

THIRTYSOMETHING..

Commissioned from designer Stan Curtis and built in Britain, the 30-series range comprises a passive 'pre-amplifier', a stand-alone phono stage, and a choice of stereo or twin monoblock power amplifiers. Only passive pre- has any controls on the front, these being selector and volume, and minimalism is clearly of the essence here. The Moth owner is presented with a row of simple, solid oak front panels, each four inches wide by two high and with only a red LED. The phono stage is so minimalist that it doesn't even have a mains power switch, and the switch on the power amplifiers is mounted on the (recessed) back panel.

The phono stage is suitable for moving-magnet and moving-coil cartridges, with a rear switch selecting gain. Unusually, the stage is designed primarily for low-output cartridges, the low setting simply cutting circuit gain by 20dB. The mains transformer is mounted in an external plastic box.

The passive unit has four line-inputs and one output – though future units will be fitted with an additional fixed-level output to drive a tape deck. I understand that a further unit is on the way to provide extra tape outputs and a headphone facility. Externally, the stereo and mono power amplifiers look identical, apart from the absence of one input socket on the monos. In fact, the mono units are not, as one might guess, bridged stereo amplifiers, but a beefed-up version of the stereo amp circuit with extra load-driving capability though few more 'on paper watts'. For a case this small, one specification that must necessarily be compromised is output power – limited by the power supply size (and heat dissipation). Two pairs of output sockets on the mono units allow easy bi-wiring.

Sound quality

It took very little time to come to the conclusion that this would not be an unpleasant reviewing session. My basic premise on a product is that the less it

Something special – Moth's British-designed and built amplifiers offer sweet sound

by Richard Black

does wrong, the better. Hi-fi can distort the signal, making sweet music sour; so when the music comes back sounding sweet there must be something going for a design.

Now this word 'sweet' must be used with caution to describe amplifiers. It seems to mean to some people a nice, comfortable 1950s valve sound – lots of second harmonic, a bit of attenuation at frequency extremes, limited power but soft clipping, and so on. I prefer to apply it to amplifiers that are what I would call 'subjectively accurate', *ie* amplifiers which introduce a minimum of audible distortion. The Moth amplifiers are *sweet*.

I'm glad I started listening to the stereo power amplifier first, since I liked it. Had I begun with the monoblocks I might have been not so enthusiastic – as it was, I changed from stereo to monos and basically kept it that way. But the sound is much of a muchness with either setup, the differences being in the mono units' greater ease in strenuous loud music. The monoblocks are also a shade clearer generally, but on the whole the following comments apply to either setup.

The Moth sound is essentially solid, clear, uncluttered, and not in the least fatiguing to listen to, at any level and for any length of time. Fine background detail in good recordings is properly conveyed, as for instance in the Chesky record of Ravel's *Daphnis and Chloe* (Boston SO/Munch; a reissue of RCA's 1954 original and in some ways the best orchestral LP I know), where Ravel's complex but never thick orchestration provides a fine test for this aspect of performance. Perhaps the treble does not sound quite as open as with the very best, but lower frequency

regions are handled remarkably well for an amplifier system in this price bracket.

In fact there is, overall, precious little to give away the price of the Moths. By conducting extended and comprehensive A/B bypass testing on the phono stage I became aware of a few limitations in it, but I had to listen for a long time to be sure. If one is to be really choosy, it does lose the 'nth' degree of clarity, detail and leading edge attack, but frankly for £169 it is altogether praiseworthy. The power amplifiers are lively and dynamic, and the monoblocks particularly have a feeling of ease in their delivery of dense textures. In my own system, the stereo amplifier seemed in danger of running out of steam completely on occasion, but under less demanding conditions it acquitted itself admirably. No one sort of music programme is unduly favoured, which I regard as a good sign, nor is any particular signal source. A pretty impressive group.

Lab report

I mentioned the matter of power output above, and this is an area where the Moths rather break with convention. The normal rulebook says that a good power amplifier supplies N watts into 8 ohms and about $2N$ watts into 4 ohms, and can do this indefinitely. However, restrictions on the size of the mains transformer here mean that the output power of a Moth amplifier is limited to about 36W, be it two channels at 18W into 4 or 8 ohms, or one channel at 36W. Continuous power drain just drags the power supply voltage down, and the transformer cannot keep up with demand. However, under transient conditions very much more power is available, and a single cycle of 1kHz can reach levels equivalent to 56W into 8ohms or 100W into 4ohms from the stereo unit (one channel), or some 30% more from a monoblock. The high peak output current from the monoblock is equivalent to an instantaneous 1kW into 1ohm!

Purists may jib at this but, after all, plenty of '50W'-ish amplifiers will catch

fire after a few minutes at full power, so they should be down-rated, too. A few minutes, a few milliseconds, who's counting? The point is that most music hits full level for only milliseconds at a time anyway, with exceptions like commercial radio, of course [and Radio 1! - News Ed], so with real programme the Moths are adequate for normal hi-fi use.

As for bandwidth, noise and crosstalk, the power amplifiers are fine. Distortion in the mono units is very good, below 0.005% at high output levels and well buried in noise at low levels. Maximum distortion occurs around 3W out, and although normal distortion measurement shows figures below 0.01% at any frequency and any level, differentiating the output from the amplifier (the 'dV/dt distortion test' which usefully highlights very high harmonic order distortions) yields a signal with spiky distortion at up to 0.5% peak-to-peak ratio - crossover distortion if ever I saw it. Since there is a certain degree of class A operation in the amplifiers, this distortion effectively vanishes at output powers below about 300mW (full power -20dB), and the spikes are in any case only 10 microseconds wide. So it is not disastrous, but it is there and it is quite probably an audible artefact, reducing clarity and precision from the sound by a small amount (cf.

comments on treble openness above?).

In the stereo amplifier, distortion is rather higher than in the mono, particularly as regards low (up to 10th order) harmonics. Crossover distortion is similar. Given that the stereo and mono amplifiers are very similar internally (the mono in fact approximates to a stereo with both channels paralleled), I found this higher distortion slightly surprising, but the designer's own data agree with this and it seems to correlate with the somewhat clearer sound of the monos.

The phono stage measures as impressively as it sounds. It has a quite outstandingly flat response (facilitated by the use of passive equalization), within 0.1dB from 20Hz to 20kHz on low gain setting and extending to beyond 100kHz. Noise is excellent with a moving-coil cartridge, about as good as I have ever seen in an active m-c stage, and the poorer figure for m-m input reflects the fact that the input stage is optimized for a low impedance source. From my own experience, I would recommend using a lead-through load terminator for m-c cartridges, which generally prefer a lower impedance than the 47k provided.

Headroom is fine, and a maximum output of 18V, sourced from 100 ohms, is enough to damage the input stage of an unpowered power amplifier, so be care-

ful! The Moth phono stage is unusual in being able to drive low impedance loads, as low as 100 ohms, with a small increase in distortion at outputs above about 1V, so cable tweaks could try using a properly double-terminated line (with 92ohm coaxial or 300ohm ribbon cable). Crosstalk is good, sensitivity is lowish but is being increased on current production samples, and distortion is practically unmeasurable. Beware the DC-coupled output stage, which can generate quite a bit of offset voltage (also to be improved).

The passive unit thoughtfully switches ground as well as signal lines, and as a result has excellent immunity to hum loops and good input separation.

Conclusion

I am certainly impressed by the whole system, very much so by the phono stage and not less by the other components. Obviously a whole Moth system could be purchased together, but the units would also suit the integrated-amplifier user who wishes to start on the separates route. The phono stage could be used with many integrated amplifiers to advantage, either replacing the built-in phono amp, adding m-c compatibility or adding a phono option to a line-only integrated. Whatever, these amplifiers are likely to win friends. ♪

MOTH 30 SERIES AMPLIFIERS

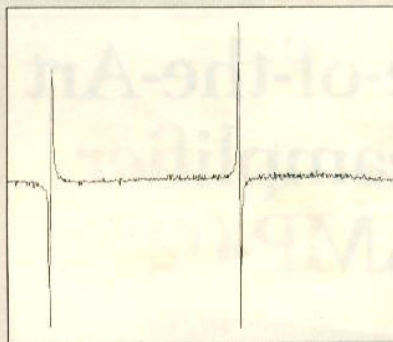


Fig 1: dV/dt distortion residual on 1kHz at 3W out (mono unit). Trace covers 1ms. Amplitude is 0.5% peak-to-peak of signal

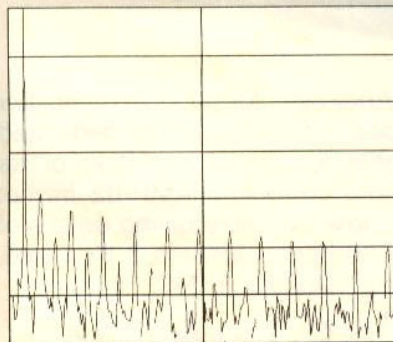


Fig 2: distortion spectrum of stereo amplifier; 1kHz, 20W out (0-25kHz, 20dB/vertical division)

Test results

Moth 30-series mono power amplifier

Output max. before clipping:	29W-32W into 8 ohms, 30W-36W into 4 ohms
Peak (pulse) output power	72W into 8 ohms, 128W into 4 ohms +34A/-30A
Peak output current into 1ohm + 7.5µF	
Frequency response (any level):	3Hz-130kHz ± 1dB, 1.4Hz-240kHz ± 3dB -89dBW, A-wtd
Noise	
Total harmonic distortion:	20Hz 1kHz 20kHz
25W out into 8 ohms	<0.01% <0.005% 0.01%
50mW out into 8 ohms (peak ratios)	<0.02% <0.003% <0.01%
dV/dt distortion, 25W out into 8 ohms (peak ratios)	0.3% 0.25% 0.1%
dV/dt distortion, 50mW out into 8 ohms (peak ratios)	- <0.02% 0.05%
Sensitivity for rated output (30W)	0.58V
DC offset	6mV
Output impedance, TdP method	20Hz 1kHz 20kHz
100mA in	18mohm 20mohm 110mohm
Slew rate into 8 ohms	± 20V/µs
Typical price including VAT	£199

Test results

Moth 30-series stereo power amplifier

Output max. before clipping:	15W-18W into 8 ohms, 12W-16W into 4 ohms, both channels driven (approx 60% higher one channel driven)
Peak (pulse) output power	56W into 8 ohms, 100W into 4 ohms +24A/-22A
Peak output current into 1ohm + 7.5µF	
Frequency response (any level):	3Hz-120kHz ± 1dB, 1.2Hz-240kHz ± 3dB -96dBW, A-wtd
Noise	
Total harmonic distortion:	20Hz 1kHz 20kHz
25W out into 8 ohms	0.02% 0.01% 0.03%
50mW out into 8 ohms (peak ratios)	<0.02% <0.02% <0.02%
dV/dt distortion, 25W out into 8 ohms (peak ratios)	0.3% 0.3% 0.08%
dV/dt distortion, 50mW out into 8 ohms (peak ratios)	- <0.4% 0.5%
Sensitivity for rated output (30W)	0.56V
Stereo separation:	Approx. 60dB across the audio band
DC offset L/R	0.7mV
Output impedance, TdP method	20Hz 1kHz 20kHz
100mA in	14mohm 14mohm 120mohm
Slew rate into 8 ohms	± 24V/µs
Typical price including VAT	£199

Test results

Moth 30-series passive control unit

Input impedance:	10kohm
Stereo separation at least favourable volume setting, any frequency:	>70dB
Crosstalk between adjacent inputs at least favourable volume setting, any frequency:	<-90dB
Typical price including VAT	£129

Test results Moth 30-series phono stage

Frequency response:	1dB limits 3dB limits
M-m input	3Hz-110kHz 1.1Hz-200kHz
M-c input	23Hz-80kHz 11Hz-150kHz
Phono response - comments:	Within 0.1dB 20Hz to 40kHz (m-m)/60Hz-40kHz (m-c), excellent square wave response
Signal/noise, m-m in (cartridge input termination) ref. 1kHz 5mV	73dB A-wtd
Noise figure, m-m input	5dB A-wtd
Signal/noise, m-c in (12ohm input termination) ref. 1kHz 0.5mV	80dB A-wtd
Noise figure, m-c input	6dB A-wtd
Total harmonic distortion	20Hz to 20kHz at up to 3V output, less than 0.01% (typically less than 0.004%)
Overload levels, m-m input	20Hz 1kHz 20kHz
Overload levels, m-c input	2.2mV 2.10mV 600mV
Input sensitivity for 1V out:	
M-m input	1.2mV
M-c input	1.2mV
(Note: to be revised on future production to approx 8mV and 0.8mV respectively)	
Stereo separation:	20Hz 1kHz 20kHz
M-m input	83dB 78dB 60dB
M-c input	85dB 81dB 74dB
DC offset	Up to 30mV on test; to be improved on future production
Input impedance (either gain setting)	47kohm
Output impedance (any frequency)	100ohm
Typical price including VAT	£169

Phono/phone interconnects not included with units

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