



Questions and Answers

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 68K applications talk directly to the FPU chip. These applications cannot function on 68K Macintosh computers without an FPU. These applications cannot function on a Power Macintosh either, even though an FPU is integrated onto the PowerPC CPU chip, because the Apple emulator that runs 68K applications on the Power Macintosh does not emulate the 68K FPU. If you launch a 68K FPU application on a 68K Macintosh without an FPU or a Power Macintosh, the application will display a warning message and quit.

What is SoftwareFPU?

SoftwareFPU is a control panel that allows most 68K 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 compatible with System 6, 7, and 8, and is PowerPC native. SoftwareFPU will **not** work on 68000 Macintoshes 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 Macintoshes (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 Macintoshes, SoftwareFPU is the only way you can use FPU applications until they are available in PowerPC-native form.* Examples of applications which will only work with SoftwareFPU on Macintoshes without an FPU include AutoCAD Release 12, CG Option for Media 100, DynaPerspective 2.33, Elastic Reality, Elite Flight Simulators 3.1, Excel 2.2, GeoView 3.1, Igor Pro 2.01, Illustrator 5.0 (some plug-ins require an FPU), Infini-D 2.5.1, LabView 3.0, MacFortran II 3.2, MacOberon 3.3, MacRLab 1.05f, MacTSP, MATLAB 4.2a, PainterX2 (some effects require an FPU), PhotoShop 2.5.1 (some plug-ins require an FPU), PixelPaint Professional 2.0, Proof Positive, RayDream Designer 2.0, ScanMatch 2.0, SPSS 6.1, StatView 4.02, StudioPro 1.0, Studio/8 1.1, StudioPro 1.0, Systat 5.2, TekColor 1.1, TREE, Tristan 1.02, Vellum & Vellum 3D, VidSynth, 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.

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 several possible icons will appear on the screen during system start up:

Startup Icon

Meaning



SoftwareFPU installed (PowerPC version)



SoftwareFPU installed (68K version)



SoftwareFPU did **not** install, for one of the following reasons:

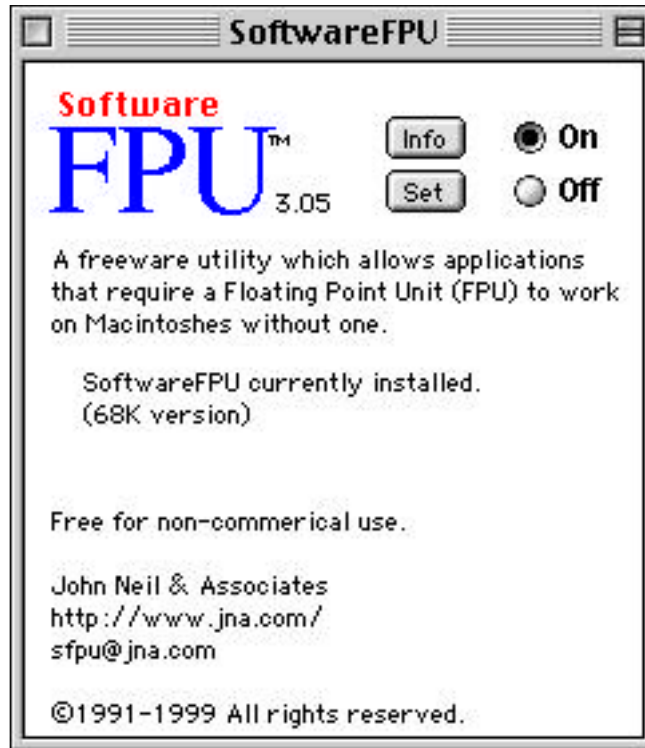
Problem

Solution

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)	Discard obsolete PseudoFPU and restart
Not in proper location on hard drive	Put in Control Panels folder (System 7) or System folder (System 6)



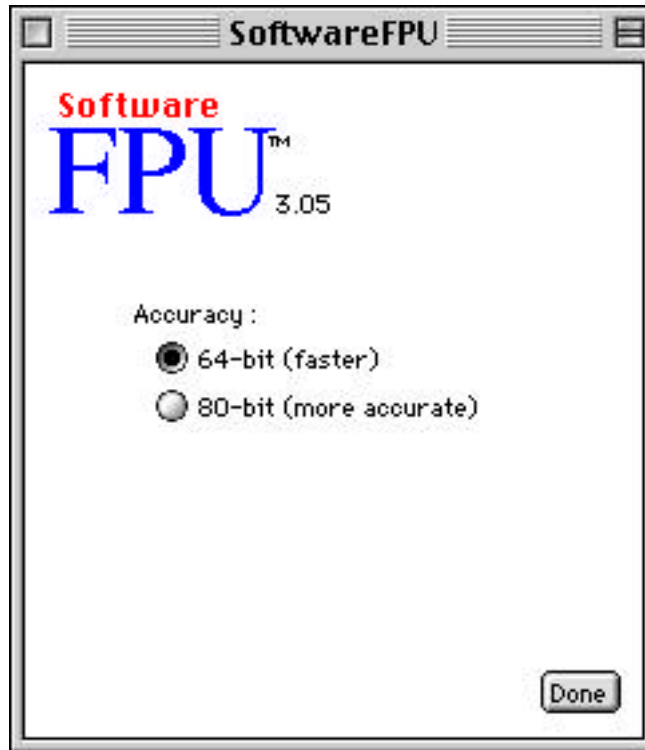
You can turn SoftwareFPU on or off, or learn more about the program, by opening the SoftwareFPU control panel. To do this, select Control Panels from the Apple Menu and double-click the SoftwareFPU icon in the Controls Panels window. (System 6 users must select the Control Panel from the Apple menu, 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 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.



Clicking the “Set” button displays the following:



The Accuracy option allows you to select the FPU accuracy (Power Macintoshes only). To configure SoftwareFPU to operate in fast 64-bit accuracy 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 perfectly acceptable.

Is SoftwareFPU free?

SoftwareFPU is free for non-commercial use. SoftwareFPU may not be sold or bundled with products that are sold without a license from John Neil & Associates. For information on commercial licensing, please contact us at the above address.

While we have made every effort to deliver this software free of bugs, SoftwareFPU comes “as is” with no warranty whatsoever. If you run across something unexpected, please send us an e-mail and we will try to fix it.

Where can I obtain the latest version of SoftwareFPU?

The latest version of SoftwareFPU is available at our web site www.jna.com.

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

No! Non-FPU applications perform at identical speed with or without SoftwareFPU installed. The only effect of SoftwareFPU is 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?

The “co-processor not installed” system error is a very misleading error message. While it is possible to get this message by launching an application that requires an FPU, most modern, well-written 68K FPU applications check for an FPU and display a more explanatory error message if an FPU is not present. Therefore, this system error is usually caused by an unrelated problem. The “co-processor not installed” system error appears because this unrelated problem caused the application to execute an illegal instruction that by chance was an FPU instruction.

To determine for sure whether a “co-processor not installed” system error was caused by a missing FPU, check what application was running when the system error occurred. If the application requires an FPU, then the system error probably resulted from a missing FPU, and SoftwareFPU should eliminate the error. If the application does not require an FPU, the system error resulted from an unrelated problem, such as corrupted system software, a system extension conflict, a virus or a bug in the application or system software. In these instances SoftwareFPU will not help. If you are unsure whether an application requires an FPU, contact the publisher of the application in question and ask.

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 Macintosh models, 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 many FPU applications from working properly with SoftwareFPU. The bug is confirmed by Motorola and listed as bug E4 on revision 4 of the official Motorola 68LC040 errata sheet. Unfortunately there is no way for SoftwareFPU to work-around this bug. If you have SoftwareFPU installed on a 68LC040 Macintosh, you will have to test each FPU application you use to see whether it will work on your Macintosh. If the application crashes, it is probably due to the 68LC040 CPU chip bug. To verify the cause of 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 your 68LC040 Macintosh. If the application crashes on a 68040 Macintosh, the CPU bug is not the cause of the 68LC040 crash.

If your FPU application crashes with SoftwareFPU because of the 68LC040 CPU bug, your options are:

- Replace the application with a version that does not require an FPU, if available.
- Replace the 68LC040 CPU in your Macintosh with a 68040 CPU that contains a hardware FPU. Sonnet Technologies (800/786-6260, <http://www.sonnettech.com/>) sells user-installable 68040 upgrade kits for desktop Macintoshes and offers an upgrade service for PowerBooks.
- Install a PowerPC upgrade card in your computer. FPU applications work properly with SoftwareFPU on PowerPC Macintoshes.

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

Most FPU applications require an FPU to work properly. Excel and a few other applications have the optional 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 capability and does not report the presence of an FPU to them, so they operate at maximum speed.

Is an FPU application with SoftwareFPU faster than the non-FPU version of the same application?

No. SoftwareFPU is a compatibility solution, not a performance enhancement. On a 68K Macintosh without an FPU, you will get better performance using a non-FPU version of an application than using an FPU version with SoftwareFPU. On Power Macintosh computers, you will get much better performance by upgrading all 68K FPU applications to PowerPC native versions.

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

The PowerPC processor has an FPU integrated on-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 Macintoshes. The emulation software supplied by Apple does not emulate an FPU.

Does SoftwareFPU use the PowerPC FPU on Power Macintoshes?

Yes, some calculations are performed in the PowerPC FPU on Power Macintoshes, but the overhead for FPU emulation is such that SoftwareFPU is still much slower than the PowerPC or 68K FPU.



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Why does the SoftwareFPU control panel say the 68K version is installed, even though I have a Power Macintosh?

Click the “Set” button in the SoftwareFPU control panel and switch to 64-bit accuracy. 80-bit accuracy forces SoftwareFPU to load the 68K version of the FPU emulator.

What is the SoftwareFPU icon?

It is a floating point!

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