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ADD: Meraj Rahimi, Michael Eudy, Dawnmathews Kalathiveettil, Kyle Song, Jeanne Johnston, Holly Cruz, Mary Neely

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Submitter Information

Name: Anonymous Anonymous

General Comment

With increased use of instrument channels involving microprocessors and computers, software may introduce errors that need to be accounted for in the related setpoint uncertainty calculations.

Specifically, Software requirements should identify system response in the event of the following errors:

Rounding/ Round off Error: Analog signal approximated to a quantization level value higher than the original analog signal

Truncation Error: Analog signal above the nearest quantization level is dropped. Usually the main source of error in numerical integration or solution of differential equations. Errors can be amplified as they propagate through a computation: (1) Loss of precision in displayed or monitored parameter, and (2) Cause oscillation in closed loop control systems; control error (difference between measured value and control setpoint) inaccurately represented and output signal either set too high or too low, depending on the error.

Overflow Error: Result of a computation that cannot be held in the accumulator. It may result in wraparound error. Such type errors have been implicated in two high-visibility rocket accidents: (1) Failure of U.S. Patriot missile to intercept Iraqi-launched Scud missile during Gulf War, and (2) Failure of Ariane 5 launch vehicle during maiden flight.

Indicating Reading Error: Error applied to accuracy when reading analog and digital indications in an instrument loop or on M&TE.

The draft regulatory guide should address these types of errors.