To: J3
From: Larry Meadows
Date: August 20, 2000
Title: Unresolved Issue 249
Rounding mode changes in procedures

Unresolved issue 249, p. 365, has two parts:

First, a procedure is supposed to save and restore the rounding mode in effect on entry to the procedure. The question whether a procedure defined by means other than Fortran should have the same requirement; that is, can a caller of a non-Fortran procedure assume that it does not alter the rounding mode.

Secondly, the editor wonders why the requirement that the rounding mode be preserved exists to begin with.

For the second issue, it was once again confirmed at the WG5 meeting in Oulu that the requirement to preserve the rounding mode was WG5's intention (see J3/00-257 which is WG5/N1406).

For the first issue, we wish to place the burden of preserving the rounding mode on the programmer, in order to promote efficiency. Consider a Fortran subprogram that calls a BIND(C) procedure. There are four cases to consider:

Case 1: The BIND(C) procedure preserves the rounding mode.
This case requires no action on the part of the programmer.

Case 2: The BIND(C) procedure does not preserve the rounding mode, the subprogram calls IEEE_SET_ROUNDING_MODE, and the subprogram is indifferent to the rounding mode after the call.
This case requires no action on the part of the programmer. The Fortran processor is required to save the rounding mode upon entry to the subprogram, and to restore it on exit, since IEEE_SET_ROUNDING_MODE is called, so the programmer doesn't need to perform any action.

Case 3: The BIND(C) procedure does not preserve the rounding mode, the subprogram calls IEEE_SET_ROUNDING_MODE, and the subprogram cares about the rounding mode after the call.
This case requires the programmer to save the rounding mode before the call to the BIND(C) procedure, and restore the rounding mode after the call. The processor will probably unnecessarily save the rounding mode on entry and restore it on exit to the subprogram, but correctness will be preserved.

Case 4: The BIND(C) procedure does not preserve the rounding mode and the subprogram does not call IEEE_SET_ROUNDING_MODE.
This is an error by the programmer; the program is non-conforming.

Edits:

[365:1-22] Delete
[364:25-27] Change to read:
In a procedure that does not have the BIND attribute, and is not IEEE_SET_ROUNDING_MODE, the processor shall not change the rounding mode on entry, and on return shall ensure that the rounding mode is the same as it was on entry. A procedure that has the BIND attribute may change the rounding mode. It is the responsibility of the programmer to ensure that any procedure without the BIND attribute that calls a procedure with the BIND attribute preserves the rounding mode.