

Subject: Result Value paragraph of 13.7.64 GAMMA is wrong  
 From: Van Snyder  
 Reference: 08-007r2

- 1 The **Result Value** paragraph of 13.7.64 GAMMA has an incomplete definition of the function to be  
 2 computed. The definition applies only for positive arguments, but the function allows negative arguments  
 3 so long as they're not integers.  
 4 The paragraph should read

**Result Value.** The result has a value equal to a processor-dependent approximation to the gamma function of  $X$ ,

$$\Gamma(X) = \begin{cases} \int_0^{\infty} t^{X-1} \exp(-t) dt & X > 0 \\ \int_0^{\infty} t^{X-1} \left( \exp(-t) - \sum_{i=0}^k (-1)^i \frac{t^i}{i!} \right) dt & -k-1 < X < -k, k \text{ an integer } \geq 0 \end{cases}$$

- 5 Note to J3: The formula for  $X < 0$  is called the Cauchy-Saalschütz formula. It can be gotten from the  
 6 one for  $X > 0$  by integrating by parts. See page 44 of **Special Functions – An Introduction to the**  
 7 **Classical Functions of Mathematical Physics** by Nico Temme.