



A. Rationale (informative annex)

A.1 Introduction

A.1.1 Purpose

A.1.2 Scope

This Standard is more extensive than previous industry standards for the Forth language. Several things made this necessary:

- the desire to resolve conflicts between previous standards;
- the need to eliminate semantic ambiguities and other inadequacies;
- the requirement to standardize common practice, where possible resolving divergences in a way that minimizes the cost of compliance;
- the desire to standardize common system techniques, including those germane to hardware.

The result of the effort to satisfy all of these objectives is a Standard arranged so that the required word set remains small. Thus ANS Forth can be provided for resource-constrained embedded systems. Words beyond those in the required word set are organized into a number of optional word sets and their extensions, enabling implementation of tailored systems that are Standard.

When judging relative merits, the members of the X3J14 Technical Committee were guided by the following goals (listed in alphabetic order):

Consistency

The Standard provides a functionally complete set of words with minimal functional overlap.

Cost of compliance

This goal includes such issues as common practice, how much existing code would be broken by the proposed change, and the amount of effort required to bring existing applications and systems into conformity with the Standard.

Efficiency

Execution speed, memory compactness.

Portability

Words chosen for inclusion should be free of system-dependent features.

Readability

Forth definition names should clearly delineate their behavior. That behavior should have an apparent simplicity which supports rapid understanding. Forth should be easily taught and support readily maintained code.

Utility

Be judged to have sufficiently essential functionality and frequency of use to be deemed suitable for inclusion.

A.1.3 Document organization

A.1.3.1 Word sets

From the beginning, the X3J14 Technical Committee faced not only conflicting ideas as to what **real** Forth is, but also conflicting needs of the various groups within the Forth community. At one extreme were those who pressed for a **bare** Forth. At the other extreme were those who wanted a **fat** Forth. Many were somewhere in between. All were convinced of the rightness of their own position and of the wrongness of at least one of the two extremes. The committee's composition reflected this full range of interests.

The approach we have taken is to define a [Core word set](#) establishing a greatest lower bound for required system functionality and to provide a portfolio of optional word sets for special purposes. This simple approach parallels the

fundamental nature of Forth as an extensible language, and thereby achieves a kind of meta-extensibility.

With this key, high-level compromise, regardless of the actual makeup of the individual word sets, a firm and workable framework is established for the long term. One may or may not agree that there should be a [Locals word set](#), or that the word [COMPILE](#), belongs in the [Core Extensions word set](#). But at least there is a mechanism whereby such things can be included in a logical and orderly manner.

Several implications of this scheme of optional word sets are significant.

First, ANS Forth systems can continue to be implemented on a greater range of hardware than could be claimed by almost any other single language. Since only the Core word set is required, very limited hardware will be able to accommodate an ANS Forth implementation.

Second, a greater degree of portability of applications, and of programmers, is anticipated. The optional word sets standardize various functions (e.g., floating point) that were widely implemented before, but not with uniform definition names and methodologies, nor the same levels of completeness. With such words now standardized in the optional word sets, communications between programmers - verbally, via magazine or journal articles, etc. - will leap to a new level of facility, and the shareability of code and applications should rise dramatically.

Third, ANS Forth systems may be designed to offer the user the power to selectively, even dynamically, include or exclude one or more of the optional word sets or portions thereof. Also, lower-priced products may be offered for the user who needs the Core word set and not much more. Thus, virtually unlimited flexibility will be available to the user.

But these advantages have a price. The burden is on the user to decide what capabilities are desired, and to select product offerings accordingly, especially when portability of applications is important. We do not expect most implementors to attempt to provide all word sets, but rather to select those most valuable to their intended markets.

The basic requirement is that if the implementor claims to have a particular optional word set the entire required portion of that word set must be available. If the implementor wishes to offer only part of an optional word set, it is acceptable to say, for example, **This system offers portions of the [named] word set**, particularly if the selected or excluded words are itemized clearly.

Each optional word set will probably appeal to a particular constituency. For example, scientists performing complex mathematical analysis may place a higher value on the [Floating-Point word set](#) than programmers developing simple embedded controllers. As in the case of the core extensions, we expect implementors to offer those word sets they expect will be valued by their users.

Optional word sets may be offered in source form or otherwise factored so that the user may selectively load them.

The extensions to the optional word sets include words which are deemed less essential to performing the primary activity supported by the word set, though clearly relevant to it. As in the case of the Core Extensions, implementors may selectively add itemized subsets of a word set extension providing the labeling doesn't mislead the user into thinking incorrectly that all words are present.



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