

FIRSTWATT F5

Reviewer: Srajan Ebaen

Financial Interests: click [here](#)

Source: APL HiFi NWO 3.0-GO; Ancient Audio Lektor Prime; Raysonic Audio CD-168

Preamp/Integrated: Supratek Cabernet Dual; ModWright LS-36.5 with PS 36.5; Melody I2A3; Woo Audio Model 5; *Trafomatic Experience One* [on loan]

Amp: 2 x Audiosector Patek SE; 2 x First Watt F4; Yamamoto A-08s; Fi 2A3 monos; Yamamoto A-09s

Speakers: Zu Audio Definition Pro; DeVore Fidelity Nines; WLM Grand Viola Monitor with Duo 12; Rethm Saadhana; *Zu Presence* [on loan]; Mark & Daniel Maximus & Ruby Monitors w. OmniHarmonizer

Cables: Ocellia Silver Signature loom; Crystal Cable Ultra loom; Zanden Audio proprietary I²S cable; Crystal Cable Reference power cords; double cryo'd Acrolink with Furutech UK plug between wall and transformer; Stealth Audio Indra and Meta Carbon

Stands: 2 x Grand Prix Audio Monaco Modular 4-tier

Powerline conditioning: 2 x Walker Audio Velocitor S fed from custom AudioSector 1.5KV Plitron step-down transformer with balanced power output option; Furutech RTP-6 on 240V line feed

Sundry accessories: GPA Formula Carbon/Kevlar shelf for transport; GPA Apex footers underneath stand, DAC and amp; Walker Audio Vivid CD cleaner; Walker Audio Reference HDLs; Furutech RD-2 CD demagnetizer; Nanotech Nespa Pro; Acoustic System Resonators and front wall sugar cube matrix

Room size: 16' w x 21' d x 9' h in short-wall setup with openly adjoining 15' x 35' living room; concrete floor and ceiling, concrete/brick walls

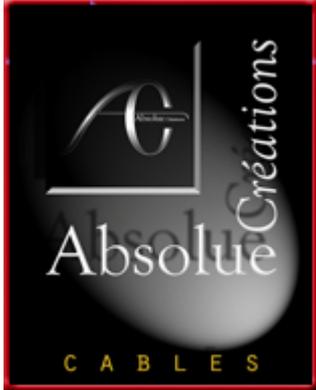
Review Component Retail: \$3,000



Nelson's infamous Klein horns used to evaluate a large range of wideband drivers. These horns have since been gifted to an artists' collection. One of Nelson's current speaker experiments centers around a Featrex D9nf in an open baffle.

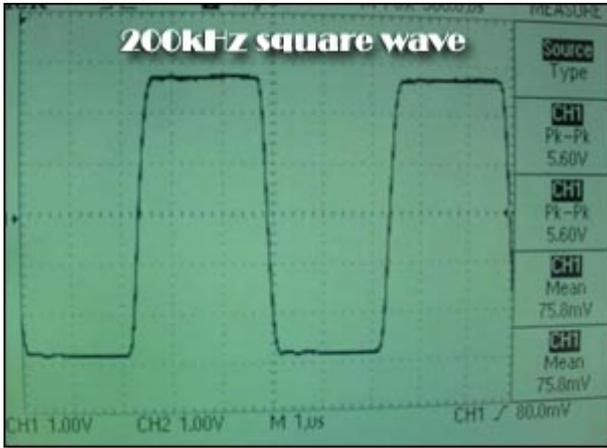
Nelson Pass. FirstWatt. Kitchen table venture. Surely all this has been active long enough to no longer catch our readers in the dark. For a light switch reminder, reviews of the F1 thru F4 plus Aleph J have all the relevant information covered solid in our archives. Here's what bears repeating though. By design, all FirstWatt products are tailored to certain very specific uses. As the name gives away, those are focused on the higher-sensitivity speakers that come on song within the very first watt to consume little power.

"Jack of all trades but master of none." "Being everything to all people." *Not!* So exclude, eliminate, focus, optimize, perfect. Arrive. That would be limited editions of 100, with each amp model -- and five line-level products are in the chute next -- custom-tailored for very narrow applications. Single-ended and push/pull transconductance amps. A low-power amp with JFETs for output devices. A pure power buffer with zero voltage gain. And, as the odd one out by being a perfectly normal amp in this group of eccentricities, a new installment of the classic Aleph circuit with JFETs at the input, hence Aleph J. That's been Nelson's output under FirstWatt thus far.

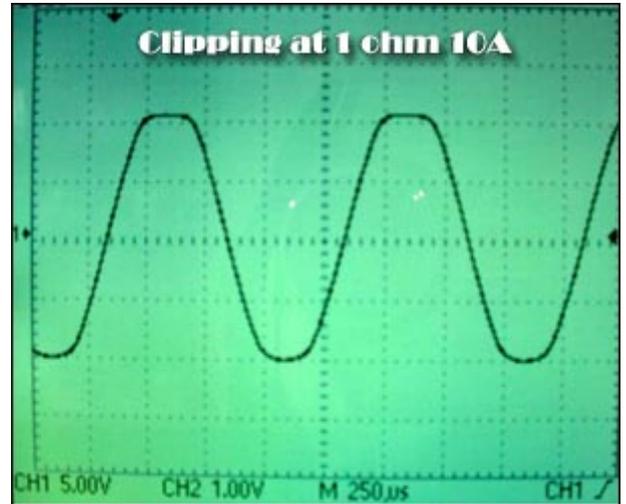


Common to it all have been the chassis; class A operation; twin 18V secondaries; hand assembly by the maestro himself; and a very generous transfer of the circuit schematics into the public domain once the limited editions had sold out. To recap, with FirstWatt, Nelson Pass is beholden to no one but his own creative genius. His livelihood and economic viability are secured by Pass Labs. FirstWatt is thus the quintessential mad scientist's lab at the edge of the mainstream abutting another universe. You just never know what to expect next. Except that five follows four. In *this* universe.

In his own, would the man pull another stunt as he did with the Aleph J? Not that way, this time. The latest in the F series (which might stand for *fun* or *fabulous* or *far out*) is the F5 which follows numerically on the heels of the F4 buffer/follower amp. The F6 thru 8 have already been conceptualized as higher-power mono versions of the 3, 4 and 5 respectively. FirstWatt is about narrow paths less traveled, not milking repetition in overgrazed fat meadows. "I think it will be a little while before FW starts repeating itself" quipped Nelson laconically. So watts up with the 5? What particular niche and needs does it fill? (For a great read on Nelson's earlier career by the way, jump over to Thomas J. Norton's 1991 interview with the man in the Stereophile [archives.](#))

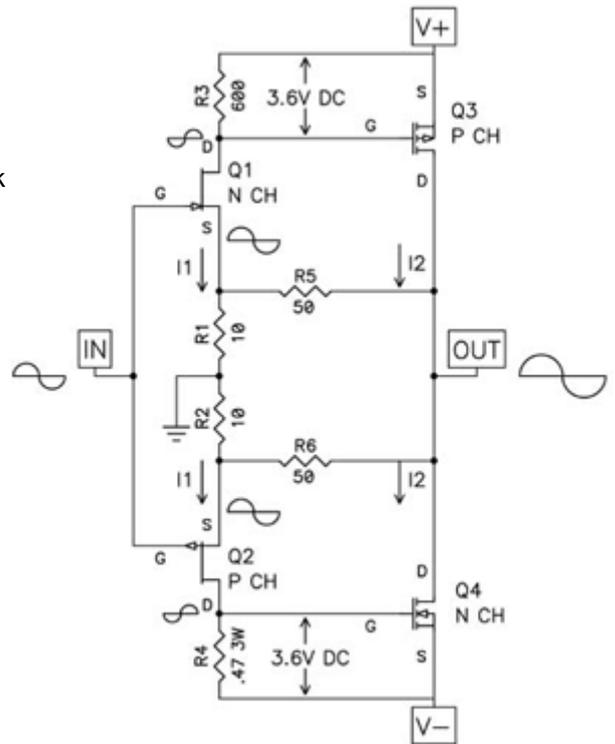


These graphs open to 698 x 511 at 54.7KB and 698 x 581 at 73.7KB respectively and in new windows



It introduces a few firsts for FirstWatt: feedback*; and a full 50 stereo watts. The simplified circuit shows a DC-coupled 2-stage current source amp with 15.15dB into 8-ohm voltage gain, specifically a complementary MOSFET common source output stage (as previously seen in Nelson's Zen Variation 5 DIY circuit, here biased at 1.3A and class A up to 2.6A) driven from a complementary JFET common source with +/-24V rails. On the subject of bandwidth, check out the square wave performance into 200kHz - scarily close to perfection. Might the lack of signal path capacitors have anything to do with that?

When I first saw that graph, I had to know - was this ultra-low distortion and speed due to newfangled parts or circuitry? The latter. Nelson describes himself as a circuit mechanic. Parts are important but to him, circuit architecture is senior. Where modifiers will throw money at designer parts, a true master of the craft goes to the source. He manipulates how the electrons flow, resets the levies and dikes and flow valves in the three-dimensional construct of an electronic circuit. This enforces very specific electron behavior to establish ideal relationships between voltage, current, distortion, bandwidth, amplification factor, ground plane, noise, impedances. It writes the 'molecular code' for how a circuit behaves. That would seem rather more creative than dressing up parts.



* Nelson Pass: "As I have previously pointed out elsewhere and in the F5 write-up, the term current feedback probably came from the marketing departments at the chip companies when they began selling high-speed op amps using this approach."

The distortion performance at 1 watt is below 0.002% and rises to a negligible 0.05% at 20 watts which would turn low-power SETs green with envy. Poster Klaus on the [Pass DIYaudio.com](#) forum suggested "would the master be offended if I called the F5 a modern FET-based Hiraga? I see some similarities, current output (open loop), current feedback, straight two-stage design (if one wants to count a diamond buffer and a CFP as one stage, resp)."

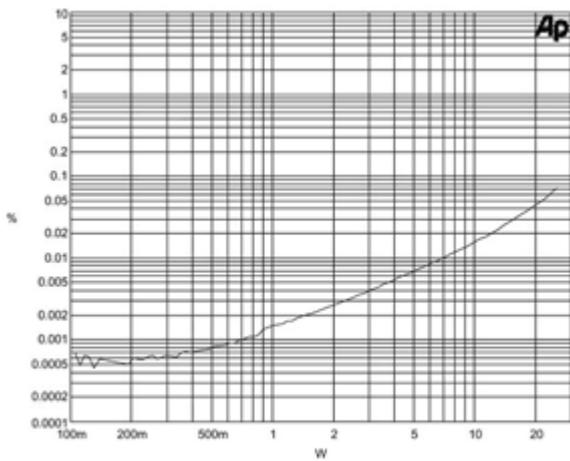


FIGURE 7 DISTORTION VS POWER @ 8 OHMS @ 1 KHZ

This graph open to 610 x 512 at 91.7KB in a new window

to which Nelson replied: "Not at all. It's a topological classic - the devil is entirely in the details." Other posters called the circuit "an amp so simple, even a cave man could build it". "Of the Zen and FirstWatt series and for damping factor, the F5 would be the best since it has a DF of 80 and will drive 2 ohms without burping. I don't believe, however that I would point it at a speaker with both a low impedance and a low sensitivity. Reactance is not an issue. The performance is slightly more robust into a fully reactive load vs a resistive load of the same impedance. The F5 has the lowest distortion yet achieved by either a Zen or First Watt amplifier, descending to 0.001% below 1W. Suffice it to say that the F5 has

more power, more damping, more current, more bandwidth, lower distortion and higher input impedance than the other Fs. Many will think it sounds better."

Those looking for ground-breaking circuit innovation will come up short. The F5 takes wing at the zenith of a master's career where, regardless of craft, less becomes more. A simple sketch conveys more meaning than a technically advanced photo-realist painting. A short haiku nails more essence than a florid novel. It's about trimming the fat. It's about distilling a circuit down to its barest essence while *seeing* and manipulating the interrelatedness inside that simplicity with new clarity.

Nelson has penned a how-to F5 article in [AudioXpress](#). "One of the aims of these articles is to get people to build amplifiers". With 50 stereo watts, low output impedance and feedback, the F5 appears to move away from the FirstWatt center focus and toward the periphery.

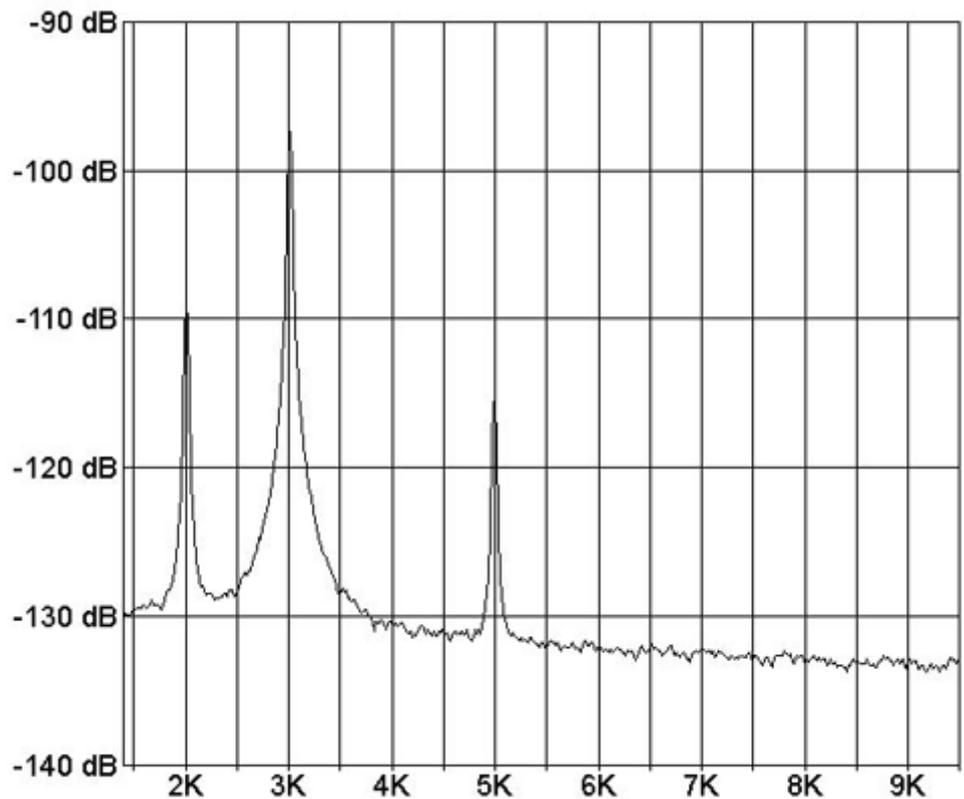


FIGURE 8 DISTORTION SPECTRUM @ 1 WATT @ 1 KHZ



But the distortion figures suggest clearly that the core of the credo -- the ability to track the most minuscule signal fluctuations inside that very first watt -- isn't merely retained. It's arguably been heightened with a high-speed wide-bandwidth circuit of uncommon linearity. The culprit or *boogie* man in this instance is feedback. It's also a contentious and misunderstood topic on which Nelson is penning an upcoming paper for our readers.

“PROBABLY EVEN GEICO CUSTOMERS COULD BUILD ONE.”

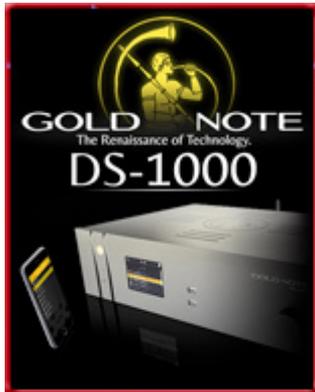
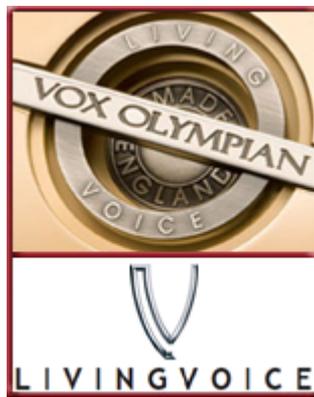
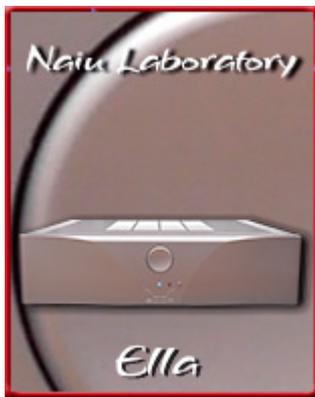


“CURRENT THROUGH ONE HUNDRED
PINCHED THE FRONT END BIAS IS
OUTPUT SOURCE MATTERS NOT.”

Informal attire during post-surgery convalescence

"This circuit employs feedback in a dual pair of low impedance voltage dividers -- low impedance feedback has been (incorrectly) referred to as 'current feedback' -- and one of the charms of this arrangement is that unlike the classic two transistor differential pair, the drive current available exceeds the bias of the input stage. Each JFET has its own feedback so there are two separate and independent feedback loops to this amplifier. The input impedance is 101 Kohm and the output impedance 0.1 ohms for a damping factor of 80. The noise is about 30uV. Because the output stage employs only two output devices per side which are capable of very high current, deliberate limiting is set by 3-watt power resistors to the source pins of the MOSFETS to increase thermal stability and serve as convenient current-sensing elements. The amplifier with 24V supply rails is good for a 50-watt peak into 8 ohms or about 2.5 amps. For a 4-ohm load we would want 5 amps and for a 2-ohm load, 10 amps. Since we only have two output devices, we probably are best off stopping there to ensure against damage into dead shorts. Current limiting gets a bad rap in general, but I think it's a matter of where and how the limits are set. In toto, a nice little amplifier without too many parts that sounds great."

In the end, that's the part which matters most to you and me. Nelson's haiku instructions to thinking DIYers are for the hands-on crowd. Amazingly here, detailed instructions on how to roll your own are out prior to first commercial units. For the F5, Nelson's very sporting generosity has put DIYers on equal footing with FirstWatt. To hell with commercial considerations. Off to fun 'n' games. That's been the prevailing attitude of this kitchen table effort all along: "The B1, a buffered "passive" using my new Jfet buffer is in production, that is to say I have stuffed one up and it works. I have the boards for another 10, so it will be waltzing shortly. The specs are fabulous and it will be really interesting to see if the buffer solves the age-old passive problem that people have. I think it will, insofar as the concept worked very well for our INT150 integrated, which is really just an X150.5 with a selector and buffered volume control." If it takes two to tango, Pass Labs and First Watt are partnering up very nicely.



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