# THE HELIX IMAGE" Power Cable

15/11/15 15:33 *HELIX USB Cable*HELIX IMAGE Power Cable

Steve Reeve
Fine Art Photography

*Inspired by moments in time*


***MY GOAL: -***
***To bring great sounding cables and "Tweaks" to the DIY Audio Enthusiast :-)***

***PLEASE NOTE: -***
***I have NO affiliation to the products or companies mentioned on these pages***

***The products mentioned are those that I have used over time and found to perform very well.***

**For links to products mentioned in the text see *Product Links below**

**GOT QUESTIONS?**
-sareeve124@gmail.com

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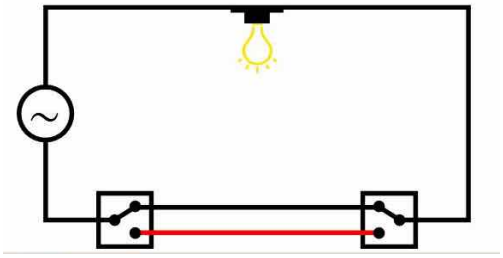
The ***"HELIX IMAGE"*** power cable represents several years of researching different cable architectures and materials.

I started looking at cable architectures a while back, initiated by an experience with a home lighting repair.

I was installing a new two way switch on a hallway light, the type with a switch at each end of the hallway (see diagram below). I decided to play it safe and use my multimeter to verify the open/closed position of the switches.

With the switch in the OFF position everything checked out, but with the switch in the ON position I found that there was a reading of 42 volts on what was supposed to be the "dead conductor" i.e. the red conductor in the diagram below.



I subsequently found articles on the web which verified that in this particular situation it is common for one of the conductors in standard household power cable to register an *"induced voltage"*.

In the case of “conventional” cable architectures, the live conductor and the neutral conductor tend to be side by side in extremely close proximity for the length of the cable, so is it reasonable to assume that noise will be induced between the conductors in a power cable?.

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Would “noise pollution” also be present on the ground conductor, which, and depending on the design of a components circuit, might also have an adverse effect on sound quality?

**Additional research revealed even more to consider regarding good cable design...**

For more information on cable design issues please read the three articles below that talk about the many problems that challenge cables designers.

They will provide a great deal of insight into the many parameters and design techniques employed to build cables that excellent in their performance.

The articles are specific to Interconnect and speaker cables, but much of the theory also applies to power cables

https://www.psaudio.com/article/cables-time-is-of-the-essence-part-1/

https://www.psaudio.com/article/cables-time-is-of-the-essence-part-2/

https://www.psaudio.com/article/cables-time-is-of-the-essence-part-3/

***The premise of the helical design concept eliminates the parallel conductors which minimizes cable issues to imperceivable levels!***

***BONUS! - the Helix acts as a Faraday Cage just for the LIVE wire!***

**But First My Disclaimer:**

**DO NOT attempt any of the assemblies detailed below unless you are an experienced *Electrical Professional* *OR* *Electronics Hobbyist* - otherwise consult a technician!**

**YOU ARE RESPONSIBLE: for following local electrical codes. Failure to do so may result in personal injury, damage to equipment, or power cable failure which can result in fire.**

**YOU ARE RESPONSIBLE: for ensuring the cable selected is suitably rated for the power requirements of the component(s) it will be attached too !**

**YOU ARE RESPONSIBLE: for ensuring the IEC/Mains connectors are installed observing the correct polarity !**
**- failure to do so can result in poor operation, component failure or electric shock.**

**YOU ARE RESPONSIBLE: for ensuring the dielectric strength of the insulation on ALL conductors used, meets or exceeds local codes!**

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***e.g. In North America - 600v at 200 Celsius for 120v 50/60 Hz supply***

**These Power cables are only to be used for Home Audio Purposes and must not subjected to harsh environments and frequent handling, which generally require additional protective coverings.**

**The materials mentioned below comply with most codes for NORTH AMERICA ONLY!**

**Electrical codes in other countries may require the selection of different materials, therefore YOU ARE RESPONSIBLE for following those local electrical codes.**

***YOU are responsible for ensuring "power related" assemblies are safe to use!***

**What size wire do you recommend for various components?**

For "power components" i.e. amps and power conditioners, I have found that using a single 2 x 14 gauge live Conductor (effectively an 11 gauge wire) will suffice for the most demanding components (e.g. amps up to 600 watts).

You might think an 11 Gauge cable is capable of handling much more that 600 watts, HOWEVER, transient peaks in the music can result in very high instantaneous current demands. This cable has been designed to accommodate a significant amount of "headroom" in order to handle those peaks without compressing the signal, **so I conservatively rate its use up to 600 watts.**

**However, since you will NEVER drive a high output amps to their max, these power cables can be used with higher wattage components up to 1000 watts.**

**For the LIVE Conductor of Source Component power cables:**

**Either…**

- **2 strands of 14 gauge Neotech UP-OCC solid copper - my preference for Heavy Duty cables**
- **2 strands of 18 or 16 gauge UP-OCC Solid Copper for Source power cables**

***Materials...***

**The materials listed below will build a 5ft power cable that is suitable for use with Power Aimplifiers rated up to 600 watts.**

For 5 ft power cable you will require…

- LIVE conductor: 10 ft of one of the wires identified above
- NEUTRAL Conductor: 15 feet of Stranded Neotech UP-OCC wire with teflon insulation
- GROUND Conductor: 15 feet of green 12 gauge mains copper wire from Home Depot
- 4" of 3/4" or 1" black Heat Shrink sleeve
- 2" of 1/8" black heat shrink sleeve with adhesive
- Optionally 6 ft of 1/8" diameter cotton sleeve - when installed the sleeve expands, which makes it shorter
- 1 Pair of SONAR QUEST CRYO Ag Audio Grade Silver plated IEC plug + US main plug
- eutectic solder suited for electronics use - or WBT 4% silver solder can also be used
- 1 - 5/16" (7-8mm) diameter fibreglass rod 4-5 ft long - available from Home Depot

For the Spade/Fork terminals…

- buy the 10/12 gauge (yellow) for the double neutral conductor
- and 14/16 gauge if using solid wire for the Live conductor, otherwise use the 10/12 gauge
- I buy them from a local auto supply, electrical or hardware store
- 

The Sonar Quest connectors have heavy Silver plating on pure copper contacts that provide excellent clamping and transmission of electrical current - available from ***ebay***

**I use an approximate ratio of 3:1 of Ground/Neutral:Live conductor**

**e.g. for a 5ft power cable I use 15ft of Ground and Neutral Conductor**

## How To Make Them...

To determine the “Direction” of the Helix - see Inside The Helix Geometry.

***The Neutral Conductor...***
On the 5/16” rod, wind the neutral conductor in a helix configuration, space the windings about 1/4” apart and remove from the rod.

***The Ground Conductor...***

On the 5/16" rod, wind the green GOUND conductor in a helix configuration, space the windings about 1/4” apart and remove from the rod.

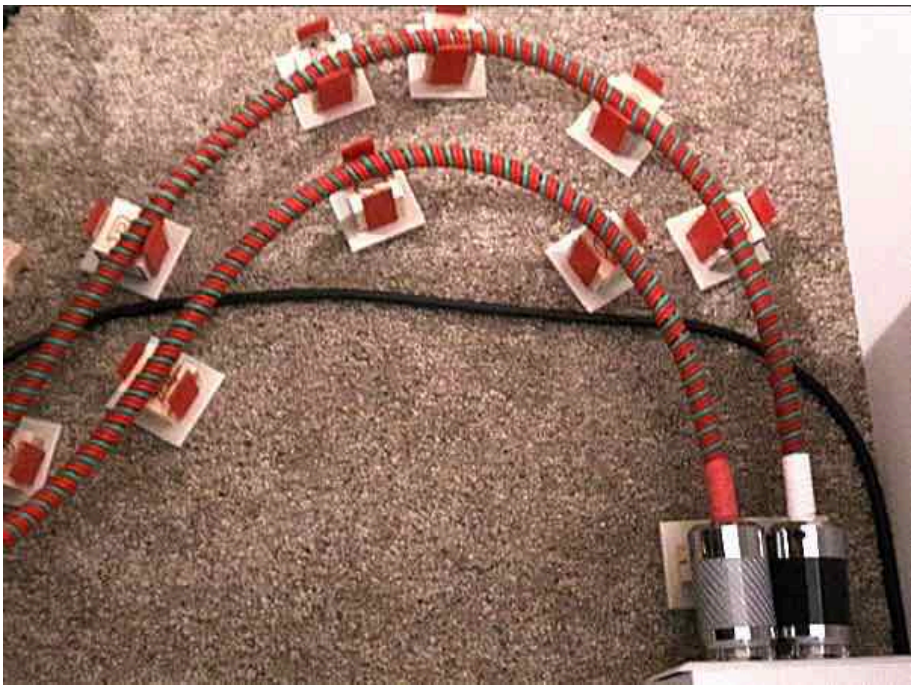
- Interleave the Neutral conductor and the Ground conductor while the ground conductor is still on the rod
- apply heat shrink to each end such that the connectors have a more solid foundation for the cable grip to clamp onto.

***The Live Conductor…***

Constructor the Live conductor as shown in…The HELIX IMAGE (Air)

- Thread the Live conductor assembly through the centre of the red & green coil(s)
- Trim and attach a second 12/10 awg spade connector on free end of the Live conductor, crimp and solder in place.
- Attach a second 12/10 awg spade connector on the free end of the neutral conductor, crimp and solder in place.
- Place 12/10 awg spade connectors on both ends of the ground conductor, crimp and solder in place
- OPTIONAL: add expandable nylon tube for added cable protection

Here are two of my earlier power cables sitting on cable lifters...



NOTE: When Attaching the Sonar Quest connectors to the cable assembly...

***PLEASE ensure you adopt the correct polarity - your life may depend on it!!!***


***Assembly Notes...***

***Why do I use spade connectors? -***

- First, trying to attach the mains/IEC connectors to a large gauge cable is very difficult,
- More importantly - the spade connectors prevent detachment from the connectors in the event of unforeseen stress being placed on the connectors.
- I have also found that the spade connectors that are ***crimped and soldered*** actually improve sound quality.

For a more secure crimped joint, I always crimp from the back - as shown in the image

below, which prevents the collar from opening.


I use pliers as shown in this image that applies an extended crimp along the whole length of the spade connectors collar

Cables that are more suited to source components can use lighter gauge conductors, but be sure to determine their power requirements and select a gauge that can handle it with headroom to spare.

***Can you use other brands of IEC/Mains connectors?***

Of course. Some people might prefer to use Furutech, or Oyaide high quality connectors.

Others may prefer to use something more reasonably price, like the Vanguard range of connectors.

I believe the Sonar Quest connector line provides exceptional sound quality for a reasonable price.

## Power Cables for my Source Components...

Most “Source components” - like CD players, phono stages, DACs, etc.. draws significantly less power than amplifiers. They typically consume up to 40 watts

***So, they do not require a 12 gauge power cable !***

Most source components have a “less capable” power supply than amplifiers.

***So their performance can be improved using a better “quality” power cable !***

The following are details for building the **HELIX IMAGE - SOURCE** power cable as follows...

- A dual neutral conductor made from 14 gauge silver plated Mil-spec wire,
- **OR, a single neutral conductor made from a single strand of 14 gauge Neotech stranded UP-OCC copper wire - is simpler to fabricate and will improve performance**
- The ground wire is a single 14 gauge copper wire - I now use the Mil-spec wire - it retains the coil shape better
- for neutral and ground wires - use a ratio of 4:1 neutral to signal to provide adequate helix coverage

- The Live conductor can be either a 2 x 18 or 2 x 16 gauge UP-OCC bare copper wire, each wire inserted in a teflon tubes
- The construction techniques are almost identical to the standard HELIX Image power cable above

NOTES:

- **• DO NOT use wire that has a cotton insulation - they are not rated for mains use in power cables**

So - for a 5 ft cable you will need...

- 2 x 5 ft of 18 or 16 gauge Neotech Solid copper with insulation removed for the Live conductor
- **OR** 2 x 5ft 18 or 16 gauge Bare UP-OCC copper wire from parts connexion for the live conductor
- 2 x 20 ft of **14 gauge Silver plated Mil-spec** wire from Take Five audio for the Neutral
- **OR** - 1 x 20 ft of 14 gauge **Neotech stranded UP-OCC** copper wire for the Neutral - you only need one wire for the neutral if UP-OCC wire is used
- 1 x 10 ft of Teflon Tube (PTFE 10 Tubing .106"ID .130"OD Approx. 10 awg ) from Take Five Audio
- 1 x 20 ft of **14 gauge Silver plated Mil-spec wire** from Take Five audio for the Ground conductor
- 7 ft of 1/8" cotton sleeve (if desired)
- 14 and 18 gauge Spade connectors - auto supply stores normally have very cheap spade connectors
- 2" of 1/8" heat shrink tube with adhesive
- some masking tape
- quality solder - I now use eutectic solder, but high content (e.g. 4%) silver solder can also be used

## So why do they work?

The power supply of an amplifier tends to be very well designed and built, because of the power requirements at play, whereas the more affordable source components, tend to be built to a price point and therefore the power supply is very often not as "capable" as the rest of the circuit.

The rest of the electrical components are very often just as capable as those in the amp, but in operation, their performance is impacted by the inadequacies of the power supply when handling transient peaks in the signal

So if you use a very good power cable on a source component you can mitigate some of the inadequacies of its power supply.

Solid silver wire, if used for the Live conductor has an IACS rating of around 106% compared to UP-OCC copper at around 103%

***What is IACS?*** — it's a measure of the conductivity of various metals relative to ***"Pure Copper"***, a standard developed for copper wire producers, annealed copper having a rating of 100%

So the silver wire in these cables is able to respond more quickly to transient signal demands.

ALSO - the insulation on this particular silver wire has a Dielectric Constant (Dk) of 1.4, compared to Teflon at 2.1. But if the Air adaption is used the IACS approaches 1.1-1.2

The continual change in polarity of the alternating current charges and recharges the insulation much like the dielectric in a capacitor, which induces noise into the conductor. A lower Dk reduces the amount of noise generated internally within the conductor itself.

***What improvements did I observe?***

- There was a significant improvement in the details of “venue acoustics” - i.e. echoes and reverberations
- dynamics were noticeably crisper
- the image was noticeably larger front-to-back and there was more precision of artist location within the image
- there appeared to be more “air” around each performer
- clarity was improved, i.e. you could hear more of the fine details and layers within the music

I recommend making the single 2 x 18 gauge cables...

***ONLY - if your component draws less than 40 watts - WHY?***

The 18 gauge wire(s) is rated at around 1 amp - HOWEVER - transient spikes can result in significantly higher current draws, which can impact performance or even overheat the cable.

For components rated BETWEEN 40 - 80 watts - use 2 x 16 gauge strands (effectively 13 gauge).

## Using Helix Power Cables in a more "Demanding" Environment?

Let's face it, power cables in an audio system "generally" sit at the back of the audio rack and DO NOT move, except for the occasional component swap or audition. It's not what I consider a dynamic environment. so the construction methods and materials above are "safe", ***but for this style of use ONLY!***

**I will warn that** the Helix power cable IS NOT SUITED (intended or designed) to be used in extreme rugged and demanding environments. such as a recording studio or a live performance !
**If you need a "REALLY HEAVY DUTY CABLE", then, The Helix IS NOT the cable you need, so get yourself a length of Furutech bulk mains cable, which is designed to be used in almost any environment.**

## *The Journey...*

***I’m a frugal person with a distinct dislike of overpaying for something as simple as a piece of wire!***

I started making my own cables many years ago from Bulk cable with reasonably priced connectors.

I first tried Furutech bulk cable and then stumbled upon DH Labs, which I believe offers similar performance for about 1/3 the price - how could you not like that.

I then investigated a braided architecture which proved very effective, even using plain old Romex house wire.

Finally, I tried the Helix Architecture, which has proved to be the best performing power cable architecture to date.

I have now implemented this architecture on all my cables that have anything to do with audio.

***What do they sound like?***

The ***“HELIX IMAGE Power Cable”*** is a high performance power cable that allows connected components to perform to the best of their abilities.

They assist components in delivering ultra fast dynamic performance, exceptional clarity, expansive imaging and a very deep and exceptionally well controlled and very natural bass performance.

***How Long is the Burn-In Period?***

It is imperative that these cables are allowed adequate time to settle and burn-in...

- they will sound extremely good on initial installation
- after about 60 hours they allow more of the micro details in the form of venue specific reverberation captured in live recordings, or applied by very talented sound engineers, to clearly be heard.

### *The end of the Road?*

My hope is that this design will be embraced and enhanced by the DIY Community and encourage them to experiment with different conductor materials and configurations to tailor the sound to their own liking.

## For Helix cable spec's please see Its More Than Just Numbers - Isn't It?

***My Review System:***

- Custom built turntable with a Soundsmith Denon DL103 phono cartridge mounted on an Audiomods Arm with one piece silver litz harness + **KLEI Absolute®Harmony RCA's**
- Simaudio MOON LP5.3 RS phono stage
- Bluesound Node 2i music server
- Bryston B135 Integrated amp.
- Gershman Acoustics Sonogram speakers.
- DIY Power Cables - The "POWER HELIX"
- DIY Interconnect Cables - The "HELIX IMAGE Interconnect"
- DIY Speaker Cables - The "HELIX IMAGE Speaker Cable"

 ***Give them a try - and - Enjoy The Music!***

Tags: Power Cable