

Aircraft Headphone and Microphone Connectors

Applications Note AN-2
Edition 27 Aug 96
p/n 81332



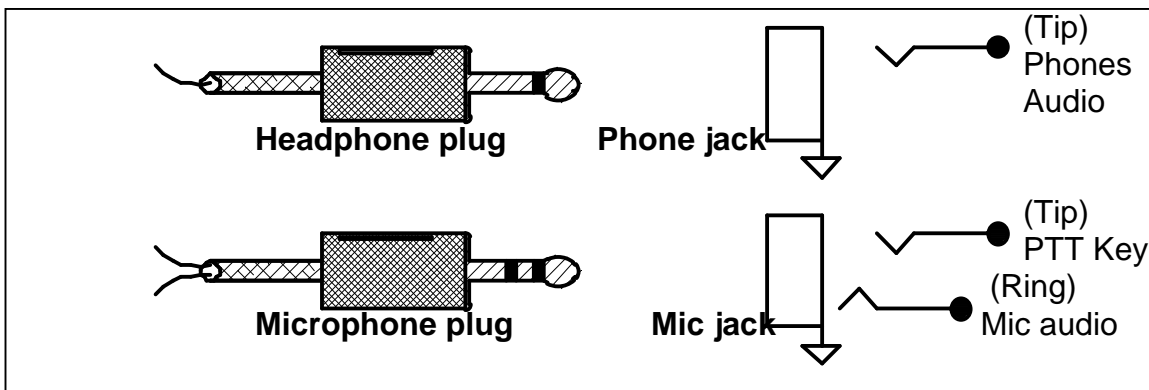
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Civilian fixed-wing aircraft use standardized microphone (“mic”) and headphone (“phone”) connectors. After that, things get a lot less standard very quickly. The military use half a dozen different sizes and the helicopter folks (the fling-wingers) aren’t far behind. The scope of this little note will focus directly on the standard civilian airplane connectors.

In electronics usage, a PLUG is the male part of the connector, and the JACK (sometimes called the RECEPTACLE) is the female half of the connector. It doesn’t take a lot past sophomore hygiene class to figure out which is which.

The MICROPHONE connector is a 3-terminal device that has a common ground, a push-to-talk (“PTT”) connection, and a microphone audio connection.



The actual diameter of the microphone plug is 0.206”, but it is colloquially called a $\frac{3}{16}$ ” plug. The TIP is connected to one side of the PTT switch, and the other side of the PTT switch is connected to the sleeve, or common (and the sleeve is almost universally connected to airframe ground). The RING is connected to one side of the microphone audio, and the other side of the audio is connected to the sleeve. Thus, for a transmission to take place, two things have to take place simultaneously -- the TIP has to be connected to the SLEEVE through a switch to turn the transmitter on, and the RING has to be connected to the microphone audio to allow your voice to modulate the transmitter.

If, for whatever reason, the tip never gets connected to the shell (ground), then the transmitter will never be turned on. If the tip is connected to ground but through some failure the microphone doesn’t get connected to the ring terminal, then the transmitter will key, but there won’t be any voice on the carrier. This is usually reported as “carrier but no modulation”.

One reason for mic jack failure (usually the audio line failure) is the use of the old-style milspec plug (PJ-068) in the jack. This plug is only a few thousandths of an inch bigger in diameter than current production plugs, but

it is enough to very slightly spring the jack open far enough so that it doesn't contact a new plug. The solution is to reach around behind the instrument panel and ever so slightly squeeze the contacts back together. You can usually tell this kind of a failure as wiggling the mic plug vigorously will cause intermittent keying or audio.

One quick check to see whether the airplane wiring to the mic jack is operating normally is to alligator-clip jumper the tip metalwork on the mic jack directly to airframe ground. If the selected transmitter keys up (while you listen on your aircraft portable radio for the carrier) then the mic key circuit is working just fine. To check the audio line simply touch a second grounded test jumper to airframe ground. You should get a loud "click" in the monitor receiver. This test tells you nothing about the QUALITY of the transmitter's modulation, but it does indicate whether or not the mic audio wiring is OK.

I can't count the number of times I've gone to troubleshoot a new installation only to find that the installer managed to reverse the PTT and mic audio lines to the aircraft mic jack. This erroneous installation will generally let you key up the transmitter using the PTT switch but then the residual resistance from the microphone will keep the transmitter keyed long after the PTT is released. See the diagram below, but understand that some manufacturers (perverse little devils that they are) will not keep to this convention. It is always preferable to use your ohmmeter to confirm which terminal is ring and which is tip.

The HEADPHONE connector is a plain old garden-variety 1/4" diameter device that every home stereo that was ever made uses. This connector has only two terminals -- tip and sleeve. The sleeve is universally grounded and the tip is headphone audio.

If you suspect that your headphone itself may be at fault, almost all modern transceivers will drive a set of "stereo" home entertainment earphones. It may be at low volume, it may be slightly distorted, but you can certainly plug in a set of stereo 'phones and listen with one ear to see if the aircraft wiring and jack are working.

Another quick test for headphones is to wear them and then connect an ohmmeter on the Rx1 scale from tip to sleeve. You should get a loud click in the earphone when contact is first made.

