



AD3000 AUDIO SYNCHRONIZER Series Applications

BACKGROUND

The AD3000 is a digital audio memory with several unique features which give it capabilities unmatched by any other audio delay product in the market today. One of the most valuable features is our pitch shifting capability which utilizes patent pending circuitry to provide correction for pitch errors which occur when continuous delay changes are made.

Old systems perform delay changes by either rubber banding the memory, or by stealing or repeating small segments of audio. The segment stealing method creates low level clicks and pops which sound like harmonic distortion. The rubber banding method creates a pitch error much like what happens when a tape recorder is played back at the wrong speed. Rubber banders usually restrict the rate of change of the delay to around .1% to attempt to keep the pitch shift unnoticeable. This unfortunately does not work, as a good ear can hear even a .1% shift. In addition, the amount of time necessary to make even a small change in delay length is excessive. For example, to make a delay compensation for a pointer crossing in a modern video frame synchronizer can take over a minute, with the lip sync being way off the whole time. Just when the audio synchronization is needed most, it is at maximum error and accompanied by a pitch artifact.

VIDEO PATH LENGTH CHANGES

Video processing paths are often changed in steps, for example by switching noise reducers and color correctors in and out as needed to correct video problems. As the video path, and consequently the video delay is changed, AD3000 is used to provide a corresponding audio delay to keep lip sync in place. It is possible to make the AD3000 correction automatic by using the remote dump. For example, if a color corrector is to be used, the dump contact is kept closed unless the color corrector is inserted in the video path. The dump is then released allowing the AD3000 to quickly build up to a preprogrammed delay.

FORMAT/SAMPLE RATE CONVERSION

The AD3000 has both analog and digital input capability and simultaneous analog and digital output. The digital input can be selected to receive virtually any digital format in use today. The digital output can also be selected to provide virtually any digital format in use today. For systems that need to lock audio sample rate to video, the AD3000 has a video reference to provide this function.

The input and output sample rates are independent, as a consequence the AD3000 can be used as a format converter, sample rate converter, Analog to Digital converter or Digital to Analog Converter. The analog outputs can also be used for monitoring in a digital environment. Whenever a facility needs to marry one piece of audio equipment to another, the AD3000 can do it.

ARGO BOX

The AD3100 option provides 6.1 seconds of audio delay. When used with the dump function this makes a nice ARGO box (profanity delay) for radio or television programs where they take live telephone calls. The "live" caller's audio is delayed through the box before it airs and if the caller gets out of line the delay is dumped and the offensive language (and the caller) never reaches air.

By the way, the name ARGO box comes from what often happens to the live roving reporter on the street Q: "sir - sir - can we ask you a few questions? sir - sir -" A: "AR GO F--- OFF".. Note that some radio station engineers will tell you that the FCC mandates a 7.5 second delay - this is an old wives tale - there is no specified delay time required, only that it be sufficient to prevent the airing of offensive language.

One of the nice features about using the AD3100 for this application is that our FAST TRACK technology can rebuild delays at up to a 25% rate of change. In other words we can rebuild a 6.1 second delay in just 25 seconds.

There are other profanity delays on the market, but they take minutes to rebuild, and they create pitch artifacts while they do so. The rebuild time is a serious problem with most radio DJs since they do not want to wait for minutes before taking another call after they dump an obstreperous caller.

One delay manufacturer attempts to overcome the delay buildup problem by making partial dumps, that is dumping only 3 seconds of a six second delay, thus keeping a 3second delay for the next caller. This is a somewhat faulty solution since it still takes minutes to build the delay back from 3 to 6 seconds.

Simply stated, our FAST TRACK technology provides the quickest, cleanest delay rate of change on the market - by an order of magnitude faster than the competition.

FILM TO TAPE CONVERSION

Many production houses provide film to tape conversion services to transfer 24 fps film to 29.9 fps NTSC or 25 fps PAL. For the NTSC conversion using 3:2 pull down, there is a slight speed error of .3% however in PAL there is a significant speed error of 4%. This speed error creates a corresponding pitch shift of 4% which must be corrected. The AD3100 has pitch correction capability which can easily facilitate this correction with 20 bit audio quality.

In addition, many telecines also incorporate delays of several frames in the video path to accomplish noise reduction, scratch removal, judder filtering, color correction and image enhancement functions. This video delay creates a lip sync problem which requires a corresponding audio delay for correction. The AD3100 can provide simultaneous pitch shifting and delay to solve this problem. In addition, it can take the audio output of the telecine in whatever format it is in and convert it to any other desired format.

TIME COMPRESSION

A large number of stations like to time compress their movies and other programs to make room for more commercials. Most stations still have some type C machines around, or newer disk based machines, which can play back with a 4 or 5 percent increase in playback speed. This increase can make a couple of minutes of extra commercial time available for sale. This is most valuable leading into the local news, and can pay for the AD3100 in just a few evenings.

Unfortunately, this same speed increase creates a pitch increase which must be corrected. Just as with the film to tape speed corrections above, the AD3100 pitch shift capability can easily facilitate this correction with 20 bit audio quality. People who do lot of computer based nonlinear editing often find that audio play times can slip due to unsynchronized audio sampling. Often they find that their 30 second commercial is no longer precisely 30 seconds, but may be off by a second or two. The AD3100 has its own time compression / expansion capability which can make these corrections and restore the audio to precisely the desired run time.

TRACKING DELAY

Of course, don't forget about the primary AD3000 capability, that of providing tracking audio delay to keep lip sync in place. The same FAST TRACK and pitch shifting technology give us the quickest, most accurate and highest performance audio synchronizer technology on the market.

We have the only audio synchronizer in the world with pitch shifting capability to prevent pitch artifacts when making large delay correction changes.

In addition, our AD3000 accepts the industry standard delay steering signal from video frame synchronizers. If your application does not provide a delay steering signal, our DD2100 delay detector is compatible with all video systems to measure the video delay and provide a steering signal for the AD3000.

QUALITY CONTROL MONITORING

The AD3000 has a delay increase/decrease mode of operation where the delay may be continuously adjusted without loss of audio or pitch artifact. Several broadcasters use this function with their "air" switcher to allow lip sync to be continually monitored, and if necessary, adjusted. Operation is as simple as pressing one button to increase and pressing another to decrease the delay.

REMOTE

The AD3000 has as a standard feature a 1/4" jack for wiring a remote dump switch for ARGO box applications. The dump switch is quite valuable since it can be used to set the delay to 0 or to quickly set the delay to some preprogrammed amount.