

Proposal to Encode TURNED DIGIT ONE for Balanced Ternary

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Target Block: Number Forms (U+218x)

1. Abstract

This document proposes the addition of **TURNED DIGIT ONE (𐌒)** to the Unicode Standard. The character represents the negative unity digit (-1) in balanced ternary numeral systems. It has documented historical usage in mid-20th-century computer science literature, most notably in technical documentation for the Soviet *Setun* ternary computer system.

2. Character Properties

- **Proposed Name:** TURNED DIGIT ONE
- **Proposed Code Point:** U+218C (or next available slot in Number Forms)
- **General Category:** No (Number, Other)
- **Numeric Type:** Nu (Numeric)
- **Numeric Value:** -1
- **Bidirectional Class:** EN (European Number)
- **Combining Class:** 0 (Not combining)

3. Historical and Technical Justification

Background

Balanced ternary is a non-standard positional numeral system using base 3 with the digit set {-1, 0, +1}. Unlike standard binary or decimal systems, balanced ternary can represent negative values without a separate sign bit or leading minus sign.

In early ternary computing systems—most famously the **Setun** computer developed at Moscow State University in 1958 under Nikolai Brusentsov—the negative digit -1 was represented in printed materials as a rotated or turned digit 1 (𐌒).

Evidence of Existing Usage

The primary documented usage appears in foundational Soviet computer science literature regarding the Setun:

Primary Citation:

N. A. Krinitsky, G. A. Mironov, and G. D. Frolov, "*Chapter 10: Program-controlled machine Setun*," in *Programming* (in Russian), ed. M. R. Shura-Bura (Moscow: GTTI, 1963).

In Chapter 10 of this text, balanced ternary sequences are printed using ↓, 0, 1, to represent ternary words directly without resorting to multi-character representations like -1 or non-standard ASCII substitutions like - or T.

Technical Requirement

Currently, plain-text representation of balanced ternary forces users to rely on:

1. Multi-character sequences (e.g., -1), which breaks column alignment and byte-to-character equivalence in fixed-width displays.
2. Arbitrary text substitutes like - or T, which lack standard numeric semantics and disrupt text-to-speech engine parsing.
3. Combining characters (e.g., 1 + combining overbar U+0305), which fail when standard digit processing routines require a single, atomic numeric character.

Existing multi-character and combining alternatives are incompatible with segmented digital displays; conversely, a turned digit one mapped to a single display cell is natively implementable on standard nine-segment displays. Encoding TURNED DIGIT ONE (↓) resolves these interoperability issues and preserves historical computer science literature in digital archives.

4. Glyph Representation

- **Primary Glyph:** A standard digit 1 rotated 180 degrees (↓), sharing the baseline, cap-height, and font metrics of standard digits 0 through 9.
- **Font Metrics:** Must match standard fixed-width and proportional numeral sets for uniform tabular display.

5. ISO/IEC 10646 Information

1. **Has this character been submitted before?** No.
2. **Will the character be used in script mixing?** No, it functions strictly within numeric and mathematical contexts.
3. **Can it be represented as a glyph variant or sequence?** No. While visually a turned version of U+0031, it carries distinct semantic meaning as an atomic negative digit in positional arithmetic.

6. References

I cannot provide a visual reference for the N. A. Krinitsky, G. A. Mironov, and G. D. Frolov, "Chapter 10: Program-controlled machine Setun," in *Programming* (in Russian), ed. M. R. Shura-Bura (Moscow: GTTI, 1963) citation as I have no access to the book.

There is plenty of evidence of TURNED DIGIT ONE (↵) use on the web, as depicted in the following resources:

- **The Base Some Computers Use Instead of Binary:** https://youtu.be/yfQVL0_POKg
- **Balanced Ternary Tribble:** https://youtu.be/-Wx_IZjjkss
- **Setun Computer:** https://en.wikipedia.org/wiki/Balanced_ternary

P.S.

I don't know if you have noticed, but people don't print much anymore. They are stuck using the symbols you give them. It would be nice if you made it easier to evolve with technology. Just look at this example. Wikipedia uses the capital letter T as a symbol for -1. It also mentions my citation (https://en.wikipedia.org/wiki/Balanced_ternary). Notice how much more intuitive and visually satisfying the YouTube videos are. The TURNED DIGIT ONE (↵) symbol truly conveys a sense of balance of the system to the viewer.

ISO/IEC JTC 1/SC 2/WG 2
PROPOSAL SUMMARY FORM TO ACCOMPANY SUBMISSIONS
FOR ADDITIONS TO THE REPERTOIRE OF ISO/IEC 10646

A. Administrative

1. Title:	Proposal to encode TURNED DIGIT ONE for Balanced Ternary
2. Requester's name:	Adam Victor
3. Requester type:	Individual contribution
4. Submission date:	2026-08-14
5. Requester's reference (if applicable):	Proposal to encode TURNED DIGIT ONE for Balanced Ternary
6. Choose one of the following:	
This is a complete proposal:	Yes
(or) More information will be provided later:	

B. Technical – General

1. Choose one of the following:	
a. This proposal is for a new script (set of characters):	No
Proposed name of script:	
b. The proposal is for addition of character(s) to an existing block:	Yes
Name of the existing block:	
2. Number of characters in proposal:	1
3. Proposed category (select one from below - see section 2.2 of P&P document):	
A-Contemporary ☒ B.1-Specialized (small collection) ☐ B.2-Specialized (large collection) ☐	
C-Major extinct ☐ D-Attested extinct ☐ E-Minor extinct ☐	
F-Archaic Hieroglyphic or Ideographic ☐ G-Obscure or questionable usage symbols ☐	
4. 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 P&P document?	Yes
b. Are the character shapes attached in a legible form suitable for review?	/
5. Fonts related:	
a. Who will provide the appropriate computerized font to the Project Editor of 10646 for publishing the standard?	
	Adam Victor
b. Identify the party granting a license for use of the font by the editors (include address, e-mail, ftp-site, etc.):	
	Adam Victor
6. References:	
a. Are references (to other character sets, dictionaries, descriptive texts etc.) provided?	/
b. Are published examples of use (such as samples from newspapers, magazines, or other sources) of proposed characters attached?	Yes
7. 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)?	
/	

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? _____ If YES, available relevant documents: _____	No
3. Information on the user community for the proposed characters (for example: size, demographics, information technology use, or publishing use) is included? Reference: _____	No
4. The context of use for the proposed characters (type of use; common or rare) Reference: _____	Common
5. Are the proposed characters in current use by the user community? If YES, where? Reference: _____	Yes
6. After giving due considerations to the principles in the P&P document must the proposed characters be entirely in the BMP? If YES, is a rationale provided? If YES, reference: _____	Yes 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: _____	
10. Can any of the proposed character(s) be considered to be similar (in appearance or function) to, or could be confused with, an existing character? If YES, is a rationale for its inclusion provided? If YES, reference: _____	No
11. Does the proposal include use of combining characters and/or use of composite sequences? 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: _____	No
13. Does the proposal contain any Ideographic compatibility characters? If YES, are the equivalent corresponding unified ideographic characters identified? If YES, reference: _____	No

UnicodeData.txt

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1 1 Class: EN (European Number);TURNED DIGIT ONE;No;0;EN;;-1;-1;-1;N;;;;;
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