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Open Headset Interconnect Standard

Mark Smith, N6MTS

https://ohis.org/

Who am I?

Mark Smith, N6MTS

- President/CEO, Halibut Electronics: https://electronics.halibut.com/
- A host of the Ham Radio Workbench Podcast: https://www.hamradioworkbench.com/
- YouTube: @SmittyHalibut
- Mastodon/Fediverse: @smitty@halibut.com

Video

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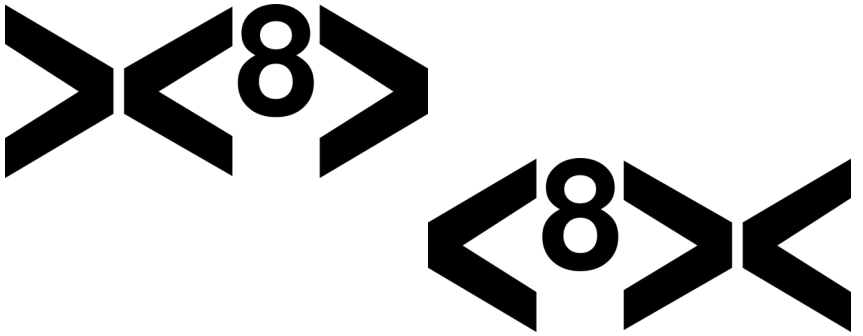
Who am I?



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Head Cheese

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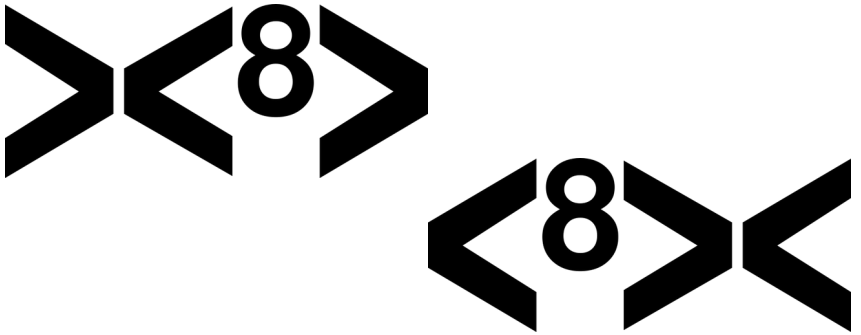

- **Ham**: Active ham since 1992.
- **College**: Two years in Electrical Engineering, but degree in Computer Engineering, CalPoly San Luis Obispo
- **Work**: ~30 years in IT, Network and Unix Systems Engineering, and Information Security.
- **All Three**: Left IT in 2021, started Halibut Electronics to make Ham Radio and Audiophile electronics.

Video

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Open Headset Interconnect Standard

Video

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Open Headset Interconnect Standard

- **Open**: Any individual or company may make devices compliant with this standard, with no obligation.

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- **Headset**: Describes the signaling commonly found between a user and a radio: Microphone, Headphones, and Push To Talk.

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Open Headset Interconnect Standard

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- **Headset**: Describes the signaling commonly found between a user and a radio: Microphone, Headphones, and Push To Talk.
- **Interconnect**: Describes both the physical and electrical connection of those signals between the user and radio.

Video

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Open Headset Interconnect Standard

- **Open**: Any individual or company may make devices compliant with this standard, with no obligation.
- **Headset**: Describes the signaling commonly found between a user and a radio: Microphone, Headphones, and Push To Talk.
- **Interconnect**: Describes both the physical and electrical connection of those signals between the user and radio.
- **Standard**: Devices built to this standard will work with other devices built to the same standard.

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Electrical Standards

We have electrical standards (defined, or de-facto) for things like RF and Power:

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Electrical Standards

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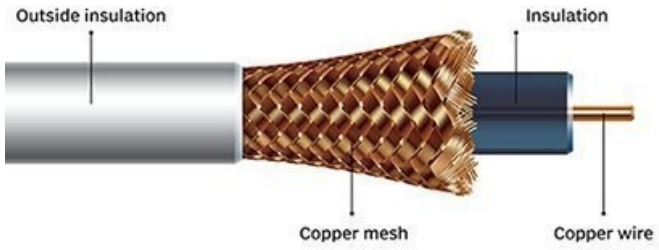
- **RF**: 50 ohm impedance coax, 450 ohm twin lead



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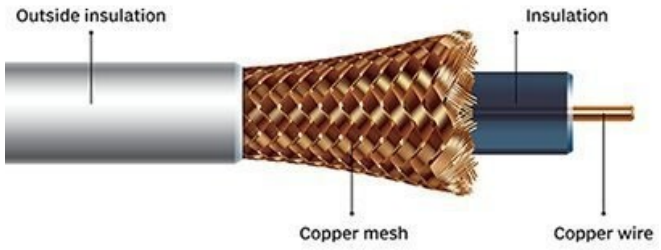
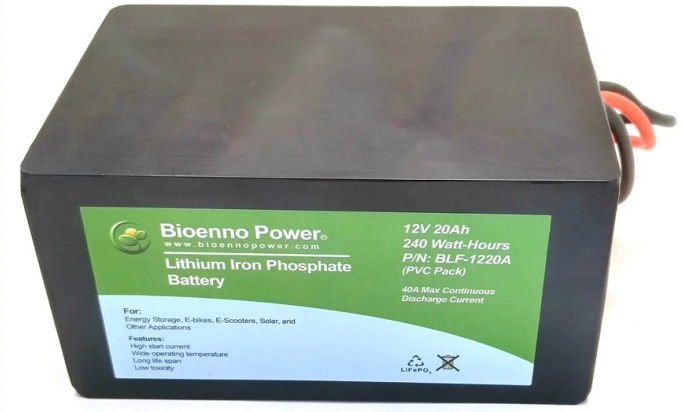


- **Power**: +13.8vDC +/- 15%



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Physical Standards

And one, or a few, physical standards that are easy to convert between:

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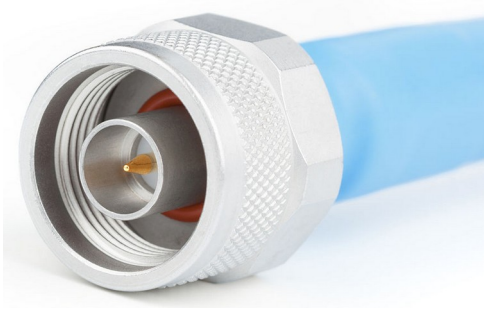
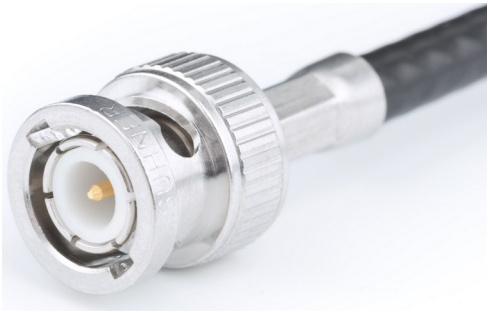
Physical Standards

And one, or a few, physical standards that are easy to convert between:

- **RF**: PL-259, Type N, BNC, etc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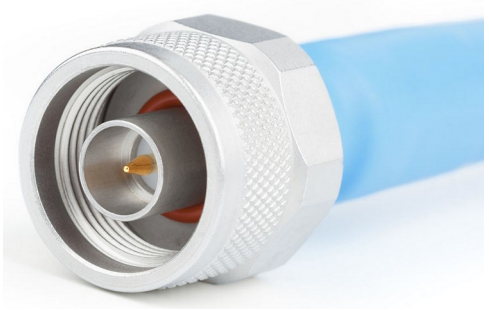
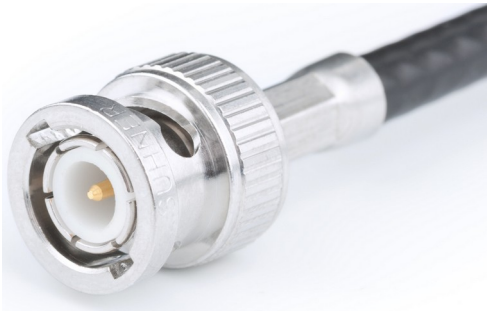


- **Power**: Powerpole, 6-pin “Molex”, “T” blades, etc


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Headset Standards?

No such electrical standards exist for the User to Radio interface:

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- **Microphone**: Dynamic, Electret, or Carbon? Balanced or single ended?

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- **Microphone**: Dynamic, Electret, or Carbon? Balanced or single ended?
- **Audio out**: Line level, headphone level, or speaker level? Ground referenced or push-pull? Mono or stereo?

Video

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Headset Standards?

No such electrical standards exist for the User to Radio interface:

- **Microphone**: Dynamic, Electret, or Carbon? Balanced or single ended?
- **Audio out**: Line level, headphone level, or speaker level? Ground referenced or push-pull? Mono or stereo?
- **PTT**: GPIO style contact closure to ground, or completing the mic circuit?

Video

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So many to choose from!

There are even more physical options to choose from!

Video

So many to choose from!

There are even more physical options to choose from!

- **Microphone**: 3.5mm TS/TRS? ¼” TS/TRS? XLR? “8-pin round” Aviation? 8 pin modular? 6 pin modular? What pinout?

Video

So many to choose from!

There are even more physical options to choose from!

- **Microphone**: 3.5mm TS/TRS? ¼” TS/TRS? XLR? “8-pin round” Aviation? 8 pin modular? 6 pin modular? What pinout?
- **Audio out**: 3.5mm TS/TRS? ¼” TS/TRS? RCA?

Video

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- **Audio out**: 3.5mm TS/TRS? ¼” TS/TRS? RCA?
- **PTT**: On the mic connector? 3.5mm TS? ¼” TS?

Video

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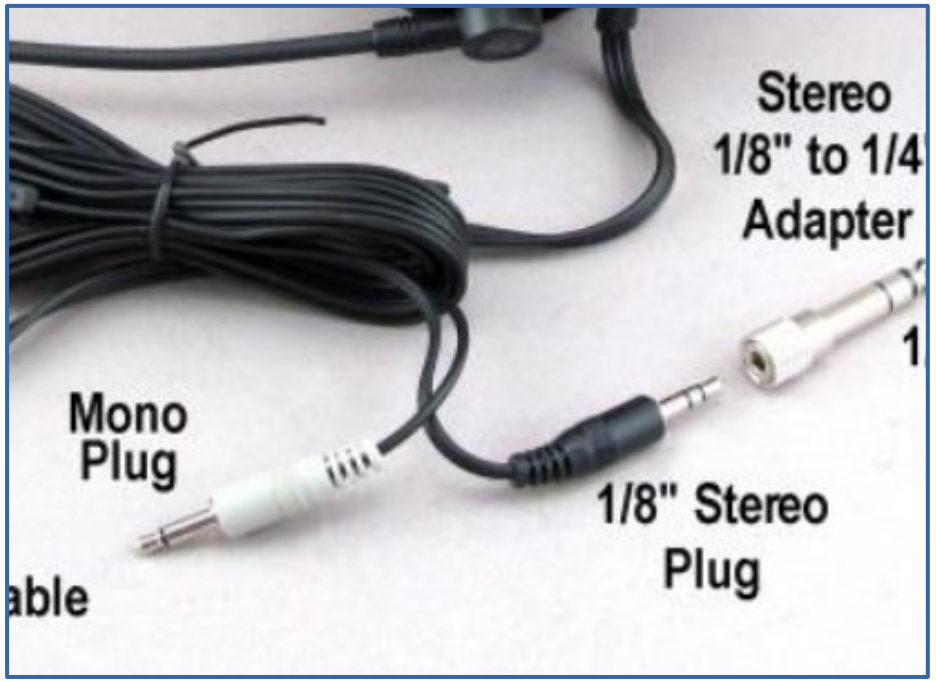
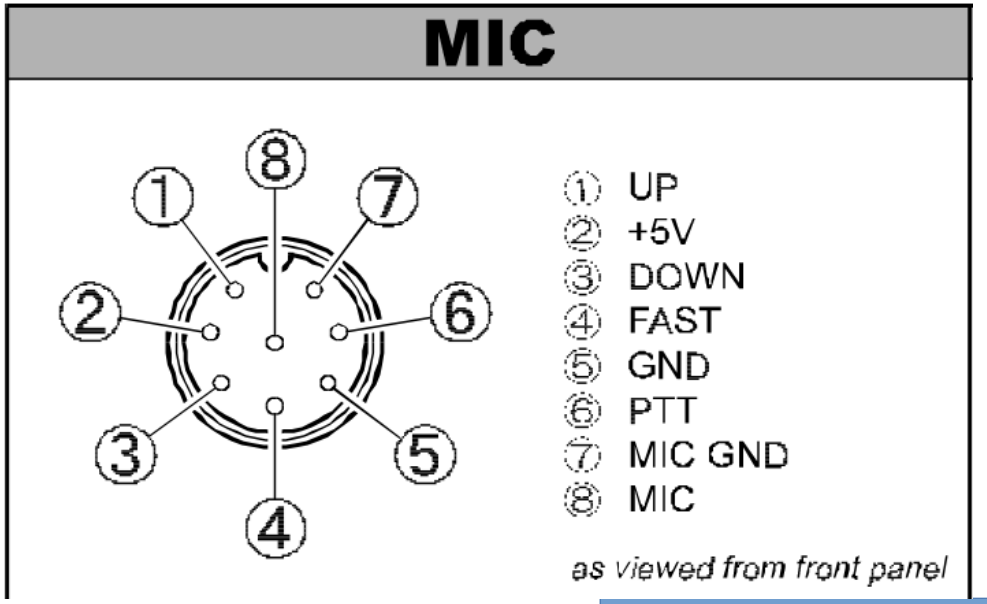
The problem is...

Heil Pro 7 Headset:



Yaesu FT-920 Microphone pinout:



Video

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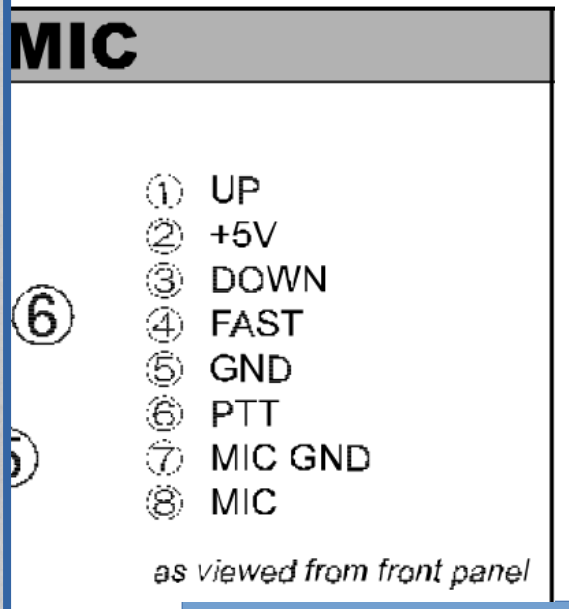
The solution?

Heil Pro 7 Headset:

Heil AD-1-Y Adapter:

rophone pinout:



Video

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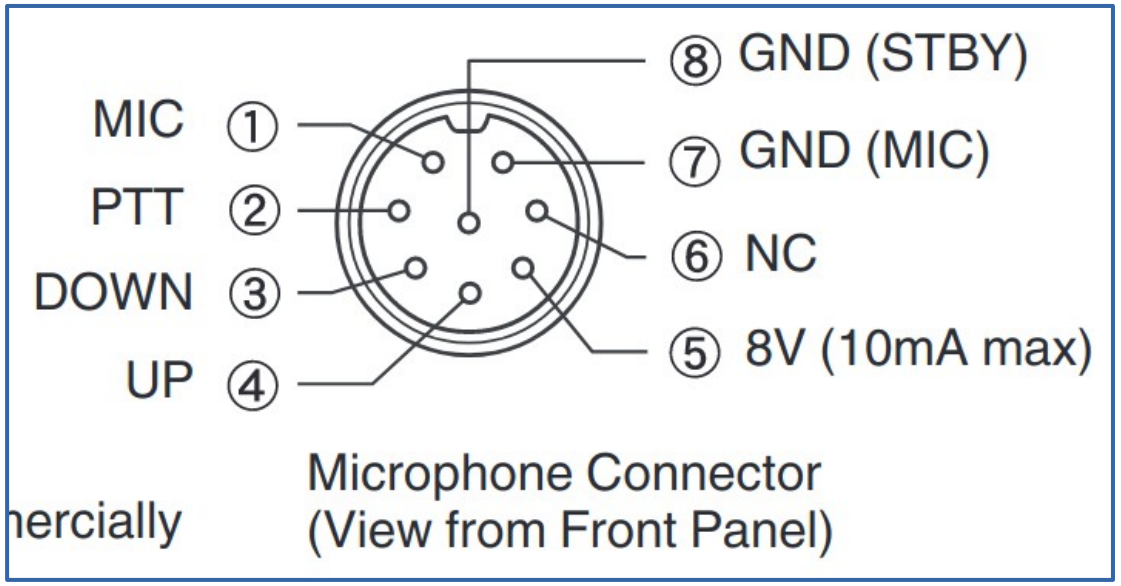
But, I've got a Kenwood too.

Kenwood TS-890S Microphone pinout:



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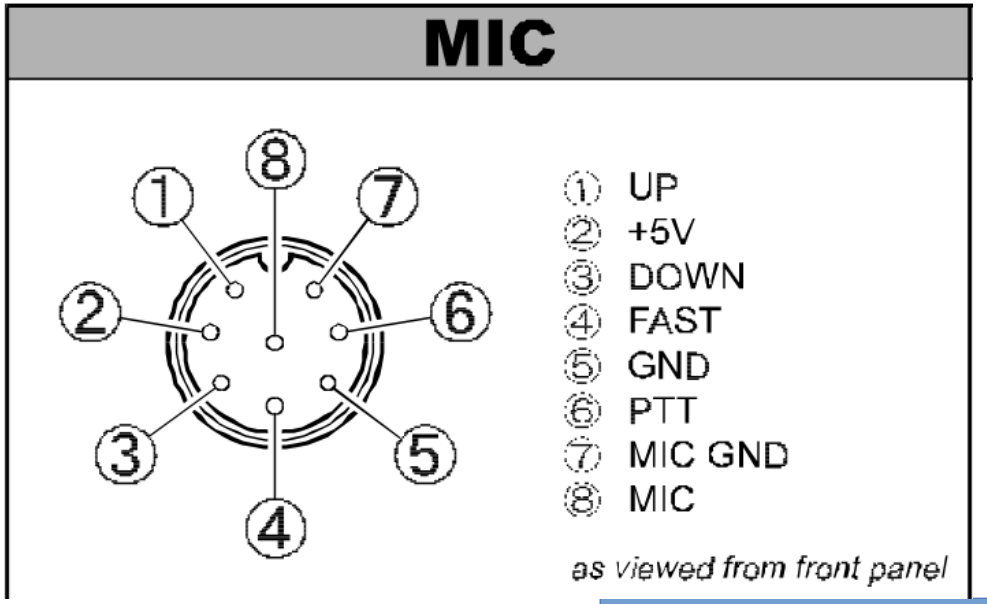

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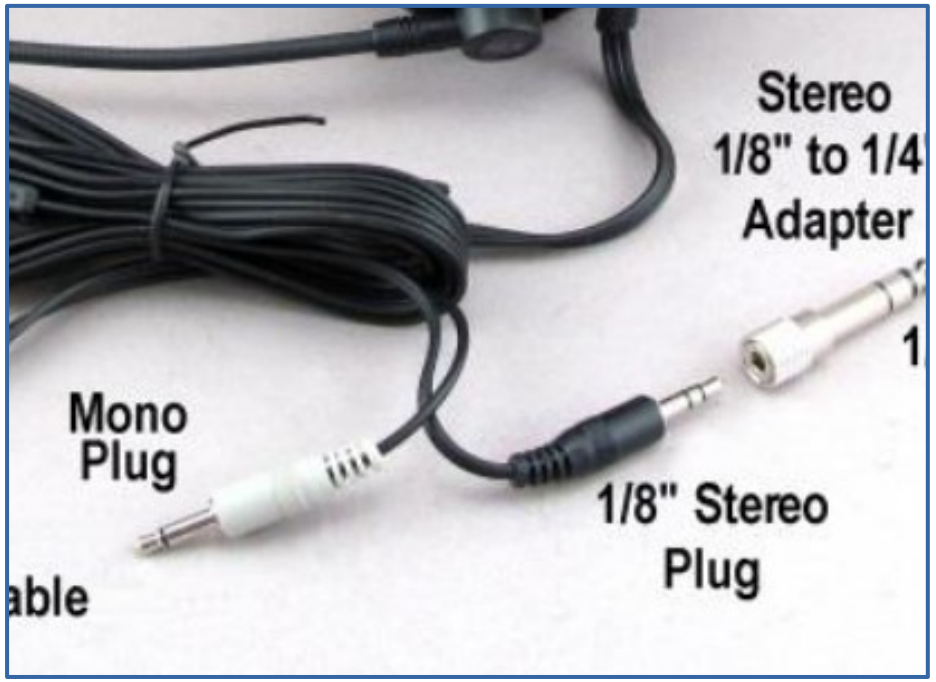

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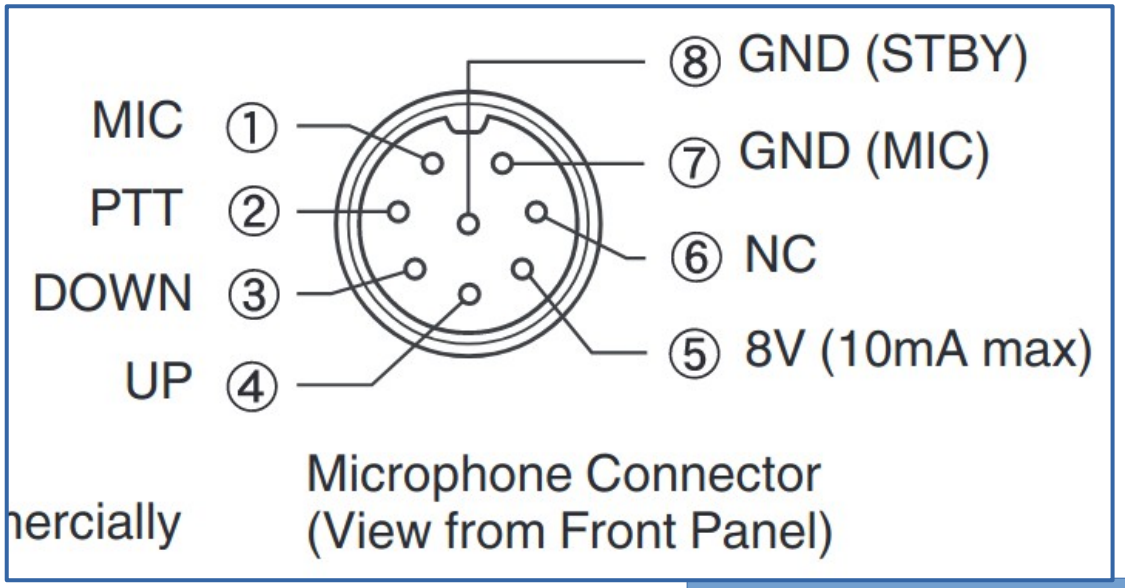

Video

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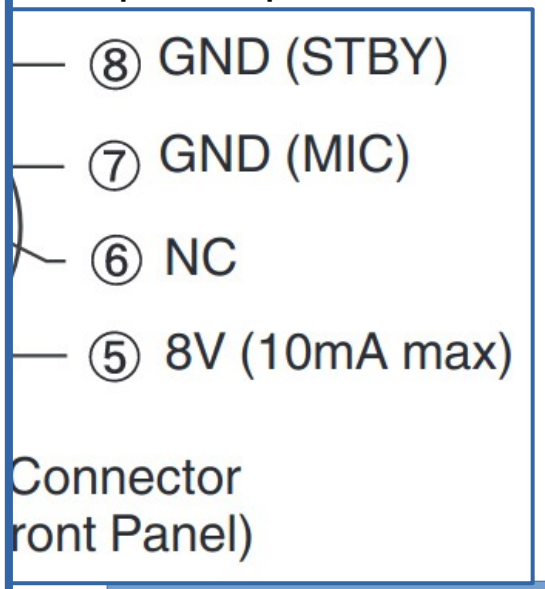
Bob has me covered...

Heil Pro 7 Headset:

Heil AD-1-K Adapter:

Microphone pinout:



Video

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What about Icom?

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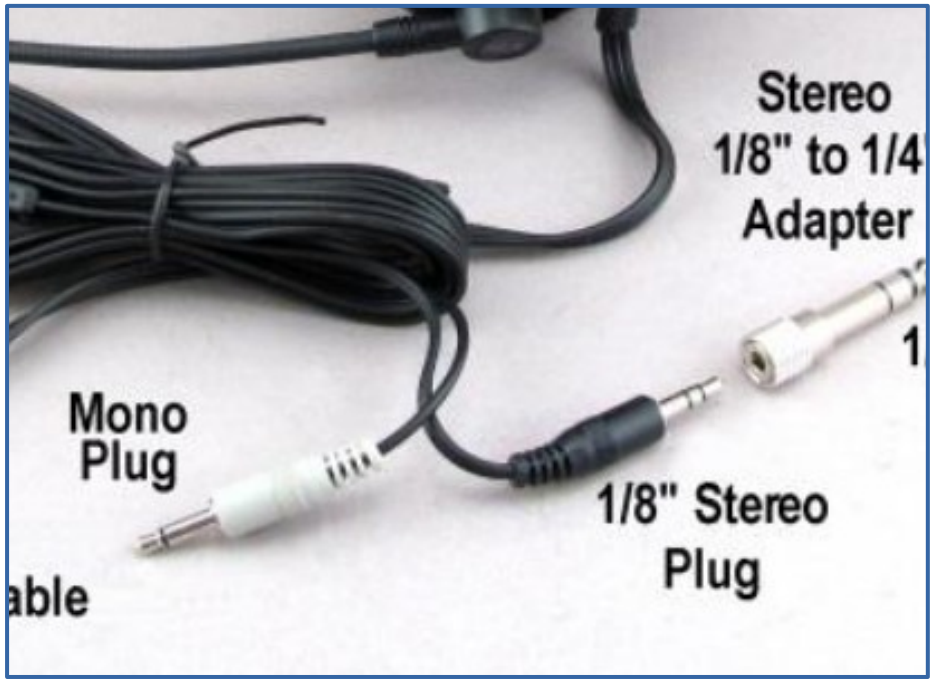
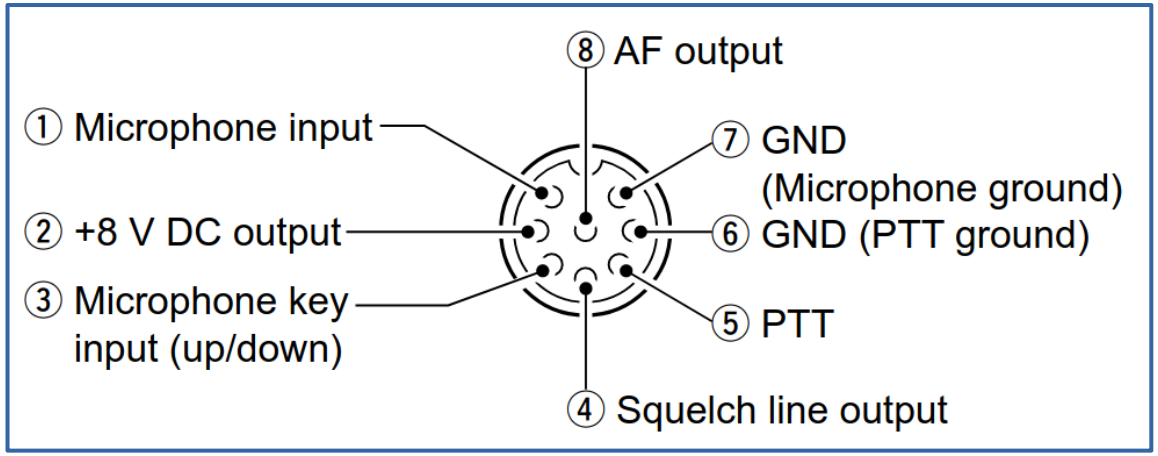


Icom IC-7300 Microphone pinout:



Video

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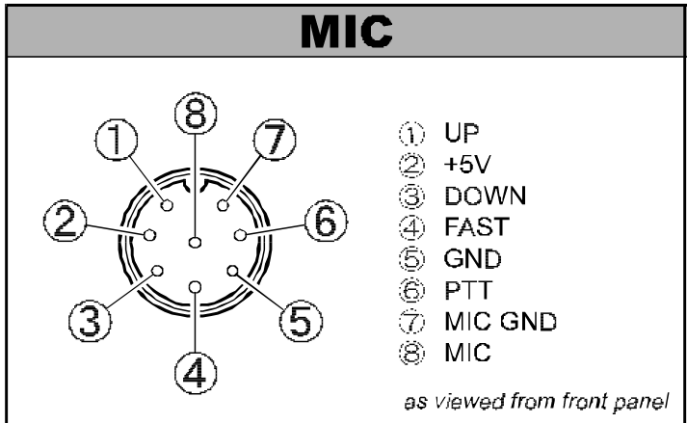
Same connect-- oh… Never mind...

Yaesu FT-920 Microphone pinout:



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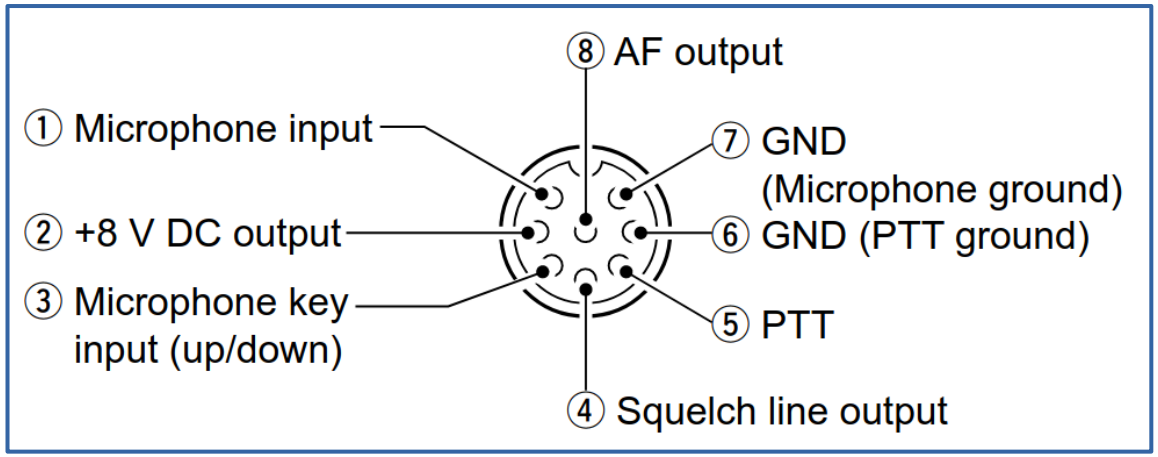

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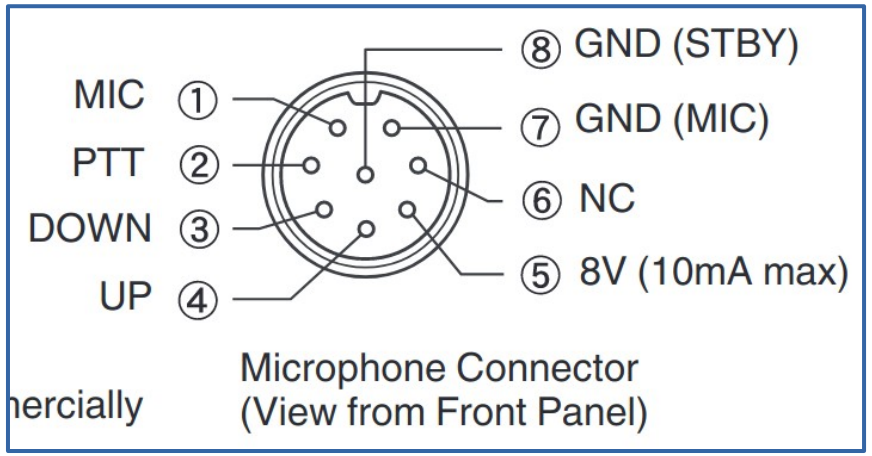

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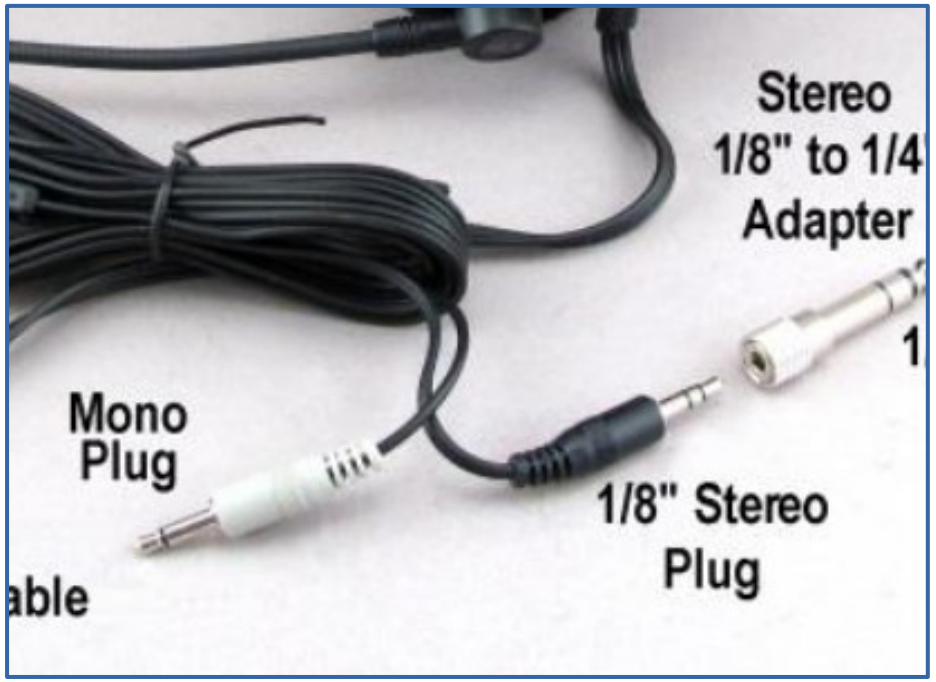

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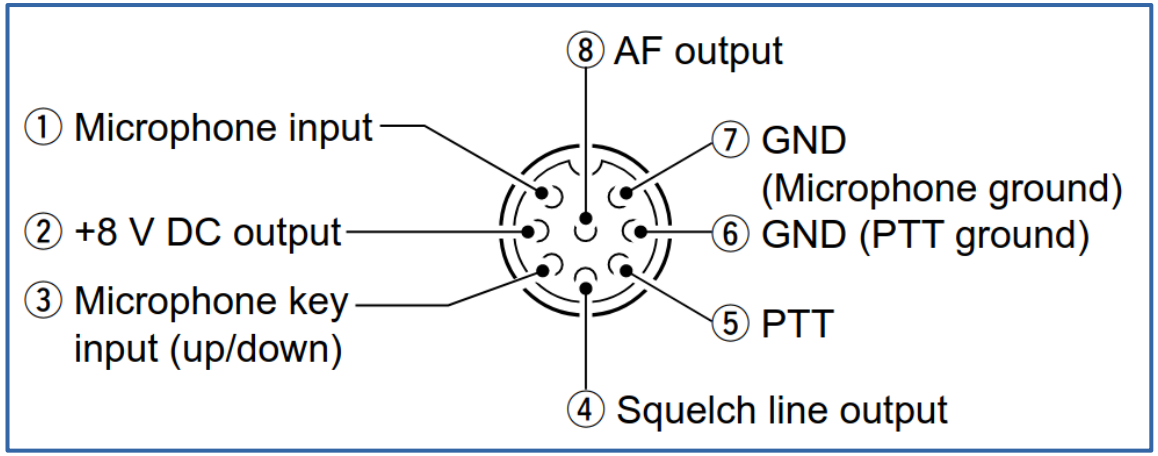

Video

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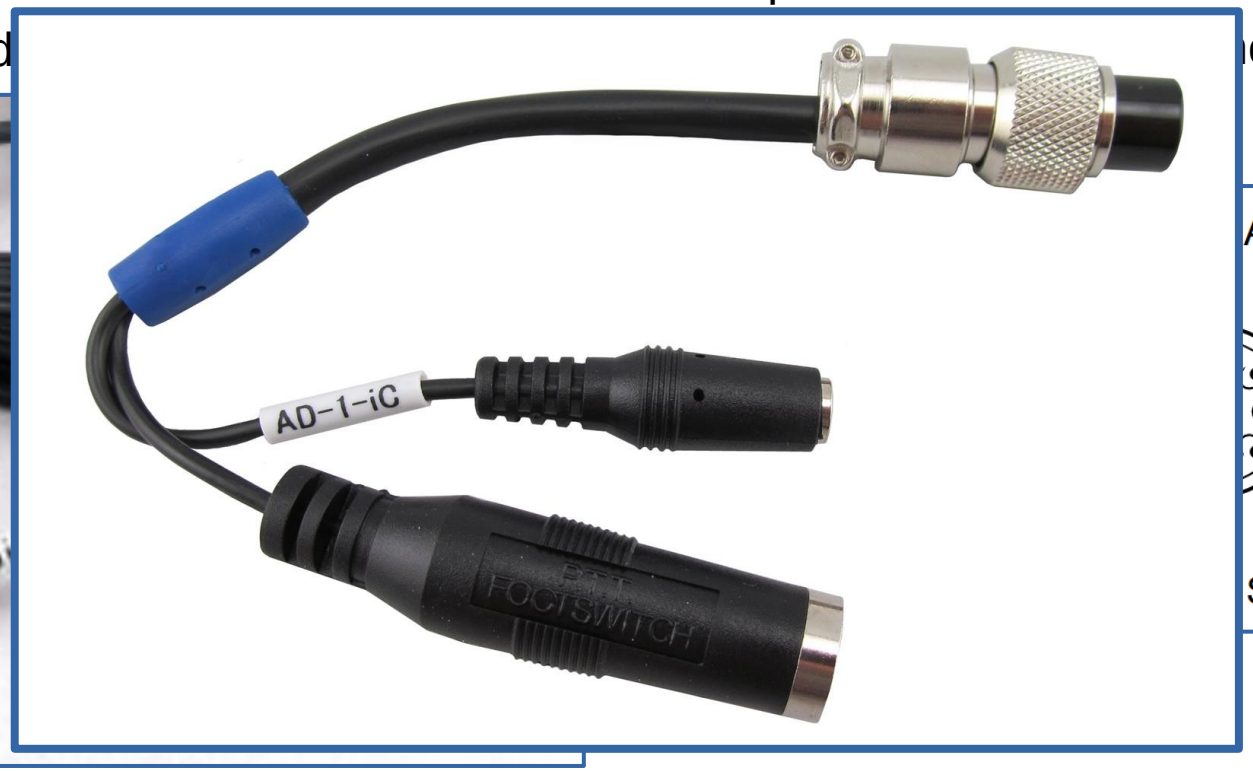
Bob *still* has me covered...

Heil AD-1-iC Adapter:



Heil Pro 7 Head

one pinout:

AF output

⑦ GND
(Microphone ground)
⑥ GND (PTT ground)

⑤ PTT

Squelch line output

Video

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But, wait a minute...

Heil Pro 7 Head

Heil AD-1-iC Adapter:

Heil P7-IC-ELEM Microphone Element:

one pinout:

AF output

⑦ GND
(Microphone ground)
⑥ GND (PTT ground)

⑤ PTT

Squelch line output

Video

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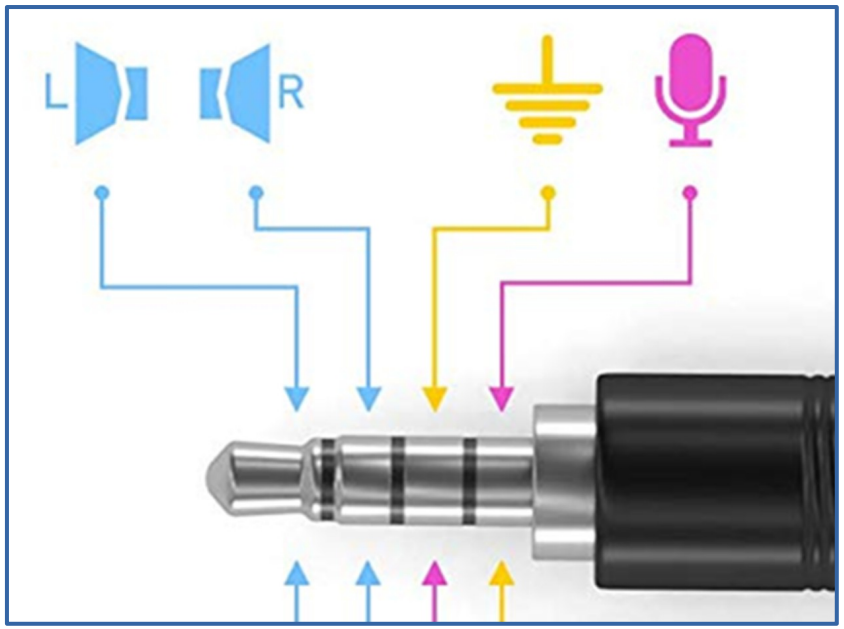
Another headset,

CTIA “PC Gaming Headset”
or “Mobile Phone” pinout:



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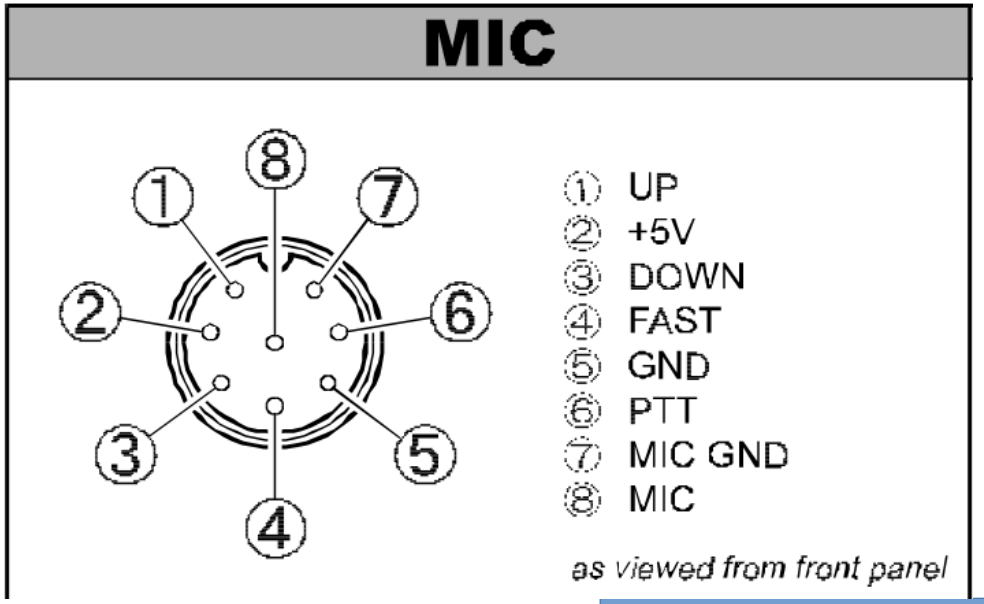

Video

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Another headset, 3 more adapters...

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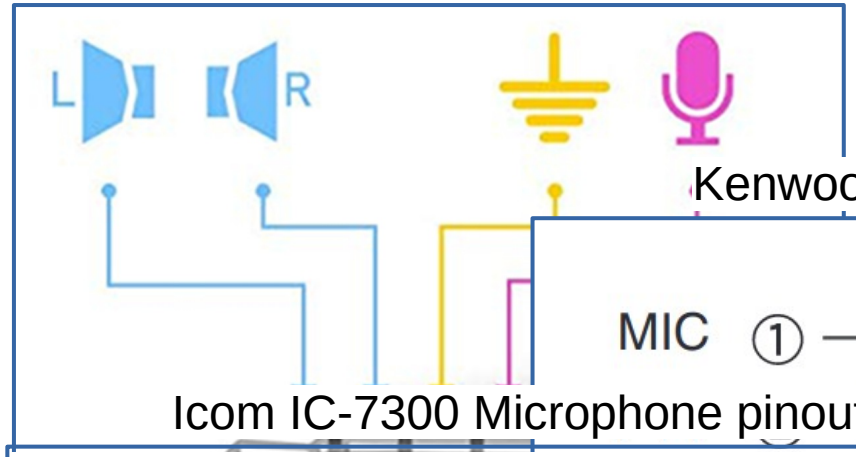

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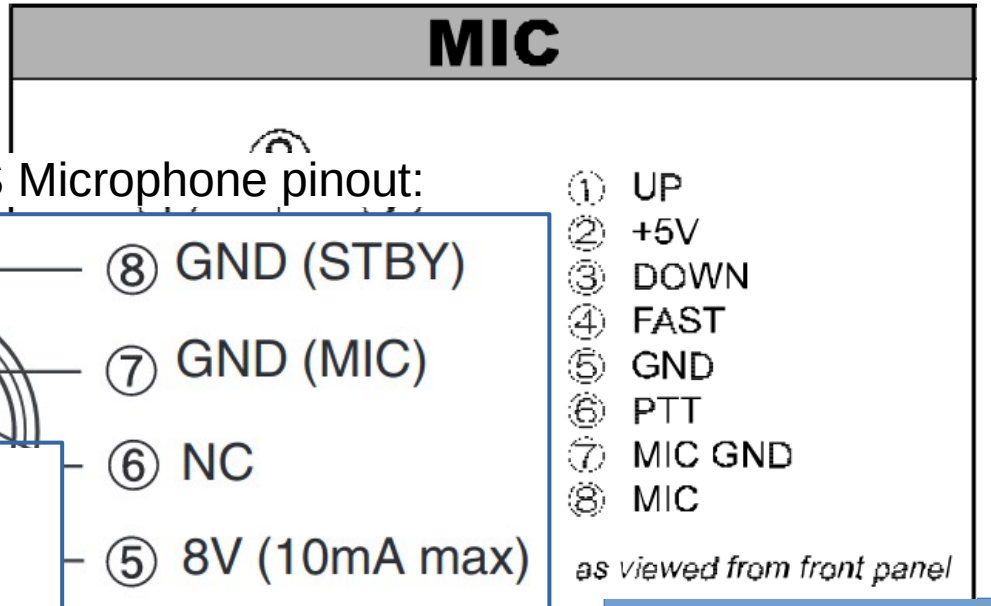

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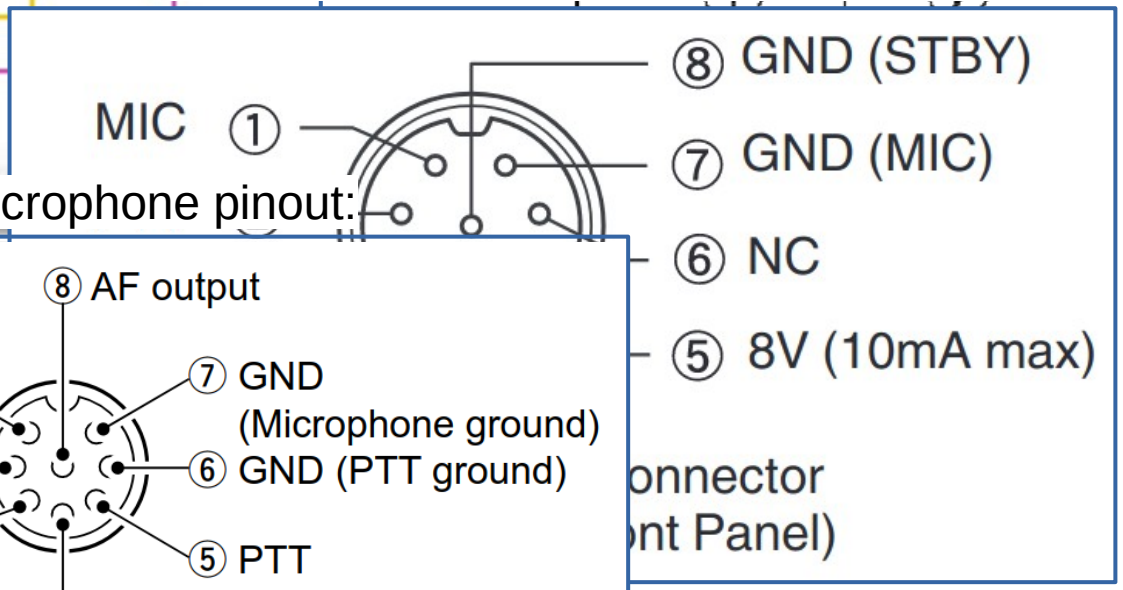

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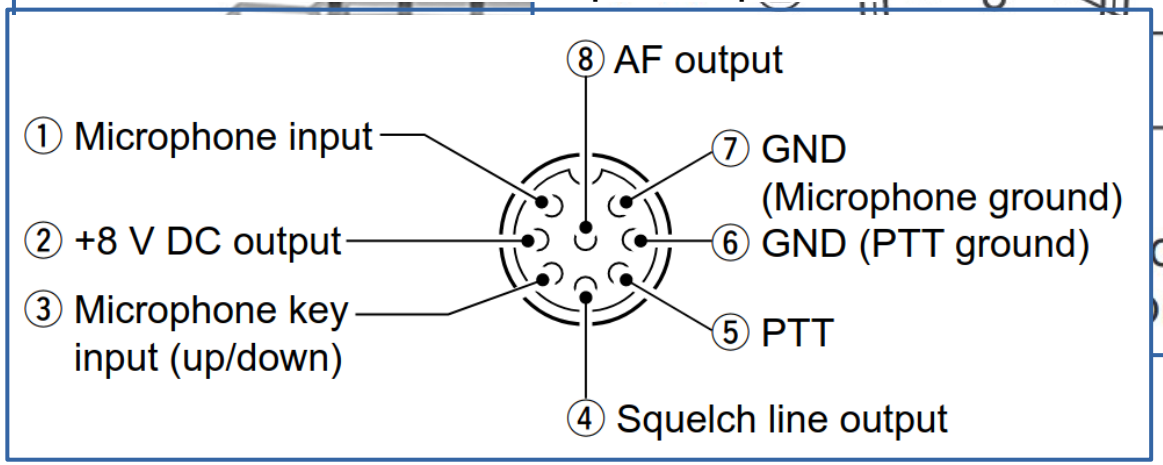

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“Your audio is distorted!”

CTIA “PC Gaming Headset”
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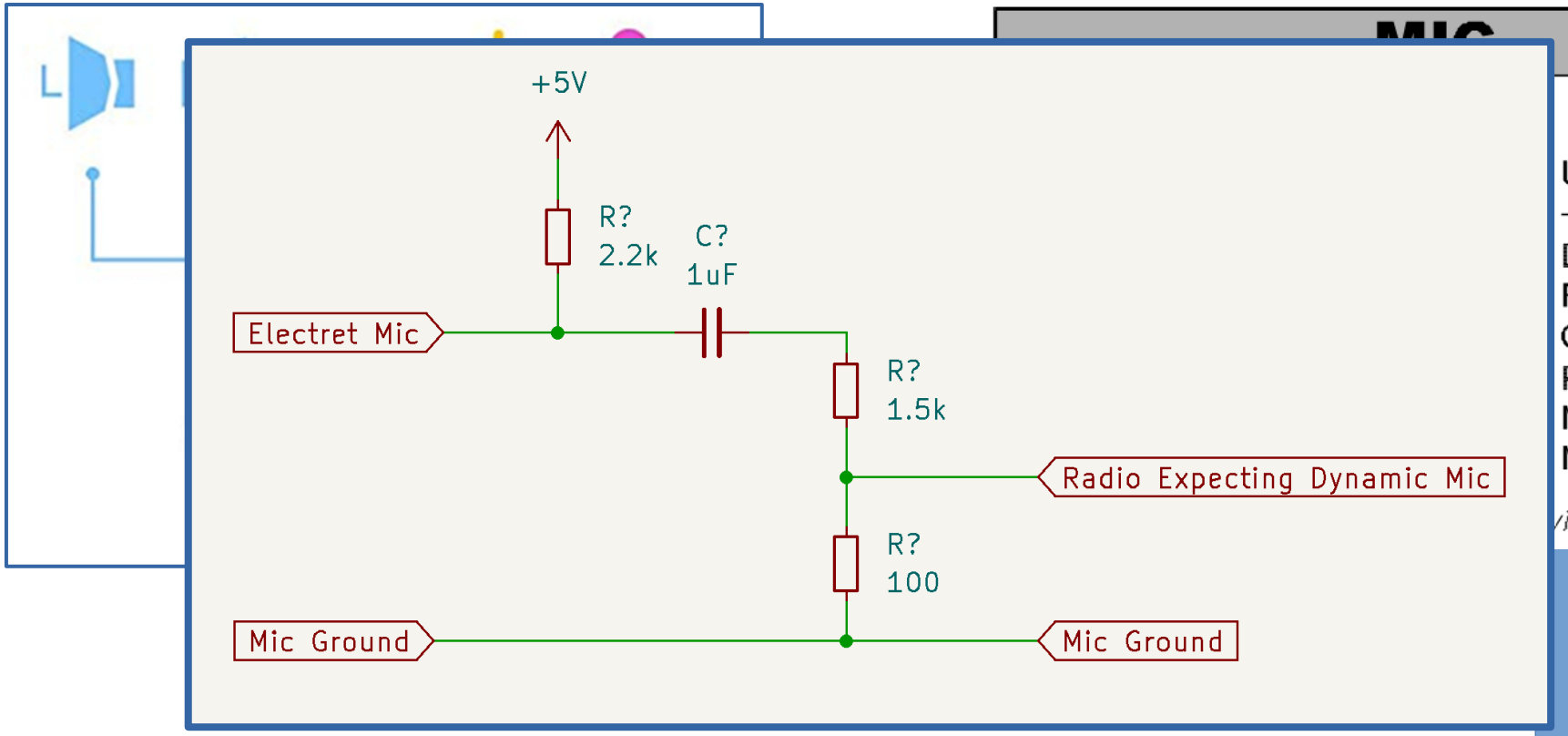

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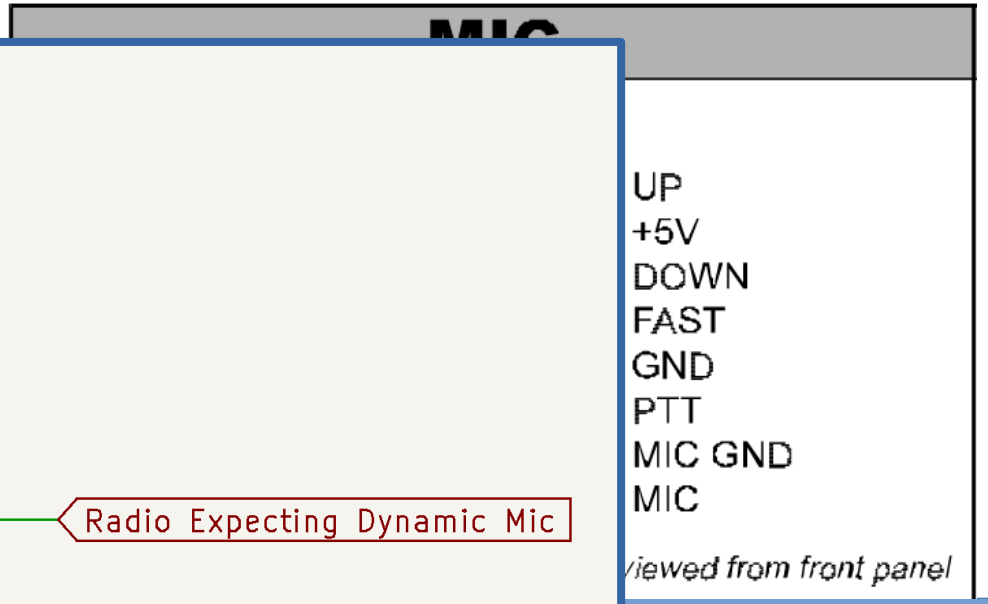

Video

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Which 3.5mm TRRS was that?

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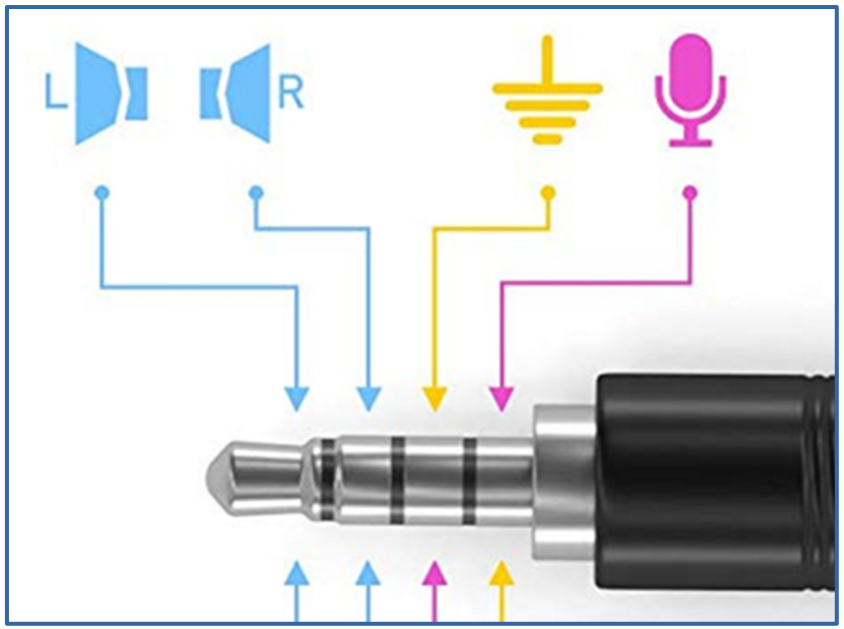

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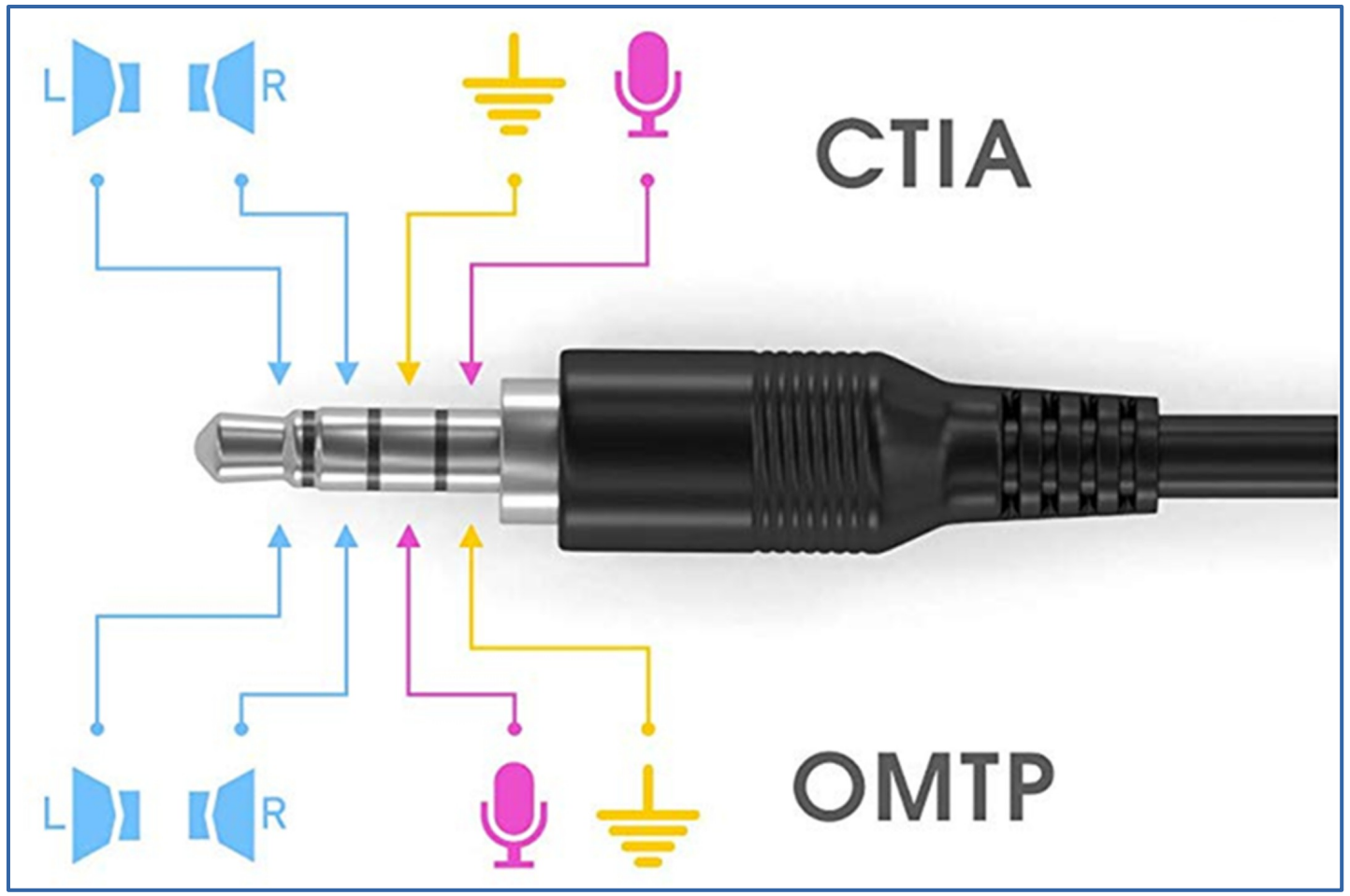

Video

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Your Adapter Game is strong.

This is quickly getting out of hand.

It’s a full mesh of adapters, from every different headset to every different radio.

Video

https://ohis.org/

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How do we address this?

Video

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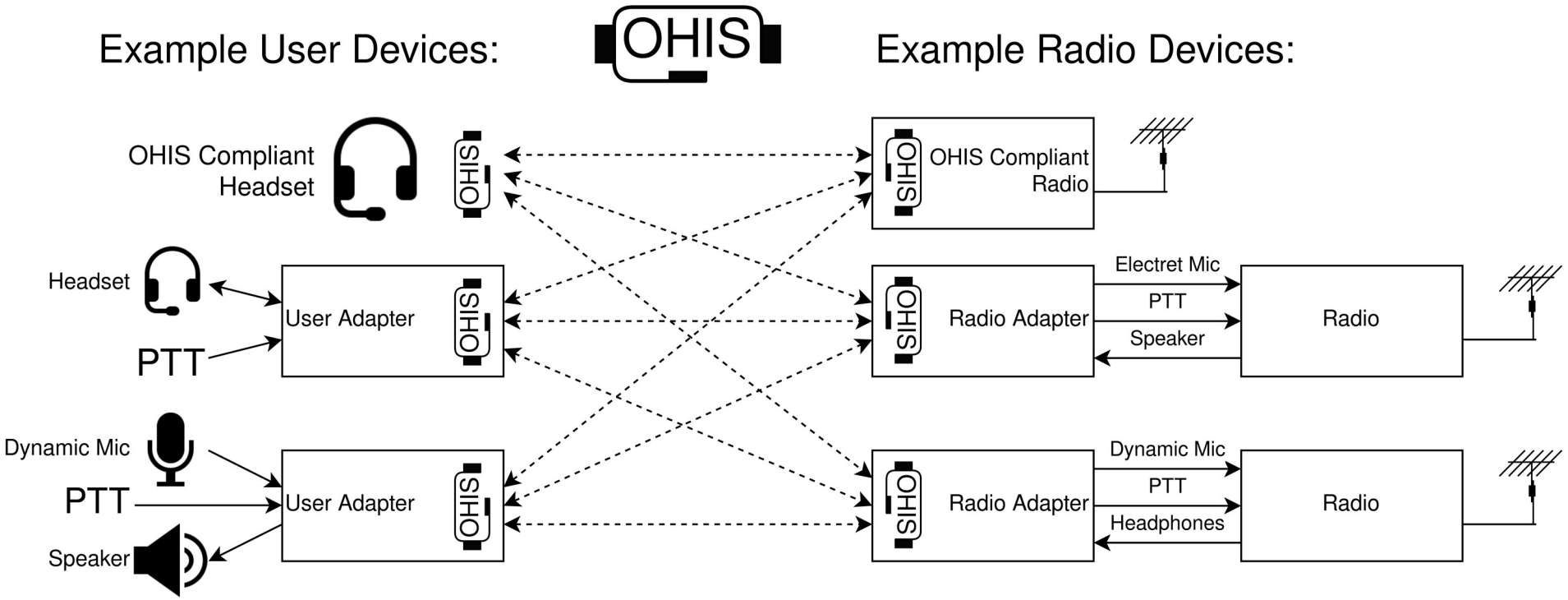

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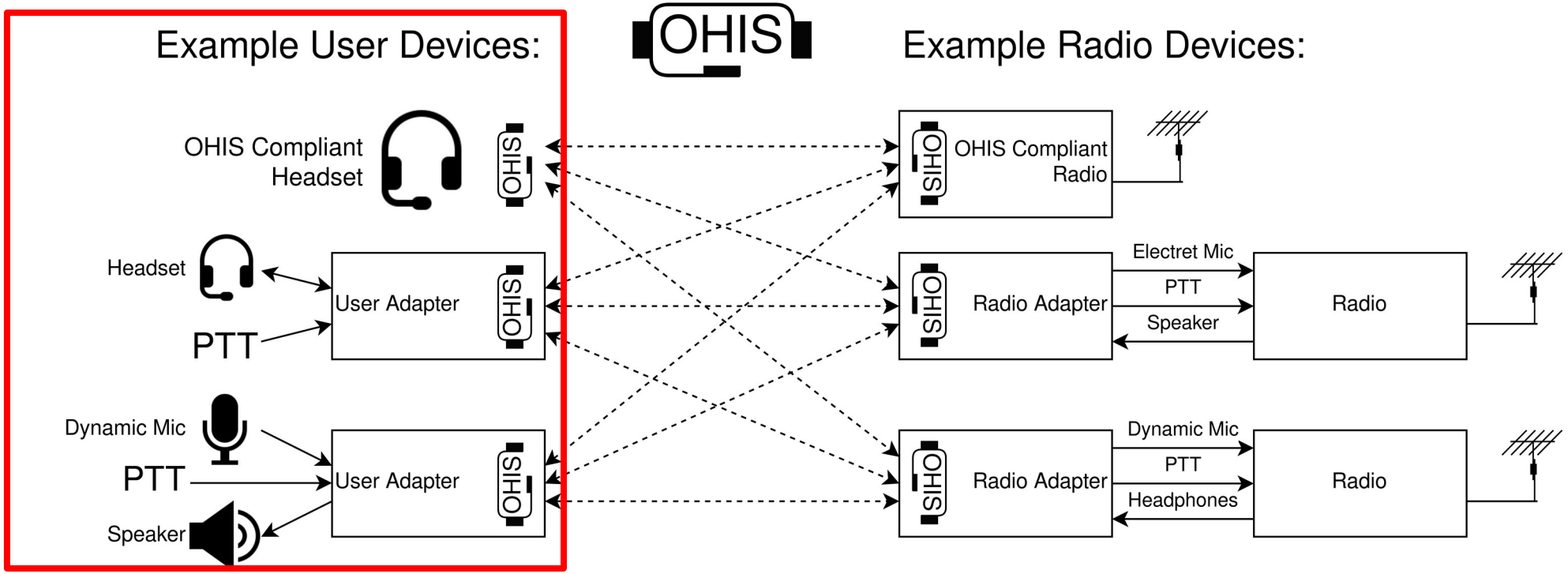

- **User Device/Adapter:** Specific to the headset, stays with the headset.

Video

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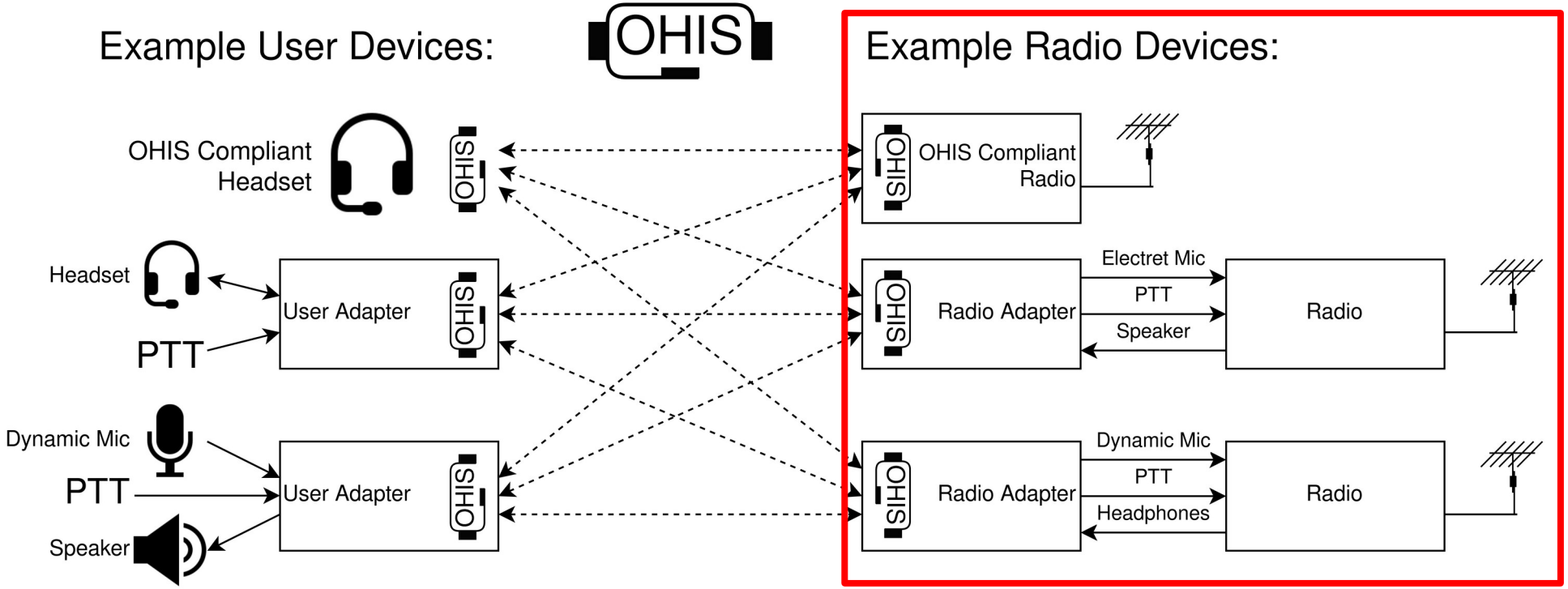

- **User Device/Adapter:** Specific to the headset, stays with the headset.
- **Radio Device/Adapter:** Specific to the radio, stays with the radio.

Video

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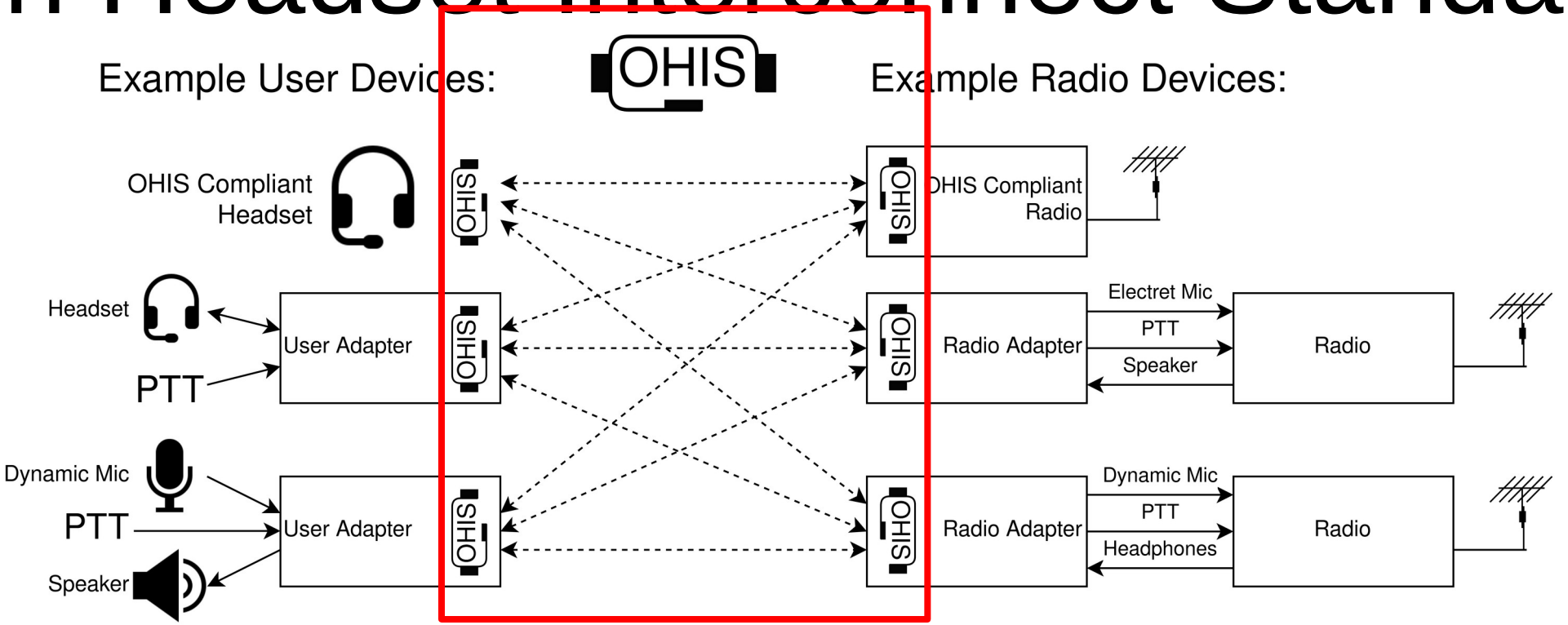
Open Headset Interconnect Standard



- **User Device/Adapter:** Specific to the headset, stays with the headset.
- **Radio Device/Adapter:** Specific to the radio, stays with the radio.
- **Open Headset Interconnect Standard** is the connection between them.

Video

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Technical Summary

Electrical:

Video

Technical Summary

Electrical:

- **Microphone**: “Electret” level: -45dBV +/- 3dB, pseudo-balanced. +5vDC bias provided by Radio Device.

Video

Technical Summary

Electrical:

- **Microphone**: “Electret” level: -45dBV +/- 3dB, pseudo-balanced. +5vDC bias provided by Radio Device.
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- **PTT**: Contact closure to power ground.

Video

Technical Summary

Electrical:

- **Microphone**: “Electret” level: -45dBV +/- 3dB, pseudo-balanced. +5vDC bias provided by Radio Device.
- **Audio Out**: “Headphone” level: 0dBV full volume, ground referenced, stereo.
- **PTT**: Contact closure to power ground.
- **Power**: (Optional) +5vDC 200mA provided by Radio for audio amplifiers, LED indicators, signal processing, etc.

Video

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Technical Summary

Physical:

Video

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Technical Summary

Physical:

- **Connector**: 8P8C Modular. (Commonly, but incorrectly, known as RJ-45.)

Video

Technical Summary

Physical:

- **Connector**: 8P8C Modular. (Commonly, but incorrectly, known as RJ-45.)
- **Cable**: Shielded Cat5 (or better).

Video

Technical Summary

Physical:

- **Connector**: 8P8C Modular. (Commonly, but incorrectly, known as RJ-45.)
- **Cable**: Shielded Cat5 (or better).
- **Wiring**: TIA-568A or 568B. Which pins are pairs is important.

Video

Technical Summary

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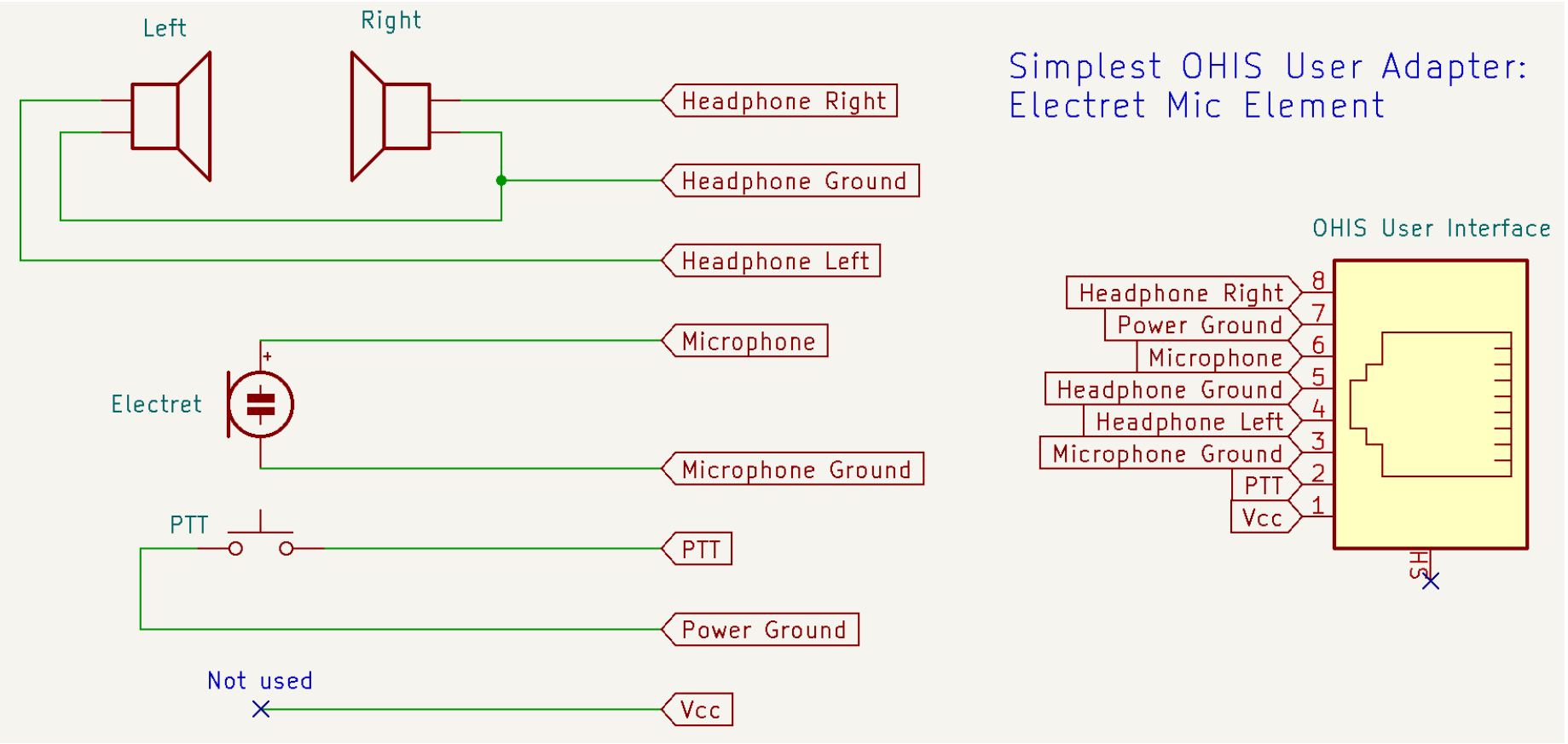
Allows the use of common off-the-shelf Ethernet cables.

Video

https://ohis.org/

Technical Summary

Pin-out:



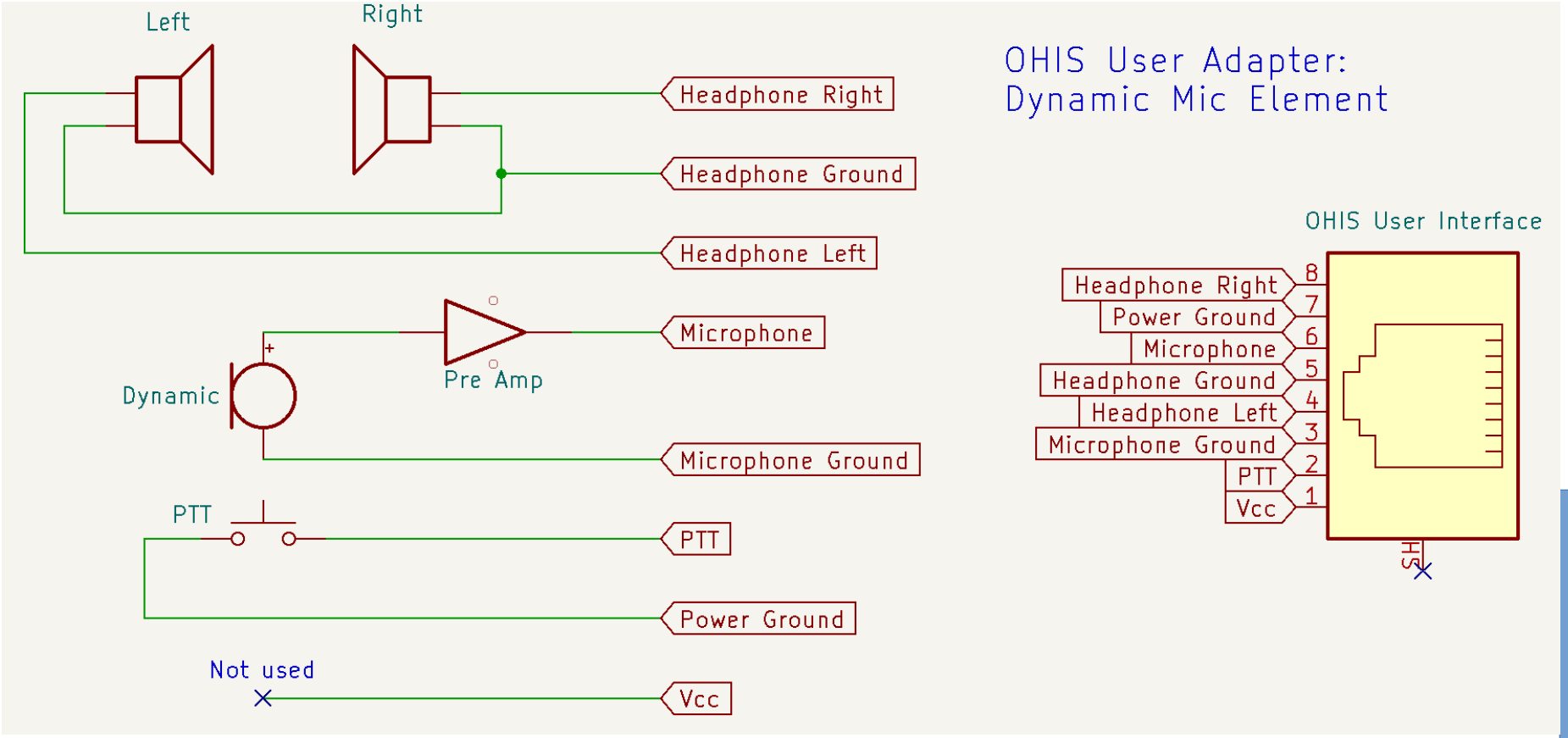
Simplest OHIS User Adapter:
Electret Mic Element

Video

https://ohis.org/

Technical Summary

Pin-out:

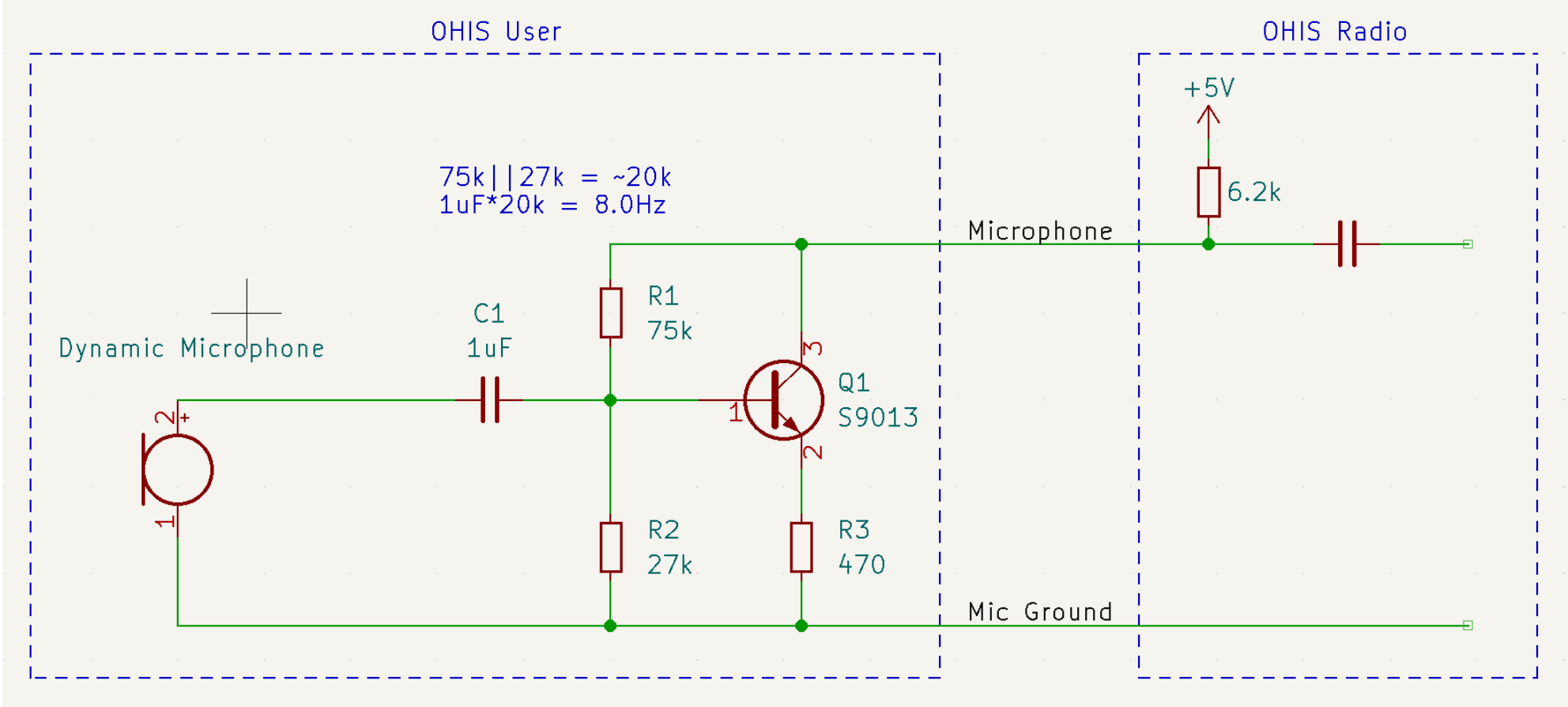


Video

https://ohis.org/

Dynamic Mic Pre-Amp

Part of the open standard, freely available for use.



Video

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When is OHIS useful?

Video

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- When you have several different radios and headsets.

Video

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- When you operate in a multi-user environment and users have their own (different) headsets.

Video

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  - Examples: Field Day, club shack, or an Emergency Operations Center.

Video

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When is OHIS useful?

- When you have several different radios and headsets.
- When you operate in a multi-user environment and users have their own (different) headsets.
  - Examples: Field Day, club shack, or an Emergency Operations Center.
- To present a common electrical interface for devices between the user and the radio.

Video

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When is OHIS over-kill?

Video

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When is OHIS over-kill?

- When you only have one radio, or one headset, or any situation where the “full mesh” problem doesn’t apply.

Video

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When is OHIS over-kill?

- When you only have one radio, or one headset, or any situation where the “full mesh” problem doesn’t apply.
- When you already have all the adapters you need.

Video

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When is OHIS over-kill?

- When you only have one radio, or one headset, or any situation where the “full mesh” problem doesn’t apply.
- When you already have all the adapters you need.
- When you prefer the simplicity of a single adapter between you and your radio.

Video

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Why an Open Standard?

Video

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Why an Open Standard?

- Open is how we get out of this mess.

Video

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Why an Open Standard?

- Open is how we get out of this mess.
- It makes a good DIY project.

Video

Learn more:

https://ohis.org/

Video

Questions and Answers

Beginning now

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