
Another View of Ethiopic Number Sequences

by Daniel Yacob

If you are like me, you probably have not seen any Ethiopic numbers in any value larger than what would be used for writing years; and may be uncertain about the rules for writing numbers greater than 10,000. Also, if you are like me, in fact you would have to be almost exactly like me, you were sketching out Arabic to Ethiopic number conversion algorithms during lunch today, and actually enjoying it. But if you were this much like me you would also be writing now in which case one or both of us would cease to exist under The Cosmic Absurdity Theorem which by requirement initiates the collapse of the known universe. So, I hope it is just me...

...if you do find numbers interesting then read on...

The purpose of this posting is to get feedback to see if I am totally wrong on the mechanics of Ethiopic numbers as I have perceived them. Converting an Ethiopic string of numbers into a second system is trivial, converting from another system into Ethiopic I found requires a little more care.

Notation:

A^B	\Rightarrow	B is the exponent of A
A/B	\Rightarrow	integer division of A by B
$A \times B$	\Rightarrow	A multiplied by B
$A \% B$	\Rightarrow	A in the modulo class of B
(A)	\Rightarrow	"A" is the Fidel equivalent
$[A] (B)$	\Rightarrow	A instances of (B), Example: $[3] (B) = (B) (B) (B)$

Let's take an arbitrary string of what we call Arabic numerals:

EeDdCcBbAa

The decimal expansion is the same in both systems, but to rewrite the string in Ethiopian numbers a delimiter of sorts appears:

$$(E \times 10) (e) + 10^8 + (D \times 10) (d) + 10^6 + (C \times 10) (c) + 10^4 + (B \times 10) (b) + 10^2 + (A \times 10) (a)$$

The delimiter that appears are the orders of 10 that must be inserted in the string as additional Ethiopic numerals. Observing that they are the exponents are all divisible by 2 we perform a simple shift of this index:

$$(E \times 10) (e) + 100^4 + (D \times 10) (d) + 100^3 + (C \times 10) (c) + 100^2 + (B \times 10) (b) + 100^1 + (A \times 10) (a)$$

This form is more insightful as it becomes apparent soon that the orders-of-100 delimiters are really sequences of the two Ethiopic numbers “፻” (100) and “፳፻” (10,000).

The exponents “i” of 100^i then tells us how many ፻ numbers and how many ፳፻ numbers are needed. It is also quick to see that we only need the number ፻ when i is odd. We can take i-1 (or i alone when i is even) to tell us how many ፳፻ numerals to write. Our string is then:

$$(E \times 10) (e) (\text{፳፻}) (\text{፳፻}) (D \times 10) (d) (\text{፻}) (\text{፳፻}) (C \times 10) (c) (\text{፳፻}) (B \times 10) (b) (\text{፻}) (A \times 10) (a)$$

The compacted formula for 100^i interpretation:

$$100^i = [i\%2] (\text{፩}) [i/2] (\text{፪})$$

An example I can verify is for a year such as 1988 which becomes:

$$1988 = (1 \times \text{፩}) (\text{፪}) + \text{፪}^1 + (\text{፭} \times \text{፩}) (\text{፭}) = (\text{፩}) (\text{፪}) (\text{፪}) (\text{፭}) (\text{፭})$$

but this is a small number and again I truly don't know if dates are an exception or not. I would hope counting rules work independent of their application.

Author's Note

This article is the first in a series of numeral algorithms developed and published over several years. While the algorithm presented is believed to be valid, the paper should be considered as having been superseded by later papers, and ultimately the final paper: [A Look at Ethiopic Numerals](#).

The complete numeral algorithm series:

- 1994, *Another View of Ethiopic Number Sequences*, originally posted to the “EthioSciences” email list of the EthioList mail server. Then later published as a web page under the Abyssinia Cyberspace Gateway: <http://abyssiniagateway.net/fidel/EthNumbers.html> , at Academia.edu https://www.academia.edu/127879191/Another_View_of_Ethiopic_Number_Sequences
- 1995, *Altered Perspectives and Insight to Algorithm – an Illustration of the Glyph Arithmetic Development of Ethiopic Numbers*, Abyssinia Cyberspace Gateway, <http://abyssiniagateway.net/fidel/Enums.html> , at Academia.edu https://www.academia.edu/127879201/Altered_Perspectives_and_Insight_to_Algorithm_an_Illustration_of_the_Glyph_Arithmetic_Development_of_Ethiopic_Numbers
- 1997, *Daniel's Ethiopic Number Algorithm #4*, Abyssinia Cyberspace Gateway, <http://abyssiniagateway.net/fidel/EthNumbers97.html> , at Academia.edu https://www.academia.edu/127879205/Daniel_s_Ethiopic_Number_Algorithm_4
- 2000, *A Look at Ethiopic Numerals*, 2000, <https://www.geez.org/Numerals/>, Geez.Org. A form of this article was published under the title “*Conversion and Formatting of Ethiopic Numerals*”, in Multilingual Magazine, November, 2000. At Academia.edu https://www.academia.edu/127115901/A_Look_at_Ethiopic_Numerals