CLOCKIT SYNC MODULE

Timecode / Wordclock generator
ACS 401

Description and instructions for use.
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THE CLOCKIT SYNC MODULE ACS 401

The Sync Module is a small, highly accurate portable time code and sync signal generator. Audio machines such as DAT Recorders can be locked to the sync module thus giving very low drift between machines. Typically, the drift will be less than one frame a day, when working with other clockit modules for eg. Lockit box, Masterslate.
The unit uses the same hardware as the Sync module for HHB and ist uses are as a pocket master clock or as an external Timecode master generator and syncing unit for DAT recorders such as HHB or Fostex Due to ist low price it can be chosen instead of the Lockit for audio timecode. The accuracy and Clockit features are the same as the Lockit etc.

The Sync module can be jam synced with external timecode* or set with an Aaton ASCII code.

***Note when setting from external code only the time is transferred. The framerate generated is as selected by the dipswitches.**

The Sync module can be used to "pull up" the HHB DAT recorder using the external video sync input and the Frame sync pulse. The recorder is set to 29.97 Fps with external sync and an external timecode and Timecode/Framesync running at 30 Fps is connected.**

****In NTSC Countries where film is being shot at 24 Fps and video transfer is required, the sound can be recorded at a sample frequency slightly above the standard rate in the relationship 30/29.97. On transfer to video running at 29.97 Fps the film is transferred at 23.98 Fps and the DAT playback is "pulled down" to the standard sample frequency giving exact sync between sound and picture.**

Special Features.

Clockit Crystal less then 1 Frame a Day timecode Drift between Clockit boxes connected to different machines.

Clockit crystal can be tuned at regular intervals using Ambient ACC 101 Clockit controller, thus minimising long term drift.

Extensive unit monitoring through 2 Leds

DC/DC converter for long battery life, over 48 hours with 2 penlite cells.

All clockit features have been retained. The Timecode generator Xtal can be calibrated in the field to under 0,2ppm giving under 1 frame a day drift between clockit units.
The lockit box can be set with Aaton Ascii protocoll and also with external timecode.

TIMECODE

- **3 Volts pp at the Lemo socket**
- **1.2 Volts pp at the BNC socket**
- **All framerates generated including 24. 23.98*. 25. 29.97*. 30* Fps**
- *** Nondrop, Dropframe. With 24 Fps drop is 23.98**
- **Timecode jamming independant of frame rate**
- **Ascii protocoll. Aaton timecode setting**

SYNC

- **Framesync Pulse 5volt pp eg 25 Fps timecode 50 Hz**
  29.97 Fps timecode 59.96 Hz
- **48 kHz Wordclock 5 volts pp**

1.1 CONTROLS

DIPSWITCHES

Fps	24.	23.98.	25.	29.97	29.97Drop	30	30Drop
1	on	on	off	on	on	off	off
2	off	off	off	on	on	on	on
3	off	on	off	off	on	off	on
4	off set/free on read/ locked						
5	A programmable						
6	B programmable						

Red switch: towards batteries, on

Note. dipswitch 4,5,6 see section 1.8 EVENT NUMBERING

1.2 INPUTS /OUTPUTS

Lemo socket		Cable
1	Ground	TC out
2	LTC in	TC in
3	ASCII in/out	Framesync out*
4	6-16 volt external powering.Tune ref out 1.92 MHz	Wordclock out*
5	LTC out	

TC input under 200mV to 5 Volts pp
TC output 1.5 Volts pp and 3 Volts pp at Lemo socket
*** Internal connection as required**

1.3 LED INDICATORS

The red and the green Led show the state of the Lockit unit
Red led shows that Lockit has not been set from an external source or has lost timecode.
Green led shows Lockit has been jammed correctly to an external source. Note. If a Lockit which has been running green changes to red the time value has been lost. Rejam.

RED or GREEN LED Indicators

blink secs.	1s	2s	3s	4s
Normal	X	X	X	X
Batt. Low	X X		X X	

==== 5 Frames
========10 Frames
================1 Second

1.4 BATTERIES. EXT POWERING.

The sync module is powered by 2 Mignon (AA) cells, 3 Volts, which feed a DC/DC to 5 volts converter. It is recommended to use alkaline cells. The external power is connected directly to a linear regulator and can have a voltage from 6-16 volts.
If the module is being powered externally, the internal batteries can be fitted and act as a backup if external power is removed. With external power and batteries fitted and switched on the led will blink normal 1 sec. intervals if batteries are good, doubleblink if batteries are bad (or not fitted)
Note. The batteries will run for at least 48Hrs probably much longer.

ATTENTION EXT POWER
Doubleblink if no or bad batteries are fitted. Normally insert batteries when using external powering to ensure battery backup. Then the sync module gives a single blink with external power showing backup is fitted.

1.5 SETTING THE MODULE FROM AN EXTERNAL TIMECODE SOURCE.

A External LTC Timecode

Normally on switch on the Module will start counting from zero, but it can be jammed to another timevalue from external code. The jamming process is automatic and is signalled by the Leds.
Note. In LTC jam as in ASCII jam only the time is transferred. The framerate is as selected by the dip switches. This allows "X jamming" say a Module running at 25Fps with a film camera running at 24 Fps.
Connect the external LTC using the Lemo socket. the Red led will light followed by the green, which will then blink in the same way as the red led. Remove the external TC on the green phase, the Lockit has been jammed to external code. If the external TC is left connected the jamming process will repeat every 5 seconds. Always remove on the green phase.

B Setting with Aaton Origen C or Ambient Controller**

The Lockit and all clockit units are Aaton compatible. The Module is connected to the Origen C or our Controller with an Ascii cable and setting and comparisons can be carried out using the Aaton instructions. After setting the led goes green. Remove the ASCII cable

**** The Ascii Protocol does not transfer framerate only time and Userbit values. Note the userbits must follow the Aaton format or Ascii setting method will not work!**

Userbits

DD MM YY PP

D, day. M, month. Y, year. P, production number.

1.6 NOTES.

When running film at 24 or 30 Fps there is a sound sync problem when transferring to video and running the film at reduced speed to be in sync with the video. This feature was easily implemented in analog timecode recorders, as the timecode itself was used for resolving. Syncing a recorded 30Frs timecode to 29.97 Fps gave the required reduction in play speed.

In digital recorders things are different and the wordclock defines the sound playback speed. In normal record mode the word clock runs sync to 30 or 29.97 Fps at its standard frequency of 44.1 or 48 kHz. When this sound is transferred to fit the rushes which are played back at 23.98 or 29.97 to fit the video, the house sync or word clock will play back the sound at the standard rate which will not slow down the sound as required to fit picture which is being played back slower.

The solution is to run the word clock at a slightly higher frequency in the recording process, to fit the 24 or 30 frame filmspeed. This feature is not always available in DAT machines. This is managed by setting the Dat or digital recorder to 29.97 Fps external timecode and external sync. The recorder is then fed with 30 Fps timecode and a 30 Fps NTSC videosync or framesync locked to this timecode. The digital recorder locks to this external sync thinking it is 29.97 fps and is now speeded up in the required amount and is running sync to the filmcamera. On transfer the digital player is locked to house sync running at the normal sample frequency sync to 29.97 Fps. the digital recording locks to the normal sample rate and thus is slowed down by the amount required for it to be in sync with the telecine speed. Using the Lockit box as an external sync source not only gives the above capability but gives under one frame a day timecode drift which is more accurate and stable than most DAT recorder timecode generators.

Note. The HHB Portadat doesn't have the 30Fps drop frame. Select 29.97 dropframe and feed external 30 fps dropframe as above with the external framesync pulse. The word clock shift required is 1/1000th which is within the lock capabilities of the Portadat word clock PLL which will lock into signals of +- 0.5 %.

The sync module is a selfcontained timecode and sync generator for all combinations which also provides these 30 Fps TC locked to 30 Frame sync. The Unit is Aaton compatible and has a less than one frame a day drift compared to the Ambient Master slate and most film cameras. The unit can also be tuned to calibrate the Xtal at regular intervals.

1.7 DIMENSIONS

Size	**125 x 44 x 26mm**
Weight	**200 grams with batteries**

1.8 EVENT NUMBERING

The sync module was originally conceived for the HHB Pportadat and has software to implement the event numbering proceedure. This idea increments a number in the userbits every time the machine switches on. Thus there is a unique number in the timecode userbits for each recording. After the module is set dipswitch 4 is turned on. The timecode generator is locked out and the input is used as a reader. The timecode in to the module is connected to the timecode out of the DAT recorder and this output is set to off tape . The module senses when the timecode stops (no frame increment Tape stops). When the timecode restarts (frame increment, tape running), the userbits are incremented and applied to the generator which outputs its own time with the new userbits. The DAT recorder takes its userbits and/or timecode from the module which is connected to the DAT recorder via the external TC in socket. Dipswitches 5 and 6 A B programmable are for future useand should be always off.

The clockit sync module has 3 outputs

- **Timecode**
- **48 KHz wordclock**
- **50/60 Hz pulse (double frame rate) (59.9 by 29.97 Framerate)**

These outputs are available in the XLR plug !!

Shield and Blue	**O volts**	**Connected**
Red	**Timecode**	**Connected**
White	**48 KHz**	**Not connected**
Yellow	**50/60 Hz**	**Not connected**

To get two outputs for example to sync an HHb Portadat 1000 C, make a BNC lead and wire inside the XLR plug

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