

ALTERNATIVES TO TRADITIONAL NOTATION

Traditional notation has survived the test of time and is read by musicians around the world, but there are many musicians who desire, devise, or use alternative systems.

BY MARK GAARE

There have been literally hundreds of proposals to reform traditional music notation, which evolved in the Middle Ages. Individuals have searched for notational systems that were easier to learn, read, and write. They have tried to develop systems that were more direct in their representation, required less memorization and less mental math, and could handle the complex harmonies and rhythms that have developed over the centuries. Notation expert Gardner Read says, "Since roughly 1700, composers and theorists, pedagogues and amateur musicians have put forward with notable regularity proposals to simplify, to improve, or to supplant the prevailing system."¹ Out of the hundreds of alternatives that have been designed, several tablature notation systems have become popular in various parts of the world. In addition, new digital notational systems are being used extensively in the music industry. To understand why anyone would want to use another system, it is helpful to know the history of notation in relation to instruments.

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Notation and Instruments

Musical notational systems were often developed to represent the music of specific instruments. The oldest known example of music notation dates back to 1800 B.C. It is a song from the Hurrian people who lived in the ancient city of Ugarit on the coast of Syria in the Middle East. The notation was verbal in form and not a graphical representation. The seven pitches described in the text used the same intervals that make up our modern major scale (the diatonic scale) and could be played on a seven-string lyre.²

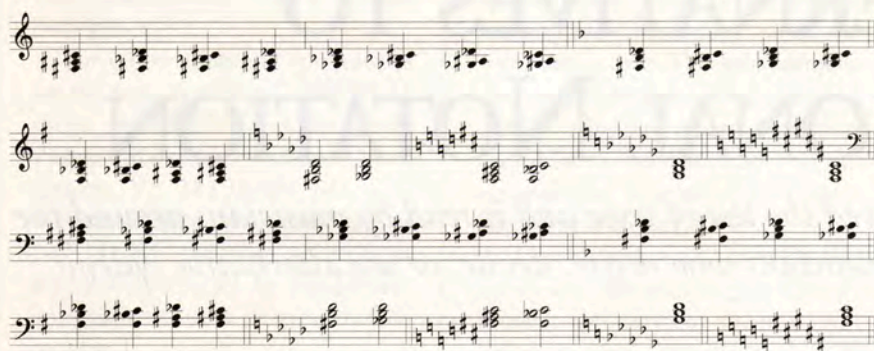
The first keyboard, a pipe organ called the hydraulis, was invented around 200 B.C. by a Greek engineer

named Ktesibios. It is believed that the instrument had only one row of white keys, arranged in a diatonic fashion with seven steps per octave. The hydraulis and the organs that followed it only had one row of "white" keys for well over a thousand years.³ History books seldom mention this important fact in relation to the development of notation.

In the year 1020 A.D., before the appearance of chromatic keyboards, Guido d'Arezzo, an Italian monk and choir director, invented the first music notation system to employ a grid of lines. His four-line staff was later expanded to our present five. Guido's notation was also the first "diastemic" system, meaning that the placement of the notes was precise with respect to pitch. Because the five chromatic tones were not yet in significant use in the Western world, Guido based his notation on consecutive octaves of diatonic scales, which was the approach used throughout Greek, Roman, and medieval times.⁴

However, seven tones per octave proved to be an insufficient number. Further divisions were necessary for transposition of the medieval modes, presumably to accommodate the vocal range of the singers. The first nondiatonic tone used on instruments and in notation was B-flat, followed quickly by F-sharp. The five black keys were added to keyboards at the end of the

Figure 1. Forty-four different ways to write the same chord



eleventh century, but these first black keys did not play the uniform chromatic half-tones of today. When sharps and flats were first introduced, they represented different frequency intervals based on the Pythagorean mathematical system.⁵

In 1637, a Frenchman named Le Padre Marin Mersenne and a German named Andreas Werckmeister individually introduced systems that divided the octave into twelve equal semitones (the modern-day chromatic scale). This became known as “equal temperament,” and sharps and flats became “enharmonic equivalents.” For example, F-sharp became the same note as G-flat, at least on the keyboard.⁶

Traditional Notation

Our system of traditional music notation was built upon a scale consisting of seven diatonic tones per octave. However, this system posed serious problems when the remaining five chromatic notes were added to keyboards at the end of the eleventh century.⁷

Notes are not notated equally. In traditional notation, all notes are not treated equally on the staff. Chromatic tones do not occupy their own line or space. Therefore, at least one addition-

al piece of information is needed to decipher a chromatic tone (an accidental marking at the note head or a key signature), which can tax a reader's short-term memory. This inequality leads to two more difficulties. First, some key signatures are perceived as being “easy keys” (like C) and “difficult keys” (like C-sharp) when, in actuality, the musical intervals could be exactly the same. The only thing that is different is the absolute value of the pitch frequencies. Second, the intervals seem ambiguous. The vertical scale of note pitches (the staff) is not uniform. Intervals between notes cannot be determined locally; instead, readers must rely on their knowledge and memory of the key and clef they are playing in.

Staff lines are nonexclusive. In traditional notation, notes do not have unique locations on the staff. For instance, a “C” can be on a line or on a space depending on the octave. This is because the staff lines and spaces only represent the seven “natural” notes, an uneven number of notes per octave. Clefs can confuse the reader even further by transposing the locations of notes in the staff. Clefs were introduced for individual instruments so that the staff would be centered over the prime range of that particular

instrument or voice. However, some instrumentalists and vocalists may have extended ranges of three octaves or more, which forces them to read and interpret multiple clefs or multiple ledger lines. In addition, the same note can be written several different ways, depending on the key signature and accidentals. (See figure 1 for forty-four ways to write the same chord in traditional notation.)

Duration symbols require heavy math. Duration symbols in traditional notation are not intuitive and require processing fractions “on-the-fly.” Many notation reformers feel that proportional note spacing is a superior method of notating the time function.

System is rooted in diatonicism. Traditional notation does a poor job of representing atonal and microtonal music. In addition, the system was not designed to handle the complex instruments, harmonies, and rhythms that have developed since the Middle Ages. Avant-garde composers in the second half of this century, such as John Cage, George Crumb, and Pierre Boulez, created new notation symbols to be used in the traditional notation system.⁸

There has always been a need for a system that is more direct in its representation, requiring less memorization and mental math. Erhard Karkoschka, in his *Notation in New Music*, pleaded that in any new system, “the visual event must be apparent as the direct translation of the auditory event, requiring as few additional thought processes as possible.”⁹

Alternative systems of music notation have already been invented for the manipulation of some instruments that many consider superior to traditional notation. These alternative systems are known as “tablatures.” Tablature notation is a direct visual representation of the physical techniques used to produce music on a given instrument. Tablature can be thought of as an instrument-specific shorthand. The first music printed from engraved plates is thought to be a piece of lute tablature from 1536.¹⁰

Guitar Tablature

Guitar tablature, which has become very popular recently, is not officially authored or sponsored by any individ-

ual or group. It was born out of the necessity for guitar players to communicate with one another on paper. As their numbers grew, they demanded a notation that matched the characteristics of their instrument. Magazine publishers were quick to tap this need in the marketplace. Figure 2 shows an example of guitar tablature. The six lines below the treble clef graphically represent the six strings on the guitar fingerboard. Each numeral represents the fret where the note is played. If the numerals are lined up horizontally, the notes are to be played together.

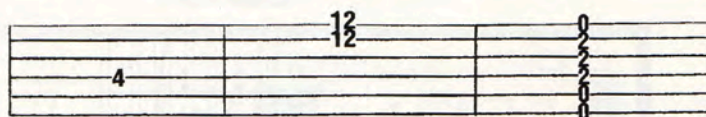
Guitar tablature is a successful notation because guitar players don't have to interact with other instrumentalists very often. (Neither do concert pianists, at least on a notational level.) The only problem with tablature notation is that musicians playing other instruments cannot read it.

All musicians could learn to play their various instruments using guitar tablature as a guide, but why? Why should other instrumentalists struggle when they could each have their own form of efficient tablature? Historically, we have ruled out the idea of every instrument having its own individualized tablature system. We did so because transposition by hand or eye would be difficult and time-consuming.

However, computers have made the task of transposition as simple as pushing a button. Not far in the future, a conductor may be able to have a score electronically transposed into any notation system he or she prefers, in concert key. The conductor will still be able to communicate verbally to the players, even though the players are reading other forms of notation.

Randy Rucker, owner of the Musi*Key catalog in Tucson, Arizona, estimates that guitar tablature represents 1–2 percent of all titles currently in print, and 7–8 percent of all pop titles (estimates are for the U.S. only).¹¹ According to Ted Piechocinski, senior vice president for Cherry Lane Company in Port Chester, New York (one of the leading suppliers of guitar tablature music), as much as 25 percent of all new pop titles are printed in guitar tablature.¹² The explosive

Figure 2. Examples of guitar tablature



4th string, 4th fret 1st string, 12th fret an open A major chord
2nd string, 12th fret
played together

Moderate Rock ♩ = 96

C (acoustic gtr.) Cmaj7 Cadd9 (simile) C

1

mf

let ring throughout

T 1 0 1 0 0 0 0 3 0 3 0 1 0 1

B 3 2 3 2 3 2 3 2 3 2 3 2 3 2

B 3 3 3 3 3 3 3 3 3 3 3 3 3 3

* doubled by 12-string gtr.
** fingerpicking: m = middle, i = index, t = thumb (use thumb for all downstemmed notes)

Source: Excerpt from "Dust in the Wind." Words and music by Kerry Livgren, copyright 1977, 1978 EMI Blackwood Music Inc. and Don Kirshner Music. All rights controlled and administered by EMI Blackwood Music Inc. International copyright secured. All rights reserved. Reprinted by permission of the Hal Leonard Corporation.

growth of guitar tablature has now leveled off, with one quarter of the pop market now being served by tablature instead of traditional notation.

Accordion Tablature

Accordion tablature is very popular in China. Figure 3 shows an extract from a typical songbook, which features the melody written in scale degrees on the top row. A dot above or below the scale degree indicates whether the note is played in the upper or lower register.

of the accordion. The rhythm is also notated. The quarter note is represented as a simple numeral. When the numeral is underlined, it indicates an eighth note. The lengthening of the value of a quarter note is indicated with a hyphen after the numeral, and a zero represents a rest. The bottom row of numbers in the tablature represents the buttons on the left side of the accordion. Although this notation is not suitable for complex music, it serves the needs of many amateurs.¹³

Figure 3. Example of accordion tablature

Source: Excerpt from *Selected Songs in Singing Name Notation for 7–5 or 6–6 Type Accordion* by Yin Zhi Chao, p. 1, published by Times Art Press, China, copyright 1989 by Yin Zhi Chao. Reprinted by permission.

Figure 4. Example of keyboard tablature

MARCIA FUNEBRE sulla morte d'un Eroe
Maestoso andante

Note: The diagram at the top left shows how black and white dots in Klavarskribo represent the black and white keys on a keyboard. The excerpt of Klavarskribo at the top right is from Beethoven's *Sonata in A-flat*, op. 26, with the same measures written in traditional notation below it. Excerpt is taken from *Source Book of Proposed Music Notation Reforms* by Gardner Read, p. 76, copyright 1987 by Gardner Read. Reprinted by permission of Greenwood Publishing Group, Inc., Westport, Connecticut.

Keyboard Tablature

"Klavarskribo," a new notational system for keyboard, was developed in Holland in 1931 by a Dutch electrical engineer and amateur musician, Cornelis Pot (1885–1977). The name "Klavarskribo" is from the international language of Esperanto and means "keyboard writing." As the name suggests, Klavarskribo is based on the piano keyboard and can be classified as a type of tablature notation. The system is now called "Klavar" for short.

Like a player piano roll, the time-axis is vertical on the page, reading from top to bottom (see figure 4). The notes are placed horizontally relative

to the keys on the piano. The basic staff contains five lines. These lines are grouped together as two lines and three lines, forming a visual analogy to one octave of the keyboard. Staves may be added as needed for a particular piece, but generally four staves will suffice for most music. The notes between the lines are always white (or open) and represent the white keys on the keyboard (naturals). The notes directly on the lines are always black and represent the black keys (accidentals).

Measures are subdivided by dotted lines that represent the beat or "count." Counting numerals may also be placed to the left of the staff to

indicate the various meters and subdivisions of time. Each note is located in the measure exactly where it is supposed to be played. The end of a note is marked by a halt sign ("v") or another note. To avoid confusion, a duration dot is occasionally employed when a note is sustained.

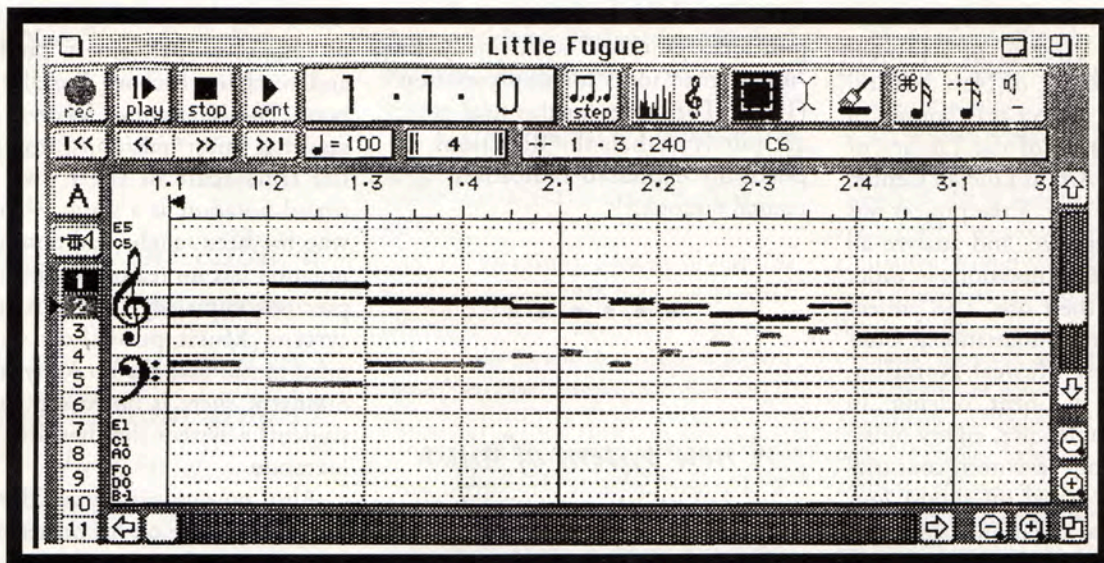
Klavar is easy to learn and apply to the keyboard. But the main reason for using Klavar instead of traditional notation is that it simplifies the written score. It eliminates the need for sharps and flats because each of the twelve notes has its own unique location on the staff. It also eliminates the confusion of multiple clefs. Finally, the precise placement of the notes in regard to time is easier to learn and read for certain musicians, compared to our traditional system of notating duration. Flags, beams, and noteheads are abstract symbols that have meanings that must be memorized. Unfortunately, Klavar's analogies are only relevant to the keyboard. For example, there are no "black" or "white" notes on a trumpet. To a saxophonist, notes placed to the left or right do not signify playing lower or higher pitches.

Klavar is by far the most widely accepted and disseminated system of the hundreds of notational reforms that have been proposed throughout the years.¹⁴ To date, Klavar has been used to produce or transcribe over twenty-five thousand pieces of music. These include the sonatas of Beethoven, Haydn, and Mozart; the preludes of Chopin; and the complete works of Bach for organ. There are many teachers in Europe today who have embraced the system wholeheartedly and regularly teach it to their students. It is estimated that one third of the musicians in Holland read Klavar, and one half of the music sold in Holland is in Klavar.¹⁵

Digital Music

Many composers, especially those in the pop music world, have already abandoned traditional written or printed music for the digital music studio. Three recent innovations have led to this revolution in music: synthesizers, samplers, and sequencers. The electronic synthesizer was the first innovation to loosen the stranglehold of notation by enabling automatic

Figure 5. Example of music notated on sequencing and notation software



Source: Screen shot of music written with *Musicshop* software by Opcode Systems, Inc. Courtesy of the author.

transposition. Next, samplers were invented, which enabled composers to use the sounds of orchestral instruments without having to first communicate their musical ideas to orchestral musicians by way of notation. The final development was electronic music sequencers. A sequence is an electronic transcription of music that can be edited completely.

In September of 1989, *Macworld* magazine featured an article on MIDI sequencers. The article quoted Bob Ezrin, composer and producer of Pink Floyd, Yes, Lou Reed, Peter Gabriel, as well as other musicians and groups. He said, "In the same way that the telephone revolutionized communication by making it real time, MIDI sequencers have bypassed the old Morse code of notation and rendered musical expression virtually instantaneous."¹⁶ With step editing and complete control over tempo, sequencers have also enabled the creation of music without dexterity on an instrument.

Technology has made the wholesale replacement of traditional notation more feasible in several ways. First, international telecommunications and the Internet have enabled music educators from around the world to meet

electronically and confer about the future of notation. Second, the world's library of traditional notation is no longer "safe" in its vastness. It is now possible for a computer to "read" a sheet of music by using an optical scanner and character recognition software.¹⁷ Once inside the computer, the musical data can be manipulated and "transnotated" into any other notation system.

Digital Piano Roll

Computers and sequencing software have advanced the state of transcription even further by adding a video monitor capable of displaying the music in a graphical form. Software sequencers have come a long way and, in the process, the developers have created a new kind of musical notation known as the "piano roll." Just like traditional music notation, a piano roll is a graph of bars representing notes with the vertical axis (a picture of the black and white keys on an upended keyboard) representing pitch and the horizontal axis representing time. These piano rolls have actually replaced traditional notation as the primary music language for many people in the pop music world.

Software developers have already begun to meld the best of both the old and new worlds with a hybrid display of staff lines (old world) and horizontal proportional spaces (new world). These innovative products have brought us closer to a readable sequencer notation. Figure 5 shows a printout of music notated with both staff lines and horizontal proportional spaces. Here the up-ended keyboard has been replaced with a grand staff. The program includes the ability to zoom in on both dimensions independently (see magnifying glasses in lower right corner). In addition, multiple tracks can be viewed simultaneously, each with its own color as selected by the user. The staff lines that form the vertical axis of traditional notation are universally known, easily readable, and not instrument specific. The staves are also very compact. This makes them ideal for writing out music by hand. In fact, to represent the same range of notes on a piano roll would take twice the vertical space. The horizontal bar graph of notes is a direct representation of time and is readable by both computers and humans. This kind of display enables music on a piano roll to be read "on the fly," the same way traditional notation is read.

Brief History of Notation Reform

In 1913, Johannes Wolf cataloged more than one hundred proposals for reform in his *Handbuch der Notationsskunde*.¹⁸ From 1970 to 1974, Kurt Stone was the director of a project known as the Index of New Musical Notation. The project was housed in the music division of the Library of the Performing Arts at Lincoln Center, New York. The goal of the project was to catalog, categorize, and analyze all of the new musical notations in order to standardize their use. The project culminated in the International Conference on New Musical Notation, which was held in Ghent, Belgium, in 1974. At the conference, eighty music professionals from seventeen countries scrutinized and voted on almost four hundred selected notational signs and procedures. The conference proceedings contain all of the notational signs that were accepted at the conference. The proceedings were published in *Interface—Journal of New Music Research* and in Stone's book *Music Notation in the Twentieth Century*.¹⁹

In 1987, Gardner Read cataloged and analyzed 391 notation systems that have been proposed since 1764 in his landmark compendium called *Source Book of Proposed Music Notation Reforms*.²⁰ Besides Cornelius Pot, the inventor of Klavarskribo, four of the more well known notation inventors are the following:

■ Arnold Schoenberg (1874–1951), an Austro-Hungarian composer known for his dissonant twelve-tone music, created a system of notation known as “A New Twelve-Tone Notation.”

■ Karlheinz Stockhausen (b. 1928) is a German composer and theorist and a pioneer of electronic music and new music notation. Beginning in 1953, Stockhausen was one of the first to compose works for electronic “instruments.” Not the MIDI keyboards of today, these were simple sine-wave generators, white noise generators, ring modulators, electric filters, and short-wave radio receivers. In his scores, Stockhausen experimented with different ways to notate time and pitch with machine-like accuracy. Stockhausen also wrote many pieces for orchestral instruments but allowed for some degree of randomness in

their execution. Instead of writing notes (the desired outcome), Stockhausen created graphic signs to represent the desired actions. Later in his career, he added the “notation of compositional processes” and, finally, the “notation of ideas for improvisation” (1968). The scores for this final group are purely verbal; the directions are poetically expressed indications of a mental outlook.²¹

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A new system of music notation cannot be handed down from on high.

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■ Henri Carcelle won fifteen thousand dollars with his new keyboard and notation system in a 1992 French inventions contest sponsored by the GAN Insurance Group. There were 5,000 entries with winners in eight different categories. Carcelle won the prize for “Best Scientific and Technical Innovation” from a field of 150 entries in that category. His new system is called “Proportional Chromatic,” and it uses a vertical time axis similar to Klavar. Carcelle patented his notation system and hopes to collect royalties from all music that is published using it.

■ William F. Buckley, Jr. (b. 1925), author, editor of the *National Review*, and host of the PBS television show *Firing Line*, also had his own ideas on how to improve traditional notation. He developed the Buckley Notation System, which is traditional music notation with two additional elements: (1) sharp and flat notes are printed in red and (2) piano fingering for every note is shown. The Buckley Notation System is currently featured in two music books available from Songbooks Unlimited.²²

Speed of Reform

If notation needs to be reformed, why have none of the hundreds of attempts been successful? The main reason may be the conservative nature of composers, performers, publishers, and teachers. Richard Rastall, in his book *The Notation of Western Music*, says that “most musicians, working on the time-scale of their own lives, regard notation as a static.”²³ Anyone who has been taught traditional music notation has no reason to discard that precious knowledge to learn another system. Music publishers will not print music that has no ready market. Similarly, there is no reason to teach students a system that has little or no literature.

Also, no one person could effect a universal change on his or her own. A new system of music notation cannot be handed down from on high. Any change that occurs will need to be a grass roots movement from the bottom up if it is ever to be accepted. MIDI is an excellent example of a music standard that developed with no owner, trademark, copyright, or patent involved. MIDI was developed by a group of synthesizer manufacturers who decided to cooperate for the good of the industry in 1982.²⁴

Finally, a new notation system cannot be a local phenomenon. To be truly successful, a new notation system must be supported by musicians from around the world. Even today, few Americans know about Klavar, even though in Europe more than twenty-five thousand different compositions are printed in this notation system.

Current Reform Movement

The current movement in notation reform is supported by the Music Notation Modernization Association (MNMA). Founded in 1985, the MNMA is an international, nonprofit organization with headquarters in Kirksville, Missouri. The association is dedicated to the study of music notation and the changing face of the printed music industry.

For the first time in history, worldwide cooperation has been enlisted to guide the future of music notation and evaluate proposals for reform. MNMA represents one hundred and thirty

members in seventeen countries, sponsors a conference every three years (England, 1988, the United States, 1991, and the Netherlands, 1994), and publishes a quarterly journal, *Music Notation News*.²⁵

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Ideas for Music Educators

One of the greatest challenges for a teacher is to recognize when a student is having difficulty with reading traditional notation (as opposed to having difficulty playing his or her instrument). There are many successful pop musicians who have still never learned to read music but "play by ear." Instead of giving up on students who cannot read music, teachers can direct them to a program where alternate notational systems are taught. Teachers are encouraged to introduce their students to the fascinating history of music notation, to the tablatures that are used for various instruments, and to the amazing capabilities of sequencers and computer notation software. This knowledge will help students gain an appreciation of notation and how it relates to music theory.

Notes

1. Gardner Read, *Source Book of Proposed Music Notation Reforms* (New York: Greenwood Press, 1987), 1.
2. Anne D. Kilmer, "Old Tune Makes New History," *Science Digest*, June 1974, 70-71.
3. F. E. Kirby, *A Short History of Keyboard Music* (New York: The Free Press, 1966), 5-6.
4. C. F. Abdy Williams, *The Story of Notation* (1903; reprint, New York: Longwood Publishing Group, 1978), 75.

5. Don Michael Randel, ed., *The New Harvard Dictionary of Music* (Cambridge, MA: Belknap Press of Harvard University Press, 1986), 400-01, 837-38.

6. Henri Carcelle, "The 'Proportional Chromatic' Piano Keyboard and Musical Notation," *Music Notation News* 3, no. 2 (1993): 5.

7. E. J. Hopkins and E. F. Rimbault, *The Organ, Its History, and Construction* (1855; reprint, London: Hilversum: Scrits Knus, 1965), 33.

8. Paul Griffiths, *Modern Music: The Avant Garde since 1945* (London: Braziller, 1981).

9. Erhard Karkoschka, *Notation in New Music* (New York: Praeger Publishers, 1972), 10.

10. D. W. Krummel and Stanley Sadie, *Music Printing and Publishing* (New York: W. W. Norton, 1990), 30.

11. Randy Rucker, telephone conversation with author, February 11, 1995.

12. Ted Piechocinski, telephone conversation with author, February 11, 1995.

13. Bob Stuckey, "A Psalm to Quell Discordant Hearts," *Music Notation News* 3, no. 4 (1993): 3-4.

14. The Klavar Music Foundation (which promotes Klavarskribo) goes so far as to say, "To play a conventional score requires mental contortions that have nothing to do with musicianship, so that millions of music lovers are held back from making their own music, not by any lack of ability, but by the absurdity of an obsolete system."

For more information, contact the Klavarskribo Institute in the Netherlands: Klavarskribo Institute, Postbus 39, 2980 AA Ridderkerk, The Netherlands, telephone number and fax: 01804-12339; or the Klavar Music Foundation of Great Britain, 171 Yarborough Road, Lincoln LN1 3NQ, United Kingdom, telephone number: 0522-523117.

15. This description of Klavarskribo is based on an article "What is Klavarskribo?" by Mark Gaare, from the MG Music Company newsletter *The Note Reader* 1 (July, 1991): 4.

16. Christopher Yavelow, "MIDI Sequencers: Greatest Hits," *Macworld* September, 1989, 196.

17. Two currently available music-scanning programs are: *Midiscan* from Musitek, Ojai, California, and *NoteScan* from Temporal Acuity Products, Bellevue, Washington.

18. Johannes Wolf, *Handbuch der Notationskunde* (Leipzig, Germany: Hildesheim, 1913).

19. Kurt Stone, *Music Notation in the Twentieth Century* (New York: W. W. Norton, 1980).

20. Gardner Read, *Source Book of Proposed Music Notation Reforms*.

21. Stanley Sadie, ed., *The New Grove Dictionary of Music and Musicians*, vol. 18 (London: Macmillan, 1980), 151-59.

22. William F. Buckley, Jr., *Selected Works of J. S. Bach, Selected Works of W. A. Mozart* (New York: N. R. Publishing & Ekay Music, Inc., 1991). Available from Songbooks Unlimited, Ridgely, Maryland; 800-527-6300. Coloration was also used in the Middle Ages to indicate notes that were subject to chromatic alteration, as well as to distinguish other features of notation, such as rhythmic proportions and individual strands of notation. See Stanley Sadie, ed., *The New Grove Dictionary of Music*, vol. 13, 374-77.

23. Richard Rastall, *The Notation of Western Music* (London: J. M. Dent & Sons, Ltd., 1983).

24. Mark Vail, "MIDI Is Ten Years Old," *Keyboard Magazine* 19, no. 2 (1993): 69-84.

25. The members use the Internet, the phone, the fax, and meetings at international conferences to communicate and compare notes. For free information about the Music Notation Modernization Association, contact: MNMA, PO Box 241, Kirksville, MO 63501; 816-665-8098; Internet address: www.il.net/~metro/mnma.htm. ■

Contribute Your Ideas

Do you have experience with or opinions about alternative notation systems? Send your comments (500 words or fewer) by April 30, 1997, to Idea Bank, *MEJ*, 1806 Robert Fulton Drive, Reston, VA 20191-4348. Contributions to be published will be selected by the *MEJ* staff and edited to conform to the journal's style and to fit available space. Please include a daytime telephone number.