REVIEW

School of Rock

Fresh from the pen of electronics sage, Douglas Self, comes Cambridge Audio's new mid-price 'Class XD' integrated amplifier. If ever there was budget esoterica, it is this, thinks Noel Keywood...

The trouble with amplifiers is they're perfect. Unlike loudspeakers, which completely fall apart under close technical scrutiny, amplifiers survive all you can throw at them under test and come out smelling of roses. All the same, that didn't stop one reviewer famously calling a Japanese amplifier "boring" and was promptly threatened with legal action. At issue here wasn't just the description, but the impossibility of attaching it to something substantially free of any detectable blemish. Had there been something - anything - measurably wrong with that amplifier then there might have been some basis for his contention, some slight justification for the description - but there wasn't.

Amplifier design has gone around in circles ever since, no one quite being certain why an amplifier should sound "boring", but knowing they often do. Listening to music through them is no more exciting than peeling potatoes. It should not be like this; the idea that a piece of hi-fi equipment should discourage listening rather than encourage it is bizarre.

These days effort is put into getting solid-state amplifiers to display a bit of brio, to bring at least a smidgen of life and soul to music. But because they are seemingly perfect in any case, how to do this isn't clear. There are a lot of ideas, especially in the USA. In the budget conscious UK we tend to stick to tried and tested formula circuits, often based on manufacturer's application notes, embellished with tiddly bits, such as high current power supplies.

This approach isn't unsuccessful, but neither is it ground breaking. Today's amplifiers generally sound tidy and clean.

Cambridge Audio recently weighed into this difficult field with a new £749.95 model, the 840A reviewed here. This, they say, gives the low distortion of Class A, without its drawbacks - mainly excessive heat production. Nominally a 100W amplifier, if this amount of power was delivered by a conventional Class A it would stream heat from large heatsinks. To avoid this the 840A uses a new bias scheme they term Class XD (crossover displacement). It produces better results than Class B, which typically suffers crossover distortion, and Class A/B which distorts at the transition between Class A and B working (they say).

Class XD uses a Displacer that draws current from one arm of the output pair, moving the output stage into asymmetric current conditions that moves the crossover region. Cambridge have developed the idea into a sophisticated form that uses active control circuitry, driven by the signal, to move the crossover region dynamically. In effect it is a form of super Class A/B. It is quite an innovation, significantly complicating the output stage.

Class A amplifiers often distort quite significantly in practice, but it isn't nasty crossover, it is relatively innocuous second and third harmonics at acceptably low level. But distortion isn't the only factor affecting sound quality, as Cambridge themselves acknowledge. Most manufacturers fit high current power supplies in order to ensure there's plenty of grunt to cope with low impedance loudspeakers, which most are these days.

The 840A is no exception, as you find when lifting it. It has totally independent power supplies for the power amplifier and preamplifier, as well isolated left and right channel power amplifier supplies. All this weight is held in place by a substantial chassis that uses a steel undertray and aluminium side panels.

Where many manufacturers use an Alps Blue volume control these days, Cambridge use their own resistive ladder attenuator switched with relays - a very high quality solution. The relays make a clicking noise when adjusting volume.

Input selection is through relays too, an increasingly popular choice these days. These aren't those clunky old P.O. jobs by the way, but modern, gold plated low current jobbies, usually sealed in an inert atmosphere. This approach offers short signal paths and minimises active devices. This is the best way to do it; solid-state switching and attenuators are not ideal in hi-fi amplifiers.

The 840A has eight inputs, each of which can be allocated a name, which explains the front panel LCD. At its centre lies a symbol showing volume control position.

There is no phono stage; Cambridge have an external unit in their product range, the 640P. There is, however, one pair of balanced inputs for easy connection of a source with balanced outputs.

As most amplifiers and all CD players are basically unbalanced in their circuitry, using this connection method puts no fewer than two extra unbalanced-to-balanced circuit stages in the signal path, something that has to be weighed up against the benefits of improved hum and noise rejection of a balanced connection. The benefits aren't clear cut, but it is usually felt that balanced connections are better.

There are two pairs of loudspeaker outlets, a preamp out, and tape in and outputs. The rear panel carries an RS232 port and Infra Red emitter in and control bus in/out for custom install systems. There's also an A-Bus for their own Incognito multi-room keypads. The amplifier has a remote control and even a pair of fixed gain inputs so it can be used for front channels in a home cinema system.

SOUND QUALITY

This amplifier saw service in a variety of systems on a fairly casual basis before close scrutiny, hooked up to a pair of Spendor S8es. This helped run it in, as well as give us some idea of how it behaves driving a range of loudspeakers. My initial impressions were of an amplifier with real force, stemming from fulsome bass delivery and a generally engaging dynamic, yet its high frequency performance was curiously elusive.

Spendor S8es driven by a Sugden A21a Class A amplifier are a lovely combo if there ever was one. The A21a's absence of harshness nicely complements the smooth delivery of the Spendors, its treble sheen working well with the easy going nature of the S8es, gently lighting cymbals and strings to make them sparklingly clear on the soundstage. I compared the 840A to a Sugden A21a pure Class A amplifier. This was a no brainer - an amplifier claiming to be close to Class A against the real thing. There's a massive power gap of course, 120W to 18W, but the Spendors are sensitive enough to allow this and I don't review at particularly high volume levels; 18W is plenty enough in my 16ft by 14ft lounge.

The harp is a trying test of any hi-fi when closely recorded, and Malaguena from Andalucia, and 'Suite Espagnol' is one of those popular pieces that we all know if cannot name perhaps. From an SACD, the Telarc Classical Sampler 2, this instrument had real scale through the 840A, with fullness and body in the lower octaves that gave it force. There's was a sense of space around the instrument too that seemingly came from a dark background and fine resolution of low level decays. Yolanda Kondonassis is known for the vitality of her approach and this wasn't lost through the 840A; it was neatly timed and kept a strong grip on rhythmic progression, if not a razor sharp one. There was a subtle rounding of leading edges

that smoothed what was, through the A21a, sharply defined events as the strings were plucked. This subtle softening of transient edges gave the 840A an almost warm feeling to its highs. Whilst the vibrant - almost lacerative - attack of the strings wasn't so strongly supported, there was a sense of weight to the instrument the Sugden couldn't sustain.

I was left more confused by these differences when listening to another equally vigorous and engaging player of stringed instrument: Nigel Kennedy. The A21a breezed through Vivaldi's 'Spring', from Kennedy's Greatest Hits CD. The 840A didn't have its sweetness of tone and at times I felt there was a slight fluttering or sense of modulation to strings, that diluted their tonal stability. Whilst Kennedy's violin inarguably had body and scale through the 840A that made it sound more a real instrument than a representation of one, as time stretched out I realised the A21a was easier and more stable to live with.

So Massenet's Meditation, the next track, was going to be a repeat performance I felt. I was wrong. Where it drifted by politely through the Sugden, Cambridge's 840A discovered an altogether more gripping and emotionally charged performance in which Kennedy's violin seemingly developed extraor

dinary powers! This wasn't what I had expected; the recording was strong in energy lower down the audio range and the 840A was resolving it with a sense of textural richness and dynamic force that was startling, yet really exciting.

Moving on to Rock, and the Scissor Sisters' 'Laura', the 840A showed its mettle. The track's muscular, metronomic bass line had all the force you could hope for, as well as depth; the amplifier reaches down well, that's for sure. Sibilants hissed a little and the steady contribution from ride cymbal was a trifle jittery I felt. There was lovely insight into vocals though, and again the strong sense of timing and control I had picked up on with other material propelled this track along nicely. The artfully restrained rhythmic progression of this track was made very obvious too; the 840A has both scale and grip beyond anything price rivals can muster. It's here, as a solid-state amplifier, that it really excels. Put the 840A against rivals and they will sound retentive by way of contrast. Here's an amplifier with scale, albeit quite easily presented.

Celine Dion's 'I'm Alive' was the track this amplifier had been waiting for. The simple synthesiser beat was delivered with impressive muscularity, whilst vocals stood out beautifully on the sound stage, locked into position. There was both air and space around Ms Dion and her vocal inflexions were delightfully resolved in front of me, in all naturalness. It was a delicious performance, made so by a delivery that I would

summarise as full and easy, yet vigorous. No problem with 'Is It Just Me?' from The Darkness either; power chords come through with a force that'll have all neighbours, except the must hardened headbangers, going apoplectic. Here's an amplifier that Rocks.

At a time when amplifiers still commonly sound dynamically restrained, Cambridge have produced a well honed powerhouse in the 840A that forges along. Its rich and lustrous presentation is gripping, yet often forceful; it's not often I am frightened by a violin! There's something in this package for everyone, classical and Rock listeners alike. Much of its ability comes from careful engineering - you can hear it in the all-round refinement of its delivery, from rock solid imaging to propulsive dynamics. The diamond lacks a little polish at high frequencies perhaps, but this seems a small price to pay for all its other strong qualities I feel. It's a gripping listen.

ANOTHER CLASS?

Does Class A give best sound quality? Noel Keywood investigates...

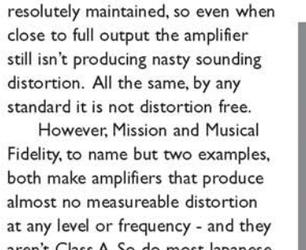
"It is indisputable that Class A power amplifiers have the potential to give best linearity when well designed" Cambridge say, "but they are impracticable".

Class A produces a lot of heat, because the amplifier is working flat out all the time. Getting rid of it means big heatsinks and hot running, which is why they are "impracticable".

The output transistors don't "crossover" to one another, as in conventional amplifiers, so much as share the load, one conducting more whilst the other conducts less, eliminating crossover distortion. As crossover distortion sounds nasty this is a good thing. All the same, they do distort.

How much a Class A amplifier distorts depends upon the linearity of, and matching between, output devices, as well as the amount of feedback applied. They are not in theory any more linear than any other amplifier and in my experience Class A amplifiers usually distort quite significantly, certainly more than standard A/Bs, especially when the latter use wideband (fast) output devices and mountains of feedback.

Take a look at the distortion from our classic Sugden A21a, a benchmark for the breed. At high frequency, there's 0.03% distortion, a figure that is commonly bettered nowadays. It isn't the level of distortion that is important though,



Class A distortion from the Sugden A21a of 0.03% at 10kHz - no nasty bits, just second harmonic.

so much as what it contains, for there's innocuous distortion and nasty distortion. The Sugden produces solely second harmonic - and this is the most innocuous distortion going. In fact, it is the only distortion you can barely hear unless it exists in

Distortion of a Lux L-505f, a Class A/B. There's just 0.003% at 1W output, 10kHz. Third harmonic dominates.

large quantities, around 1% or more. Even then, second only produces a lightening of timbre. Better still, as output rises, the characteristic is resolutely maintained, so even when close to full output the amplifier still isn't producing nasty sounding distortion. All the same, by any standard it is not distortion free.

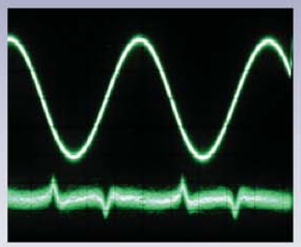
However, Mission and Musical Fidelity, to name but two examples, both make amplifiers that produce almost no measureable distortion at any level or frequency - and they aren't Class A. So do most Japanese companies: look at our Lux L-505f distortion analysis. This has been the case for the last fifteen years or so. Such amplifiers have lower distortion figures than the Sugden and negligible crossover distortion at high frequencies too, showing Class A amplifiers have no special advantages nowadays, when looked at from the distortion viewpoint at least.

You can argue though, that because Class A amplifiers don't in themselves produce nasty sounding distortion, there is more leeway to experiment with various design parameters that may affect sound quality, especially feedback.

Class A amplifiers like our own Sugden do usually sound very good. But they are specialised audiophile designs using quality components and expensive design options such as high current power supplies. And Class A may also sound good because it is thermally stable, like a valve amplifier. There are no short term heating effects at the current junctions because the whole thing runs hot.

A good compromise between Class A and Class B is the most popular design choice for modern amplifiers: Class A/B. This gives good linearity at low levels by operating in Class A, banishing the great weakness of pure Class B, whilst switching to Class B at higher levels, for cool running. In practice Class A/Bs run warm, but acceptably so. Cambridge's new XD circuit is a sophisticated form of Class A/B in truth, one that gives a smoother transition between the two methods of operation. Unfortunately, it doesn't seem to be without its own problems our measurements showed. At high frequencies it doesn't look like a Class A at all, so much as a mediocre Class B.

The sound quality of an amplifier isn't determined by distortion alone. There are plenty of near-zero distortion amplifiers around, like the Lux L-505f I am using as an example in this discussion. Even when this state of apparent perfection has been reached, substantial sound quality differences remain between such amplifiers, one reason for this being poor quality components. Manufacturers now even feel that models they've sold in the past may have been quite severely compromised by this little appreciated factor in amplifier behaviour; Quad once told me



Spiky distortion of 0.04% from the 840A at 1W, 10kHz; it looks like classic crossover.

that capacitors within their 405 amplifier were likely poor when new and deteriorated quickly thereafter. In their view this is why it received a lukewarm reception. A small industry has been building up offering replacement of duff parts to revive old faithfuls and the general concensus is sound quality is transformed. Better componentry brings better sound. Cambridge acknowledge this, using in the 840A a solid, vibration resistant chassis, high quality volume control, remote input switching, multiple power supplies and good components.

It isn't distortion alone that determines amplifier sound quality so much as a whole rake of factors, some of which we know about, some we suspect and likely many that are little understood. So as interesting and fertile a subject as it may be, the Class of operation of an amplifier doesn't say too much about how it will sound in use.

VERDICT £

Big sound that is both insightful and well controlled, allied to excellent design and build, make this a true affordable audiophile amplifier bargain.

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FOR
- powerful, dynamic sound
- rich in timbre
- stable imaging

AGAINST
- jittery high treble

MEASURED PERFORMANCE

The Azur 840A produces 128W into 8ohms under test and 210W into 4ohms. In the midband at least, it managed this without strain, producing just 0.0003% distortion when close to full output, into 8ohms.

The XD circuit was less happy at high frequencies though, classic crossover distortion with an extended harmonic structure affecting output under all conditions. The structure varied with level, but happily the total distortion value did not rise above 0.03%, somewhat less than other designs with unusual operating schemes. Our analysis shows output at 1W, 10kHz as usual, where harmonics are extensive. This is likely to tinge treble slightly.

Frequency response was normal enough and noise low, helped a little by low sensitivity.

The Azur 840D measures satisfactorily, if not being up with the best in this respect. NK

Power	128watts
Frequency response	4.4Hz-77kHz
Separation	84dB
Noise	-107dB
Distortion	0.02%
Sensitivity	0.45mV
d.c. offset	3, 4 mV