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Audio for Television – The Big Picture

2/20/2002

Welcome to my first official column for TV Technology. Actually, this is my first regular column in any magazine and I am very happy to be here.

In coming months, I will try to cover the "nuts and bolts" of audio for both digital and analog television, focusing on the issues and applications within the broadcast plant. Production and post production of audio will be given less attention than how to get that audio through the plant, to the transmitter and – finally – to the viewers' ears. I hope to keep the column as "real world" as possible so that it is useful in the day-to-day operation of television facilities.

HISTORY

To put things into perspective, I suppose a quick bit of history is in order. Prior to returning to New York, I spent nearly three years as the broadcast product manager for Dolby Laboratories at its San Francisco headquarters.

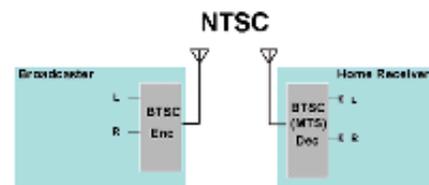
I was part of the team that developed and refined broadcast technologies like Dolby E and Dolby Digital (AC-3). Several colleagues and I spent a great deal of time with broadcasters to better understand their methods of operation and needs, enabling us to bring useful products to market to support their transition to digital television.

After giving many presentations and listening to broadcasters' feedback, we also learned that audio is a generally misunderstood area of both digital and analog television – and as such, has developed a reputation of being overly difficult.

Yes, some things are rather tricky but the lack of understanding seems to be less an issue of one specific area causing trouble and more an issue of the system as a whole not being completely defined.

You might be thinking, "Wait a minute – there are television audio standards out there that define the system!" This is true. There are, in fact, multiple standards that describe audio for analog and digital television. I think you will be impressed with their detail, but surprised to learn how narrow their scope actually is. Let's look at exactly what two of these standards cover.

In NTSC television, the Broadcast Television Systems Committee (BTSC) developed the Multichannel Television Sound (MTS) standard that defines how the stereo, Secondary Audio Program (SAP) and PRO channels are carried. BTSC stereo is now common in both transmission plants and in consumer equipment such as VCRs and television sets. But the standard only describes how to encode a signal at the emission (transmission) side and then how to decode it after reception (**Fig. 1**).



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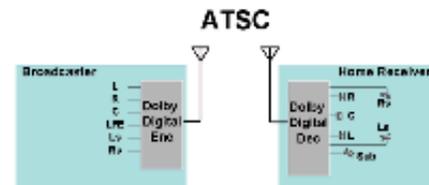
Fig. 1: BTSC Stereo for NTSC Television

The ATSC describes the audio system for digital television in document A/52. Not a light piece of reading, this document describes in great detail the inner workings of the Dolby Digital (AC-3) coding system. Again, the encoder is described for emission and the decoder is described for reception (**Fig. 2**).

Both standards cover the path from the broadcaster to the consumer in enough detail to allow manufacturers to design encoders and decoders. However, they stop short of describing how stereo or 5.1 channel programs are to be created, stored, routed or switched, and make no attempt to describe what happens in consumer equipment after decoding.

They do not cover topics like "How do you carry Surround Sound through the BTSC system?" or "What happens if I am broadcasting a 5.1 channel program and the consumer only has a two-channel decoder?"

The standards explain only what happens between the input terminals of the encoder and the output terminals of the decoder – and this is fine as it would be outside their scope to go much further. That is precisely what we will embark upon in the coming months.



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Fig. 2: A/52 (AC-3) Audio for ATSC

THE THREE-INCH PICTURE

I believe that a good comprehension of the system as a whole is critical to understanding the minute details that can trip up even the most seasoned broadcaster (and consultant). We will look at the entire path from program delivery specifications through the plant and transmission systems – and ultimately to how the audio is presented to the consumer.

It may seem counterintuitive, but to effectively look at the big picture of television audio, we will start from the consumer side and work our way back to the beginning of the chain.

As programs are generally created with the consumer in mind, it really makes sense to look at how audio is presented to consumers by their television sets, DTV receivers, cable set-top boxes and home entertainment systems. There are also features in all these devices that are controlled by the encoder at the station, so it is important to know how each adjustment will eventually affect the audio.

To paraphrase an overused quote, "Dorothy, we're not just hearing this through a three-inch speaker anymore."

After we cover the basics, we will then go back to key points – such as audio/video synchronization, matrix and 5.1 channel Surround Sound in the plant; audio in master control; and loudness measurement and control for analog and digital television – and explore them in more detail.

Next time, we will explore NTSC receivers with and without BTSC stereo decoding, as well as some of the extra (and sometimes problematic) audio bells and whistles included in TVs these days. We will also look at ATSC receivers and digital cable set-top boxes, ranging from mono to 5.1 channels of audio.

I welcome comments or questions, and encourage you to point out specific audio issues that you would like to see  discussed in this column. I hope to hear from you. [Print Page](#)