Information

Dolby

Phase Correctors and Dolby Surround

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Since the introduction of stereo broadcasting, devices designed to correct the relative phase of stereo audio signals have been in existence. Phase correctors were originally intended to electronically replace the mechanical azimuth adjustment on analog tape machines used to "cart" commercials at radio stations. Because the relative phase on stereo analog audio and video tapes was (and still is) prone to be slightly different on each analog tape submitted, these units saved countless hours of machine alignment. It was also believed by some that using phase correctors made the carts sound better on playback.

As broadcasters became more aware of potential uses for phase correctors, these units began to take on a new role at stations. They started appearing at the input to the transmitter, acting as a catchall to fix possible inverted phase conditions between the two channels of incoming stereo signals. Using this device before the transmitter would mean that any out-of-phase stereo signal that appeared at the input to the transmitter would be corrected. This would mean that all the viewers listening in monaural would be guaranteed of hearing the program information at all times.

This may seem like a good idea, but it isn't. Unfortunately, the units aren't smart enough to detect when the stereo signals that are being sent to them are intentionally out of phase and, therefore, do not require any correction. For example, signals that are present in a proper Dolby Surround mix may contain conditions where there is more out-of-phase information than in-phase information present in the signal for brief periods of time.

A perfect example is a front-to-back pan. When the effect is panned to any of the front channels, everything is fine. As the effect passes the halfway point while panning towards the surround channel, it begins to contain more out of phase information than in phase information. This is a result of the way that Dolby Surround matrix encoding works.

Another example occurs frequently when these units are used on the broadcasts of live sporting events. A large crowd roar with announcers talking over the ambience could suddenly have more out-of-phase than in-phase information if the announcers were to simply stop talking. When these conditions occur, the phase correction unit will momentarily invert the polarity of one channel until the situation returns to the expected "normal" polarity. The return flip usually has a small delay before taking place.

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What you actually hear when these unwanted inversions take place depends on how you are listening. If you are listening in Dolby Surround, the center and surround channels will be reversed. This means that the announcers from our sporting event example would momentarily be heard from the surround speakers during the phase inversion. Once the program audio returned to its expected phase relationship and the unit reverted to the uncorrected mode again, the announcers would jump back to the center speaker (or the left and right speakers, if no center speaker is used).

Viewers with stereo receivers may notice a subtle "hole" in the mix between the two speakers, and the soundfield will also appear to be wider than the speakers while the inversion is taking place. If the unit is going back and forth, as often happens with announcers and crowd in live sporting events, one would notice the hole and localization shifting in and out.

In monaural applications, the announcers and other center channel or monaural information will disappear from the mix as long as the inversion is in effect. When the inversion is removed, the announcers and other center channel information will pop back on.

As you probably know, conditions such as these usually result in irate phone calls from your viewers. The use of a phase corrector may have made some sense as an automatic electronic azimuth adjuster in the days of analog tape, but the use of one as a catchall for improper engineering and/or attention to detail will actually cause more harm than good, whether on Dolby Surround or stereo programming. Because most programming today is played out from digital tape machines, CDs, or servers, the need to constantly correct analog azimuth errors is basically a thing of the past.

Dolby Surround is used for more than just movies. Approximately 200 weekly or daily TV shows are routinely broadcast using Dolby Surround encoding. The music industry has been busy producing DVDs, CDs, and cassettes encoded in Dolby Surround. Live concert broadcasts are also being produced for radio stations in Dolby Surround, and more and more commercials are being produced in Dolby Surround, though they generally aren't labeled as such.

Having the Dolby Surround encoded signals pass properly through your broadcast facility is important to everyone. If you absolutely must have a phase corrector in the line, may we suggest that you make the automatic phase flip function an operator-actuated function. Have the unit trigger an alarm when an out-of-phase condition occurs, and let the operator decide if the signal is truly out of phase and requires attention, or if it temporarily has content that is intended to be out of phase at that particular moment.