in G minor
♩.= 60
Minuet in G Major
Bach
♩.= 60

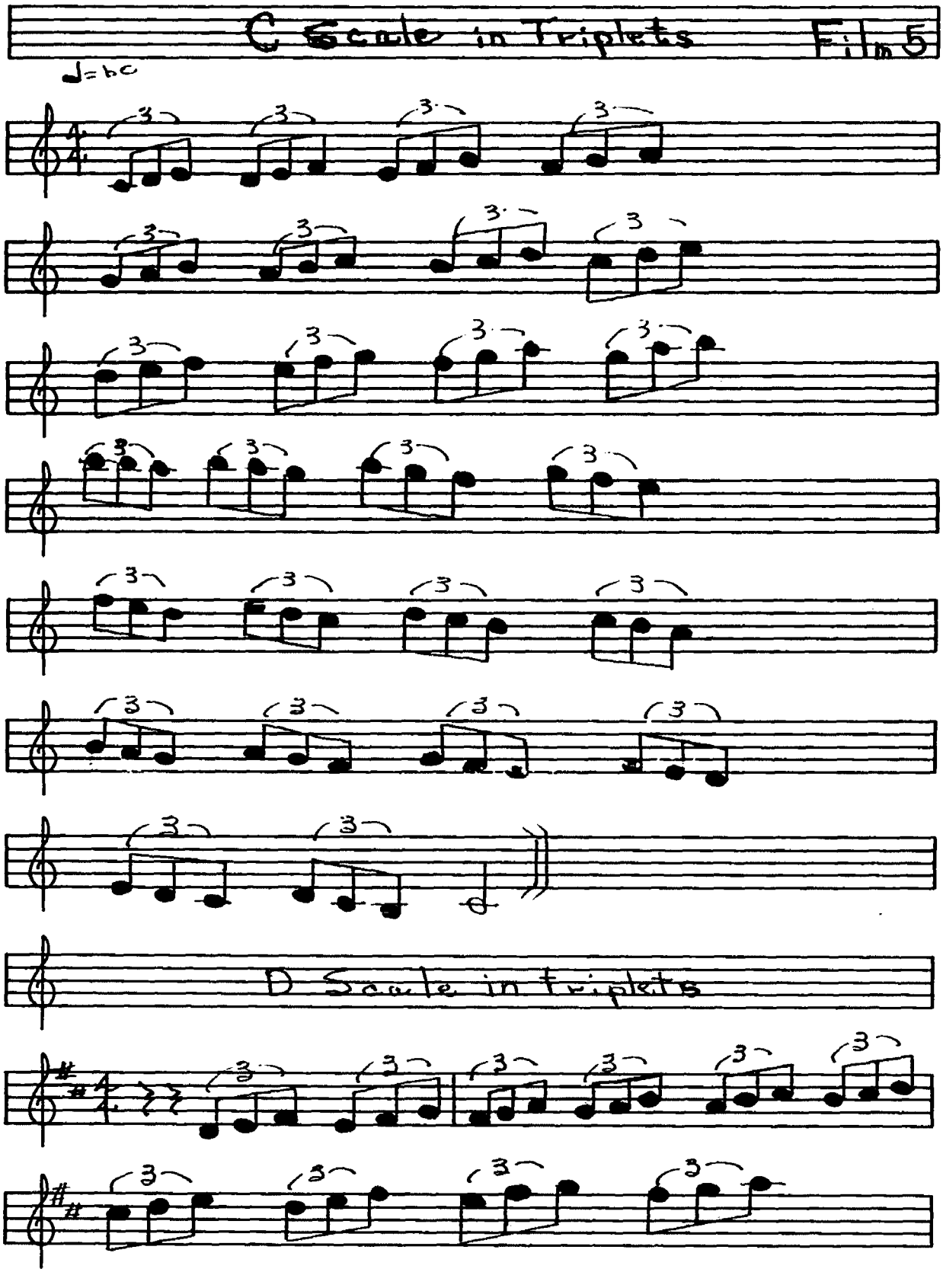

1.
2

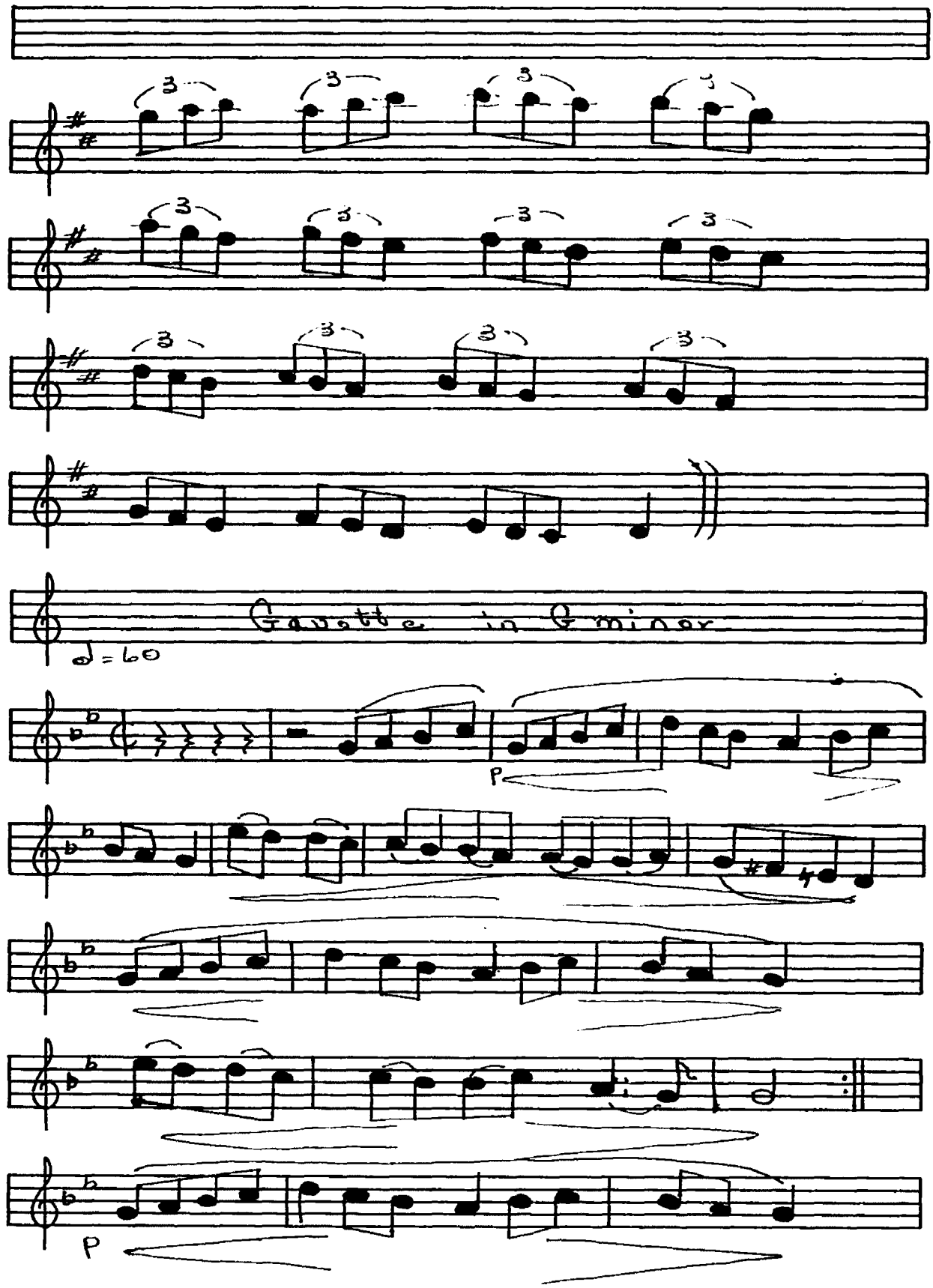

Musette in D
BACH
♩= 120
mf
p
p
mf

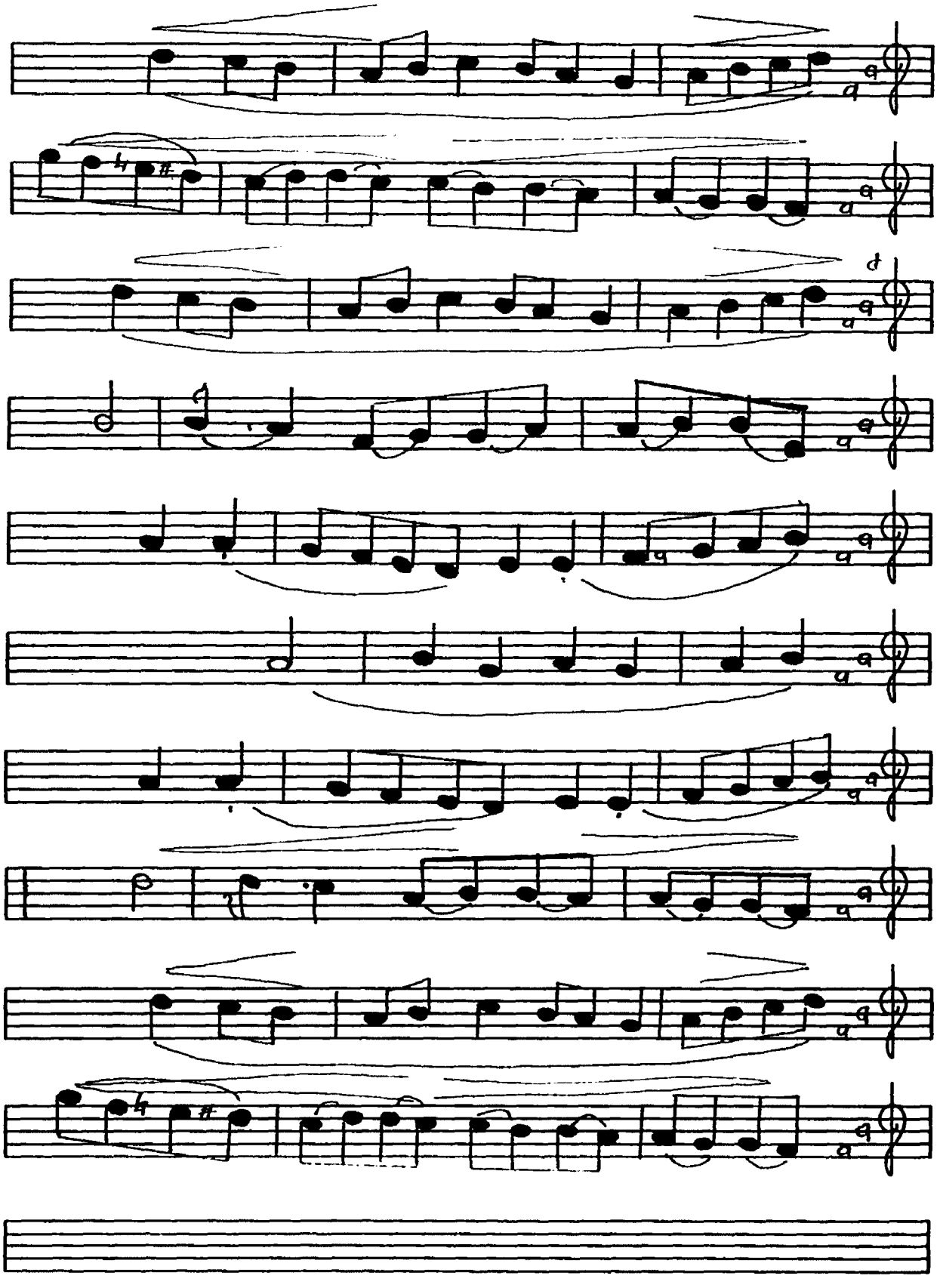

f
p
mf
p
♩. = 60
Allegro in C
MAGYAR
p

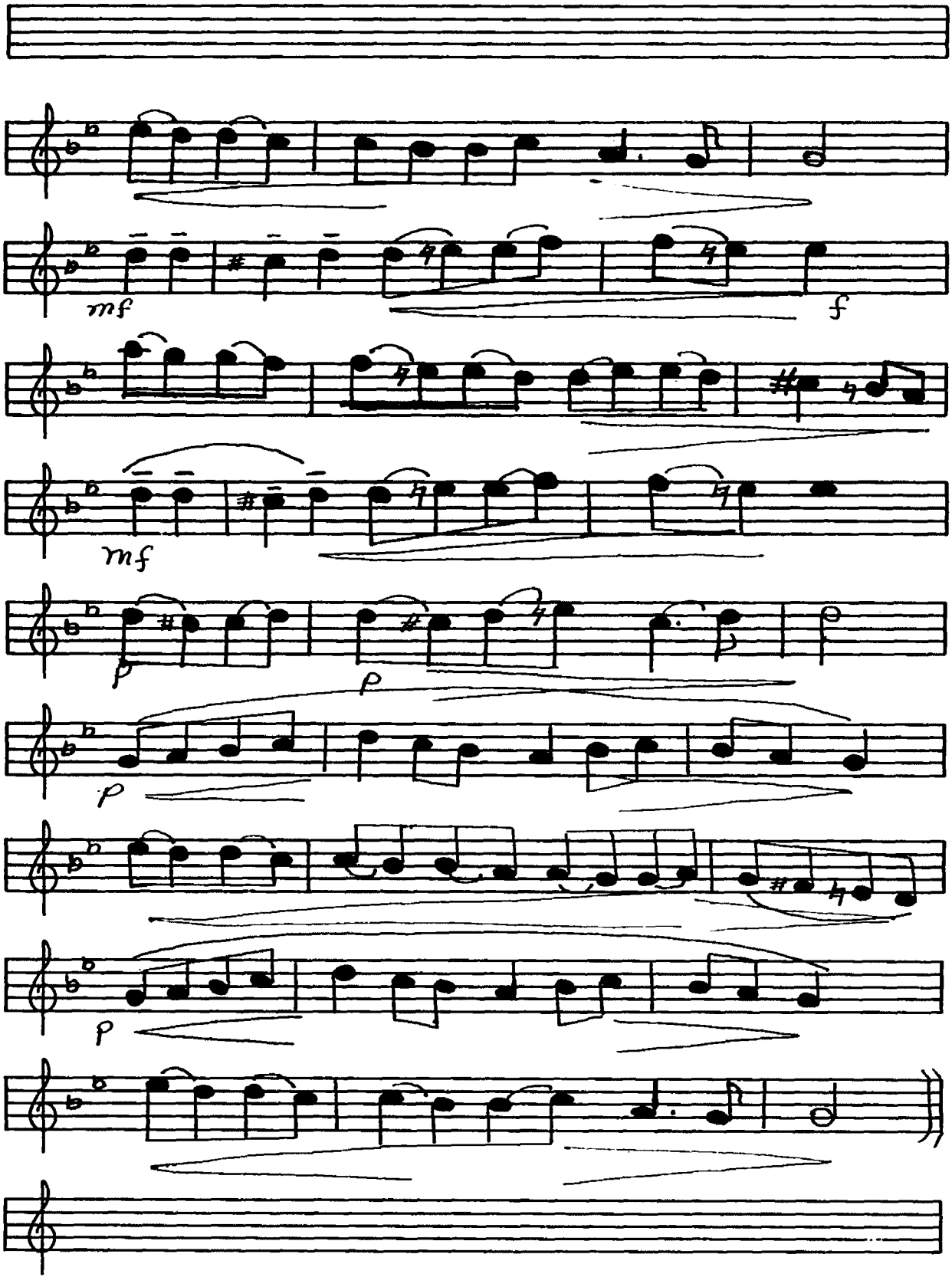

p

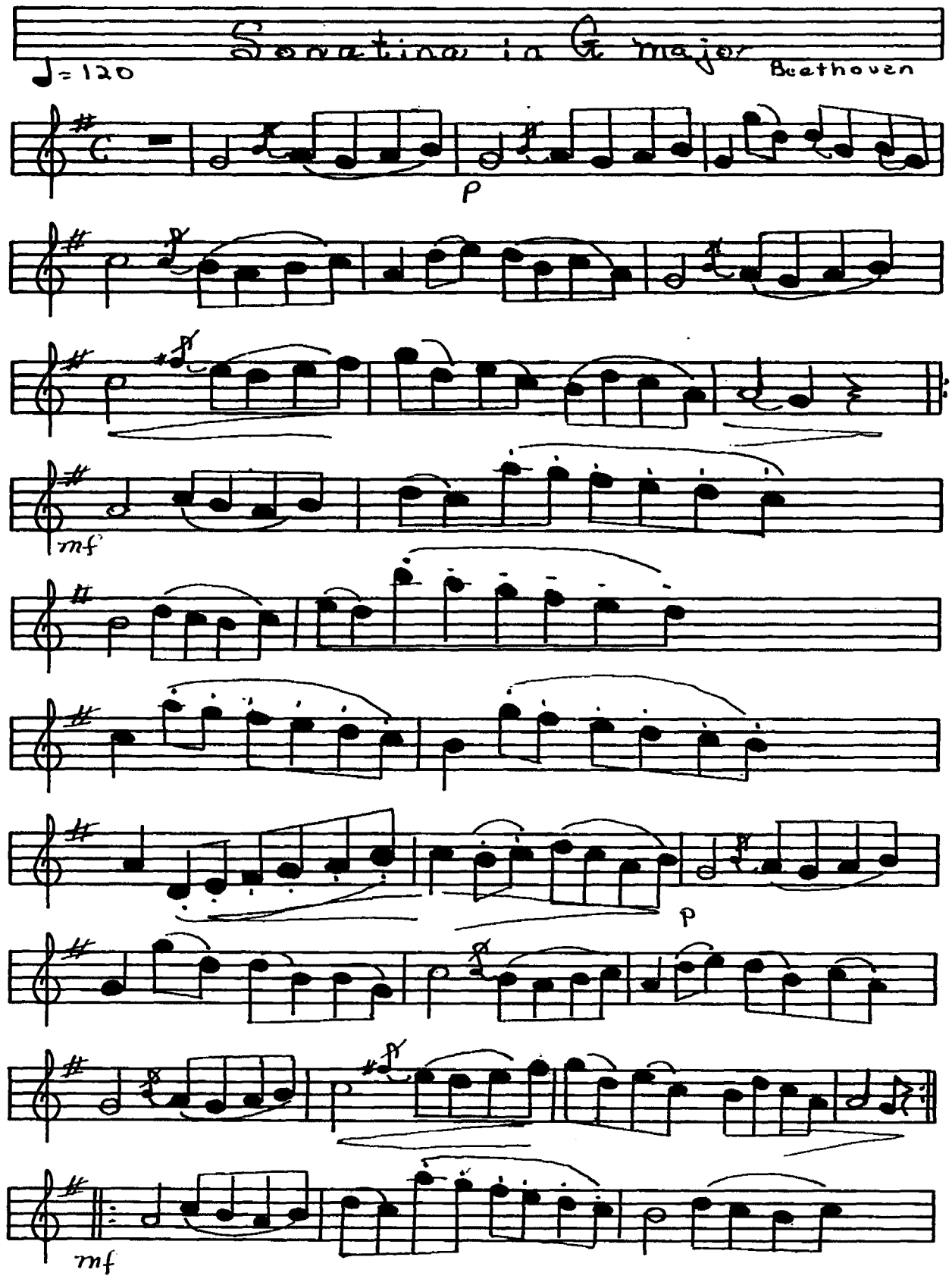

C Scale in triplets
♩=60

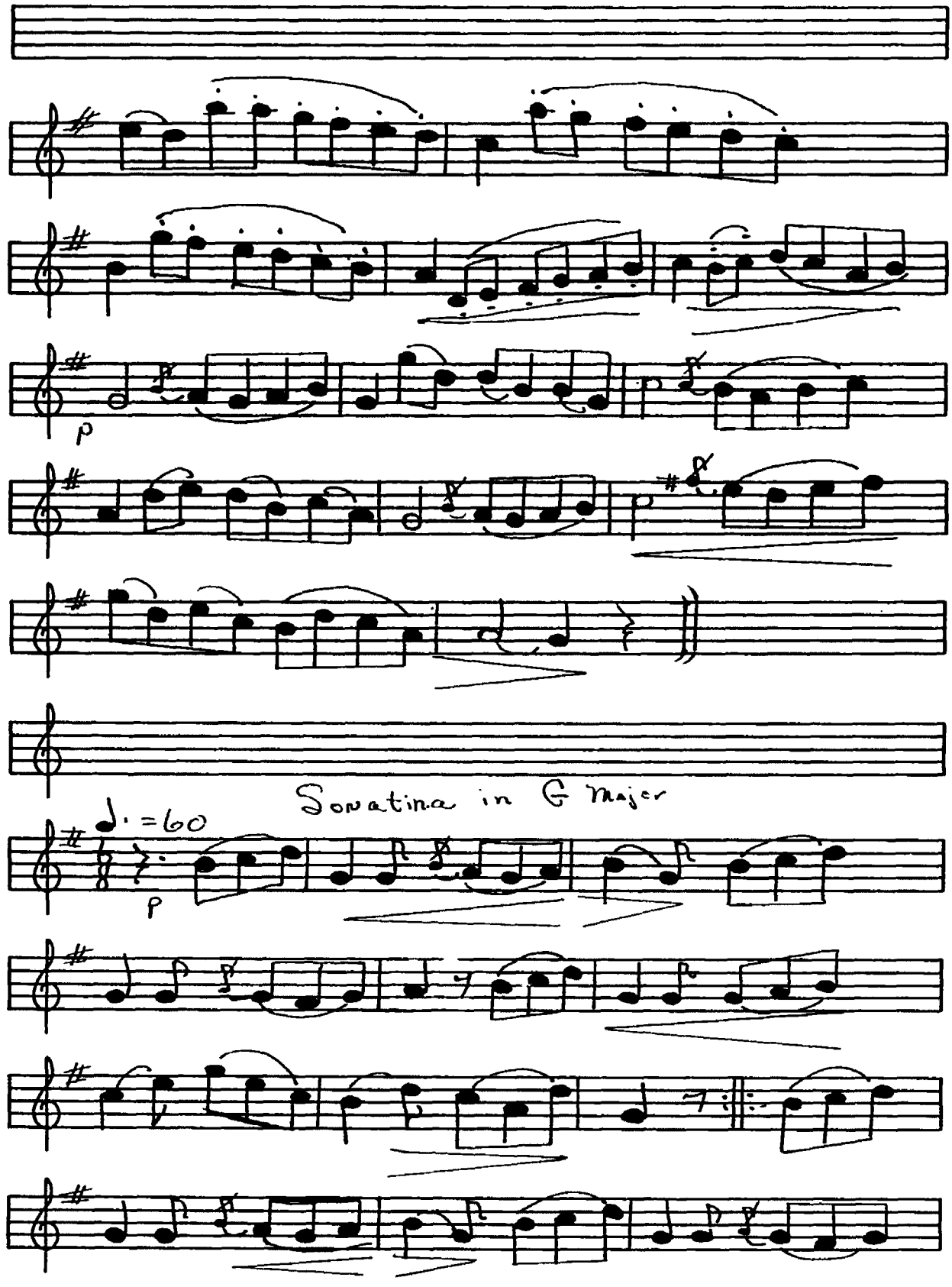

C Scale in Triplets
F Im 5
♩=bc
D Scale in triplets

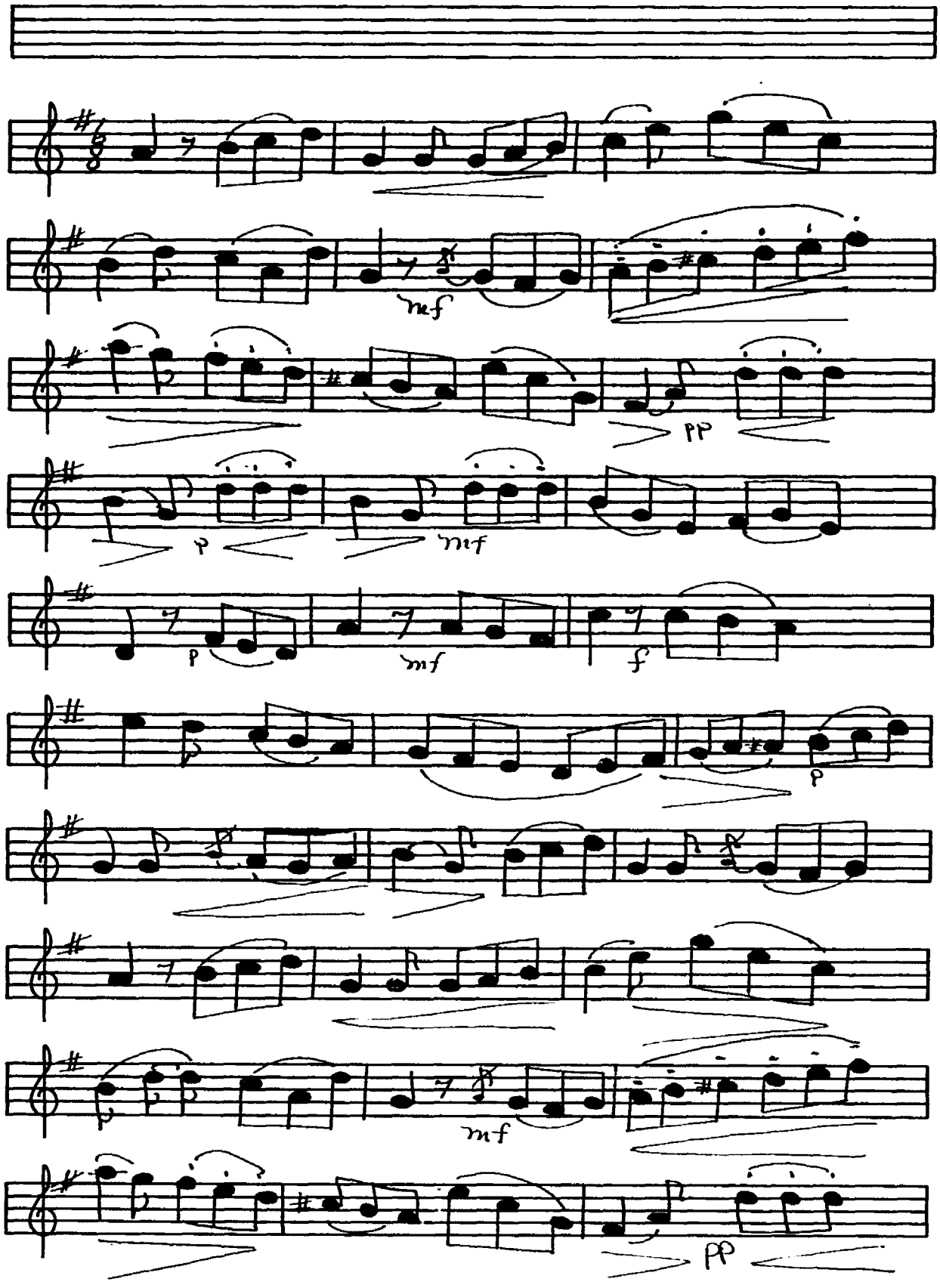

Gavotte in G minor
♩= 60
P
P

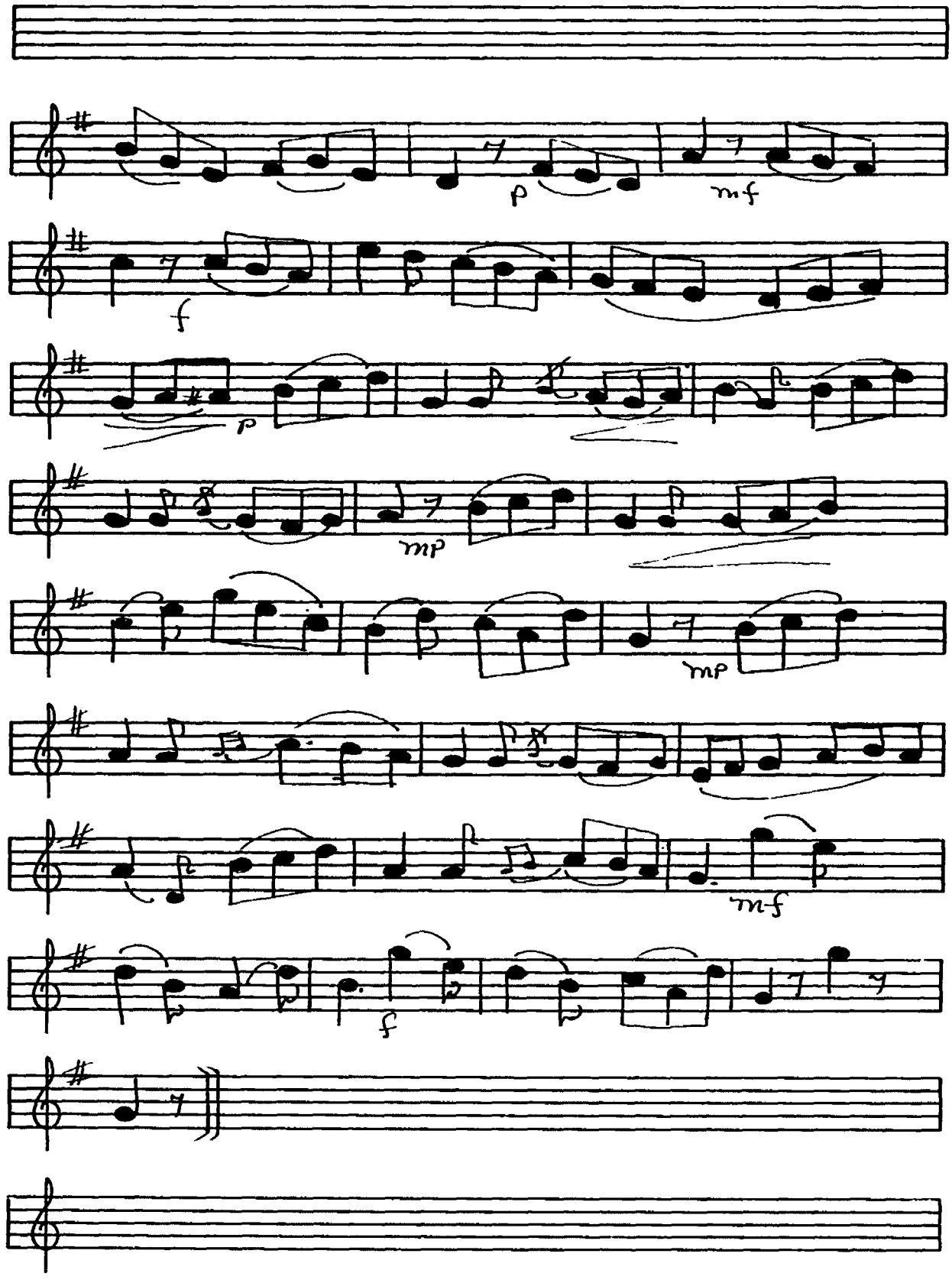


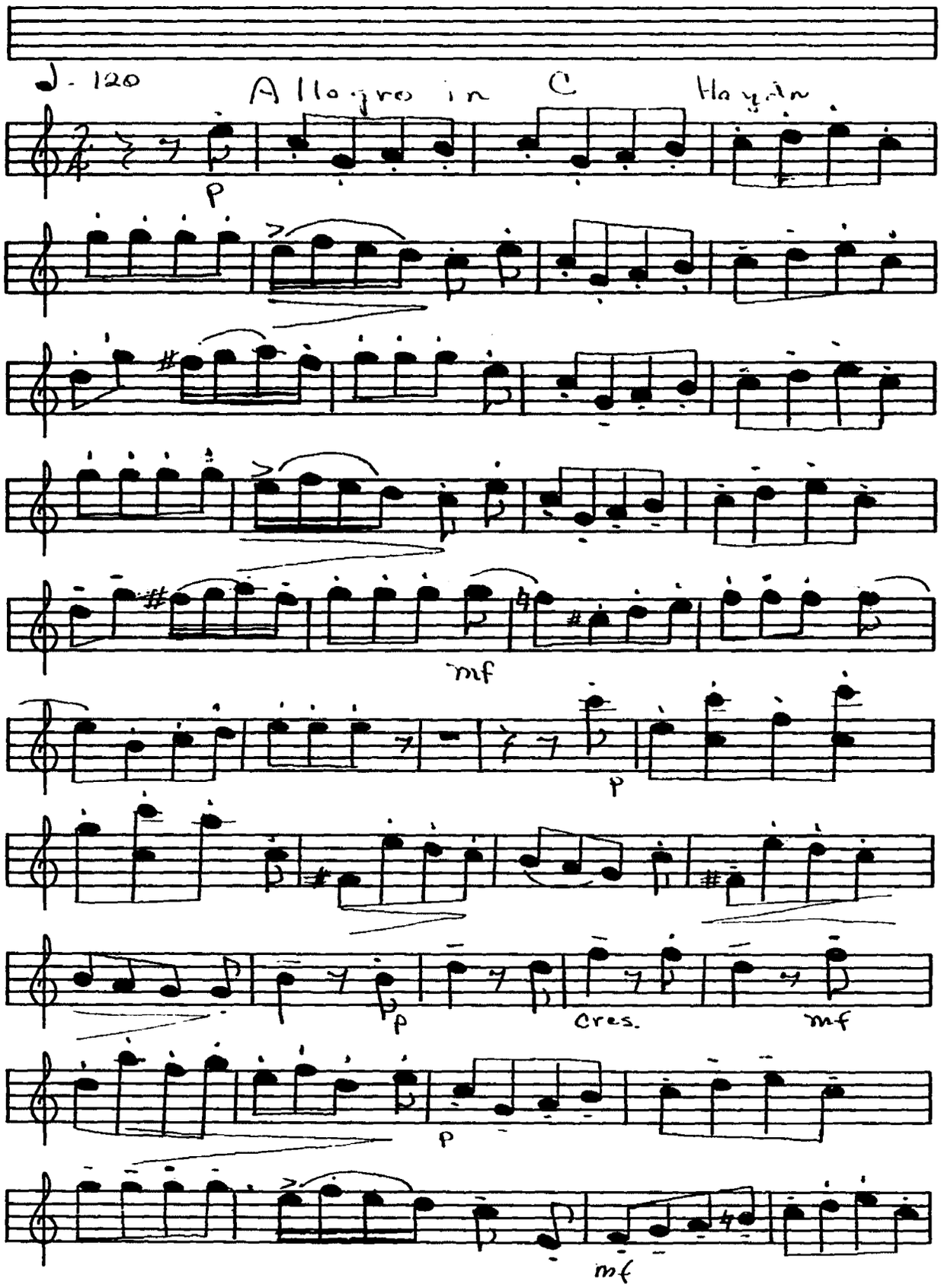

mf
f
mf
p
p
p

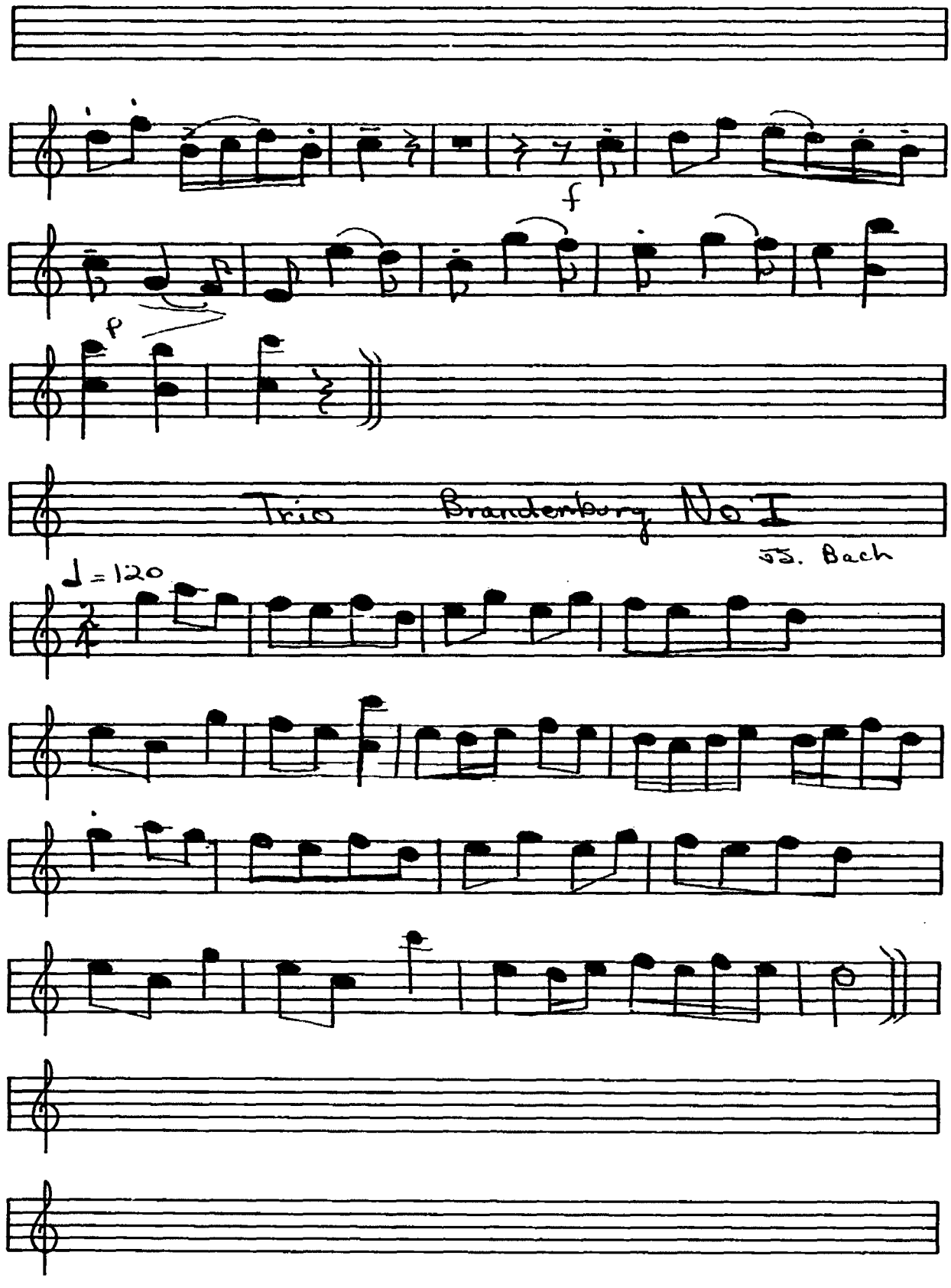

Sonatina in G major
Beethoven
♩= 120
p
mf
p
mf

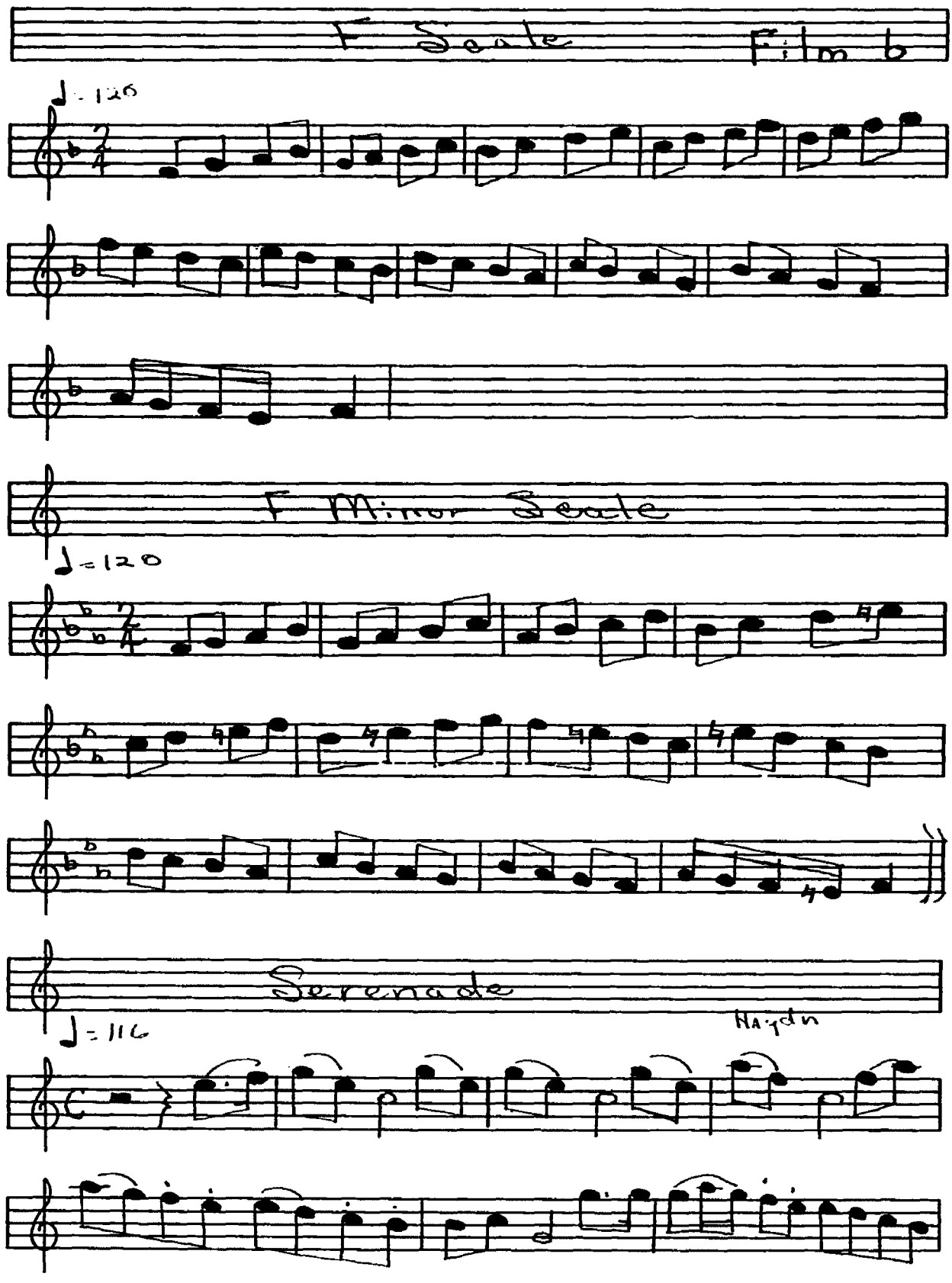

p
Sonatina in G major
♩. =60
p

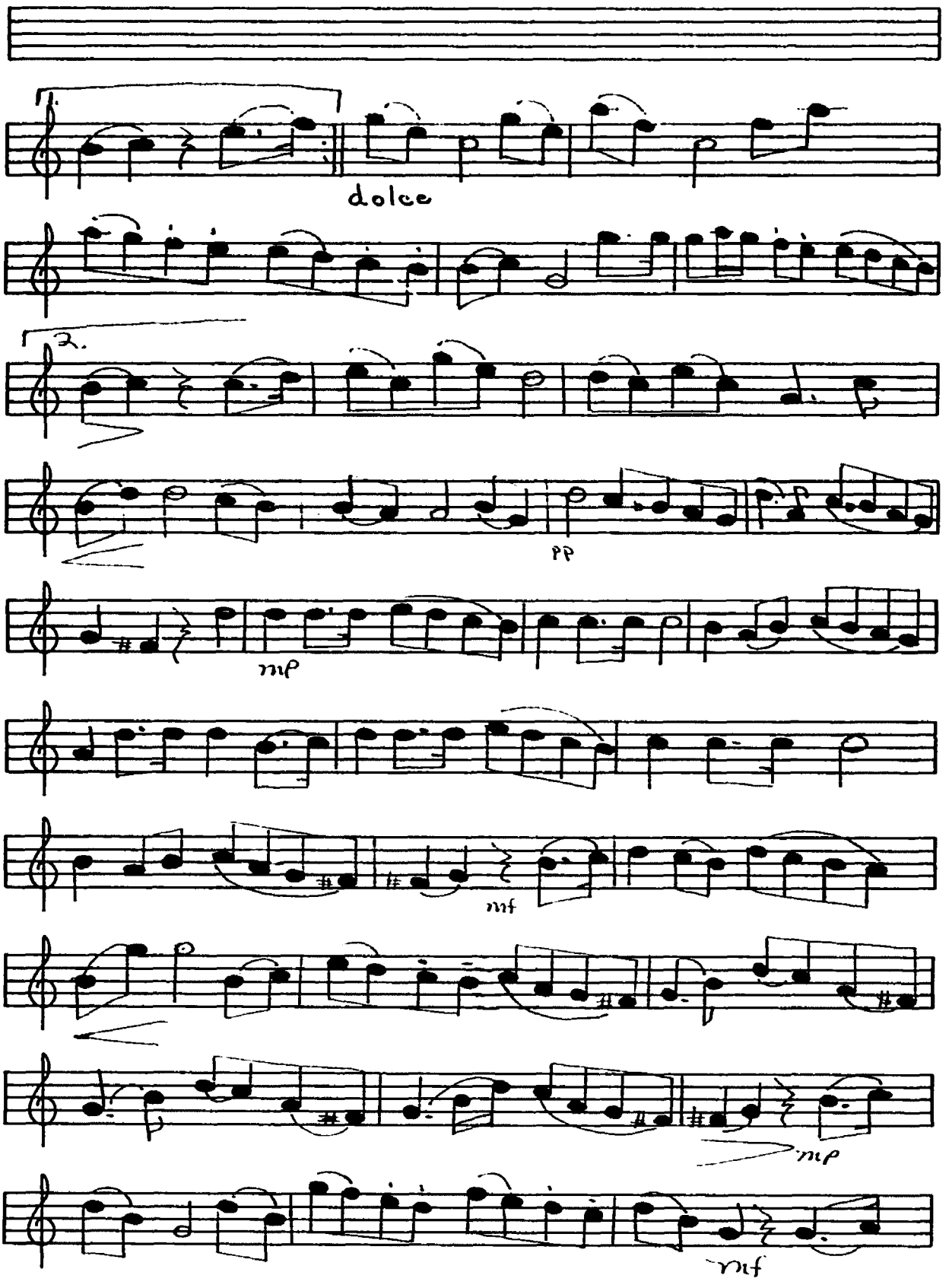

mf
pp
p
mf
p
mf
f
p
mf
pp

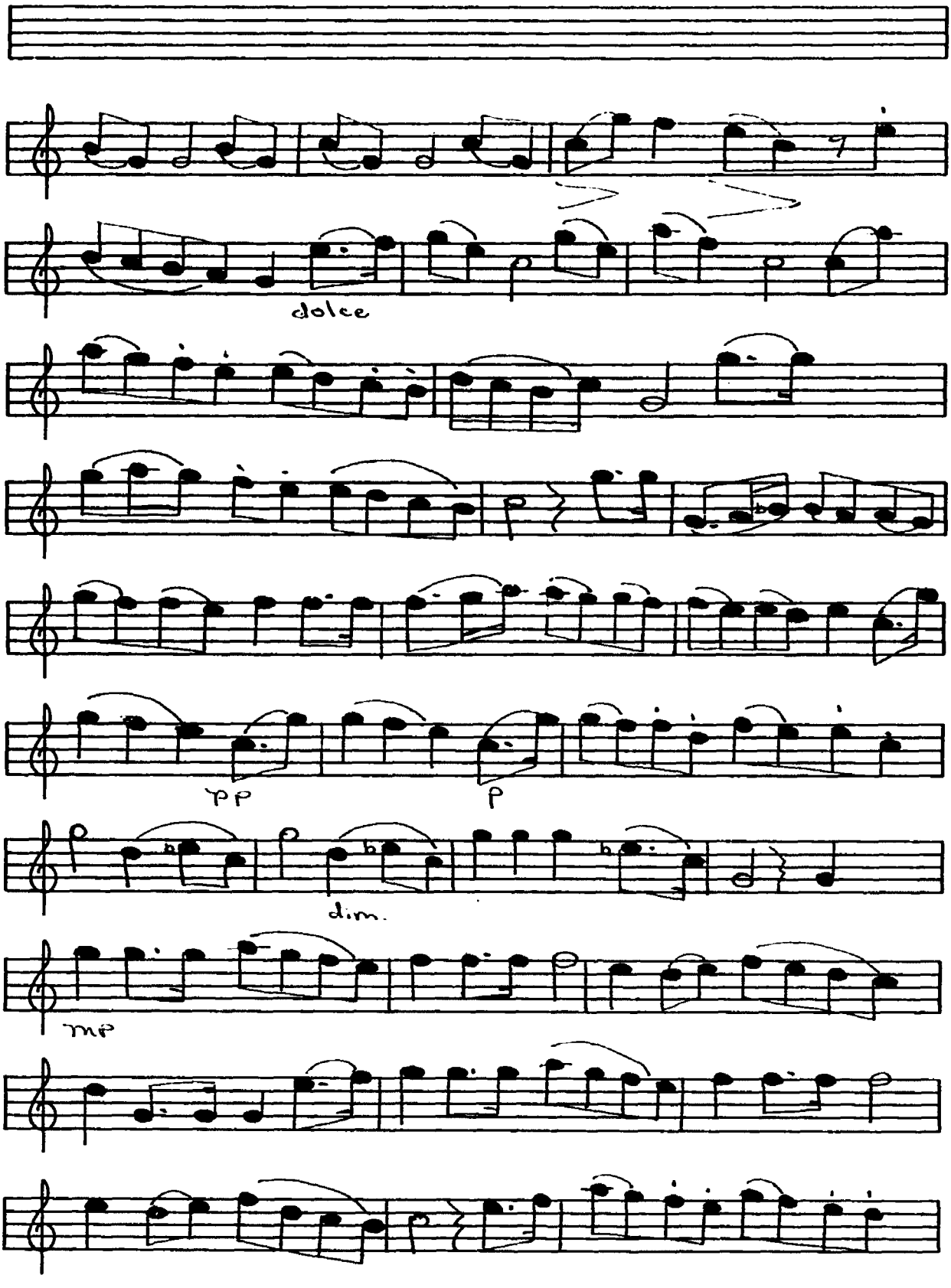

p
mf
f
p
mp
mp
mf
f

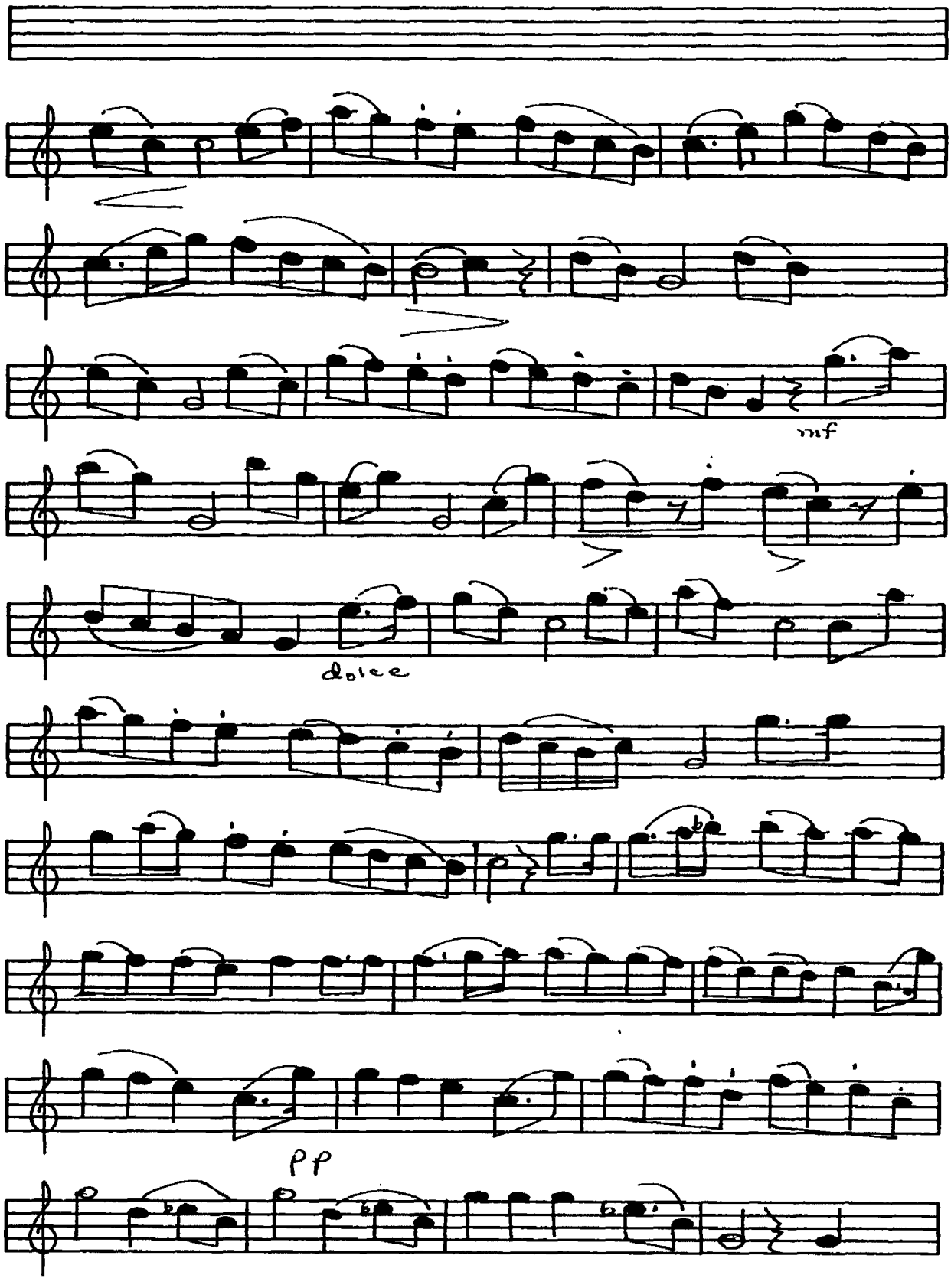

♩. 120
Allegro in C
Haydn
p
mf
p
p
cres.
mf
p
mf

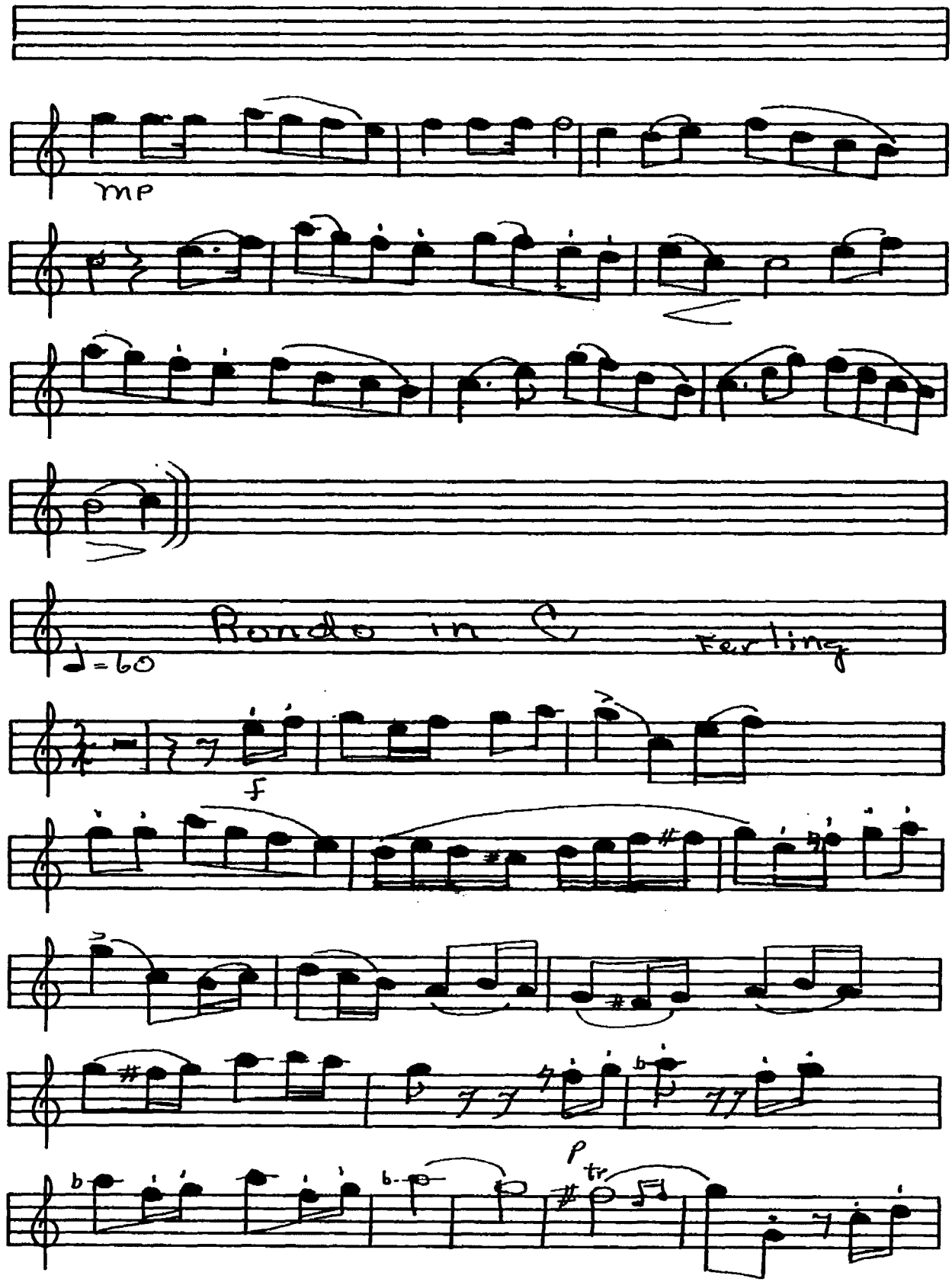

f
p
Trio Brandenburg No I
J.S. Bach
♩ = 120

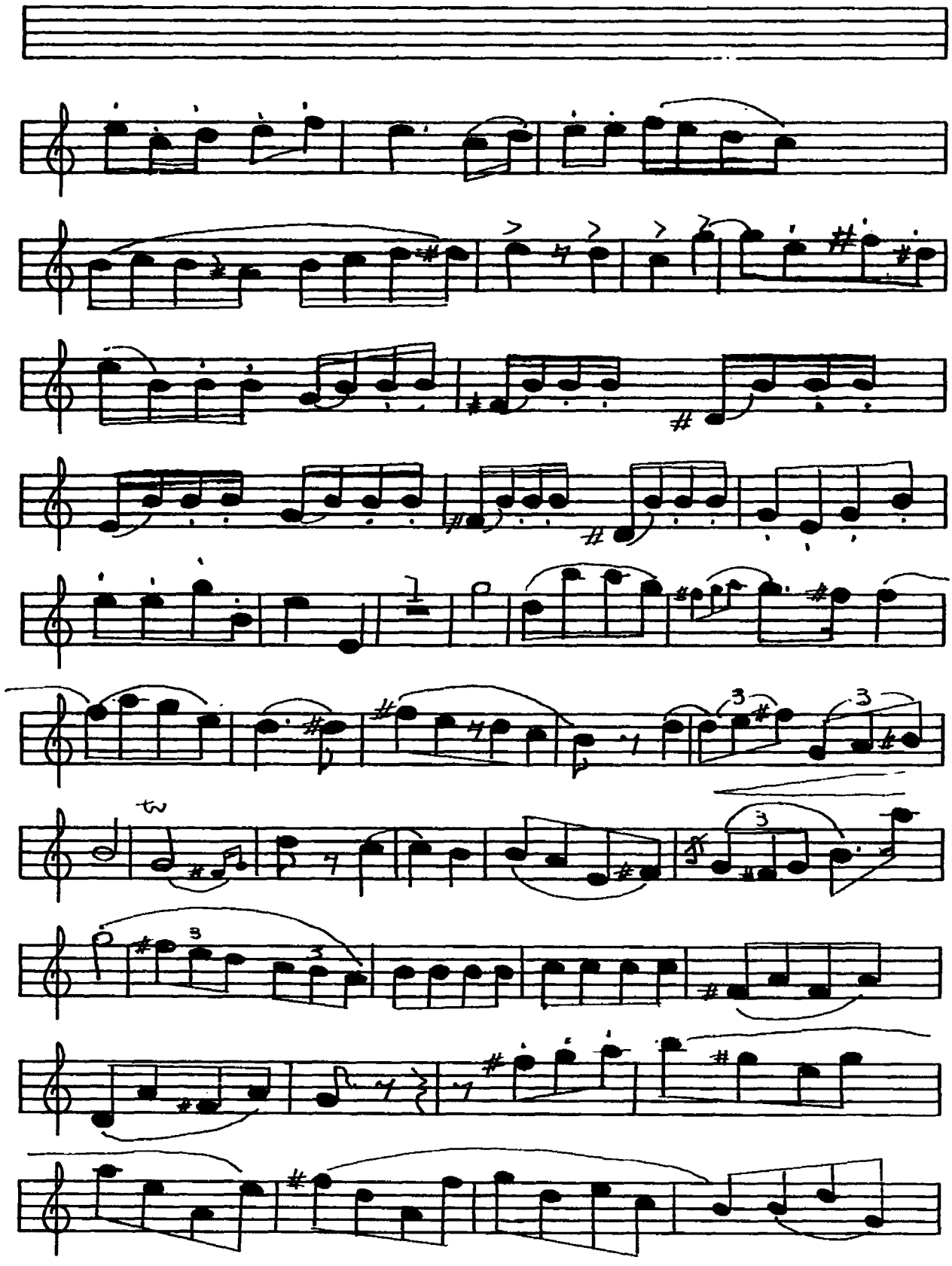

F Scale
F: I m b
♩ = 126
F Minor Scale
♩ = 120
Serenade
Haydn
♩ = 116

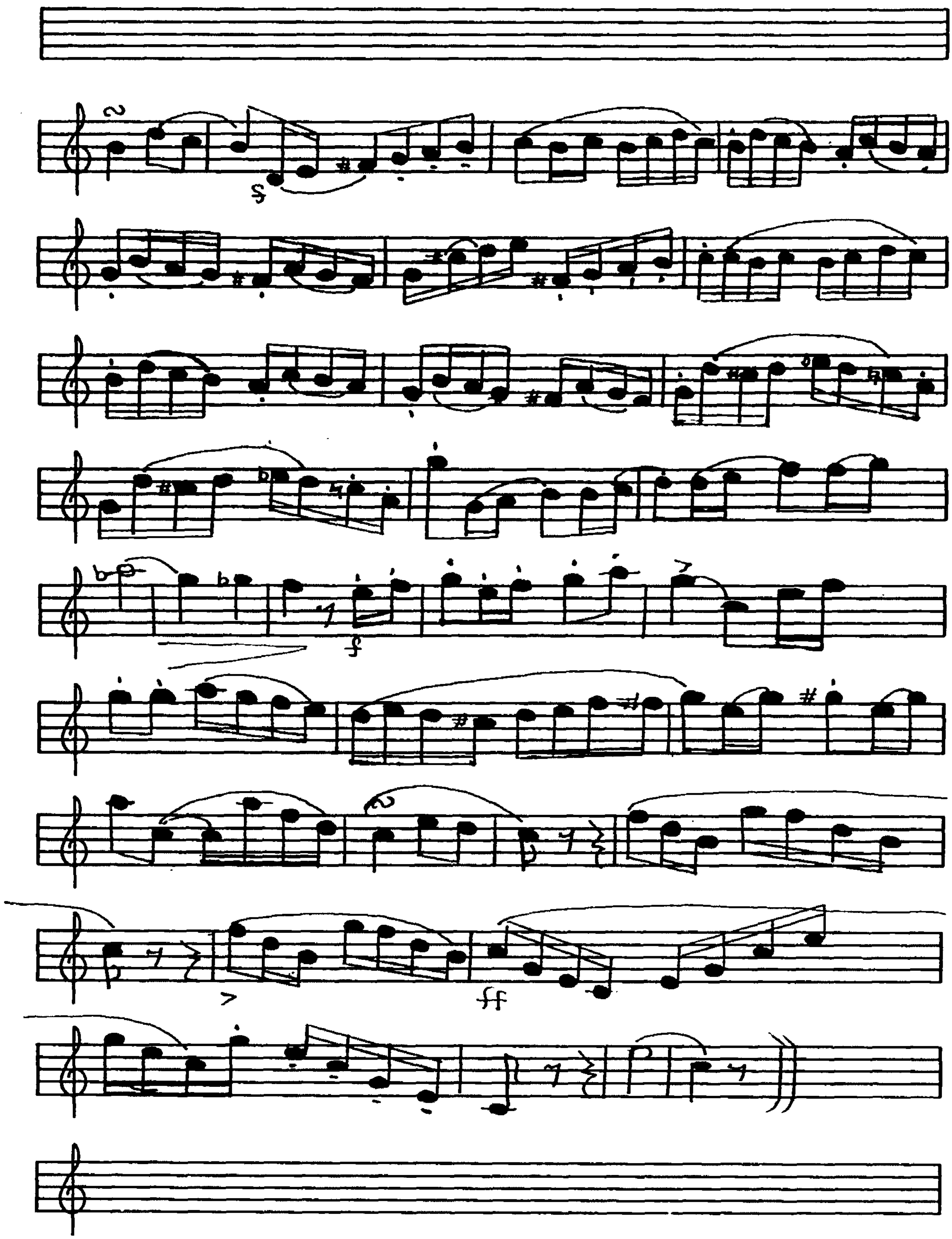

1.
dolce
2.
pp
mp
mf
mp
mf

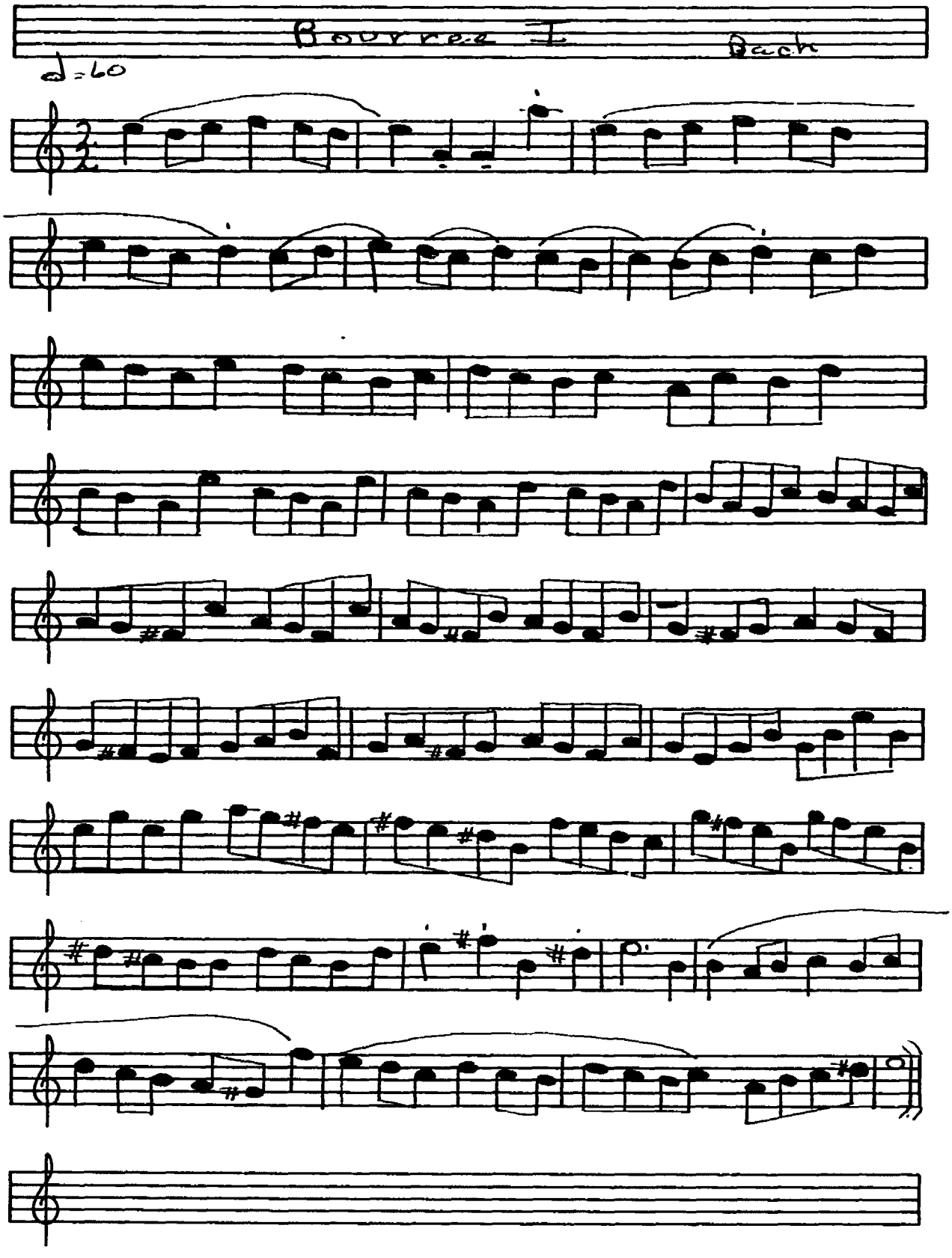

dolce
pp
p
dim.
mp

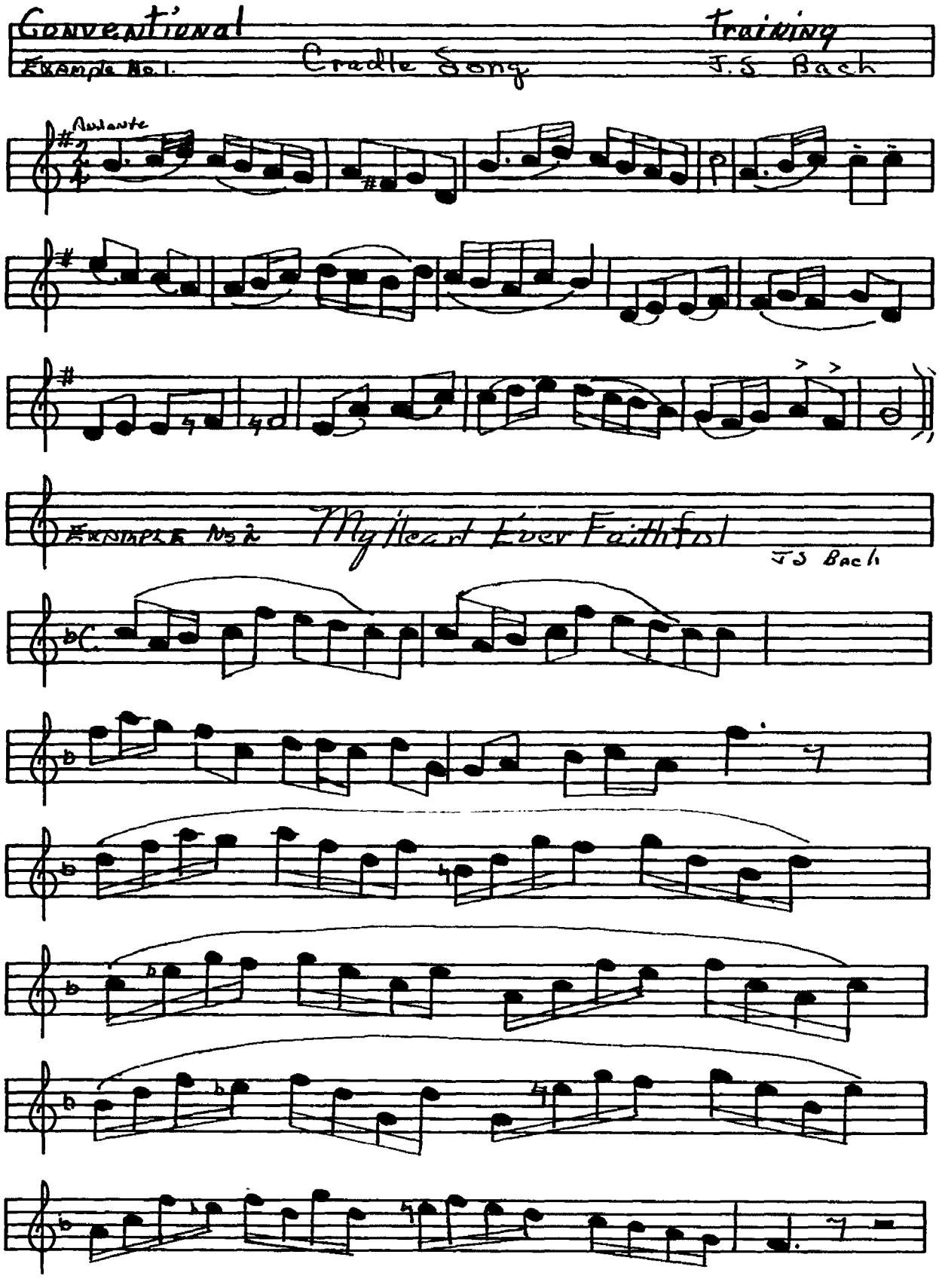

mf
dolce
pp

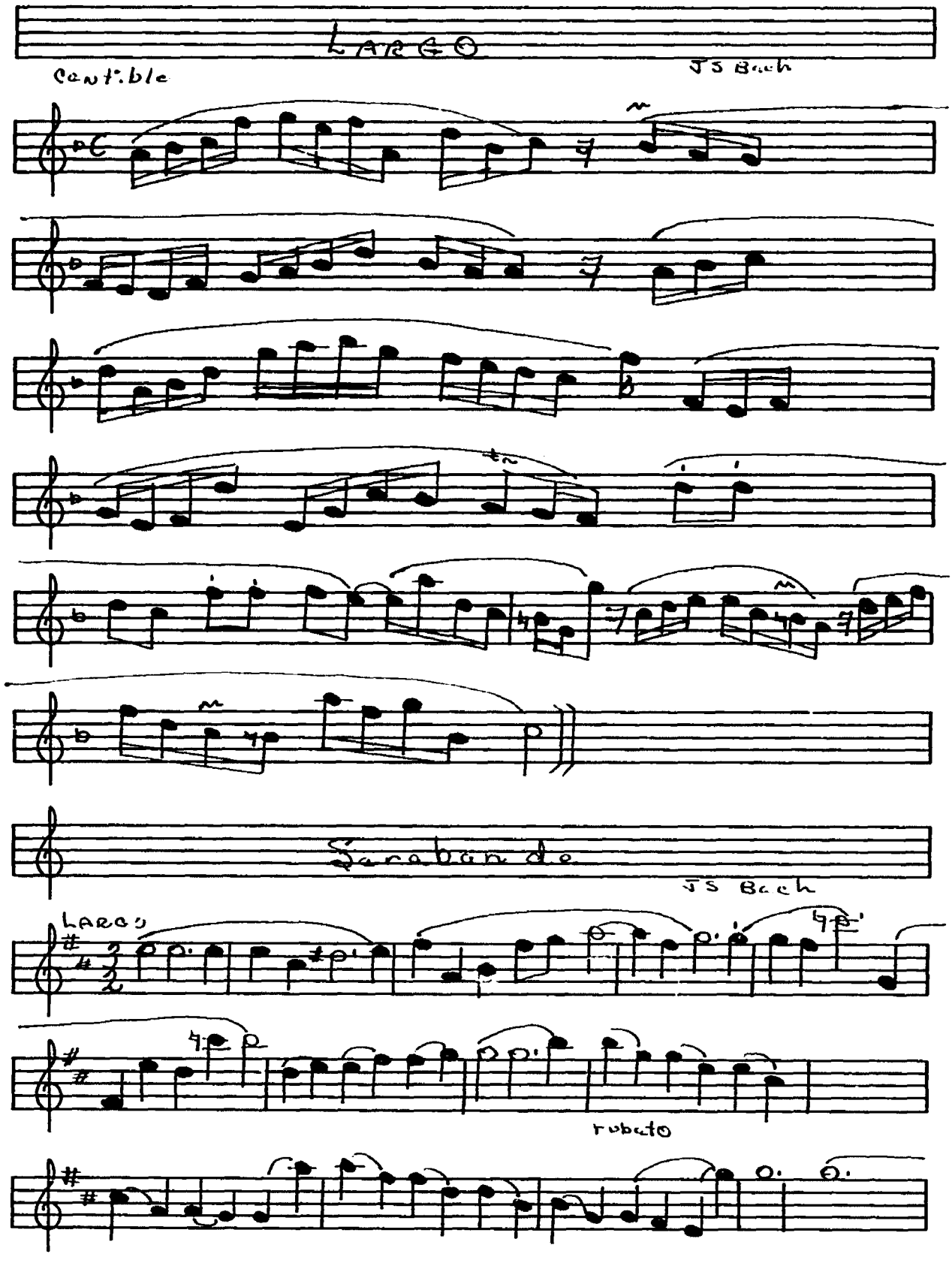

mp
Rondo in C
Ferling
♩=60
f
p
tr

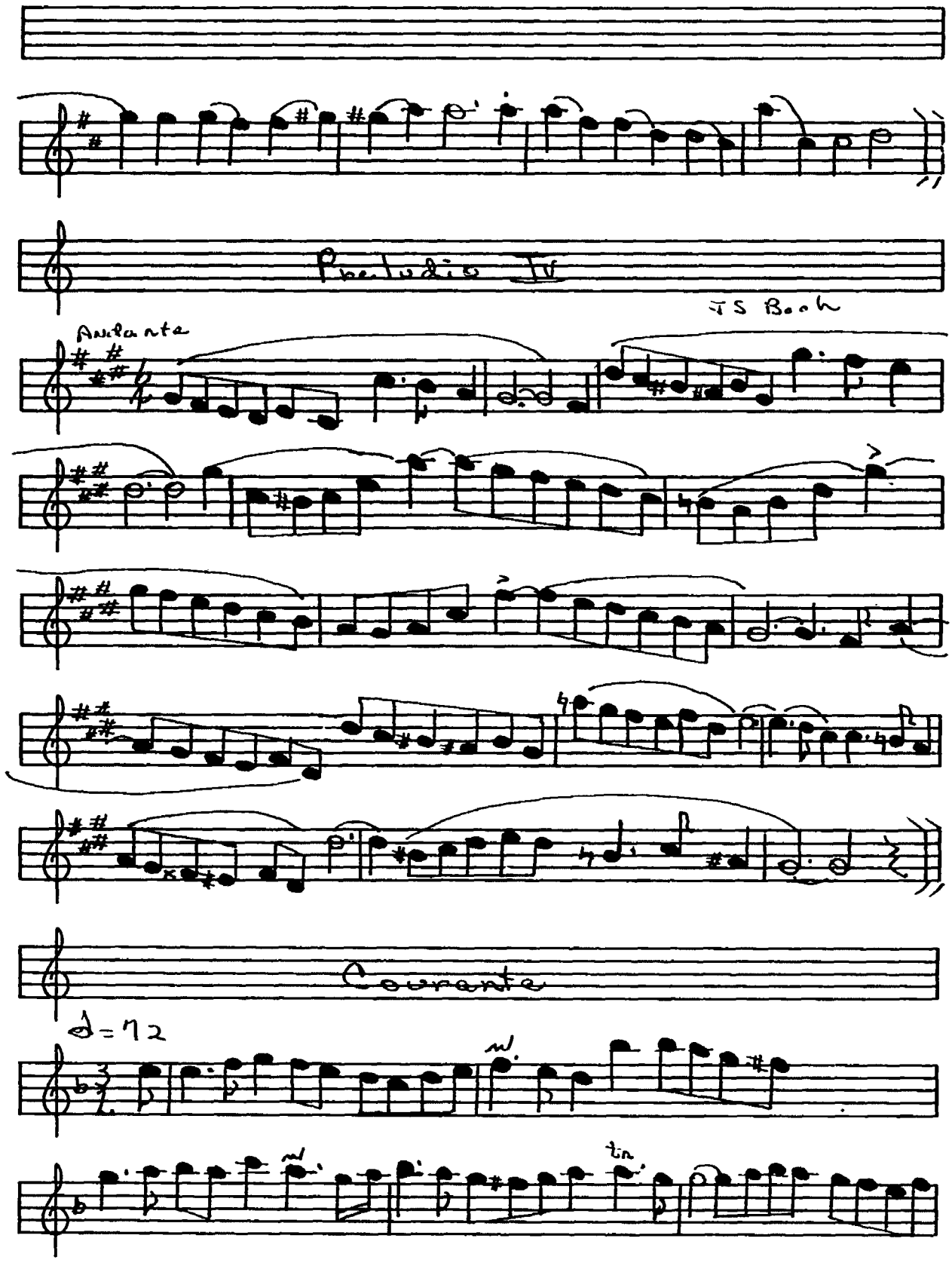


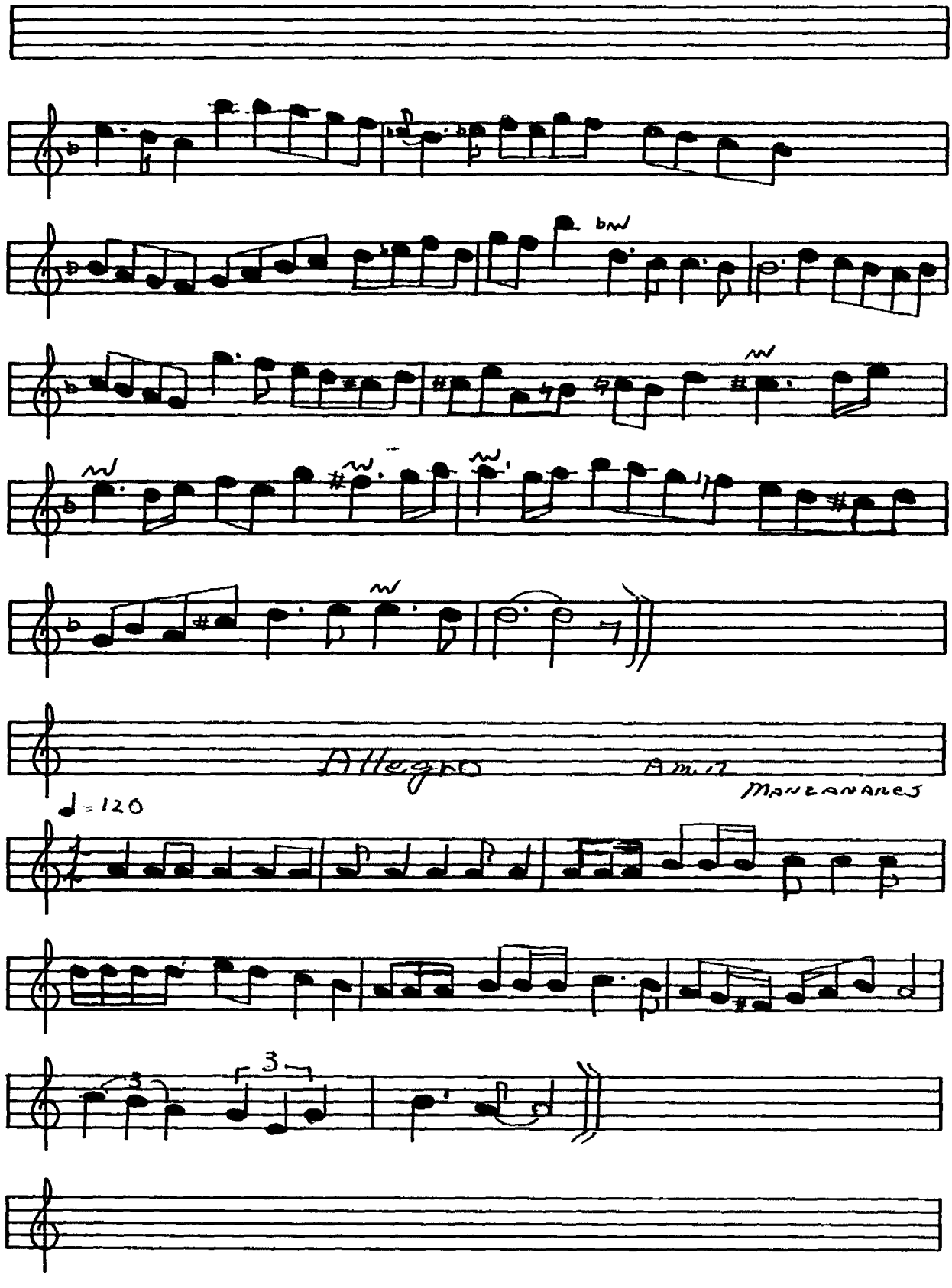

f
ff

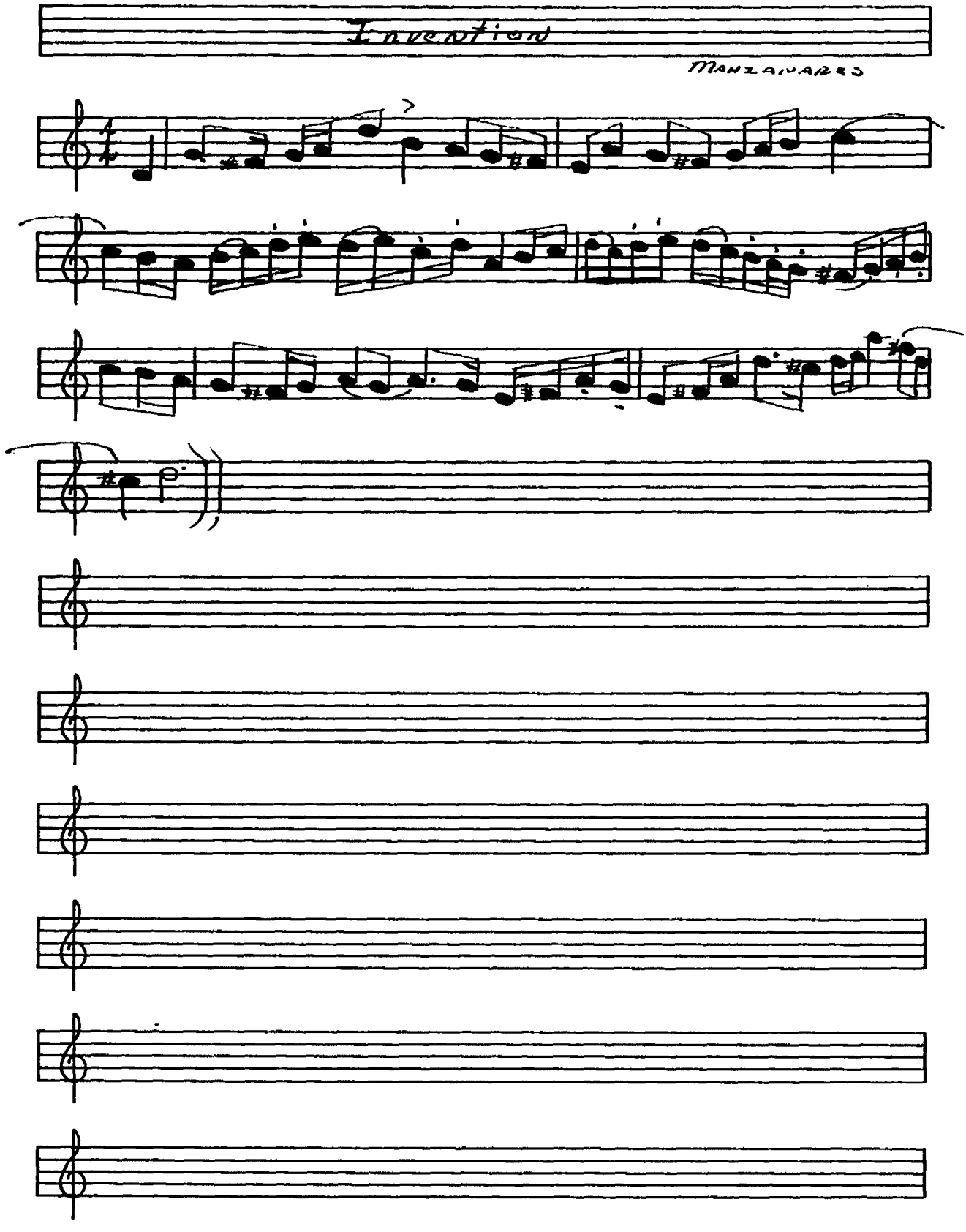

Bourree I
Bach
♩=60

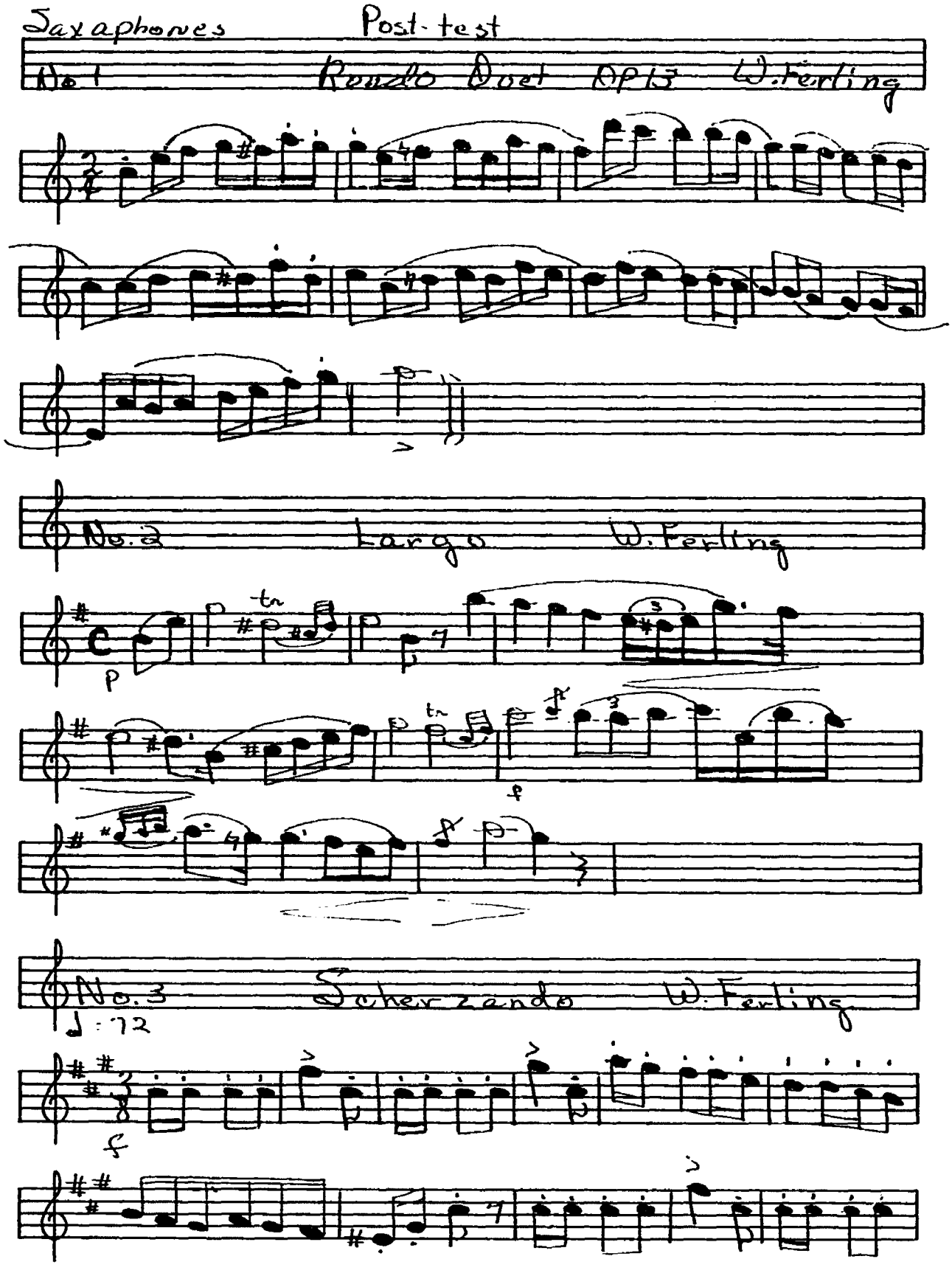

Conventional Training
Example No. 1. Cradle Song J. S. Bach
Andante
Example No. 2 My Heart Ever Faithful
J S Bach

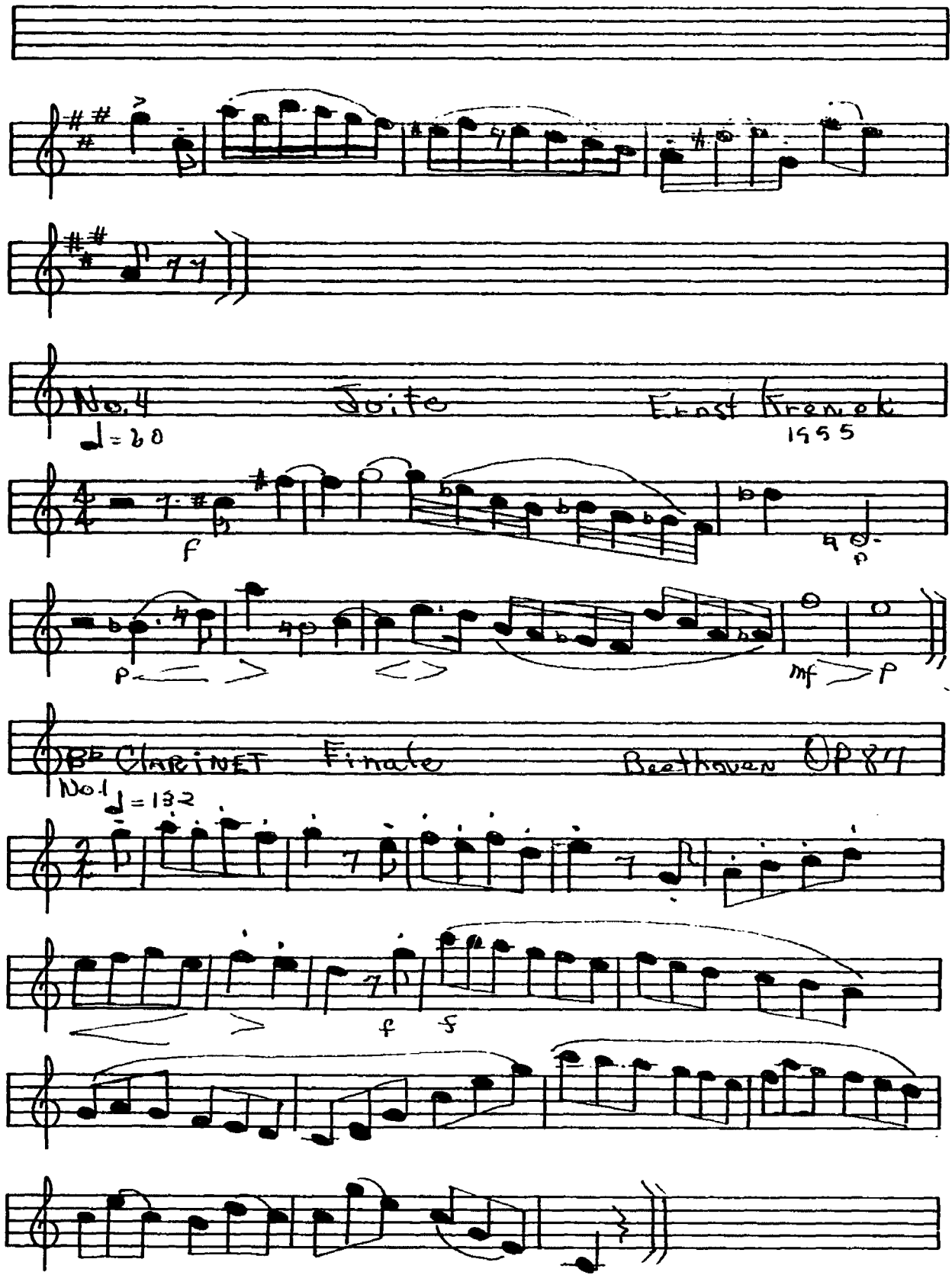

LARGO
Cantable
JS Bach
Sarabande
JS Bach
Largo
rubato

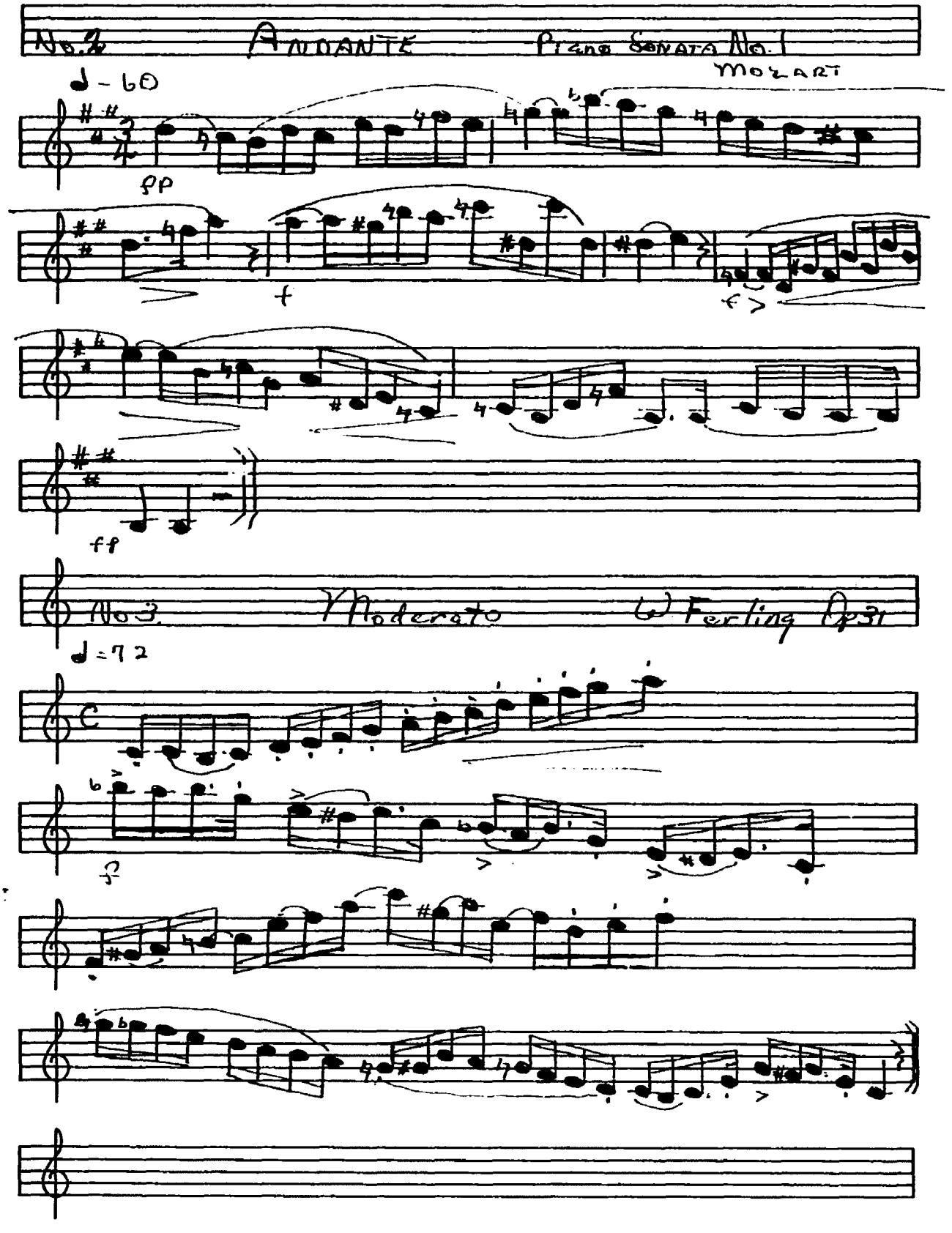

Prelude IV
J S Bach
Andante
Courante
♩=72

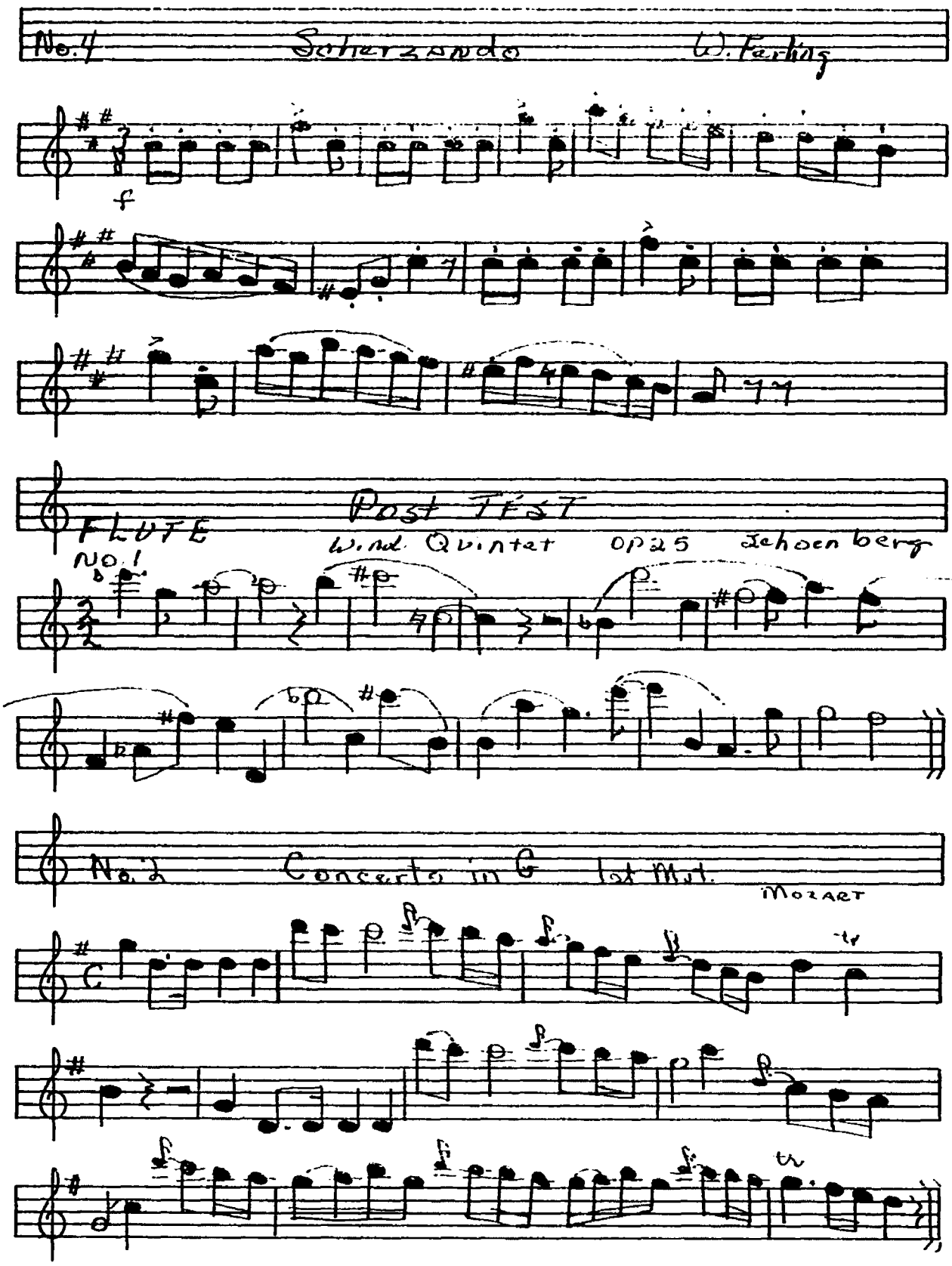

Allegro
Am.17
MANZANARES
♩ = 120

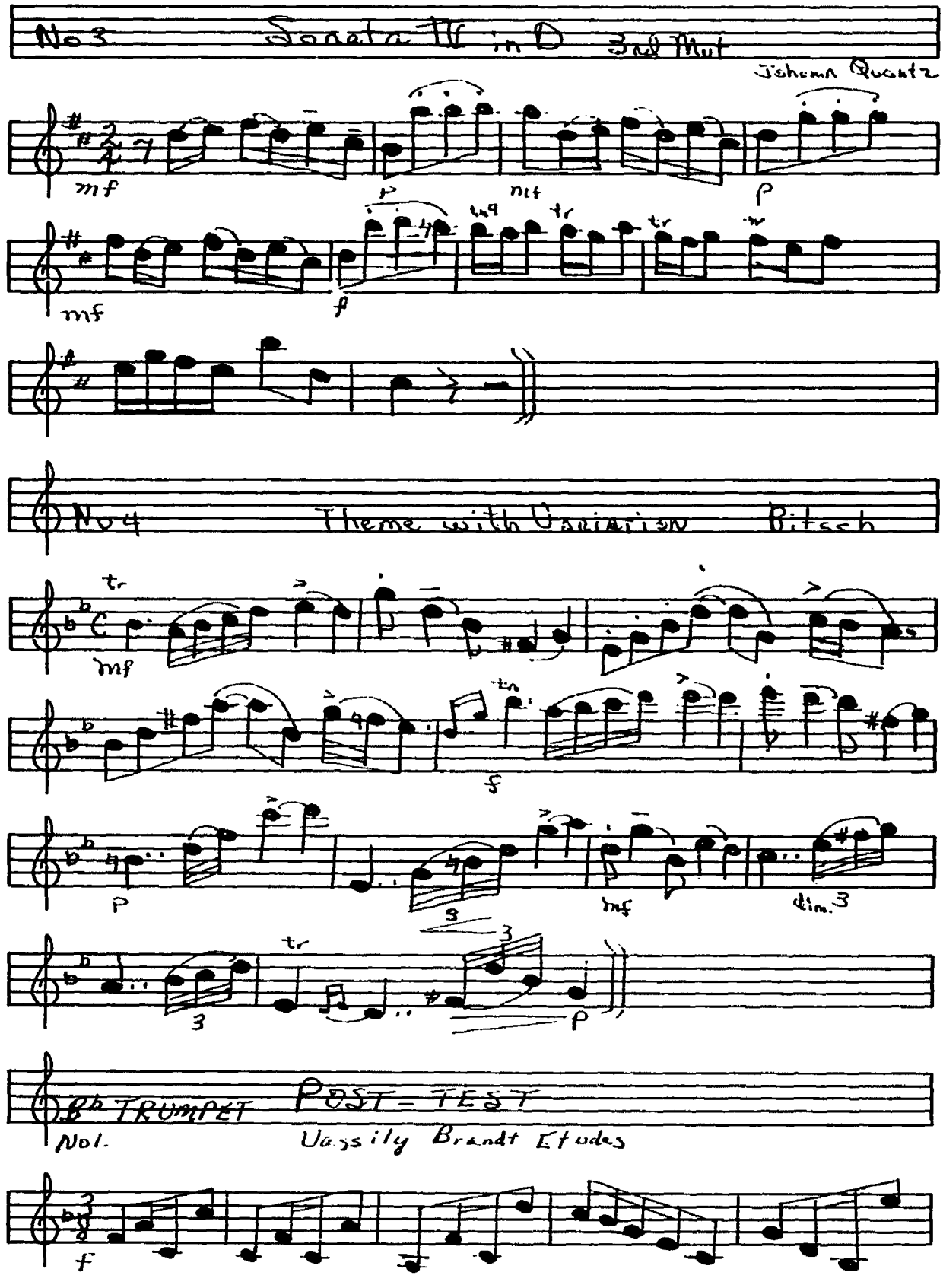

Invention
MANZANARES

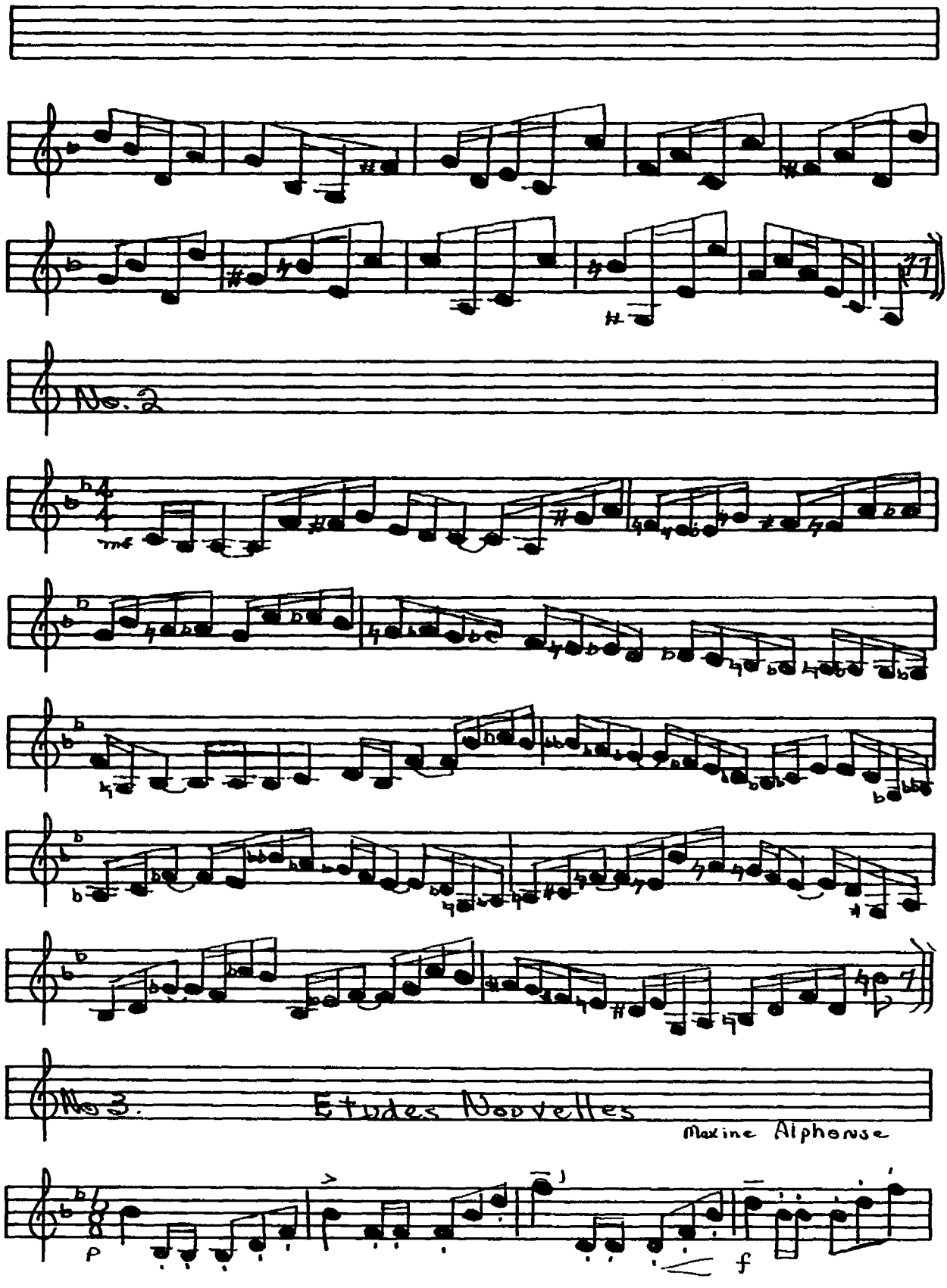

Saxaphones
Post-test
No.1
Rondo Duet Op 13 W. Ferling
No. 2
Largo
W. Ferling
No. 3
Scherzando
W. Ferling
♩ = 72

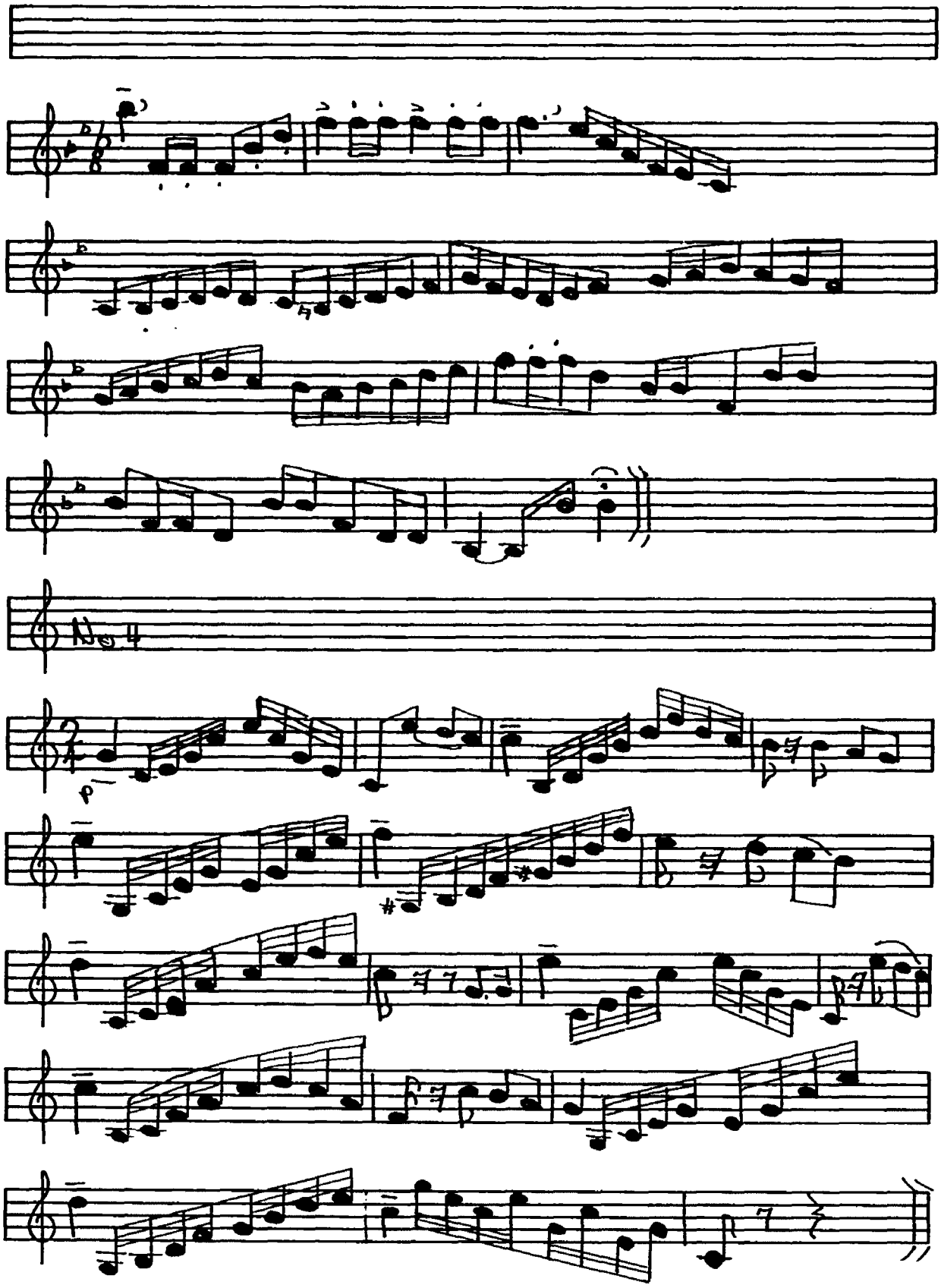

No.4
Suite
Ernst Krenek
1955
♩= 60
f
p
p
mf
p
B♭ Clarinet
Finale
Beethoven Op 97
No.1
♩= 132
f
f

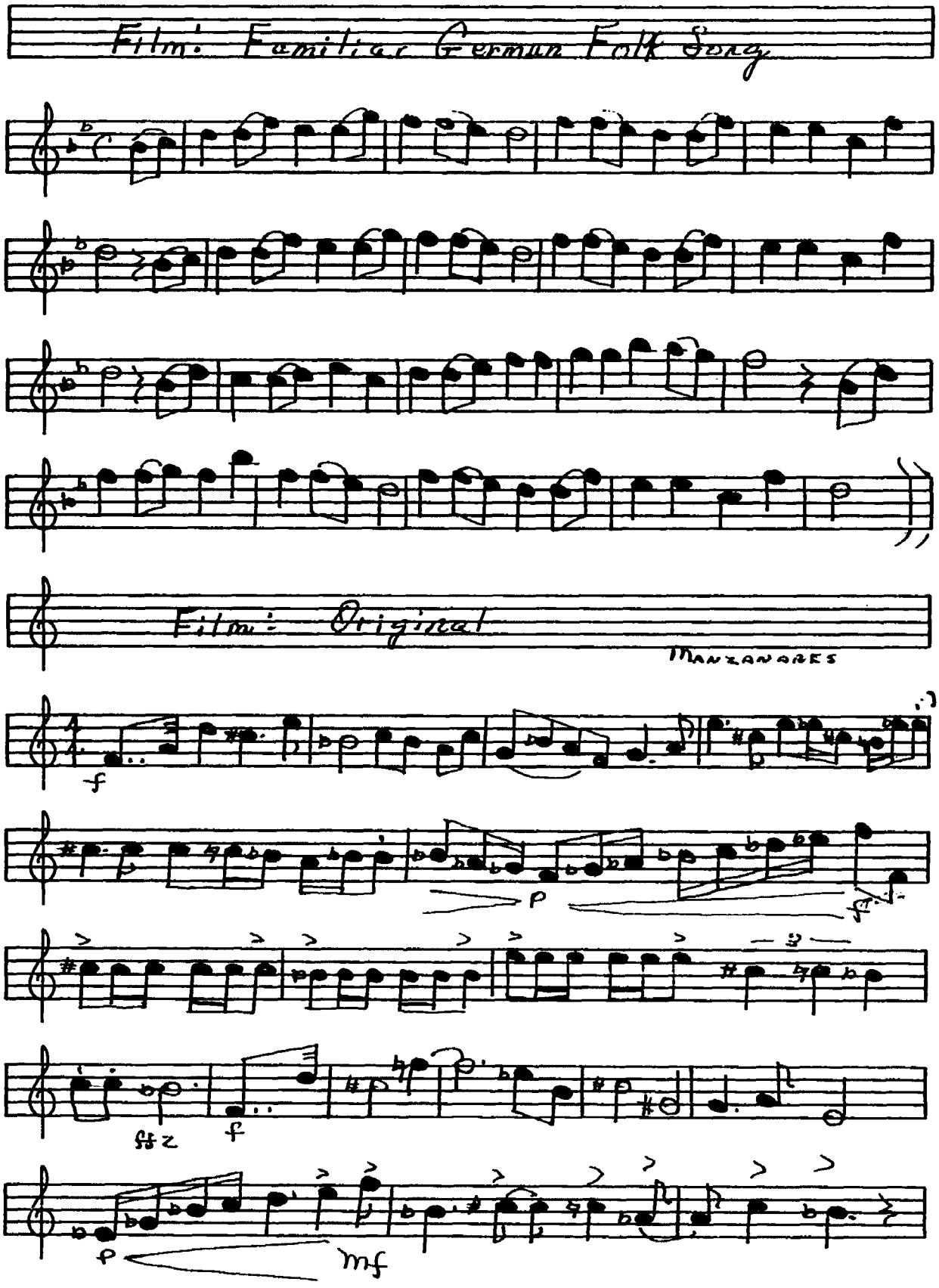

No.2 ANDANTE Piano Sonata No. 1
MOZART
♩ - 60
pp
f
ff
No3. Moderato W Ferling Op31
♩ = 72
C
f

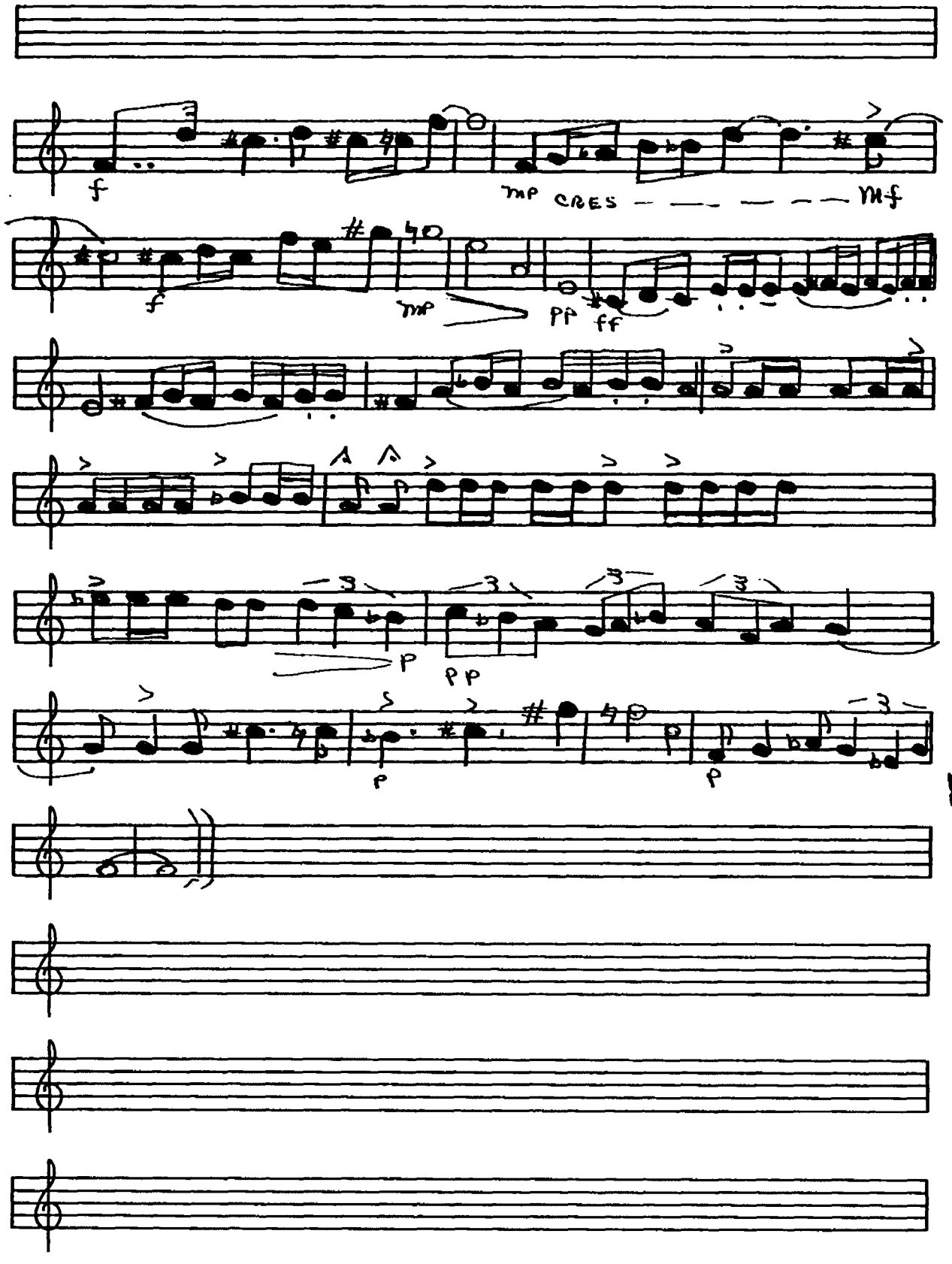

No. 4 Scherzando W. Fairlig
f
FLUTE
Post Test
Wind Quintet Op 25 Schoenberg
No. 1
No. 2 Concerto in G 1st Mvt.
Mozart


No 3 Sonata IV in D 3rd Mvt
Johann Quantz
mf
p
mf
f
No 4 Theme with Variation Bitsch
mf
f
p
mf
dim.
p
Bb TRUMPET POST-TEST
No1. Vassily Brandt Etudes
f


No. 2
mf
No 3. Etudes Nouvelles
Maxine Alphonse
p
f




Film: Familiar German Folk Song
Film: Original
MANZANARES
f
p
ff
f
p
mf


f
mp CRES
mf
f
mp
pp
ff
p
pp
p
p

APPENDIX B

RAW DATA FOR PRE-TEST

RAW DATA FOR POST-TEST

TABLE 1

RAW DATA FOR PRE-TEST

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	1	Clarinet	Junior	2	5	5	5	4	4
				3	5	4	4	4	4
				10	5	4	4	4	4
				6	5	4	4	4	4
				F-1	4	4	4	4	4
2	1	Clarinet	Junior	2	5	5	5	5	5
				3	4	4	4	4	4
				10	4	4	5	5	4
				6	4	5	5	5	5
				F-1	4	5	5	5	5
3	1	Clarinet	Junior	2	5	5	5	4	5
				3	4	4	4	5	4
				10	3	4	4	4	4
				6	5	4	4	5	4
				F-1	4	4	4	4	4
4	1	Clarinet	Junior	2	4	3	2	3	3
				3	3	4	3	3	3
				10	4	3	3	4	3
				6	3	4	3	3	3
				F-1	4	3	4	4	4
1	2	Clarinet	Junior	2	5	5	5	4	4
				3	5	4	4	4	4
				5	5	5	5	4	4
				6	4	3	4	4	4
2	2	Clarinet	Junior	2	5	5	5	5	5
				3	3	3	4	5	4
				5	5	5	5	5	5
				6	3	3	5	5	4

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
3	2	Clarinet	Junior	2	5	4	5	5	5
				3	5	4	5	5	5
				5	5	5	5	5	5
				6	4	3	5	5	4
4	2	Clarinet	Junior	2	5	4	4	4	4
				3	4	3	4	4	4
				5	5	5	4	4	5
				6	2	4	4	4	3
1	3	Flute	Junior	1	5	4	4	4	4
				3	3	4	4	4	4
				7	5	5	5	5	5
				10	1	5	5	5	3
				F-1	4	4	4	4	4
2	3	Flute	Junior	1	5	4	5	5	5
				3	5	5	5	5	5
				7	5	5	5	5	5
				10	5	5	5	5	5
				F-1	4	4	5	5	5
3	3	Flute	Junior	1	4	5	5	5	5
				3	4	4	5	5	4
				7	5	5	5	5	5
				10	5	5	5	5	5
				F-1	4	4	4	5	4
4	3	Flute	Junior	1	5	4	4	4	4
				3	4	4	4	4	4
				7	5	5	3	5	5
				10	3	3	4	4	3
				F-1	4	4	4	4	4
1	4	Flute	Senior	2	5	5	5	4	5
				3	4	4	4	4	4
				9	4	3	4	4	4
				7	4	4	4	4	4

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
2	4	Flute	Senior	2	5	5	5	5	5
				3	1	2	2	4	3
				9	4	3	4	4	3
				7	5	5	5	5	5
3	4	Flute	Senior	2	3	4	3	3	3
				3	2	4	3	2	3
				9	3	3	4	3	3
				7	5	5	4	4	4
4	4	Flute	Senior	2	4	3	3	3	3
				3	2	4	3	3	3
				9	3	4	3	3	3
				7	4	5	3	4	3
1	5	Trumpet	Senior	2	5	5	5	5	5
				10	4	5	5	5	5
				3	5	4	5	5	5
				6	5	4	5	5	5
				F-1	4	3	4	4	3
2	5	Trumpet	Senior	2	5	5	5	5	5
				10	4	5	5	5	5
				3	5	4	5	5	5
				6	5	5	5	5	5
				F-1	4	4	4	4	4
3	5	Trumpet	Senior	2	5	5	5	5	5
				10	5	4	4	5	4
				3	5	5	4	5	4
				6	3	4	4	5	4
				F-1	2	3	3	4	3
4	5	Trumpet	Senior	2	5	5	5	5	5
				10	5	4	4	4	4
				3	5	5	5	5	5

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
				6	4	4	4	4	4
				F-1	4	3	4	4	4
1	6	Trumpet	Junior	2	5	5	5	5	5
				10	5	4	5	5	5
				1	5	5	5	5	5
				8	5	5	5	5	5
2	6	Trumpet	Junior	2	5	5	5	5	5
				10	5	4	5	5	5
				11	5	4	5	5	5
				8	5	5	4	5	5
3	6	Trumpet	Junior	2	4	5	5	5	4
				10	5	3	4	5	4
				1	4	5	5	5	5
				8	5	5	5	4	5
4	6	Trumpet	Junior	2	5	5	5	5	5
				10	4	3	5	4	4
				1	5	4	4	4	4
				8	5	5	5	5	5
1	7	Saxophone	Senior	2	4	4	5	4	4
				10	5	5	5	5	5
				6	5	4	5	4	4
				5	4	4	5	4	4
				F-1	4	3	3	3	3
2	7	Saxophone	Senior	2	5	5	5	5	5
				10	5	5	5	5	5
				6	3	3	4	4	4
				5	3	3	4	4	4
				F-1	3	3	3	4	3

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
3	7	Saxophone	Senior	2	4	2	3	3	3
				10	5	4	4	4	4
				6	2	4	3	4	3
				5	4	3	3	3	3
				F-1	3	2	3	3	2
4	7	Saxophone	Senior	2	2	4	3	3	3
				10	2	3	3	3	3
				6	2	4	3	3	3
				5	3	4	3	3	3
				F-1	3	2	3	3	3
1	8	Saxophone	Senior	2	4	4	4	3	4
				9	5	5	5	5	5
				3	4	3	5	5	4
				10	5	4	5	4	4
2	8	Saxophone	Senior	2	5	4	5	5	5
				9	5	5	5	5	5
				3	2	2	4	4	3
				10	4	4	3	4	4
3	8	Saxophone	Senior	2	2	3	1	3	2
				9	5	4	3	4	4
				3	2	3	2	2	2
				10	4	2	4	3	3
4	8	Saxophone	Senior	2	4	4	3	4	4
				9	5	4	4	4	4
				3	2	4	3	3	3
				10	3	2	3	3	3
1	9	Clarinet	Freshmen	2	4	4	4	4	4
				3	3	3	4	4	4
				1	3	3	4	4	4
				10	2	3	3	4	3
				F-1	2	1	2	2	2

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
2	9	Clarinet	Freshmen	2	5	4	3	4	4
				3	2	2	4	4	3
				1	2	2	3	3	2
				10	5	5	4	3	4
				F-1	1	1	3	3	2
3	9	Clarinet	Freshmen	2	5	4	4	4	4
				3	4	3	4	4	4
				1	3	3	4	4	3
				10	3	3	3	4	3
				F-1	2	2	2	2	2
4	9	Clarinet	Freshmen	2	4	4	3	4	4
				3	3	2	3	3	3
				1	2	1	2	2	2
				10	1	2	2	2	2
				F-1	2	2	3	4	2
1	10	Clarinet	Freshmen	2	5	5	5	4	5
				3	2	5	4	4	4
				10	4	3	4	4	4
				8	2	4	3	4	3
2	10	Clarinet	Freshmen	2	5	5	5	4	4
				3	2	2	4	4	3
				10	3	3	4	4	3
				8	1	2	1	3	2
3	10	Clarinet	Freshmen	2	4	3	3	3	3
				3	2	4	3	3	2
				10	1	2	3	4	2
				8	2	2	1	2	1
4	10	Clarinet	Freshmen	2	5	5	5	4	5
				3	2	4	3	2	2
				10	2	3	4	2	2
				8	3	4	4	3	3

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	11	Flute	Sophomore	2	5	5	4	5	5
				1	4	5	4	4	4
				8	3	4	4	4	4
				10	3	5	5	4	4
				F-1	2	3	2	2	2
2	11	Flute	Sophomore	2	5	5	5	4	5
				1	5	5	5	5	5
				8	3	3	4	5	3
				10	3	3	4	4	3
				F-1	2	1	3	2	2
3	11	Flute	Sophomore	2	5	5	4	4	4
				1	5	4	5	3	4
				8	4	3	4	3	3
				10	3	3	4	5	3
				F-1	3	2	2	2	2
4	11	Flute	Sophomore	2	4	4	3	3	4
				1	4	4	3	4	4
				8	2	4	3	3	3
				10	3	2	3	3	3
				F-1	1	2	3	3	2
1	12	Flute	Freshmen	2	5	5	5	4	5
				1	3	4	5	4	3
				9	5	4	5	4	4
				10	3	3	4	4	3
2	12	Flute	Freshmen	2	5	5	5	5	5
				1	4	3	4	5	5
				8	3	3	4	5	4
				10	3	3	5	5	5
3	12	Flute	Freshmen	2	5	3	3	4	4
				1	2	3	3	3	3
				8	3	4	4	4	4

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
				10	2	3	3	3	3
4	12	Flute	Freshmen	2	5	5	5	5	5
				1	4	3	5	4	4
				8	4	3	4	4	4
				10	2	3	3	3	3
1	13	Trumpet	Freshmen	2	4	4	4	4	4
				5	4	3	4	3	3
				8	3	3	4	3	3
				1	4	4	4	4	4
				F-1	2	2	3	3	3
2	13	Trumpet	Freshmen	2	2	4	5	4	4
				5	5	5	4	5	4
				8	4	3	5	5	4
				1	4	4	4	4	4
				F-1	2	2	3	3	3
3	13	Trumpet	Freshmen	2	3	3	3	3	3
				5	4	2	1	4	3
				8	3	2	3	3	3
				1	4	4	3	4	4
				F-1	3	3	2	2	2
4	13	Trumpet	Freshmen	2	4	3	4	4	4
				5	3	4	4	4	4
				8	3	3	4	4	3
				1	5	4	5	5	5
				F-1	3	2	3	3	2
1	14	Trumpet	Freshmen	2	5	5	5	5	5
				1	4	5	5	4	4
				6	4	5	5	4	5
				8	5	1	5	2	2

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
2	14	Trumpet	Sophomore	2	5	5	5	5	5
				1	5	5	5	5	5
				6	4	4	5	5	4
				8	4	1	4	5	2
3	14	Trumpet	Sophomore	2	5	5	5	5	5
				1	4	3	5	4	4
				6	4	5	4	4	4
				8	5	1	4	4	3
4	14	Trumpet	Sophomore	2	5	5	5	5	5
				1	5	5	5	5	5
				6	4	4	4	4	4
				8	4	2	4	4	3
1	15	Saxophone	Sophomore	2	5	5	5	5	5
				5	4	5	5	5	4
				10	4	3	3	4	3
				3	3	4	4	4	3
				F-1	3	2	2	2	2
2	15	Saxophone	Sophomore	2	3	5	4	4	4
				5	4	5	5	3	4
				10	3	2	3	3	2
				3	2	2	3	3	2
				F-1	2	2	2	2	2
3	15	Saxophone	Sophomore	2	5	4	3	4	4
				5	5	5	4	3	4
				10	3	2	3	3	3
				3	4	2	3	3	3
				F-1	3	2	3	2	2
4	15	Saxophone	Sophomore	2	5	5	4	4	5
				5	5	5	5	4	5
				10	3	3	3	2	3

TABLE 1--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
				3	4	2	3	3	3
				F-1	3	3	3	3	3
1	16	Saxophone	Freshmen	2	4	4	3	3	4
				3	3	4	3	4	4
				10	4	3	3	4	3
				8	4	4	4	4	4
2	16	Saxophone	Freshmen	2	4	5	4	4	4
				3	2	2	4	3	3
				10	4	3	3	4	3
				8	4	4	4	4	4
3	16	Saxophone	Freshmen	2	5	3	3	4	3
				3	3	4	3	3	3
				10	4	4	3	3	4
				8	5	5	2	4	4
4	16	Saxophone	Freshmen	2	3	3	3	3	3
				3	3	4	3	4	3
				10	4	4	3	3	4
				8	2	3	3	3	3

TABLE 2

RAW DATA FOR POST-TEST

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	1	Clarinet	Junior	1	5	5	4	4	5
				2	5	5	4	4	5
				3	4	5	4	4	4
				4	4	5	4	4	4
				F-1	3	4	4	4	3
				F-2	5	5	5	4	5
				F-3	3	3	4	3	3
				F-4	4	4	4	4	4
2	1	Clarinet	Junior	1	5	5	5	5	5
				2	5	5	5	4	5
				3	5	4	4	5	4
				4	5	5	5	5	5
				F-1	5	4	4	4	4
				F-2	5	5	5	5	5
				F-3	3	2	3	4	3
				F-4	4	3	4	5	4
3	1	Clarinet	Junior	1	5	5	4	5	5
				2	4	5	5	4	5
				3	4	4	5	5	4
				4	4	4	5	5	4
				F-1	5	4	5	4	4
				F-2	5	5	5	5	5
				F-3	3	3	4	3	3
				F-4	4	5	4	3	4
4	1	Clarinet	Junior	1	4	4	4	4	4
				2	4	5	4	4	4
				3	4	3	4	4	4
				4	4	4	4	4	4
				F-1	4	2	4	3	3
				F-2	4	3	4	4	4
				F-3	2	2	3	3	2
				F-4	3	3	4	3	3

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	2	Clarinet	Junior	1	5	5	4	3	5
				2	5	4	4	3	4
				3	5	5	5	3	5
				4	5	5	5	4	5
2	2	Clarinet	Junior	1	5	5	5	5	5
				2	5	5	5	5	5
				3	5	5	5	5	5
				4	5	5	5	5	5
3	2	Clarinet	Junior	1	5	5	5	5	5
				2	5	4	5	5	5
				3	5	5	5	5	5
				4	5	5	5	5	5
4	2	Clarinet	Junior	1	5	5	5	5	5
				2	5	5	5	5	5
				3	5	5	5	5	5
				4	5	5	5	5	5
1	3	Flute	Junior	1	4	3	3	4	3
				2	4	4	4	4	4
				3	5	4	4	3	4
				4	4	5	4	4	4
				F-1	3	2	3	4	2
				F-2	4	4	4	4	4
				F-3	3	3	3	3	3
				F-4	4	4	4	3	4
2	3	Flute	Junior	1	5	5	5	5	5
				2	4	5	4	5	4
				3	5	5	3	3	4
				4	4	4	4	4	4
				F-1	4	4	5	5	4
				F-2	5	5	5	5	5
				F-3	3	3	4	4	3
				F-4	4	5	4	4	4

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
3	3	Flute	Junior	1	4	4	5	4	4
				2	4	5	4	5	5
				3	5	5	5	4	5
				4	4	4	5	4	4
				F-1	5	4	5	4	4
				F-2	5	5	5	5	5
				F-3	4	4	4	3	4
				F-4	4	5	5	4	5
4	3	Flute	Junior	1	4	4	4	4	4
				2	5	5	5	5	5
				3	5	5	5	5	5
				4	4	4	4	4	4
				F-1	4	3	4	4	4
				F-2	5	4	5	5	5
				F-3	3	3	4	3	3
				F-4	4	4	4	4	4
1	4	Flute	Senior	1	3	4	4	4	4
				2	5	5	4	4	5
				3	4	4	4	3	4
				4	4	4	4	4	4
2	4	Flute	Senior	1	4	4	5	5	4
				2	5	5	4	5	5
				3	5	4	5	5	4
				4	5	4	4	3	4
3	4	Flute	Senior	1	4	5	4	5	4
				2	5	5	5	5	5
				3	4	4	5	3	4
				4	3	4	4	3	4
4	4	Flute	Senior	1	3	4	4	3	3
				2	5	5	5	5	5
				3	5	5	5	4	5
				4	4	4	4	4	4

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulations	Dynamics	General Sight-reading
1	5	Trumpet	Senior	1	4	5	4	4	4
				2	4	4	4	4	4
				3	4	4	4	4	4
				4	4	5	4	4	4
				F-1	4	4	4	4	4
				F-2	4	4	4	4	4
				F-3	5	4	4	4	4
				F-4	5	5	4	4	5
2	5	Trumpet	Senior	1	5	4	5	5	5
				2	4	4	5	5	4
				3	4	4	5	5	4
				4	4	4	5	5	4
				F-1	5	4	5	5	5
				F-2	5	5	5	5	5
				F-3	5	4	5	5	4
				F-4	5	5	5	5	5
3	5	Trumpet	Senior	1	5	4	5	5	5
				2	5	4	5	5	4
				3	4	4	5	5	4
				4	5	4	5	4	4
				F-1	5	4	5	5	5
				F-2	5	4	5	5	5
				F-3	4	4	5	5	5
				F-4	5	5	5	5	5
4	5	Trumpet	Senior	1	4	3	4	4	4
				2	3	3	3	3	3
				3	3	4	4	3	3
				4	3	3	4	3	3
				F-1	4	4	4	4	4
				F-2	5	5	5	5	5
				F-3	3	2	3	3	3
				F-4	4	4	4	4	4

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	6	Trumpet	Junior	1	4	3	3	4	3
				2	2	2	3	3	2
				3	5	5	4	4	4
				4	3	5	4	4	4
2	6	Trumpet	Junior	1	5	3	5	4	4
				2	2	2	4	4	2
				3	5	5	5	5	5
				4	2	4	5	4	3
3	6	Trumpet	Junior	1	5	3	5	5	4
				2	4	3	4	5	4
				3	5	5	5	5	5
				4	3	4	4	5	4
4	6	Trumpet	Junior	1	4	3	4	4	4
				2	2	2	4	3	2
				3	3	4	4	4	4
				4	1	3	4	3	2
1	7	Saxophone	Senior	1	5	4	4	4	4
				2	4	4	4	3	4
				3	5	4	5	5	4
				4	4	4	4	3	4
				F-1	4	3	4	4	3
				F-2	4	4	4	4	4
				F-3	3	3	4	3	3
				F-4	3	3	4	3	3
2	7	Saxophone	Senior	1	5	4	5	5	5
				2	4	5	4	4	5
				3	5	5	5	4	5
				4	4	4	5	5	4
				F-1	4	1	3	4	2
				F-2	5	5	5	4	2
				F-3	4	4	5	5	4
				F-4	4	4	5	5	4

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
3	7	Saxophone	Senior	1	3	4	4	4	4
				2	4	5	5	5	5
				3	3	4	4	4	4
				4	4	4	5	4	4
				F-1	3	3	4	4	3
				F-2	4	4	5	5	4
				F-3	4	3	4	4	4
				F-4	2	4	4	4	3
4	7	Saxophone	Senior	1	4	4	4	3	4
				2	3	4	4	4	4
				3	4	4	3	4	4
				4	4	4	4	4	4
				F-1	4	2	4	4	4
				F-2	4	3	4	4	4
				F-3	3	3	4	4	4
				F-4	2	3	3	3	3
1	8	Saxophone	Senior	1	5	5	4	4	4
				2	4	4	4	3	3
				3	5	4	4	4	4
				4	3	4	4	4	4
2	8	Saxophone	Senior	1	5	5	4	5	5
				2	4	4	3	4	4
				3	5	5	3	5	4
				4	4	4	4	4	4
3	8	Saxophone	Senior	1	5	5	4	5	5
				2	3	4	4	4	4
				3	3	4	4	5	4
				4	3	5	4	4	4
4	8	Saxophone	Senior	1	4	4	3	4	4
				2	4	4	3	4	4
				3	3	4	2	3	3
				4	2	4	4	3	3

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	9	Clarinet	Freshmen	1	4	5	3	3	4
				2	3	3	3	3	3
				3	3	4	3	3	3
				4	3	3	4	4	3
				F-1	2	2	4	4	2
				F-2	4	5	4	4	4
				F-3	1	1	2	2	2
				F-4	1	1	2	2	4
2	9	Clarinet	Freshmen	1	5	5	1	3	4
				2	2	2	3	3	3
				3	4	2	3	4	3
				4	1	1	2	3	1
				F-1	2	2	2	3	2
				F-2	5	5	5	5	5
				F-3	1	1	1	3	1
				F-4	2	2	3	3	2
3	9	Clarinet	Freshmen	1	4	5	3	4	4
				2	3	3	4	3	3
				3	4	3	4	3	3
				4	2	3	3	4	2
				F-1	4	4	5	5	4
				F-2	3	4	5	4	4
				F-3	3	3	3	3	3
				F-4	3	4	4	3	3
4	9	Clarinet	Freshmen	1	3	4	3	4	4
				2	2	3	3	3	3
				3	2	3	2	3	3
				4	2	2	3	2	2
				F-1	3	2	3	2	2
				F-2	2	3	3	3	3
				F-3	1	1	2	2	1
				F-4	2	2	2	2	2

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	10	Clarinet	Freshmen	1	4	4	4	3	4
				2	3	4	4	3	3
				3	3	3	4	4	3
				4	2	2	3	4	2
2	10	Clarinet	Freshmen	1	5	5	3	3	4
				2	2	4	3	2	2
				3	1	4	3	3	2
				4	1	4	3	2	2
3	10	Clarinet	Freshmen	1	4	4	4	3	4
				2	3	4	4	3	3
				3	2	3	4	3	3
				4	3	1	3	4	2
4	10	Clarinet	Freshmen	1	2	3	3	3	3
			—	2	1	3	2	2	2
				3	1	3	3	2	2
				4	2	1	3	2	2
1	11	Flute	Sophomore	1	4	5	4	4	4
				2	4	3	4	4	3
				3	4	4	4	3	4
				4	4	4	4	3	4
				F-1	4	3	4	4	3
				F-2	4	5	4	4	4
				F-3	3	3	4	3	3
				F-4	4	4	4	3	4
2	11	Flute	Sophomore	1	3	3	4	4	3
				2	3	2	2	4	2
				3	4	4	1	4	3
				4	4	4	4	4	4
				F-1	1	1	3	3	1
				F-2	5	5	5	5	5
				F-3	2	2	2	2	2
				F-4	3	3	4	4	3

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
3	11	Flute	Sophomore	1	3	4	4	3	3
				2	3	3	4	3	3
				3	5	5	5	3	4
				4	4	5	4	3	4
				F-1	4	3	4	3	3
				F-2	4	5	5	4	4
				F-3	3	3	3	3	3
				F-4	3	4	4	3	3
4	11	Flute	Sophomore	1	2	3	2	2	2
				2	3	2	3	2	2
				3	3	3	2	3	3
				4	2	3	2	2	2
				F-1	4	3	4	3	3
				F-2	4	4	4	4	4
				F-3	2	2	3	2	2
				F-4	3	3	3	3	3
1	12	Flute	Freshmen	1	2	3	2	4	2
				2	4	4	4	4	4
				3	4	3	3	3	3
				4	3	3	3	3	3
2	12	Flute	Freshmen	1	3	3	4	4	3
				2	5	5	5	5	5
				3	5	5	2	4	4
				4	3	3	4	4	3
3	12	Flute	Freshmen	1	2	3	3	3	3
				2	5	4	4	3	4
				3	4	2	4	3	3
				4	2	3	3	3	3
4	12	Flute	Freshmen	1	1	3	2	1	1
				2	4	4	4	4	4
				3	4	4	4	4	4
				4	3	4	3	3	3

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	13	Trumpet	Freshmen	1	4	3	4	4	3
				2	4	3	4	4	3
				3	4	4	4	3	4
				4	4	4	4	3	4
				F-1	2	2	3	4	2
				F-2	3	3	3	4	3
				F-3	2	2	3	3	2
				F-4	3	3	3	2	3
2	13	Trumpet	Freshmen	1	5	5	5	5	5
				2	5	4	4	4	4
				3	5	4	5	5	4
				4	5	5	5	5	5
				F-1	1	2	3	3	2
				F-2	3	4	4	4	4
				F-3	1	1	2	3	1
				F-4	5	4	4	4	4
3	13	Trumpet	Freshmen	1	5	4	4	4	4
				2	4	4	4	5	4
				3	3	3	3	3	3
				4	4	4	4	4	4
				F-1	5	4	3	3	3
				F-2	4	3	4	3	3
				F-3	4	3	3	2	3
				F-4	3	3	4	2	3
4	13	Trumpet	Freshmen	1	4	3	4	4	4
				2	3	1	3	3	2
				3	4	3	3	3	3
				4	4	3	4	4	3
				F-1	3	2	3	3	3
				F-2	4	4	3	4	4
				F-3	2	1	3	2	2
				F-4	3	2	3	3	3

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
1	14	Trumpet	Sophomore	1	4	3	4	4	4
				2	4	3	4	4	3
				3	4	4	4	4	4
				4	3	4	4	4	3
2	14	Trumpet	Sophomore	1	5	5	5	5	5
				2	2	2	4	4	2
				3	5	5	5	5	5
				4	4	3	4	4	4
3	14	Trumpet	Sophomore	1	4	4	5	5	4
				2	5	3	5	5	3
				3	4	4	5	4	4
				4	3	4	5	5	4
4	14	Trumpet	Sophomore	1	4	4	4	4	4
				2	2	3	3	3	3
				3	4	3	4	4	4
				4	2	2	2	3	2
1	15	Saxophone	Sophomore	1	4	4	4	4	4
				2	4	4	4	4	4
				3	4	3	3	4	3
				4	4	4	4	4	4
				F-1	4	5	4	4	4
				F-2	5	4	4	4	4
				F-3	3	3	3	3	3
				F-4	4	4	4	3	4
2	15	Saxophone	Sophomore	1	4	4	1	4	3
				2	3	4	3	4	3
				3	4	2	3	4	3
				4	4	2	4	4	3
				F-1	5	5	5	5	5
				F-2	5	5	5	5	5
				F-3	1	1	1	2	1
				F-4	4	2	3	4	3

TABLE 2--Continued

Judge NO.	Student NO.	Instrument	Class	Example NO.	Accuracy (rhythm)	Accuracy (pitches)	Articulation	Dynamics	General Sight-reading
3	15	Saxophone	Sophomore	1	2	4	1	4	3
				2	2	3	4	3	3
				3	2	2	2	3	2
				4	3	3	4	3	3
				F-1	5	5	5	5	5
				F-2	5	4	5	5	5
				F-3	3	3	3	2	3
				F-4	2	3	2	3	2
4	15	Saxophone	Sophomore	1	4	4	4	4	4
				2	3	3	4	3	3
				3	3	4	3	3	3
				4	3	4	3	3	3
				F-1	4	4	4	4	4
				F-2	5	5	5	5	5
				F-3	2	2	3	3	2
				F-4	3	3	2	3	3
1	16	Saxophone	Freshmen	1	5	4	4	4	4
				2	4	3	4	4	4
				3	3	4	4	4	4
				4	4	4	4	4	5
2	16	Saxophone	Freshmen	1	5	5	5	5	5
				2	3	4	2	4	3
				3	3	2	3	4	3
				4	4	3	3	3	3
3	16	Saxophone	Freshmen	1	5	4	4	5	4
				2	3	3	4	3	3
				3	2	3	4	3	3
				4	2	3	3	3	3
4	16	Saxophone	Freshmen	1	4	4	3	4	4
				2	2	3	3	3	3
				3	2	3	2	3	3
				4	2	3	3	3	3

APPENDIX C

AVERAGED SCORES FOR POST MINUS PRETEST GAINS

AVERAGED SCORES IN RANK ORDER

MANN-WHITNEY U TEST FOR HYPOTHESES 1-5

TABLE 3

AVERAGED SCORES FOR POST MINUS PRETEST GAINS

	Pre-Test					Post Test					Gains				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1.	4.250	4.125	4.000	4.125	3.938	4.438	4.563	4.375	4.375	4.438	0.188	0.438	0.375	0.250	0.500
2.	4.375	4.063	4.563	4.500	4.313	5.000	4.875	4.875	4.563	4.938	0.625	0.812	0.312	0.063	0.625
3.	4.250	4.500	4.563	4.688	4.437	4.375	4.438	4.250	4.188	4.250	0.125	-0.062	-0.313	-0.500	-0.187
4.	3.625	3.938	3.688	3.688	3.750	4.313	4.250	4.375	4.125	4.313	0.688	0.312	0.687	0.437	0.563
5.	4.688	4.563	4.688	4.875	4.688	4.063	3.938	4.438	4.250	3.938	-0.625	-0.625	-0.250	-0.625	-0.750
6.	4.813	4.500	4.813	4.813	4.750	3.438	3.500	4.188	4.125	3.438	-1.375	-1.000	-0.625	-0.688	-1.312
7.	3.625	3.813	3.938	3.813	3.750	4.063	4.188	4.313	4.063	4.250	0.438	0.375	0.375	0.250	0.500
8.	3.812	3.563	3.688	3.750	3.688	3.875	4.313	3.875	4.063	3.938	0.063	0.750	0.187	0.313	0.250
9.	3.188	3.000	3.375	3.563	3.313	2.938	3.188	2.938	3.250	3.000	-0.250	0.188	-0.437	-0.313	-0.313
10.	2.813	3.500	3.500	3.375	3.000	2.438	3.250	3.313	2.875	3.313	0.375	-0.250	-0.187	-0.500	0.313
11.	3.813	4.000	4.000	3.938	3.813	3.438	3.500	3.313	3.188	3.125	-0.375	-0.500	-0.687	-0.750	-0.688
12.	3.625	3.563	4.188	3.938	4.000	3.375	3.500	3.375	3.438	3.250	-0.250	-0.063	-0.813	-0.500	-0.750
13.	3.688	3.438	3.812	3.938	3.688	4.188	3.500	4.000	3.938	3.688	0.500	0.062	0.187	0.000	0.000
14.	4.500	3.813	4.867	4.375	4.063	3.688	3.563	4.188	4.188	3.625	-0.812	-0.250	-0.679	-0.187	-0.438
15.	3.875	3.688	3.750	3.563	3.563	3.313	3.375	3.188	3.625	3.250	-0.562	-0.313	-0.562	0.062	-0.313
16.	3.625	3.688	3.188	3.625	3.500	3.313	3.438	3.438	3.688	3.563	-0.312	-0.250	0.250	0.063	0.063

TABLE 4

AVERAGED SCORES IN RANK ORDER

	1	2	3	4	5
1.	-1.375	-1.000	-0.813	-0.750	-1.312
2.	-0.812	-0.625	-0.687	-0.688	-0.750
3.	-0.625	-0.500	-0.679	-0.625	-0.750
4.	-0.562	-0.250	-0.625	-0.500	-0.688
5.	-0.375	-0.250	-0.562	-0.500	-0.438
6.	-0.312	-0.250	-0.437	-0.500	-0.313
7.	-0.250	-0.313	-0.313	-0.313	-0.313
8.	-0.250	-0.063	-0.250	-0.187	-0.187
9.	0.063	-0.062	-0.187	0.000	0.000
10.	0.125	0.062	0.187	0.062	0.063
11.	0.188	0.188	0.187	0.063	0.250
12.	0.375	0.312	0.250	0.063	0.313
13.	0.438	0.375	0.312	0.250	0.500
14.	0.500	0.438	0.375	0.250	0.500
15.	0.625	0.750	0.375	0.313	0.563
16.	0.688	0.812	0.687	0.437	0.625

TABLE 5

MANN-WHITNEY U TEST FOR ALL VARIABLES

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	U	Pu > .05
Accuracy of rhythm	C	C	E	E	E	C	C	E	C	E	E	C	E	E	C	C		Pu > .520 α = .05
U=	C	0				3	3		4			6			8	8	U=32	Not Significant
Accuracy of pitches	C	E	E	C	C	C	E	C	E	E	E	C	E	E	C	C		Pu > .480 α = .05
U=	0			2	2	2		3				6			8	8	U=31	Not Significant
Articulation	C	E	C	C	E	E	E	E	C	C	E	C	C	E	E	C		Pu > .520 α = .05
U=	0		1	1					5		5	6	6			8	U=32	Not Significant
Dynamics	E	C	E	E	C	C	E	C	E	E	C	C	E	E	C	C		Pu > .221
U=	0		1	1			3		4	4			6	6			U=25	α = .05
General sight reading	C	E	C	E	C	E	E	E	E	C	C	C	E	E	C	C		Pu > .323 α = .05
U=		1		2		3	3	3	3				6	6			U=27	Not Significant

APPENDIX D

AVERAGED SCORES FOR POST MINUS PRETEST GAINS

AVERAGED SCORES IN RANK ORDER

MANN-WHITNEY U TEST FOR HYPOTHESIS 6

TABLE 6

AVERAGED SCORES FOR POST MINUS PRETEST GAINS

	Pre-Test					Post Test					Gains				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1.	4.438	4.563	4.375	4.375	4.438	3.875	3.563	4.125	3.813	3.688	-0.563	-1.000	-0.250	-0.625	-0.750
2.	5.000	4.875	4.875	4.563	4.938	4.188	3.813	4.500	4.375	4.063	-0.812	-1.062	-0.375	-0.188	-0.875
3.	4.375	4.438	4.250	4.188	4.250	4.063	3.813	4.250	4.000	3.938	-0.312	-0.625	0.000	-0.188	-0.312
4.	4.063	3.938	4.438	4.250	3.938	4.563	4.188	4.500	4.500	4.500	0.500	0.250	0.062	0.250	0.562
5.	4.063	3.938	4.438	4.250	3.938	4.563	4.188	4.500	4.500	4.500	0.500	0.250	0.062	0.250	0.562
6.	3.438	3.500	4.188	4.125	3.438	3.438	3.250	4.063	3.563	3.438	0.000	-0.250	-0.125	-0.562	0.000
7.	4.063	4.188	4.313	4.063	4.250	3.563	3.250	4.235	4.063	3.563	-0.500	-0.938	-0.188	0.000	-0.687
8.	3.875	4.313	3.875	4.063	3.938	2.688	3.313	3.313	3.313	2.938	-1.187	-1.000	-0.562	-0.750	-1.000
9.	2.938	3.188	2.938	3.250	3.000	2.438	2.562	3.125	3.125	2.750	-0.500	-0.626	0.187	-0.125	-0.250
10.	2.438	3.250	3.313	2.875	3.313	2.188	2.750	3.250	3.125	2.438	-0.250	-0.500	-0.063	-0.250	-0.875
11.	3.438	3.500	3.313	3.188	3.125	3.313	3.313	3.750	3.313	3.125	-0.125	-0.187	0.437	-0.125	0.000
12.	3.375	3.500	3.375	3.438	3.250	2.875	2.688	3.250	3.125	2.750	-0.500	-0.812	-0.125	-0.313	-0.500
13.	4.188	3.500	4.000	3.938	3.688	3.000	2.688	3.188	3.063	2.813	-1.188	-0.812	-0.812	-0.875	-0.875
14.	3.688	3.563	4.188	4.188	3.625	3.813	3.750	4.188	3.938	3.875	0.125	0.187	0.000	-0.250	0.250
15.	3.313	3.375	3.188	3.625	3.250	3.813	3.625	3.625	3.750	3.688	0.500	0.500	0.437	0.125	0.438
16.	3.313	3.438	3.438	3.688	3.563	2.438	3.063	3.563	3.438	3.188	-0.875	-0.375	0.125	-0.250	-0.375

TABLE 7

AVERAGED SCORES IN RANK ORDER

Order	Variables	1	2	3	4	5
1.		-1.188	-1.062	-0.812	-0.875	-1.000
2.		-1.187	-1.000	0.0562	-0.875	-0.875
3.		-0.875	-1.000	-0.375	-0.625	-0.875
4.		-0.812	-0.938	-0.250	-0.562	-0.875
5.		-0.688	-0.937	-0.188	-0.500	-0.813
6.		-0.563	-0.812	-0.125	-0.313	-0.750
7.		-0.500	-0.812	-0.125	-0.250	-0.687
8.		-0.500	-0.626	-0.063	-0.250	-0.500
9.		-0.500	-0.625	0.000	-0.250	-0.375
10.		-0.312	-0.500	0.000	-0.188	-0.312
11.		-0.250	-0.375	0.062	-0.188	-0.250
12.		-0.125	-0.250	0.125	-0.125	0.000
13.		0.000	-0.187	0.187	-0.125	0.000
14.		0.125	0.187	0.437	0.000	0.250
15.		0.500	0.500	0.437	0.125	0.438
16.		0.500	0.250	0.562	0.250	0.562

TABLE 8

MANN-WHITNEY U TEST FOR HYPOTHESIS 6

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	U	Pu > .05
Accuracy of rhythm	E	C	C	C	C	E	C	E	E	E	C	E	C	C	E	E		Pu > .191 α = .05
U=		1	1	1	1		2				5		6	6			U=23	Not Significant
Accuracy of pitches	C	C	E	E	C	C	E	E	E	C	C	C	E	C	E	E		Pu > .253 α = .05
U=	0	0			2	2				5	5	5		6			U=25	Not Significant
Articulation	E	C	C	E	E	C	C	C	E	C	E	C	E	E	E	C		Pu > .360 α = .05
U=		1	1			3	3	3		4		5				8	U=28	Not Significant
Dynamics	E	C	E	C	C	C	C	C	C	C	E	E	E	E	E	E		Pu > .041 α = .05
U=		1		2	2	2	2	2	2	2							U=15	Significant
General Sight-reading	C	C	C	E	C	E	E	C	C	E	E	C	E	C	E	E		Pu > .080 α = .05
U=	0	0	0		1			3	3			5		6			U=18	Not Significant

APPENDIX E

AVERAGED SCORES FOR POST MINUS PRETEST GAINS

AVERAGED SCORES IN RANK ORDER

MANN-WHITNEY U TEST FOR HYPOTHESIS 7

TABLE 9

AVERAGED SCORES FOR POST MINUS PRE-TEST GAINS

	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1.	4.250	4.125	4.000	4.125	3.938	4.438	4.563	4.375	4.375	4.438	0.188	0.438	0.375	0.250	0.500
2.	4.375	4.063	4.563	4.500	4.313	5.000	4.875	4.875	4.563	4.938	0.625	0.812	0.312	0.063	0.625
3.	4.250	4.500	4.563	4.688	4.437	4.375	4.438	4.250	4.188	4.250	0.125	-0.062	-0.313	-0.500	-0.187
4.	3.625	3.938	3.688	3.688	3.750	4.313	4.250	4.375	4.125	4.313	0.688	0.312	0.687	0.437	0.563
5.	4.688	4.563	4.688	4.875	4.688	4.063	3.938	4.438	4.250	3.938	-0.625	-0.625	-0.250	-0.625	-0.750
6.	4.813	4.500	4.813	4.813	4.750	3.438	3.500	4.188	4.125	3.438	-1.375	-1.000	-0.625	-0.688	-1.312
7.	3.625	3.813	3.938	3.813	3.750	4.063	4.188	4.313	4.063	4.250	0.438	0.375	0.375	0.250	0.500
8.	3.812	3.563	3.688	3.750	3.688	3.875	4.313	3.875	4.063	3.938	0.063	0.750	0.187	0.313	0.250
9.	3.188	3.000	3.375	3.563	3.313	2.938	3.188	2.938	3.250	3.000	-0.250	0.188	-0.437	-0.313	-0.313
10.	2.813	3.500	3.500	3.375	3.000	2.438	3.250	3.313	2.875	3.313	0.375	-0.250	-0.187	-0.500	0.313
11.	3.812	4.000	4.000	3.938	3.813	3.438	3.500	3.313	3.188	3.125	-0.375	-0.500	-0.687	.750	-0.688
12.	3.625	3.563	4.188	3.938	4.000	3.375	3.500	3.375	3.438	3.250	-0.250	-0.063	-0.813	-0.500	-0.750
13.	3.688	3.438	3.813	3.938	3.688	4.188	3.500	4.000	3.938	3.688	0.500	0.062	0.187	0.000	0.000
14.	4.500	3.813	4.867	4.375	4.063	3.688	3.563	4.188	4.188	3.625	-0.812	-0.250	-0.679	-0.187	-0.438
15.	3.875	3.688	3.750	3.563	3.563	3.313	3.375	3.188	3.625	3.250	-0.562	-0.313	-0.562	0.062	-0.313
16.	3.625	3.688	3.188	3.625	3.500	3.313	3.438	3.438	3.688	3.563	-0.312	-0.250	0.250	0.063	0.063

TABLE 10

Averaged Scores in Rank Order

	1	2	3	4	5
1.	-1.375	-1.000	-0.813	-0.750	-1.312
2.	-0.812	-0.625	-0.687	-0.688	-0.750
3.	-0.625	-0.500	-0.679	-0.625	-0.750
4.	-0.562	-0.250	-0.625	-0.500	-0.688
5.	-0.375	-0.250	-0.562	-0.500	-0.438
6.	-0.312	-0.250	-0.437	-0.500	-0.313
7.	-0.250	-0.313	-0.313	-0.313	-0.313
8.	-0.250	-0.063	-0.250	-0.187	-0.187
9.	0.063	-0.062	-0.187	0.000	0.000
10.	0.125	0.062	0.187	0.062	0.063
11.	0.188	0.188	0.187	0.063	0.250
12.	0.375	0.312	0.250	0.063	0.313
13.	0.438	0.375	0.312	0.250	0.500
14.	0.500	0.438	0.375	0.250	0.500
15.	0.625	0.750	0.375	0.313	0.563
16.	0.688	0.812	0.687	0.437	0.625

TABLE 11

MANN-WHITNEY U TEST FOR HYPOTHESIS 7

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Accuracy of Rhythm	U	L	U	L	L	L	L	L	U	U	U	L	U	L	U	U	Pu > .164 α = .05
U=		1		2	2	2	2	2				5		6			=22 = Not Significant
Accuracy of Pitches	U	U	L	L	L	L	L	L	U	L	L	U	U	U	U	U	Pu > .080 α = .05
U=			2	2	2	2	2	2		3	3					2	=22= Not Significant
Articulation	L	L	L	U	L	L	U	U	L	U	L	L	U	U	U	U	Pu > .025 α = .05
U=				3			5	5		6	8		8	8	8	8	=51= Significant
Dynamics	L	U	U	U	L	L	L	L	L	L	L	U	U	U	U	U	Pu > .139 α = .05
U=		1	1	1								8	8	8	8	8	=43= Not Significant
General Sight Reading	U	U	L	L	L	L	L	U	L	L	U	L	U	U	U	U	Pu > .117 α = .05
U=			2	2	2	2	2		3	3		4					=20= Not Significant

APPENDIX F

AVERAGED SCORES FOR EXPERIMENTAL GROUP GAINS

AVERAGED SCORES IN RANK ORDER

SIGN TEST FOR HYPOTHESIS 8

TABLE 12

AVERAGED SCORES FOR EXPERIMENTAL GROUP GAINS

	Pre-Test					Post Test					Gains				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1.	4.000	4.000	4.250	4.250	4.250	4.250	4.000	4.250	3.750	3.500	0.250	0.000	0.000	-0.500	-0.750
3.	4.000	4.000	4.250	4.500	4.250	4.000	3.250	4.250	4.250	3.500	0.000	-0.750	0.000	-0.250	-0.750
5.	3.500	3.250	3.750	4.000	3.500	4.500	4.000	4.500	4.500	4.500	1.000	0.750	0.750	0.500	1.000
7.	3.250	2.500	3.000	3.250	2.750	3.750	2.250	3.750	4.000	3.000	0.500	-0.250	0.750	0.750	0.250
9.	1.750	1.500	2.500	2.750	2.000	2.750	2.500	3.500	3.500	3.000	1.000	1.000	1.000	0.750	1.000
11.	2.000	2.000	2.500	2.250	2.000	3.250	2.500	3.750	3.250	2.500	1.250	0.500	1.400	1.000	0.500
13.	2.500	2.250	2.750	2.750	2.500	2.750	2.500	3.000	3.250	2.500	0.250	0.250	0.250	0.500	0.000
15.	2.750	2.250	2.500	2.250	2.250	4.500	4.750	4.500	4.500	4.500	1.750	2.500	2.000	2.250	2.250

TABLE 13

AVERAGED SCORES IN RANK ORDER

Order	Variables	1	2	3	4	5
1.		0.000	-0.750	0.000	-0.500	-0.750
2.		0.250	-0.250	0.000	-0.250	-0.750
3.		0.250	0.000	0.250	0.500	0.000
4.		0.500	0.250	1.500	0.500	0.250
5.		1.000	0.500	0.750	0.750	0.500
6.		1.000	0.750	0.750	0.750	0.500
7.		1.250	1.000	1.000	1.000	1.000
8.		1.750	2.500	2.000	2.250	2.250

TABLE 14

SIGN TEST

Variable	N = # of Signs	x = Small # of Signs	P .05	Significance
1.	7	0	.008	significant
2.	7	2	.227	not significant
3.	8	0	.016	significance
4.	8	2	.145	not significant
5.	7	2	.227	not significant

APPENDIX G

SIGHT-READING TEST SCALE

FIGURE 2. SIGHT READING TEST SCALE

INSTRUCTIONS

The purpose of this evaluation is to rate the sight-reading of each student as objectively as possible. Put a check mark (✓) indicating your rating of each student for each classification.

NAME

Accuracy (rhythm)	good	____	____	____	____	____	bad
Accuracy (pitches)	good	____	____	____	____	____	bad
Articulation	good	____	____	____	____	____	bad
Dynamics	good	____	____	____	____	____	bad
General Sight-reading	good	____	____	____	____	____	bad