

Proposal to Encode Medieval East-Slavic Musical Notation in Unicode

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Abstract

A proposal to encode twelve additional characters in the Musical Symbols block of Unicode required for support of mediæval East-Slavic (Kievan) Music Notation.

1 Introduction

East Slavic musical notation, also known as Kievan, Synodal or “square” music notation is a form of linear musical notation found predominantly in religious chant books of the Russian Orthodox Church and the Carpatho-Russian jurisdictions of Orthodoxy and Eastern-Rite Catholicism. The notation originated in present-day Ukraine in the very late 1500’s (in the monumental *Irmologion* published by the Supraśl Monastery), and is derived from Renaissance-era musical forms used in Poland. Following the political union of Ukraine and Muscovite Russia in the 1660’s, this notational form became popular in Moscow and eventually replaced Znamenny neumatic notation in the chant books of the Russian Orthodox Church. The first published musical chant books using Kievan notation were issued in 1772, and though Western musical notation (what is referred to as Common Music Notation [CMN]) was introduced in Russia in the 1700’s, Kievan notation continued to be used. As late as the early 1900’s the publishing house of the Holy Synod released nearly the entire corpus of chant books in Kievan notation. The *Prazdniki* and *Obihod* chant books from this edition were reprinted in Russia in 2004, and may be found in the choir lofts of most monasteries and many parishes today. Therefore, the proper typesetting of Kievan notation is of interest not only to those in academic circles, but also to those who practice Russian Orthodox chant today.

Kievan notation is characterized by the distinct, square shape of its noteheads. The graphical form of some symbols of Kievan notation is similar to shape notes used in the United States or to some elements of mensural notation or notation used for Gregorian chant, all of which have already been encoded in Unicode. However, these elements of Kievan notation are functionally different from their shape notes, mensural or Gregorian analogs. In addition, they do not decompose into stems, heads and flags. Thus, the use of characters used for that repertoire to represent Kievan notation is not appropriate; Kievan notation characters should be encoded separately.

It is a goal of the Unicode standard to leave the rendering of pitch and other complexities associated with typesetting music to higher-level protocols. Musical layout, as well as the digital storage of musical compositions are therefore not addressed in this proposal. Rather,

the encoding of Kievan notation in Unicode is required for two reasons. First, to allow the handling of Kievan notational symbols in line (that is, within a body of text, such as academic literature, instructional manuals and guides to computer software); second, to identify the repertoire and provide a standard encoding method for use by musical typesetting software. In a related project, the authors propose a method for the handling of Kievan musical notation in the popular open-source music engraving package LilyPond.

2 Proposed Characters

Kievan notation and CMN share some elements of encoding; others may be considered as simple graphical variants. Table 1 presents the additional symbols proposed for inclusion required for full support of Kievan notation within Unicode. The subsequent section discusses the technical aspects of Kievan notation support. Figures 1 and 2 present examples of the use of Kievan musical symbols within a body of text. Figure 3 presents an example of a typical music score using Kievan notation; this proposal encodes all of the characters required to typeset the score, though the typesetting (engraving) process itself is left to musical software.

It has been noted that two of these characters are similar to Gregorian ligatures; however, these characters are not ligatures but single characters. The character Musical Symbol Kievan Whole Note (labeled 1 in Figure 1; proposed codepoint 1D1E2) consists of two attached diamonds; the nominal note is located between the two diamonds. The character Musical Symbol Kievan Eighth Note Stem Down (labeled 5 in Figure 1; proposed codepoint 1D1E7) consists again of two attached diamonds and a stem; the nominal note is located on the top diamond. The character Musical Symbol Kievan Final Note (labeled 1 in Figure 2; proposed codepoint 1D1E0) consists of two attached rectangles; the nominal note is located between the two rectangles. The character Musical Symbol Kievan Recitative Mark (labeled 1 in Figure 3; proposed codepoint 1D1E1) also consists of two attached rectangles; the nominal note is again located between the two rectangles. For more on the technical aspects of Kievan Notation, the reader is encouraged to consult [1].

3 Technical Comments

We have proposed for encoding the additional symbols required for Kievan musical notation. In some cases, symbols used in Kievan notation have a sufficiently close graphical representation and an identical function as CMN analogs; in these cases, the existing CMN symbol should be used. Thus, for example, we have not proposed the encoding of a Kievan Combining Augmentation Dot or a Kievan Sharp Sign; rather, the existing codepoints U+1D16D and U+266F, respectively, should be used.

In general, the following principles can be followed in typesetting Kievan notation in line. Kievan notes occur on a five-line staff; the existing five-line staff, U+1D11A, should be used. Musical phrases are separated by bar lines, and the existing codepoint, U+1D100 should be used for the bar line. We have proposed for encoding the Tsefaut clef¹ the only clef used in

¹This clef is called Tsefaut because the note on the line where it appears would, in solfège nomenclature, be called *fa* or *ut*, which in the alternative terminology, is called C (Slavic pronunciation: *tse*). While functionally similar to the alto-clef, there is this subtle difference, *viz.* that in the Obihod scale, transposition by a fourth (from *ut* to *fa*) is musically invariant.

Figure 1: Kievan musical symbols used in-line. Note the characters used: 1. Musical Symbol Kievan Whole Note; 2. Musical Symbol Kievan Half Note on Line; 3. Musical Symbol Kievan Quarter Note Stem Down; 4. Musical Symbol Kievan Quarter Note Stem Up; 5. Musical Symbol Kievan Eighth Note Stem Down; 6. Musical Symbol Kievan Eighth Note Stem Up. Source: [2].








Богослужебныя пѣвческія книги печатаются ¹ва ²ра ³то ⁴бо ⁵то ⁶то.
 Квадратныя ноты имѣють слѣдующее начертаніе: 
 Различіе между изображенными здѣсь нотами заключается въ *долготѣ* или *длительности* соответствующихъ имъ звуковъ; такъ нота  означаетъ звукъ наибольшей длительности; звукъ ноты  равняется половинѣ долготы звука предыдущей ноты; нота  или  равняется по долготѣ четверти первой ноты; ноты  или  составляютъ вось-

Figure 2: Additional Kievan musical symbols used in-line: 1. Musical Symbol Kievan Final Note; 2. Musical Symbol Kievan End of Piece; 3. Musical Symbol Kievan Tsefaut Clef; 4. Musical Symbol Kievan Flat Sign. Source: [2].





Въ концѣ пѣснопѣнія ставится обыкновенно нота ¹, означающая звукъ неопредѣленной длительности. Впрочемъ эта же нота *иногда*
 Знакъ ² употребляется для означенія конца пѣснопѣнія.
 Для того, чтобы узнать, какъ называется нота, ³входящаяся на известной линіи или промежуткѣ, употребляется знакъ , называемый *ключемъ*. Это ключъ *цѣфавтный* ³). Въ богослужебныхъ пѣвческихъ третьяго тетра хорда, ⁴т.е. между *ля* и *фа* на приписной линіи, всегда употребляется знакъ , соответствующій знаку пониженія — *бемоллю*.

Figure 3: A typical music score in Kievan notation. Note also the use of 1. Musical Symbol Kievan Recitative Mark and both variants of Musical Symbol Kievan Half Note, short stem up (Kievan Half Note on Line) (2) and long stem up (Kievan Half Note in Space) (3). Source: [3].

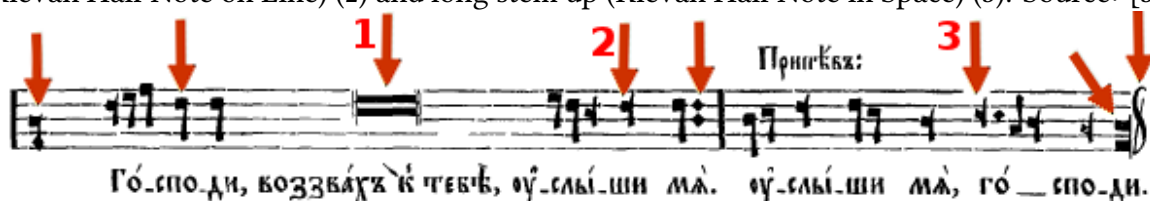














Table 1: Proposed Characters

Representation	Codepoint	Name	Comments
Clefs			
	U+1D1DE	MUSICAL SYMBOL KIEVAN TSEFAUT CLEF	C-clef with a unique graphical representation.
Ornamentation			
	U+1D1DF	MUSICAL SYMBOL KIEVAN END OF PIECE	Placed at the end of a piece
Notes			
	U+1D1E0	MUSICAL SYMBOL KIEVAN FINAL NOTE	Nominal note located between the two rectangles
	U+1D1E1	MUSICAL SYMBOL KIEVAN RECITATIVE MARK	Nominal note located between the two rectangles
	U+1D1E2	MUSICAL SYMBOL KIEVAN WHOLE NOTE	Whole note with a unique graphical representation.
			Nominal note located between the two diamonds.
	U+1D1E3	MUSICAL SYMBOL KIEVAN HALF NOTE IN SPACE	This variant of the half note is used between staff lines.
	U+1D1E4	MUSICAL SYMBOL KIEVAN HALF NOTE ON LINE	This variant of the half note is used on a line.
	U+1D1E5	MUSICAL SYMBOL KIEVAN QUARTER NOTE STEM DOWN	Quarter note with stem down.
	U+1D1E6	MUSICAL SYMBOL KIEVAN QUARTER NOTE STEM UP	Quarter note with stem up.
	U+1D1E7	MUSICAL SYMBOL KIEVAN EIGHTH NOTE STEM DOWN	Eighth note with unique representation. Nominal note located on the top diamond.
	U+1D1E8	MUSICAL SYMBOL KIEVAN EIGHTH NOTE STEM UP	Eighth note with stem up.
Accidentals			
	U+1D1E9	MUSICAL SYMBOL KIEVAN FLAT SIGN	Flat sign with unique representation.

Kievan notation. We have proposed for inclusion all required notes for the full repertoire of music. Graphical variations in the shape of the notes between the Synodal publishing house sources and the manuscript tradition should be handled at the font level.

The existing CMN support in Unicode offers a set of control characters that may be used for the repertoire of Kievan notation, if necessary. For example, on some occasions, notes may be beamed. For the purposes of beaming, the existing control characters U+1D173 (Musical Symbol Begin Beam) and U+1D174 (Musical Symbol End Beam) should be used. The correct beaming behavior may be implemented at the font level, *e.g.*, via a ligature substitution.

While slurs and ties do not exist in Kievan music notation, notes in single-syllabic melismatic structures are frequently grouped together; in the chantbooks, melismatic groups are separated from each other by whitespace. Existing control characters U+1D179 (Musical Symbol Begin Phrase) and U+1D17A (Musical Symbol End Phrase) should be used for the purposes of grouping.

4 Appendix: Character Properties

The following entries are proposed for addition to UnicodeData.txt:

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1D1DE;MUSICAL SYMBOL KIEVAN TSEFAUT CLEF;So;0;L;;;;;N;;C or do
    clef in Kievan notation;;;
1D1DF;MUSICAL SYMBOL KIEVAN END OF PIECE;So;0;L;;;;;N;;;;;
1D1E0;MUSICAL SYMBOL KIEVAN FINAL NOTE;So;0;L;;;;;N;;;;;
1D1E1;MUSICAL SYMBOL KIEVAN RECITATIVE MARK;So;0;L;;;;;N;;;;;
1D1E2;MUSICAL SYMBOL KIEVAN WHOLE NOTE;So;0;L;;;;;N;;;;;
1D1E3;MUSICAL SYMBOL KIEVAN HALF NOTE IN SPACE;So;0;L;;;;;N;;
    See 1D1E4 for half note on line;;;
1D1E4;MUSICAL SYMBOL KIEVAN HALF NOTE ON LINE;So;0;L;;;;;N;;
    See 1D1E3 for half note in space;;;
1D1E5;MUSICAL SYMBOL KIEVAN QUARTER NOTE STEM DOWN;So;0;L;;;;;
    N;;See 1D1E6 for quarter note with stem up;;;
1D1E6;MUSICAL SYMBOL KIEVAN QUARTER NOTE STEM UP;So;0;L;;;;;N
    ;;See 1D1E5 for quarter note with stem down;;;
1D1E7;MUSICAL SYMBOL KIEVAN EIGHTH NOTE STEM DOWN;So;0;L;;;;;N
    ;;See 1D1E8 for eighth note with stem up;;;
1D1E8;MUSICAL SYMBOL KIEVAN EIGHTH NOTE STEM UP;So;0;L;;;;;N;;
    See 1D1E7 for eighth note with stem down;;;
1D1E9;MUSICAL SYMBOL KIEVAN FLAT SIGN;So;0;L;;;;;N;;;;;
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References

- [1] Simmons, Nikita. “A Primer of Kievan Square-note (Quadratic or Synodal) Musical Notation”. Online resource: http://www.synaxis.info/psalom/research/simmons/Kievan_notation.pdf

- [2] Soloviev, D., *Краткое руководство к первоначальному изучению церковного пения по квадратной ноте. (A brief handbook for the study of church music written in square notation)*. St Petersburg, Russia, 1889.
- [3] *Обиход нотнаго пения употребительных церковных роспевов. (Obihod of scored music in common church chants)*. Moscow, Russia: Publishing Council of the Russian Orthodox Church, 2004.