NOVEMBER 1992

TITLE: Additional Information on Second CD 10967-1
                    and request for clear national body
                    positions in their voting

SOURCE: Secretariat ISO/IEC JTC1/SC22

WORK ITEM: JTC1.22.28

STATUS: New

CROSS REFERENCE: N1263 (CD 10967-1)

DOCUMENT TYPE: Additional Information re: CD 10967-1

ACTION: For information to SC22 Member Bodies.
                    Member Bodies are requested to consider this
                    information in responding to the CD Ballot.

From: ISO/IEC JTC1/SC22/WG11
To: SC22 Member bodies
Subject: Request for clear national body positions in the voting on
           ISO CD 10967-1 Language-Independent Arithmetic
           Part 1: Integer and Real Arithmetic
Reference: SC22/N1263
Date: October 1992

The intention of the Language-Independent Arithmetic standards is to provide a family of standards which can be normatively included by reference in programming language standards to define the required properties of mathematical operations and functions. The required properties are so defined as to afford the numerical programmer some assurances and quantitative measures of the behavior of the programming language operations as compared to the true mathematical operations on a wide range of machine architectures.

Language standards have been reluctant to standardize in this area because of a concern that such standardization would limit the platforms on which an efficient conforming implementation could be built. This is a valid concern, but the effect has been to make arithmetic in programming languages almost entirely "implementation-dependent". i.e. defined as whatever the compiler/platform does. This standard seeks to make arithmetic at least "implementation-defined". i.e. documented choices from a list of alternatives, supported by some corresponding parameter values whose meaning is described by the standard.

ISO CD 10967-1 (Language-independent arithmetic. Part 1 Integer and real arithmetic) is a specification for conformance of arithmetic software which can be achieved on a wide range of machine architectures. This contrasts with IEC 559:1989 (Binary floating-point arithmetic for microprocessor systems), better known as IEEE 754, which is a specification for the implementation of arithmetic and is only practical if implemented in hardware.

There is an outspoken group of numeric users who strongly believe

1. that IEC 559:1989 should be the only standard for arithmetic; and

2. that ISO CD 10967-1 "condones weaker machine arithmetics" and thus "conflicts with" and "undermines" IEC 559: and

3. there is no useful goal of ISO CD 10967-1 which cannot be met by simply citing IEC 559.

These users fear that vendors will continue the development of alternate (they would say "inferior") arithmetics and cite compliance with ISO 10967-1 as an alternative to complying with IEC 559. Even worse, de jure standards and procurements might cite ISO 10967-1 rather than IEC 559. thereby permitting the acquisition of equipment with arithmetic "inadequate for serious numerical analysis". As a consequence they do not want to see CD 10967-1 progressed AT ALL. Comments generated by this community cite dozens of supposed problems and weaknesses in the draft standard. It is the impression of the Working Group, however, that their purpose is not to improve the standard; their purpose is to prevent its progression. To be acceptable to this body of commentators, CD 10967-1 would have to be recast as a binding of IEC 559 to programming languages and require conformance of arithmetic operations in the languages to IEC 559.

Experience in some language working groups teaches that such a requirement would prevent the normative inclusion of ISO 10967-1 in language standards and thus DEFEAT ITS PURPOSE. Arithmetic in programming languages would remain implementation-defined, as

now, with some implementations conforming to IEC 559, and many others unable to.

SC22/WG11 therefore asks SC22 member bodies voting on the progression of CD 10967-1 to make a careful determination of what the national body position on this issue is:

— Is it the position of the national body that this document should not be progressed because of a perceived conflict with the aims of IEC 559?

— Or is it the position of the national body that the document should be progressed, while possibly citing certain technical problems which require resolution?

If a sufficient number of national bodies hold the first position, then the Working Group will not be able to resolve the NO-votes and the standardization effort for LIA Part 1 will have to be abandoned. If, on the other hand, all national bodies hold the second position, then the Working Group will make every effort to resolve the ballot comments in a way satisfactory to all national bodies, so that consensus on progression of the document can be obtained.