

N-F-P Line Stage, Order Information and Cost Breakdown (updated)

Whenever possible I've tried to limit the number of vendors to save on shipping charges. If you have favourite parts from other suppliers by all means use the parts you think best.

I've converted prices to approximate Canadian dollars to help with budgeting.

Aikido board from glass-ware.com:

<http://glass-ware.stores.yahoo.net/aikido12vac.html>

Don't forget to choose the 12 volt version of the parts kit with whatever resistors you fancy (carbon film or metal film). Choose the tubes if you wish. See below.



Aikido 12Vac

Item# Aikido-12Vac

\$29.00

Four Vacuum Tubes:

Part Kit: **resistors, capacitors, rectifiers, tube sockets,**

standoffs:

A3-Mini Stepped Attenuator:

Selector switch & PCB for switching between 3 input

sources:

Resistor pack for A4-

Mini:

Selector switch & PCB for switching between 3 input

sources:

Availability: Usually ships in 2-3 business days

Product Description



Introducing the new Aikido 12Vac PCB and part kits. The key advantage of the Aikido 12Vac is that it can be operated from a lowly wallwart power supply, yet develop a fairly high-voltage B+ for the triodes.

Where the typical tube-based line-stage amplifier requires a B+ of 200V to 400V, the Aikido 12Vac can get by with only a B+ voltage of 80Vdc with 6DJ8/6922/E88CC tubes; or 120Vdc with 12AU7/6CG9/6CG9A tubes. The heaters are all placed in series and this

Total with 4 JJ E88CC tubes including shipping= US \$153.50

\$CDN with HST and customs clearance fee

Total

\$243

eBay Chassis Details:

I've found eBay vendor *Chenwang 1986* reasonably reliable.

<http://stores.ebay.com/chenwang1986>

The chassis I purchased was model BZ3205.



<http://www.ebay.com/itm/BZ3205-Full-Aluminum-preamplifier-headphone-DAC-decoding-Enclosure-AMP-case-box-/252431478516?hash=item3ac616aef4>

The AC inlet is included with the chassis. Be sure to specify the one with the fuse drawer. In fact email the vendor and send them this picture to be sure:



Price: US \$37 + \$29 for shipping (approx. \$90 Can.)
+ about \$15 customs clearance and HST

Total \$105

I also purchased the knobs from the same vendor. Be sure to specify silver if that's the colour you want, black is available as well.



<http://www.ebay.com/itm/Diameter-38-handle-diameter-25-high-29-all-aluminum-solid-audio-volume-knob-/252125230227?hash=item3ab3d5b493>

Price: US \$9 each including shipping

If you are buying a chassis at the same time you can probably strike a deal and get a pair for \$9 (approx. \$12 Can.)

Total \$12

A note about the jacks required for the N-F-P: They must be insulated from the chassis to avoid hum pick-up due to ground loops.

The jacks shown in the line stage I built were purchased from a different eBay vendor. I got 10 pairs for US \$19.50 including shipping. They were advertised as Teflon but of course they were not Teflon for that price, I suspect the insulator is PVC.

If you are a clumsy at soldering you might want jacks that do have a Teflon insulator in which case you'll have to pay US \$7.50 per pair. The jacks shown below are suitable for panels up to 5mm thick.



<http://www.partsconnexion.com/product7494.html>

I purchased some jacks (for another project) from Chenwang 1986. They aren't Teflon either (nor are they advertised as such) but I prefer this style as they mount from inside the chassis. Wires can be soldered to the jacks first before they are assembled to the chassis. These jacks are suitable for panels up to 3mm or so thick (OK for the chassis chosen). I've sized the holes in the rear panel to take either of the jacks pictured.



<http://www.ebay.com/itm/one-pair-original-US-CMC-816-RCA-Terminals-24-K-gold-Copper-RCA-socket-/252113960411?hash=item3ab329bddb>

Price: US \$8 per pair including shipping

If you are buying a chassis at the same time you can again probably strike a deal and get 4 pairs for about \$16 (approx. \$22 Can.)

Total \$22

Mouser Parts Order:

Mouser will sell in Canadian dollars and the prices include HST and any duties owing. Their shipping charge is \$20 for orders under \$100 and free for orders over that. If you and a buddy are building two line stages you can combine your orders and save on shipping. The same goes for getting your cabinet parts machined and laser engraved; combine and save.

My preference is to order online from Mouser as their telephone manner is sometimes a little abrupt.

Description and part no.	(Notes)	price \$CDN ea.	Quan.	Total
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CAPACITORS

667-ECQ-E2103KF	(grounding)	\$0.46	1	\$0.46
72-VY1102M35Y5UG63V0	(power sw. protection)	\$0.33	1	\$0.33

SWITCHES

112-R13-130A	(power)	\$3.60	1	\$3.60
105-SR2511F-43S	(input select)	\$6.15	1	\$6.15

FUSES

693-0034.3114	(0.5 amp Slow Blow 5x20mm)	\$0.42	3	\$1.26
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TORROIDAL TRANSFORMER

553-VPT24-1040	(25VA dual pri. & dual 12V sec.)	\$25.69	1	\$25.69
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IMPORTANT: If you use another transformer its secondary should not be rated for more than nominally 12 volts AC. Using a transformer rated for more than this could exceed the voltage rating of some of the filter capacitors.

VOLUME POT

688-RK27112A00CC	(Alps Blue Velvet)	\$20.30	1	\$20.30
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SOLDER LUGS

534-7311	(chassis grounding)	\$0.25	4	\$1.00
517-1634	(volume pot grounding)	\$0.20	1	\$0.25

GROMMETS

836-2240	(to dress up tube holes in top cover)	\$0.36	4	\$1.44
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RESISTORS

283-10-RC	10 Ω 3W (for grounding)	\$0.36	1	\$0.36
294-2.2K-RC	(2.2K Ω 1 watt, for LED)	\$0.33	1	\$0.33
281-7.5K-RC	(7.5K Ω 1 watt, for LED)	\$0.33	1	\$0.33
294-100K-RC	(100K Ω 1 watt, optional bleeder resistor)	\$0.33	1	\$0.33

660-MOS3CT631R510J	(51 Ω ohm 3 watt, R15 on board*)	\$0.31	2	\$0.62
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71-CCF2-J-1K	(1K Ω 2watt, R12 on board*)	\$0.28	1	\$0.28
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*Correct values for transformer specified above & with line voltages between 110 & 125 VAC

LED

604-WP469EGW	(2 Colour red/green top hat style)	\$0.68	1	\$0.68
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Hex Board Standoffs (only required if using low chassis above otherwise use ones supplied in kit)
 761-2100-440-AL-7 (4-40 x 1/4") \$0.25 5 \$1.25

Solder
 590-4900-35G (lead free with silver) \$7.76 1 \$7.76

Self-Adhesive Cable Tie Mounts
 514-08461 \$0.78 8 \$6.24

AC INLET (needed if not buying chassis from eBay)
 562-719-W-00/02 \$2.16 1

Shipping \$20

TOTAL (without AC Inlet) \$99

Total for all parts including shipping and taxes **CDN \$481**

Machining cost (cash and carry price): \$150 for one set \$120 each \$150
 for 2 or more if ordered at the same time (see PDF download for the
 machining prep for a way to save a little more).

Laser engraving cost (cash and carry price): \$15 each, \$10 for each \$15
 additional panel if ordered at the same time.

Grand total for all parts, machining and laser engraving except misc. (see below): **CDN \$646**

Miscellaneous Parts: source locally or where desired

Description and part no.	Quan.
4-40 x 3/8" or M3 x 10mm screws (may be 1/2" or 12mm long)	4
Nuts to match screws above	4
Flat washers for screws and nuts above	4
Small zip ties	~20
Twisted pair signal cable (shielded or unshielded)	~ 8 feet
Hook-up wire (various colors for grounding, LED wiring and AC connections)	~7 feet
Heat shrink tubing	
Clear nail polish (for locking screw & nuts)	

There you have it. I had hoped to bring it in for less than \$500 Canadian but \$646 dollars, shipping and taxes included, is what it takes to get a high value tubed line stage. Don't forget if you and a friend build two line stages you'll save on shipping, machining and laser engraving costs. You'll drop your cost down close to about \$600 per unit.

If there are any WoS fans in the USA contemplating this project the stronger US dollar means that your line stage will cost less than \$500 US.

Below you'll see a couple of inexpensive upgrade options for the output caps that I can recommend. A value of 1uF is sufficient. You may use larger value caps if you wish just check the size before you order to ensure it will fit in the space allotted on the board.



<https://www.audiyo.com/capacitors/film-audio/mcap-evo-oil.html>



http://www.partsconnexion.com/capacitor_film_obligato_gold.html

Note: The Obligato caps have a very thin plastic wrap over the metal barrel. The barrel is conductive. Don't allow the cap to contact other parts. Insulate the leads with sleeving or stripped off insulation. Better yet insulate the leads and cover the body of the cap in heat shrink.

The chassis I chose has an inside dimension of 310mm wide x 237mm front to back. I could have spent 10 or 15 bucks less and crammed things into a smaller one but I wanted to make the N-F-P easy to wire and avoid potential electrical interference issues. I have, in the past, tried to cram circuits into a too small chassis then kicked myself later.

The chassis offerings from many of the Chinese vendors on eBay often overlap. A chassis might be found for less than the one mentioned above. Many models seem to have a short production run and therefore sell out. Check the many vendors on eBay.

Another vendor I have used is: AQ Electronic Store. They seem reliable as well.

<http://stores.ebay.com/AQ-electronic-store? trksid=p2047675.l2563>

As of this writing AQ has a decent deal on rear mount RCA jacks.

<http://www.ebay.ca/itm/One-Pair-CMC-816-RCA-terminals-Amplifier-RCA-sock-Perfect-/111635613932?hash=item19fe0048ec>

The BZ3205 chassis I used is not available at AQ but they have the WA83 model that has the same foot print but is about 15mm higher and only costs about \$4 more.

<http://www.ebay.ca/itm/Full-aluminum-silver-amplifier-enclosure-WA83-chassis-AMP-box-325-70-248mm-/112146154709?hash=item1a1c6e84d5>

The front panel of the WA83 is 2mm thicker so a few minor changes to the front panel machining drawings will be needed.

If you buy a chassis that has a thicker front panel than 6mm (the BZ3205 has a 6mm thick panel) email me through the WOS site and I'll sort you out with a modification to the drawing.

AQ also has knobs available in their 'parts' section. Have a look if you wish, something might appeal to you.

Have a look around the various eBay stores that offer parts for electronic hobbies, you might see something that strikes your fancy. Just remember if you plan to use my machining drawings the more you diverge from them the more you'll have to change them and errors are more likely to creep in.