

“... contemporary audio engineering
AT ITS BEST.”

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 stunning realism ...
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 piece of audio equipment,
 capable of giving
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by Peter Aczel

I have believed, and proclaimed, for years that the power amplifier and the loudspeaker are in effect a single system, the back end of the audio chain, and should ideally be designed as an integrated unit. The market, on the other hand, has steadily resisted such an approach, at least until recently. (Audiophile orthodoxy requires an à la carte choice of each separate component, and especially of the power amplifier, otherwise those exquisite judgments regarding the “speed” or “graininess” or “layering” of bipolar versus MOSFET output stages, not to mention single-ended triodes, would remain unexercised.) Today, the penetration of the home theater market by powered subwoofers is making it easier for powered main speakers like the Paradigm Reference Active/20 to gain acceptance. It is plain common sense that a lean-and-mean dedicated amplifier is a more efficient engineering solution than a fat all-purpose amplifier, but common sense is not what usually prevails in the delirious world of high-end audio.

All of the above would be little more than enlightened theorizing were it not for the outstanding performance of the Active/20. This product represents contemporary audio engineering at its best. Exactly how good is it? So good that, if it were only a *tiny* bit better, the ultra-high-end loud speaker business would be in big, big trouble. Luckily for the megabuck speaker makers, the Paradigm stops just a hairsbreadth short of “ultimate” performance. But it’s close, uncomfortably close.

Not that the Active/20 isn’t high-end. This publication, unlike certain others, doesn’t consider products at this price to be mid-fi. But look what you get. A very solidly built, bookshelf-size, thoroughly dead enclosure, available in a choice of attractive finishes; a 6-1/2-inch bass/midrange driver with a high-tech mica-loaded polymer cone and die-cast basket; a 1-inch aluminum dome tweeter,

Active/20



also with die-cast chassis; two built-in power amplifiers (110 watts for the bass/midrange, 50 watts for the tweeter); an electronic crossover (3rd order, 1.5 kHz); a full complement of calibrated controls; a choice of RCA or XLR (balanced) input; an extra-long AudioStream shielded interconnect with RCA plugs (tweako style, B.S. arrows printed on the insulation to show signal direction — but, hey, it's harmless, it's sturdy, and it's free). That's pretty good value, and all of it is quite nicely built. (One exception: the heavy toroidal power transformer of the internal electronics could be more securely mounted; it came loose in one sample I looked at.)

“The sound quality resulting from these performance characteristics is very high ...”

Obviously, I couldn't have such a high opinion of the Active/20 if the measurements weren't good. But they are. The 1 meter frequency response on axis is very flat, ± 2 dB, up to about 14 kHz; above that it rises to an 18 kHz peak which flattens out off axis. Whether the axis is considered to be that of the woofer or of the tweeter is quite uncritical; the curves are almost the same. At 45° off axis the response is still excellent, ± 3 dB all the way up to 18 kHz. The low-frequency response is necessarily limited but very respectable; the vented box with its rearward firing ducted port is tuned to 42 Hz, which is the -3 dB point of the 4th-order Butterworth response profile. A highpass filter (3rd order, 100 Hz) is activated by a toggle switch to roll off the bass for use with a subwoofer.

At a 1-meter SPL of 90 dB, normalized to 400 Hz, the nearfield THD sweep of the woofer started at 0.15% at the top of its range, remained at that level down to 300 Hz, then rose steadily to a maximum of 3.6% at 32 Hz. The tweeter at the same 1-meter SPL, normalized to 6 kHz, fluctuated between 0.05% and 0.15% THD over its operating range, pretty much like other 1-inch dome tweeters. This admit-

tedly limited exploration of the Active/20's distortion performance indicates perfectly well-behaved drivers, unlikely to be pushed beyond their capability by their dedicated amplifiers.

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The sound quality resulting from these performance characteristics is very high, as I have already stated. The speaker is not quite as neutral, transparent, and subtly refined in sonic detail as the Joseph-Audio RM7si “Signature” or, especially, our reference Waveform Mach 17 but it definitely nudges the borders of that category. Only by quickly switching to those superior speakers (as driven by external electronics) is the difference clearly perceived. Considering the advantages, in cost and convenience, of the Active/20's internal electronics, the difference may not be important to the prospective purchaser. This is a highly persuasive piece of audio equipment, capable of giving satisfaction to demanding audiophiles, and it can expand into a



Servo-15

self-powered super system by the addition of the Paradigm Servo-15 subwoofer, whose review follows.

SERVO-15

I find it a little difficult to pinpoint the place of this unit in the high-end subwoofer pecking order. I would rank it higher than the Bag End Infrasub-18 but lower than the Velodyne Servo FSR-18 — if it were that simple, which it isn't. For example, the Bag End is easier to match to the main speakers, the Paradigm sub is the obvious bass extender for their Active/20s, and the Velodyne is relatively overpriced without offering greater low-frequency extension. And so on. The truth is in the details.

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The Servo-15 is a motional-feedback subwoofer designed around a 15-inch driver, a 400-watt internal power amplifier, and an outboard crossover/control unit (X-30). Its external dimensions are 20 in. (height) by 18 in. (width) by 22-1/2 in. (depth). The X-30 controls the phase, lowpass cutoff frequency, and level of the sub, while providing highpass outputs for the main speakers with a choice of three crossover frequencies. Thus an elaborate AV front end (such as the Lexicon DC-1) would eliminate the need for the X-30, but in most installations some, or all, of the functions of the latter will be used. Other powered subwoofers usually have these functions consolidated on the back panel.

Are the sealed-box loading, the power amp, and the accelerometer-controlled servo loop of the Paradigm fundamentally

different from the design used by Velodyne? Without blueprints and circuit schematics I can't have an answer to that question, but I discern somewhat different design priorities on the part of the Paradigm engineers. The external evidence of that is the relatively higher THD of the Paradigm — but still much lower than the distortion in open-loop systems — accompanied by low-frequency performance quite comparable, and even superior, to that of 18-inch subs. What could be the reason for such a difference? The design of the driver, for one thing. The design of the accelerometer, for another, not to mention the placement of the accelerometer. Maybe all three.

“... low-frequency performance quite comparable, and even superior, to that of 18-inch subs. ... The measured performance of our Servo-15 sample was outstandingly good.”

The measured performance of our Servo-15 sample was outstandingly good. The small-signal frequency response was ± 0.75 dB down to 21 Hz and 3 dB at 18 Hz. That is very similar, almost identical, to the response of the Velodyne Servo FSR-18. A nearfield THD sweep of the sub at a 1-meter SPL of 100 dB (normalized to 50 Hz) resulted in a curve that starts with 0.15% at 110 Hz, crosses 0.2% at 52 Hz, begins to break sharply at 44 Hz, crosses 1.0% at 30 Hz, and rises to 4.1% at 20 Hz. The nearfield FFT spectrum of a 20 Hz tone, with the 1-meter SPL set to 95 dB at that frequency, showed the 2nd harmonic to be at -26 dB (5.0%), the 3rd harmonic at -32 dB (2.5%), the rest negligible. Thus the Paradigm distorts a lot less than ordinary woofers but quite a bit more than the Velodyne.

Then there is the question of maximum SPL capability. At 20 Hz, the rapidly rising distortion in the vicinity of 100 dB suggests that there is little margin left

before the limiter clamps down. (All powered subs have some kind of built-in limiting.) Above 40 Hz there appears to be considerably more headroom; I estimate that limiting would take place only past 110 dB—but I am not willing to expose my ears, my shelves, and my windows to testing at such levels, as I am not really interested in sound tracks with car crashes and rocket launches. In any event, the Servo-15 is at least as capable SPL-wise as any 15-inch sub known to me.

“As far as subjective listening quality is concerned, the Paradigm is right up there with the very best. Organ, bass drum, double basses, etc., are reproduced with stunning realism ... distortion ... is not audible when playing music ... This is one of the best powered subwoofers money can buy ...”

As far as subjective listening quality is concerned, the Paradigm is right up there with the very best. Organ, bass drum, double basses, etc., are reproduced with stunning realism, and the relatively higher distortion vis-à-vis the Velodyne Servo FSR-18 is not audible when playing music (as distinct from test signals), unless more prolonged listening than I have done proves otherwise. This is one of the best powered subwoofers money can buy and that's \$899 less money than the price of the Velodyne.

The combination of the Paradigm® Reference Servo-15 with a Paradigm® Reference Active/20 pair is a stereo amplifier/speaker system whose performance would be hard to beat with conventional equipment costing three times as much or more. If your budget for the “back end” of a stereo system is in that ballpark (and, remember, the 2.1

combination is readily expandable to a cost-effective 5.1 surround-sound array), I cannot recommend anything else more highly. The only thing you risk is losing the love of power-amp manufacturers. A word of caution if you take this route. Correctly level-matching the Active/20s and the Servo-15 to one another is a fussy, time-consuming affair, even if you follow the instructions faithfully. I strongly recommend one of the inexpensive Radio Shack sound level meters and some CDs with frequency sweeps, pink noise, and warble tone to do the job. You'll be frustrated if you do try to do it by ear. I fine-tuned the combination very successfully and ended up with splendid sound, but it took a while. Considering the sound quality per dollar, the effort is well rewarded.

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