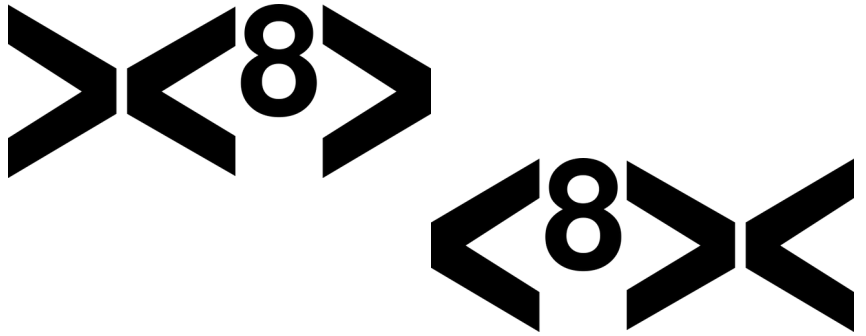
Open Headset Interconnect Standard

Mark Smith, N6MTS

Who am I?



Mark Smith, N6MTS

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

Video

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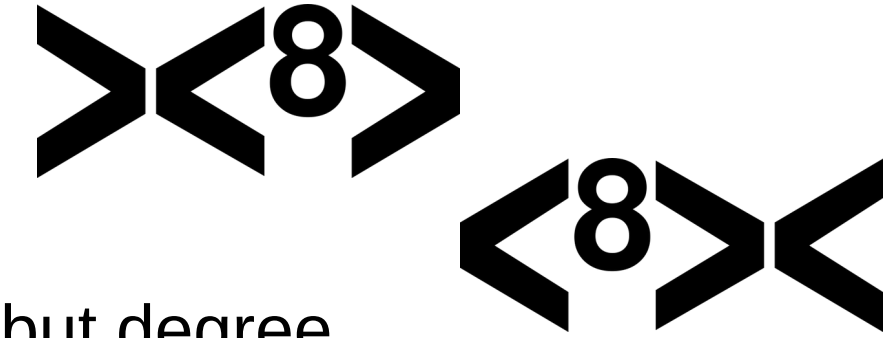

- **Ham**: Active ham since 1992.
- **College**: Two years in Electrical Engineering, but degree in Computer Engineering
- **Work**: ~30 years in IT, Network and Unix Systems Engineering, and Information Security.
- **All Three**: Left IT in 2021, started Halibut Electronics to make Ham Radio and Audiophile electronics.
- First big product, SOAR: Satellite Optimized Amateur Radio. Available late 2022.

Video

Open Headset Interconnect Standard

Video

Open Headset Interconnect Standard

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

Video

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.

Video

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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

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.

Video

Electrical Standards

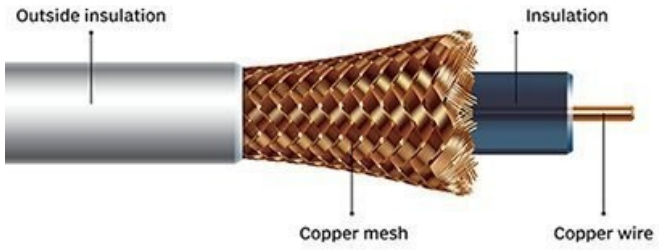
We have electrical standards (defined, or defacto) for things like RF and Power:

Video

Electrical Standards

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

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



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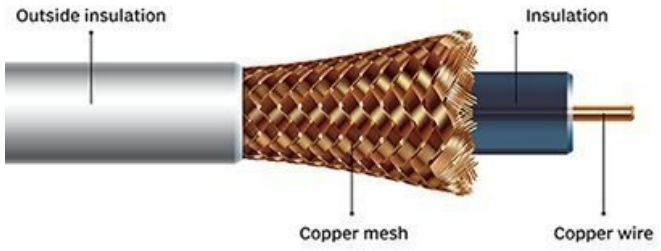
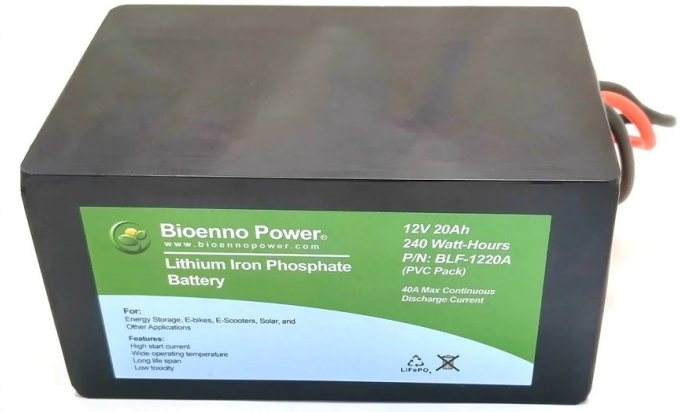


- **Power**: +13.8vDC +/- 15%



Video

Physical Standards

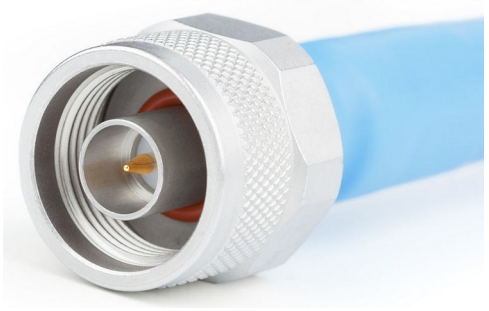
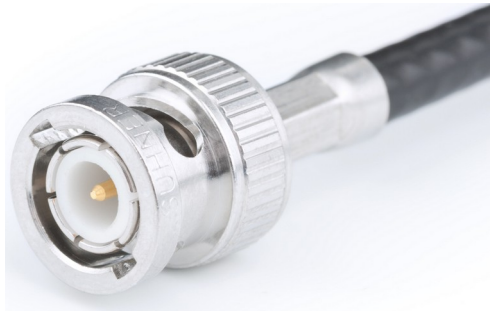
And one, or a few, physical standards that are easy to convert between:

Video

Physical Standards

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

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


Video

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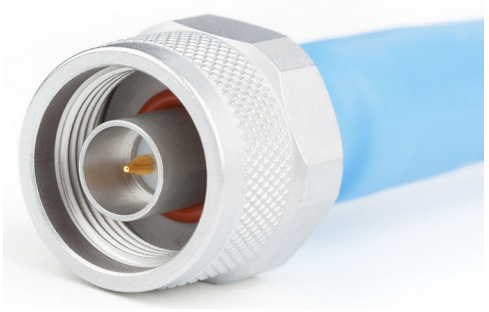
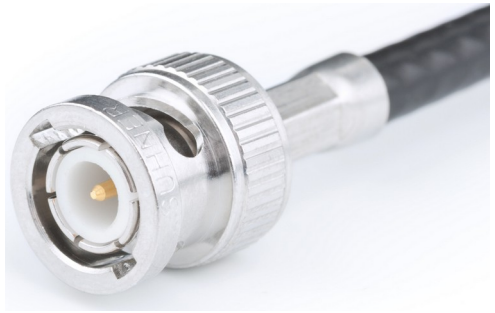


- **Power**: Powerpole, 6-pin “Molex”, “T” blades, etc


Video

Headset Standards?

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

Video

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

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Video

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

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

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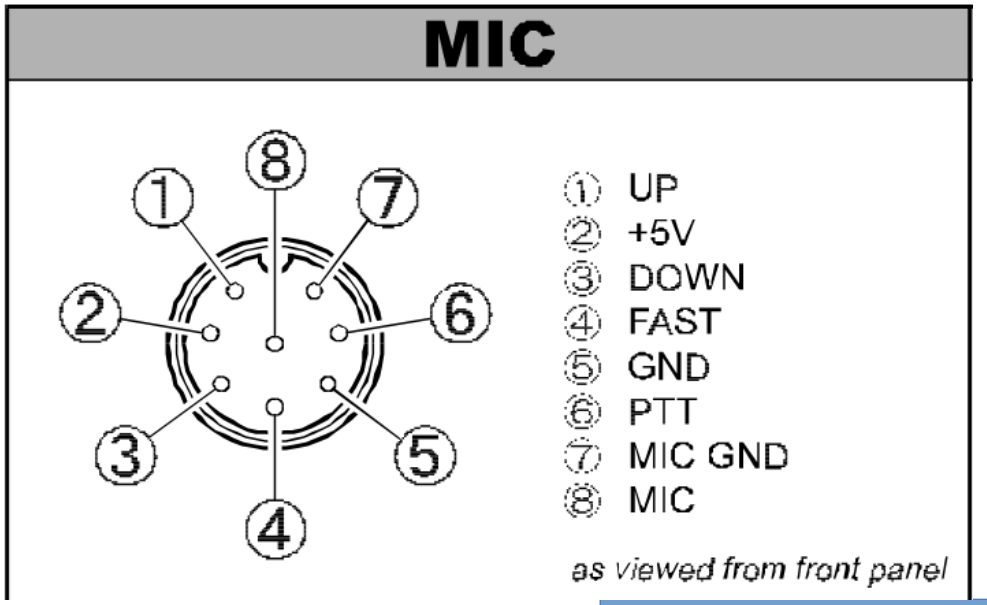
- **Audio out**: 3.5mm TS/TRS? ¼” TS/TRS? RCA?
- **PTT**: On the mic connector? 3.5mm TS? ¼” TS?

Video

The problem is...

Heil Pro 7 Headset:

Yaesu FT-920 Microphone pinout:



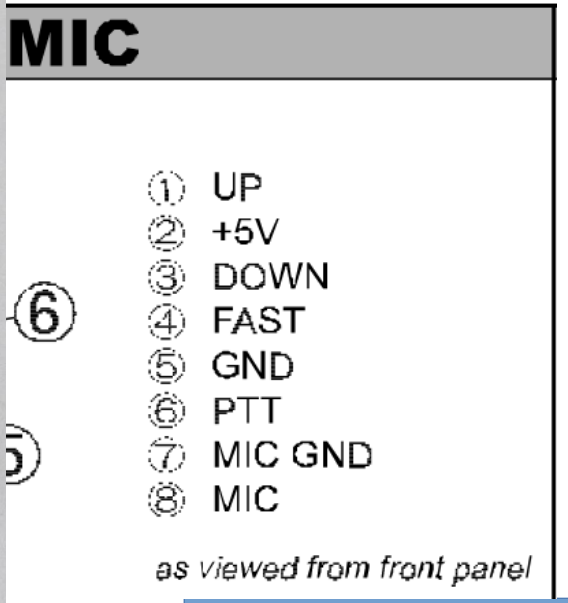
Video

The solution?

Heil Pro 7 Headset:

Heil AD-1-Y Adapter:

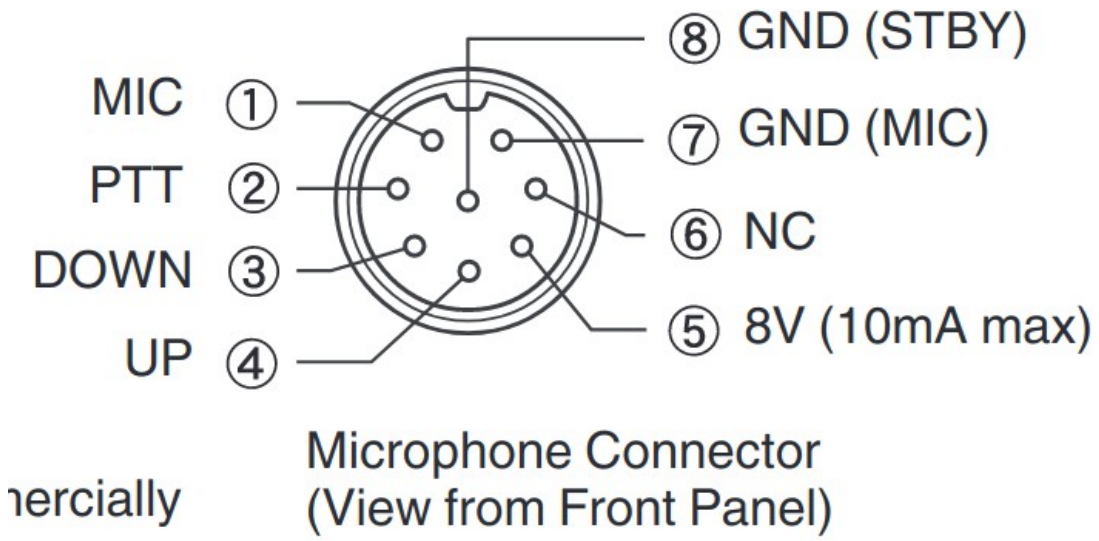
rophone pinout:



Video

But, I’ve got a Kenwood too.

Kenwood TS-890S Microphone pinout:



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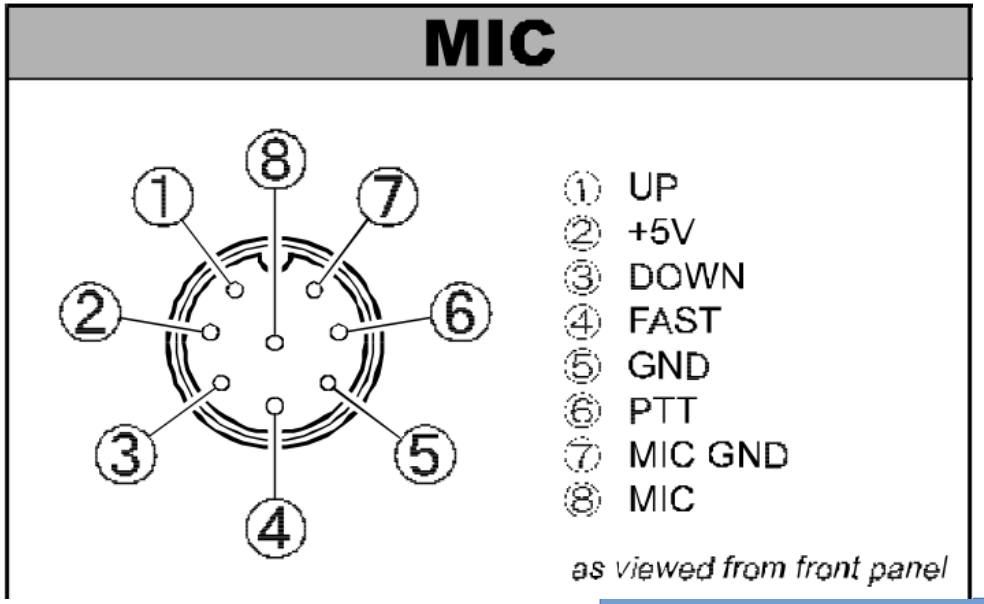

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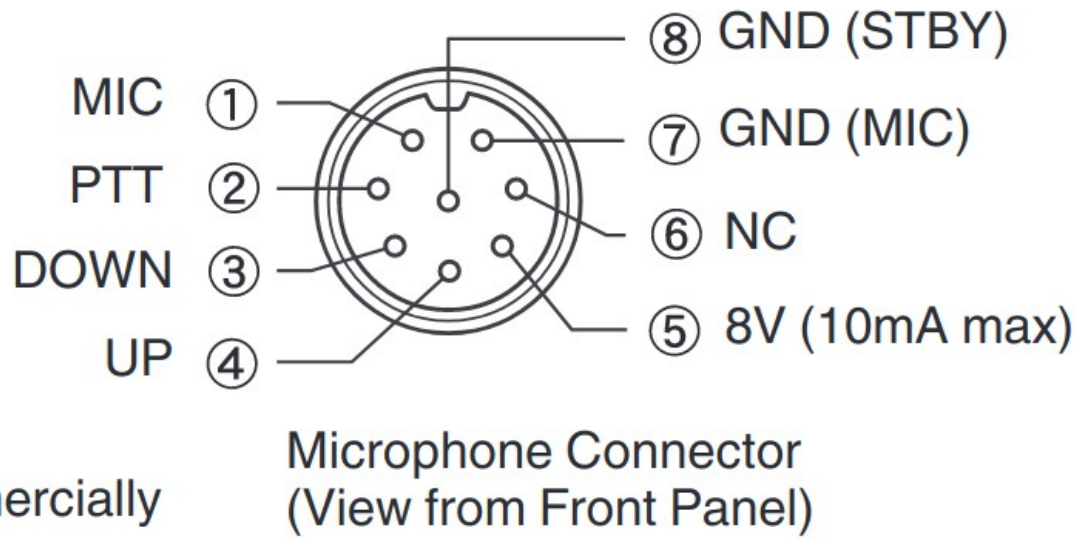


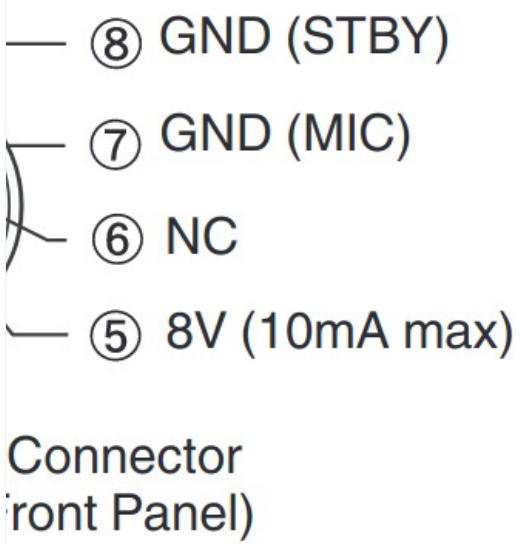
Video

Bob has me covered...

Heil Pro 7 Headset:

Heil AD-1-K Adapter:

Microphone pinout:

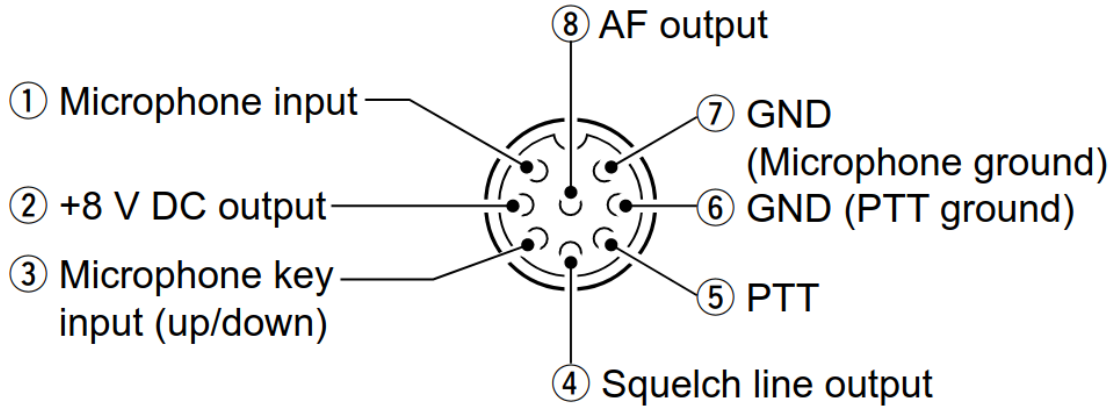


Video

What about Icom?

Heil Pro 7 Headset:

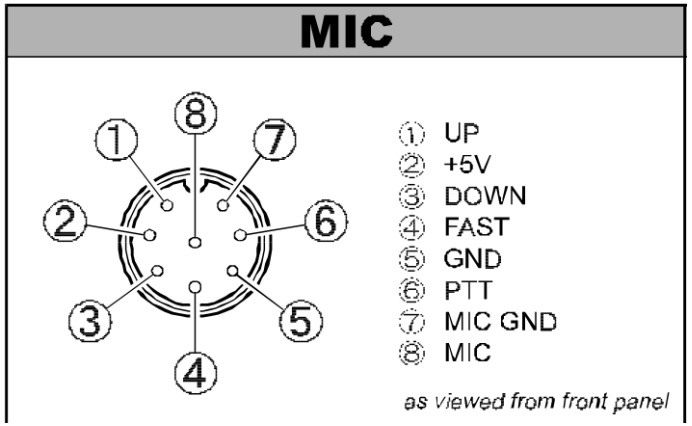
Icom IC-7300 Microphone pinout:



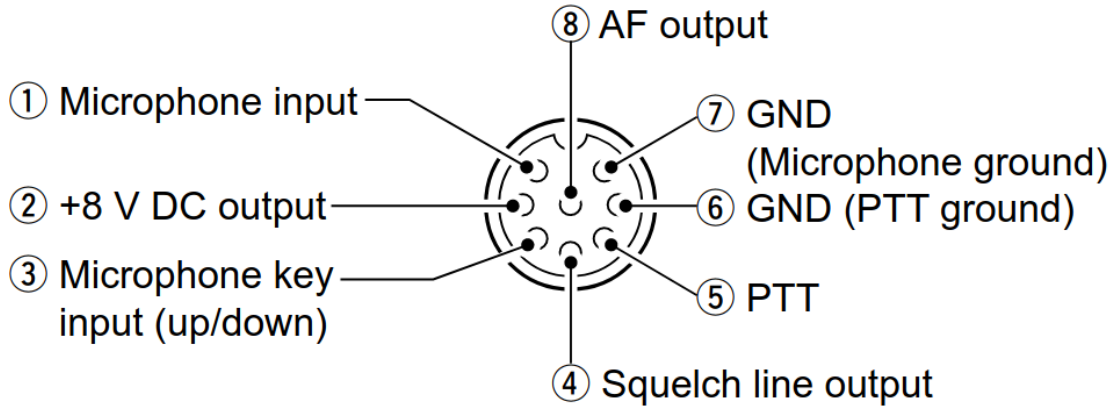
Video

Same connect-- oh… Never mind...

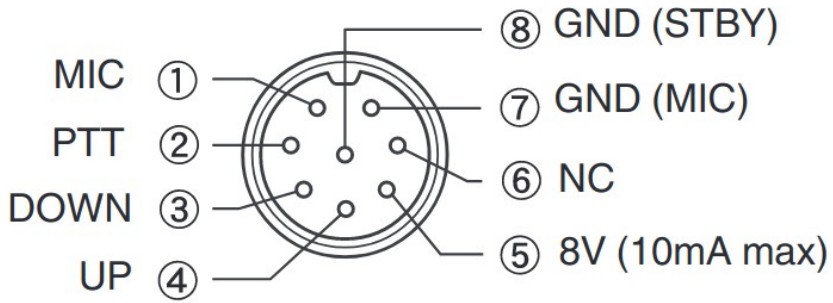
Yaesu FT-920 Microphone pinout:



Icom IC-7300 Microphone pinout:



Kenwood TS-890S Microphone pinout:



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Microphone Connector
(View from Front Panel)

Video

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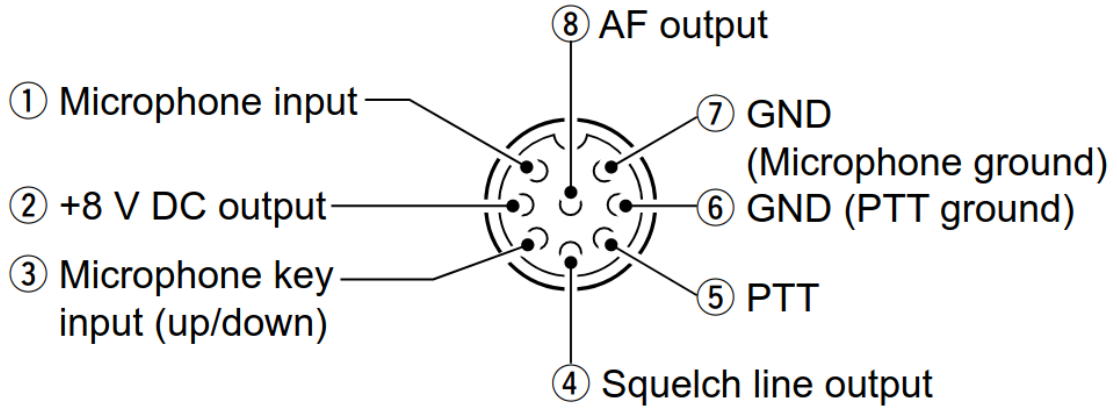


Video

Bob *still* has me covered...

Heil Pro 7 Head

Heil AD-1-iC Adapter:

hone pinout:

AF output

⑦ GND
(Microphone ground)
⑥ GND (PTT ground)
⑤ PTT

Squelch line output

Video

But, wait a minute...

Heil Pro 7 Head

Heil AD-1-iC Adapter:

Heil P7-IC-ELEM Microphone Element:

hone pinout:

AF output

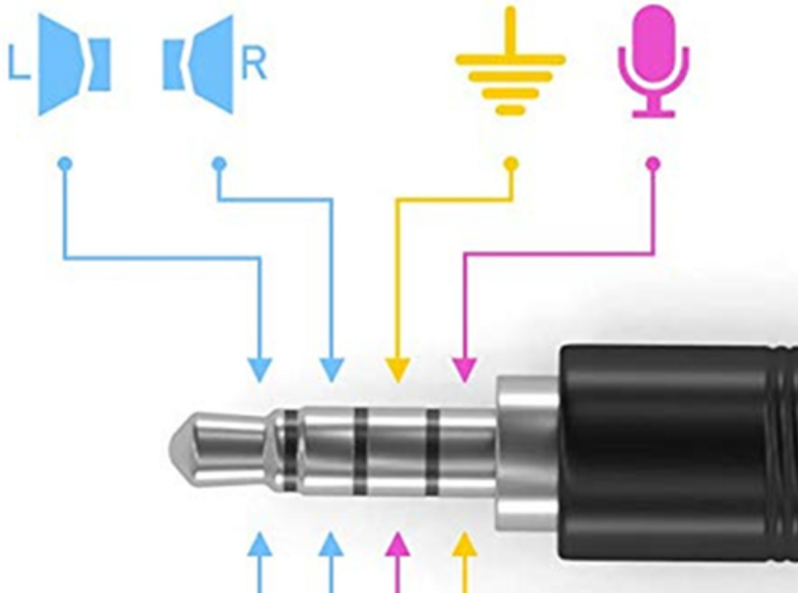
⑦ GND
(Microphone ground)
⑥ GND (PTT ground)
⑤ PTT

Squelch line output

Video

Another headset,

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



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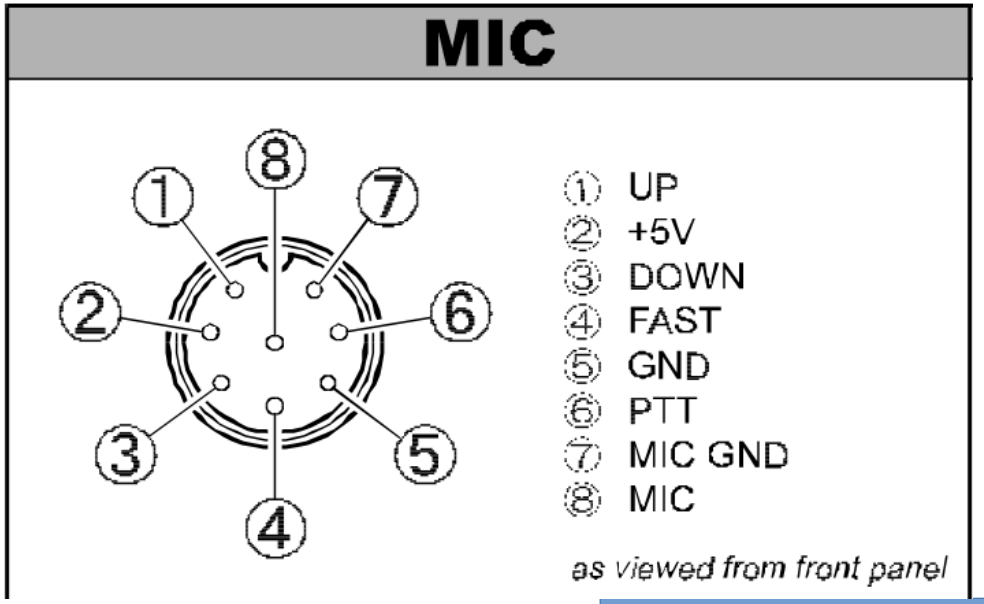

Video

Another headset, 3 more adapters...

CTIA “PC Gaming Headset”
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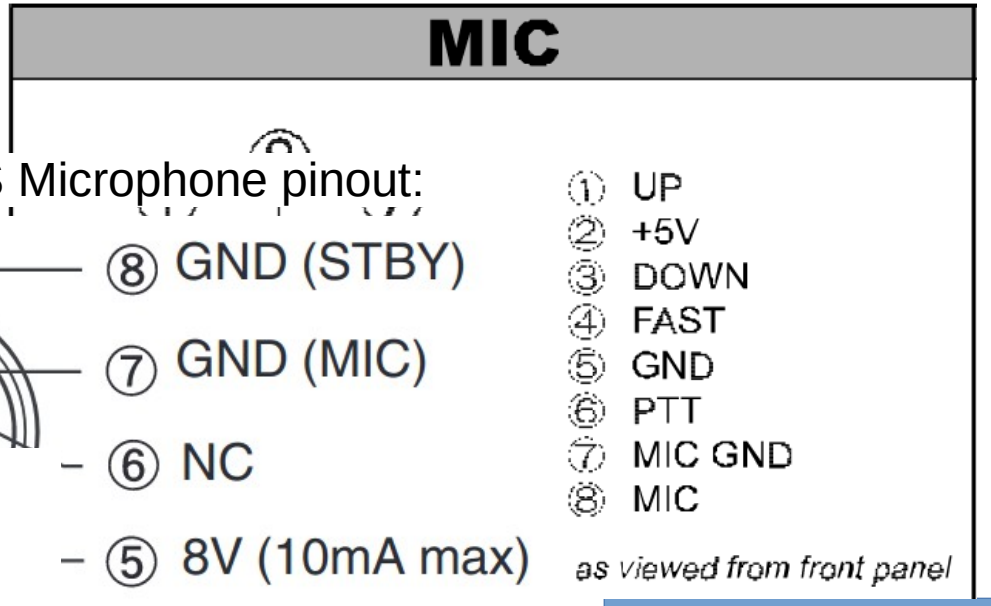

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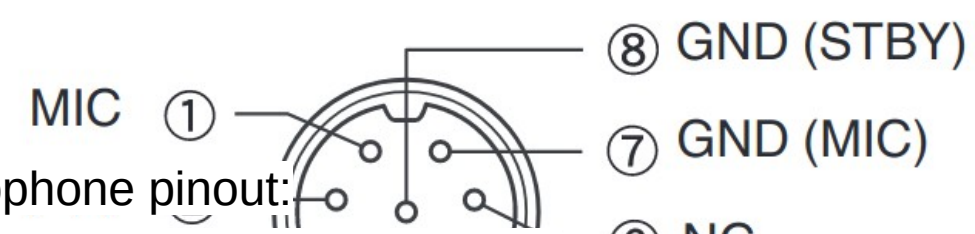

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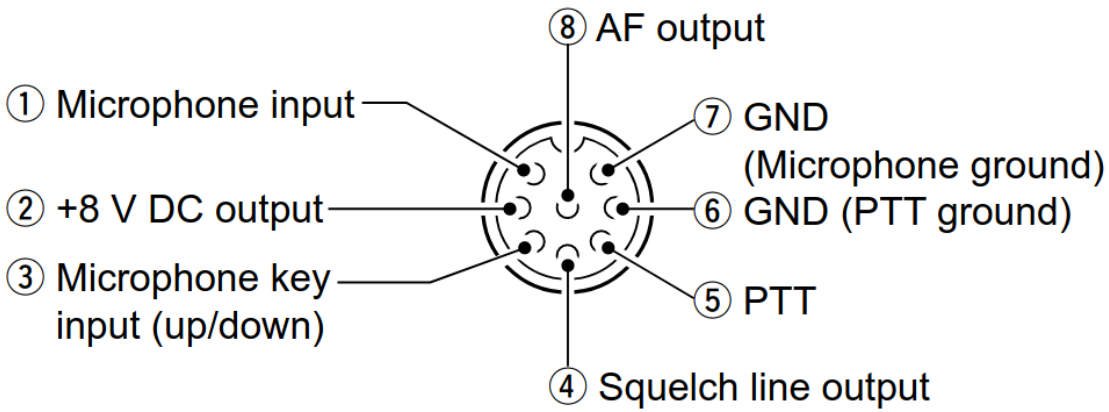
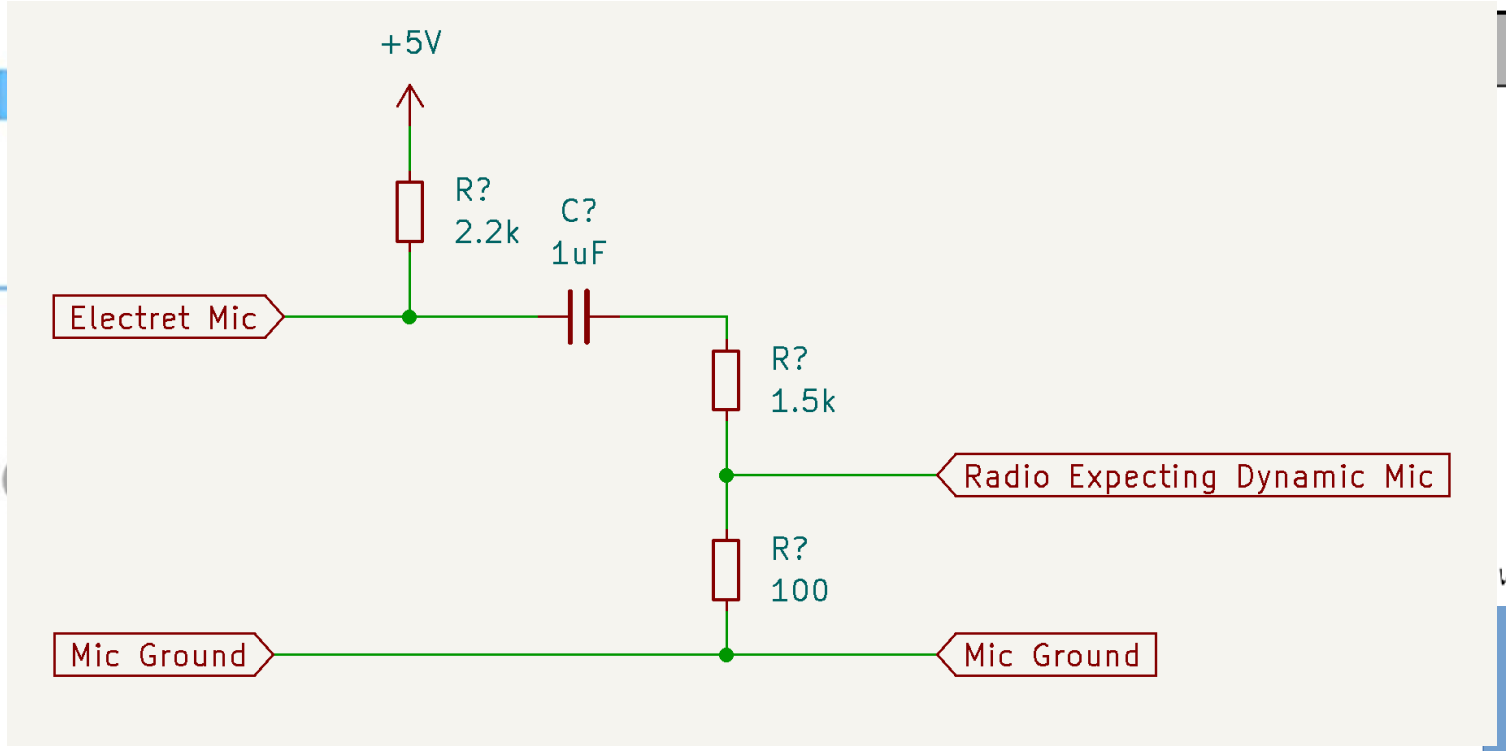


Video

“Your audio is distorted!”

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



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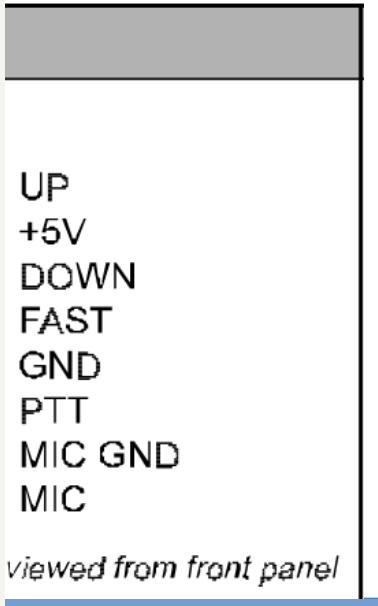

Video

Which 3.5mm TRRS was that?

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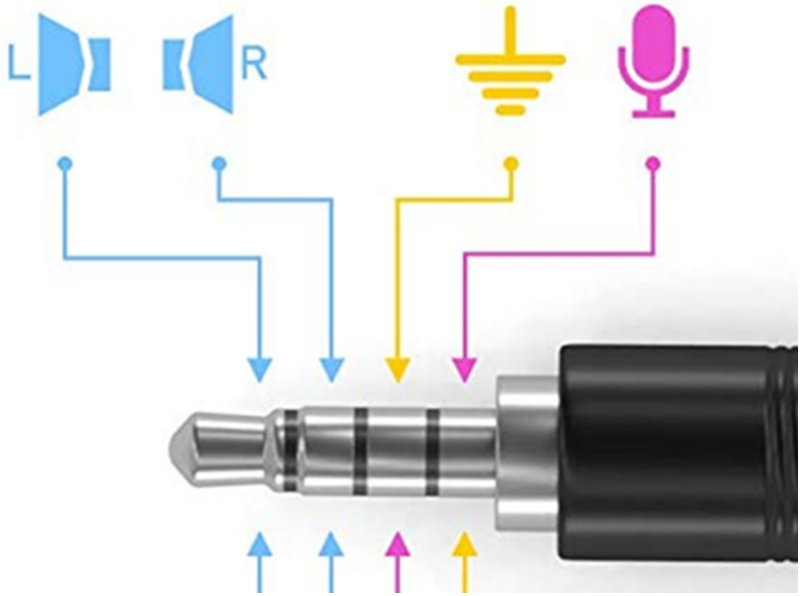

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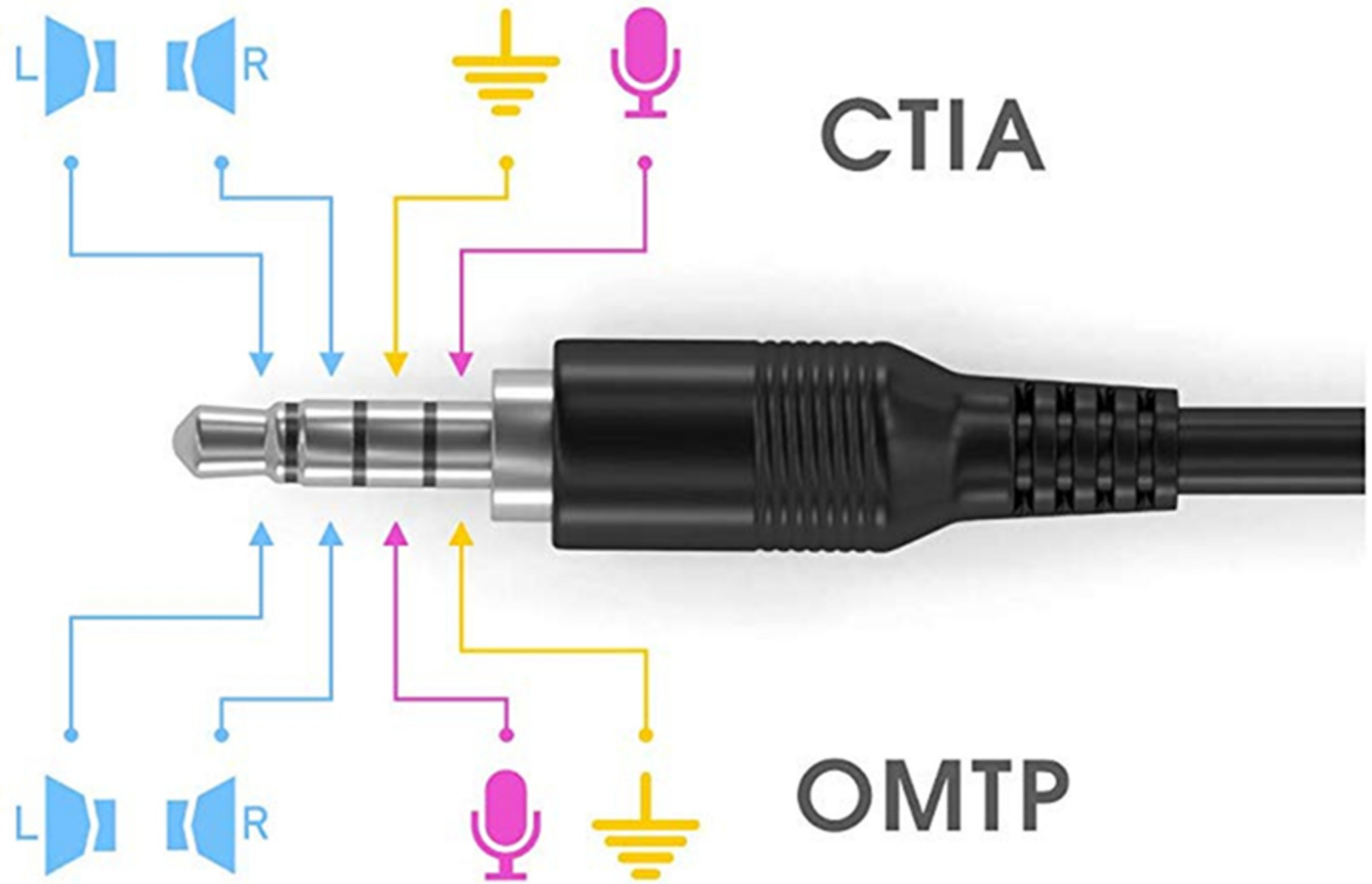

Video

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

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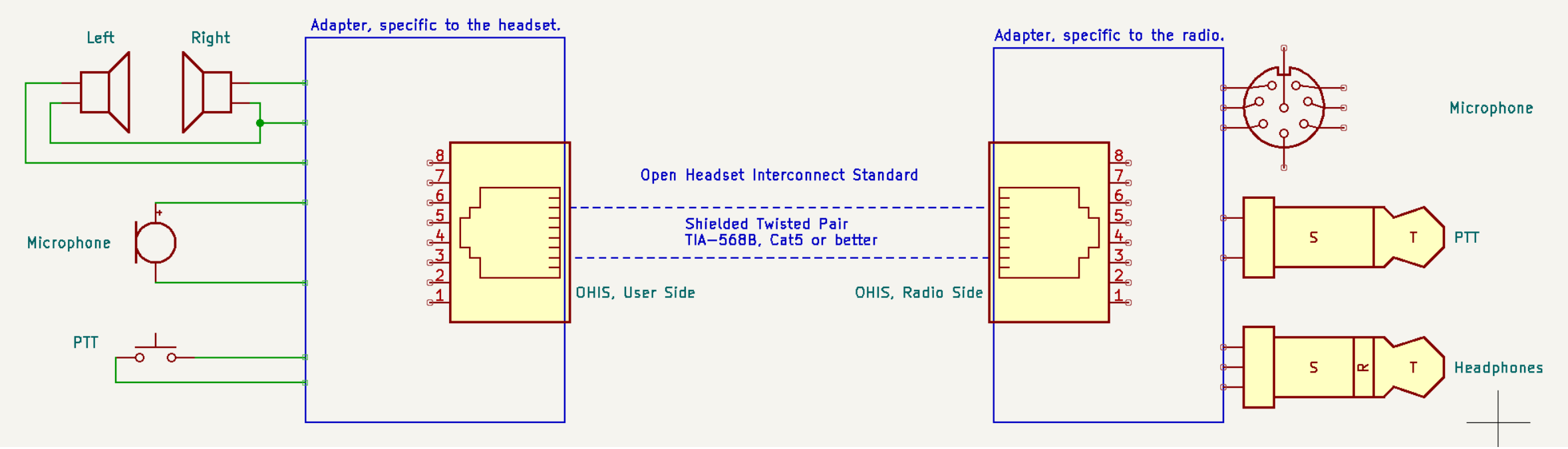
It’s a full mesh of adapters, from every different headset to every different radio.

How do we address this?

Video

Open Headset Interconnect Standard



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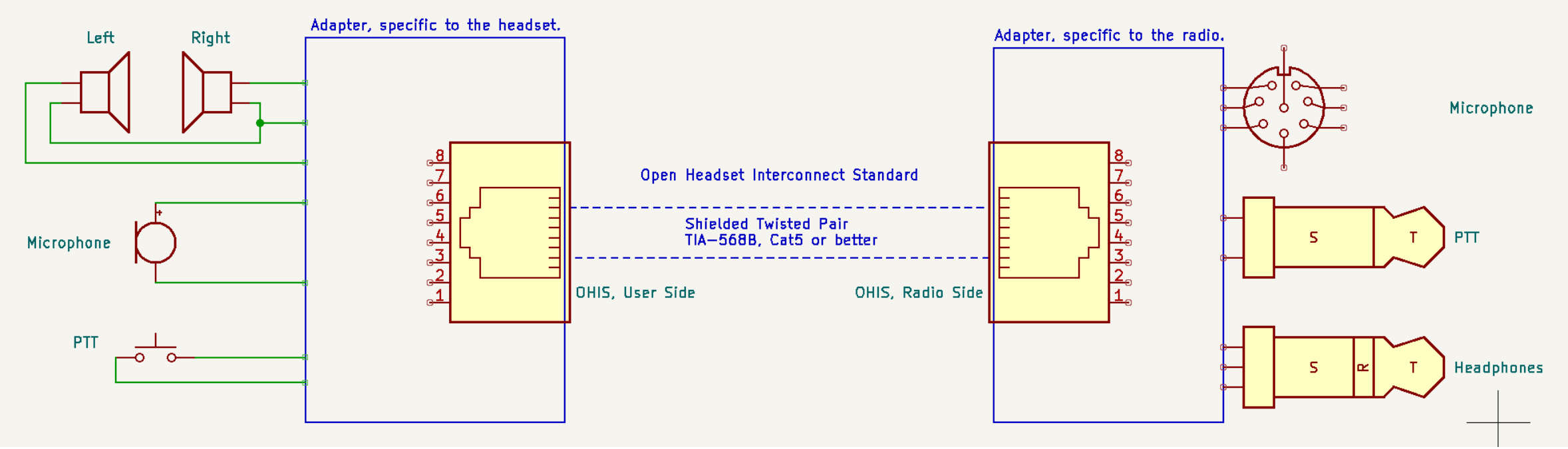

- **User** side adapter: Specific to the headset, stays with the headset.

Video

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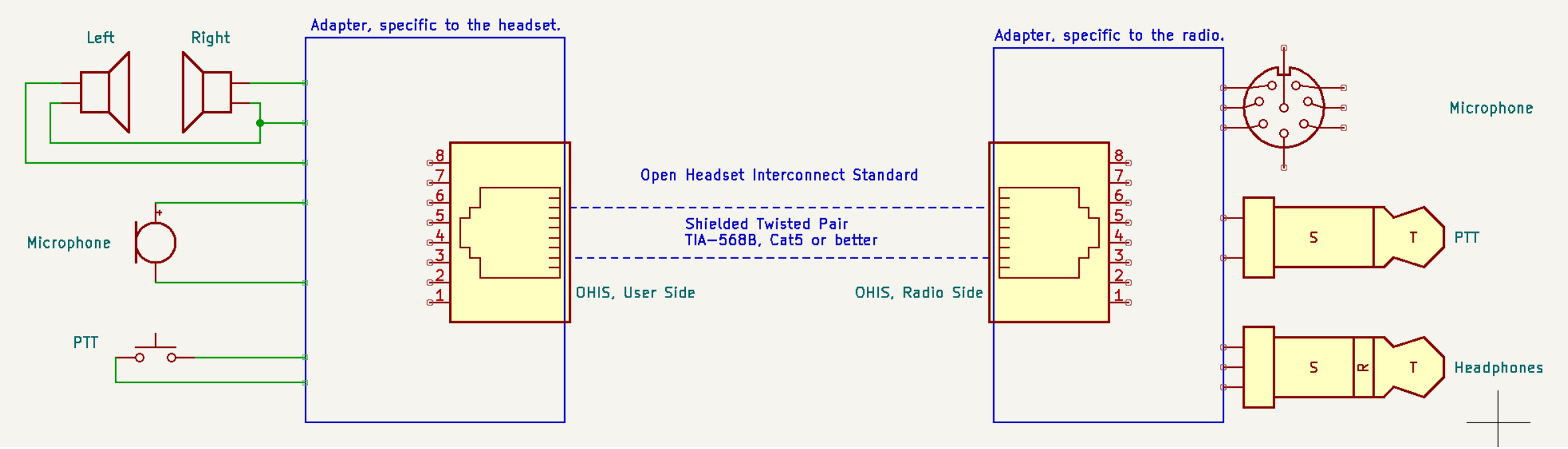
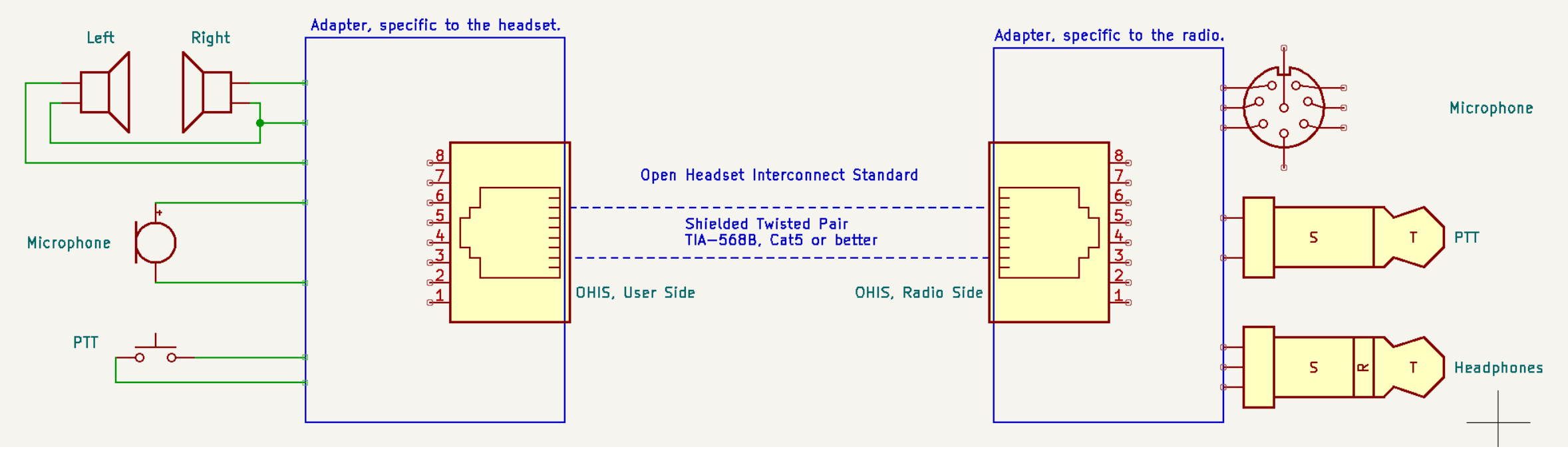


- **User** side adapter: Specific to the headset, stays with the headset.
- **Radio** side adapter: Specific to the radio, stays with the radio.

Video

Open Headset Interconnect Standard



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

Video

Technical Summary

Electrical:

Video

Technical Summary

Electrical:

- **Microphone**: Electret level. +5vDC bias provided by Radio.

Video

Technical Summary

Electrical:

- **Microphone**: Electret level. +5vDC bias provided by Radio.
- **Audio Out**: Ground referenced, “Headphone” level, stereo.

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- **Microphone**: Electret level. +5vDC bias provided by Radio.
- **Audio Out**: Ground referenced, “Headphone” level, stereo.
- **PTT**: Simple contact closure to ground.

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Technical Summary

Electrical:

- **Microphone**: Electret level. +5vDC bias provided by Radio.
- **Audio Out**: Ground referenced, “Headphone” level, stereo.
- **PTT**: Simple contact closure to ground.
- **Power**: +5vDC 200mA provided by Radio for audio amplifiers, LED indicators, signal processing, etc.

Video

Technical Summary

Physical:

Video

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**: Cat5 or better. Shielded is preferred but not required.

Video

Technical Summary

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- **Connector**: 8P8C Modular. (Commonly, but incorrectly, known as RJ-45.)
- **Cable**: Cat5 or better. Shielded is preferred but not required.
- **Wiring**: TIA-568A or 568B. Which pins are pairs is important.

Video

Technical Summary

Physical:

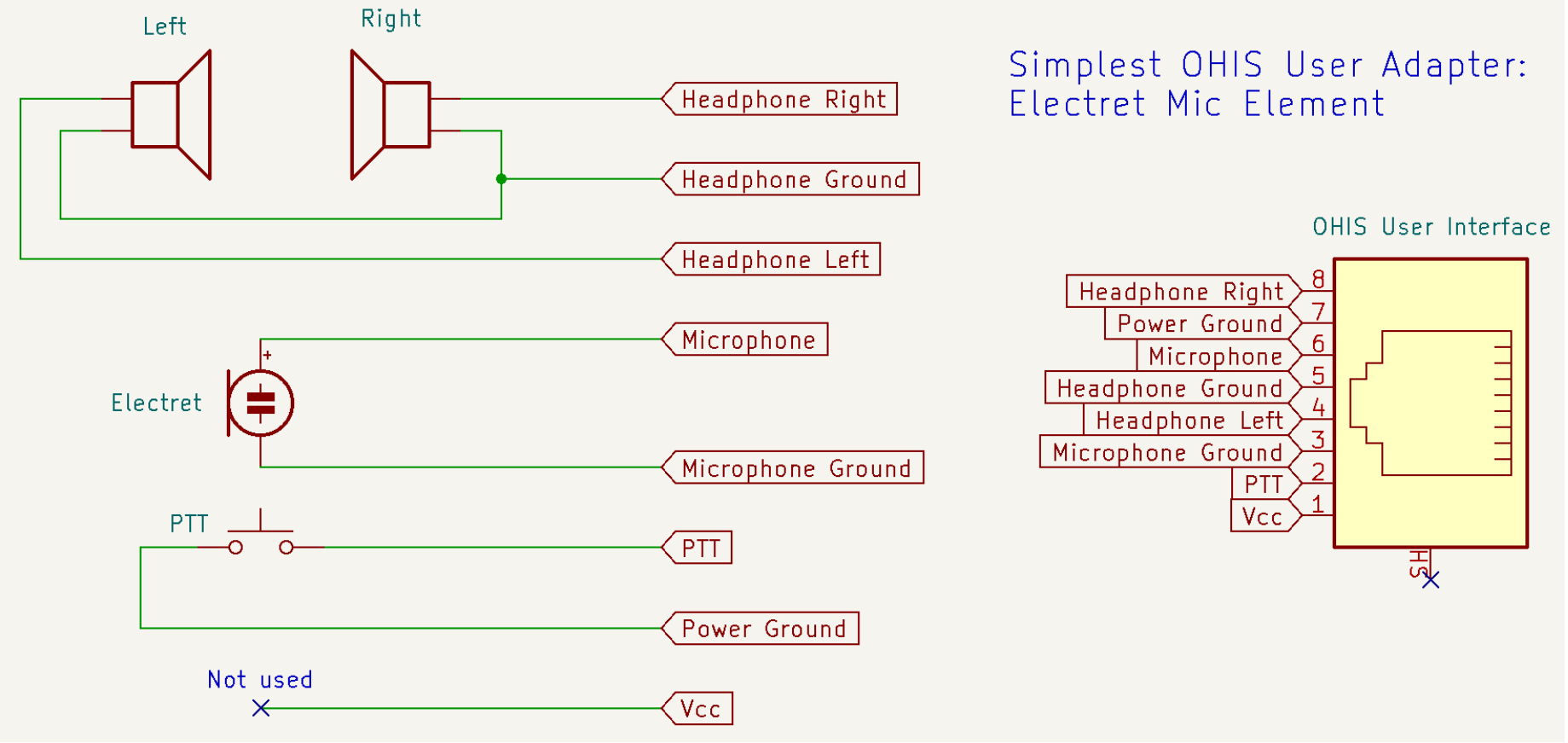
- **Connector**: 8P8C Modular. (Commonly, but incorrectly, known as RJ-45.)
- **Cable**: Cat5 or better. Shielded is preferred but not required.
- **Wiring**: TIA-568A or 568B. Which pins are pairs is important.

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

Video

Technical Summary

Pin-out:



Video

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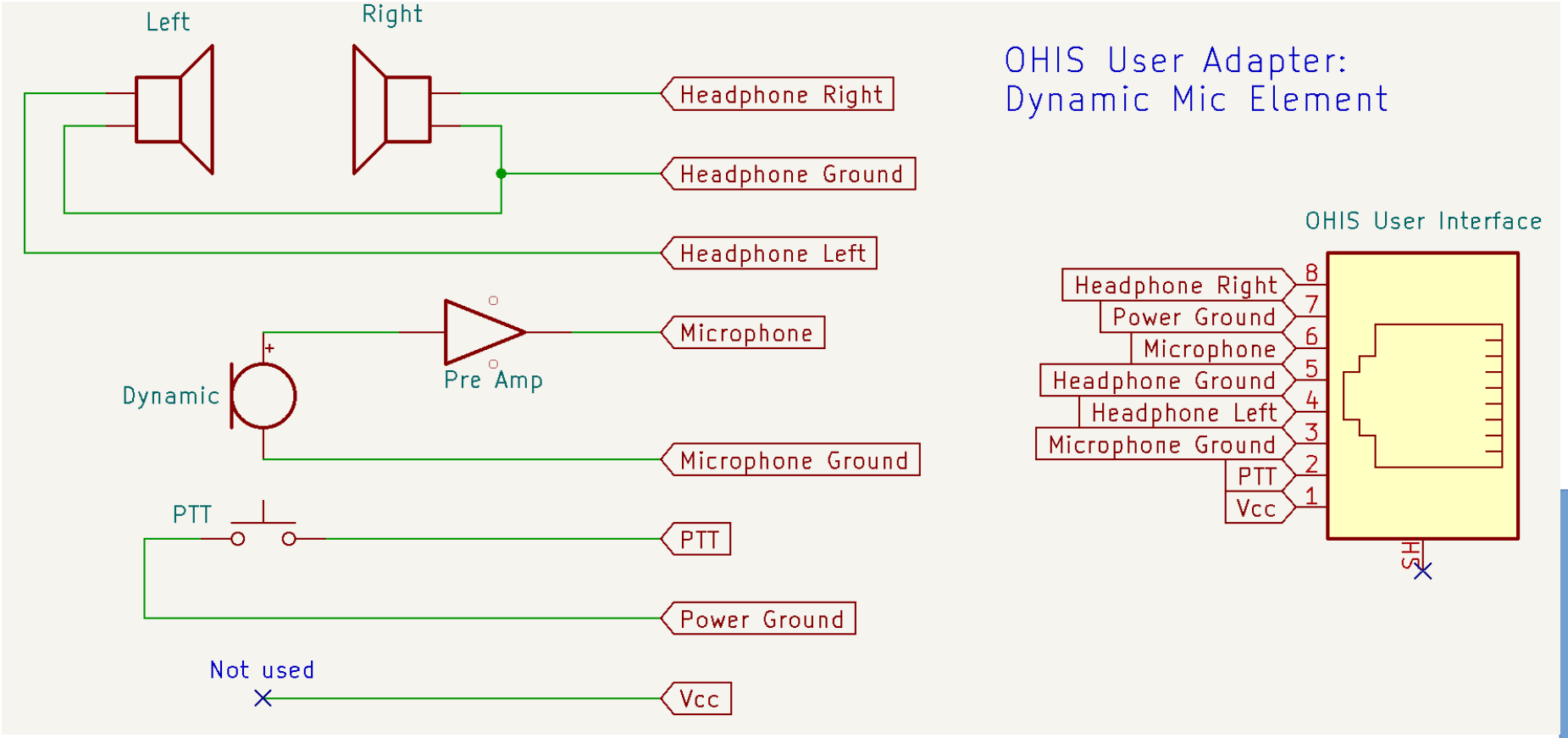
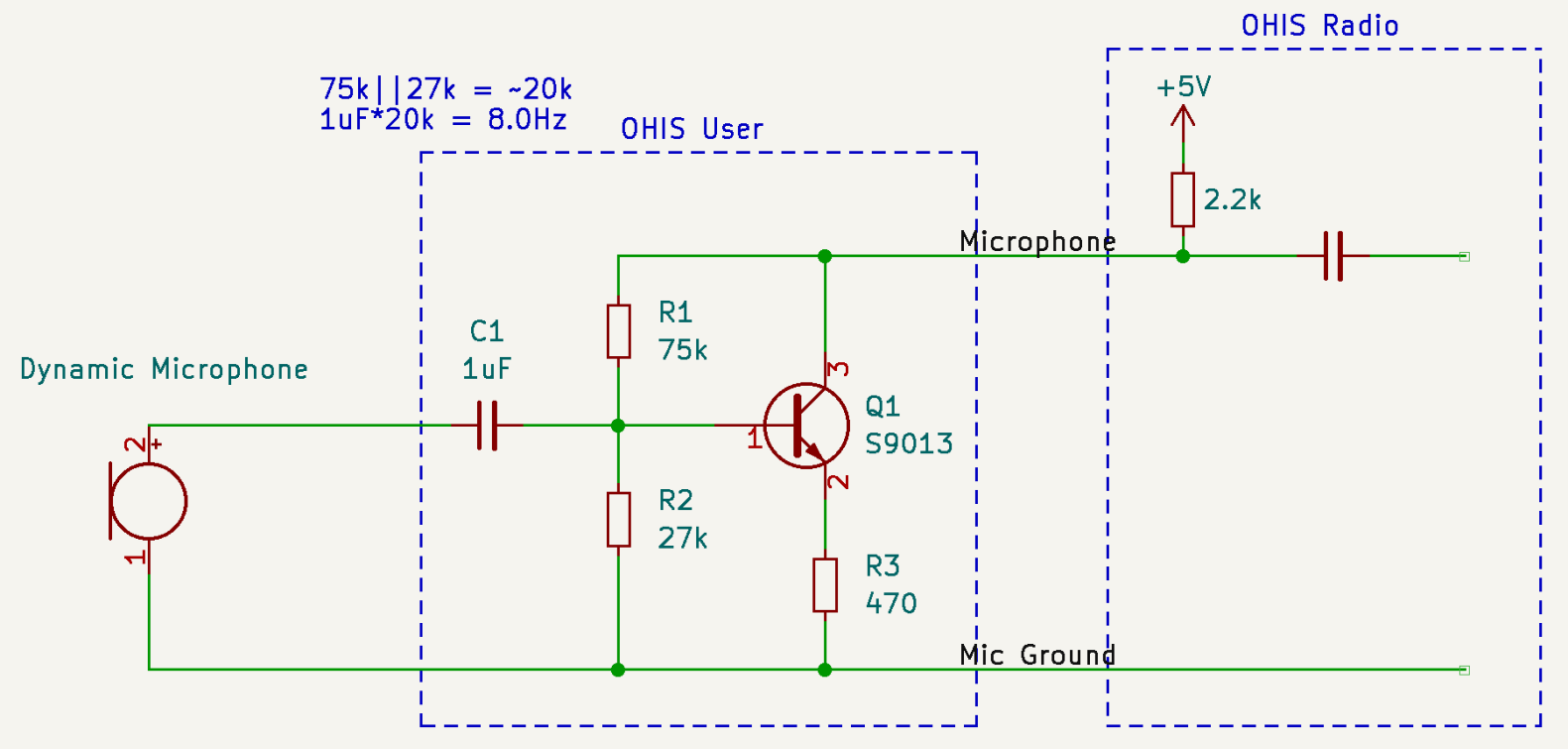


Video

Dynamic Mic Pre-Amp

Part of the open standard, freely available for use.



Video

Technical Details...

See the QR codes at the end of this presentation for the Standard Document, the Groups.io email list, and GitHub repository.

Video

When is OHIS useful?

Video

When is OHIS useful?

- When you have several different radios and headsets.

Video

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- When you have several different radios and headsets.
- When you operate in a shared environment and users have their own (different) headsets.

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

Video

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- When you want to design and sell a device that goes between the User and the Radio, and have it work everywhere without overly complex input and output interfacing.

Video

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- When you have several different radios and headsets.
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><8>

Video

When is OHIS over-kill?

Video

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

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

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

Why an Open Standard?

Video

Why an Open Standard?

- Open is how we get out of this mess.

Video

Why an Open Standard?

- Open is how we get out of this mess.
- Halibut Electronics needed to solve this problem for future products, and I am not Gillette.

Video

Why an Open Standard?

- Open is how we get out of this mess.
- Halibut Electronics needed to solve this problem for future products, and I am not Gillette.
- This is a good DIY project, and I love DIY projects

Video

Learn more

The Standard document:
https://halibut-electronics.github.io/Open-Headset-Interconnect-Standard/Open-Headset-Interconnect-Standard.pdf

GitHub repository:
https://github.com/Halibut-Electronics/Open-Headset-Interconnect-Standard

Groups.io mailing list:
https://halibut-electronics.groups.io/open-headset-interconnect-standard/

Video

Questions and Answers

Beginning now

Slide Title

Slide Content