Mutec Smart Clock / Smart Clock AV

Go the all-digital route and you'll encounter benefits and problems that you might not have expected. Most of all, you'll need a clock for more than telling the lateness of the hour with.

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WE TAKE A LOT of things for granted – water supply, drainage, public transport – but infrastructure is generally not very exciting or noticeable until you realise it isn't doing its job or is simply missing. Studios have always needed good infrastructure, reliable mains power, good earthing and regular maintenance. The digital studio has extra requirements of equal importance.

The inherent advantages of a separate master clock generator are now generally accepted. Although it is perfectly possible to 'get away with' connecting a digital source to a destination using the audio signal as a self clocking reference, anything more complex really demands a proper word clock generator and distribution arrangements. Even with a single source and destination, there are jitter issues to consider. Once time code and video are involved, greater sophistication is essential.

If the clock source is sufficiently accurate and stable, the choice of unit depends on convenience of operation, price and connectivity. Mutec quotes generator accuracy at 1ppm, compliant with AES 11 grade 1 and 'extremely low jitter'. I cannot objectively verify this but I have no reason to doubt it.

Mutec has updated its earlier Smart Clock unit and added a variant, Smart Clock AV. Both can be fitted with an optional video module.

Smart Clock generates word clock at all the standard rates up to 192kHz. It can also generate Superclock, i.e. word clock times 256, and output both in a number of physical connection formats. Smart Clock AV caters for film to video transfers by adding the standard pull-up and pull-down variations. With the addition of an optional internal card either Smart Clock will also generate PAL or NTSC black and burst or black video syncs.

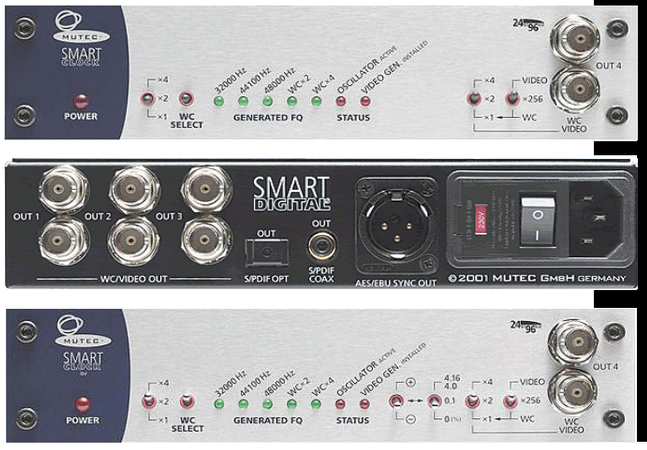
BNC connections are switched in pairs. The front panel pair are ideal for 'guest equipment' since they are independently (and externally) switched. For the rear mounted ones, selection is made using internal switches so a little preplanning will be required to avoid taking the lid off too often. The rear BNCs and XLR have the extra option of Smart Bus. Operation is simple, once the internal switches are set.

These units provide a solid and cost effective basis for a digital audio studio. Video can be added if the application requires it, but you don't have to pay for it if you don't need it. Similarly, the AV version will not be necessary for all applications but absolutely essential for others. Mutec's real strength is that the system is scaleable at reasonable cost.

Looping word clock is undesirable. Each device should have its own dedicated source. Enter Smart Bus, Mutec's delay-compensated connection between generator and distributor(s). This signal enables the number of outputs to be expanded by connecting one or more Distributor AE or WS units. When daisy chained using the Smart Bus signal, all outputs are phase-synchronised and delay-compensated.

With a little thought, these building blocks enable highly complex arrangements requiring several word clock rates and formats (plus video) to be constructed as required. About the only obvious omission is any way of slaving the Smart Clock to any form of external sync. This could be an issue in some studios that insist on 'house sync' (video or word clock) driving everything and for the thankfully rare occasions when you need the tail to wag the dog, such as with dodgy, non-standard recordings, odd time code formats, etc.

The manual offers much good advice about cabling and terminations. The packaging is appealing and well thought out. Mutec Smart Clocks with the add-on AES and word clock distributors make a useful addition to the infrastructure. ■



Both units are in 1U steel cases just under half rack width. Optional rack ears extend a single unit to full rack width or a side-by-side frame accommodates two units. Rubber feet for standalone operation are included.

Mains supply is internal with a rear mounted combined IEC socket, switch and fuse.

Smart Clock has a total of eight BNC outputs, six on the rear panel and two on the front. The BNCs are arranged in groups of two. Each rear group has an internal switch for video or word clock output and word clock x1, x2, x3, x256 or Smart Bus. There are also coaxial and optical SPDIFs and an AES-EBU XLR output on the rear panel. The left-hand toggle switch sets the frequency multiplier at x1, x2 or x4. The next one sets the basic frequency to 32kHz, 44.1kHz or 48kHz. The first three green LEDs indicate the selected sampling rate and the next two indicate if the x2 or x4 multiplier is in use. Two red status LEDs indicate oscillator active and video generator installed. Two further toggle switches set the word clock multiplier for the front panel BNC sockets and select their output between word clock, x256 and video (where fitted). All outputs are phase synchronised.

Smart Clock AV adds two more toggle switches to select pull-up or pull-down and the percentage deviation – 0, 0.1, 4 or 4.16. This covers the common film to video transfer rates.

Where the video option is fitted, its output may be internally selected between PAL (B/G) 625 lines 50Hz and NTSC 525 lines 59.94Hz (29.97 drop frame). Format can be switched between composite sync black and burst or composite sync black.

Contact

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PROS Neat packaging; scaleable and versatile; internal power supply

CONS No provision for locking to external sync; internal DIP switch set-up for some parameters; no LED on Smart Clock AV to indicate pull-up/down selected.

EXTRAS The diagram shows Smart Clock AV as a master in a postproduction environment where it generates different word clock rates and PAL or NTSC video syncs based on one common clock reference. The application shows that all video and audio devices, as well as a synchroniser, receive their reference clocks phase-locked in a similar manner from the Smart Clock AV.

A second workplace is integrated into the studio by using a sampling rate convertor. With respect to the basic studio clock rate of 48.0kHz, this workplace receives a four times multiplied clock rate of 192.0kHz for DVD-A mastering.

For multiplying the word clock and AES-EBU clock outputs, Mutec's Distributor WS and Distributor AE have been added to the studio set-up. They receive their delay-compensated reference signals through the Smart Clock AV.