

Reciprocal Square Root Iteration Sequence

$$R_3 = (3 - R_1 R_2) / 2$$

*Forced into 3
bit adds*
 $-(R_1 R_2 - 3) / 2$

where: R_1 = The approximate reciprocal square root of the original operand that was found by the reciprocal square root approximation sequence.

R_2 = The approximate square root of the original operand that was found by multiplying the reciprocal square root approximation by the original operand.

R_3 = A correction factor which when multiplied by R_2 will yield a more accurate approximate square root.

example: Do an iteration on the $\sqrt{16}$ example from the reciprocal square root approximation sequence.

$$R_3 = (3 - R_1 R_2) / 2$$

$$R_1 = .2499899$$

$$R_2 = 3.9998384$$

$$R_3 = [3 - (.2499899)(3.9998384)] / 2 = 1.0000404$$

The correction factor is 1.0000404

This correction factor can now be used to get a more accurate square root value. You can now use the multiply to get the more accurate value.

$$R_4 = R_3 R_2$$

$$R_2 = 3.9998384$$

$$R_3 = 1.0000404$$

$$R_4 = (1.0000404)(3.9998384) = 4 \text{ (calculator accuracy)}$$

$$\text{The } \sqrt{16} = 4$$

Reciprocal Square Root Iteration Instruction Summary

127ijk Enter Si with reciprocal square root iteration 3 - Sj * Sk

157ijk Enter Vi with reciprocal square root iteration 3 - Vj * Vk