

Adrienne Electronics Corporation

“PC CLOCK SETTING (GUI) INSTRUCTIONS”

For All PCI-TC, USB-TC, PCIe-TC, AEC-PCIe, and AEC-IUSB Products

Introduction:

The “AecClock” program makes it easy to set (jam) your PC's clock to match an incoming time code reference signal. This makes it easy to synchronize PC's to each other (via a common time code reference signal), and also makes it easy to synchronize an individual PC to the “house reference” time code.

PC Clock Setting Overview:

The “AecClock” program provides a graphical user interface (GUI) which makes it easy to configure, test, and install this clock setting “service”. In Windows, an application program which can be loaded and executed automatically by Windows every time it starts up is called a “service”. There are usually dozens of services running on a Windows PC at any given time. Once started, the service periodically checks the time of the incoming time code reference signal versus the PC's internal time, and changes the PC's internal time to match the incoming time if needed.

The Registry:

Windows maintains a “Registry”, which can be thought of as a large collection of tiny files (“keys”) which indicate how your PC should behave under various circumstances. For the most part these Registry entries can all be thought of as being “user settings”. These keys are very well hidden from the average user, and only in extreme circumstances should you attempt to access or change them directly. The “AecClock” program saves whatever PC Clock Setting settings you select to the Registry, so that when Windows loads and executes the program (as a Windows service) the next time it starts up, it can automatically retrieve your desired settings from the Registry and perform exactly as you intended.

Local Time versus System Time:

Windows PC's use "UTC" (Co-ordinated Universal Time) (see Wikipedia) as their internal timing reference for everything, and call this "System Time". This convention is necessary for worldwide communication purposes, such as e-mail and other internet activities. UTC is a newer and scientifically more accurate version of "GMT" (Greenwich Mean Time). For time zone purposes, UTC and GMT are pretty much identical.

Windows PC's also store the local time zone, and associated Daylight Savings Time (DST) information, so that the system time can be presented to the PC user as a local date and time, which is known as "Local Time". If you right-click on the date and time display on your Windows desktop, and go through several menus, you will be given a choice of the local time zone, which is expressed as UTC plus or minus up to 13 hours.

Whenever Windows starts up, it reads the current (local) date and time from your PC's internal Real Time Clock (RTC) hardware, applies the stored time zone (and DST) offset, and thus establishes the initial System Time. Whenever date and time are subsequently displayed to the Windows user, they are displayed as Local Time.

The Adrienne Electronics clock setting software allows you to select whether the incoming time code reference signal represents Local Time or System Time. Usually the time code signal represents Local Time, which is the default setting. Advanced users may wish to use System Time instead, which is appropriate if the reference signal is set to UTC. Either way, the Windows System Time gets changed by the clock setting software, either directly (if System Time is selected), or indirectly (if Local Time is selected and the time zone and DST offsets are applied by Windows).

Daylight Savings Time (DST) Issues:

In the USA, most states change from Standard Time to Daylight Savings Time in the summer months, in a theoretical effort to reduce energy consumption due to indoor lighting needs. Many other countries do effectively the same thing under different names. The dates and times of the DST transitions vary periodically for political reasons, which complicates the lives of Windows software programmers. In all cases, the underlying Windows System Time (UTC) does not change during DST transitions, which is in some cases a perceived advantage of using System Time. The Windows time zone information effectively changes on each DST transition, which in turn affects the Local Time display.

The Adrienne Electronics clock setting software avoids making any changes to the PC's clock whenever DST transitions are expected. This helps avoid surprises during that period. As soon as things settle down after each DST transition, the clock setting software resumes normal operations. Note that the Windows software will automatically make the DST change (and thus also the Local Time change) at the proper time, and for proper operation it is expected that the reference time code signal will also be changed at or near the same time (unless you have a UTC time code reference and are using System Time).

The Reference Time Code Offset:

The AecClock program allows you to enter an arbitrary time offset which will be added to the incoming time code reference signal before comparing the total with the PC's selected internal clock. The offset has fields of hours, minutes, seconds, and milliseconds. Your settings are stored in the Registry, will be retained until you change them, and will be automatically applied every time that Windows starts up. For example, if the incoming time code is 10:23:45:678, and you specify an offset of 01:00:00:000, the AecClock program will set the PC's clock to 11:23:45:678. The maximum offset allowed is 23:59:59.999, which is effectively the same as "minus one millisecond", because the AecClock program and the incoming time code both use a 24 hour clock.

Time Accuracy and "Slop" Notes:

The AecClock program assumes that the incoming time code reference signal is counting at about exactly the same speed as the PC's internal clock. Thus changes to the PC's clock should occur infrequently. The "Allowed Slop" setting permits you to select how much of a time difference you are willing to accept before the AecClock program needs to adjust the PC's clock. Larger slop settings mean that the clock is changed less often, but each change will be larger. We recommend that you accept the default "100ms" setting, which makes 100ms changes when needed (barely noticeable). Digital filtering is employed to make sure that most system glitches will be ignored.

AEC Product Compatibility:

As of February 2019, the "AecClock" program works with all of our PCI-TC, USB-TC, PCIe-TC, AEC-PCIe, and AEC-IUSB products. The model number of the first AEC device found will be displayed in the AecClock dialog window. Older versions of this program made you manually select between USB-TC and PCI-TC (and PCIe-TC), and did not support any of the newer AEC products. At present there is no way to force the new program to work with some AEC products and not others. Please let us know if you need to use the AecClock program with more than one AEC device attached (and your reason for doing so). If no AEC product is detected, the model number display box will indicate "NOT FOUND". If the model number is properly displayed, your AEC device is properly installed and ready to work with the AecClock program.

Installation:

The "AecClock" program is a 32-bit Windows application. In order to install the AecClock program, please proceed as follows:

- 1) Log onto your PC with "Administrator" privileges.
- 2) Use Windows Explorer to create a new "C:\aectime" folder (directory) if it does not already exist. This is just a recommended name for the folder, and you are free to name it something else if desired. The selected folder should be a normal (non-shared) folder which is NOT visible to other PC's on your network.
- 3) Use Windows Explorer to copy all files from the "PC Clock Setting" folder on the CDROM (or copy thereof) into the "aectime" folder. If you are not sure how to do this, first use Windows Explorer to display the contents of the "PC Clock Setting" folder, then left-click on the top file name to highlight it, then Shift-left-click on the bottom file name to select all the files in the folder, then right-click on any highlighted file name, select "Copy", then right-click on the "aectime" folder name, and select "Paste".
- 4) Use your favorite anti-virus program to scan our "AecClock.exe" file if desired. Our files are clean when they leave our offices, but in today's world, they could have been corrupted by somebody while on the way to your precious PC. We don't want to get blamed for the criminal behavior of other people whom we do not know.
- 5) For Windows NT 6.0 and newer operating systems, which includes Windows Vista and Windows Server 2008 and everything newer as of this writing, you must take one additional step here to undo some of the extra security which Windows included in these newer operating systems. Otherwise the AecClock program will not work properly. Use Windows Explorer to right-click on the "AecClock.exe" file name within the "aectime" folder, then select "Properties". Within the "AecClock.exe Properties" window which opens, select the "Compatibility" tab, then check the "Run this program as an administrator" box, then click "OK". For Windows 10, select the "Change Settings for All Users" option before checking the "Run this program as an administrator" box.
- 6) Double click on the "AecClock.exe" file name to start the program. Select the "HELP/INFO" button to get more information on individual settings. Select the "TEST" button to show the incoming time code and the PC's time, and to make sure that you like your User Offset and other settings before you save them in the Registry. Select the "SAVE" button to save all your settings to the Registry and enable this program to start automatically the next time Windows starts.
- 7) That's all!

Performance Test Display:

To verify that the AecClock program is working properly, and that the reference time code signal (usually LTC, possibly IRIG-B) is OK, first run the "AecWinDemo" program which can be found within the "Windows Demo" subdirectory on your AEC product CDRom. Then right-click on the Windows date/time display, and select "Adjust Date/Time" (or something like that). That opens a Windows "Date/Time" display window. Use your mouse to drag the title bars of the two windows close enough together so that it is easy to see the current time displays next to each other. Let it run for hours if you like. There should be no visible difference between the two time displays. Except that time code uses a 24-hour clock, and PC's usually display a 12-hour clock.

If you are running AecClock as a Windows service on a PC, which is the normal application, and want to quickly check whether or not the incoming time code reference signal is OK, just run the "AecWinDemo" program quickly, verify that everything is OK, then close the program. Or let it continue to run if you like.

Note that this performance test only works with AecClock v3.0 or later, because it uses the same "AEC_NTTC.dll" file as does the "AecWinDemo" program. Both programs can run simultaneously. If you try this with an older version of AecClock, or with an older version of the DLL software, it will not work, and may very well cause your PC software to crash.

The Windows Service Manager:

The Windows Service Manager allows you to monitor and make changes to each and every Windows “service”. It is generally a very bad idea to make any changes to Windows services directly, because doing so will usually make Windows stop working properly. The hard part is finding the Windows Service Manager in your system. Each version of Windows does things a little bit differently. Here are some examples...

For Windows XP Service Manager, select...

Start → Settings → Control Panel
→ Administrative Tools → Services

For Windows 7 Service Manager, select...

Start → Control Panel
→ System and Security → Administrative Tools → Services

For Windows 8 Service Manager, select (from the main tiled screen)...

[down-arrow in lower left corner] → Control Panel
→ System and Security → Administrative Tools → Services

For Windows 10 Service Manager, select (from the main tiled screen)...

[window icon in lower left corner] → Windows System → Control Panel
→ System and Security → Administrative Tools → Services

In Case of Difficulties:

If you know or suspect that the “AecClock” service (program) is causing your PC to crash or otherwise behave badly, then proceed as follows:

- a) If possible, navigate to the Windows Service Manager per the instructions above, right-click on “AEC Time Code Setting PC Clock Service”, and select “Properties”. Within the Properties window which opens, on the default “General” tab, select “Startup Type” → “Disabled” → “OK”. This will prevent this Windows service (program) from starting up automatically whenever Windows starts. Restart your PC. Otherwise...
- b) If necessary, boot up your Windows PC in “Safe Mode” by pressing (repeatedly) the “F8” key before the Windows logo appears on-screen. When the “Advanced Boot Options” screen appears, just select “Safe Mode” and continue. This will boot up Windows without any of the special drivers and services installed (the most likely cause of problems). Then follow step “a” above.

Please notify us immediately if you encounter any such problems. We will need to know the AEC product model that you are using, the exact Windows version, whether you are using 32-bit or 64-bit Windows, and (if you can find it) the date of the installed driver for your AEC device. We want you to be a happy and satisfied customer, so please give us a chance to fix any problems found.