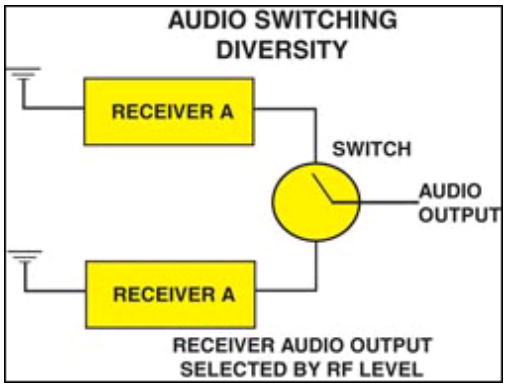
Comparing Diversity Reception Techniques

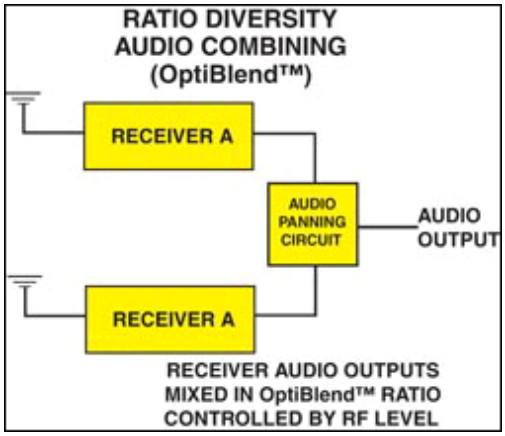
Traditional analog diversity reception designs employed techniques ranging from simple antenna and audio signal switching using one or two receivers, to dual-receiver ratio combining systems. In the digital realm, even more advanced techniques are possible to analyze and correct antenna phase.

Audio Switching Diversity and Ratio Diversity (Optiblend™)

A popular phrase, "true diversity," arose in defense of dual-receiver audio switching diversity designs over very low cost receivers that simply had two antennas mounted on a single unit. Diversity reception can be implemented by mixing or selecting the audio from two separate receivers, or by various antenna combining techniques ahead of the receiver. In reality, all receiver designs can aptly be called "true diversity" if they make use of two or more antennas that are receiving diverse (uncorrelated) signals.

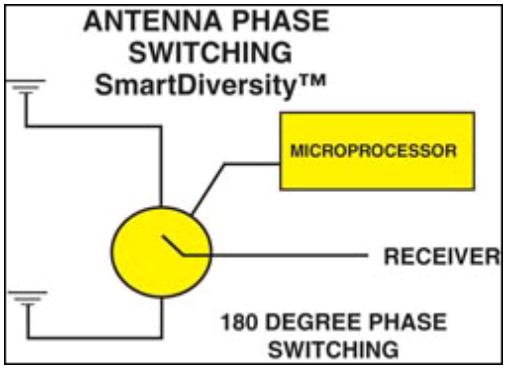
Two diversity designs found in use today include Audio Switching Diversity and Ratio Diversity. Both offer some improvement in audio reception, but with a significant increase in equipment costs because of the need for two receivers.





SmartDiversity™

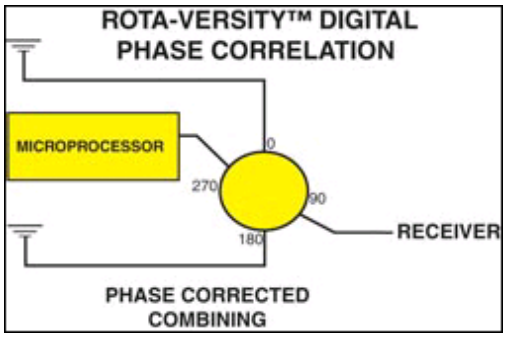
SmartDiversity™ is a microprocessor controlled technique that automatically analyzes audio content and RF levels to determine optimum timing for the switching activity. Active analog antenna phase switching techniques use both antennas at the same time, with 180 degree phase switching to help keep the received signals in phase and minimize dropouts. When the overall RF signal strength quickly drops, the phase of one antenna is switched 180 degrees. If the switch increases the RF level, it will remain latched in that position until the RF quickly level drops again. Both antennas are used at the same time, so overall operating range is also improved.



Rota-versity™

Rota-versity™ is only possible in the digital realm. Rota-versityTM uses a four-way phase shifter to combine the output of two antennas in any of four phase angles, each 90 degrees apart, regardless of RF levels. Hundreds of times per second, all of the phase angles are explored, with the angle offering the best reception used for the audio data. The result is that the diversity system “tracks” the phase shift between the two antennas to ensure that they

always add to one another (they are always less than 90 degrees out of phase). Multi-path dropouts are minimized and operating range is maximized by using both antennas simultaneously. Rota-versity™ is also transparent and cost effective because it times the phase switches to happen only during digital packet headers, where no audio is being conveyed.



Frequency Diversity

Frequency Diversity combines the techniques of SmartDiversity™ and OptiBlend™ with the additional redundancy of using two separate transmitters. The two transmitters, on different RF channels, are adjusted to deliver essentially identical audio at two SmartDiversity™-equipped receiver modules. The outputs of the receiver modules are then combined in an OptiBlend™ ratio, which automatically adapts in real time to RF signal strength. If Lectrosonics 400 Series or 200 Series transmitters are used, the OptiBlend™ ratio is also influenced by transmitter battery status, so a single failing battery will not glitch the audio.