

# Macintosh 512/E Math Operations Benchmarks

by Alan Mimms

This document contains the results of a benchmarking operation designed to get a rough idea of the relative performance of the various types of math operations supported directly by the Macintosh hardware or firmware ( $\geq 128k$  ROMs). In order to reduce the magnitude of any inaccuracies, the information was obtained by timing many (usually more than 1000 and usually less than 100000) iterations operations. Note, however, that the (very small) overhead introduced by the looping has *not* been discounted from the data; due to its small magnitude, in most cases overhead from this source can be ignored. I can't make any "absolute accuracy" claims for these benchmarks, but they should be pretty close.

The benchmark program was written using LightspeedC™ version 2.01 and was run on a Macintosh 512/E (with 1MB via a homemade expansion) and a Mirror Technologies 20MB internal SCSI hard disk (shouldn't matter). There may be some "glue routine" overhead as a consequence of the particular C implementation and compiler and runtime environment I used, some or all of which might not be present or might be different using some other development environment. It should, however, be reasonable to expect that the information contained herein is "typical" for a very good C development environment like LightspeedC 2.01 on the Macintosh.

The operations I benchmarked are

- multiplication
- division
- addition
- sinus
- square root

on the data types

- long (32 bit) integers (the LightspeedC type **long**)
- fixed-point real numbers with 30 bits of fraction (the LightspeedC type **Frac**)
- fixed-point real numbers with 16 bits of fraction (the LightspeedC type **Fixed**)
- floating-point real numbers in IEEE 32-bit format (the Lightspeed C type **float**)
- floating-point real numbers in IEEE 64-bit format (the Lightspeed C type **short double**)
- floating-point real numbers in IEEE 80-bit format (the Lightspeed C type **double**)

In all cases, the time required for subtraction operations was found to be identical to that required for addition. The mark • is given in the table below for those operations for which the Macintosh and/or LightspeedC environment contain no builtin functions. All entries are in terms of the number of operations that can be performed per second.

Operation	long integer	float	short double	double	Frac	Fixed
<b>x * y</b>	11342	722	631	1395	4000	4000
<b>x / y</b>	13333	476	461	789	2727	1935
<b>x + y</b>	73170	722	677	1764	73170	73170
<b>sin (x)</b>	•	•	•	67	1333	•
<b>sqrt (x)</b>	•	•	•	419	1578	•

I hope you can put this information to good use. While the results have not been independently

verified, they seem fairly consistent with my idea of the workings of the Macintosh. If you have any questions or comments, send GENIE™ mail to A.MIMMS or send me snail mail at

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