

Title: Towards an Encoding for Coptic Numbers in the UCS
Source: Script Encoding Initiative (SEI)
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1 Introduction

A set of characters used for representing numbers in Coptic was described by the present author in L2/09-163R (“Proposal to Encode Coptic Numerals in ISO/IEC 10646”). Several changes to the original document have been made, including change of name of the script block from “Coptic Numerals” to “Coptic Numbers”; development of a draft font; addition of a code chart and names list; and allocation of the block in the Supplementary Multilingual Plane (SMP).

There are a few concerns regarding the character repertoire and the name for the script block. These issues are discussed in Section 6. Advice is sought from the Unicode Technical Committee and additional Copticians regarding these issues.

2 Background

The proposed characters are elements of a numeric notation system used in some Coptic manuscripts, which differ from the standard representation of numbers using letters of the alphabet. A comparison of the two systems is given in Table 1. The numbers are reputed to be ‘cursive’ forms of Coptic letters. In *Grammaire Copte* (1956), Alexis Mallon shows a possible derivation of the numbers from letters of the Coptic alphabet; he calls them ‘cursive Coptic numbers’ (“chiffres coptes cursifs”). It is believed that these numbers were used primarily in Coptic-Arabic manuscripts, such as that shown in Figure 2. They appear in Coptic manuscript fragments in the collection of the AHRC Rylands Cairo Genizah Project at the University of Manchester (Figure 3).

The Coptic Numbers were not included by Michael Everson in N2636 “Revised proposal to add the Coptic alphabet to the BMP of the UCS”. The proposed Coptic Numbers appear in Figure 14 of N2636, an excerpt of which is given here in Figure 6. In the caption for the figure, Everson writes that “further study may indicate that some of the additional characters and symbols shown here should also be added to the Standard”. Indeed, additional research has shown that the ‘Signes de numération’ illustrated in the figure were also described by Antoine P. Pihan in *Exposé des signes de numération* (see Figure 4). An encoding for the Coptic Numbers will enhance the Coptic repertoire by offering a means for representing characters used in Coptic-Arabic manuscripts.

3 Characters Proposed

The proposed code chart and names list are shown in Figure 1. Digits 1–9 are named `DIGIT`; all others are named `NUMBER` for consistency within the Universal Character Set.

4 The Notation System

Structure Coptic Numbers represent units of a positional decimal system. The system is additive, that is, the value of a number is the sum of the values of the numbers that constitute it. There is no character for zero; it is inherently represented in the distinct number for each decimal orders. The number are written left-to-right. The system has unique characters for representing decimal orders of the primary, tens, and hundreds units. The thousands are represented by writing a slash-mark beneath the numbers.

Orthography The thousands are represented by writing the primary number and $\overset{\circ}{\text{O}}$ THOUSANDS MARK: $\text{Ⲝ} \text{FIVE} + \overset{\circ}{\text{O}}$ THOUSANDS MARK = $\text{Ⲝ} \text{Ⲙ}$ 5,000. The ten thousands are written using the tens number and the THOUSANDS MARK: $\text{Ⲛ} \text{FIFTY} + \overset{\circ}{\text{O}}$ THOUSANDS MARK = $\text{Ⲛ} \text{Ⲙ}$ 50,000. The hundred thousands are written with the numbers for the hundreds and the THOUSANDS MARK: $\text{Ⲓ} \text{FIVE HUNDRED} + \overset{\circ}{\text{O}}$ THOUSANDS MARK = $\text{Ⲓ} \text{Ⲙ}$ 500,000.

Decimal orders larger than hundred thousand may be represented by stacking the THOUSANDS MARK. This practice mirrors the principle of writing numbers using letters of the Coptic alphabet, where the overline $\overline{\text{O}}$ U+0305 COMBINING OVERLINE is doubled to indicate the orders of the thousands, eg. $\overline{\overline{\text{O}}}$.

Composite numbers are produced using the primary numbers and the numbers of larger decimal orders. The larger numeral is written first, then the primary numeral: $\text{Ⲙ} \text{Ⲝ} \text{Ⲙ}$ 25 (TWENTY + FIVE); $\text{Ⲙ} \text{Ⲝ} \text{Ⲝ}$ 205 (TWO HUNDRED + FIVE); $\text{Ⲙ} \text{Ⲛ} \text{Ⲝ}$ 250 (TWO HUNDRED + FIFTY).

Numbers are marked using the $\overset{\sim}{\text{O}}$ COPTIC NUMBER MARK. The length of the NUMBER MARK extends over the entire sequence of numbers: $\overset{\sim}{\text{Ⲝ} \text{Ⲙ}}$ 15; $\overset{\sim}{\text{Ⲓ} \text{Ⲛ} \text{Ⲝ}}$ 550; $\overset{\sim}{\text{Ⲓ} \text{Ⲓ} \text{Ⲝ} \text{Ⲙ}}$ 5,505.

5 Implementation

Allocation Coptic Numbers are allocated at the range U+102E0..U+102FF in the Supplementary Multilingual Plane (SMP).

Character Properties The proposed characters have the following properties:

```

102E0 COPTIC THOUSANDS MARK;Mn;0;NSM;;;1000;N;;;;;
102E1 COPTIC DIGIT ONE;No;0;L;;;1;N;;;;;
102E2 COPTIC DIGIT TWO;No;0;L;;;2;N;;;;;
102E3 COPTIC DIGIT THREE;No;0;L;;;3;N;;;;;
102E4 COPTIC DIGIT FOUR;No;0;L;;;4;N;;;;;
102E5 COPTIC DIGIT FIVE;No;0;L;;;5;N;;;;;
102E6 COPTIC DIGIT SIX;No;0;L;;;6;N;;;;;
102E7 COPTIC DIGIT SEVEN;No;0;L;;;7;N;;;;;
102E8 COPTIC DIGIT EIGHT;No;0;L;;;8;N;;;;;
102E9 COPTIC DIGIT NINE;No;0;L;;;9;N;;;;;
102EA COPTIC NUMBER TEN;No;0;L;;;10;N;;;;;
102EB COPTIC NUMBER TWENTY;No;0;L;;;20;N;;;;;
102EC COPTIC NUMBER THIRTY;No;0;L;;;30;N;;;;;
102ED COPTIC NUMBER FORTY;No;0;L;;;40;N;;;;;
102EE COPTIC NUMBER FIFTY;No;0;L;;;50;N;;;;;
102EF COPTIC NUMBER SIXTY;No;0;L;;;60;N;;;;;
102F0 COPTIC NUMBER SEVENTY;No;0;L;;;70;N;;;;;
102F1 COPTIC NUMBER EIGHTY;No;0;L;;;80;N;;;;;
102F2 COPTIC NUMBER NINETY;No;0;L;;;90;N;;;;;
102F3 COPTIC NUMBER ONE HUNDRED;No;0;L;;;100;N;;;;;
102F4 COPTIC NUMBER TWO HUNDRED;No;0;L;;;200;N;;;;;
102F5 COPTIC NUMBER THREE HUNDRED;No;0;L;;;300;N;;;;;

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102F6 COPTIC NUMBER FOUR HUNDRED;No;0;L;;;;400;N;;;;;
102F7 COPTIC NUMBER FIVE HUNDRED;No;0;L;;;;500;N;;;;;
102F8 COPTIC NUMBER SIX HUNDRED;No;0;L;;;;600;N;;;;;
102F9 COPTIC NUMBER SEVEN HUNDRED;No;0;L;;;;700;N;;;;;
102FA COPTIC NUMBER EIGHT HUNDRED;No;0;L;;;;800;N;;;;;
102FB COPTIC NUMBER NINE HUNDRED;No;0;L;;;;900;N;;;;;
102FC COPTIC NUMBER MARK;So;0;L;;;;N;;;;;

```

6 Issues

1. **Name** Based upon advice from the UTC, the name for the block was changed from ‘Coptic Numerals’ to ‘Coptic Numbers’. Terry Wilfong, an Egyptologist, expressed concern with the name. He indicated that the numbers are a late innovation, not standard Coptic usage, and are used only in Coptic-Arabic manuscripts. He suggested that the block be renamed in order to indicate the non-standard usage of the numbers. Would it be appropriate to rename the block as ‘Coptic Arabic Numbers’?
2. **Character Repertoire** Michael Everson recommended against the encoding of COPTIC NUMBER MARK, stating that Copticists would prefer to use U+0305 COMBINING OVERLINE, as is the standard convention for writing numbers. Everson’s recommendation is acceptable. However, does the UTC see any reason to include COPTIC NUMBER MARK?
3. **Suitability for Encoding** It is likely that the numbers are variations on the standard cursive forms of Coptic letters. However, the fact that they are depicted uniquely in Figure 4 and Figure 6 suggests that they were considered sufficiently distinct from the original alphabetic sources. Is it possible to unify these characters with existing Coptic letters or is an independent encoding justified?






























7 References

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8 Acknowledgments

I would like to thank Traianos Gagos and Terry Wilfong, both of the University of Michigan, for sharing their comments on L2/09-163R.










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	102E	102F
0	 102E0	 102F0
1	 102E1	 102F1
2	 102E2	 102F2
3	 102E3	 102F3
4	 102E4	 102F4
5	 102E5	 102F5
6	 102E6	 102F6
7	 102E7	 102F7
8	 102E8	 102F8
9	 102E9	 102F9
A	 102EA	 102FA
B	 102EB	 102FB
C	 102EC	 102FC
D	 102ED	
E	 102EE	
F	 102EF	



















Sign

102E0  COPTIC THOUSANDS MARK

Digits

- 102E1  COPTIC DIGIT ONE
- 102E2  COPTIC DIGIT TWO
- 102E3  COPTIC DIGIT THREE
- 102E4  COPTIC DIGIT FOUR
- 102E5  COPTIC DIGIT FIVE
- 102E6  COPTIC DIGIT SIX
- 102E7  COPTIC DIGIT SEVEN
- 102E8  COPTIC DIGIT EIGHT
- 102E9  COPTIC DIGIT NINE

Numbers

- 102EA  COPTIC NUMBER TEN
- 102EB  COPTIC NUMBER TWENTY
- 102EC  COPTIC NUMBER THIRTY
- 102ED  COPTIC NUMBER FORTY
- 102EE  COPTIC NUMBER FIFTY
- 102EF  COPTIC NUMBER SIXTY
- 102F0  COPTIC NUMBER SEVENTY
- 102F1  COPTIC NUMBER EIGHTY
- 102F2  COPTIC NUMBER NINETY
- 102F3  COPTIC NUMBER ONE HUNDRED
- 102F4  COPTIC NUMBER TWO HUNDRED
- 102F5  COPTIC NUMBER THREE HUNDRED
- 102F6  COPTIC NUMBER FOUR HUNDRED
- 102F7  COPTIC NUMBER FIVE HUNDRED
- 102F8  COPTIC NUMBER SIX HUNDRED
- 102F9  COPTIC NUMBER SEVEN HUNDRED
- 102FA  COPTIC NUMBER EIGHT HUNDRED
- 102FB  COPTIC NUMBER NINE HUNDRED

Number Mark

102FC  COPTIC NUMBER MARK

Figure 1: Proposed code chart and nameslist for Coptic Numbers

	1	2	3	4	5	6	7	8	9
1	ⲃ ⲁ̄	ⲟ Ⲃ̄	ⲛ ⲥ̄	ⲉ ⲗ̄	ⲕ ⲉ̄	ⲛ ⲙ̄	ⲟ ⲟ̄	ⲃ Ⲉ̄	ⲑ Ⲑ̄
10	ⲛ ⲓ̄	ⲟ ⲕ̄	ⲛ ⲗ̄	ⲉ ⲙ̄	ⲕ Ⲏ̄	ⲛ ⲟ̄	ⲟ ⲏ̄	ⲃ ⲡ̄	ⲑ ⲑ̄
100	ⲛ ⲡ̄	ⲟ ⲥ̄	ⲛ ⲧ̄	ⲉ ⲣ̄	ⲕ Ⲟ̄	ⲛ ⲟ̄	ⲟ ⲟ̄	ⲃ Ⲟ̄	ⲑ ⲧ̄
1,000	ⲛ ⲁ̄	ⲟ Ⲃ̄	ⲛ ⲥ̄	ⲉ ⲗ̄	ⲕ ⲉ̄	ⲛ ⲙ̄	ⲟ ⲟ̄	ⲃ Ⲉ̄	ⲑ Ⲑ̄
10,000	ⲛ ⲓ̄	ⲟ ⲕ̄	ⲛ ⲗ̄	ⲉ ⲙ̄	ⲕ Ⲏ̄	ⲛ ⲟ̄	ⲟ ⲏ̄	ⲃ ⲡ̄	ⲑ ⲑ̄
100,000	ⲛ ⲡ̄	ⲟ ⲥ̄	ⲛ ⲧ̄	ⲉ ⲣ̄	ⲕ Ⲟ̄	ⲛ ⲟ̄	ⲟ ⲟ̄	ⲃ Ⲟ̄	ⲑ ⲧ̄

Table 1: Numbers written using Coptic Numbers (top) and the alphabetic system (bottom).

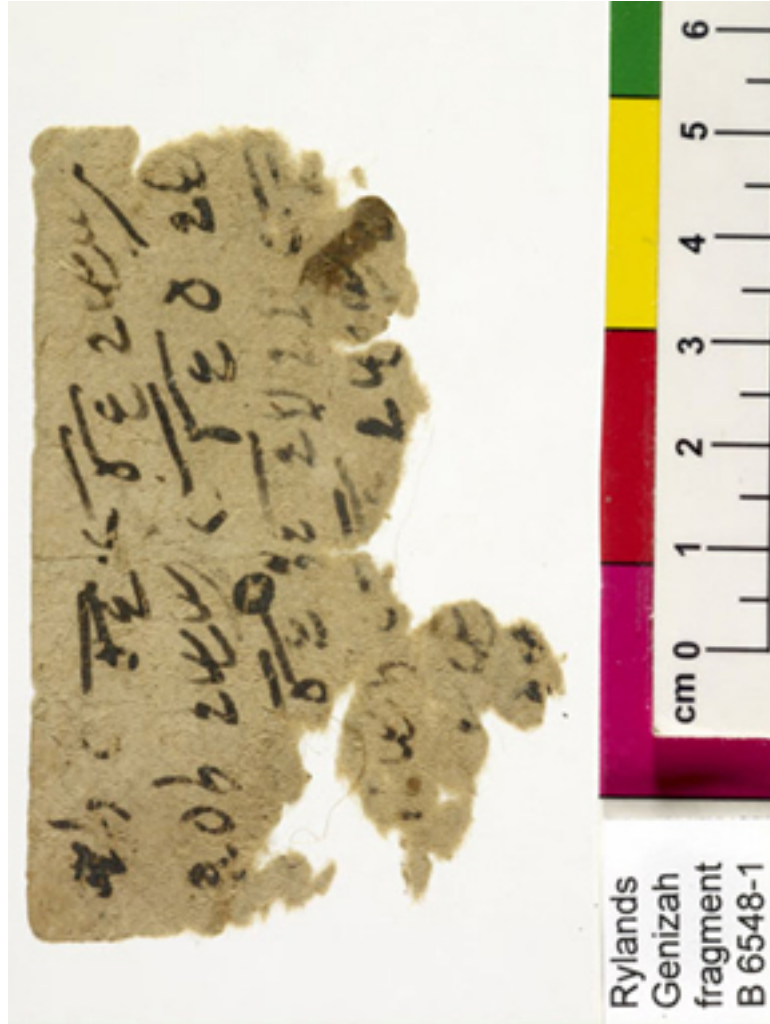


Figure 3: Coptic numbers in a manuscript fragment from the Rylands Genizah collection (from AHRC Rylands Cairo Genizah Project: fragment B 6548-1).

UNITÉS.								
ⲁ	Ⲃ	ⲃ	Ⲅ	ⲅ	Ⲇ	ⲇ	Ⲉ	ⲉ
1	2	3	4	5	6	7	8	9
DIZAINES.								
Ⲑ	ⲑ	Ⲓ	ⲓ	Ⲕ	ⲕ	Ⲍ	ⲍ	Ⲏ
10	20	30	40	50	60	70	80	90
CENTAINES.								
ⲏ	Ⲑ	ⲑ	Ⲓ	ⲓ	Ⲕ	ⲕ	Ⲍ	ⲍ
100	200	300	400	500	600	700	800	900
MILLE.								
Ⲏ	ⲏ	Ⲑ	ⲑ	Ⲓ	ⲓ	Ⲕ	ⲕ	Ⲍ
1,000	2,000	3,000	4,000	5,000	6,000	7,000	8,000	9,000
DIZAINES DE MILLE.								
ⲏ	Ⲑ	ⲑ	Ⲓ	ⲓ	Ⲕ	ⲕ	Ⲍ	ⲍ
10,000	20,000	30,000	40,000	50,000	60,000	70,000	80,000	90,000

Figure 4: Table showing the forms of Coptic Numbers (from Pihan 1860: 213). Compare the Coptic Numbers to the alphabetic system system shown in Figure 7.

EXEMPLES DE NOMBRES COMPOSÉS.

ⲥⲁ	Ⲉⲏ	Ⲑⲓⲃ	ⲕⲟ	ⲁⲓⲃⲧⲏ	ⲏⲏⲓⲃⲏ
16	45	803	4,370	38,491	752,020

Figure 5: Table showing composite numbers written with Coptic Numbers (from Pihan 1860: 214).

Chiffres coptes cursifs.

1	ā	ⲁ	ⲁ	ⲁ	ⲁ	70	ō	ⲟ	ⲟ	ⲟ
2	ḅ	ⲃ	ⲃ			80	ḥ	Ⲅ	Ⲅ	Ⲅ
3	ṯ	ⲅ	ⲅ	ⲅ		90	ḳ	Ⲇ	Ⲇ	Ⲇ
4	ā	ⲇ	ⲇ	ⲇ		100	ḫ	Ⲉ	Ⲉ	Ⲉ
5	ē	ⲉ	ⲉ	ⲉ		200	ḏ	Ⲋ	Ⲋ	
6	ē	ⲋ	ⲋ	ⲋ	ⲋ	300	ṯ	Ⲍ	Ⲍ	Ⲍ
7	z̄	ⲍ	ⲍ	ⲍ	ⲍ	400	ṽ	Ⲏ		
8	ḥ	ⲏ	ⲏ	ⲏ	ⲏ	500	ḥ	Ⲑ		
9	ō	ⲑ	ⲑ	ⲑ	ⲑ	600	ḳ	Ⲓ		
10	ī	ⲓ	ⲓ	ⲓ	ⲓ	700	ṽ	Ⲕ		
20	k̄	ⲕ	ⲕ			800	ḫ	Ⲗ		
30	ā	ⲗ	ⲗ	ⲗ	ⲗ	900	ḫ	Ⲙ	Ⲙ	Ⲙ
40	ū	ⲙ	ⲙ	ⲙ	ⲙ	1000	ā	Ⲛ	Ⲛ	Ⲛ
50	ḥ	ⲛ	ⲛ	ⲛ		2000	ḥ	Ⲝ	Ⲝ	Ⲝ
60	z̄	ⲝ	ⲝ	ⲝ	ⲝ	3000	ṯ	Ⲟ	Ⲟ	Ⲟ

Figure 8: Table showing the Coptic numbers (from Mallon 1956: 234).