The UltraLite and SMPTE Time Code Synchronization

OVERVIEW

The UltraLite can resolve directly to SMPTE time code via any analog input, without a separate synchronizer. The UltraLite can also generate time code via any analog output. The UltraLite provides a DSP-driven phase-lock engine with sophisticated filtering that provides fast lockup times and sub-frame accuracy. Direct time code synchronization is supported by Cubase, Nuendo and other audio sequencer software that supports the ASIO2 sample-accurate sync protocol.

Any analog input and output on the UltraLite can be used for time code (LTC) input and output, respectively.

FIREWIRE SMPTE SETUP

The included MOTU SMPTE Setup™ software provides a complete set of tools to generate SMPTE for striping, regenerating or slaving other devices to the computer.

CLOCK/ADDRESS

The *Clock/Address* menu (Figure 1) provides the same global *Clock Source* setting as in MOTU Audio Setup ("Clock Source" on page 28 in the UltraLite manual), but it includes additional information: each setting shows both the clock and the address (time code or sample location), separated by a forward slash (/). For example, the word clock setting (*Word Clock In / Internal*) shows the clock source (*Word Clock In*) followed by the address

(*Internal*). Notice that only the SMPTE setting supports SMPTE time code as the reference for address. The S/PDIF digital clock source does not support the UltraLite's on-board SMPTE time code sync. To resolve the UltraLite to SMPTE time code, choose the *SMPTE / SMPTE* setting in the Clock/Address menu. This means that the system will use SMPTE as the clock (time base) and SMPTE as the address.

FRAME RATE

This setting should be made to match the SMPTE time code frame rate of the time code that the system will be receiving. The UltraLite can auto-detect and switch to the incoming frame rate, except that it cannot distinguish between 30 fps and 29.97 fps time code. So if you are working with either of these rates, make sure you choose the correct rate from this menu.

READER SECTION

The Reader section (on the left-hand side of the window in Figure 1) provides settings for synchronizing the UltraLite to SMPTE time code.

Status lights

The four status lights (Tach, Clock, Address and Freewheel) give you feedback as follows.

Tach

The Tach light blinks once per second when the UltraLite has successfully achieved lockup to SMPTE time code and SMPTE frame locations are being read.

Clock

The Clock light glows continuously when the UltraLite has successfully achieved lockup to an external time base, such as SMPTE time code or word clock.

The Reader section provides settings for resolving to video and/or SMPTE time code.

The Generator section provides settings for striping SMPTE time code.

Figure 1: SMPTE Setup gives you access to your UltraLite's on-board SMPTE time code synchronization features.

Address
The Address light glows continuously when the UltraLite has successfully achieved lockup to SMPTE time code.

Freewheel
The Freewheel light illuminates when the UltraLite is freewheeling address (time code), clock or both. For details about Freewheeling, see "Freewheel Address" and "Freewheel clock" below.

SMPTE source
Choose the analog input to which the SMPTE time code source is connected. This is the input that the UltraLite "listens" to for time code.

Freewheel Address
Freewheeling occurs when there is a glitch or drop-out in the incoming time code for some reason. The UltraLite can freewheel past the drop-out and then resume lockup again as soon as it receives readable time code. Choose the amount of time you would like the UltraLite to freewheel before it gives up and stops altogether.

The UltraLite cannot freewheel address without clock. Therefore, the *Freewheel Address* setting will always be lower than or equal to the *Freewheel Clock* setting, and both menus will update as needed, depending on what you choose.

Keep in mind that freewheeling causes the system to keep going for as long as the duration you choose from this menu, even when you stop time code intentionally. Therefore, if you are starting and stopping time code frequently (such as from the transports of a video deck), shorter freewheel times are better. On the other hand, if you are doing a one-pass transfer from tape that has bad time code, longer freewheel times will help you get past the problems in the time code.

The 'Infinite' freewheel setting
The *Infinite* freewheel setting in the *Freewheel Address* menu causes the UltraLite to freewheel indefinitely, until it receives readable time code again. To make it stop, click the *Stop Freewheeling* button.

Freewheel clock
Freewheeling occurs when there is glitch or drop-out in the incoming SMPTE time code for some reason. The UltraLite can freewheel past the drop-out and then resume lockup again as soon as it receives a stable, readable clock signal.

The UltraLite cannot freewheel address without clock. Therefore, the *Freewheel Address* setting will always be lower than or equal to the *Freewheel Clock* setting, and both menus will update as needed, depending on what you choose.

The 'Infinite' freewheel setting
The *Infinite* freewheel setting in the *Freewheel Clock* menu causes the UltraLite to freewheel indefinitely, until it receives readable time code again. To make it stop, click the *Stop Freewheeling* button.

Stop Freewheeling
The Stop Freewheeling button stops the system if it is currently freewheeling.

GENERATOR SECTION
The Generator section (on the right-hand side of the window in Figure 1) provides settings for generating SMPTE time code.

Level
Turn the level knob to adjust the volume of the SMPTE time code being generated by the UltraLite. The level knob disappears when the Destination is set to *None*.

Tach light
The Tach light blinks once per second when the UltraLite is generating SMPTE time code.

Destination
In the *Destination* menu, choose the analog output from which SMPTE time code will be generated. This is the output that sends time code.

Stripe
Click this button to start or stop time code. To set the start time, click directly on the SMPTE time code display in the Generator section and type in the desired start time. Or drag vertically on the numbers.
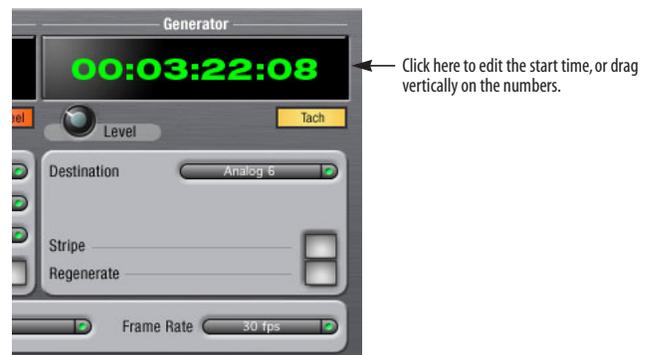

Click here to edit the start time, or drag vertically on the numbers.

Figure 2: Setting the time code start time.

Regenerate
This option, when enabled, causes the generator to generate time code whenever the UltraLite is receiving SMPTE time code.

SETTING UP FOR SMPTE TIME CODE SYNC

In summary, the UltraLite system can resolve directly to SMPTE time code. It can also generate time code and word clock, under its own clock or while slaving to time code. Therefore, the UltraLite can act both as an audio interface and digital audio synchronizer. You can use the UltraLite to slave your audio software to SMPTE as well, as long as your software supports ASIO2 sample-accurate sync, which is the means by which the software follows the UltraLite. The accuracy may not be sample-accurate, but in most cases it will be very close.

Use this setup if you have:

✓ A SMPTE time code source, such as a multitrack tape deck.

✓ Host software that supports sample-accurate sync.

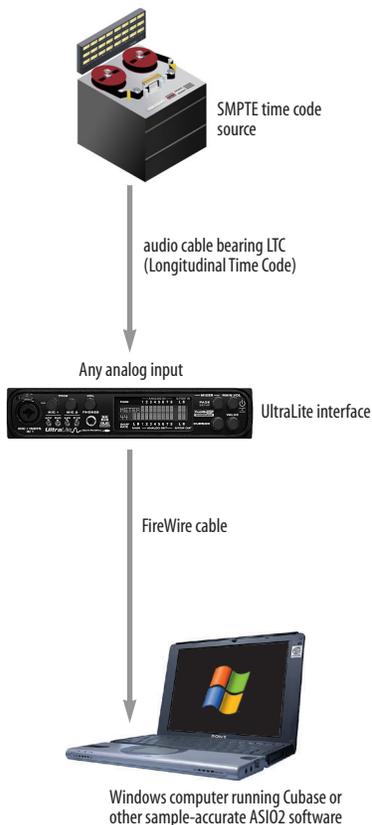**This setup provides:**

✗ No sample-accurate locating.

✓ Continuous sync to SMPTE time code.

✓ Sub-frame timing accuracy.

✓ Transport control from the SMPTE time code source.

RESOLVING CUBASE OR NUENDO TO SMPTE TIME CODE

To resolve your UltraLite directly to SMPTE time code with no additional synchronization devices, use the setup shown in Figure 3. Make sure the *Clock Source* setting in the MOTU Audio Setup window is set to *SMPTE*. Also, make sure that you've connected an LTC input signal to an UltraLite analog input, and that you've specified that input in the SMPTE Setup.

SMPTE time code source

audio cable bearing LTC (Longitudinal Time Code)

Any analog input

UltraLite interface

FireWire cable

Windows computer running Cubase or other sample-accurate ASIO2 software

Figure 3: Connections for synchronizing the UltraLite directly to SMPTE time code.
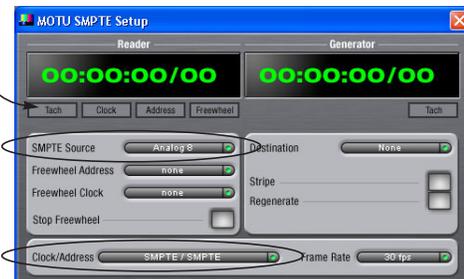
Choose *SMPTE* as the clock source in the MOTU Audio Setup. This setting can also be made in the MOTU SMPTE Setup software (shown below).
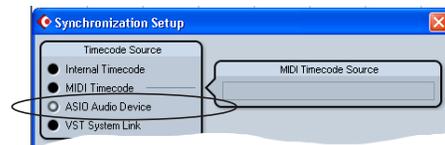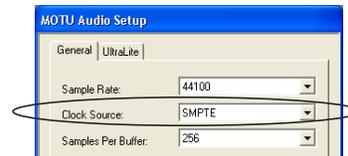
In Cubase SX, go to the Sync Setup window and choose the *ASIO Audio Device* option.

When lockup is achieved, the CLOCK light illuminates and the TACH light blinks once per second.

Launch the MOTU SMPTE Setup and specify the *SMPTE Source*, which is the input receiving the SMPTE time code. Also, confirm that the *Clock Source/Address* is *SMPTE/SMPTE*.