Halcro DM58 Amplfier: The Meaning of Zed

Two years ago an unknown company in Australia called Halcro took out a full-page advertisement in *Stereophile* to introduce a power amplifier it claimed would maintain distortion at a level not exceeding 0.00001 percent. Now that's not the sort of claim that would impress many audiophiles, but having investigated low-distortion amplifiers at some length, I was quite interested. I thought the company merited investigation, and I contacted them. Two years later, I got a review sample.

Claims and Numbers

I paid to have the Halcro amplifiers measured by an independent test facility in Australia, the Physics Department of the University of Adelaide, before they were shipped to me. Testing was done on a specially constructed bridge circuit, in which a Hewlett Packard oscillator produced the test tones, and the padded-down output signal from the amplifier was compared to the oscillator signal, which was in an anti-phase relationship to the amplifier output, since the amp is inverting. The residue represented the distortion products of the amplifier.

At 1 kHz, harmonic distortion was unmeasurable up to 40 watts and there was no evidence of crossover distortion. At 20 kHz, distortion was unmeasurable at 4 watts and under, but rose to about 0.0001 percent at 400 watts. The measurement was about the same at 40 watts and showed almost equal values for second, third, fourth, and fifth harmonics. Intermodulation distortion measurements were rather curious but undeniably excellent. At 1kHz at 120 watts, the figure was 0.00003 percent, but unmeasurable at higher frequencies. Published measurements were all made at 4 ohms, but according to the lab report, 8-ohm measurements were even lower. Incidentally, Halcro makes another model, the dm68 with distortion purportedly four times lower.

What does this mean in the context of the current marketplace? The closest competitor is Boulder, whose newer amps are spec'd in the 0.0001 percent range. About a decade ago, an English designer named Les Sage sold amplifier modules with claimed distortion in the 0.00001 percent range, but these have long been out of production. Most High End solid-state amps today put out about a hundredth of a percent distortion, though as recently as ten years ago, that figure was more likely to be a tenth. Interestingly, some of the no-feedback designs, such as the Ayre Acoustics products, spec out at over 1 percent THD.

A final word on measurements: Signal-to-noise ratios were not provided by the test facility. Designer Bruce Candy believes that such figures mean little because they are almost never made with reference to frequency or gain. He does say that the dm58 is among the quietest amplifiers in the industry.

The way in which distortion figures in the sound of amplifiers is a matter of fierce debate in the High End, with some designers even maintaining that an inverse relationship exists, i.e., the lower the distortion, the worse the sound. In theory, though, an amplifier with no distortion of any kind should simply sound more transparent.

Design and Construction

Those who have seen Halcro's ads in our magazine know what the amplifier looks like, which is to say, not much like an amplifier at all: two large aluminum boxes separated by an air space, supported by two massive curved legs that double as heat sinks. Trimmed with lacquered copper and some kind of unspecified tropical hardwood, it is quite handsome.

The Halcros are designed in such a way that only a trained service person can get into them, so I could not open them to see the innards. However Halcro achieves its remarkable measured performance, they don't want you to know! Nevertheless, the company did post some technical specifics on their website (subsequently taken off), and Candy provided me with a few tantalizing scraps of information.

The dm58 and the similar dm68 utilize bipolar inputs and MosFET outputs in a topology that is single-ended up to the output stage, which itself is quasi-Class A. A unique power-factor-corrected switching power supply with built-in line conditioning is said to provide uniform power output at any voltage from 70 to 250. All stages except the output are extensively voltage regulated and constant current sourced, and each output device is driven by its own separate driver device. According to Candy, the amps are heavily protected against all fault conditions, including surges in the kilowatts, DC inputs, and dead shorts.

Candy further states that the arrangement of stages is fairly conventional – differential input, followed by a main gain-stage loaded with a current mirror, followed by a unity gain power-output stage – but that the individual circuit topologies through which these stages are realized are highly unconventional. Parts are also said to be quite unusual for an audio component and in fact designed for other applications. Almost uniquely, extensive Faraday shielding is used to prevent magnetic interactions between stages.

Candy's basic approach to audio circuit design – maximizing input impedance and bandwidth and stabilizing gain characteristics across the frequency spectrum – is pure textbook. Feedback is utilized, but not in especially high values. Candy takes pains to point out that the infinite-gain, infinite-feedback approach used in most low-THD commercial op-amps is not the design principle he followed in the Halcro units.

The Sound of Zed

In my system, the Halcros were used to drive German Physiks Unicorn loudspeakers and Elac Ribbon tweeters. An Accuphase SACD player and a Sota Millennia turntable with a Decca Jubilee cartridge furnished the signal sources. A Boulder L3AE preamp, a Dact preamp, and a Silver Rock transformer potentiometer were variously used as interfaces, with the Silver Rock preferred. My reference Wolcott Audio Presence monoblocks (THD under a hundredth of a percent) provided a reference.

My first impression was of vastly heightened dynamics, almost as if a signal processor were present somewhere in the circuit. Particularly with SACD, musical events seemed to detonate, and all within a precisely defined performance space. Nowhere was this more evident than on the Mo-Fi reissue of *Muddy Waters, Folksinger* [MFSL-1-201]. With the Wolcotts, the recording was certainly exuberantly alive, but with the Halcros in the system, guitar chords were more plangent, bass notes fell with greater impact, and drum-beats positively resounded.

Heightened dynamic range combined with extraordinary articulation of musical textures was evident on recording after recording. Recordings set at apparently normal listening levels – and normal for me is pretty low – would reach startling crescendos, and never with any audible sense of amplifier overload. Rather, the amp appeared to have limitless headroom. And yet the distortion specs argue strongly against signal processing. Maybe the extraordinarily low noise-floor is one factor. Used with the Silver Rock potentiometer, which is passive, the Halcros are dead silent with the pots set at full gain.

If the Halcros appear to contain a dynamic-range expander, they also seem to harbor a frequency-range expander. The German Physiks Unicorns have steep bass roll off at 40 Hz and a squirrelly top end owing to high-frequency ringing in the driver. When they were driven by the Halcros, neither problem was much evident. Indeed, the bass on this inefficient loudspeaker becomes sonorously authoritative, witness Edgar Meyer's impassioned bowing on *Appalachian Journey* [Sony Classical SACD 55-66782], on which the high harmonics of Mark O'Connor's fiddle are also arrestingly real. The top octave and beyond, rendered with stratospheric extension by the Accuphase SACD player on the one hand and the Elac ribbon tweeter on the other hand, were unfailingly sweet, limpid, and natural sounding with the Halcros – no hash, no glare, no glitter, nothing but air, delicacy, and crystalline articulation. Cymbal hits on *Miles Smiles* [SACD version, CS 65682 Columbia Legacy] were the best I've heard in terms of sound reproduction, and Miles' own muted trumpet was palpably real.

Reverberation, whether artificial or native to the recording space, was reproduced with startling precision. Sounds decayed with the half-life of uranium, dwindling away into deep, black silences the like of which I've never heard on an audio system. This in turn conveyed an amazing sense of depth, as on the M-A recording *Mudejar* [MO42A], recorded in a church with minimal microphone techniques.

The Halcros, as one would expect, are not euphonic, and are quite unable to mask poor source material or the blemishes of other components in the signal chain. Through the Halcros, I became aware of a slight metallic hardness imparted by the Boulder LA3E preamp that vanished when the passive Silver Rock was substituted. With a signal chain consisting of the Accuphase, the Silver Rock, and the Halcros, terminating in the Unicorns, there was no taint of electronic glare whatsover. On well-recorded source material such as *Beethoven, First and Third Piano Concertos* performed by the Ochestre Philharmonique de Monte Carlo under Jean-Claude Pennetier [Lyrinx SACD LYR 2166], the sense of naturalness was astonishing, and I found myself thinking that the need for tube amplification, at least in the playback chain, is now exceedingly questionable. In fact, I don't believe any consumer vacuum-tube component holds an advantage over the Halcros.

What about solid state? I don't know. Over the years, I've compared the Wolcotts to amplifiers from Krell, Spectral, Pass Labs, Bryston, and Burmester, and of the lot, only the Burmester really approached the Wolcotts in overall performance. But the Halcros beat the Wolcotts in every respect but deep-bass reproduction, where the two were about equal – which is to say: better than the rest. The Wolcotts are tremendously powerful, high in resolution, and without a hint of hardness, but they don't resolve low-level detail as well. But then nothing does that I've heard.

The more I listened, the more convinced I became that Halcro's technical excellence represents the preferred approach to amplifier design. If you

want the colorations, go to the other people. If you want diamond clarity and an utter lack of blemishes or misbehavior, go to Halcro. But once you've lived with the things, you just won't be able to go back to the prior art. You'll have to have Halcro.

But you'll also have to have $20,000.

DAN SWEENEY

MANUFACTURER INFORMATION

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Source: Manufacturer loan
Prices: dm58 – $20,900 (dm68 – $29,900)

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Sanibel Sound
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ASSOCIATED EQUIPMENT

Sota Millenia turntable; Mission Mechanic pick-up arm; Decca Jubilee phono cartridge; Accuphase DP-100 CD transport; Accuphase DC-101 digital processor; Boulder LA3E preamp; Dact preamp; Silver Rock transformer potentiometer; Wolcott Audio tube monoblocks; Harmonic Technology cabling throughout

MANUFACTURER RESPONSE

...We would like to explain our philosophy . . .and the meaning of Power Factor Correction (PFC) to readers unfamiliar with this term:

We are keen audiophiles and find that the harshest and most artificial sound resides in high frequencies, especially for ...complex music...In order to improve upon this, we decided to tackle amplifier distortion. After a great deal of R&D, we developed the Halcro technology, which substantially improves this area. We believe that Sweeney's and other audiophiles' positive observations are mostly in response to the [Halcro's] improvement in the ability...to accurately reproduce high frequencies...especially the dynamics of transients.

In contrast to [our designs], it is currently fashionable to maximize distortion! This practice may provide satisfactory sound for simple musical instrumentation and may indeed mask some aspects of poor recordings or associated equipment, but is unsuitable for more complex music, especially for high-quality recordings.

To the best of our knowledge, all other amplifiers use peak-voltage rectification in their power supplies. This means that the mains current surges near the peaks of the mains voltage waveform and idles at lower voltages. This practice is common in virtually all mains electronics (computers, video equipment, etc)...Peak rectification causes massive distortion to mains waveforms, which may interfere with some audio equipment. This problem is so acute that peak rectification is soon to be outlawed in many counties. In contrast, the active PFC Halcro current waveforms do not corrupt mains waveforms and produce a current in direct sympathy with voltage.

BRUCE CANDY
HALCRO