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February 19, 2016

Headphone Connectors & Pins / Pinouts for DIY

So, as you have probably noticed, headphone manufacturers are not very good about standardizing connectors for use with headphones and amplifiers, to the point of absurdity. I am going to try and document most of the different headphone connector pin diagrams aka pinouts in one place so you don't have to pull out your hair tracking them down. If you need a cable built with any of the connectors below, reach out to [Zynsonix Audio](#).



The 2.5mm TS with narrow shoulders originally was created for use with the Sennheiser HD700 headphone cups, but now has also been adopted for the Oppo PM-1, Oppo PM-2 and can potentially be used with the HiFiMan 400S, HE-560, HE-1000 and Edition X as the stock TRS does not use the ring (R). The tip is used for signal/positive, and the sleeve is ground/negative.

Recommendations: The best I've found are unbranded/generic connectors with the gold plated connector, chrome barrel and "long shoulders" which looks like the illustration above. I don't advise the other plastic/nickel plated plugs.



The 2.5mm TRS is found on some mobile phones, although most use the ubiquitous 3.5mm TRS. The tip is left signal (L), the ring is right signal (R), and the sleeve is ground (G).

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HiFiMan headphones (New Models): includes the updated HE400S and HE560, HE1000 and Edition X, which use this connector at the cups. Per measurements, the tip is the positive, the sleeve is the negative, and the ring doesn't appear to be used.

Recommendations: There aren't many quality 2.5mm TRS connectors out in the wild, the best of which are unbranded ones coming from across the pond (China / Hong Kong).



The 2.5mm TRRS is commonly used for balanced operation for [Astell and Kern](#) portable digital audio players. Tip is right negative (R-), ring closest to tip is right positive (R+), ring closest to sleeve is left positive (L+) and sleeve is left negative (L-).

Other applications:

Onkyo portable DP X1 DAC: Tip is right negative (R-), ring closest to tip is right positive (R+), ring closest to sleeve is left positive (L+) and sleeve is left negative (L-). : [Source](#)



The HiFiMan HM-801 digital media player and Oppo PM-3 headphone (balanced) follow this unique configuration using the 2.5mm TRRS. Tip is left positive (+), ring closest to tip is right positive (+), ring closest to sleeve is left negative (L-) and sleeve is right negative (R-). Get yourself a nice aftermarket cable using the TRRS from [Zynsonix Audio](#).



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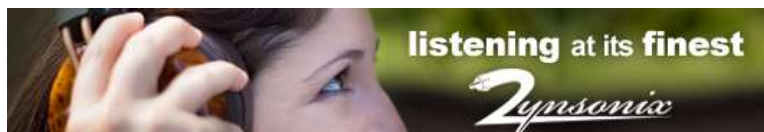
[Millett DCP Engineer's Amp](#)

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The 3.5mm connector (aka mini connector) is the most common plug used for portable audio. The tip is left signal (L), the ring is right signal (R), and the sleeve is ground (G).

Recommendations: There are great options out there from Switchcraft, Furutech, Canare, Oyaide, ViaBlue, Amphenol and more. The [Switchcraft 35 HD](#) series is a great place to start for a rugged, U.S. made plug.



The 3.5mm TRRS has quite a few applications:

iPhone and many other mobile phones: The tip is left signal (L), the ring closest to the tip is right signal (R), the ring closest to the sleeve is ground (G), and the sleeve is the microphone connection.

Oppo PM-3 headphones: This is used for the balanced cup connection for the Oppo PM-3. Per Oppo, the tip is L+, the ring closest to the tip is R+, the ring closest to the sleeve is L- and the sleeve is R-

Hifiman HM-901: Tip is L+, the ring closest to the tip is R+, the ring closest to the sleeve is L- and the sleeve is R-

Geek Out V2: Tip is L+, the ring closest to the tip is R+, the ring closest to the sleeve is L- and the sleeve is R-

Custom Red Wine Audio can feature this jack: RWAK240, RWAK380 and MZAK240

JH JH3A digital connection - Tip is left (L), ring closest to tip is right (R), the second ring handles digital coaxial information, and the sleeve is ground for both analog and digital.



The 1/4" TRS (aka 6.25mm TRS for the metric folks) is the most ubiquitous plug for home/studio headphones. The tip is left signal (L), the ring is right signal (R), and the sleeve is ground (G).

Recommendations: I find the [Neutrik NP3C-BAG](#) to be a great value 1/4" connector and the [Furutech FP-704 \(G\)](#) to be a great choice if you want to spend a few more dollars.

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The mini XLR has become quite popular in the headphone market as it is relatively small, it locks in place, and the connections are more reliable than your average TRS. The mini XLR 3 pin is commonly used by AKG for their K-240S, K271 MKII, K701, K702, K712 and other K701 derivatives like the Quincy Jones Q701. The pins are labeled on nearly all mini XLR connectors, though you may have to look under a light to see them.

For the standard AKG wiring, pin 1 is ground, pin 2 is right signal and pin 3 is left signal.

Recommendations: The tried and true is the Switchcraft TA-3, however I prefer the REAN RT3FC and RTCMC models at the same price as they seem a little more sturdy and have two different strain relief sizes depending on your wire size. The Furutech FT-610 resembles the Switchcraft, however has nicer rhodium plated connectors and looks a little prettier. Bottom line, if you want the best available, go with the Furutech, and if you need the best value, go with the REAN.



The standard-sized XLR is used for a few different applications. As an audio interconnect, Pin 1 is the ground, Pin 2 is the positive signal, and Pin 3 is the negative signal. You'll notice that most XLRs have the pins labeled 1, 2 and 3 if you look closely enough.

Recommendations: The [Neutrik XX series](#) is a great value. I also like the solid weight and feel of the [Switchcraft AAA series](#), and they're two piece, so a little easier to assemble. If you'd like super solid and have a couple more bucks to spare, the [Furutech FP series](#) is a nice choice.



Headroom initially debuted their first balanced headphone amplifier in a dual 3 pin configuration (I suppose if someone wanted to have headphone monoblocks in the future), however the 4 pin XLR proved to make more sense as it's an easier, less cumbersome implementation. You'll notice that most XLRs have the pins labeled if you look closely enough. Pin 1 is L+ (left positive), Pin 2 is L- (left negative), Pin 3 is R+ (right positive), Pin 4 is R- (right negative). Nearly all balanced headphone amps use this configuration, as well as the legendary AKG K1000.

Recommendations: The same recommendations from the 3 pin XLRs are echoed here: [Neutrik XX series](#) is a great value. I also like the solid weight and feel of

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the [Switchcraft AAA series](#), and they're two piece, so a little easier to assemble. [Furutech](#) also just released (FINALLY!) a 4 pin XLR, the FP-705 in 2016, which is a great choice for a few more dollars.



As mentioned above, Headroom initially debuted their first balanced headphone amplifier in a dual 3 pin configuration. It still sticks around today, however is not as popular as the 4 pin configuration. You'll notice that most XLRs have the pins labeled if you look closely enough. Pin 1 (typically the ground) is not used for balanced headphones. Pin 2 is used for the positive signal, and pin 3 is the negative signal. In this diagram, the white wire is left positive (+), the orange wire is left negative (-), the red wire is right positive (+), and the blue wire is right negative (-).

Recommendations: The same recommendations from the 3 pin XLRs are echoed here: [Neutrik XX series](#) is a great value. I also like the solid weight and feel of the [Switchcraft AAA series](#), and they're two piece, so a little easier to assemble. If you'd like super solid and have a couple more bucks to spare, the [Furutech FP series](#) is a nice choice. Also the [Cardas CG](#) series is pure eye candy and a popular choice of my clients.



The Kobiconn Auto IRIS is an odd little connector typically used with cameras. These are found on [Ray Samuels](#) (RSA) balanced portable headphone amplifiers like the Protector and SR-71B, however are also on amplifiers Centrance GloveAudio A1, HiFi M8, and the ALO Rx Mk3 B. Pin 1 is left positive (L+), pin 2 is right positive (R+), pin 3 is left negative (L-), and pin 4 is right negative (R-).



The Male SMC connector is used to connect to older HiFiMan headphone cups, and current models such as the HE-6. As you can see from the pinout, the signal is the small center pin, and the ground is the textured area at the end of the connector. Care should be used when soldering the ground, as using too much solder will prevent the brass cover from sliding over.

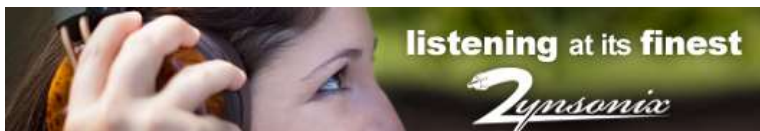


The Sennheiser HD connector features two pins. It's difficult to notice on a quick glance, but one is larger than the other. The larger pin should be used for ground/negative, and the smaller pin is signal/positive.

Recommendations: There are only a couple of DIY connectors out there that are compatible with the Sennheiser HD265, HD525, HD535, HD545, HD565, HD565 II, HD580, HD600 and the HD650. ... Cardas and Furutech, the Cardas HPSC and Furutech FT-2PS.

The Cardas HPSC is reasonably priced (\$~16 as of this writing), but not ideal for beginners. It's a flexible molded plastic with not much room for the wire to be soldered to the internal pins, and the rhodium needs to be heated enough so the solder takes, but not enough for the plug to melt. Flux can be helpful for this, and I personally fill the cavity with a plastic-like hardening adhesive for longevity. The Furutech FT-2PS runs quite a bit more (~\$46 as of this writing, but makes the soldering much easier by separating the pins with plastic, features an internal clamp for strain relief, is made of tough plastic, and looks great. So personally, I would purchase the Furutech unless cost is an issue.

This is a work in progress and there are still a few connectors to add ;)



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Posted by [HiGHFLYiN9 @ Zynsonix](#) at [6:35 PM](#)



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10 comments:



[eehmke](#) March 8, 2016 at 5:43 PM

Hello,
thank you for this great blog! Those informations are invaluable. However, I think I found a mistake. You list the HifiMan HE400S under the 2.5 mm TRS plug, with assignment L, R, G. This makes no sense because the HE400S has already separated jacks at both cups left and right. It can be connected by a simple 2.5 mm TS plug on both sides. I built a balanced cable and tested it successfully with this wiring: +, -, no G. The same applies to the HifiMan Edition X. Please tell your objection.

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[HiGHFLYiN9 @ Zynsonix](#) March 8, 2016 at 5:56 PM