

Do No Harm!

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audioquest[®]

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AudioQuest History



The Quest Group was born from one man's passion for music and the arts. William E. Low (Bill), founder and chief designer of AudioQuest, became intensely interested in music and audio equipment during his teenage years. A burning curiosity, along with the economic realities of subsidizing higher education, soon found Bill selling music systems to fellow classmates on the campus of Reed College in Portland, Oregon in the early 1970's.

By 1976, with his college days in the rear-view mirror, Bill found the urge to move to California irresistible. After a two-year stint as a manufacturer's representative in the Bay area, he continued south and established a small, high-end audio salon in Santa Monica. During this time, Bill recognized that deficiencies in the signal-carrying cables were a source of various kinds of distortion. He began to experiment with various cable construction techniques and quickly realized that seemingly small changes in construction could have substantial effects on the sound of an audio system. Subsequently, he came to the same realization with video cable. From this point on, an ever-evolving journey of improving the performance of audio & video cables became Bill's passion.

By 1980, cables were being provided by Bill to an emerging network of specialty audio dealers in Southern California. With business plan in hand and a few hundred dollars in the bank, he formally established AudioQuest and began to expand distribution throughout the United States and around the world.

Over 30 years later, AudioQuest is positioned as the premier provider of high performance audio & video cables and accessories. AudioQuest's success continues to be driven by Bill's unwavering belief that the best marketing is done by passionate and inspired customers!

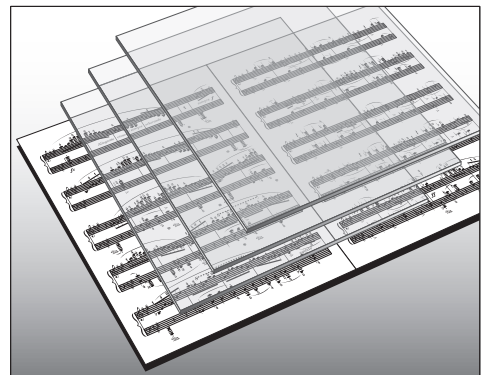
AudioQuest Culture



AudioQuest is driven by an equal passion for product performance and customer service. Phone calls and emails are answered by real people, and products are designed by people with a genuine love of music and film. Despite growth and success, AudioQuest remains a small company at heart that believes business is earned by staying true to its core values of performance and value.

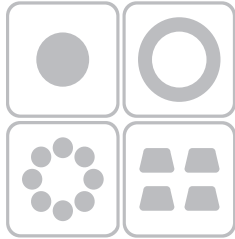
Do No Harm

Audio and video reproduction is fundamentally a case of damage control. The signal is at its greatest potential ... is least damaged ... at the source. Great sound and great pictures, music that consumes you, movies that transport you around the universe ... all come from honoring the original signal. It's an unavoidable fact of life that every component and cable in a system causes distortion, changing the overall character of the signal. These aberrations add up, like layers of dirty glass between you and an image you are trying to see. Better cables, and for that matter better components, cannot improve the signals they carry ... they can only do less harm to those signals and reduce the amount of noise and distortion introduced into a system, thus improving performance.



The goal of high quality components and cables is to be like cleaner panes of glass ... to minimize any alteration or distortion of the signal.
Do No Harm!

The Four Elements

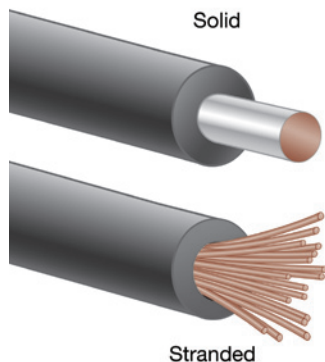


The foundation on which AudioQuest is built is comprised of the following four fundamental ‘elements’ of cable design and manufacture.

Another way to think of this is that these elements comprise the basic “recipe” for all cables. The choices the cable designer makes in selecting and

balancing these materials and construction techniques determine the cable’s ability to reduce distortion and noise and deliver high performance. An off-the-shelf cake mix, for example, might produce an edible product, but that’s unlikely to match the efforts of an educated pastry chef who handpicks the finest, freshest local ingredients.

By learning about the Four Elements and their significance, you’ll be able to better understand the entire AudioQuest product platform.



Solid Conductors

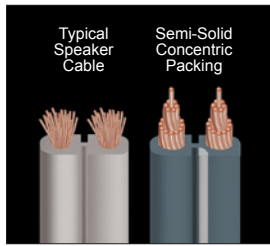
Solid conductors eliminate a fundamental problem caused by stranded conductors, which results in significantly better performance. To understand the benefits of solid conductors, one needs to understand the problems inherent in stranded conductors.

The Trouble With Strands: A stranded conductor is made up of hundreds of strands (sometimes not much bigger than the thickness of a human hair) bundled together to create a conductor. The strands on the outside present an ideal electrical pathway, but the ones on the inside have different electrical values. This causes the same information to be distorted differently in different parts of the cable. The bigger the bundle of strands, the bigger the problem. The fundamental problem is that the position of each strand in the conductor is not consistent. Individual strands weave from the outside of the bundle towards the center and back again in a standard bunched-conductor multi-strand design. Because the signal wants to take the path of least resistance, it will travel closest to the surface of the conductor – in this case the strands on

the outside of the bundle. When an 'outside' strand weaves towards the center of the bundle, the signal will 'hop' to a neighboring 'outside' strand in order to maintain the path of least resistance. Since the strands are constantly wandering, the signal is constantly 'hopping' from one strand to another, causing the most harmful kind of distortion found in a cable. In addition, the contact between these bunched strands is less than perfect. The point of contact between strands is actually a simple circuit that has capacitance, inductance, diode rectification ... a whole host of problems. This happens thousands of times in a cable, and causes most of the hashy and gritty sound in many audio cables. This distortion mechanism is dynamic, extremely complex, and because of oxidation, will become worse over time.

Magnetic Interaction is the other primary problem in cable design, both with a stranded conductor, and between conductors. A strand carrying current is surrounded by a magnetic field. Electric potential is transferred as current inside a metal conductor and as a magnetic field outside the conductor. One cannot exist without the other. The magnetic field outside a conductor diminishes at distances away from the conductor. (Density is 100% only at the surface of the conductor.) In a bundle, each strand has its own magnetic field. These magnetic fields interact dynamically as the signal in the cable changes. On a microscopic level, a stranded cable is actually physically modulated by the current going through the cable, particularly with high current applications such as speaker cable. The more powerful magnetic fields associated with the bass notes cause the greatest magnetic interaction, which modulates the electrical characteristics of the cable, which in turn modulates the higher frequencies. Because the music signal modulates the contact pressure between adjacent strands, it also modulates the distortion caused by current jumping between strands.

Distortion due to both magnetic interaction and from bare strands touching does not exist when using solid conductor designs. As a result, solid conductors cause significantly less harm to the signal and provide significantly better performance.



Semi-Solid Concentric Packed Conductors:

Semi-Solid Concentric Packed Conductors are used in some of AudioQuest's AC power and speaker cables as a cost-effective, flexible alternative to typical stranded conductors. Semi-Solid Concentric Packed Conductors use

fewer, larger strands that do not change position down the length of the cable. While solid conductors are the complete solution to strand distortion, Semi-Solid Concentric Packed Conductors avoid many of the distortion mechanisms of stranded conductors.

Feature: Solid and Semi-Solid Conductors

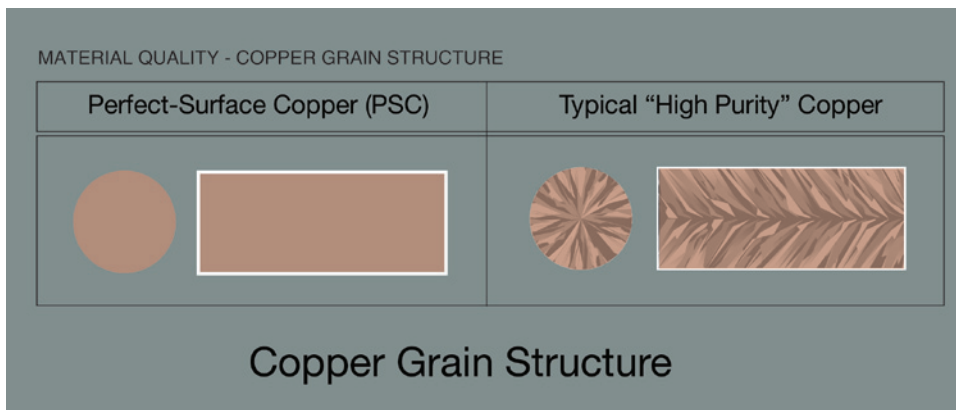
Advantage: Signal is able to maintain position and magnetic strand interaction is eliminated

Benefit: Less distortion of the signal, better performance



Metals

The quality of the copper or silver used is another important aspect of good cable design. AudioQuest uses three qualities of copper in its interconnect, speaker and power cables, solid silver in its top-of-the-line cables, and silver-plated copper in its video and digital audio cables.



LGC – Long-Grain Copper is AudioQuest's version of a premium grade of OFC (Oxygen Free Copper). All Oxygen Free Copper contains some oxygen, but in reduced amounts. AQ LGC is drawn and cast carefully so that the oxygen content is even further reduced, typically to around one sixth of a typical "High Purity"

copper. This process significantly reduces the formation of copper oxides, which substantially reduces distortion caused by the grain boundaries. In addition, LGC conductors are made up of long grains of copper, typically around 300 grains per foot compared to a typical “High Purity” copper at around 1,500 grains per foot. Because the boundaries between the grains are not nearly as conductive as the copper, the more grain boundaries per foot, the more distortion is introduced. Fewer boundaries mean better performance.

PSC – Perfect-Surface Copper is drawn and annealed through a novel proprietary integrated process that creates an exceptionally soft copper conductor with an astonishingly smooth and uncontaminated surface. The only part of a conductor with 100% magnetic field and 100% current density is the surface. The surface purity and smoothness does more to define the sonic character (or hopefully lack of character), than any other part of a conductor, hence the name “Perfect-Surface” conductor.

PSC+ – Perfect-Surface Copper Plus employs the same process as PSC but using a higher grade of copper.

PSS – Perfect-Surface Silver employs the “Perfect Surface” process using extremely high quality silver.

Silver-Plated Copper – Silver-Plated Copper is used mostly for very high frequency applications, namely analog video, digital video & digital audio. These signals, being of such a high frequency, travel almost exclusively on the surface of the conductor. As the surface is made of varying degrees of high purity silver, the performance can be very close to that of a solid silver cable (depending on the percentage of silver-plate used), but priced closer to solid copper cable. This is an incredibly cost-effective way of manufacturing very high quality video and digital audio cables. We also use silver-plated copper for subwoofer cables because we have found through listening that silver-plated copper enhances the sense of definition and impact in this application.

Feature: Superior Metals

Advantage: Fewer grain boundaries, lower oxygen content, purer metals

Benefit: Less distortion of the signal, better performance

Geometry



Counter-Spiral Geometry

Geometry, or the relationship between the conductors, determines the basic electrical characteristics of the cable. For example, a speaker cable with parallel conductors will have a high inductance that will make the cable sound dull and rolled off. A speaker cable with parallel conductors will also

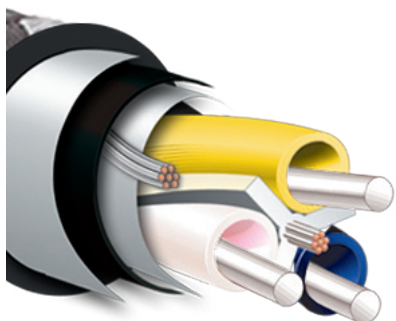
act like an antenna. Think of those indoor ‘T’ shaped antennae often supplied with tuners & receivers. What are they made out of? Two parallel conductors! A speaker cable with a twisted pair of conductors will have a reasonably high capacitance, which can in some cases make a system sound “veiled” and two-dimensional. A speaker cable with four (or more) spiraled conductors has lower inductance than the cable with parallel conductors, and lower capacitance than the cable with a twisted pair of conductors. Counter Spiral geometry takes the group of negative conductors and spirals them one way while the group of positive conductors encases the negatives and spirals in the opposite direction. This ensures that there is minimum interaction between the positive & negative conductors, reducing distortion caused by the magnetic fields that surround each conductor. It is important to get the cable geometry right!

Feature: Advanced Geometry

Advantage: Reduced noise and conductor field interaction

Benefit: Less distortion of the signal, better performance

Dielectric



FEP Air-Tubes

The dielectric, or insulation, is necessary in any cable because the positive conductor(s) and negative conductor(s) must be kept apart. Unfortunately, because the dielectric interacts with the conductors whenever a current is present, it has an adverse effect on the quality of the cable’s performance, particularly in low current cables such

as audio interconnects, digital audio cables and analog or digital video cables. When a current is passed through a conductor, the dielectric absorbs energy from the conductor. The dielectric ‘dumps’ the absorbed energy back into the conductor, and the delay between absorbing the energy and dumping the energy causes a smearing of the signal which robs the music of some detail. In order to minimize these effects, AudioQuest uses a variety of insulation materials in its cables:

PVC – Although PVC (Polyvinyl chloride) absorbs more energy than some other materials, the sonic effects are quite benign.

Foamed-PE – This is PE (polyethylene) that has been foamed in order to create pockets of air in the material. Because air does not absorb (and therefore does not release) any energy from or into the conductor, distortion is reduced.

Air-Tubes – The next best thing to no insulation at all! By making the inner diameter of the Air-Tube greater than the outer diameter of the conductor, the conductor is surrounded by air, which as we now know doesn’t absorb any energy from the conductor. Air-Tubes are a significant improvement over PVC and Foamed-PE.

Special Application Dielectric

HCF – Hard-Cell Foam insulation is used exclusively in most of AudioQuest’s video and digital audio cables. Similar to Foamed-PE, it is nitrogen injected to create air pockets. ‘Hard’ foam is used because the stiffness of the material allows the conductors in the cable to maintain the same relationship with each other along the full length of the cable, thus ensuring that the characteristic impedance of the cable is consistent.

Solid High-Density Polyethylene (Solid High-Density PE) – All AudioQuest HDMI, FireWire and USB cables use Solid High-Density Polyethylene insulation. In HDMI and USB cables, maintaining a precise geometry is incredibly important and the structure that Solid High-Density PE provides overrides any benefits of other dielectrics.

Feature: Superior Dielectric

Advantage: Increased air content reduces signal smearing

Benefit: Less distortion of the signal, better performance

Beyond The Four Elements

There are a few other cable design techniques special to AudioQuest:

Dielectric-Bias System (DBS, US Patent #s 7,126,055 & 7,872,195 B1)



High-frequency engineers often believe that “low-frequency” audio is just so simple ... but in fact, it is very difficult to handle a multi-octave audio signal without damaging the time relationships that define individual sounds.

Even when multi-channel audio is packaged as a single-channel digital stream, as in HDMI, USB, FireWire, Coax, AES/EBU, Toslink, etc., time-based data corruption, known as “jitter,” causes unfixable damage to the information package.

In addition to insulating, “insulation” is also a “dielectric.” This means that it interacts with any nearby electrical signal, slowing down the signal. Absolute speed is not itself relevant, but when insulation is unbiased, it slows down different frequencies and different amplitudes by varying degrees, a significant distortion mechanism.

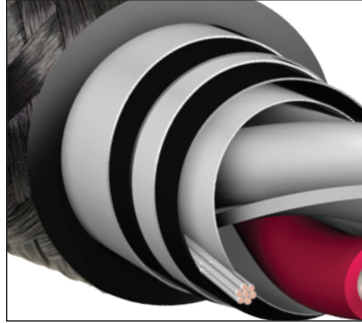
AudioQuest’s DBS creates a strong and stable electrostatic field, which saturates and polarizes (organizes) the molecules of the insulation. This minimizes both energy storage in the dielectric, and the multiple nonlinear time-delays. Sound appears from a surprisingly blacker background with unexpected detail and dynamic contrast. Because DBS creates a field, but does no “work,” the DBS battery packs will last for years. A test button and LED allow for the occasional battery check..

Feature: Dielectric-Bias System

Advantage: Eliminates so-called “break-in” phenomenon, time delay and signal smearing

Benefit: Less distortion of the signal, better performance

Noise-Dissipation System



Noise, in the form of Radio Frequency (RF) energy, is the mortal enemy of good sound. Traditionally, RF energy is routed to ground in an interconnect cable through the use of a shield, consisting of either a braided metal and/or a wrapped foil. It's hard not to think of the "shield" in cable as

something that thwarts incoming RF and other types of distortion by deflecting it away to ground.

This "draining" of RF to ground causes a modulation of the ground plane. This in turn causes a form of signal modulation, a distortion of the signal. One easy analogy is to think of the electrical ground as the earth we walk on. The routing of RF energy to ground causes various degrees of seismic activity in the "earth," (otherwise known as earthquakes). These earthquakes in turn wreak havoc on whatever is sitting (or moving) on the earth/ground. Electrically, we have signal riding on the ground. When the ground gets modulated, the signal also gets modulated. AudioQuest's Noise-Dissipation System greatly reduces the effect of this modulation by using a combination of different "shield strategies," which reduce RF energy BEFORE that RF energy is dumped to ground. The combined effect of using varying layers of metal and carbon-loaded synthetics prevents most RFI from ever reaching the equipment's ground plane. The carbon-loaded synthetics have the ability to turn some of this RF energy to heat, to very effectively "lose" this energy. Metal, used in a passive manner, is incorporated to act as another method of dissipating and reducing the incoming RF.

By the time whatever RF is left has been drained to ground (via an inner foil which IS attached to ground), the RF "enemy" has been greatly reduced by the Noise-Dissipation System.

The result? Dramatically less modulation of the signal, less distortion and better sound.

Feature: Noise-Dissipation System

Advantage: Reduces RF energy before it modulates the ground plane

Benefit: Less distortion of the signal, better performance

Directionality



When metal is pulled to form the long conductors needed for building cables, certain grain structures are formed that affect the overall sonic performance of the wire. Simply put, the conductor has lower perceived distortion when running in one direction (“with the grain”) than when reversed (“against the grain”).

This is true for any cable that carries audio, be it a pair of analog interconnects, speaker wire, or even HDMI cable. The only way to properly test for directionality is the ultimate test equipment ... the human ear. Every spool of copper being used for an audio cable is listened to for directionality and then labeled for the proper direction. This is so important to us that directionality is marked permanently on the plug of all terminated audio cable, including HDMI, and on the writing on the jacket of our unterminated bulk wire. AudioQuest’s commitment to directionality is such that the single pair of conductors in AudioQuest’s HDMI cables dedicated to the Audio Return Channel feature is run in the opposite direction of the rest of the signal-carrying conductors to ensure that sound quality is optimal for all signal paths.

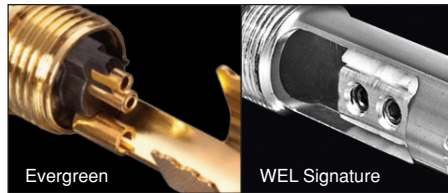
Feature: Directionality

Advantage: Wire is optimized for best performance through listening tests

Benefit: Less distortion of the signal, better performance

Connectors

Unlike most cable providers AudioQuest is not beholden to “off the shelf” OEM parts for its connectors. Instead, AudioQuest designs each connector from the ground up to provide the best possible performance for the given application. Painstaking care is taken to evaluate every quality option. For example, AudioQuest uses the state-of-the-art “Cold-Weld System” to provide a nearly perfect low-distortion connection in its entire line of interconnect cables from the entry-level Evergreen all the way to the flagship WEL (William E. Low) Signature series. In addition, rather than using the customary phosphor-bronze or beryllium coppers (which are much harder



alloys and therefore easier to machine), AudioQuest pushes the art by using high-purity pure copper (not alloy) as the base metal in most of its RCA, XLR and

3.5mm Mini connectors. Pure copper is softer and therefore more difficult to machine, but the sonic results are more than worth the added effort!

Feature: Pure copper connectors

Advantage: Connectors evaluated for best sonic performance through listening tests

Benefit: Less distortion of the signal, better performance

Silver Terminations



AudioQuest pays special attention to the plating it uses over the carefully chosen base metals used for its connectors. The standard for “quality” in the cable industry for years has been very shiny gold plugs on both speaker wire and interconnect plugs. The purpose for this is primarily cosmetic and in no way improves the performance of the product. Silver is a far better conductor

than gold, and the performance is actually slightly improved by the natural oxidation process of the silver. A jewelry-like shine to plugs is achieved by using intermediary layers of nickel – this only diminishes the quality of the termination. At AudioQuest, performance is not compromised for an “eye-candy” appearance. All gold and silver plated spade and banana speaker connectors are plated directly over the copper, with no intermediate layer of nickel. All silver-plated connectors, whether for analog audio interconnects, HDMI, USB, FireWire®, AES/EBU balanced or S/P DIF single-ended digital cables, are Direct-Silver plated.

Feature: Silver Termination

Advantage: Fewer, better metals used in plug construction

Benefit: Less distortion of the signal, better performance

Cold-Welded Terminations



Making the perfect connection between conductor and connector is not a simple process. There are three accepted ways to make the connection between a cable and an RCA or XLR plug. This introduction of heat and extra materials like solder change the character of the wire at the point of termination. Solder is by far the most common method of connection. (By the way, all solder is not created equal.)

Resistance welding is clearly superior to even the best solder. However, just as solder introduces an inferior layer of differing material, causing distortion and reflections, so does welding. The alloy created at the interface of cable and plug is far superior to solder, but it is still an undesirable intermediary layer. After so much attention to the quality of the conductor and connector, the contact system deserves just as much consideration.

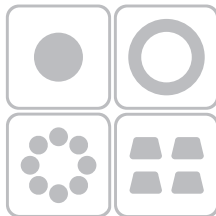
AudioQuest's Cold-Weld System solves this problem with a superior connection that ensures that the structural integrity of the conductor and plug is kept completely intact without the damaging effect of heat. The conductor and plug being joined is subjected to several tons of pressure resulting in a nearly perfect connection.

From modestly priced cables like Evergreen interconnect to the bleeding-edge WEL (William E. Low) Signature models, AudioQuest has incorporated Cold-Weld connection technology into its entire line of interconnects and prepared speaker cables.

Feature: Cold Weld Terminations

Advantage: No heat, foreign materials used in cable termination

Benefit: Less distortion of the signal, better performance



**For more information visit our website at www.audioquest.com
or contact us at info@audioquest.com**