

## AQVOX Phono 2 Ci - part 1



[\[Italian version\]](#)

Product: Phono 2 Ci  
Manufacturer: [AQVOX](#) - Germany  
Price: 700 €  
Reviewer: [Werner Ogiers](#) - TNT Belgium  
Reviewed: April, 2006

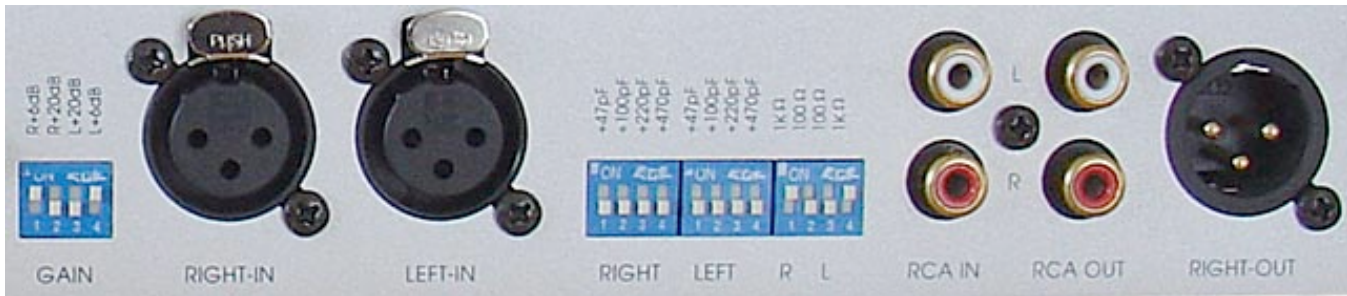
Phonostages are my pet audio components. The design of a really good MC preamplifier is an extremely challenging job: the tiny input signals are in the range of tens of nanovolts (60-80dB below the *nominal* output level of a moving coil): this is not about counting beans, it is about counting individual electrons. Small wonder then that often original and wonderful circuits are employed to extract the best from the vinyl record. Hence my fascination.

One or two voices in the industry pointed my attention to the unassuming box that is the subject of this article. This AQVOX Phono 2 Ci is, allegedly, 'a good one'. AQVOX is a young German manufacturer operating on the divide between serious consumer audio and professional studio gear, surely a position with an interesting perspective. The present portfolio includes this phonostage, a USB-enabled stereo DAC, and a stereo microphone preamp plus 24 bit / 192kHz recording ADC.

The main designer for AQVOX is [Carlos Candeias](#), who gathered some fame for his work on the upper-end [CEC](#) products. Most of Candeias' designs, AQVOX and CEC alike, prominently feature a transistor-based amplifier circuit dubbed 'LEF', or 'Load-Effect Free', something that is touted on the companies' websites with a curious mix of in-depth explanation and mystique. More on LEF in a later installment of this review.

## A Guided Tour

The AQVOX Phono 2 Ci scores exceedingly high on my interest-o-meter, going off the beaten path whenever and wherever possible. Count this: 1) switching power supply, 2) no loop feedback, 3) current or voltage input, 4) RCA and balanced in, 5) RCA and balanced out, 6) no IC opamps, 7) attractive pricing .. this is most definitely not a run of the mill RIAA preamp. In fact, the 2 Ci allows so many different configurations that it is more of a collection of phonostages housed in one box. The prospect of reviewing all of these thoroughly is positively daunting! That's why we split the work: in this first part you'll get an overview of the product and my listening impressions. In the second part of this review Mark Wheeler will put down his verdict, and I'll go into the technical details of this fascinating phono preamplifier.



Ignoring the balanced XLR inputs for a while the Phono 2 Ci is almost like a normal well-endowed phono preamplifier. DIP switches on the back are used to set gain, with choices between nominal (suitable for MMs), '+6dB' and '+20dB' (for MCs). In addition to this, per-channel rotary controls on the front panel give another stepless +0 to +10dB. Other banks of backside DIPs serve for cartridge load, with 100, 1000, and 47000 Ohms present, alongside capacitances of 47pF, 100pF, 220pF, or 470pF on top of a default 47pF.

The output is simultaneously present at unbalanced RCA connectors as well as truly-balanced XLRs. The unit is capacitatively coupled and thus the output is always free of DC and subsonic rumble. An additional, and quite steep, subsonic filter can be switched in and out of circuit at the front. Other things of interest, at the back, are a ground terminal that accepts bare wire, spades, and even banana plugs (but not the crocodiles used on e.g. Incognito-wired Regas or the Michell TecnoArm) and a button that lifts the internal ground connection of the amplifier, handy in case of hum problems.

And then there is of course that press button labelled 'RCA/XLR Input'...

...which allows one to connect a cartridge to the balanced XLR inputs, turning the AQVOX into a totally different animal. While the RCA inputs operate in standard voltage mode, compatible with any cartridge, the XLRs are *current* inputs, and should be used with moving coil cartridges only: a current-mode input presents a near-short to the cartridge, and works only properly when the cartridge impedance is low and resistive. Now this is not the only current-mode phonostage on the market (other examples are 47Labs, the various Dynavectors, the ESE Nibiru, Jean Hiraga's DIY design from the seventies, ...), but the AQVOX is to my knowledge the only one combining this principle of operation with a balanced input. Using the XLR inputs comes with the requirements of a

tonearm with suitable cabling and some care on behalf of the user: this is definitely a case where reading the manual pays off!

The front panel gain controllers are particularly welcome, for a multitude of reasons. For starters, many phono cartridges, and not just affordable ones, suffer audible channel imbalances. It is very nice being able to compensate for this close to the source. Then there is the confusing fact that a current-mode amplifier's effective gain depends not just on its circuit, but also on the cartridge's generator particulars. In other words, gain is more or less a surprise (see below for my experiences). Again, it is extremely nice to be able to trim gain closer to the desired value. And lastly, variable gain comes in as a necessity when directly connecting an ADC (analogue-to-digital convertor) to the phono stage. These days this is not so far-fetched as it seems: this may happen during LP-to-CD transfers (both my recording ADCs lack input level controls), when connecting to a serious AV-receiver (they often digitise the analogue input), or indeed to the Lyngdorf TDA2200 digital integrated amplifier.

### A Matter Of Balance

The AQVOX is one of the few phono stages offering a balanced input. While the number of preamplifiers employing this connection mode is growing (Ayre, MalValve, ..), the Phono 2 Ci is certainly the cheapest of the lot.



A balanced input exploits the fact that a cartridge does not need to be connected to ground to work properly. Cartridges can operate 'floating'. As they lack a center tap they are not truly balanced, but still, connecting a floating source to a true balanced/differential input brings benefits in common-mode hum and interference rejection.

For such a connection to be made the cartridge and tonearm cabling should not have any connection between any of the four cartridge pins and the ground. Most tonearms obey this rule, even when they are terminated in RCA plugs, but one notable exception is Rega: you can NOT use a standard Rega tonearm with the Phono 2 Ci in balanced/CI mode! If you want to do this the tonearm wiring has to be modified, [instructions](#) are available on the company's website. The same site also carries a growing [list of tonearms](#) that are known-compatible with the balanced inputs: during this

review I used an Incognito-wired Rega RB-300, an SME IV, and the Technics SL-1200 to good effect.

Ideally one re-terminates the tonearm cable in XLR plugs, but for short tests AQVOX can provide an RCA-to-XLR cheater cable: a contraption that connects the + and - phase of the XLR to the inner and outer contact on a female RCA. Note that with such a setup the RCA connector is entirely floating at -500mV and, if it has a metallic body, care should be taken that it never touches any other metal part. I used such a connector for this review, probably compromising sound quality a little bit.

### Current Flows

The other unique selling point of the Phono 2 Ci is its current-mode input for moving coil cartridges:

In normal operation the output *voltage* of a cartridge causes a preamp's input device to generate a current proportional to this voltage. This current is later on converted into another, higher voltage.

In current mode the input device presents the cartridge with a very low impedance, a near-short. The cartridge generator dumps a current into this impedance, and this *very same* current is further on in the circuit converted to a higher voltage. An additional benefit, claim AQVOX, is that this gives more damping, smoothing out those peaky MCs we all know (no names please). I am not sure if this is beneficial with each and every cartridge, though.

## Listening to the current input

The AQVOX balanced current-mode input is about as odd a moving coil interface as it gets, and thus compatibility issues are to be expected with some cartridges. Luckily I had four entirely different types available, and luckily there still was the Technics SL-1200 review sample with its detachable headshells, duly pressed into service alongside the regular GyroDec with SME IV. *Denon DL-103*

The first trial was with the trusty DL-103. This has a regular low-output generator, 0.35mV, married to a coil impedance of 40 Ohms. Intuitively the latter seems to be on the high side for use with the nearly short-circuited current input. In practice all went well, electrically that is, the Denon/AQVOX combination sounding optimal with the gain controls in the +6/9dB region.

The sound, however, was something of a mixed bag. Treble was very pure, silky, and natural, much in line with what I expect from a competent feedback-less design. Deep down bass definition and tunefulness was truly wonderful. But alas, the DL-103 exhibits a slight leanness in the SL-1200's arm, and the Phono 2 Ci tended to exaggerate this. The resulting sound had a see-through clarity that would be beguiling if not for a certain distant character and a lack of body. I can perfectly imagine that some people would like this type of sound, but a universal combination this was not.

### *Grado Statement Platinum*

Next one was the Grado Statement Platinum, the low-output moving-iron cartridge that gave such a disappointing account of itself during the SL-1200 review. Grado specifies it as 0.5mV output from 2 Ohms resistance combined with 2 millihenries inductance (see Grado website as well as the product manual). The very low coil resistance suggests a high effective gain when combined with the current input. On the other hand, that enormous inductance surely will attenuate all treble when combined with the low 20 Ohms input impedance of the Phono 2 Ci, something like -21dB at 20kHz! No-one in his right mind would attempt to drive a current-mode phono stage with such a generator. So that's what I did. And it worked! In fact, the Grado now outpaced the DL-103, adding plenty of bass warmth and emotion to the mix, with almost none of the uncontrolled sibilance I had experienced in the past from this cartridge.

So what happened? Had Ohm's Law suddenly be suspended? Of course not. Using the handy [Peak Atlas LCR40](#) gizmo I went and measured the Platinum's true impedance: 2 Ohms in series with .. a mere 60 microhenries. The published Grado specs are plain wrong, shame on them. With this sort of impedance the expected drop at 20kHz is a fairly insignificant 0.6dB, just enough to act as a sweetener, just enough to make me hate this reviewing business even more .. *Benz Micro MC Scheu*



Over then to the Benz Micro MC Scheu. Being a high-output MC this is, again, not something one would use with a current input. This cartridge's figures are 2mV at 5cm/s and 50 Ohms. Once more the combination worked well, although even with the gain controls set to 0 there was a slight excess of gain. Not that this harmed the sound, which was pure, liquid, warm, dynamic, and rhythmic, with filigrane treble, and above all, elegant. I'm speaking of serious quality levels now, but keep in mind that the success experienced in this particular case is not a license to freely mix high-output MCs with current-input phonestages.

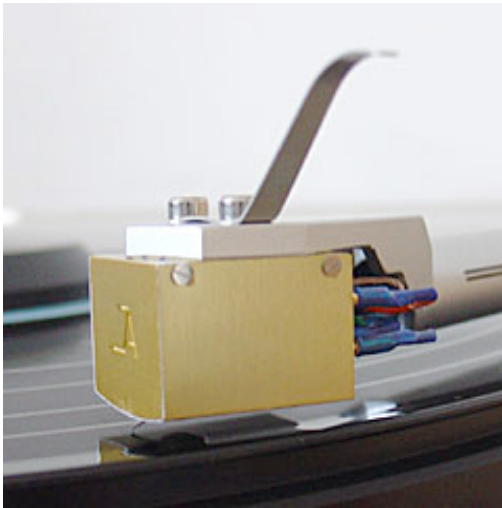
The Scheu's generator impedance of 50 Ohms is remarkably



low for its 2mV output, and this probably helps in interfacing. Something like a Denon DL-110 delivers a near-identical 1.6mV, but needs 160 Ohms coil resistance for that. Such a cartridge probably won't work here! Not that it matters: the Phono 2 Ci clearly deserves a better cartridge, and anyway, there are always the voltage-mode inputs as a back-up.)

### *Jan Allaerts MC1b*

Even more serious levels of quality were attained with the Jan Allaerts MC1b (0.5mV, 20 Ohms). Interfacing was wholly unproblematic, although the preferred gain settings were once more +6/9dB, just as with the *weaker-output* DL-103.



With this GyroDec/SME/Allaerts combo I indulged in the archetypical record-after-record sessions as, indeed, the AQVOX proved to be totally addictive in this setup. It consistently carries a purity of sound all over the tonal spectrum, where other phonostages tend to be a little dirty and/or uneven. This purity and lack of 'mud' gives rise to a see-through stereo picture, a fine transparency, and natural, convincing dynamics. The sound is analytical in the sense that it allows you to easily focus on *any* instrument line in the mix, but it is not in the least clinical and always remains sweet and pure. Even when there seems to be a lack of overt lushness and drama, I always found this phonostage totally inviting so it must be doing something very very good indeed.

My regular phono preamp is a modified Mkl Trichord Dino+. I don't know how it compares to the present-day MkII Dino (which gets good reviews, even in Germany), but mine sounds a bit sweeter than a regular Mkl, thanks to a slightly re-engineered RIAA-curve and Epcos MKV polypropylene-in-oil capacitors. In fact, I also have a Delphini MkII (just a board, sitting in my DIY line preamp's housing), and I deem the Dino more musical, if less precise. Anyway, next to the AQVOX the Dino sounds a bit rounder and meatier at the bottom, is superficially as sweet, and images a bit more convincingly in dimensionality as well as levels of focus. However, closer listening reveals that the Trichord carries less information in the bass and is overall slightly thicker and dirtier. Good as the Dino is, the AQVOX is comprehensively cleaner, preciser, still more musical, and thus overall better.

By now you'd have gathered that I was very happy indeed with the sounds emanating from the AQVOX in current mode. The only complaint would be that overall its inherent gain in this mode is at the low side: I would have preferred to run cartridges like the Allaerts at 3-6dB on the gain controls, thus leaving some room for cartridges with a lower output. This complaint, however, should be balanced by three things. First, gain does not come for free in a two-stage open-loop design like this, and making the circuit louder would probably harm its sonics. Second, I did all of my serious listening with a unity-gain line stage. Most other users' preamps will have some gain that redresses my complaint. Third, the balanced outputs, which I did not use, have an additional 6dB when used with a true balanced input on the line stage, so there you go ..

### **Listening to the voltage input**

As the current mode of operation is one of the 2 Ci's unique selling points I devoted only a short time to the 'normal' voltage mode, using the MC1b.

My feelings then were of a somewhat less confident presentation, with less stable imaging. Luckily the fine tonality experienced with current mode remained, including the wonderful bass definition and treble purity. I'd gather that voltage mode gives you 80% of what the Phono 2 Ci is capable of (maybe more with a high-output MM), and that still brings it to a very high level. Although ultimately every owner should strive to use the current input, one should not feel cheated if resorting, temporarily or even long-term, to voltage mode.

## **LP to CD transfers**

AQVOX also compete in the arena of pro sound. The closest I can get to that is in my home office, where a system is dedicated for transferring LPs to CDs courtesy of a Rotel RX-970 phono stage (non-stock with 0.1% RIAA components and a completely variable frequency curve above 2120HZ) piped into an M-Audio Firewire Audiophile (again, with modified input stage prior to the ADC chip). In current mode the MC Scheu got too much gain, driving the ADC slightly into clipping, so I had to revert to voltage mode. The Phono 2 Ci's volume controls proved of great use matching the level of any LP to the ADC's input range and also redressing slight channel imbalances. Overall the AQVOX led to superior transfers, and the hacked Rotel's unique variable RIAA was more than offset by the Phono 2 Ci's much greater dynamism, transparency, and general lack of crud and distortions.

## **Practical**

The AQVOX proved a fine component to live with. Fit and finish are good and the looks are, to my eyes, nicely understated and elegant. The gain control knobs have a solid feel to them and, more importantly, tweaking them during replay induces no crackle or other untoward sounds. Knowing where exactly these gain potentiometers are in the LEF circuit I can assure you that this is an indicator of AQVOX's circuit design and engineering qualities. Likewise the optional subsonic filter seems to do its job in a most unobtrusive way. Whether in or out I could not detect its influence, although this was admittedly done on the ESL-63s which are not truly full-range. (Incidentally, I had the impression that the Phono 2 Ci's removal of subsonic junk allowed me to push the Quads to higher levels than I'm used to.) While not the most quiet phono stage around noise levels were very low in current mode, and just-noticeable in voltage mode.

The switching power supply did its work admirably, without the mechanical rattle and hums I am used to from almost every linear supply (our house has a pretty bad mains). On the other hand, the Phono 2 Ci was prone to some electrical humming and buzzing in the main system as well as in the PC recording system, and this regardless the state of its Ground Lift switch. This unit is extremely sensitive to ground loops and I could only silence it by replacing its standard 3-wire mains cable with an ungrounded 2-wire type.

## **Werner's conclusion**

Throughout the review period the AQVOX Phono 2 Ci entertained me with its natural dynamics, beguiling clarity, unforced precision, and astonishing consistency. While its tonal balance is a shade lighter than the norm, with somewhat less saturated colours, I must say this matched very well with my ESL-63s and with all of the cartridges tried bar the DL-103.

Offering innovative circuitry, fine build quality and aesthetics, and a pragmatic choice of functionality, and of course the attractive pricing, this truly is a phono stage for the twentyfirst century. Highly desirable!!!

[\[Go on to Part 2\]](#)

### Werner's listening toys

- turntables: Michell GyroDec MkV + SME IV, GyroDec MkII + Rega RB-300/Incognito, Technics SL-1200 MkII
- cartridges: Allaerts MC1b, Benz Micro MC Scheu, Denon DL-103, Grado Statement Platinum
- phono preamp: Trichord Dino+
- line preamp: DIY (FET-based)
- power amp: LFD PA0
- loudspeakers: Quad ESL-63, KEF Q Compact
- furniture: Tabula Rasa Basis 600 and Basis Custom
- cables: yes, all of sufficient length

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## AQVOX Phono 2 Ci - part 2

In which [Mark Wheeler](#) listens to this phonostage, and [Werner Ogiers](#) shines some light on its technology ...



[\[Italian version\]](#)

Product: Phono 2 Ci  
Manufacturer: [AQVOX](#) - Germany  
Price: 700€  
Reviewers: [Mark Wheeler](#) & [Werner Ogiers](#)  
Reviewed: April, 2006

### Mark Wheeler writes

I have already wired my **Hadcock GH242SE** in balanced mode. It is balanced even when fitted with those truly horrible RCA connectors so contrarily loved by the domestic audio business. The Hadcock, thus wired, keeps the true earth separate from the signal return. Thus, playing with the **Aqvox 2Ci** is a doddle. At first I try it with my favoured rebuilt Decca fitted with a [Len Gregory](#) extended contact diamond. First impression is of a very lean sound, the **White Stripes *Digital is Evil*** sounding like the excesses of early CD. I worry that 2 days was inadequate burning-in with nothing more elaborate than a bit of wire to generate hum (I do not have an inverse RIAA filter to feed a RIAA input properly). Days of playing later I am realising that this is not the whole story.

Musical qualities of pace, pitch, rhythm & timing are all intact, indeed among the best I have heard from a moving magnet input. I am reminded of my modified Naim phonostage. The music bounces along and the traditional Naim forwardness is also present but there is much more to this. While I struggle to decide whether it is forward upper mid-range I am hearing, or a bass-light balance to exaggerate pace and speed, I begin to notice other qualities as I acclimatise to the balance.

The higher registers are spectacularly clear without ever becoming too much. Aqvox designer Carlos Candeias has chosen to adopt the Neumann variation on the usual RIAA equalisation. This

has an extra pole, usually at 3.18uS to equalise for the 50kHz roll-off introduced by Neumann to reduce cutting head failure rates. This is well described by [Allen Wright](#). The effect of this deviation from the playback standard is to extend the high frequency response of the cartridge-headamp system but also to reduce the out of band phase-shift, resulting in improved high-frequency timing. Even though the action is an octave beyond middle-aged steady-state audibility, the effect is similar to adding a supertweeter.

The **Aqvox 2CI** looks like a pro-sector product, sized very much like a 1U rack item, and their [website](#) lists a rackmount option. The XLR connectors reinforce that impression. Lifting the cover reveals a well constructed board populated with good quality parts and a modest power supply 40mm from the edge of the audio board. The gain blocks are (presumably) regulated by LEDs making this look as good as a valve pre-amp with the lid off. The sound opens up slightly with the lid off, as is a common experience with aluminium (but better than steel) casework. If I were selling this product to the domestic audiophile I'd fit a tinted perspex top to show off the innards.

The professional audio look inspired me to begin listening with balanced high-quality shielded multistrand cable output, which generally suits pro sources better than audiophile single strand. Substituting a single ended (shield connected at only the Aqvox end) phono-cable immediately improved the frequency balance. Typically the cable choice is dictated by the send-end.

Fortunately, while I had the **Aqvox 2CI** in my system, Bill Dyer arrived with his [Digital Audio Systems Harefield](#) active monitors. These have a more pro-sector balance and match the 2Ci perfectly, and will be reviewed on TNT-audio soon. This symbiosis in my listening room may seem fortuitous, but C G Jung might have suggested it is the synchronicity of the audio world collective unconscious at work. Bill Dyer is also on a mission to introduce accurate high-frequency phase to the domestic audio world, and this attribute of his speakers works wonders with the clear extended treble of the Aqvox 2Ci.

Sadly the various input impedance combinations available for the RCA inputs of the Aqvox 2Ci do not include the 30kohm that suits the Decca better than 47k. I try the [Cartridge Man MusicMaker II](#) but it too has the apparently lean balance, or forward upper-midrange I experienced with the Decca. This balance is mitigated by [Bill Dyer's Harefields](#), but would not suit the majority of typical small modern domestic speakers. This is not a criticism of the Aqvox, more a comment on the lean balance of recent loudspeakers ever since the ultra-rich sounding Linn Sondek defined front-end expectations in the '80s.

Using my variable transformer as a passive volume control feeding the active **DAS Harefields** via 7m of balanced cable, the only single ended connection is the output of the Aqvox 2Ci to the transformer primary. Graham Nalty of [Black rhodium](#) was good enough to loan me 700€ worth of balanced **Opera DCT** interconnect fitted with high quality XLR plugs. I have no idea what the construction is but this combination takes another step closer to the music. The balanced output works better than single ended in my system, once the right wire type had been identified.



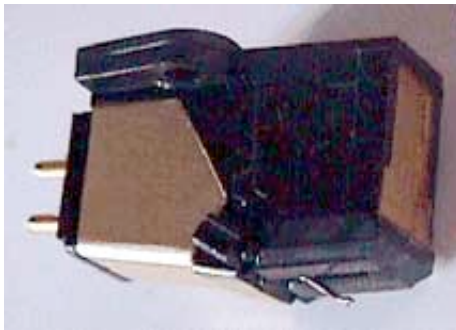
Rewiring my arm leads to XLR connectors I can now try the Aqvox 2CI trump card. The XLR input is a fully balanced current amplifier. Because it uses the cartridge current swings to modulate the gain stage its impedance should be irrelevant. I dig out one of my most awkward old cartridges to test this theory. This Linn Asak T-DC2100K (dc to 100k?!? dates from Ivor's finest hour of hype, bless 'im) is based around Supex innards and I recall I spent many hours in the 80s trying different input resistors and found 470 ohm worked

best. The Aqvox RCA input can switch between 100 & 1k but nothing in between. What will the balance be like I wonder as I crimp the armlead terminals over the Linn's non-standard undersized four-in-a-row pins?

As good as the Naim 'S' boards designed for this cartridge is how the Aqvox sounds. Digging out the **Nimbus Supercut** of **Little Feat's** *Feats don't fail me now* that spun many times on my old Linn under this cartridge the sound is right there. The Asak was notorious for a spitty quality with the wrong moving-coil input; it could upset transformers and transistors alike. It doesn't upset the Aqvox, even when I hurl weird live recordings of **Captain Beefheart's** *Magneticism*. The final Asak test is **Latin Quarter** Modern Times, with its nasty sibilant vocal microphone EQ, and the Aqvox tames the Asak's wilder tendencies without masking any of the musical substance.

A more typical selection of old Ortofon, Audio Technica and something whose identity I've forgotten all give of their best into the **Aqvox 2Ci**. The balanced current sensing input obviously works for all my low output moving coils. I do not own any high output (above 2mV for 5cm/S) moving coil cartridges since my Sumiko Blue point Special broke, but I'm curious what might happen with a balanced output cartridge of moving iron persuasion. My Decca gets refitted to the Hadcock GH242SE, where it tends to reside most often. The Decca generator is unlike either conventional moving-magnet nor moving coil; it generates its output in lateral and vertical coils whose outputs are sum-&-difference wired to create left & right channel outputs. It is fully floating with respect to earth so is as 'balanced' as a moving-coil.

The Decca London does not give of its best into this input. It sounds slightly similar to the RCA input even though the configuration is completely different. The Decca is famous for its weirdness and so untypical that its mismatch is no criticism, but illustrates that no generator input (cartridge or microphone) can be truly universal, and for acoustic blues I'd choose the Decca feeding the Concordant Excelsior for scary delusions of realism.



Speaking of acoustic blues, the final curved ball thrown at the Aqvox 2Ci phono stage is the MusicMaker II into the XLR input. My hunch is that this shouldn't work. VTA just gets set cartridge top level with vinyl surface on thinnest 70s disc (dynaflex style) so tail-down on the **Anadisc 200g** Original Master Recording that next lands on the **Michell Orbe SE** platter: **Muddy Waters' Folk Singer**. The frequency balance is as one might expect from a moving magnet fed into a low Z input: deeply scooped midrange (the antithesis of the correct adjusted load RCA input) and muted highs...but despite this,

the ambience retrieval is spectacular, suggesting good HF phase response despite the wrong resistance and capacitance to match the cartridge. The ambience is very well portrayed, surrounding a soundstage of average dimensions. Return to the low Z mc; the balanced input doesn't suit the mm MusicMaker.

This superb ambience is even present with mono recordings (as it should be) and the illusion of space was uncannily similar to the all-valve [Concordant Excelsior](#). The accurate frequency response and phase performance are especially obvious with mono recordings; the central image remains accurate and in proportion, but the sense of space is present in the reverberation and flutter echoes.

## Mark's Conclusion

The **Aqvox 2Ci** is a remarkable accurate phono amplifier, even more remarkable at a shade under

700€. The Dyer DAS Harefield active loudspeakers were a fortunate inclusion in my system while the Aqvox was performing head-amp duties. The Harefields allowed the Aqvox 2Ci strengths to blossom, where more typical modern domestic speakers might have masked the strengths while emphasising the lean balance. The Aqvox heavily regulated power-supply and modest power-supply capacitors keep the pace up with the quickest, but might contribute to the lean effect. The bass response sounds accurate but is qualitatively different from the familiar audiophile presentation, which can be offputting at first.

Musically, rhythms are flowing well and timing is impeccable right up to the limits of high-frequency audibility. Ambience is very well portrayed and full-bandwidth phase accuracy maintains soundstage proportions from low to high frequencies without inappropriate instrumental wanderings.

The **Aqvox 2Ci** doesn't pretend to the full gloss of high-end couture, and occupies a price point in the middle of the sector. It is much more accurate than many budget (sub 200€) products, and almost as transparent as more expensive products. This is a very accurate and versatile product and one I would recommend to anyone with a drawer-full of cartridges.

### Mark's listening system

- turntable: Michell Orbe SE + Hadcock GH242SE
- cartridges: Decca London with Cartridgeman stylus, Cartridgeman Musicmaker II, Linn Asak, unspecified Audio Technica and Ortofon low-output moving coils
- phono preamps: Naim 'S' boards, Concordant Excelsior
- line preamp: transformer volume control
- active loudspeakers: Digital Audio Systems Harefield
- cables: Black Rhodium Opera DCT interconnects

### Get a LEF!

The Phono 2 Ci is built on two circuit boards. One contains a heavily-filtered switching power supply, the other the amplifier proper. Not too much is advertised about the circuit, so what follows is based mostly on my guesses. I feel quite confident about them, though.



This phono preamplifier seems to consist of three stages: two LEF amplifier modules and then an output buffer. Inter-stage coupling is with capacitors; there is always some subsonic filtering present, but an additional relay-controlled subsonic filter can be switched into circuit. (An older version of the 2 Ci used an opamp-based circuit for this filtering; this circuit was early 2006 abandoned for simple C-coupling, as this was found to sound better. At the same time the phonostage's gain was increased. The lower-gain opamp-filtered Phono 2 Ci was reviewed in Hifi World and LP Magazin.)

The internal build quality and component selection is nice, but nothing special. The signal capacitors are said to be of the polypropylene film variety, but the MM-section cartridge loading caps are cheap and nasty ceramic disc types. (Apparently less of a problem than one might think: the good-sounding Trigon stage also uses these.)

The LEF amplifier modules are Candeias Engineering CC80s (see here for a [datasheet](#)), resembling Marantz's HDAMs in shape and size, but then of red plastic instead of copper. The LEFs are plugged into the main board, and the area beneath the modules is itself filled with passive components, possibly for the RIAA correction.

Each CC80 constitutes a balanced-in-balanced-out gain cell and is fed from, I think, a +22/-22V supply (I measured this, but forgot to write down the actual value). The modules employ some tens of surface mount components, including bipolar transistors, resistors, and capacitors. Each CC80 contains the actual amplifier, in addition to two voltage regulators and one or more DC servo units, making these modules really self-contained. The amplifier circuit is dual single-ended (dual, since balanced), without loop feedback, but with programmable local feedback, and using folded cascodes in the gain stage(s), presumably with emitter followers as output buffer. The folded cascode technique is relatively little used in circuits lacking loop feedback, but related art can be found in John Curl's Vendetta, the Pink Triangle PIP II, and my own JFET phono stage prototype. It is a circuit topology that, to me, has two major strengths: first, its current consumption is constant and entirely independent of the signal amplitude, which makes it very easy on power supply regulation, and second, as the gain is realised in a transconductance stage feeding an impedance, the RIAA de-emphasis can be built easily into that impedance. This makes it an intrinsic part of the amplifier circuit (as opposed to an add-on), and yet without any problems of input stage overload (the bane of traditional passive RIAA solutions).



The first CC80 of each channel interfaces with the cartridge, with user options of connecting to the input transistors' bases, for standard voltage mode, or to their emitters, for current mode. These emitters each carry a -500mV potential, *which is directly connected to the cartridge in current mode*. This is not a problem, as the in-built servo mechanisms guarantee that all cartridge pins 'see' the same voltage, so that no current flows and hence no damage is possible. Even during power-on or power-off does the cartridge interface remain clean and safe. Hats off to AQVOX! (Still, should there ever be made accidental connection from a cartridge tag or tonearm hot/cold terminal to ground or to the unit's housing, then a - limited - current will flow where it should not and there is a slight chance that the cartridge might be damaged in the process. So beware, don't take any unnecessary risk, and be careful when making connections, especially with RCA-to-XLR cheater cables.)

The second LEF is a gain stage with the input transistors' emitters linked to the front panel gain potentiometers. This allows gain control by modifying the stage's local feedback, instead of the usual attenuation (good!). Even so, these potentiometers are still in the signal path, and I don't like the long traces linking these pots to their circuits! The RIAA correction is passive, but it is not clear to me whether it uses one or two stages, and if it is interwoven in the folded cascodes (preferable) or just inter-stage. (I suspect two-stage, interwoven.)

With all those operating modes and alternative inputs there is, understandably, a lot of housekeeping in this phono stage, most of it neatly executed with relays. And yet, one wonders how much of a compromise this is, and how much better still a pure-CI pure-balanced Phono 2 Ci would sound. I would like AQVOX to consider 1) a more purist version of the same circuit, and 2) perhaps an even more elaborate version for the pro sector, including variable equalization for older pre-RIAA standards and for

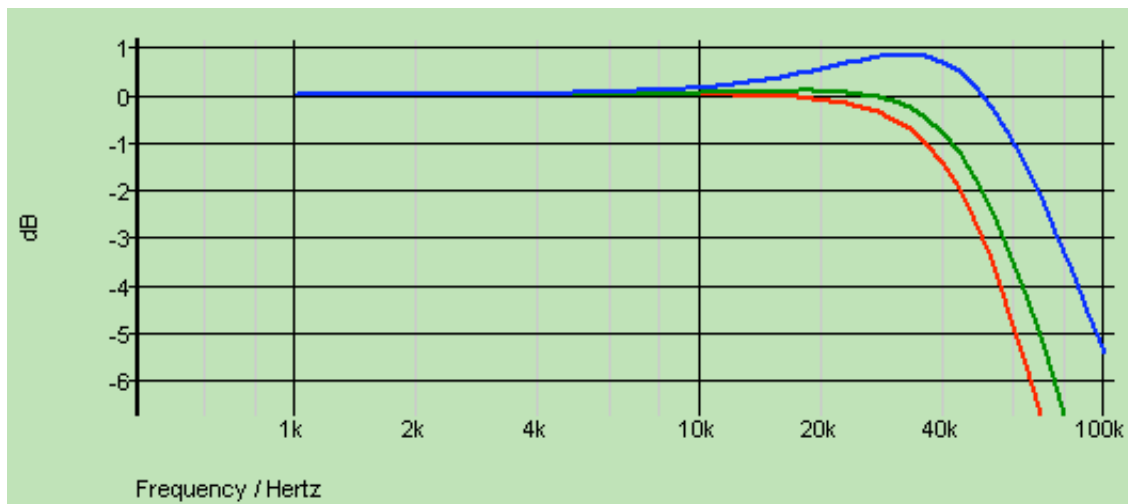
tweaking the sound during transcription to digital.

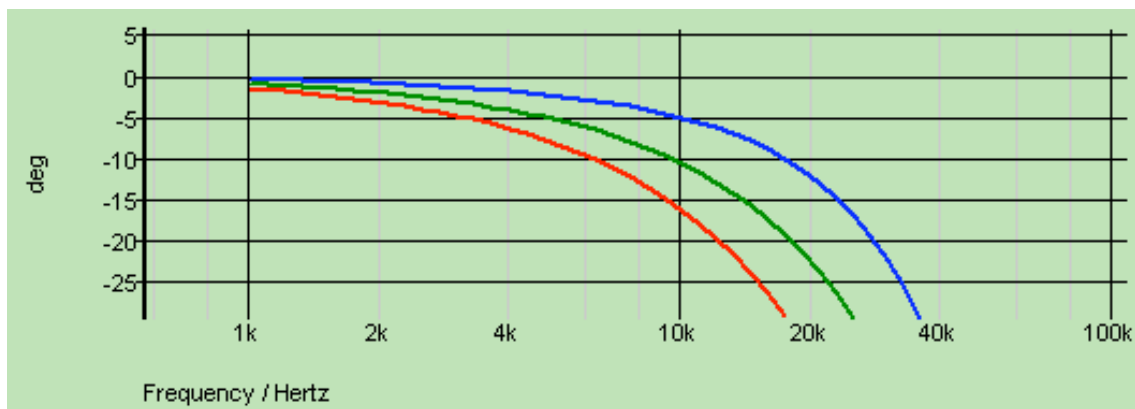
As the accompanying documentation and manual are not entirely clear on this (I urge AQVOX to update their documentation!), I measured the Phono 2 Ci's gain in several modes. Unbalanced RCA-in to RCA-out, voltage mode, and the front panel gain controls turned to Min, the gain in "0dB", MM mode is 36.3dB. Using the "+6dB" switch brings this to 41.8dB (a 5.5dB difference). Engaging the "+20dB" switch yields 51.7dB, or 15.4dB difference. Turning the gain controls to Max then adds another 13.7dB. So the maximum gain available in unbalanced voltage mode is about 65dB. Using balanced-in, unbalanced-out, current mode, and testing with a DL-103 cartridge the gain of this particular combination, knobs set to Min, proved to be 57dB. From the listening tests emerged that channel balance was excellent, so I did not bother measuring it.

Comparing to some other phonostages (Dino, a heavily silenced Rotel RQ-970, and a homebuilt Naim clone) indicated that the Phono 2 Ci is somewhat more sensitive to radiated disturbances than usual: I found it picking up more 50Hz and HF garbage than the others in the all-too-noisy lab corner of my home office. This happened both with the voltage input and the current input, and seemed to depend somewhat on the tonearm cable quality or geometry, an Incognito-wired RB-300 clearly bettering the SL-1200's stock wiring.

I did not run a frequency response test, but an older version of the Phono 2 Ci was measured in the German magazine "LP", the [review](#) being available on AQVOX's site. The plot in that article reveals a RIAA curve doctored for a sweet sound, with a hump between 60 and 800Hz, and a depression from 1 to 15kHz.

The Phono 2 Ci deviates from standard RIAA in the treble, having +0.5dB at 20kHz. This is done to compensate for the frequency response of real-world cutting machines, which can't keep boosting treble out to infinity and hence have to roll off *somewhere* above 20kHz, violating the RIAA 'standard' in the process. It seems wise to compensate for this deviation during replay, as Vacuum State (Allen Wright), Graham Slee, Whest Audio, and an army of DIYers found a long time ago. The silly thing now is that often the proposed replay compensation entails no more than a single zero at 50kHz, while e.g. Neumann's cutting curve happens to be treble-limited with a second-order Sallen-Key filter (-3dB at 33kHz in the old SX-66, 50kHz in the ubiquitous SX-74 cutter). Replay with a single-order zero at 50kHz then redresses the phase response somewhat, but leads to excess treble between 10 and 20kHz!





Have a look at the above figures, which are simulations of a Neumann SAL-74B cutter amplifier followed with standard RIAA de-emphasis (red) and single-zero-50kHz-compensated de-emphasis (blue). The standard equalisation has a near-flat amplitude response out to 20kHz, but suffers over 25 degrees of phase shift at this frequency. The 'compensated' replay equalisation shows a slowly rising treble, but has less phase shift. (The green curves are for a single-zero 100kHz compensation, something AFAIK no-one uses.)

In the end neither solution is right or wrong, although it must be remarked that the treble peaking in the compensated version might offset some of the treble losses inherent to vinyl's crude manufacturing process. Nevertheless, the correct replay of LPs remains an illusive target.

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