



Open Headset Interconnect Standard

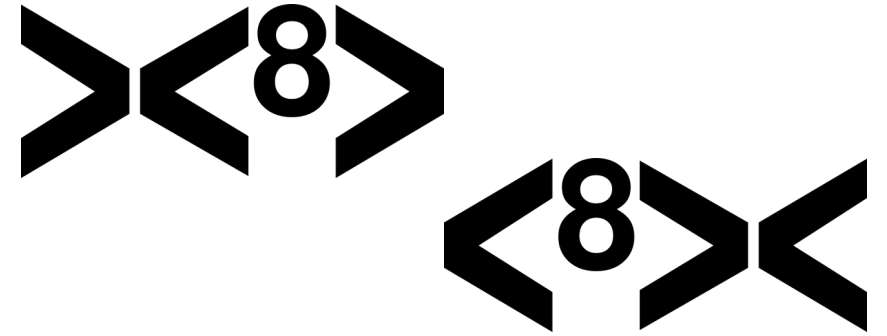
***Mark Smith,
N6MTS***



Who am I?

Mark Smith, N6MTS

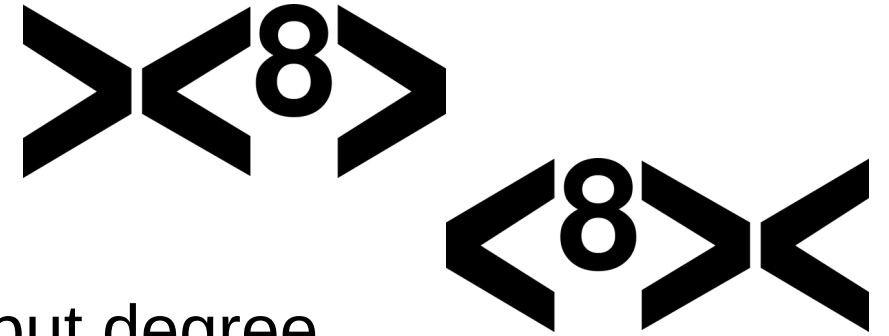
- Head Cheese, Halibut Electronics:
<https://electronics.halibut.com/>
- A host of the Ham Radio Workbench Podcast:
<https://www.hamradioworkbench.com/>
- Twitter and YouTube: @SmittyHalibut
- Mastodon/Fediverse: @smitty@halibut.com



Video

Who am I?

- **Ham:** Active ham since 1992.
- **College:** Two years in Electrical Engineering, but degree in Computer Engineering
- **Work:** 25 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

- **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.

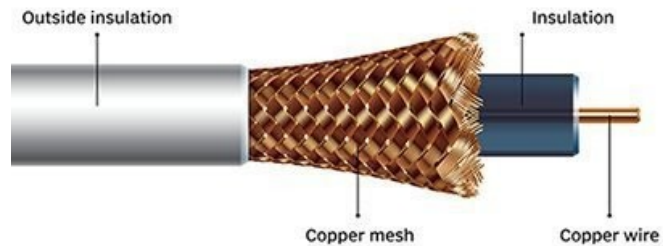


Video

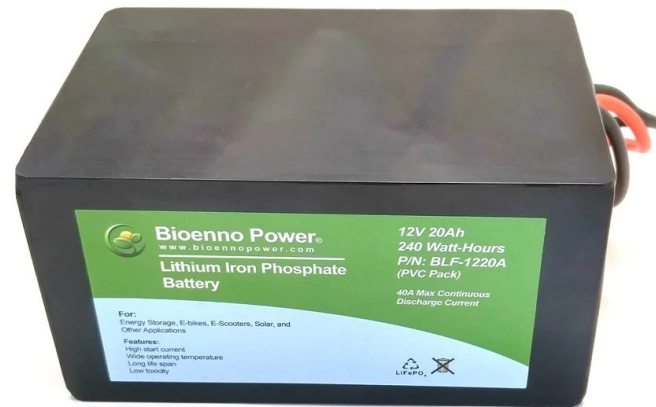
Standards

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

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



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

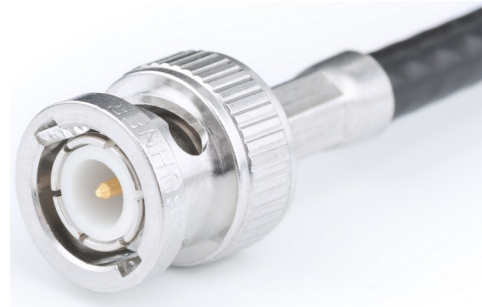
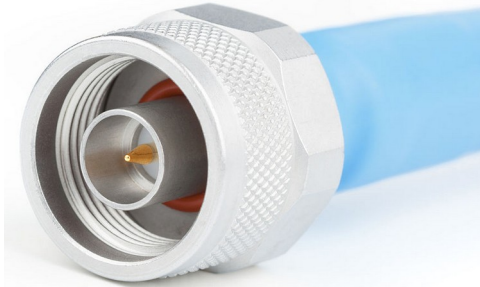


Video

Standards

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

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



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



Video

Standards?

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

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



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So many to choose from!

There are even more physical options to choose from!

- **Microphone:** 3.5mm TS/TRS? 1/4" TS/TRS? XLR? "8-pin round" Aviation? 8 pin modular? 6 pin modular? What pinout?
- **Audio out:** 3.5mm TS/TRS? 1/4" TS/TRS?
- **PTT:** On the mic connector? 3.5mm TS? 1/4" TS?

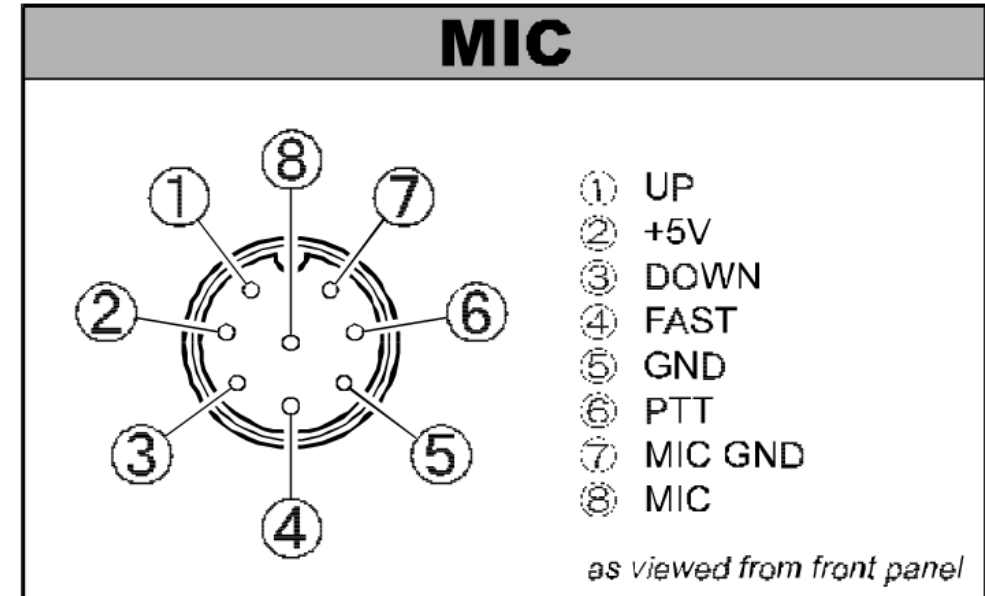
Video

The problem is...

Heil Pro 7 Headset:



Yaesu FT-920 Microphone pinout:



Video

The solution?

Heil Pro 7 Headset:



Heil AD-1-Y Adapter:



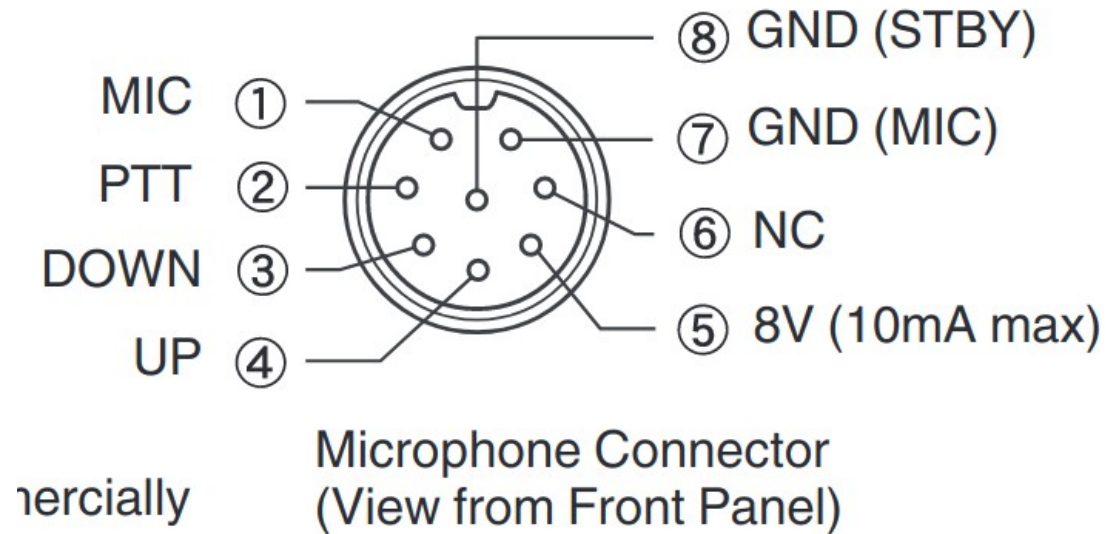
Microphone pinout:

MIC	
①	UP
②	+5V
③	DOWN
④	FAST
⑤	GND
⑥	PTT
⑦	MIC GND
⑧	MIC
<i>as viewed from front panel</i>	

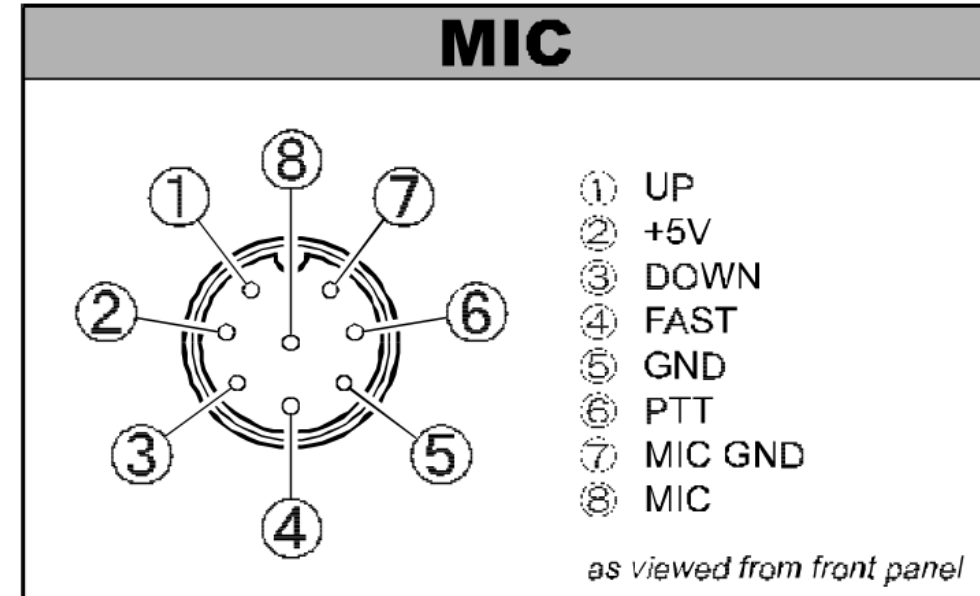
Video

But, I've got a Kenwood too.

Kenwood TS-890S Microphone pinout:



Yaesu FT-920 Microphone pinout:



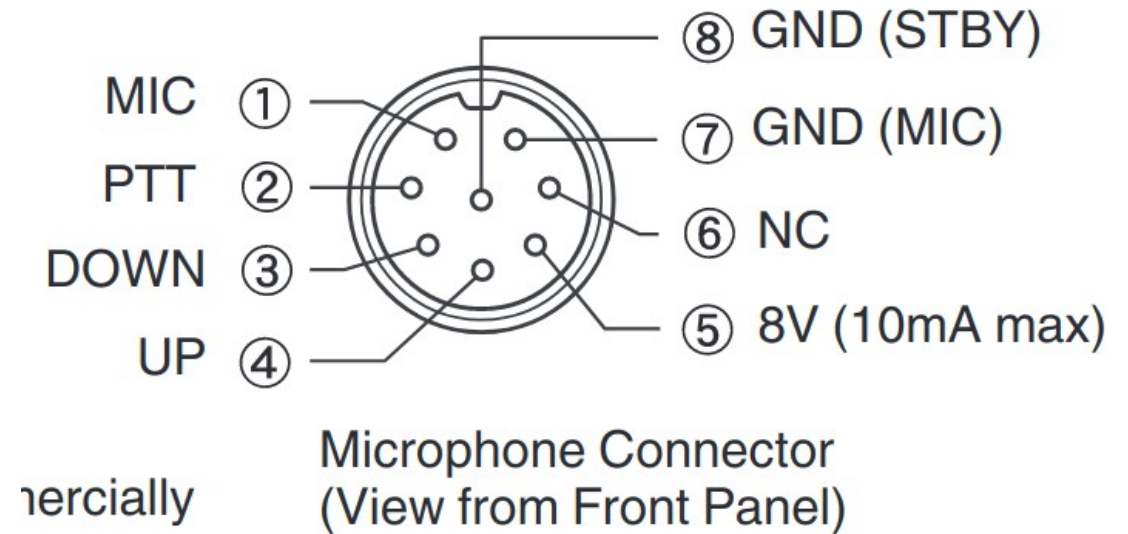
Video

But, I've got a Kenwood too.

Heil Pro 7 Headset:



Kenwood TS-890S Microphone pinout:



Video

Bob has me covered...

Heil Pro 7 Headset:



Heil AD-1-K Adapter:



Microphone pinout:

- ⑧ GND (STBY)
- ⑦ GND (MIC)
- ⑥ NC
- ⑤ 8V (10mA max)

Connector
(Front Panel)

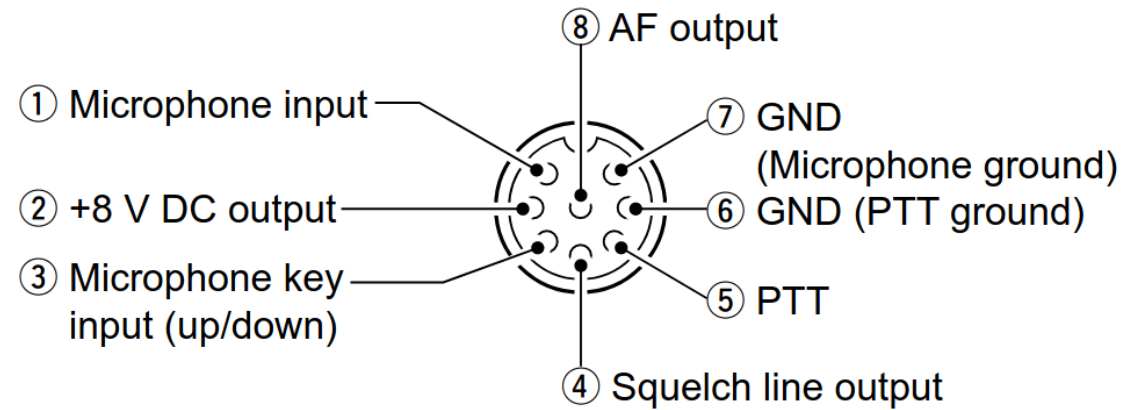
Video

What about Icom?

Heil Pro 7 Headset:



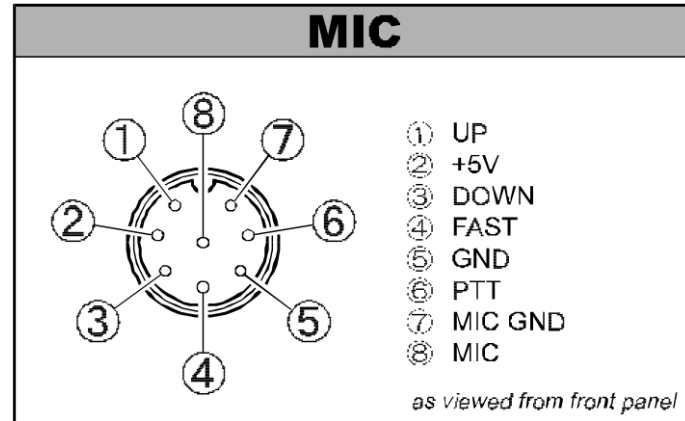
Icom IC-7300 Microphone pinout:



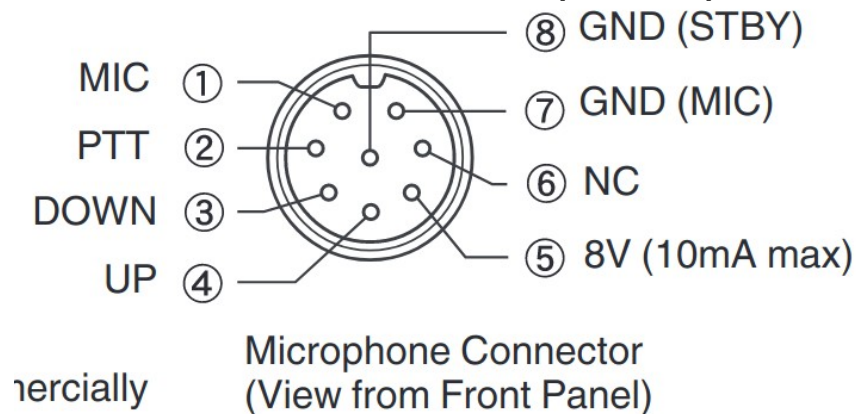
Video

Same connect-- oh... Never mind...

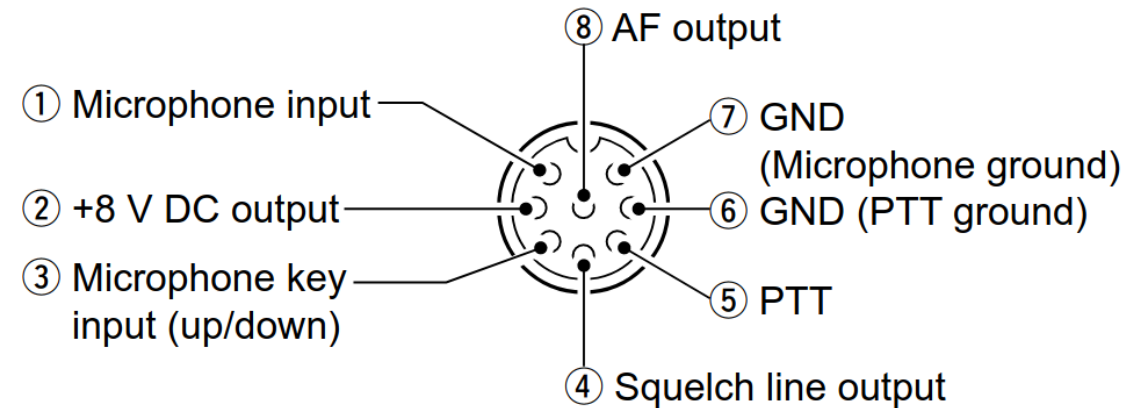
Yaesu FT-920 Microphone pinout:



Kenwood TS-890S Microphone pinout:



Icom IC-7300 Microphone pinout:



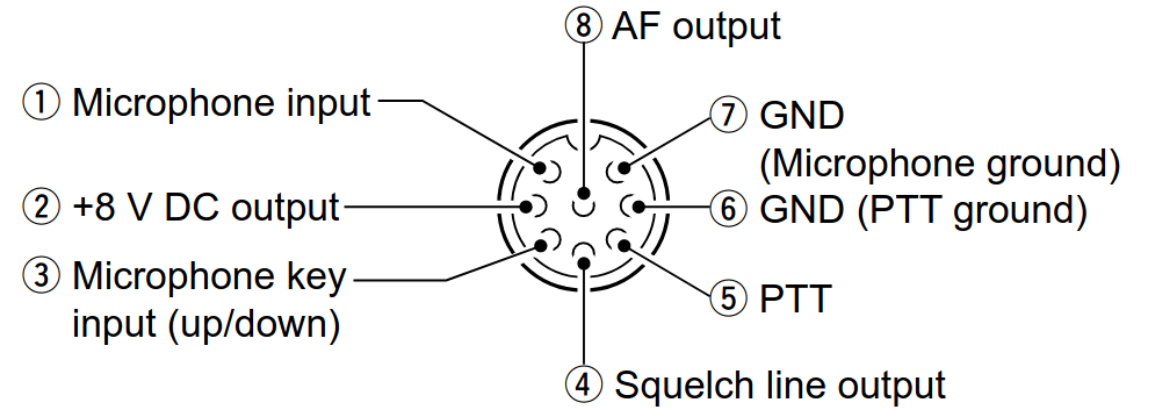
Video

What about Icom?

Heil Pro 7 Headset:



Icom IC-7300 Microphone pinout:



Video

Bob *still* has me covered...

Heil Pro 7 Headset

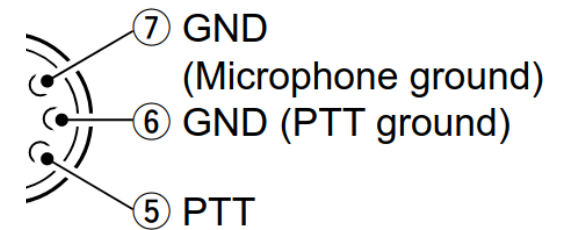


Heil AD-1-iC Adapter:



one pinout:

AF output



Squelch line output

Video

But, wait a minute...

Heil Pro 7 Headset



Heil AD-1-iC Adapter:

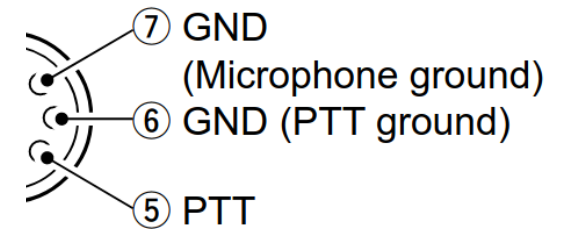


Heil P7-IC-ELEM Microphone Element:



one pinout:

AF output

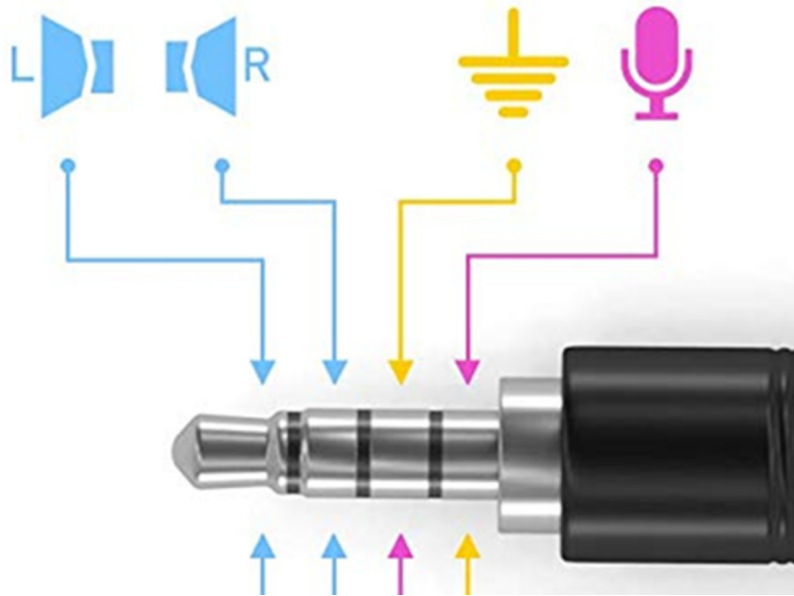


Squelch line output

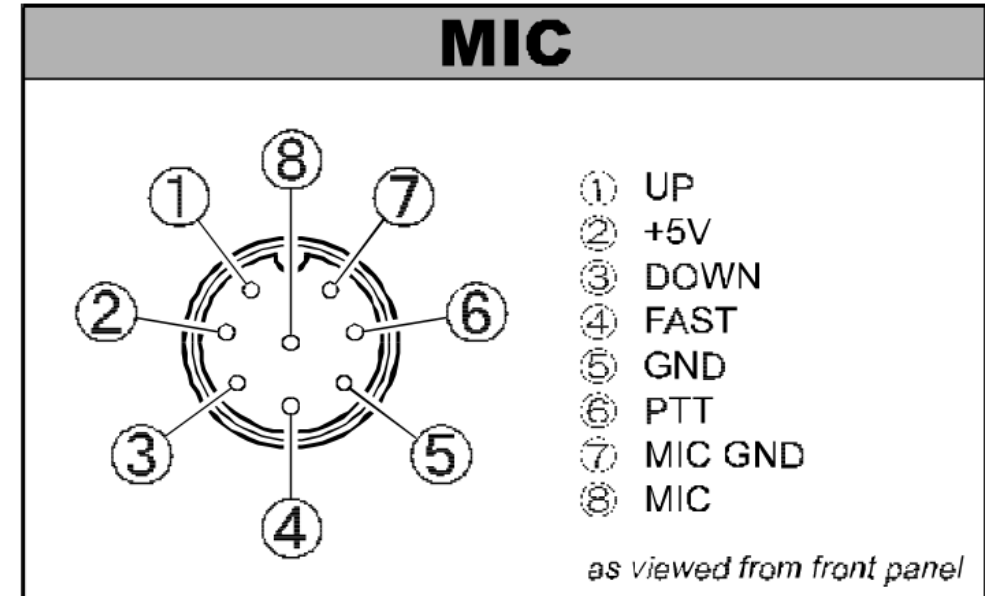
Video

Another headset,

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



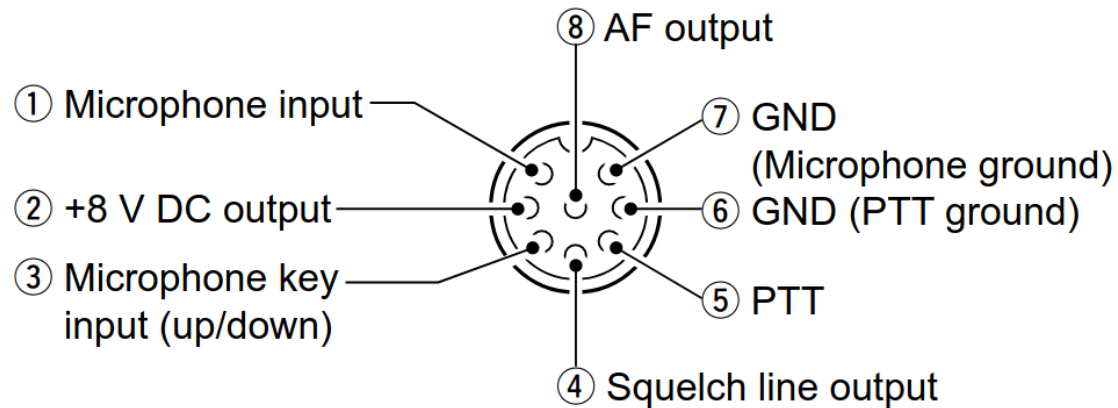
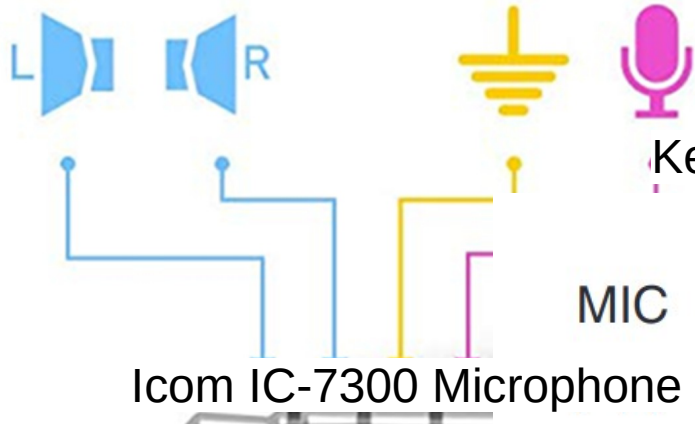
Yaesu FT-920 Microphone pinout:



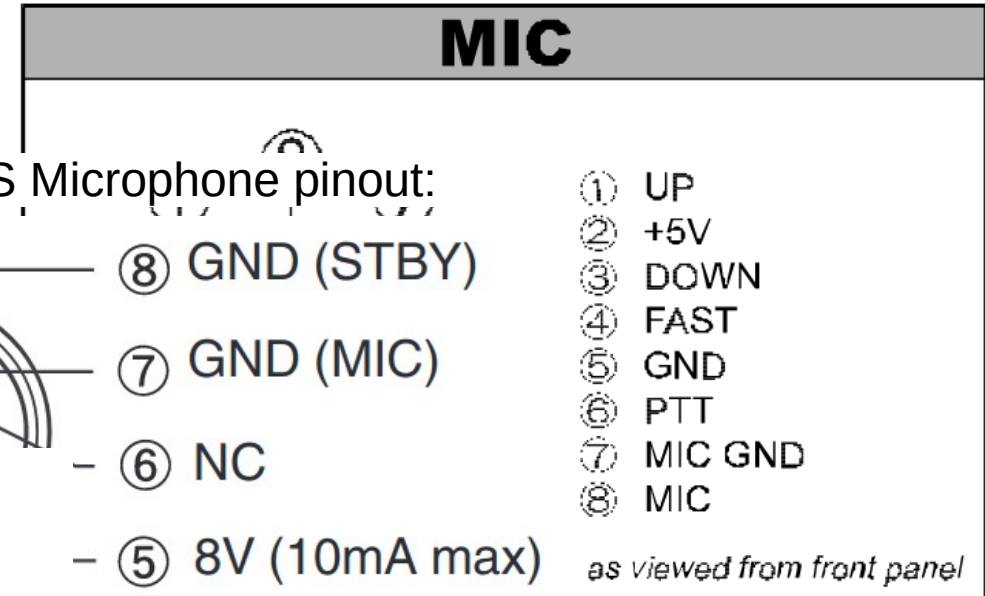
Video

Another headset, 3 more adapters...

CTIA "PC Gaming Headset"
or "Mobile Phone" pinout:



Yaesu FT-920 Microphone pinout:



Kenwood TS-890S Microphone pinout:

- ⑧ GND (STBY)
- ⑦ GND (MIC)
- ⑥ NC
- ⑤ 8V (10mA max)

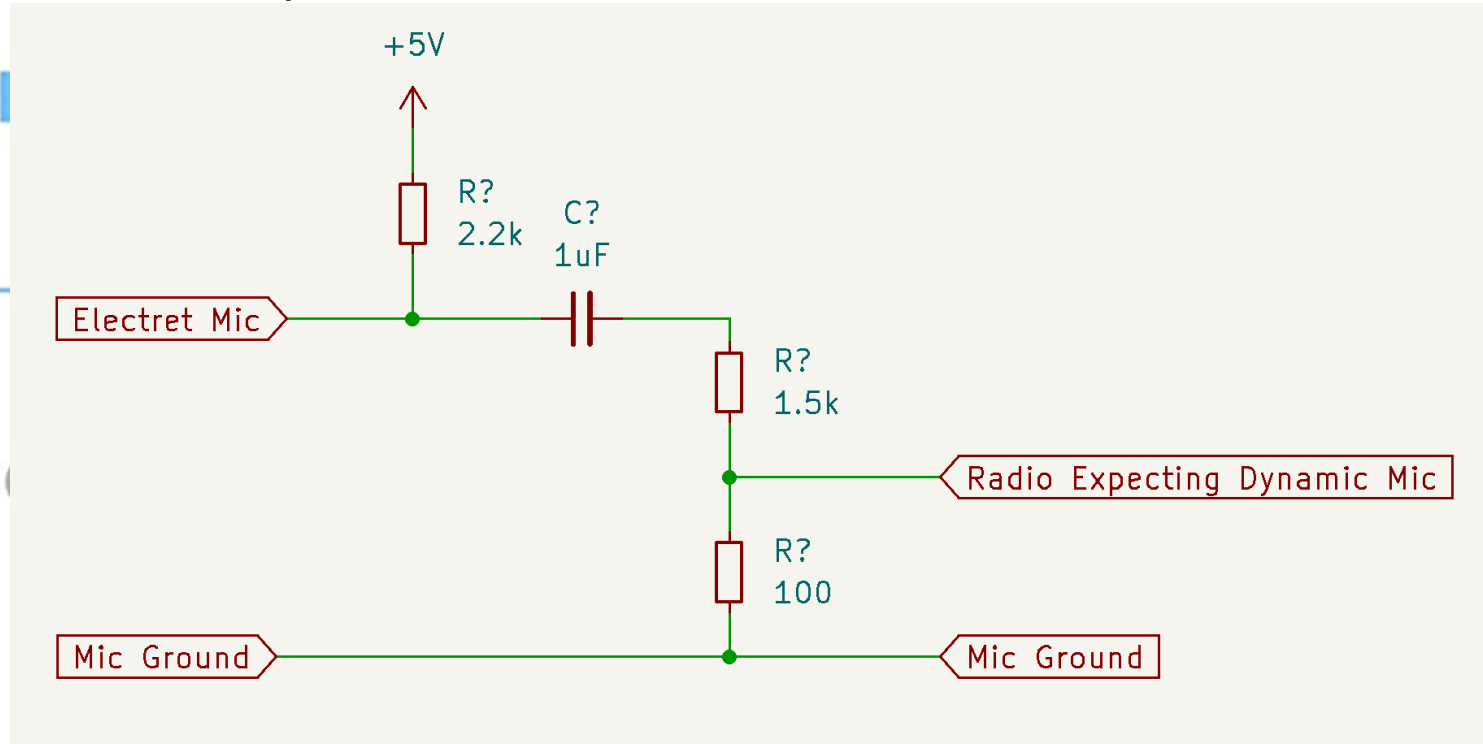
connector
(Front Panel)

Video

“Your audio is distorted!”

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

Yaesu FT-920 Microphone pinout:



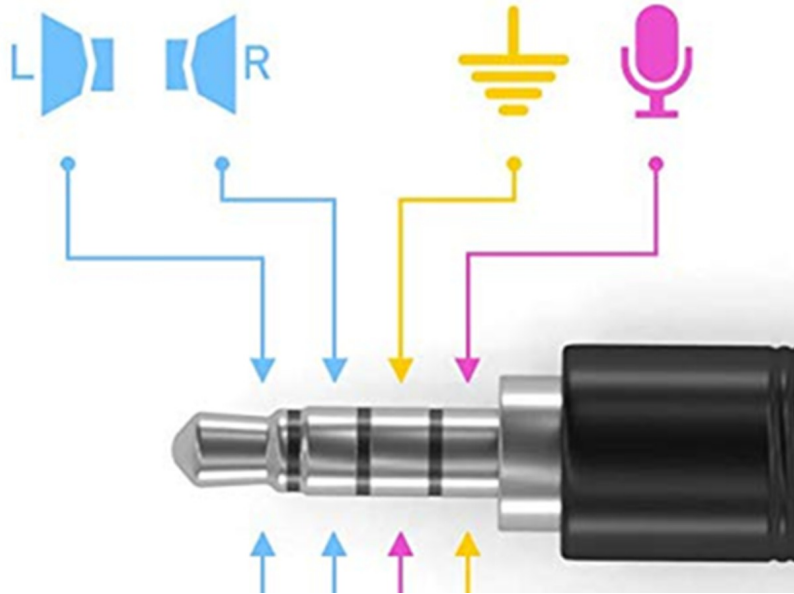
UP
+5V
DOWN
FAST
GND
PTT
MIC GND
MIC

viewed from front panel

Video

Which 3.5mm TRRS was that?

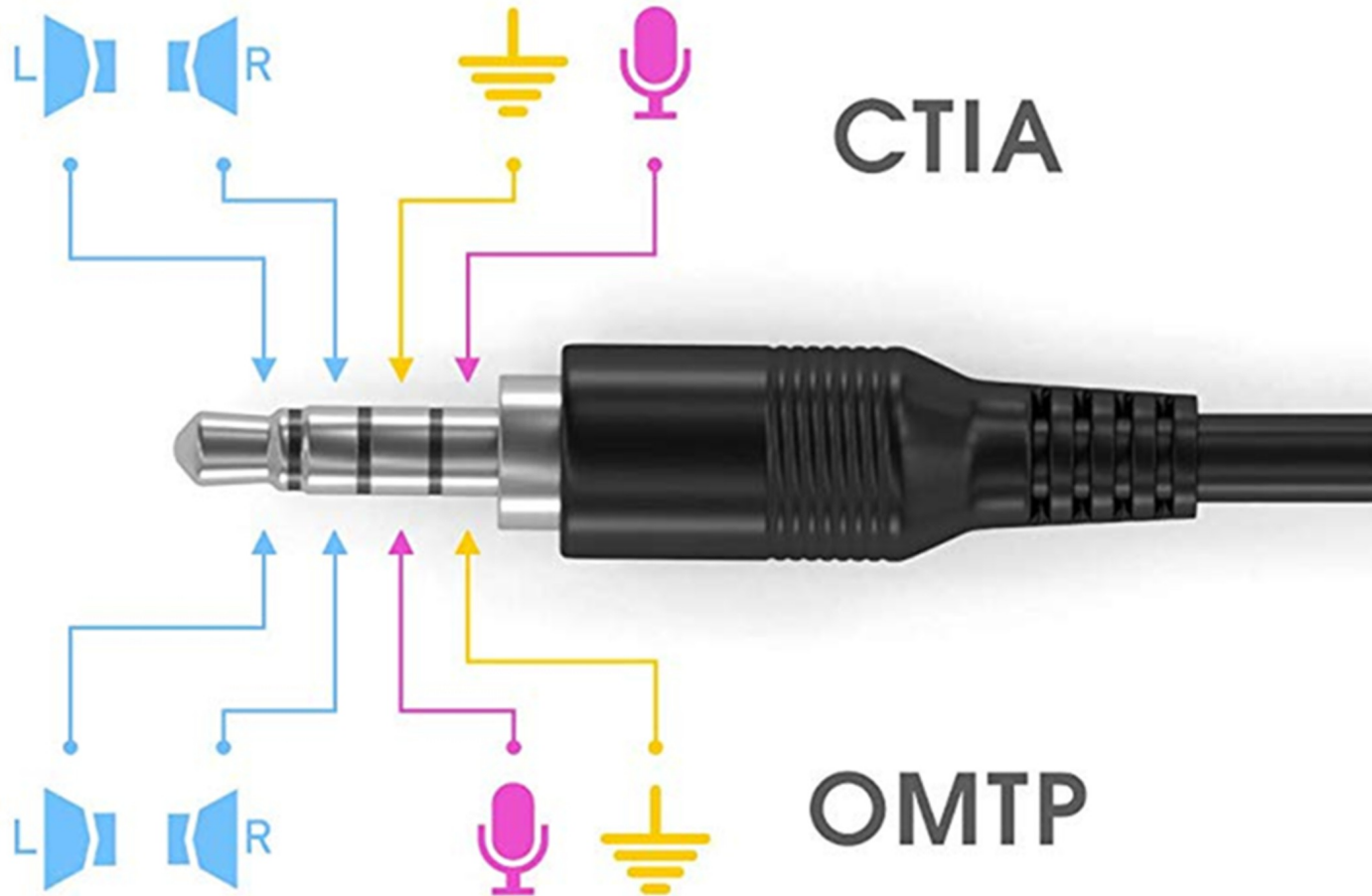
CTIA “PC Gaming Headset”
or “Mobile Phone” pinout:



Video

Which 3.5mm TRRS was that?

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



Video

Your Adapter Game is strong.

This is quickly getting out of hand.

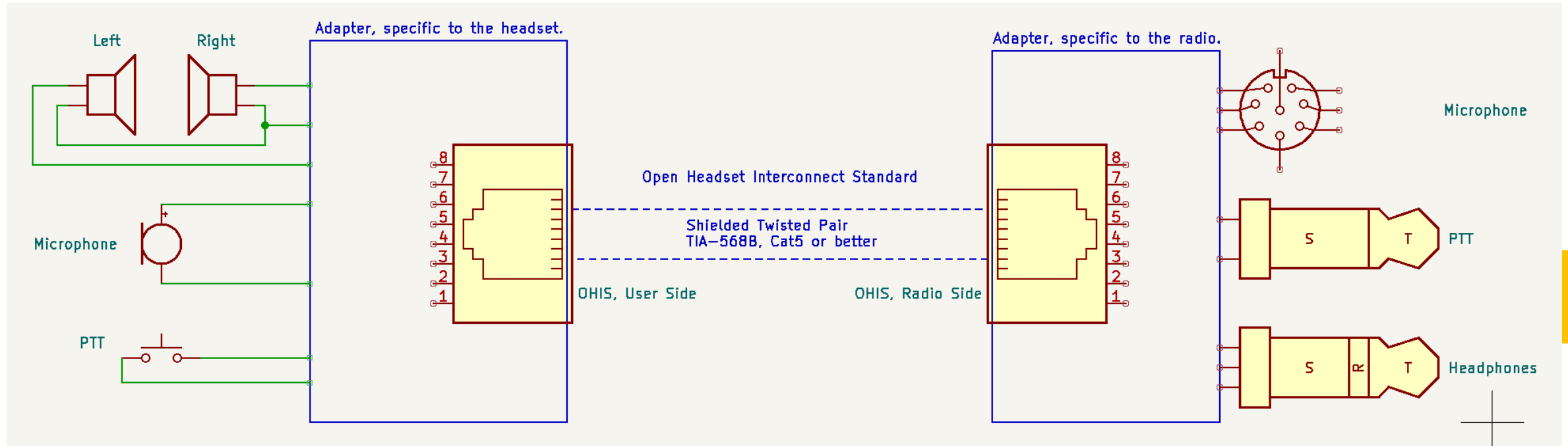
It's a full mesh of adapters, from every different headset to every different radio.

How do we address this?



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

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 pairs are on is important.

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

Video

Technical Summary

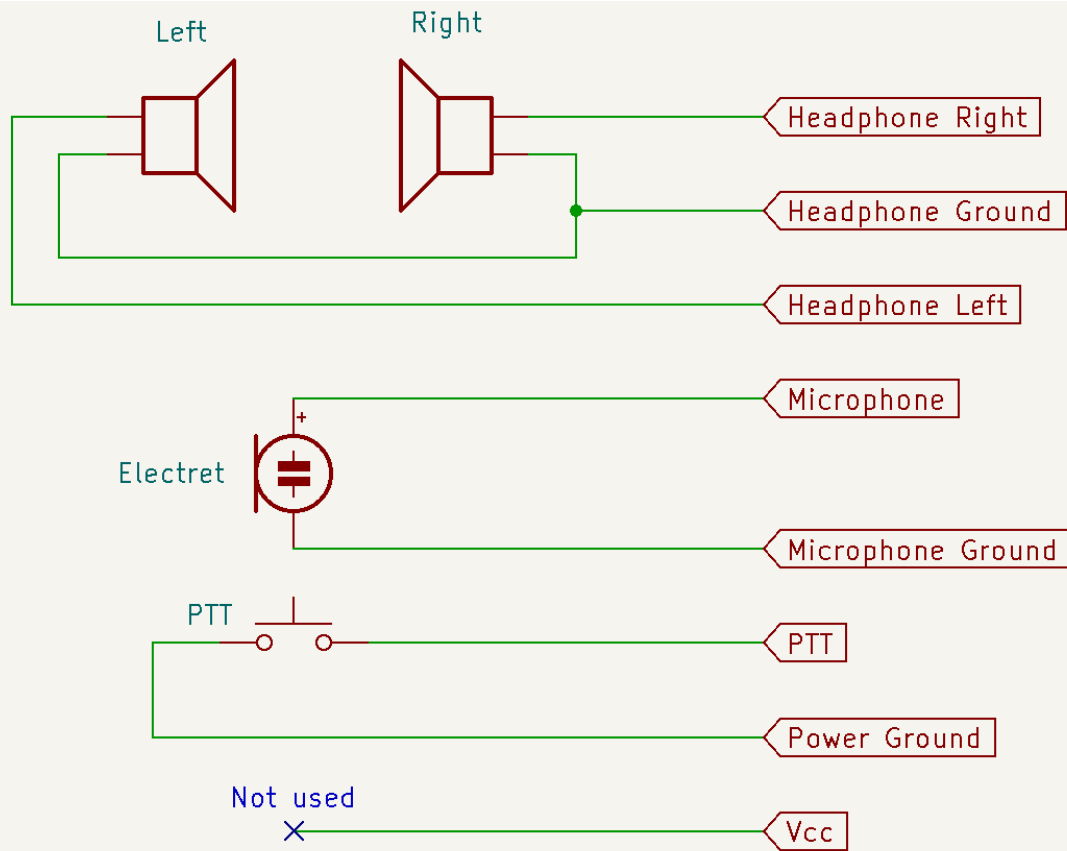
Electrical:

- **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.

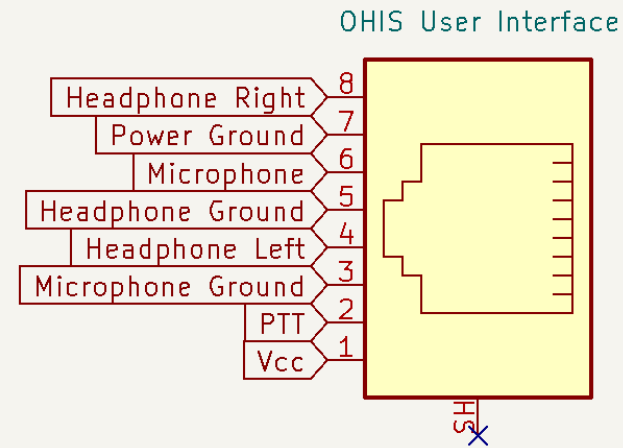
Video

Technical Summary

Pin-out:



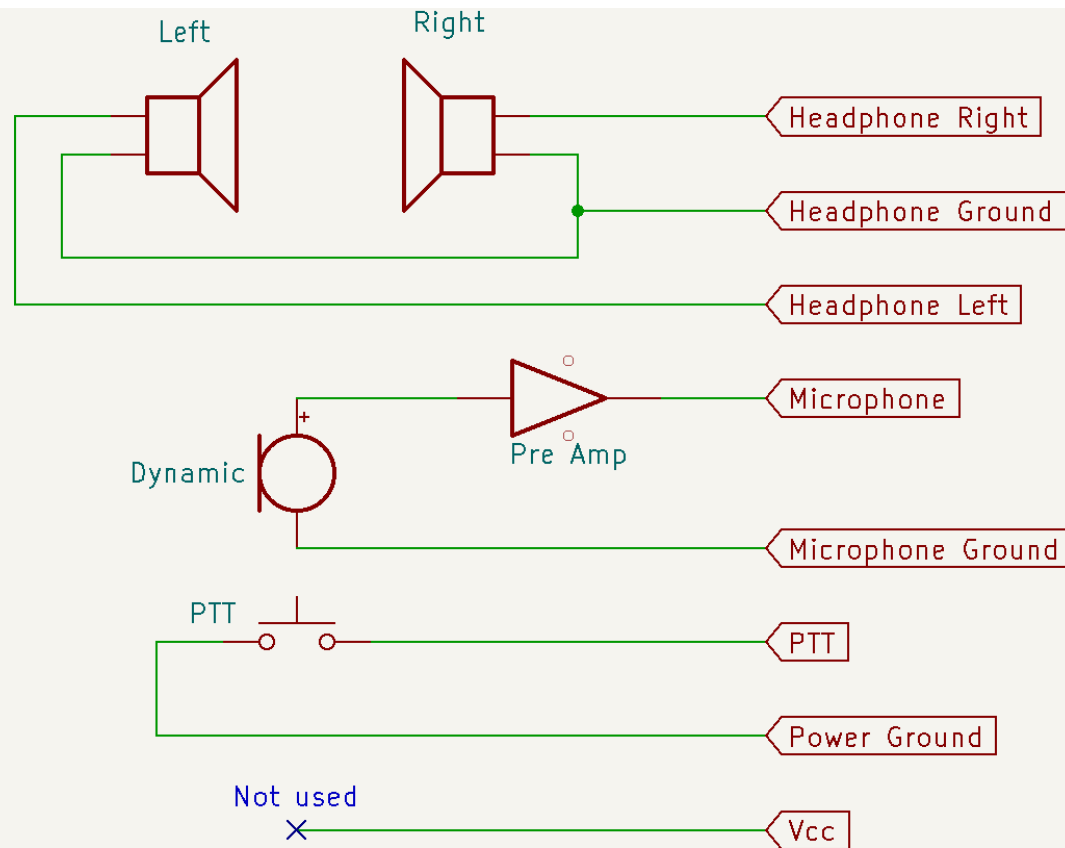
Simplest OHIS User Adapter:
Electret Mic Element



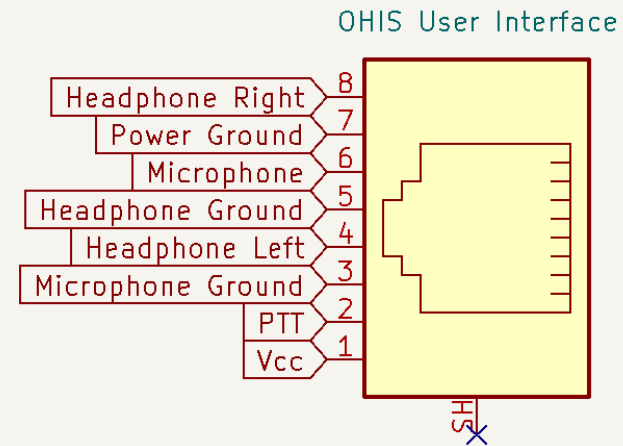
Video

Technical Summary

Pin-out:

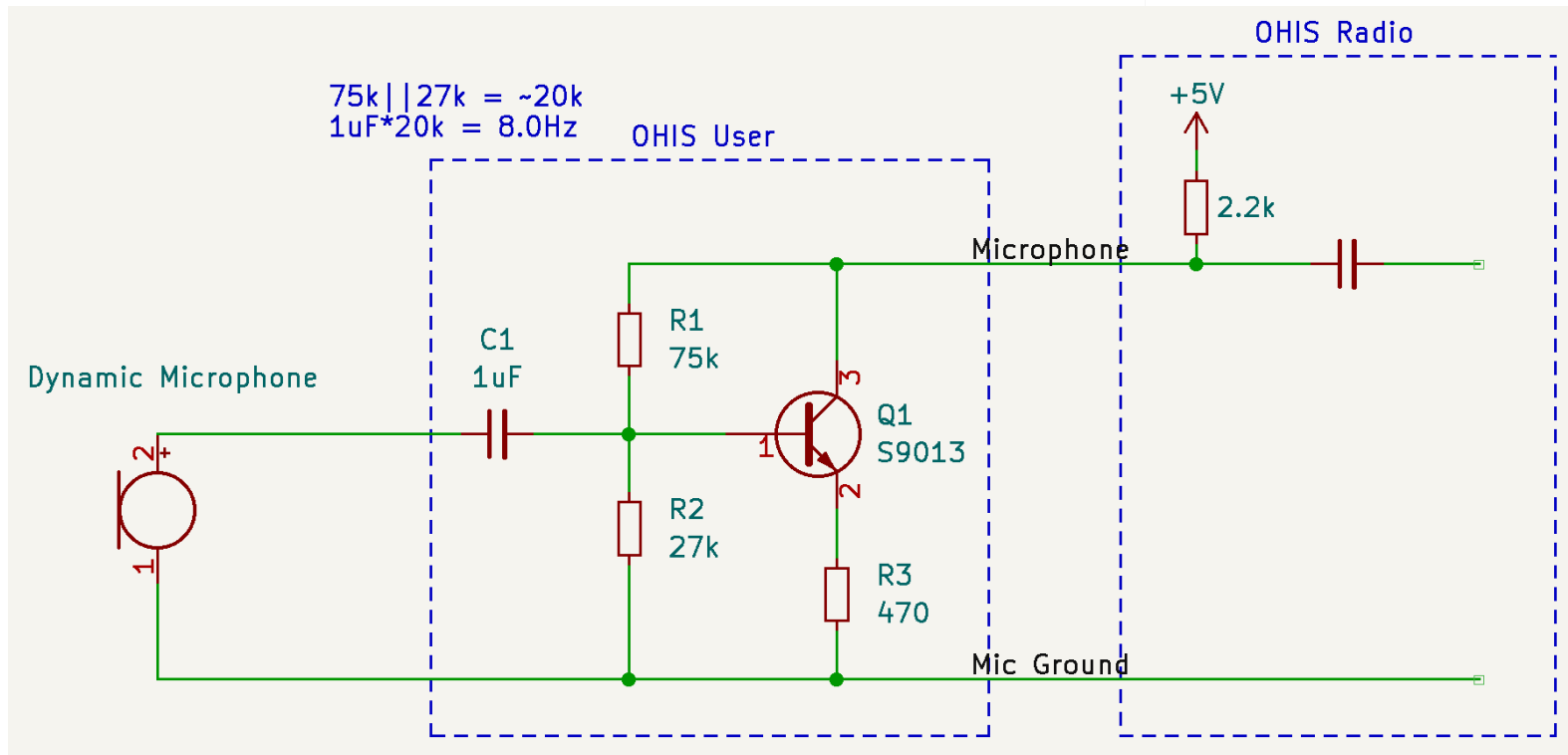


OHIS User Adapter:
Dynamic Mic Element



Video

Dynamic Mic Preamp



Video

Technical Details...

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



Video

When is OHIS useful?

- When you have several different radios and headsets.
- When you operate in a shared environment and users have their own (different) headsets.
 - Examples: Field Day, club shack, or an Emergency Operations Center.
- 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.

ahem



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?

- Open is how we get out of this mess.
- Halibut Electronics needed to solve this problem for future products.
- 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



Video