

HOW CAN CABLES MAKE A DIFFERENCE?

Everything along the signal path does make a difference. In this illustration, dirty panes of glass represent several different components, maybe an amplifier, a speaker, and a couple of cables. They all compromise the original signal. Cleaning any one of the panes of glass (improving any single component), will improve your "view" of the sheet music. Usually, improving the cables is the least expensive way to make the most improvement.



SKIN EFFECT is one of the most fundamental distortion mechanisms in cable, and probably the most misunderstood. Contrary to normal cable-hype, skin effect does not alter all of the high frequency signal, and it does not cause any relevant power loss. Skin effect does cause discontinuity in the transmission of high frequencies within different parts of a conductor. Also, in a conventional stranded conductor, skin effect encourages current to jump from strand to strand, causing a signature harshness to the sound.

STRAND INTERACTION is the single greatest source of distortion in cable, and one of the easiest to avoid. As mentioned above, whenever current crosses the poor oxidized contact between bare strands, the signal will be altered. In addition, the magnetic fields of the various strands are constantly interacting, causing confusion (smearing), and causing the contact pressure between strands to be constantly modulated. AQ's Semi-Solid Concentric-Packing almost eliminates these problems. Solid conductors are the complete solution.

CABLE GEOMETRY is the relationship between conductors, both of similar polarity, and opposite (+ and -). At its simplest, a twisted cable has a clear advantage over a parallel model. A single four conductor helix obviously outperforms the same conductors in two pairs, and a Circular Array of six or more conductors allows even better performance. Too much intimacy causes overly high capacitance, braids cause magnetic confusion ... It's worth getting the geometry right.

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**SPEAKER CABLES,
AUDIO INTERCONNECTS**

WHO IS AUDIOQUEST?



Today, it is the intelligence, talent and hard work of many people that makes AudioQuest possible. Twenty-four years ago, when I founded AudioQuest, I designed the cables, soldered all the terminations, and shipped from my garage; and of course used credit cards for financing. A lot has changed since 1980. I do not solder, crimp, re-spool or ship much these days, but I do still design and specify every aspect of AudioQuest's copper and silver cables.

My objective has never changed. I went into business simply assuming that a better product would make its own path. I drove all over the US, opening phonebooks in distant cities, driving over to what appeared to be the best dealer in town, doing a "shared evaluation" with the store staff ... and most always taking an opening order.

Twenty-four years has brought a remarkable progression of new insights and new materials. I am proud of those first early cables, and I am proud of all my current "children." These include speaker and audio interconnect cables, from hardware store prices up to models costing as much as a decent used car. To me, a designer's ability is best judged when the budget is tiny. The expensive products are only as good as the underlying understanding that is common to the entire range. In an appropriate system, all AQ models are the least expensive way to make the most improvement ... if I didn't believe that, I would not make them.

Over the years, in addition to a series of audio cable innovations, I have truly enjoyed "pushing the envelope" in the video and digital domains. Over a couple of generations, the top engineers in this arena have developed very sophisticated constructions for minimizing "loss." I have taken the best that this professional community has already learned, and have added a far greater concern for "distortion." It is a great pleasure for me to put a standard test pattern up on a TV screen, and simply prove in a matter of seconds that AQ's CinemaQuest cables have less distortion. I am still having fun!

William E. Low

A handwritten signature in black ink, appearing to read 'Bill'.

CONDUCTOR MATERIAL QUALITY

Conductor material quality makes a world of difference. However, the best materials will not rescue an inferior design. Impurities in the conducting material cause a harshness signature similar to strand interaction. The best materials have very long grain structures and superior contact between the grains... all that going on inside every single strand! The quality of a conductive path is most defined by a conductor's surface. The surface is a meeting of the area of greatest current density inside the conductor, and of the greatest external magnetic field density. The surface is like a rail-guide for the entire energy envelope.

INSULATION MATERIAL QUALITY

Insulation material quality is a major source of distortion in a low level cable. Air is the best, so the best cables include as much air as possible. Solid materials all affect the signal, and are best chosen for the nature of their distortion, for having a lack of discernible character. "Low loss" is not itself important, as the little bit that is lost is not heard. The energy that is stored and then released back into the conductor is out of phase. This will either rob intelligibility (be dull), or add irritation (be bright).

DIELECTRIC-BIAS SYSTEM (DBS)

Batteries on a cable? In addition to insulating and protecting a conductor, insulation is also a "dielectric." While insulating ability is defined by how well insulation can block current, a dielectric is defined by how much it will slow down a signal; known as time delay or "phase shift."

Time delay cannot be completely prevented, but the damage it causes can be dramatically reduced. When the molecules of the insulation are electrically unorganized, the time delay is different for every frequency and for every signal level. In much the same way that a magnetic field causes a compass to point in a certain direction, the AQ DBS system creates a fixed stable field which electrostatically organizes (polarizes) the insulation. Once organized, the insulation no longer causes multiple nonlinear time delays. Sound appears from a surprisingly black background with much better preserved clarity and dynamic contrast.

The 12V hardware-store batteries used in the AQ DBS packs will last for years because they are only used to maintain an electric field; there is no closed circuit, no drain on the batteries. A test button and LED allow for the occasional battery check.



Model	Construction	Metal	Features	Gauge/Sq. mm	Jacket	Termination Options
G-4	Flat	LGC	SST, SSCP	15 / 1.56		1456 (S or G) 5/16"
X-4		LGC	SST, SSCP	13 / 2.65		
F-14		LGC	SST, Hyperlitz	16 / 1.23		
TYPE 2	Quad Helix HyperLitz	LGC	SST, UL/CL-3	17 / 1.06		P-8M (S or G) 1/4 • 5/16"
TYPE 4		LGC	SST, UL/CL-3	15 / 1.56		
CV-4		PSC+ / PSC	SST, UL/CL-3	15 / 1.56		
KE-4		PSS	24v DBS, SST, UL/CL-3	15 / 1.56		
TYPE 6	Circular Helix HyperLitz	LGC	SST, SBW, UL/CL-3	13 / 2.65		P-814 (S or G) 1/4"
CV-6		PSC+ / PSC	24v DBS, SST, SBW, UL/CL-3	13 / 2.65		
KE-6		PSS	48v DBS, SST, SBW, UL/CL-3	13 / 2.65		
SLATE	Double Quad Helix "Flat Rocks"	LGC	SST, SBW	12 / 3.19		PSC Benda-Pin (S or G)
BEDROCK		PSC / LGC	SST, SBW	12 / 3.19		
GIBRALTAR	Counter Spiral "Earth Features"	PSC+	SST, SBW	12 / 3.19		BFA/Banana (S or G) Crimp Version
PIKES PEAK		PSC+ / PSC	24v DBS, SST, SBW	12 / 3.49		
MONT BLANC		PSC+	24v DBS, SST, SBW	12 / 3.49		
VOLCANO	Counter Spiral "Earth Features"	PSC+	48v DBS, SST, SBW	9 / 5.94		BFA/Banana Set Screw Version
KILIMANJARO		PSS	48v DBS, SST, SBW	12 / 3.49		
EVEREST		PSS	48v DBS, SST, SBW	9 / 5.94		

Model	XLR	Metal/Features	Model	XLR	Metal/Features
ALPHA-SNAKE	NA	Solid LGC Copper Symmetrical Coax AQ Solder	KING COBRA		Solid PSC+ Copper Triple Balanced Welded, Silver-Plated Plug PE Air-Tubes
G-SNAKE	NA	Solid LGC Copper Symmetrical Coax AQ Solder UL/CL-3 Available	JAGUAR		Solid PSC+ Copper Triple Balanced PE Air-Tubes 24V DBS
SIDEWINDER	NA	Solid LGC Copper Symmetrical Coax AQ Solder Foamed PE	PANTHER		Solid PSC+ Copper Welded FPC Plugs Teflon Air-Tubes 24V DBS
COPPERHEAD	NA	Solid PSC Copper Symmetrical Coax AQ Solder Foamed PE	CHEETAH		Solid PSS Silver Welded FPC Plugs Teflon Air-Tubes 24V DBS
DIAMONDBACK		Solid PSC Copper Triple Balanced Welded, Silver-Plated Plug PE Air-Tubes	SKY		Solid PSS Silver Welded FPC Plugs Large Teflon Air-Tubes 48V DBS

CONDUCTING MATERIALS

OFHC - Oxygen Free High-Conductivity copper has less oxygen (less copper oxides) inside the conducting material, therefore less distortion. Should properly be called "Oxygen Reduced."

LGC - There is a lot of variation in the quality of OFHC, because it is specified for its conductivity, not for its distortion profile. Low distortion OFHC has an exceptionally long grain structure, hence the name Long-Grain Copper.

PSC - Perfect-Surface Copper. As only the surface of a conductor has 100% current density and magnetic field density at all frequencies, the surface most defines the sound quality of the whole conductor.

PSC+ - This higher purity version of PSC is simply that much closer to not being in the way at all.

PSS - Perfect-Surface technology applied to extremely high purity solid Silver.

SPEAKER CABLE CONSTRUCTIONS

Stranded - Normal random bunched conductors have lots of strand-interaction generated distortion.

SSCP - Semi-Solid Concentric Packing: Tightly packed strands in a uniform non-changing arrangement drastically reduce inter-strand electrical and magnetic distortions.

Solid - No strand interaction distortion at all.

HyperLitz® - Solid conductors arranged in a fixed relationship, to prevent skin-effect and minimize magnetic interaction.

SST - Spread-Spectrum Technology uses multiple size conductors to greatly reduce awareness of individual conductor character flaws.

Counter Spiraling Helixes - Two circular arrays spiraling in opposite directions. Positive and negative conductors cross, reducing interaction, even while maintaining a crucial constant relationship between (+) and (-).

SBW - These cables are ideal for full range (all + and - in two groups) and for Single Biwire (+ and - in four groups).

INTERCONNECT CABLE CONSTRUCTIONS

Coax - Most interconnect cables have a "positive" center conductor, and use the shield as (an inferior) "negative" conductor.

Symmetrical Coax - A foil shield combined with a low distortion conductor identical to the center conductor, provides a negative path symmetrical with the positive center conductor.

Triple Balanced - Necessary to provide equal paths for all signals in balanced (XLR) applications. In Single-Ended (RCA) applications, distortion is reduced by doubling the negative path, as there is far greater "potential" across this connection.

INTERCONNECT CABLE INSULATIONS

PVC - Polyvinyl Chloride is under-appreciated because it is too "lossy" to use in wideband cables. PVC's "friendly" distortion profile makes it very cost effective for audio.

PE - Polyethylene absorbs less energy than PVC, and also has a very "friendly" sonic signature.

Foam PE - Filling PE with air creates Foamed PE, a much better dielectric, significantly improving clarity and dynamics.

PE Tubes - Solid PE tubes with an inner diameter (ID) much larger than the outer diameter (OD) of the metal inside. Air becomes the primary insulation!

Teflon Tubes - Even though PE Tubes have mostly air for insulation, the PE still affects the sound. Teflon tubes further improve performance.