

# Genlock For Frame-Accurate Time Code?

This month we look at time-code accuracy, often a source of disagreement in production ■ By C.R. Caillouet



C.R. Caillouet in front of NASA's DTV fly-pack. The HD fly-pack recently was put on the road by the Digital Television Program Office at Marshall Space Flight Center in Huntsville, Alabama. It was set up in a conference room overlooking one of the Jet Propulsion Lab mission control rooms.

**Pick your advice:** There are shooters who tell you that they've been working for 25 years and never had a problem with free-running multicamera shoots; and there are producers who tell you horror stories about multicamera shoots costing thousands of dollars extra because someone screwed up the code. The difference is in the expectations and proficiency of the editor on the job.

Back when I started working in television (here it comes), we didn't have no stinkin' time code. We edited on two-inch quad machines by manually punching in an edit point 15 frames before the edit and hoping

that: 1) We hit the button close to the right time, and 2) the take would be good because the next edit would have to duplicate the first, or a jump cut might be visible. Others were actually splicing videotape. I only tell that story because it illustrates the different perspectives in the industry.

There are still editors out there

who can look at two tapes, pick a reference point in the video (or slew the audio tracks until they're in sync) and not care less about time code. For those guys, code may be a nice guide to get to about the right place in the tape, but it has nothing to do with editing accuracy.

There are others who edit entirely

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## MISINFORMATION

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by code who are reduced to being completely nonproductive if the code is one frame off. Those editors may be more productive in the re-edit phase, or not, depending on competence and experience factors.

Then there are the guys in the middle who are totally flexible. They'll use the time code if it's good, but are capable of dropping back to visual matching if there are problems. These are the guys with whom I love to work.

I've personally worked on projects where the field guys simply dropped the ball; every take in the project had to be restriped with time code because the reference was wrong, and the primary audio was on separate sound. To use the audio without a nightmare of hand matching, I set an edit after the beginning of each clip and inserted clean code based on the code at the slate. This way, the editor (machine) wouldn't throw up on the bad code, and the audio machine could be slaved to the video recorder.

That brings us to the subject of this column. Whenever you have two cameras shooting the same scene and locked to the same time code, you must lock them to the same video source if you want the time code to be synchronous to within one frame.

Now, notice that I didn't say, "If you want to cut the cameras together." In the vast majority of cases, a competent editor can manually sync two cameras together and cut a perfectly acceptable scene between the two—but re-edits or changes in the show may require the same drill at each change.

Remember that manual matching



doesn't have to introduce lip-sync errors. Even at 24 fps, the maximum difference in timing between one frame and one of its adjacent frames can be only  $\frac{1}{2}$  frame, which is  $\frac{1}{48}$  second, or about 21 milliseconds (ms).

If it's more than half a frame from a frame before or after, you can change to the next or previous one, and it'll be better. Because lip sync errors aren't visible below about 20 ms (sound advanced) or 90 ms (sound delayed), you can get well within the tolerance by being observant.

To put it succinctly, the driver of project decisions becomes the precision that the editor requires from the field. If only perfect frame accuracy is acceptable, the cameras need to be genlocked and fed the same code. The code also must be locked to the video because drifting time code can cause problems in some cameras.

There's actually an SMPTE spec that calls for the code to start within 10 lines of the start of the video frame in standard definition. If a camera is truly "slaved" to a time-code source, then at some point in the drift, the camera may drop or add a time-code number that can really confuse most editors.

If the cameras are only "jammed" to the source code and then run independently until the next record point, it becomes less of a problem—but slight differences in record start times can allow for a time-code slip to affect one camera and not the other. Remember, one person's accuracy is another's unnecessary hassle.

So, talk to your post folks before you impose your assumptions on the production, or you might not be called back again.

By the way, there also is work being done by an SMPTE working group on the increased problems with lip sync since the introduction of video compression and complex digital processing, but that's grist for another mill. Watch this space... HDVP