

HEADSETS I HAVE TRIED, LIKE, OR RECOMMEND

with Various and Sundry Observations Tossed In at No Extra Costs

By James Richards - K8JHR

Overview:

Good transmit and receive audio is important for hearing weak stations or being involved in long nets/rag chews. Poor audio not only make it difficult to understand what the other operator is saying, it can also cause substantial fatigue and discomfort over time.

The selection of speakers or headphones for use with amateur radio equipment is a very subjective, personal decision, and what works for one will not necessarily work for another. Tangible differences in personalities, room acoustics, equalization, volume, distortion, and other variables from shack to shack, all mean the same speaker will not sound the same in every shack. Add in the inherent and inevitable variations in our hearing, and you have a sure fire recipe for argument over what speaker is best. Some like more bass, others more treble, and still others want it acoustically flat or linear across the audio spectrum. Personally, I like to roll the bass off at about 250 KHz and the treble off at about 3800 KHz, and boost the frequencies between 500 and 2500 just a little bit, as this seems to enhance speech intelligibility. Nevertheless, I have made a serious attempt to avoid this sort of bias in evaluating and commenting on the products mentioned in this piece, so as to be as neutral and as unbiased as I can be.

Open or Closed Earphone Receivers:

There are two types of earphone receiver:

- 1) Supra-aural type open air receivers, which sit flat against the ears, and provide no amount of ambient noise attenuation;
- 2) Circum-aural open air receivers, which have open air sound, but have a larger earphone pad which goes around the ears, and sits on the head and neck, and may provide a small amount of ambient noise attenuation; and
- 3) Circum-aural closed cup receivers which have a larger earphone pad that goes around the ears and sits on the head and neck, but which block ambient noise and provide some degree of ambient noise attenuation, or less depending on the design.

When talking on the air, I prefer open air earphone receivers because I sound more natural and normal (to myself) as I speak. I do not care as much if the headphones block out nearby sounds because I am typically alone in the shack area and it is fairly quiet in my world.

I rarely recommend supra-aural (i.e., earphone pads that rest on the ear) because these often cause discomfort by pinching or pressing the ears against the head. As a general rule, eyeglass wearers should avoid this type of earphone receiver. Some are OK, but you want to be sure before you buy. If they have too much clamping force, they can pinch and hurt the ears; if they have too little clamping force, they may not stay put or place the headphone speaker element close enough to the ear canal to sound good. While I like an open air earphone design, I usually avoid supra-aural designs.

On the other hand, not every shack is a quiet as a morgue, and one can also hear every other sound in the shack, including cooling fans, kids, and the dog and the XYL both barking. Closed cup earphone receivers muffle the sound of your own voice, so you don't sound natural and normal (to yourself) as you speak. It is analogous to putting your fingers in your ears as you speak - it sounds dull and muddled, and one tends to speak more loudly over time. I am sure we have all witnessed some teenager singing loudly and off key to music in his earphones, because he cannot hear himself well enough to stay on key and monitor his volume appropriately. It can be funny to watch sometimes. I do not like that feeling when working the rig. So open

air are nice to have because they don't plug up your ear like closed cup sets do. Our radios usually have a mic monitor setting, but that still does not work the same as when using your own ears, listening naturally.

Dynamic or Electret Condenser Microphones:

Broadcast style headsets typically employ a dynamic microphone cartridge, which works well with most amateur band transceivers, the notable exception being the modern ICOM models, for which the default microphone type is an electret condenser capsule. Dynamic microphone cartridges do not require a constant bias voltage, as do computer gaming headsets which utilize small, inexpensive electret condenser capsules. Electret capsules tend to produce a significantly higher audio output (often called open signal voltage) than dynamic cartridges. Electret condenser capsules a good match for Icom and Elecraft radios and most computer sound cards, while the majority of ham transceivers seem set, by default, to work best with a dynamic cartridge. Some radios, including those made by TEN-TEC, have a dedicated hardware microphone gain pot on the circuit board, as well as a front -panel MIC GAIN pot, for adjusting microphone input volume.

A Word about Equalization:

Radio manufacturers have selected default audio settings that to an appropriately flat equalization curve for the job and, in my opinion, no adjustment is necessary for good results. Not that one cannot not improve on those settings for various reasons, but I feel, generally, transceiver manufacturers have been reasonably conscientious and have made appropriate design decisions. After all... we typically use just 2800 KHz audio and RF bandwidth, so how good does can it get?

Nevertheless there are times when one can gain some advantage adjusting the audio equalization curve on a particular rig, relative to the speaker and microphone employed. For the purpose of this piece, my comments will assume the usual default flat, linear EQ curve as the radio comes from the factory.

Different Strokes for Different Folks - Broadcast Quality or Gaming Headsets:

I am fortunate to be able to afford high quality broadcast studio headsets which are typically fitted with a close-talking, high quality dynamic microphone that work well with my amateur band transceivers. These are usually of commercial grade construction, and, unfortunately, usually bear a commercial grade price tag. The models described below all work well, even though I may have my favorite among them. Some hams have had good luck with aircraft headsets, but I feel these are overkill and cost way too much for what they are and what they do, and feel the broadcast quality headsets provide excellent performance at a much lower price point. The only advantage I can see to some of the aircraft models is the degree of passive ambient noise attenuation, but you can obtain that with some broadcast models for substantially lower cost.

Many computer gaming headsets work well with ham transceivers. However, BUYER BEWARE! Many are cheaply made and will not be sufficiently durable for the long haul, and may not hold up under the stress of a contest or portable application, so be careful not to pay too much for too little. Also, many of the less expensive gaming headsets have poor construction, lousy audio components, and typically very little, if any, ambient noise suppression.

This is a rapidly expanding market, and many companies make low quality headsets, and charge high prices for glitzy, fancy looking sets that are poorly made or which sound bad. It is worth it to me, but this will not fit within every ham's budget. Many hams are pleased with the headsets made by Turtle Beach, Creative, Logitech, SteelSeries, ASUS, and other brands. As a rule, I am not impressed with the offerings from these companies. BeyerDynamic makes a good, well built set. As a rule, Sennheiser makes high quality gaming headsets. The Sennheiser PC-350 is a very comfortable, great sounding choice, but costs a hefty \$170 street price. The less expensive Sennheiser models offer good value, but may not be as comfortable as the more expensive models, because they (typically) provide supra-aural, on-ear receiver pads, and not the more comfortable, greater noise suppressing, circum-aural ear pads. More on this later...

This style of headset typically employs an inexpensive electret condenser microphone capsule, although a minority few models so sport a dynamic microphone cartridge. Examples of the latter include the KOSS SB-40, early versions of the Yamaha CM-500, and AudioTechnica ATH-COM models.

One must pay attention to audio input signal levels when using this type of headset microphone with amateur band transceivers. Most newer transceivers provide the required 5-10v bias voltage on one pin of a front panel 8-pin foster jack, which is necessary to charge the plate of the capsule.

This 5-10v bias voltage is not the same as 9 - 45v "phantom voltage" required by larger diaphragm electret condenser studio microphones. Not all electret condenser microphones are created equal, and the two major types are not alike - some require 5-10v bias voltage, and others require 9-45v phantom voltage. Those considered in this review are of the first type, and require bias voltage, which is typically provided on the middle "ring" of the plug or jack - typical of most computer sound card inputs.

There are LOADS of electret condenser-based headsets that can work well with our rigs. These are computer type headsets which typically terminate in 3.5mm stereo plugs, as they are designed and intended to mate with computer sound cards. Gaming headsets come in many styles, varieties, and sometimes include additional features curious to the GAMING world. After an extensive study, I conclude virtually any medium to high quality gaming headset will suffice - with prices ranging from \$10 up to over \$300. To prove the point, I ordered 20 inexpensive headsets from various vendors on eBay.com, all costing less than \$10, and I tested them in various ways. Most made the cut.

Because electret condenser elements run much HOTTER (i.e., have a substantially higher open signal voltage) than dynamic elements, I use a 10 dB ATTENUATOR PAD to reduce the signal level to that of a typical dynamic microphone cartridge. Many computer headsets work great with our transceivers, but would do better with a 10 dB attenuator to place the open signal voltage (i.e., signal strength of the mic audio electric signal) within the middle range of the transceiver. It will appear to the rig as if it were a dynamic type microphone. We routinely transform the impedance of our antennas with a matchbox or "tuner" so the transceiver sees a 50 ohm load - why not use a transformer with our microphones so the rig sees the same input signal strength from an electret microphone as from a dynamic microphone? This simple circuit can be purchased in the form of a manufactured adapter, or be home brewed as a simple voltage divider using a pair of resistors. AndreaElectronics sells such an adapter for \$5: <http://tinyurl.com/76s6n3y>

So why bother with a 10 dB attenuator? What happens if I don't use one?

You might find your rig expects the lower open signal voltage from a dynamic microphone and you end up overloading the audio input circuit, causing distortion and cramping the transmit AGC/ALC circuit - causing it to do all its work in a very small range. I will make a feeble attempt to explain this: Let's say the radio has a MIC GAIN range of 1-100%. The default MIC GAIN setting is, typically 50%, which works just fine for the typical hand-held performance type dynamic microphone. But electret condenser capsules typically have much higher output signal strength, so to get an appropriate input volume, you end up setting the MIC GAIN control way down, perhaps as low as 2 or 3%. The practical result is if you set MIC GAIN lower, it will pretty much kill the mic input entirely, and if you turn it up any higher, the transceiver ALC/AGC circuit engages full blast full time, rather than engaging only upon audio peaks as it should. Using an attenuator, allows you to set MIC GAIN much higher, closer to the default 50%, and allows you to enjoy the normal adjustment range range, as you get with the usual dynamic mic.

Of course, ICOM rigs are often designed for use with an electret condenser microphone, and that is what ICOM supplies these days. Consequently, whether or not one needs a microphone input attenuator will vary among manufacturers and among various models. One may need an attenuator with a Yaesu, TenTec, Kenwood, or other brand transceivers, but NOT with the ICOM or Elecraft models.

When using computer type electret condenser microphones, I employ a matching circuit that provides the 5v bias voltage the electret condenser capsule requires (my radios supply 10 volts on one of the front panel 8-pin foster jack,) and provides 10 dB attenuation of the audio signal. It would be an easy modification to insert a switch in the audio line to switch the attenuator in or out. While the typical electret capsule is rated to work with as little as 2 v, and as much as 15v, bias voltage, my adapter circuits employ a simple two-resistor voltage divider that reduces the 10 volts on the front panel microphone jack to approximately 5 v (equivalent to what the typical computer sound card provides,) because I believe that provides a better overall audio response.

In any case, you may want just such an attenuator circuit, and maybe add a switch to let you optionally switch the attenuator in and out of the audio chain, depending on which radio you connect your computer gaming headset.

What I Might or Might Not Buy, and Why:

I am not favorably impressed with many lines of computer headset, including, without limitation to this list, Plantronics, Logitech, Creative, Turtle Beach, TriTTon, Steel Series, Corsair, and others (although the Corsair and Steel Series appear better made and appear to have better audio specifications than some of the other brands.) In contrast, I like Sennheiser headphones and headsets because they are durable, and have better audio performance. Nevertheless, all the the brands SHOULD work acceptably well in this application. You you pays your money, and takes your chances - but most should work fine, so you be the Judge.

There are LOADS of cheap Chinese made computer gaming headsets that have decent sound quality and these can be purchased for as little as \$5 on eBay.com. Oddly, the least expensive component is the microphone, and generally they are of acceptable quality - it is the earphone speakers that usually prove to be the weak link in the audio chain. Most important, the inexpensive sets often have poor construction, and the earphone receivers often lack sufficient ambient noise attenuation, making them ill suited for use in a noisy ham shack, with significant ambient noise from cooling fans, pets, or family members, and are definitely ill suited for use in a noisy contest environment (except, perhaps in a CW contest where there is little talking going on.)

I purchased 20 cheap headsets on eBay.com and tested them for use at a multi-operator contest station I sometimes play at, and while most were good enough for daily use in a single-op shack, only a few were well suited for use in a multi-operator contest environment. It was not so much the overall sound quality, but low construction quality and the nearly total lack of ambient noise suppression that disqualified them for this particular application.

Note: One CAN modify some headphone receivers and obtain more passive noise attenuation by filling the cups with wool-like fiberfill batting and by affixing self-sticking rubber pads to the inside of the (usually) hollow plastic earphone shells. The XYL may have some left over batting from a quilting or other sewing project and this works well to attenuate ambient noise from outside the cup, and to deaden unwanted reverberation produced by the earphone cup, itself.

For example, the Superlux HMD-660 suffers from earphone cup reverberation one speaks into the microphone. The vibrations travel along the microphone boom arm and “echo” or reverberate slightly in the earphone receiver, and also vibrate back down the mic boom and adversely impacts the clarity of the microphone input. Dampening the earphone receiver with sticky rubber pads and filling the receivers with fiberfill batting resolves this problem admirably. Many headphones could provide substantially greater passive noise reduction with similar modification, and it an is easy and inexpensive to do as many headphones and headsets are constructed with screws, or clips, and not glued or hermetically sealed. Many are designed to enable one to field replace broken parts, such as shorted or broken cables or blown speaker elements.

I am confident most headphones and headsets can be made substantially more noise canceling by performing this simple modification - so much that I don not consider “active” noise-canceling headphones a worthwhile option for the ham shack. Passive noise attenuation can be accomplished : a) at lower cost, b) with no deleterious digital artifact and digital distortion, and c) with greater model selection. There is no free lunch. Active noise cancellation is a compromise solution and cannot reduce noise without imposing some deleterious artifact and can distort the desired audio signal. Many active noise canceling headsets reduce some noise, while adding a measure of high frequency white noise in its place. Consequently, I am a fan of passive noise attenuation, instead.

ASUS makes a popular wireless headset which incorporates active noise cancellation. It might incorporate everything one is looking for in a lightweight wireless, noise canceling, headset - at a \$120 typical street price. I have not tried one yet, but it is on my list of future sets to try. I have not ordered them because I am sufficiently pleased with my current stable of headsets, including the AudioTechnica BPHS-1, Shure SM-2, modded Superlux HMD-660, and KOSS 3000 which sports nearly 30 dB passive noise cancellation. All of them have sufficient passive ambient noise attenuation and have good, clear, microphones with sufficient output signal strength to drive the transceiver. Consequently, I have no need for active noise cancellation, but this

ASUS wireless headset set might fun to use because it offers reasonably high quality audio performance, has active noise cancellation, and is WIRELESS, which could be a handy feature in a shack where we already have too many wires and cables to trip over. You could use it as a wireless headset, even if you turn the active noise cancellation feature off.

SOME RECOMMENDED BROADCAST QUALITY HEADSETS:

MODEL	IMAGE	NOTES:
Audio-technica BPHS-1 \$200	 A black, over-the-ear headset with a padded headband and large, circular ear cups. A long, thin cable extends from the left ear cup, ending in a 3.5mm jack.	Superb mic and earphone speakers with durable and attractive high quality components - removable/replaceable cable is durable and well made. This is a very lightweight and comfortable headset over long operating sessions - circumaural (around the ear) pads are plush and soft - this is a treat to own and use. Top drawer pro-grade headset. Cable comes unterminated - user must add appropriate plugs for the intended application. Microphone is especially clear and suited for use with amateur band transceivers.
Sennheiser HMD-45-6 \$280	 A black, open-air broadcast headset with a padded headband and two large, circular ear cups. The ear cups are designed to sit directly on the ear. A cable with a 3.5mm jack is attached to the left ear cup.	Top grade professional headset with superb mic and earphone audio using extremely lightweight and durable components. Open air speakers rest on the ear, but with extremely low clamping force. Extremely comfortable over long operating sessions - you may forget you have them on. Cable comes unterminated - user installs appropriate plugs for his intended application. Microphone is especially clear and suited for use with amateur band transceivers. Audiophile grade earphone elements. These are as good as they come. Expensive.
Shure SM-2 \$220-\$250	 A black, over-the-ear headset with a padded headband and large, circular ear cups. It features a flexible boom microphone extending from the left ear cup. A cable with a 3.5mm jack is attached to the microphone boom.	Extremely durable, super comfortable with superb dynamic microphone and high quality earphone speakers tailored for the human speech spectrum (i.e. limited range to 200 - 8000 KHz.) Headband has many metal components, including stainless steel mic boom for consistent microphone placement and durability. Microphone is especially clear and well suited for use with amateur band transceivers. Used for years on television sets, movie lots and in recording studios. Removable/replaceable cable is extremely durable and well made. Excellent headset.

KOSS 3000 \$40		<p>Super value - super-heavy-duty commercial grade headset with super strong mic boom. Excellent clear microphone and speaker audio especially suited for use with amateur band transceivers. Rather "hot" electret condenser microphone output will benefit from the 10 dB attenuator described in the text, above. Earphone receivers provide up to 30 dB passive ambient noise reduction - practically eliminating the sound of power cooling fans and other ambient noise, allowing operator to concentrate on the desired signals. Separate L/R earphone volume controls facilitate optimal listening volume and stereo balance. Originally made for Kenwood commercial radios, now sold as inexpensive white elephants by KOSS on eBay.com. I purchased two sets for my shack, so that says how much I like this headset.</p>
Shure 512 \$110		<p>Extremely comfortable headset - with super microphone cartridge (same mic cartridge as Shure WH-20 and SM-2 headsets) - with single open air earphone receiver. It appears to have stereo earphones, but right side receiver has no speaker - although it could easily be modified for stereo. Microphone is clear and especially well suited for use with amateur radio transceivers. I use the single side earphone in tandem with a desktop speaker - which gives an interesting 3-D depth to receiver audio. Not for everyone, but the mic element, alone, is worth the cost, and can easily mount on your favorite headphones to convert them into a great headset. It would be a killer combination with KOSS Pro4/AA headphones which come with a knurled-knob microphone mount on the left earphone receiver. Super lightweight and extremely durable in spite of its appearance. I have used the Shure Model VR-250-BT headset made from the same components for computer speech recognition for over 15 years with no faults.</p>

Superlux HMD-660 \$80		<p>Inexpensive, lightweight, comfortable headset, providing good performance and fairly durable large, circum-aural (around the ears) ear pads. Good dynamic microphone with excellent wide range earphone performance, great for music. Spring steel headband with mostly metal parts easily adjusted for optimal clamping force. Microphone boom relatively lightweight compared to the competition and may be the weakest link. Good value for the price.</p> <p>Earphone receiver cups are easily be opened and modified to increase acoustic damping. Some owners of this headset, and related HMD-660 headphones, complain the earphone receivers suffer from slight, almost inaudible reverberation or have a hollow, plastic overtone - especially when speaking into the microphone - extremely subtle, but present nonetheless. Dampening the earphone receivers with fiber-fill, and/or rubber padding provides sufficient damping to fully resolve the problem at practically no cost, improving performance and overall value.</p> <p>Astute observers may notice this set bears an uncanny resemblance to the Beyerdynamic DT-777 headphones, and many parts, including very soft, plush Beyerdynamic ear pads, fit both products exactly.</p>
TEN-TEC Model 777 \$140		<p>TEN-TEC branded headset - looking suspiciously like a HEIL Proset 6 - but for less money and purportedly using a different electret mic capsule. Durable, well built headset with clear microphone and good wide range earphone audio - works well with amateur radio transceivers. Mic boom is very heavy duty. Mic capsule may be (I guess) housed in a removable shell for field repair. Ear pads are circum-aural (resting around and not on the ears) are somewhat stiff - but durable and reasonably comfortable over long operating sessions, provide an estimated 15 dB ambient noise reduction. TEN-TEC is famous for excellent service after the sale.</p>
		<p>Same microphone element as the Shure SM-2 and Shure 512 headsets. Extremely durable and very clear microphone audio - well suited for use with amateur radio transceivers. This is a handy mic if you want a head-worn mic, but do not want to headphones resting on or over the ears - can easily be modified and adapted to mount on various headphones to convert a favorite headphone into a headset.</p>

		WH-20 mic boom mounted to a Telex computer microphone headband - extremely light weight and comfortable.
		WH-20 mic boom mounted to Sennheiser HDR-130 wireless headphones. I used this combination at my office using computer speech recognition software - listening to music, while dictating legal documents.
SENNHEISER HMD-280 Pro \$225		Heavy duty headset with good microphone and excellent sounding earphone audio. Lower mic output signal level than other models. The HD-280 headphones are popular headphone in recording studios and among audiophiles interested in uncolored audio response. Microphone is clear and works well with ham band transceivers. I prefer a slightly hotter cartridges - your mileage may vary. Cable and some other components are user serviceable. Headband has moderate clamping power, but I believe can be adjusted. Good set, but I prefer the lighter, more comfortable, and hotter mic of AT BPHS-1 and Shure SM-2, and KOSS 3000 headsets.
Eartec ProLine \$140		Eartec has a reputation for making good headsets, you can special order variations in cable, connector, microphone element, headband, and other features directly from the factory. I contacted the factory, but did not order, ONLY because I already have more headsets than I need, but I expect them to be well made and comfortable. You may notice a remarkable resemblance to the HEIL PRO SET... although I strongly suspect Eartec and HEIL each use different microphone capsules - I suspect, without knowing, the same OEM makes the basic shell, headband, and other parts for both product lines. You be the Judge.

SOME RECOMMENDED COMPUTER AND GAMING HEADSETS

MODEL:	IMAGE:	Notes:
Audio-technica ATH-770COM \$35 - \$125		<p>Superb computer headset - same headband and earphone receiver shells as found on the AT BPHS-1 professional broadcast headset.</p> <p>Excellent mic - Very good earphone receivers - lightweight mic boom.</p> <p>I found this set on eBay.com for a mere \$25, but this set typically sells for more than \$100 depending on vendor, market, location, etc. - worth looking for if you can get them cheap enough. Electret condenser mic element should have 10 dB attenuator as explained in the text.</p>
YAMAHA CM500 \$60		<p>Extremely popular headset among hams. Fairly durable and reasonably comfortable over long sessions, mic and earphone receivers both sound good on amateur band transceivers. Low, maybe 10 dB passive noise attenuation. Still, a good value overall.</p> <p>This set appears to share the same construction and parts as the KOSS SB-40 headset with a \$25 price bump. Early CM-500s had a dynamic mic element, but current iterations sport an electret condenser capsule - Electret condenser mic element should have 10 dB attenuator as explained in the text.</p>
KOSS SB-45 / SB-49 \$35		<p>Excellent low cost headset - works well with ham transceivers - very cost effective - reasonably durable and comfortable over long sessions - mic boom is sturdy and remains in place - good quality mic and earphone receivers - electret condenser mic element moderately "hot" - use a 10 dB attenuator as explained in the text, above. Hard to beat its typical \$35 street price (delivered) - eBay has plenty of sellers at this price point. A real bargain in my opinion. I purchased multiple sets for a contest shack I play at. Covered by KOSS limited Lifetime Warranty.</p>

KOSS SB-40 \$35		<p>Appears to be the same headset components (except microphone) as Yamaha CM500, although this model continues to use a dynamic mic cartridge, whereas the Yamaha CM500 now uses an electret condenser mic capsule - reasonably durable and comfortable over long periods of use - mic element is just OK, provided one does not overdrive it (who would?) Cost is a huge factor - you can typically buy this set for less than \$30 delivered from many vendors on eBay. May be covered under KOSS limited Lifetime Warranty.</p>
SENNHEISER GAM4 PC-333 / PC-330 \$125 (+)		<p>Superb sounding mic and earphone receivers - extremely durable headset with excellent audio performance, but somewhat uncomfortable as the earphone receiver cups are a bit small compared to other headsets, and may rest on, and not around, the ears and this may pinch the ears over time. Your ears may fit well inside the pads, so it is a case-by-case sort of problem. The headband has rather strong clamping force so it may not be as comfortable for long periods of operation as other sets. Electret condenser mic should have 10 dB attenuation as explained in text. I sold this one. You might love it. Super construction and great audio - good pick if you find it comfortable.</p>
Sennheiser PC-350 \$150-\$175		<p>Excellent mic and earphone audio with high durability - excellent superb comfortable circumaural leatherette (around the ear) earphone pads. Outstanding computer gaming headset with excellent mic and earphone performance - a top shelf contender - very comfortable over extended periods - about as good as wired gaming headsets get. Electret condenser mic element should have 10 dB attenuator. Mic turns off if you raise the mic boom arm to a vertical position. Expensive.</p>

BeyerDynamic DL-234 Pro \$75	 A black over-the-head headset with a flexible boom microphone extending from the left ear cup. The ear cups have plush velour padding.	Extremely durable headset - acceptable microphone and earphone audio performance - smallish earphone receivers with plush velour ear pads are soft, but if they end up resting on the operator's ears instead of around them, they may pinch and be uncomfortable over long sessions. This is, of course, variable among different operators. Electret condenser mic element should have 10 dB attenuator as explained in the text. I sold this set because it pinched my ears.
SENNHEISER PC-131 \$38	 A black open-air over-the-head headset with a flexible boom microphone extending from the left ear cup. The ear cups have smaller, less padded ear receivers.	Very durable headset with outstanding mic and earphone audio - good value for the money. I like these for when I don't want to use circum-aural cans. Good value for price. Open air earphone receivers rest on the ears and may cause minor discomfort over very long periods of use - but the clamping force is not such as to bother me. The PC-151 is slightly more expensive, but uses better larger, softer pads and should be substantially more comfortable over long sessions. Electret condenser mic element should have 10 dB attenuator.
Sennheiser PC-151 \$45 - \$55 typical street price	 A black over-the-head headset with a flexible boom microphone extending from the left ear cup. The ear cups have larger, more padded ear receivers.	More comfortable, with better padding on headband and softer earphones - probably same mic capsule as the PC-131, but probably better earphone speaker elements than the PC131. Durable and reasonably comfortable over long sessions, although earphone pads do rest on the ears, so may not be quite as comfortable as a circumaural style headphone, but these are very durable, and have excellent mic and speaker audio for the price. Electret condenser mic element should have 10 dB attenuator. Open air earphone receivers, so no ambient noise suppression.

Laptop Microphone
\$1 to \$3 on eBay.com



Inexpensive microphone on flexible boom arm provides remarkable good audio input for the price. Intended to plug into a 3.5 mm phone jack on a laptop computer or gaming headset allowing it to be optionally removed. I tested several models and they all provided clear, high quality audio input. One could easily add a 3.5mm jack and cable to most consumer headphones to convert them into a headset for very low cost. Electret condenser mic element should have 10 dB attenuator.

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James Richards, K8JHR