John Neil & Associates

internet:johnneil@netcom.comP.O. Box 2156
CompuServe: 70421,730
          Cupertino, CA 95015
America Online: John Neil
eWorld: John Neil

Questions and Answers

John Neil
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What is a Floating Point Unit?

A Floating Point Unit (FPU) is a hardware chip that performs certain types of mathematical operations quickly. An FPU is also known as a floating point co-processor or a math co-processor. The performance of many scientific, mathematical, and financial applications increases greatly when an FPU is installed.

Why won't some applications work without an FPU?

For maximum performance, some applications talk directly to the FPU chip. These applications cannot function on Macintosh[1] computers without an FPU, like the LC and IIsi. Launching one of these applications on a Macintosh without an FPU will result in either a warning message or a "floating point co-processor not installed" system error.

What is SoftwareFPU?

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[1]Macintosh is a trademark licensed to Apple Computer Inc.

internet:johnneil@netcom.comP.O. Box 2156
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SoftwareFPU[2] is a control panel that allows most applications expecting an FPU to work properly on Macintoshes without one, such as the IIsi, IIvi, Macintosh LC series, Classic II and Color Classic series, Performa series, and some models of the Quadra, PowerBook, and PowerBook Duo series. SoftwareFPU will also work on Power Macintoshes. SoftwareFPU is fully System 6 and 7 compatible. SoftwareFPU will **not** work on 68000 machines such as the Macintosh Plus, SE, Classic, Portable, and PowerBook 100 (see 68000 question below). Because of a 68LC040 CPU chip bug, some applications crash with SoftwareFPU on 68LC040 machines such as the Centris 610, LC 475 & 575, Performa 475, 476, 575, 577, & 578, PowerBook 520, 540, PowerBook Duo 280, and Quadra 605 and 610 (see 68LC040 question below).

Why use SoftwareFPU?

SoftwareFPU allows you to use your FPU applications now, instead of waiting for a software upgrade or buying an FPU card. On Power Macintosh machines, SoftwareFPU is the only way you can launch FPU applications until they are available in PowerPC-native form. Examples of applications which will only work with SoftwareFPU on machines without an FPU include Excel 2.2[3], Illustrator 5.0[4], Infini-D 2.5.1[5], LabView 3.0[6], MATLAB 4.2a[7], PixelPaint Professional 2.0[8], RayDream Designer 2.0[9], StatView

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[2]SoftwareFPU is a trademark of John Neil & Associates
[3]Excel is a trademark of Microsoft Inc.
[4]Illustrator is a trademark of Adobe Systems Inc.
[5]Infini-D is a trademark of Specular International Inc.
[6]LabView is a trademark of National Instruments Corporation
[7]MATLAB is a trademark of The MathWorks Inc.
[8]PixelPaint is a trademark of Pixel Resources Inc.
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    4.02[10], Studio/8 1.1[11], StudioPro 1.0[12], Systat 5.2[13], Tristan 1.02[14], and others. In addition, if a developer only offers color Macintosh II and black and white Macintosh Plus/SE/Classic versions of their software, SoftwareFPU allows users to take advantage of color features in the Macintosh II version, rather than settling for the black and white Macintosh Plus/SE/Classic version. Some developers ship SoftwareFPU with their products to avoid the confusion of an separate non-FPU version.

    A few applications have bugs which prevent them from working properly, even with SoftwareFPU installed. You will have to upgrade these applications to use them. Other applications may be unacceptably slow when used with SoftwareFPU. If you have an important application of this type, you should consider purchasing an FPU card for your Macintosh.

How do I use SoftwareFPU?

    To activate SoftwareFPU, drop it into your System Folder and restart your computer. One of two possible icons will appear on the screen during system start up:

Startup Icon	Meaning
	SoftwareFPU installed correctly.
	SoftwareFPU did **not** install, for one of the following reasons:

Problem	Solution

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[10]StatView is a trademark of Abacus Concepts Inc.
[11]Studio/8 is a trademark of Electronic Arts
[12]StudioPro is a trademark of Strata Inc.
[13]Systat is a trademark of Systat Inc.
[14]Tristan is a trademark of Little Wing, Inc.

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Mouse button was held down during start up	Restart, do not hold down mouse button
System contains a hardware FPU	Discard SoftwareFPU, you do not need it
System software version less than 6.05	Upgrade your system software to 6.05 or greater
System contains a 68000 processor.	SoftwareFPU will not work on 68000 Macintoshes
Not enough memory to install SoftwareFPU (System 6 only)	Remove fonts or add memory
System folder contains older version (PseudoFPU[15])	Discard obsolete PseudoFPU and restart

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internet:johnneil@netcom.comP.O. Box 2156
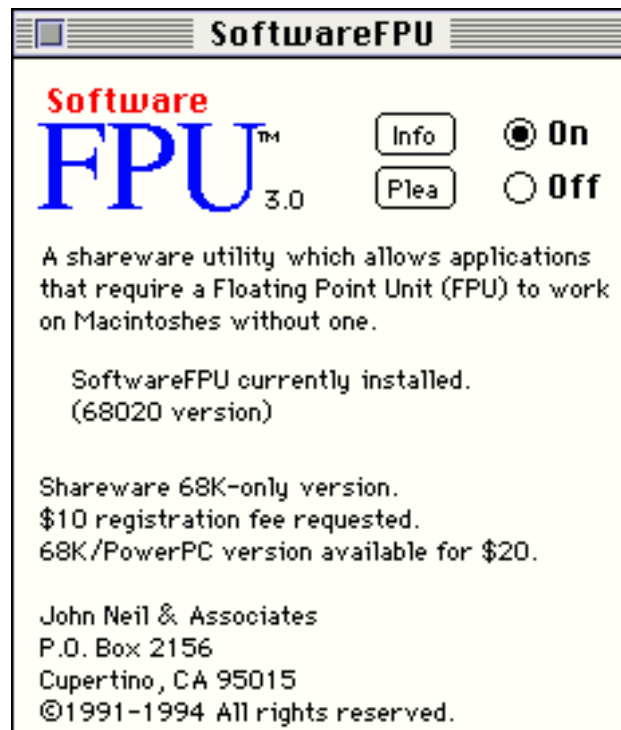CompuServe: 70421,730
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You can turn SoftwareFPU on or off, or learn more about the program, by opening the SoftwareFPU control panel. To do this, select Control Panels from the Apple Menu and double-click the SoftwareFPU icon in the Controls Panels window. (System 6 users must select the Control Panel from the Apple menu, which brings up the Control Panel dialog box. Scroll through the icons on the left side of the box until you find "SoftwareFPU" and select it by clicking on it.) The following dialog box will appear:

A status message appears below the description which indicates the current state of

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SoftwareFPU. You can turn SoftwareFPU on or off with the buttons in the top right corner. You can do this without restarting (System 7 required) as long as SoftwareFPU was installed at startup. You can also temporarily disable SoftwareFPU at startup by holding down the mouse button. Be sure to click on the "Info" and "Plea" buttons!

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internet:johnneil@netcom.comP.O. Box 2156
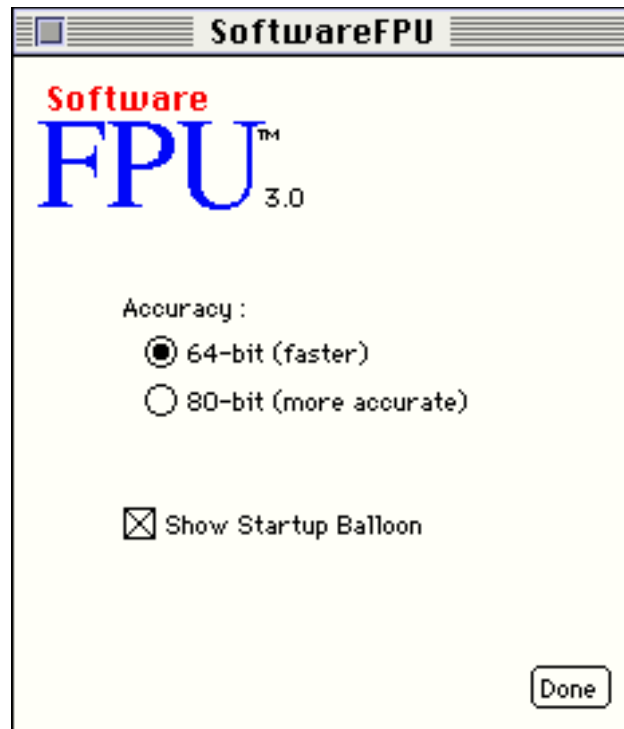CompuServe: 70421,730
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SoftwareFPU 3.0 comes in both shareware and registered versions. If you obtained SoftwareFPU from an on-line service, a Macintosh user group, or a friend, you have the shareware version. When you send in your registration fee ($10 for 68K-only version, $20 for "fat" 68K/PowerPC version), you will receive a registered version of the software in the mail. In the registered version, your can change several options using the "Set" button:

The Accuracy option allows you to select the FPU accuracy ("fat" 68K/PowerPC version on Power Macintosh machines only). To configure SoftwareFPU to operate in fast 64-bit accuracy

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mode, click the "64-bit" button. This mode allows SoftwareFPU to take advantage of the PowerPC FPU to speed up calculations, at the expense of reduced accuracy. To select slower 80-bit accuracy, click the "80-bit" button. This mode achieves maximum accuracy but runs entirely in 68K code, slowing performance. For most applications, 64-bit accuracy is fine.

    To hide the startup "thank you" balloon in the registered version, uncheck the "Show Startup Balloon" box.

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How do I register SoftwareFPU?

SoftwareFPU is a shareware product. If you use it, please send a $10 registration fee. To receive a "fat" 68K/PowerPC version, please send $20. $10 or $20 is probably not much to you but it really gives me the incentive to keep on programming. Thank you for your support!

Your registration fee entitles you to use SoftwareFPU on one computer at a time. Commercial distribution is prohibited without a software license from John Neil & Associates. For information on commercial licensing, contact me at the address above.

While I have made every effort to deliver the software free of bugs, SoftwareFPU comes "as is" with no warranty whatsoever. If you do run across something unexpected, let me know and I will do my best to fix it.

Is SoftwareFPU PowerPC-native?

The shareware version of SoftwareFPU is 68K-only. For a "fat" 68K/PowerPC version, please send $20 to John Neil & Associates.

Where can I obtain the latest version of SoftwareFPU?

The latest shareware version of SoftwareFPU is available on-line on America Online (keyword MUT), CompuServe (GO MACSYS), eWorld, via anonymous ftp at ftp.netcom.com (/pub/johnneil). To obtain the latest registered version, send your registration fee ($10 for 68K-only version, $20 for "fat" 68K/PowerPC version) to John Neil & Associates. If you are already registered, you can upgrade to the latest version for $10.

Will SoftwareFPU slow down applications that don't require an FPU?

No! Non-FPU applications perform at identical speed with or without SoftwareFPU

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installed. The only effect of SoftwareFPU will be to allow you to use FPU applications on your Macintosh.

What happens if I insert an FPU card into my Macintosh?

SoftwareFPU will automatically be disabled, and the hardware FPU will perform all floating-point calculations. A message in the SoftwareFPU control panel will tell you if SoftwareFPU is not installed because your Macintosh has a hardware FPU.

Will SoftwareFPU eliminate all "co-processor not installed" system errors?

SoftwareFPU eliminates all FPU-related application incompatibilities on Macintoshes without FPUs. However, a system software bug in System 6.0.7 occasionally leads to erroneous "co-processor not installed" system errors, and you may continue to see these

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errors even with SoftwareFPU installed. These errors are not caused by or related to SoftwareFPU in any way.

You may also see a "co-processor not installed" system error if the application you are using tries to execute illegal FPU instructions that SoftwareFPU does not understand. This error is a result of a bug in the FPU application, and is not caused by SoftwareFPU.

SoftwareFPU installed correctly, but applications still complain that no FPU is present. What's wrong?

Open the SoftwareFPU control panel. If you see a message that says "Application conflict," an application you have launched is incompatible with SoftwareFPU. This typically occurs when using a source-level debugger in a development system like MPW or THINK C/Symantec C++. In this case, the source-level debugger replaces the system F-Line exception vector, so it can catch and report illegal FPU instructions, which disables SoftwareFPU. To re-enable it again, click the "On" button in the SoftwareFPU control panel.

Why doesn't SoftwareFPU work on 68000 Macintoshes?

At first glance, SoftwareFPU might seem like a solution for allowing FPU applications to work on 68000 Macintoshes such as the Macintosh Plus, SE, Classic, Portable, and PowerBook 100. However, FPU applications depend on a number of other features that are missing from these machines, such as 68020 instructions and Color QuickDraw. Because of this, SoftwareFPU would not allow any additional applications to function on 68000 Macintoshes. Therefore, SoftwareFPU has been optimized for 68020 and greater processors, forgoing compatibility with 68000 Macintoshes.

Why do some applications crash with SoftwareFPU on 68LC040 Macintoshes?

The 68LC040 CPU chip has a bug in it which prevents SoftwareFPU from working properly

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        Cupertino, CA 95015
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with many FPU applications. Unfortunately there is no work-around for this bug. If you have SoftwareFPU installed on a 68LC040 Macintosh (such as the Centris 610, LC 475 & 575, Performa 475, 476, 575, 577, & 578, PowerBook 520, 540, PowerBook Duo 280, and Quadra 605 and 610), you will have to test each FPU application you use to see whether it will work on your machine. If the application crashes, it is probably because of the 68LC040 CPU chip bug. To verify what is causing the crash, test the same application on a regular 68040 Macintosh. If the application operates correctly on a 68040 Macintosh, the CPU bug is causing the application to crash on the 68LC040 Macintosh. If the application crashes on the 68040 Macintosh, the CPU bug is not the cause of the 68LC040 problem.

    Motorola is preparing a revised version of the 68LC040 CPU which supposedly fixes the CPU bug. The new version should be available sometime in fourth quarter 1994. The revised CPU will have a mask revision number of 03E23G or higher. To check the mask revision of the CPU in your Macintosh, open your Macintosh (check to make sure you are

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not voiding your warranty first), and locate the 68LC040 chip. The mask revision number is printed on the top of the chip, on the second line. The mask revision number reads from left to right, and each series of numeric or alphabetic characters is a different field. Reading left to right, if any of the fields are less than the corresponding field in 03E23G, your CPU has the bug that affects SoftwareFPU. For information on when the revised chip will be incorporated in new 68LC040 Macintoshes, please contact Apple Computer.

If your program crashes because of the 68LC040 CPU bug, your options are: a) replace your FPU application(s) with a version that does not require an FPU, b) replace the 68LC040 CPU chip in your Macintosh with a real 68040 CPU, or c) replace your 68LC040 CPU chip with the revised chip (when available) that does not have the bug. If your machine is still under warranty, Apple should handle this problem as a warranty repair. Please contact your Apple dealer for more information.

Why do I need SoftwareFPU on a Power Macintosh? Doesn't the PowerPC 601 processor already have an FPU?

The PowerPC 601 processor already has an FPU integrated onto the CPU chip. You do not need SoftwareFPU to use PowerPC-native FPU applications on your Power Macintosh. However, you do need SoftwareFPU to use non-native 68K FPU applications on your Power Macintosh. Non-native 68K applications are emulated on Power Macintosh machines. The emulation software built into these machines does not emulate an FPU.

Why doesn't Excel say it is using an FPU when SoftwareFPU in installed?

Most FPU applications require an FPU to work properly. Excel and a few other applications have the unique capability of using an FPU if present for floating-point calculations – otherwise these applications perform floating-point calculations in software. Software floating-point routines are usually faster than SoftwareFPU since they do not have the added overhead associated with FPU emulation. SoftwareFPU is aware of existing applications with this unique

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America Online: John Neil
eWorld: John Neil

capability and does not report the presence of an FPU to them, so they operate at maximum speed.