<div align="center">

Coati Console Project

General construction guidance.

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There are many ways that these consoles could be built while sticking to the same design specifications and maintaining interoperability between units.

This document takes you through the generic processes required in putting together a console to our design spec. If you wish, you may skip this document and refer instead to our specific assembly instructions for building a console using our recommend components.

The basics

Each console consists of the following stages: a floor input that is routed via a signal hub to two independent input channel selection switches. The floor signal is one of four signals routed to these switches from the hub. The other three are language relay buses that enter the console via the connections for the interlink cables which daisy chain all the console in use.

The output of each of the two input selection switches is then routed to two headphone pre-amp modules (power must be also supplied to the pre-amps). The pre-amp modules may have built in volume controls, or be supplied separately which makes it easier to locate the control where desired on the console. If separate volume controls are used, they should be placed in the signal path before the pre-amps/ After the pre-amps, the amplified output is routed to stereo headphone jacks built into the consoles enclosure.

That's it for the input stages. Now the output stage consists of a microphone socket on the front of the console. It could be ¼" mono jack or and XLR depending on your needs but we recommend a combo socket that provides the flexibility of accepting either option. From the socket the signal is taken by the shortest possible route to a microphone pre-amp module (which also requires power). If the pre-amp does not have a built in volume control, a potentiometer must be added {before or after?}

After the preamp the signal goes into the input of a two or three position switch. The second input is the floor signal from the signal hub. The switch allows the user to choose which signal goes to the next stage, either the amplified mic signal or the floor signal. Using a three position switch gives a third option, no input signal, effectively providing a way to switch off the microphone if the microphone doesn't have it's down switch.

After this switch the signal goes to the output channel selection switch, but the signal is also diverted to the VU meter at this point in order to provide a visual indication of the audio levels and allow for adjustment if required. The output selection switch is a four position switch like the two input selection switches mentioned earlier. However there is one input and four outputs. Three of the outputs go via the signal hub to both the interlink cable connection, and also a separate set of four audio outputs that are used for transmission of signals to the people needing to hear the interpreters. The fourth of these connectors is connected directly to the fourth output on the output selection switch as the forth bus is local only and not shared to the other consoles via the interlink cable.

The signal hub has been mentioned several times. This represents to routing of the signals paths in an organised fashion. The hub deals with four signals, the floor and three shared buses. All of them have a path to input selection switches, the console interlink connectors and output transmission ports, and all but the floor signal are also connected to the output select switch. The floor signal must also gets routed to the two or three way 'mic/floor' switch and it might as well do this via the hub too.

There are many ways this 'hub' function could be achieved. You could for example have a tangled mass of wires all soldered to the same places on the rear connectors etc. We strongly recommend the use of JST (Japanese Solder-less Terminals) or similar, and vero strip PCB. The hub can also useful provide central power rails for all the modules requiring power. You can see how we built these hubs by referring to our specific assembly instructions based around the use of specific components and modules.
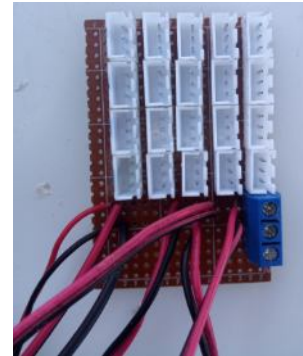
We briefly mentioned the power required by the three amplifier modules. This can be supplied with an external power supply or internal. External power supplies may be the most convenient. If all you modules have the same voltage requirement then great, that simplifies things. If not then you will need some kind of DC to DC conversion or due supplies. Whatever you do to provide power, it must be a clean regulated supply to ensure it does not introduce noise. An on/off switch may be useful, or it may be considered another control that might get played with by mistake. After all, if you need to power the unit down, it could be unplugged. Whether you include a switch or not, you might want to include a changeable fuse and a reverse polarity protection diode, just in case there are some odd power supply units mixed in with the correct ones, or maybe somebody is trying to jury rig a connection to a car battery etc.

Console enclosure

Having described the component parts of the console, lets consider the case into which the components will be assembled. Lets start with some layout considerations as they may have a bearing on the choice of case and how the actually process of assembly is tackled.

The various connectors and switches will need to be fitted in the case and laid out in a sensible fashion. We would suggest that the headphone and microphone sockets should be on the front face of the console. The interpreters may well want to use their own headphone and it's best if they have easy access to the socket without them rooting around in the cables at the back. It makes sense to have the headphone sockets on the far left, and right and place the microphone in the centre.

The connectors for the console interlink cable and for the transmission output ports, should be at the back, either on the rear face or the very back of the top panel. The power socket (and power switch if you choose to fit one) could also be on the rear or back but it might be a better idea to put them on one the side panels so it's easier to check the units are plugged in, or unplug them, without disturbing the i/o cables at the back.

The headphone volume controls should be placed near the headphone sockets. They could be placed on the front face but we'd recommend against that and suggest the top panel is a much more ergonomic location and hopefully less prone to damage in transportation. Also placed on the top panel should be the two input selection switches, each placed in close proximity to the related headphone volume control on the left and right sides of the console so it is obvious to the interpreters which controls are theirs.

The output related elements should be placed in the centre of the top face of the console: the output channel selection switch and two (or three) way floor/mic send switch. The VU meter can also be placed somewhere along this centre line. One notable exception is the microphone level control. Logically it make most sense to place it near the microphone socket, however our experience suggests that steps should be taken to discourage interpreters from playing with this control, and therefore we'd recommend either having some method to recess it or distinguish it from the headphone controls etc.. or perhaps place it out of the way towards the back somewhere. This way it will hopefully only be adjusted by somebody who knows what they are doing.

Another important consideration about layout are packing and transportation considerations. In order to reduce the chance of damage to switches etc during transportation, we recommend that all the knobs and switches be placed on a single face of the console, the top face. We also recommend that they be positioned in such a way as to ensure they do not touch each other when two consoles are placed together with the top face laid against each other. Stacking the consoles in this way will minimise packing space and help protect them from damage.

While on the subject of using less space, conventional box shaped cases will stack better and use less space than more esoteric shapes. However, wedges style cases do produce the most ergonomic consoles for the users and if carefully designed, it should also be possible to stack them with minimum wasted space when packing for transport.

Case construction

Plastic is the obvious choice for cases, especially fancy shapes, but obviously metal cases may be more durable and also less prone to interference due to being fully shielded. You can however also fairly easily shield plastic cases by gluing aluminium foil inside.

You could use readily available cases or build your own. 3D printing may be an option if you are in no hurry and not mass-producing. The maximum footprint of many home 3D printers is around 200mm square, which is just about big enough. It will take an insanely long time to print, you can expect it to use a great deal of filament too, probably a quarter of a 1kg roll at least. None-the-less, 3D printing should still cost less than most a commercial enclosures, and you get to incorporate all the holes etc for switches and connectors etc, rather than have to drill them yourself. You could do fancy stuff like recess the microphone gain control knob, even have raised or embossed style labelling of ports and controls. Even if you decide not to 3D print entire cases, it might still be a good option for producing panels for the controls and ports.

There are other ways to build cases. For our first boxed prototypes we build cases from aluminium composite board, two thin layers of aluminium sandwiching 2mm of plastic sheet. It's easy to cut and drill and can even be scored heavily on one side then bent. You probably wont end up with the most professional looking console cases but it works.

Another DIY option is to repurpose cases from redundant equipment, perhaps a good way to save money for some, but almost certainly a lot more work than you might at first imagine. We are considering doing this will some of the dead ALIS consoles as although they are bulkier than we would like, the cases are essentially free and going to waste.

Commercial Options

Here are some examples of potentially suitable commercially available enclosures. Hammond seem to be a common manufacture https://www.hammfg.com. Others include Bud Industries https://www.budind.com and Retex https://www.retex.es/en/

This one found on ebay in the UK is under 15 euros. It would be better if it were wider than it is deep, it's hard to beat at that price and everything should fit inside with a bit of a squeeze. They should stack together fine if the controls are placed so staggered when another console placed 69 style on top. https://www.ebay.co.uk/itm/192547590281
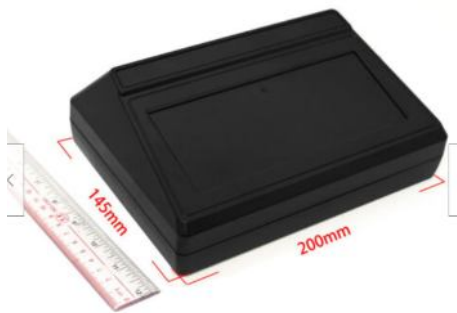
This one is a little wider and with more volume generally, about the same size as our first boxed prototypes. Probably doesn't stack well. It is about 25 euros excluding shipping, https://www.ebay.co.uk/itm/333512050087

This one is very similar to the ALIS console, but a little smaller. It has plenty of volume inside but is probably bulkier than necessary. The price is about 30 euros (excluding shipping) https://www.amazon.com/BUD-Industries-PC-11495-Plastic-Natural

This RETEX is almost certainly identical to the ALIS. Cost over 60 euros https://cpc.farnell.com/retex/33020103/sloped-console-grey-268x117-5x185mm/dp/EN83071

This one, from Bud Industries, is about 35 euros (excluding shipping). Shape and size looks promising. https://au.element14.com/bud-industries/pc-11493/enclosure-desk-top-plastic-gray/dp/4618130

See also https://au.element14.com/bud-industries/pc11491/enclosure-sloped-desktop-abs-grey/dp/2473219

This one is plastic and metal. Size seems good. However the price is probably over 50 euros once shipped so not a good deal. https://es.aliexpress.com/item/2011332422.html
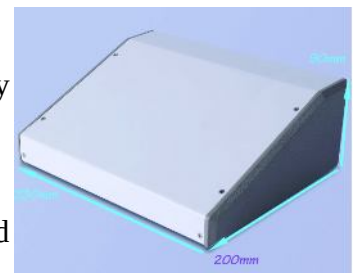
This supplier in turkey (EU) https://www.altinkaya.eu/d seems to have a good range of promising looking products at surprisingly good prices, some under 20 euro before tax and shipping. https://www.altinkaya.eu/desktop-enclosures/52-466-dt-130#/33-color-https://www.altinkaya.eu/sloped-modular-metal-enclosures/164-164822-mm-239-10#/724-color-natural_anodized https://www.altinkaya.eu/sloped-modular-metal-enclosures/158-164810-mm-195-15#/723-color-black_powder_coated

Another supplier, UK based https://evatron.com/news/desktop-enclosures/

Appendix

floor input

power input
and switch

console interlink ports

local transmission outputs

Ch1 Ch2 Ch3 signals   floor signal

floor signal

signal hub
+ power rails

Ch1 Ch2 Ch3 signals

Ch1 Ch2 Ch3 signals

floor signal

floor signal

Ch1 Ch2 Ch3 signals

Ch1 Ch2 Ch3 signals

input switch
4 way

output switch
4 way

floor signal

4th channel
local only tx signal

input switch
4 way

mic / floor
switch

mic or floor signal

headphone
amplifier module
and level control

mic pre-amp
module(s)

VU meter

headphone
amplifier module
and level control

headphone
jack

level
control

xlr/jack mic input

headphone
jack