



Conrad-Johnson ACT2

Review by Martin Colloms

Celebrating the 25th anniversary of the company, the Conrad Johnson ART line pre-amplifier set a new standard for sound quality when it was launched in 1997 [HFN, June'97]. It presented a contradiction since it employed a seemingly complex arrangement of 10 triodes per channel and yet they were organised as a single, common cathode amplifying stage with essentially zero negative feedback. Two chassis were needed to accommodate the parts required including the large arrays of custom tin foil and polystyrene film capacitors. These are key components in the valve Conrad Johnson sound.

Double-mono operation raises significant design issues in regard to grounding and in fact the ART has proved to be a bit temperamental in some systems. It demands good ground practice throughout if the lowest noise and peak performance are to be attained.

There are also some philosophical discussions which might be aired concerning the performance of double-mono versus stereo chassis design, with the single ground, single box stereo format potentially capable of superior results in certain respects. For best results unused sources and compo-

nents should be disconnected and powered down for the quietest electrical environment.

For the ART such questions were not particularly significant at the time because the overall results were pretty much beyond question. An upgrade became available [HFN, November 2001] a few years ago, which further extended the reign of this landmark concept. However the supply of

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limited editions must by definition come to an end and the ART is now no longer available.

Having proved the case for a truly high end single stage preamplifier cj could now set about the conception of something more practical, ideally less costly, to be positioned roughly where the ART had left off. Priced at £12,000, in real terms some 35% less than the ART, but still highly rarefied audiophile territory; we have a multi-input line preamplifier with remote control. Pickup cartridge matching and equalisation, if required, has to be done elsewhere, for example by a Premier 15 unit.

An impressive rather than aesthetically seductive beast, the ACT more resembles

industrial architecture than the usual slab sided box shaped audio casing. Importantly, it is a single box device, stereo from one chassis, with one central ground. The immediate and unmistakable difference is that instead of twenty triodes arranged in two sets of five duals there are now only four glass envelopes in total, providing four triodes per channel. Circuit design improve-

ment and a new choice of triode have made the reduction in glassware possible, this in itself the key to achieving the goal of a stereo chassis at this quality level.

The triodes are presented on the left hand side and their characteristic glow is apparent since they are not boxed in but are displayed within an open fabrication of circular rings manufactured in a glass-clear, acrylic, with a pierced acrylic cover disc completing the assembly. A full range of inputs is provided, with volume readout via a pair of good-sized amber LED displays, independent for each channel. The displays run from 0 to 99 and provide a fairly fine volume resolution of about 0.7 dB per step over the main operating range.

The usual, chunky, hewn from solid alloy remote control is provided and here are the expected controls including channel balance, the latter not available on the front panel. A slab of gold anodised alloy forms the front panel, above is a secondary control panel comprising the displays. The rest of the casework is finished in instrument grade matt black enamel. The phono sockets are milled from low oxygen copper, ptfе insulated, and the mains cable is an IEC detachable, allowing for user choice of mains lead as desired.

A screw terminal is available for 12V synchronised switching, standby/power up, and like the ART, two EPL facilities allow unity gain connection for external processors, home theatre and the like. There are more than enough input sockets for any system; all inputs and outputs are SE unbalanced format. Two output pairs are provided. With only four relatively standard valves, maintenance costs should be quite low and the owner may safely and easily replace the valves when required. Matched pairs will ensure that channel balance is held to a good accuracy. The new film capacitors promise higher reliability than the original polystyrene types.

"The sound grows on you day by day, as you better understood its particular musical accent. The ACT2 draws you in"

Lew Johnson's unusual casework has resulted in some difficulty for circuit designer Bill Conrad who has packed the interior with top quality parts, dozens of huge Teflon film capacitors, big Vishay metal foil resistors and the like. Each heater is separately regulated, multiple channel, separate regulators feed the valves.

The System

Listening system's source components included Linn LP12- Lingo -Naim ARO /AN IO II/ ANS-4, plus Marantz CD-7 and Naim cds3. Preamplifiers for reference grading comprised the ART -2, Spectral DMC-15, and XTC PRE II and Audio Synthesis Passion. Power amps included Amps Krell FPB 700cx, Naim NAP250, Hot Tubes JD1 power amplifier. Orelle P100 Evo II power amplifier. Loudspeakers; Avalon Eidolon Diamond, Quad 63, BBC LS3/5a, 15 ohm. Cables were Cardas Gold Cross and Gold Reference, Wireworld Equinox 5 and Transparent XL series, the latter including the XL speaker cable. Items were supported on Finite Elemente stands with extensive use of SoundCare Super Spike captive spikes interfaced to the hardwood floor.

The Sound

The ACT2 could legitimately be viewed as son of ART – but could it outdo its parent? Such a comparison begs to be made, even though the ART has little problem in remaining an extant reference line control, when appropriately matched and supported.

The exact system that was used to assess the ART in its final production form was also

used to assess the ACT2. Some minor system changes – fine tuning of cables and grounding – had to be done for the final judgement, and this only serves to highlight the fact that these two models are not exactly the same design. The ACT2 is certainly highly derivative of the ART, but from one viewpoint it seems more like a turbo charged Premier LS16 than the ART itself.

While the particular harmonic integrity, detail, speed and sheer dynamics of the ART were not fully matched by the less costly LS16 introduction, for the latter I really liked its certain sense of focus, coherence and its driving bass line. By degree these aspects were subtly distinguishable from the ART. But as the sound quality for the ACT2 came into focus, now working up a detailed critique, it seems that the ACT2 appears to combine the best virtues of the LS16 and the ART, and then some. With continued use I was driven to accept that the ACT is in fact the ART reinvented, so convincing was the overall advance in sound quality.

In the course of countless product evaluations I have heard improvements in some aspects expressed as single gains, such as greater clarity, or purer treble or perhaps

tighter bass; there might be more depth or a few of these might together be improved. But after many tens of hours with the ACT2 I am driven to assert that here the quality gain is global. There's no single sound aspect or parameter that hasn't been significantly improved. Perhaps most rewarding was the new found combination of ART-level transparency and resolution, plus an even more gripping, open, expressive and naturally dynamic presentation. Too often these parameters are seen to be in conflict.

Take the ART treble, a forte. Lively, delicate and airy, it nonetheless has a touch of stray – what I might term 'Aeolian' coloration - which I believe to be stored mechanical energy in the valve electrodes, a hint of a shimmering tinkle in the deep background. ACT's treble is subtle, more focused and yet imbued with a more concentrated energy; a crisper, clearer sound on transients with a purer more natural rasp on brass and presented with more still more stable spatiality. ACT treble is perceptibly more contained and better integrated.

ACT mid range is cleaner than the ART's, just slightly less coloured, (if it is permissible to use that term in this elevated context). At first it might appear a might leaner but that's not actually true in my opinion. That very neutral mid is ably supported by a firmer, deeper reaching lower mid range.

Significant improvements were also heard in the bass. Unbelievably the ACT sounds as if it has half an octave deeper bass, yet the science doesn't support this.

Where did all those triodes go?

For the ART- Anniversary Reference Triode- Bill Conrad had chosen the classic and long established 6922 double triode, a miniature all-glass valve, readily available in a range of quality and price, widely used, and generally well regarded on grounds of wide frequency range, low distortion, and moderate microphony - its resistance to sound vibrations. It also has moderate impedance. The circuit chosen for the ART was as simple as it gets, the idea being to put as little as possible in the way of the precious music signal as it passes through the preamplifier. It is an inverting, common cathode voltage amplifier, anode coupled at the output via a custom parallel capacitor array in some solid-state designs the signal may travel through literally dozens of amplifying junctions, still more when integrated circuit chips are used. Not that these devices cannot get good results in the right hands, but the simplicity principle remains important. For the ART just one active stage was used, without loop feedback or the usual additional cathode follower or buffer to give the expected low output impedance. A low impedance is considered beneficial for driving the output cables and the input of the following power amplifier. In the ART a common cathode amplifying stage used ten paralleled 6992 triodes to get the desired 500ohm or so output impedance.

With the renaissance of the Russian valve industry, and continued support from enthusiasts all over the world a treasure chest of triodes has become available. The triode is considered the best sounding of the valve genre thanks to a generally low order 'natural' harmonic distortion characteristic. There are hundreds of triodes to choose from, displaying both subtle and not so subtle variations in specification, these reflecting particular design for many differing applications. One such variation on the 6922 wide-bandwidth theme is the Sovtek 6N30P. It is not a direct substitute, specifically because of a much higher heater current of 0.825A.

A miniature, power grade, double-triode capable of a pulsed cathode current of an amazing 6A, it enjoys good linearity, this aiding low distortion, and its harmonic nature is said to be particularly consonant musically. The build is military grade with a high vibration immunity. A long operating life is predicted under this particular preamplifier operating condition between 5,000 and 15,000 hours, where it is virtually idling. It is particularly suited to the Conrad Johnson's application thanks to its exceptional transconductance or 'Gm' of 18mA/V, this resulting in exceptionally low output impedance for the design. The grid and cathode impedances of the basic circuit are compatible with the new valve and now the number of triodes could now be reduced to four per channel. Even with the reduction the effectiveness of the new choice means that output impedance matches the ART. While the heater current is substantially higher, with fewer devices the power supply was still essentially compatible while the circuit structure could be made physically more compact with shorter signal and ground paths. c-j call the paralleled triodes a composite hence the 'CT' in the ACT designation.

A single ended class amplifier of this type has no immunity to noise or reflected coloration from the power supply and the latter has to be built to precisely the same standard as the amplifier section if maximum quality is to be obtained. Conceptually they cannot be separated in terms of signal current.

The same Teflon film capacitors and Vishay metal film resistors are used in both sections, power and amplifying. No electrolytics are used in the active section; the supply reservoirs are custom polypropylenes film types and Teflons of very low loss factor. Only for the regulated heater supply are normal reservoir capacitors employed where large values are necessary and their behaviour is well distanced from the signal path. The standby switch leaves the preamplifier in a low power condition but electrically active and polarised ready for a reasonable quick return to optimum operating conditions.

Brought to a state of excellence in the ART, the amplifying printed circuit board of the ACT is likewise mounted on a vibration isolating chassis and the transit screws located on the underside must be removed or a substantially underdeveloped sound will result. With high transparency electronics such as these the effect of such mechanical decoupling is almost magical. For me it can be defining link between construction and good rhythm and timing; this superior quality association also shown by other top of the range preamplifiers from c-j and NAIM.

The ACT sounds better founded, more connected with the recorded space and more securely locked to the ground. The bass is substantially faster, deeper, more articulate, better timed and more revealingly tuneful. The Eidolon speaker reads such improvement effortlessly. The ACT bass really rocks!

Lab Report

I measured that trace of hum, while audible with your ear to the speakers, as a perfectly satisfactory -83.7 dB IHF CCIR [1kHz] or -87.2 dB with 'A' weighting. This suggests that at the listening location pure noise would more relevant than hum per se. Speakers of greater than 96dB/W sensitivity might show a trace of background noise in very quiet locations. Neither noise contributions were audible on test even at full volume. Referenced to a usual CD input level of 2V the 'A' weighted noise is -98.6 dB, which is fair enough.

Frequency response can be a moving target with this type of volume control and this design is no exception. At full gain '99' a most unlikely event, the response while very extended at low frequencies rolls off by an audible 2dB by 20kHz. However this corrects itself very quickly at lower settings. At unity gain, 2V in 2V out, the response was ruler flat to 40kHz, was -0.5dB at 70kHz and -3 dB at 200kHz.

At lower volume settings such a typical '50' the bandwidth is still better if inaudibly so, just 0.5dB down at 65kHz and -3dB for 200kHz. The lower frequencies are well extended, to better than 1Hz judging by my measurement at 5Hz. The specific 10Hz figure was just -0.05 dB down at all levels, loaded by the standard 100kOhm. A key question was whether the new choice of valve would affect the previously favourable low order distortion performance for this topology. I plotted distortion from 10 Hz to 200kHz at 0.5V output, and given the measurement noise floor for this analysed bandwidth, the result was flat horizontal line over the entire range. This was at -63dB, i.e. no visible distortion variation at all was present at this moderate threshold. Measured with the usual frequency relevant bandwidths, the thd results at IHF levels were -64 dB or better, 0.06%, 20Hz, 1kHz and 20 kHz and these results are essentially inaudible. Still better, spectrum analysis showed that the distortion was wholly second harmonic with no higher harmonics resolvable right down to -110dB. Confirmation of this fine result is given in the high frequency intermodulation figure of -62.1 dB at IHF output level, and -80dB at a 20dB lower gain setting.

Channel separation was fine, if typically falling with frequency, and was 105 dB at 20Hz, 82dB at 1kHz and a satisfactory 55dB by 20kHz. Channel balance was excellent, within 0.1 dB throughout, and was maintained at all volume settings. While it could generate a maximum unclipped level of 25V, showing excellent dynamic headroom, adopting a maximum thd of 1% gave a rated maximum output of 9.5 V, still enough for any power amplifier. The preamplifier is inverting and it is important that this should be adjusted in a given system, typically by inverting speaker cable polarity as given in the instructions. The matching Premier 350SA power amplifier is also inverting and here no correction is required.

At full gain, 48.7 mV input provides IHF 0.5V output; this is a gain of 20.3 dB. The input impedance varies with gain towards maximum, but at normal settings is typically 12k ohm with moderate capacitance. This will not tax modern sources. At full level it rises to 66k ohm. The output impedance is a moderate 560 ohms and rises at low frequencies to about 1k ohm, 20Hz thanks to the output capacitor. This is fine for most cable runs and amplifier loading.

In particular, the distortion of this circuit varies very little with loading, only in extreme cases a mild loss of very low bass and dynamic contrast might occur.

There is no input overload issue with a volume control of this type.

If the ART was a noted leading exponent of spatiality, delivering exceptional sound stage width, depth and near holographic focus, the ACT goes significantly farther with even sharper focus. It now has better focus at the stage sides and in the depth planes; really astonishing when you first comprehend it. And there's also more depth, and more detail, as well as even better layering of complex themes. At times you feel that you could reach out and touch the performers. The term palpability has been used in this context in previous reviews; here it is present in full force.

The ACT2 has yet another surprise for you. The sound is so open, so clear that accustomed boundaries of stage perception are expanded, and a significant expression of image height is now given by my system. I am sure that this wasn't some psychoacoustic trick based on an accidental correspondence with a particular HRTF [head related transfer function] where certain generic or characteristic frequency responses may be associated with image azimuth.

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I think that some recordings have some height information due to particular mike technique and included floor reflections. ACT2 manages to present this lower level information more constructively.

Even more than the ART, the ACT2 delivers low level and high-level dynamics with conviction. It has excellent transient integrity. It sounds lively, communicative and foot tappingly involving. It is also highly sympathetic to innate tonal colour and timbre for both instrumental and vocal sources. It doesn't need to be played loudly to demonstrate its many virtues. Even down at sub-watt power levels, 20 out of 100 on the volume scale, the sound stage remains open, superbly detailed and layered, as well as convincingly natural; there is truly an innate rightness about it. With sensible choices of matching cables – mains, interconnect and speaker – a pure system balance can be readily attained. Reaching well beyond the ART I have arrived at an overall score of 105, truly state of the art for line preamplifiers. I might have been doubtful about the technology change from polystyrene to Teflon [tm] for the vital film capacitor complement but on this evidence, I must bow to Conrad Johnson's better judgment.

For the final optimised test run I used Kimber PowerKord mains cables, Wireworld Equinox 5 interconnect from the CD player and the disc amplifier to the ACT. Pre- power was Transparent XL and Cardas Gold Reference while the speaker cable was Transparent XL. I also tried experimenting with lifting the mains ground for the ACT2 with an isolator. The results were at least 15% poorer, sounding muddy and coloured by comparison, but with no worsening in background noise.

The best timed, most upbeat and most satisfying delivery resulted from the use of a star mains connection block such as the Music Works product. All unused components were powered down, unplugged and disconnected. The power amp, CDP and ACT2 were connected to the common supply block, fed from a clean mains spur.

At this point I'd simply not realised how transparent the Eidolon Diamond really was, such was the gain in quality provided by the ACT2. It was entertaining to hear the just slightly staid big Krell FPB 700cx 'woken up' and given a new sense of energy, speed and definition. The matching Premier 350SA power amp wasn't available at this time, but from what I've heard from both models I predict the ACT2/Premier 350 combination ought to be a marriage made in musical heaven. What a way to spend £20K! So, what's the downside? Well, there is a smidgeon of residual supply hum, audible with your ear on the speaker cones. The ACT panel legend is also not really bright enough to compete fairly with the numeric volume display, or vice versa.

I know that the ACT 2 can and will be bettered but that's for the future. Like the ART in its prime, such sound quality lies at the threshold of critical perception at present. In short it's simply too close to what we now take as 'perfection' to allow for sensible qualification.

Conclusion

Aside from that tiny dose of just measurable background hum, the lab report is exemplary, as is usual with cj products. Issues of input output matching, frequency response flatness, response bandwidth, audible noise and distortion were not in question.

As this pre-amplifier fully ran-in, it demonstrated a powerful settling-in effect. The sound grows on you day by day, as you better understood its particular musical accent. The ACT2 draws you in, with a sound that's impossible to ignore – thoroughly modern and yet rich and deep. Its ability to create believable soundstages of superb depth and focus sets it at the forefront of today's designs. Musicality is the watchword with the ACT2. It's what high fidelity sound reproduction is really about.

Messrs Conrad and Johnson have created yet another landmark product, a brand new, state of the art Premier grade preamplifier. You must hear it, if only to see how superbly well it performs its allotted task. It's highly recommended

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