

ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646¹
Please fill all the sections A, B and C below.
(Please read Principles and Procedures Document for guidelines and details before filling this form.)
See <http://www.dkuug.dk/JTC1/SC2/WG2/docs/summaryform.html> for latest Form.
See <http://www.dkuug.dk/JTC1/SC2/WG2/docs/principles.html> for latest Principles and Procedures document.
See <http://www.dkuug.dk/JTC1/SC2/WG2/docs/roadmaps.html> for latest roadmaps.

A. Administrative

1. Title: **Proposal to encode Greek Numerical characters in the UCS**
2. Requester's name: **Thesaurus Linguae Graecae Project (University of California, Irvine) and UTC**
3. Requester type (Member body/Liaison/Individual contribution): **Expert Contribution**
4. Submission date: **2003-06-11**
5. Requester's reference (if applicable):
6. This is a complete proposal:

B. Technical - General

1. (Choose one of the following:)
a. This proposal is for a new script (set of characters): _____
Proposed name of script:.
b. The proposal is for addition of character(s) to an existing block: **Yes**
Name of the existing block: **Ancient Greek Numerical Characters (10175-10189)**
2. Number of characters in proposal: **21**
3. Proposed category (see section II, Character Categories): **Category C**
4. Proposed Level of Implementation (1, 2 or 3) (see clause 14, ISO/IEC 10646-1: 2000): **Level 1**
Is a rationale provided for the choice? **No**
If Yes, reference:
5. Is a repertoire including character names provided? **Yes**
a. If YES, are the names in accordance with the 'character naming guidelines
in Annex L of ISO/IEC 10646-1: 2000? **Yes**
b. Are the character shapes attached in a legible form suitable for review? **Yes**
6. Who will provide the appropriate computerized font (ordered preference: True Type, or PostScript format) for
publishing the standard? **David Perry and TLG Project (True Type)**
If available now, identify source(s) for the font (include address, e-mail, ftp-site, etc.) and indicate the tools
used: **TLG Project, mcpantel@uci.edu**
a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided? **Yes**
b. Are published examples of use (such as samples from newspapers, magazines, or other sources)
of proposed characters attached? **Yes**
8. Special encoding issues:
Does the proposal address other aspects of character data processing (if applicable) such as input,
presentation, sorting, searching, indexing, transliteration etc. (if yes please enclose information)? **No**
9. Additional Information: **The property for these characters is So**
Submitters are invited to provide any additional information about Properties of the proposed Character(s) or Script that
will assist in correct understanding of and correct linguistic processing of the proposed character(s) or script. Examples
of such properties are: Casing information, Numeric information, Currency information, Display behaviour information
such as line breaks, widths etc., Combining behaviour, Spacing behaviour, Directional behaviour, Default Collation
behaviour, relevance in Mark Up contexts, Compatibility equivalence and other Unicode normalization related
information. See the Unicode standard at <http://www.unicode.org> for such information on other scripts. Also see
<http://www.unicode.org/Public/UNIDATA/UnicodeCharacterDatabase.html> and associated Unicode Technical Reports
for information needed for consideration by the Unicode Technical Committee for inclusion in the Unicode Standard.

¹ Form number: N2352-F (Original 1994-10-14; Revised 1995-01, 1995-04, 1996-04, 1996-08, 1999-03, 2001-05, 2001-09)

C. Technical - Justification

1. Has this proposal for addition of character(s) been submitted before? If YES explain _____	No
2. Has contact been made to members of the user community (for example: National Body, user groups of the script or characters, other experts, etc.)? If YES, with whom? The TLG has been in contact with experts in the field of Classics. Earlier versions of this proposal have been posted online and received comments by members of the profession. Proposal was reviewed by Dr. John Mansfield, Cornell University, Professor Jeffrey Rusten, Cornell University, Professor Roger Bagnall, Columbia University. If YES, available relevant documents: _____	Yes
3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included?	Scholarly community
4. The context of use for the proposed characters (type of use; common or rare): Reference:	Use varies See proposal
5. Are the proposed characters in current use by the user community? Characters are present primarily in ancient papyri and their modern editions. Used extensively by scholars of Greek. Reference:	See proposal
6. After giving due considerations to the principles in <i>Principles and Procedures document</i> (a WG 2 standing document) must the proposed characters be entirely in the BMP? If YES, is a rationale provided? If YES, reference:	No
7. Should the proposed characters be kept together in a contiguous range (rather than being scattered)?	Yes
8. Can any of the proposed characters be considered a presentation form of an existing character or character sequence? If YES, is a rationale for its inclusion provided? If YES, reference: _____	No
9. Can any of the proposed characters be encoded using a composed character sequence of either existing characters or other proposed characters? If YES, is a rationale for its inclusion provided? If YES, reference: _____	No
10. Can any of the proposed character(s) be considered to be similar (in appearance or function) to an existing character? A few glyph variants are similar to existing characters.	Yes
11. Does the proposal include use of combining characters and/or use of composite sequences (see clauses 4.12 and 4.14 in ISO/IEC 10646-1: 2000)? If YES, is a rationale for such use provided? If YES, reference: _____ Is a list of composite sequences and their corresponding glyph images (graphic symbols) provided? If YES, reference: _____	No
12. Does the proposal contain characters with any special properties such as control function or similar semantics? If YES, describe in detail (include attachment if necessary)	No
13. Does the proposal contain any Ideographic compatibility character(s)? If YES, is the equivalent corresponding unified ideographic character(s) identified? If YES, reference: _____	No

Introduction







Ancient Greeks used primarily alphabetic characters to represent numbers. A number of non-alphabetic symbols were also used and those are not currently present in the Unicode Standard. This proposal contains 21 Greek Numerical (non-alphabetic) characters. A transcribed papyrus which utilizes many of the characters proposed is appended to the end of this document.

These numerical characters appear in a large number of ancient papyri. They are the standard symbols used for the representation of numbers, fractions, weights and measures and have consistently been used in modern editions of Greek papyri as well as various publications related to the study and interpretation of ancient documents. The proposed characters are already present in existing non-Unicode Greek fonts and used consistently by the scholarly community.


The property for all characters is “Symbol, other” (So).

Standard Ancient Greek Numerical Symbols

Fractions







Name		Unicode	Glyph Variants, Notes, and Examples
Greek Symbol One Half			Versions without Unicode codepoints:  Glyph variants with Unicode codepoints:  2220 (Sm)  221F (Sm) Example: Kenyon 2.10
Greek Symbol Two-Thirds			Example: Hultsch 1.83
Greek Symbol Three-Quarters			Lower bulb descends slightly below line. Example: Kenyon 1.143

Weights, Measures and Money: Standard Greek Measure of Time

Greek Symbol Year			Descends slightly below line. May also be used as number signifier, half (but not in texts with Greek Half Symbol) or Drachma (but not in texts with Greek Drachma Symbol). Very commonly appears in texts with Greek Half Symbol and Greek Drachma Symbol, therefore not a glyph variant. Example: Kenyon 2.122
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Weights, Measures and Money: Standard Greek Weights and Money²

The ancient Greeks had two systems of measurement: one for wet, and one for dry products. The kotyle, which is the basic measure in both wet and dry systems, is made up of six kyathoi or four oxybapha. Its value is different depending on local variations, but it is roughly 1/4l.

Greek Symbol Talent			Glyph variants:  and  22BC and 2305 are similar to  , however these two characters have mathematical properties. 1 Talent is c.25.75kg and 6,000 Drachmas. Example: Bilabel 2307
Greek Symbol Large Stater		03A3	1 Large Stater is c. 860g and 200 Drachmas
Greek Symbol Mna	-	-	No standard Character. 1 Mna is c. 430g and 100 Drachmas.
Greek Symbol Small Stater		03A3	1 Small Stater is c. 8.6g and 2 Drachmas

² Ancient Greeks used the same terminology for weights and currency. Many local variations existed but the Attic-Euboic system appears to have been dominant and this is the system presented in the table below.

Greek Symbol Drachma	⊥		<p>Glyph variants:</p> <p>< 22D6 (Sm)</p> <p>< 003C</p> <p>⊥ 039B + 0325</p> <p>1 Drachma is <i>c.</i> 4.3g. Not the same as the currency symbol. Example: Heiberg 2.29</p>
Greek Symbol One Obol	ϝ		<p>Glyph variants:</p> <p>~ 007E</p> <p>ϝ 223D (Sm) (but needs to match 007E)</p> <p>\ 002F</p> <p>– 2013</p> <p>1 Obol is <i>c.</i> 0.7g and one sixth of a Drachma. Example: Hultsch 1.220 and Kenyon 1974: 129</p>
Greek Symbol Two Obols	Ϟ		<p>Glyph variants:</p> <p>≈ 2248 (Sm)</p> <p>= 003D</p> <p>Example: Hultsch 1.226</p>
Greek Symbol Three Obols	ϟ		<p>Glyph variants:</p> <p>ϟ (Descends slightly below line.)</p> <p>Γ 0393</p> <p>ϟ 0283</p> <p>Τ 03A4</p> <p>~ 223F (Sm)</p> <p>Example: Kenyon 1.142, Bilabel 1923:2306, 2314</p>
Greek Symbol Four Obols	Ϡ		<p>Descends slightly below line.</p> <p>Example: Kenyon 1.142</p>
Greek Symbol Five Obols	ϡ		<p>Descends slightly below line.</p> <p>Example: Kenyon 1.142</p>

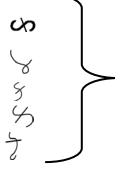

Weights, Measures and Money: Standard Greek Measures of Capacity

Greek Symbol Metretes	Ϸ		<p>Liquid measure.</p> <p>1 Metretes is <i>c.</i> 35l and 144 liquid Kotyles. Example: Kenyon 1.153</p>
Greek Symbol Chous	ϸ ^o	03C7 <superscript> 03BF	<p>Liquid measure.</p> <p>1 Chous is <i>c.</i> 3l and 12 liquid Kotyles.</p>
Greek Symbol Hemichous	-	-	<p>Liquid measure. No standard Character.</p> <p>1 Hemichous is <i>c.</i> 1.5l and 12 liquid Kotyles.</p>
Greek Symbol Medimnos	-	-	<p>Dry measure. No standard Character.</p> <p>1 Medimnos is <i>c.</i> 180l and 768 dry Kotyles.</p>
Greek Symbol Hekteus	-	-	<p>Dry measure. No standard Character.</p> <p>1 Hekteus is <i>c.</i> 30l and 128 dry Kotyles.</p>
Greek Symbol Choinix	-	-	<p>Dry measure. No standard Character.</p> <p>1 Choinix is <i>c.</i> 1l and 4 dry Kotyles</p>
Greek Symbol Kotyle	Ϲ ^o	See note	<p>Formed with Greek Kyathos Base Symbol + <superscript> 03BF</p> <p>Both a liquid and a dry measure. 1 Kotyle is <i>c.</i> 250ml.</p>

Greek Symbol Oxybaphon	-	-	Both a liquid and a dry measure. No standard Character. 1 Oxybaphon is c. 60ml and ¼ Kotyle.
Greek Symbol Kyathos Base	Κ		039A + 0337 Often written with <superscript> 03C5 after it. Dry measure. 1 Kyathos is c. 40ml and 1/6 Kotyle. Example: Hultsch 1.219


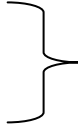

Weights, Measures and Money: Greek Characters for Roman Weights and Measures

Three Greek characters were used to represent weights (and occasionally measures) in the Roman system. The Roman system is based on the Libra or As, of 327.45g. This is divided into 12 Unciae. The Greek translations for these terms are Litra for Libra, and Ounkia³ for Uncia.

Greek Symbol Litra	ϗ		Example: Raeder 1.152
Greek Symbol Ounkia	Ϟ		Example: Hultsch 1.220
Greek Symbol Xestes	ϙ		<p>Versions without Unicode codepoints:</p>  <p>All glyph variants of each other. Preferred form is ϙ .</p> <p>Versions with Unicode codepoints:</p> <p>ϙ 03BE + 0338 ϙ 2241 (Sm)</p> <p>Problematic version:</p>  <p>Technically an abbreviation. Example: Hultsch 1.228</p>

³ Also *Onkia*. See LSJ 1268

Weights, Measures and Money: Greek Characters for non-Graeco-Roman Measures

Greek Symbol Artabe	— ◦		  <p>All glyph variants of each other. Preferred form is .</p> <p>ζ (Idiosyncratic)</p> <p>Versions without Unicode codepoints:</p> <p>< 003C ÷ 00F7</p> <p>Example: Kenyon 2.142</p>
Greek Symbol Aroua	ζ		<p>Descends slightly below line.</p> <p>Example: Kenyon 1.143</p>

Weights, Measures and Money: Ancient Greek Medical Measures

Greek Symbol Gramma	Γ ^ρ		Example: Hultsch.1.220
Greek Symbol Tryblion Base	Ϡ		<p>Descends slightly below line.</p> <p>Example: Hultsch.1.221</p>

Bibliography

- Dittenberger, W., *Inscriptiones Graecae* 7 (Berlin, 1892)
- Fraenkel, M., *Inscriptiones Graecae* 4 (Berlin 1873)
- Gardthausen, V., *Griechische Palaeographie*. 2 vols. (Lepizig, 1913)
- Heath, T. & Toomer, G.J., “Numbers, Greek” in *OCD*³ (Oxford, 1996) 1052-3
- Heath, T., *A History of Greek Mathematics* 2 vols. (Oxford, 1921)
- Hultsch, F., *Metrologorum scriptorum reliquae* (Stuttgart, 1971)
- Jeffery, L.H., *The Local Scripts of Archaic Greece* (Oxford, 1961)
- Larfeld, W., *Handbuch der griechischen Epigraphik* 2.2. *Die attischen Inschriften* (Leipzig, 1902)
- Oikonomides, A. N. (ed), *Abbreviations in Greek Inscriptions: Papyri, Manuscripts and Early Printed Books* (Chicago, 1974)
- Packard Humanities Institute (PHI) CD-ROM 7.0 (Packard Humanities Institute, 1996)
- Pririe, J.W., Jeffery, L.H. & Johnston, A.W., “Alphabet, Greek” in *OCD*³ (1996) 66
- Pryce, F.N., Lang, M.L. & Vickers, M. “Measures” in *OCD*³ (1996) 942-3
- Threatte, L., *The Grammar of Attic Inscriptions* 2 vols. (Berlin & New York, 1980 & 1996)

TABLE 10175: ANCIENT GREEK NUMERICAL

1017 1018

0		Ϟ
1		Ϛ
2		ϛ
3		Ϝ
4		ϝ
5	Ϟ	Ϟ
6	Ϛ	Ϛ
7	ϛ	ϛ
8	Ϝ	Ϝ
9	ϝ	ϝ
A	Ϟ	
B	Ϛ	
C	ϛ	
D	Ϝ	
E	ϝ	
F	Ϟ	

TABLE xx00-1F: ANCIENT GREEK NUMERICAL

hex	Name
10175	GREEK SYMBOL HALF TYPE ONE
10176	GREEK SYMBOL HALF TYPE TWO
10177	GREEK SYMBOL TWO-THIRDS
10178	GREEK SYMBOL THREE-QUARTERS
10179	GREEK SYMBOL YEAR
1017A	GREEK SYMBOL TALENT
1017B	GREEK SYMBOL DRACHMA
1017C	GREEK SYMBOL OBOL
1017D	GREEK SYMBOL TWO OBOLS
1017E	GREEK SYMBOL THREE OBOLS
1017F	GREEK SYMBOL FOUR OBOLS
10180	GREEK SYMBOL FIVE OBOLS
10181	GREEK SYMBOL METRETES
10182	GREEK SYMBOL KYATHOS BASE
10183	GREEK SYMBOL LITRA
10184	GREEK SYMBOL OUNKIA
10185	GREEK SYMBOL XESTES
10186	GREEK SYMBOL ARTABE
10187	GREEK SYMBOL AROURA
10188	GREEK SYMBOL GRAMMA
10189	GREEK SYMBOL TRYBLION BASE

Appendix

Examples of standard ancient Greek numerical symbols.

Example 1.⁴

(Col. 2.)

(Χοασονη Π ριος πρ' Επω ακα, αῦ / μ
 Δ β ις λο [Υ α λο] ξο [διοι' / μα β χ'] πρ' β / ο' χ' [ου' / η] = χ' / } νβ β χ')

Greek 3 Obol Symbol

Καλης αδε και Τικω[ς] φῶι ιδιο' αῦ / κ
 κα Υ d αλλ' Υ λο' [/ Υ d λο] διοι' / ε / ο' χ' πρ' [= χ'] / } ε

Greek Aroura Symbol

20 Μαρκος τ' Ηρατος και Φαηριος
 ου αμοντπωτ' ωνθ' Παμμονθ'
 πη' [περισ'] . . [π]η' α [διοι' / ε—] ο' προσ' = [/] ε / ο'

Greek Half Symbol (glyph variant)

Ο ουε ης αλλη' Υ Η 4 λο ιεῖ
 [} τιζ—ο'] προσ' [/ ιθ β /] / τλζ ο'

Greek 4 Obol Symbol

25 Θεωχ αδε το d αδε το d ις
 Υ . d [διοι' / κς πρ' α / κ] ζ β

Πετεχων ου δια ηους Μοσχων ηους φῶι ιδι[ο' αῦ] / κ Δ ρκη
 ηη Υ 4 σνς
 (Δ 4 ις λο [Υ] ις λο ξο αλλο [Δ] λο ρκη Υ ξο σνς) ξο' Υ σνς
 / Υ . . . [διοι' / β β ο' αλλο αῦ / μ κη Δ 4' [Υ ις διοι' /] β / } ε— [ο' πρ'] =
 / } ε / ο'

Greek 5 Obol Symbol

30 } τπα [β ο' διοι'] } μβ ο' χ' προσ' / [β χ'] ιερι } τιζ—ο' προσ' [σ' / θ β]

Example 2.⁵

13. Ἡ χίμη ἡ μεγάλη ἔχει Ϟ γ'. καὶ ἡ μικρὰ χίμη
 ἔχει Ϟ β.
 14. Τὸ ἀκάριον ἔχει Ϟ β'.
 15. Τὸ κοχλιάριον ἔχει
 16. Ὁ κύαθος Ϟ ι', Ϟ δὲ ἀ' δ'', γραμμάρια λ', ὄβο-
 λους ξ', θέρμους Ϟ', κεράτια δὲ ρπ', χαλκοὺς δὲ υπ',

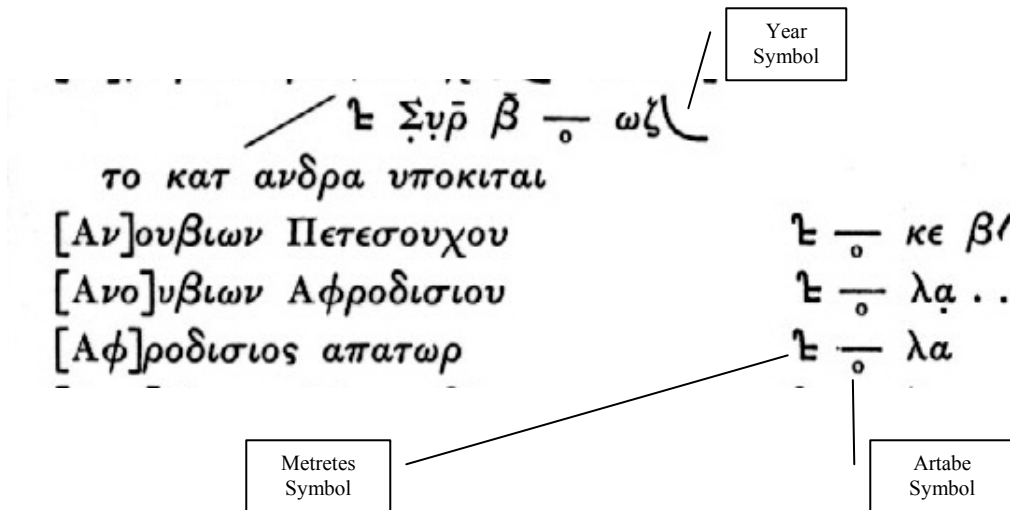
Drachma

Gramma

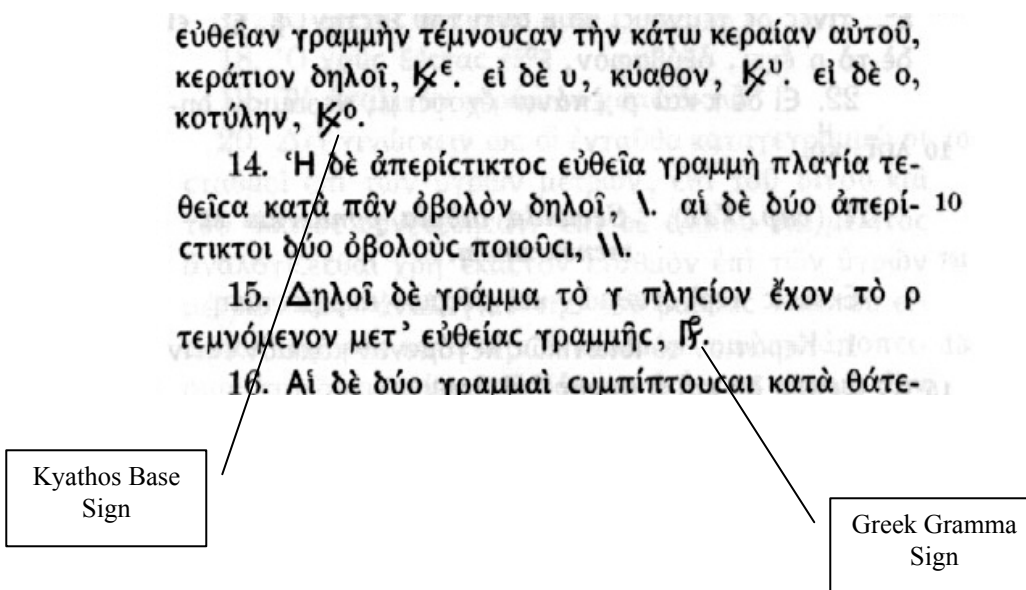
⁴ Kenyon, F.G., *Greek Papyri in the British Museum I* (London, 1893) 143. Characters found in this image but not in the table below are glyph variants of existing Greek letters or characters proposed below.

⁵ Hultsch, F., *Metrológocorum scriptorum reliquae* (Stuttgart, 1971) 255

Example 3.⁶



Example 4.⁷



⁶ Kenyon, F.G., *Greek Papyri in the British Museum I* (London, 1893) 98

⁷ Hultsch, F., *Metrologorum scriptorum reliquae* (Stuttgart, 1971) 227