Harmonic Technology

By Jim Wang

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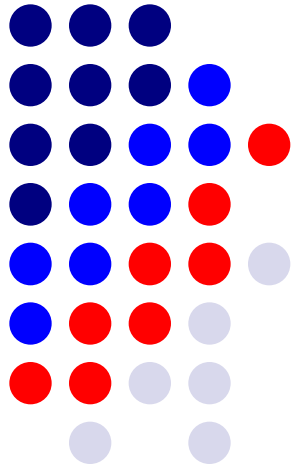


Harmonic Tech History

- Established on April, 1998
- Two types of product lines:
  - Classic Cable: We started with use only the Single Crystal OCC Copper or OCC Silver for all our Interconnect Cable, Speaker Cable, Digital Cable and Power Cord. Harmonic Technology's design process obtains purity levels in excess of 99.999997% in an atmosphere completely devoid of oxygen and other contaminants. The end result has been a dramatic increase in the clarity, dynamics and power of the signals traveling through the cables to a level never experienced before by audiophiles and home theater enthusiasts.
  - Photon Cable: On 2004, Harmonic Technology adapted fiber optics and laser-like technology to the audio realm in order to create a new generation of cable products that has truly revolutionized the industry. Through patent-pending, miniaturized LAM (Light Analog Module) Photon Transducers, Harmonic Technology's Photon cables convert audio signal to light pulses, with absolutely no digital conversions, unleashing the sonic depth, accuracy and power of every signal.

Harmonic Tech Mission

- What is our Mission?
  - We believe the cables are the primary messengers that deliver the data from any source to the desired destination.
  - Our goal is to ensure the delivery of the message is completely honest, with absolutely no alterations whatsoever.
  - Harmonic Technology designs, develops and manufactures cable products using the best materials for conductors and the correct geometry to allow the cable material to perform at the optimum.

Harmonic Technology Vision

- Global provider of high performance audio/video cables
- Harmonic Tech is to bring the beauty of the performance through the system with perfect authenticity via our wire connection
- Delivering true clarity and musical accuracy drives the design and manufacturing of every cable product in our portfolio
- Success come utilizing expertise and research in other industries to bring best practices processes into the audio/video cable market

What is OCC Copper and OCC Silver

- **Classic cable group:** Harmonic Technology uses only the Single Crystal Copper and the Single Crystal Silver for our classic cable products.
- Each cable contains a unique blend of the two metals with individual insulation to ensure complete clarity.
- The patented OCC Single Crystal™ design process, where metal is purified to eliminate any potential crystalline barrier distortion.

The benefit of OCC Single Crystal cable

- Metal is purified to eliminate any potential crystalline barrier distortion
- Provides the highest levels of accuracy in signal transfers
- Obtains purity levels of 99.99997% and above for both copper and silver wires

Why do cables make a difference–interconnects, speaker cables and AC power cords?

- Harmonic Technology designs, develops and manufactures cable products using the best materials for conductors and the correct geometry to allow the cable material to perform at the optimum. This is without adding grain or any suppression in order to enhance the source of the original data while emphasizing the "harmonic characteristics." When deciding on purchasing new cables, we believe the order of impact to the listening ear can be experienced as follows:
  - the source cable from a CD player or phono device;
  - interconnect cables between a preamp and an amp;
  - AC power cord for each component; and,
  - Last but certainly not the least, the speaker cables

The Classic Cable Dielectric Material

- Our primary dielectric material is air-formed polyethylene (PE) to insulate individual conductors, which greatly reduce strand interactions, maintain a constant OHM level and prevent oxidation of the copper and/or silver. The man-made air pockets created with air-formed PE preserves the dielectric constant at approximately 2.25, greatly increasing the signal-to-noise ratio and dynamic range. Additional materials we have used to insulate our cables include ready-made Teflon strips (dielectric constant 2.1); polypropylenes, polyvinylchloride, paper and PVC.
- With our new improved products such as Pro-9 Ref., Magic Link Two, Magic Digital Two, Fantasy Speaker Cable, we have added Teflon tapes as part of new insulation to reinforce the insulation of our products.

Classic Cable Geometry

- Harmonic Technology engineers the cable products from the ground up rather than resorting to auxiliary networks. Our technology, Balanced Field Geometry, is not limited to twisted, braided or spiraled designs, and creates neutral frequency and fast transit responses capable of reproducing signals as close as perfection as possible.

What about run-in? Why is/isn't it important?

- Although there is no scientific proof that “run-in” – also known as “burn-in” – is required for high-end cable products; practical experience has shown that cable products and audio/video components perform at their best after some hours of “run-in.” The basic premise behind “run-in” is that since all components, the cables and the power cords share a common ground, it takes some time to settle down. In addition, some residual magnetic charge in the copper and silver may need to dissipate completely. We have found that even in our Photon cables – made from fiberglass – perform at a higher level after a “run-in” period.
- The run-in period of the Photon is about one day, hence the classic cable requires at least continuous 72 hours for “run-in” A.K.A. “break-in”.

What is directionality?

- Directionality in traditional cables is primarily used as a way to assist users in identifying the side for input and the side for output. This direction is usually fixed and should not be changed.
- Our Photon cables are unique in that if the wrong direction is utilized, the cables will not work. The input LAM takes the electrons to convert to photons; while the output LAM takes the photons and converts it back to electrons.

Photon Cable Products

- Photon Cable is either RCA or XLR termination.
- The Photon Cable is in Analog domain, not in digitalization.
- At no time, we convert signal into digital and convert back in Analog.
- When the “Sine Curve coming from the source (electron), we convert into Analog Mode of the Photon Format.
- What is the analog Mode in “Light”?
  - That is the different density to represent the level of the sine curve. The Photon Cable transmits in “Light Speed” because we use “Light density” to transmit.
- We notice that some cable companies in advertising to state that their cable could transmit electron in “Light Speed”. We often wondered that, “How could anyone transmit signal in electron in the “Light Speed” without using light.

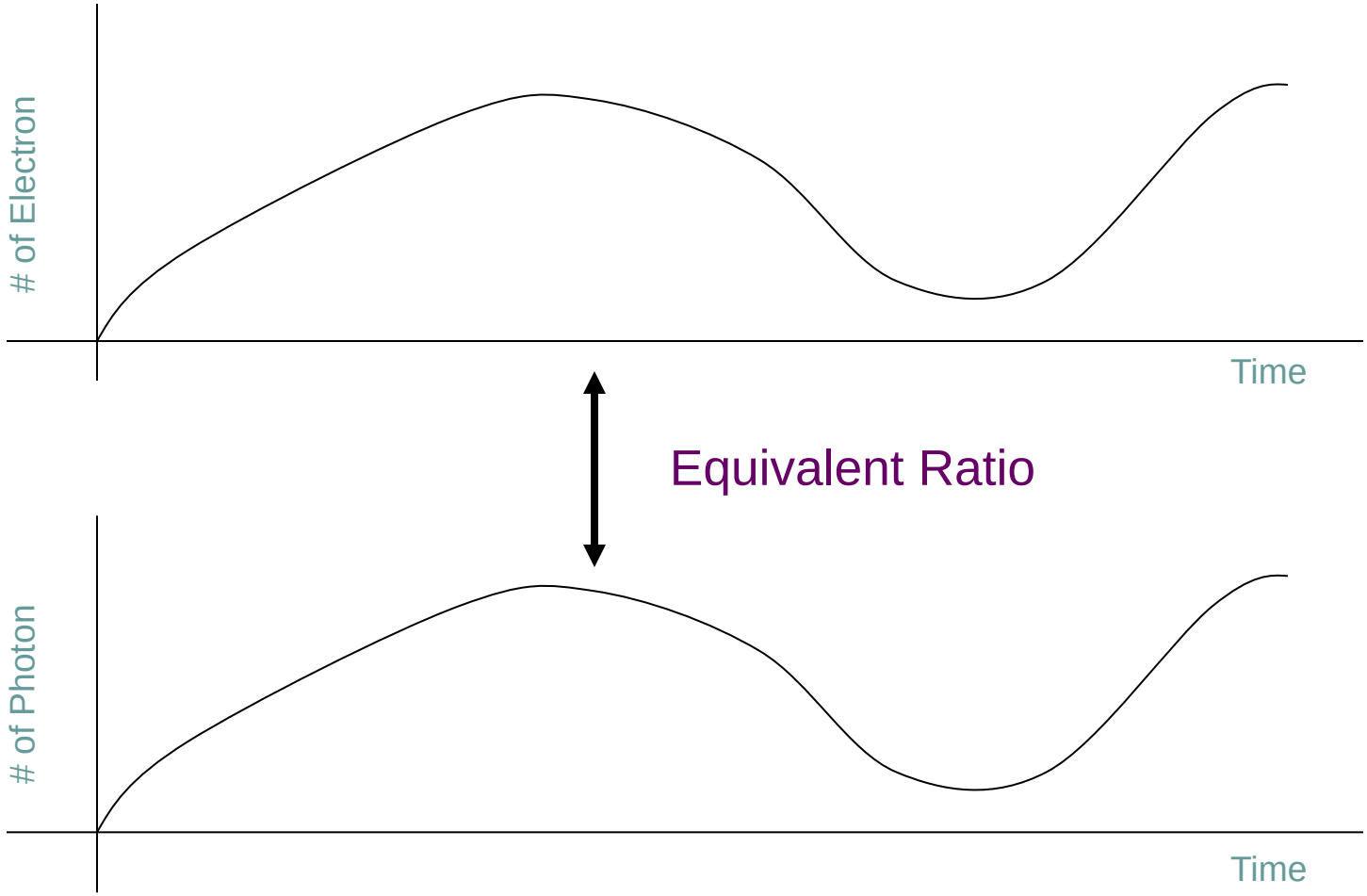
What is the Photon Analog Domain Product?

- Is there any AD/DA conversion?
  - No. The entire signal path is pure analog without any sampling.
- Is the modulation AM or FM?
  - Neither. The technology does not use AM or FM type of modulation.
- Is there a ground loop in the signal path?
  - No. The signal path is purely unidirectional, with no back reflection of the signal.
- Is the power for active shielding similar to AQ and Kinergistic?
  - No. This is a truly active cable. The power is used to power the laser components.
- Does the cable use LED, similar to the Toslink?
  - No. The cable uses true telecom/broadcasting quality analog laser with invisible light.
- Does the laser operating in On-Off or 1010 state?
  - Neither. The analog laser works with a range of intensity rather than either the 1010 or on-off state as seen in digital lasers

How Does Photon Product Work?

- Transmitter and receiver ends use Light Analog Module (LAM), a “Uniformity Density Modulation” technology to transfer the signal from electron into photon.
- Transfer is conducted via audio-grade fiber glass at the speed of light.
- Photon is then converted back to the electron on the reversed end of the LAM module.
- With every electron that comes into the system, it outputs 1 photon into the fiber and then back.
- It doesn’t matter if the wave form is sinusoidal (analog) or square (digital), since the electron to photon transfer is done in an equivalent ratio.

Electron to Photon Transfer Rate



Light Analog Module (LAM)

- LAM is an “Uniformity Density Modulation”.
- Example: If we use the cable between the DAC and the pre-amplifier, the output of the DAC will be a sinusoidal AC curve in Voltage variation. The laser has a fixed powering voltage and the laser intensity varies with the current changes.
- LAM has a equivalent voltage-current conversion that does not require the use of any DA or AD conversion.
- The result is a true analog wave form that preserves all musical information due to sampling and mathematical algorithm.
- Preservation maintains a neutral decay in musical harmony to provide greater depth, airiness and soundstage than any digitized transport can maintain.

Photon versus Classic Cable

Classic Cable

- Classic (Copper or Silver) cable is a LRC device, driven by the source component rather than just a simple transport.
- The LRC will affect frequency response, signal back reflection, forced signal attenuation.
- Also different frequencies will arrive from one end to the other at various time might cause a smudge in sound.

Photon Cable

- In Photon wire, the input and output are pure R!
- The body of the cable is pure optical and all sounds and frequency will travel at the light speed and reach the other end uniformly.
- With no LRC inside the fiber, the natural oscillation is not forced, only a natural decay exists.
- The pure R at each end is especially friendly to components. The input side has HIGH R so it is easy to drive and the output side has LOW R so it can drive the next component without first overpowering itself.
- The Photon cable is not for everybody. We will give explanation in next page.

The Photon Cable is not for everybody

- The Harmonic Tech Classic Cable is for every component and for every customer, but the Photon cable is not for every system. Why?
  - The Base Price of the Photon Cable is higher than classic cable.
  - The long run (> 5 meter) of the Photon Cable will be cheaper than the classic cable.
  - The maximum output Vrms for the source device is 2.8 Vrms. The Source Interconnect Cable, is commonly refer to the Photon Link.
  - The maximum output Vrms for the PREAMP is 2 Vrms. The Photon AMP is commonly used between the Preamp to AMP.

Why Does the Digital Cable Between the Transport and DAC Affect the Sound?

- Digital signals operate in 0's and 1's. The key is to make sure the impedance matches and the frequency range between 100Hz and 30MHz are good. So why do the cables sound different?
- The digital output on the coax side can be affected by the following variables:
  - When the signal ramps up to full voltage, representing 1, the delay in rise time to hit that voltage will cause jitter.
  - The attenuation and LRC effect in the cable also affects the voltage transfer time, introducing additional jitter.
  - RFI and EMI interference introduce both noise and jitter.
  - Back signal reflection in the copper cable can also cause either jitter or data corruption.
  - Time delay for a signal to propagate over the copper cable, which is not traveling at the speed of light, may also introduce jitter or corruption of the data bit.
- Most systems allow up to 30-40% timing offset (jitter) within a time frame, and beyond that, the data cannot be determined. But with the jitter involved, there will be much data corruption, loss and processing involved to correct the data which results in "bad" sound.
- With the Photon fiber cable, the RFI and EMI effects in the signal path is reduced to a minimum and the signal travels at the speed of light with no back reflection problem. This ensures the data gets through as cleanly as possible to preserve the intended nature sound data and is a true difference that listeners can hear in Harmonic Technology Photon cables.

Specs of Photon Cables

Cable Type	Connector	Gain	Frequency Response				
				Input	Output	Input	Output
Photon Digital	RCA or BNC	0 dB	10 - 50M Hz	0.2 - 1.0 Vp-p	0.2 - 1.0 Vp-p	75 ohm	75 ohm
	XLR	0 dB	10 - 50M Hz	2 - 10 Vp-p	2 - 10 Vp-p	110 ohm	110 ohm
Photon Link	RCA	0 dB	2 - 35M Hz	2.8 Vrms	2.8 Vrms	30,000 ohm	75 ohm
	XLR	0 dB	2 - 35M Hz	2.8 Vrms	2.8 Vrms	30,000 ohm	75 ohm
Photon AMP	RCA	0 dB	2 - 30M Hz	2.0 Vrms	2.0 Vrms	20,000 ohm	75 ohm
	XLR	0 dB	2 - 30M Hz	2.0 Vrms	2.0 Vrms	20,000 ohm	75 ohm

Photon Digital

- Best Of 2010 Blue Note Equipment Awards from the EnjoytheMusic.com as the best Digital Cable.
- The Photon Digital created a large and transparent soundscape with exquisite detail and delineation of position.
- The Photon Digital is a true 75 OHM RCA Photon Digital cable or 110 OHM AES-EBU Photon Digital (XLR) cable.

Photon AMP

- Fiber-optic technology ensures entire signal path is purely analog, without any sampling
- This Photon AMP is optimized for Preamp-to-Amplifier connections
- Light transmission through the fiber is uni-directional
- Photon light signals make it immune to EMI and RFI interference

Photon Link

- The Photon Link is optimized for Source-to-Preamp connections
- Patent-pending LAM ensures music is never digitized and offers the lowest possible noise floor
- Photon light signals make it immune to EMI and RFI interference
- To bring the ultimate level of performance to audiophiles.

i-Pure Power Supply

- Purify your DC power source without using batteries. This new i-Pure DC Power Supply, for our exclusive Photon products, isolates audio signals from any RFI or EMI, as well as any crosstalk among electrical components
- Can be used from any AC source from 100V to 240V

Pro-9 Ref. External Biwire Speaker Cable

- The **Pro-9 Reference External Bi-Wire** provides a unique design, where we have **merged** two separate sets—the Woofer set in the inner circle and the Tweeter set in the outer circle—at the amp end.
- Insulated with flexible PE and High Tech Teflon.
- The Pro-9 Reference 2009's version speaker cable will easily outperform any existing speaker cables on the market.
- This speaker cable allows the bass to be very tight, yet extremely dynamic.
- The mid-range is exceptionally rich, with tremendous detail and harmonic completeness that borders on realism.
- The highs are very smooth and detailed, without the artificial "zing" that you may experience with other speaker cables.

Pro-9 Internal Biwire SE Speaker Cable

- The **Pro-9 Internal Bi-Wire** is similar to our previous Pro-9 Plus speaker cable, but it contains a separate Woofer set and Tweeter set within one jacket. The sample shown in the left image represents a configuration where two spades are provided at the amp end and four spades are provided at the speaker end.
- Insulated with flexible PE and High Tech Teflon.
- The Pro-9 Reference Internal Bi-Wire is ideal for customers who prefer only one single jacket for each side of the speaker.
- The Pro-9 Reference 2009's Internal version speaker cable will easily outperform any existing speaker cables on the market.

Pro-9 Ref. Mono SE Speaker Cable

- This Pro-9 Ref. Mono SE speaker cable ensures the best signal transfer and greatly reduces inductance and capacitance for extremely accurate sound.
- Insulated with flexible PE and High Tech Teflon.
- The Pro-9 Reference 2009's version is the best speaker cable available for any kind speakers and/or any amplifiers.

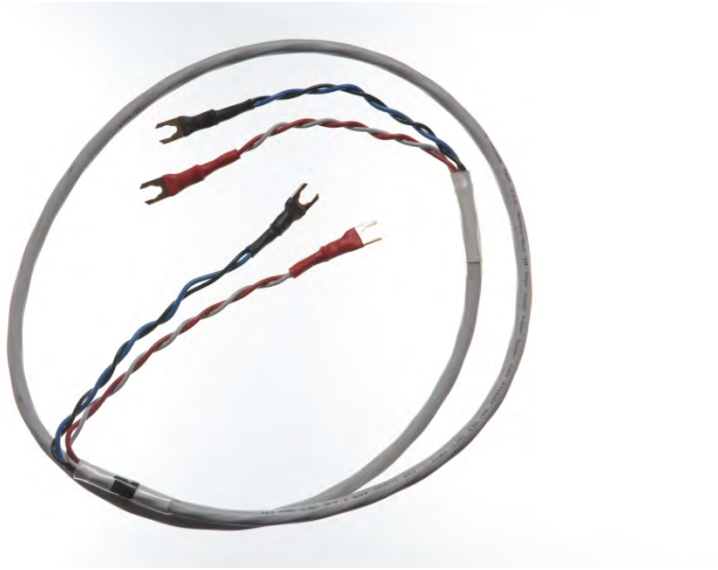
Fantasy SE Speaker Cable

- Use the similar geometry of Pro-9 Ref. Speaker cable, this Fantasy SE speaker cable can be either Mono or Biwire version.
- The Fantasy SE Speaker cable uses Single Crystal copper in an 11 gauge cable to transmit an extremely accurate sound.

Pro-11 Plus Speaker Cable

- Harmonic Technology's Pro-11 Plus speaker cable is an 11 AWG internal mono-wire single crystal cable.

Harmony Wave Speaker Cable



- Harmony Wave speaker cables utilize our proprietary Single Crystal copper wire. But with a unique exterior design constructed of UL/CL-3 grade PVC, the Harmony Wave accommodates for in-wall applications.
- It can be terminated with spades or regular banana plugs.
- Mono or Biwire Speaker Cable.

Magic Link Two Interconnect

- The best Classic Interconnect cable.
- Harmonic Technology's new MAGIC Link Two is a newly improved interconnect using a unique hybrid blend of the finest 7N (99.99997%) high purity Single Crystal OCC silver and 6N (99.9997%) OCC copper conductors, each individually insulated with flexible PE and High Tech Teflon.
- Winner of the 2009 and 2010 Absolute Sound Editor's Choice Awards.

TruthLink

- Truth-Link interconnect cable has the ability to smooth out any systems that has a tendency towards brightness.
- This interconnect does not ignore the high frequencies though; it merely provides less distortion due to the elimination of crystalline barriers.
- The Truth-Link interconnect cable is simply the most musically perfect cable because the mid-range clarity is unsurpassed by any others in the market.
- Overall tonal balance is perfection itself, along with the coherence of all frequency ranges.

Harmony Link

- Harmonic Technology's Harmony-Link interconnect cable, available in both a single-ended RCA connection and a balanced XLR configuration, was designed to break all expectations regarding the price of an interconnect cable versus its performance.
- Harmony-Link utilizes our world-renowned (OCC) Single Crystal™ copper (99.9997%) conductors at a price that makes it affordable for any system.

ProAC11 Power Cord

- Harmonic Technology's Pro AC-11 power cord is constructed with the finest high purity copper.
- Two shields of UL/CL-3 are used for superior RFI rejection and fire protection.
- They are available with a variety of IEC female and male plugs.

Fantasy AC10 SE Power Cord

- Harmonic Technology's Fantasy AC-10 achieves the highest level of clarity by using only the finest 6N (99.9997%) high purity copper and by adapting more advanced Balanced Field Geometry cable design.
- Having a total gauge of 10, the Fantasy AC-10 has more Single Crystal copper than all other power cords on the market.
- The clarity of an audio or video signal can be greatly affected by the component's power supply.

Magic Ref. II SE Power Cord

- The new Magic Reference II Special Edition Power Cord, the winner of the 2010 (and 2009) Absolute Sound Golden Ear Award.
- A patent-pending "PureAC module" contains integrated circuits for a full-band noise filter to purify the AC power source in high-end audio and video components.
- Has uniquely designed to filter both high and lower frequency noise as well as middle frequency range distortions with absolutely no interference from the most desired levels of power.

Digital Copper Cable

- A 75-Ohm coaxial digital cable manufactured with our proprietary Single Crystal (OCC) copper of the highest laboratory grade 6N purity (99.9997%).
- The Digital Copper digital cable allows for the highest level of signal purity in a coaxial design - especially in the midrange and treble frequencies.
- The most affordable RCA or BNC Digital cable

Digital Silver Cable

- This is a 75-Ohm coaxial digital cable manufactured with our proprietary Single Crystal (OCC) silver of the highest laboratory grade 7N purity (99.99997%) terminated either single-ended RCA or BNC.
- The Digital Silver digital cable allows for the highest level of signal purity in a coaxial design - especially in the midrange and treble frequencies. Harmonic richness is greatly increased due to the elimination of crystal boundaries and impurities that can disrupt the integrity of the complex harmonic digital waveform.

Magic Digital II Cable

- The best Classic 110 ohm digital cable terminated in either single-ended RCA or balanced XLR.
- It helps you fully recreate the "magic" of a recorded event in your home environment.
- The most effective and innovative science and manufacturing process for the audio and video cable market.
- The utilization of a unique blend of the finest 7N (99.99997%) high purity single crystal silver and 6N (99.9997%) high purity single crystal copper conductors

Digital Platinum Cable

- Digital Platinum can be terminated in either single-ended RCA or balanced XLR, 110 ohm Digital Cable.
- It allows your digital playback system to sound as good as an original master tape.

HDMI (High Definition Multimedia Interface) HEAC (V 1.4A)

- Audio and Video connections is suited for High Speed, 3D and Ethernet capabilities.
- The flat, silver-clad copper HDMI cable runs at extremely high speed (10.2Gbps) with reduced noise, incorporates bi-directional audio transmission and maintains 100% backwards compatibility.
- The HEAC HDMI has doubled the bandwidth and the resolution from previous HDMI cable.

Magic Audio (OFC) High Speed HDMI

- Use pure OFC copper HDMI Magic (V1.4A) Audio Cable.
- It runs at extremely high speed (10.2Gbps) with reduced noise
- The Magic Audio (ONLY) HDMI Rev. 1.4A is a high speed HDMI cable using only the purest OFC 99.9% pure copper. Although capable of transmitting video images, this Audio HDMI cable is widely known to perform better than many over $500 Audio HDMI cables in the market.

Silver Component Plus Cable

- Silver Component Plus, available in an RCA connection, or an optional BNC and 90 degree alternative terminal, is a significant upgrade to our Crystal Component cable.
- It consists of a set of three 75-ohm coaxial cables (red, green and blue) to provide superior video resolution. Harmonic Technology's Silver Component Plus cable significantly improves the depth of field, color balance, and transparency of the video signal.

An Adapter of Power Cord for your DVD or Blu Ray

- DVD AC Adapter allows you to use our high quality Pro AC-11 with ANY electronic component that uses a simple, inexpensive molded two-prong plug in cord.
- This is a high-quality molded adaptor that utilizes our world famous Single Crystal Copper in a user-upgradeable adapter. One end is a very high-quality molded two-prong plug for interfacing with your electronics, the other is a male IEC socket.

Silver Phono Cable

- The Silver Phono Cable is an interconnect for your phono components.
- Normally, the Silver Phono is terminated by RCA. In some cases, it terminated by XLR.