The following include articles not purchased last time, plus a few new goodies thrown in just to make things interesting:

Power Cords:
(2) TG HSR-A Gen II, 6'8" ground lift - $50 ea.
(2) TG HSR-A Gen II, 8'6" - $60 ea.
(1) TG HSR2, female has 20 amp plug, can reverse phase, ground lift - $125
(1) Vans Evers Pandora, 6' adjustable tuning bridge - $50
(1) WireWorld Aurora Series III, 6', Power Flow - $75

Interconnects RCA:
(1) Apex LLTL, 1m - $35
(1) ART Blue, 1m - $40
(1) Luminous Audio Technology Monarch II, 1m - $75
(1) Metaxas Enosis Blue, 1m - $35
(2) Music Metre Signature, 1m - $20 ea.
(1) Tara Rectangular Solid Core, 1m - $45
(1) TG Audio HSR, 5ft - $60
(1) Wire World Atlantis, 1m - $15

Digital Links:
(1) AudioPrism, 1m - $15
(1) Apex Ambiance, 1.5m - $10
(1) Classe, balanced, 1m - $25
(1) Esoteric Numericus, 1m - $25
(1) Luminous Audio Technology Allegro, 1m - $25
(1) Metaxas Enosis, 1m - $25
(1) Monarchy, balanced, 1m - $15
(1) Silver Sonic D-110 Digital, 1m - $25
(2) Sonoran Cactus Connect, 1m - $5 ea.
(1) Tara Rectangular Solid Core, 1m - $5
(1) TG Audio HSR, 1m - $50
(1) Tiff TDC-3, balanced, 1m - $15
(1) Vampire (?), 1m - $5
(1) WireWorld Gold Starlight, balanced, 1m - $20

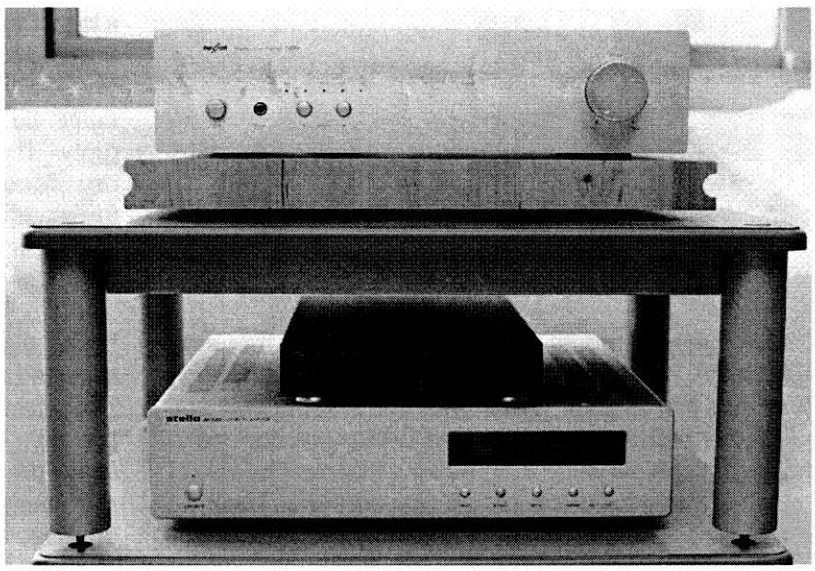
Speaker Cables: (Numbers refer to stereo pairs)
(1) Marigo Audio Labs, 8' spades, two cables per side - $75
(1) Metaxas Enosis, 15', banana terminals - $100
(1) Music Metre Signature, 10' - $75
(1) Silver Sonic T-14, 8', spades, all in one bi-wire set - $100
(1) Synergistic Research Signature #3 HF TL, 9 ft., spades, 2 cables per side - $120
(1) Synergistic Research Signature #2, 9 ft., spades - $75
(1) Tara Labs RSC Master 5000 Gen 2, spades 8', (sep. pos and neg., i.e. two cables per side) - $150
(2) Vampire Continuous Cast, 8', spades - $100 pr.

Other Stuff:
(1) Set of three Golden Sound ceramic cones, 1.5" tall (in original case) - $25
(1) Audio Alchemy Power Station Four. High Current, Dual Output Power Supply. Is not a wall wart, though all cords are captive. ± 18 v DC and ± 8 v DC - $25
(1) Signal Guard component platform. Isolation platform for components. I never cared for it all that much but it's well made and looks cool. $100

Visa and MasterCard only - MGD

Integrated Amp Battle Royal

by Marc Yun



BFS has officially gone integrated amp crazy. In the last few issues, MGD and Rich Weiner have taken a look at some interesting new units from the Far East. In this installment I survey three models ranging in price from $500 to $2800 each possessing a unique combination of attributes and strengths, they are: the Dussun DS99, the April Music Stello AI320 and the NuForce IA-7.

When one mentions integrateds in these pages, one must pay proper respect to the original

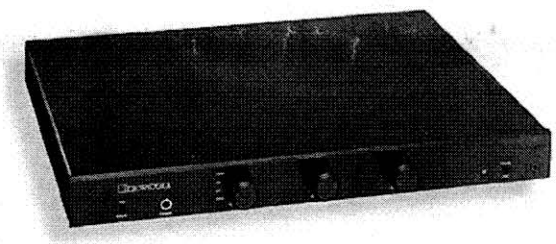
BFS benchmark: the Bryston B-60. An MGD favorite going back to his original review a decade ago, it was a prime mover in taking integrateds to a new level of audiophile respectability.

My own experience with a B-60 several years ago was mixed. Fresh out of college I purchased a used one to go with my newly acquired Merlin TSM-SE's. It was a nice amp but somehow didn't do it for me, and I wound up selling it. When this new crop of integrated amps arrived, I was certain that their performance was at least on the level of, and probably better than the B-60 from yesteryear. I told this to MGD, who proceeded to dig up his original B-60 review unit to challenge my assertion. Comparisons to it were inevitable, so why leave them to pure conjecture based on fuzzy old memories? The integrated amp battle royal was on.

Some testing notes: Speakers on hand were my Merlin TSM-MX's and Silverline Preludes, an excellent little floor-stander ($1200, review forthcoming). Source components included the Stello CDA320 CD player and a Sony C222ES SACD player modified by yours truly. In addition to the Bryston integrated, the "reference" separates for comparison were the Edge G6 and ME 550 II amplifiers driven by a MSB Gold MVC preamp. Speaker cables included JPS Ultraconductors, Synergistic Reference 10's and of course the Lowe's BFS special; interconnects were RWA and Silver Sonic Air Matrix. No power conditioning was employed.

Bryston B-60 Refresher

In case you've forgotten, the Bryston B-60 is a little gem of an integrated that's rated at 60wpc into 8? and 100wpc into 4?. The remote control version (B-60R) retailed for around $1800 for many years, and has since been updated to the B-60 SST. I don't have any experience



with the new model, but it appears to be modestly updated, mostly on the cosmetic front, and hopefully sounds just as good. Given their stellar reputation and 20-year factory warranty, used B-60's still command very high resale value... something that can't be said of 99% of the flavor-of-the-month gear out there. The B-60 was meant to last, and so it has, admirably.

This isn't meant to be a full re-review of the Bryston, just something to facilitate comparison with the current crop of newcomers. So I won't belabor the specs or construction details. I'll get straight to...

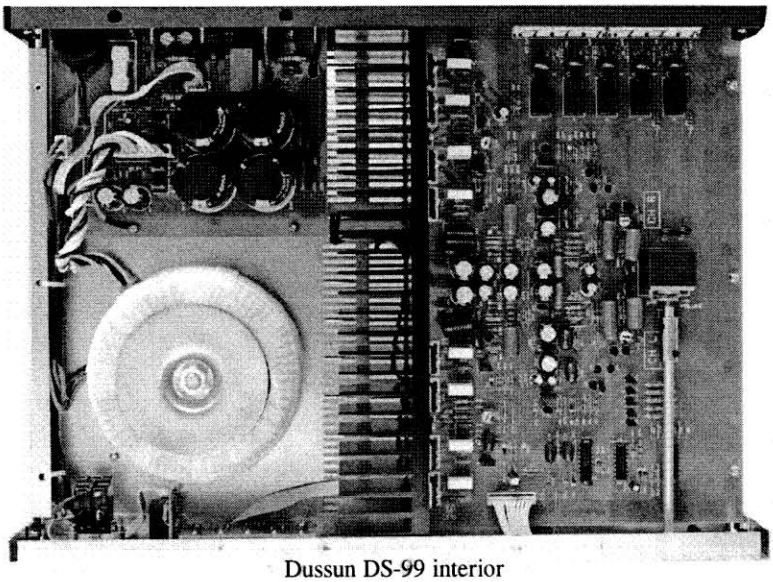
The Sound. Upon hooking it up, I immediately realized I had sold the old-timer short: this is still a great-sounding amp by most any measure. Next to the laser-like Edge G6 or some of the other integrateds, it's not necessarily the most transparent or detailed, but it has a very special way of carrying you away with the pulse and emotion of the music. My fiancée, who I admit might have even sharper ears than mine, succinctly commented: "I like the way it sounds, I don't know why... it carries the melody better, and I hear the phrasing a lot." I had to agree; it's rich and tuneful in a way which none of the other amps, even the separates, can quite imitate. All these years later, the Bryston still sets an exalted standard of musicality. So, how will the newcomers measure up?

Dussun DS-99 - 100wpc into 8 ohms; 150wpc into 4 • THD: 0.08% @ 90W • 17" x 4.1" x 14", 22lbs; $500 • Imported by AAA Audio, LLC • 617-614-0562 • www.aaa-audio.com

The DS99 was the easily overlooked entry-level sibling of the big Dussun V6i and V8i integrateds that so impressed Rich Weiner in the last issue. At $500 it is by far the cheapest and simplest in this survey. The steel chassis is basic but sturdy, the aluminum front pane is adorned only with a large volume knob, buttons for power and input selection and a headphone jack. There is no provision for remote control.

The review unit was sourced from the amiable and gracious Ping Gong of AAA Audio, Dussun's only factory-authorized distributor in North America. As with a lot of Chinese gear, a Google search will yield numerous outlets selling the DS99 at wildly varying prices. These gray market goods have no guarantee of being authentic Dussun products and carry no factory warranty. The biggest concern with such a product is the use of a cut-rate power transformer or converter to make the amps suitable for the 120V US market. My advice is to steer clear of such questionable sources. You get what you pay for.

Under the hood. Each of the five line-level inputs is switched using relays, a nice touch at the price point. The selected input is routed to a Alps "blue velvet" volume pot, then directly to the amplifier section - there is no active preamplifier section or preamp output, ruling out bi-amping or directly connecting active subwoofers. The amp section is a DC-coupled design with differential JFET input stage and a complementary bipolar output



Dussun DS-99 interior

stage. Choice parts include polypropylene film caps, low-noise Toshiba JFETs and two pairs of Sanken output transistors per channel. I did not get a chance to measure bias current in the output stage, but the DS99 does not employ the "Hyper Class A" adaptive biasing scheme of its big brothers. The unit runs fairly warm at idle, suggesting a fairly typical Class AB setup juiced just enough to get a little Class A power at low levels. (Dussun pictured above)

Small inductors are placed near the output devices, indicating the use of a Zobel network – generally a good thing in my opinion, and something Bryston also puts in the B-60. Time-delay relays keep any pops and clicks from reaching your speakers, and the unit was perfectly silent at turn-on and turn-off – bravo. A beefy toroidal transformer feeds 32,800uF of supply capacitance. Circuit layout is clean and parts quality is excellent for the money, giving no obvious indication of cut corners despite the low asking price. From the no-nonsense chassis to the efficiently executed internals, the Dussun is all business and clearly focused on the goal at hand – no-frills music reproduction.

The Setup. A number of power cords were tried, but the Dussun wasn't very picky. Try any decently heavy cord with good quality connectors (e.g. 14-3 with Marinco plugs) before going too nuts. Interconnects are a different matter – the Dussun proved itself more than transparent enough to reveal the superiority of the BFS-reference RWA interconnects over lesser wires, so use the best you can afford. Of the two speakers I had in house, the Silverline Preludes were a very nice match in both sound quality and budget level. The unit sent to me had been previously used, so I can't comment on break-in time, but as with most any amp the sound continues to open up over the long haul.

The Sound. This amp is the real deal. 500 clams does not buy you an Edge or Pass killer, but it does handily cleanse your palate of the bitter taste left by mediocre mid-fi amps of the past. The Dussun's most salient character is an open, lively quality in the midrange, with excellent detail and articulation. Rich Weiner referred to it as "fast and lithe," and I couldn't agree more. The midrange is where most of the music is, and the Dussun is an excellent communicator in that area.

The frequency extremes complement the midrange well, if not to quite the same high standard. The treble is nicely extended, with perhaps just a tinge of brightness. Nothing major mind you; when listening to Thomas Zehetmair's superb rendition of the Mozart violin concertos (Philharmonia Orchestra/Teldec) there's just a bit more "steel" to his E string than is natural. The foundation of the music in the lower midrange and bass was generally good; it's not what I would call rich, but not threadbare either. To a greater degree than the other amps, the fleshiness of the sound will depend on the specific synergy with the speaker system and setup. With the Silverline Preludes, I found that switching from JPS Ultraconductor bi-wires to the Lowe's BFS special helped to firm things up in the bass while opening up the midrange further. It's difficult for me to comment on the lowest reaches of the bass without having a true full-range speaker on hand, but I did get the opportunity to hear the Dussun with a pair of large Focus Audio speakers in someone else's home, and came away very impressed with the extension and control in the bottom octaves.

Power is ample; not a hint of murkiness or obscurity of the kind one often gets with mid-fi solid state amps with triple-digit power ratings. It's not a dynamic beast, but it has a sense of ease and control that could easily be mistaken for a high-end 150 wpc amp. Sometimes amps can be powerful in absolute terms, yet give you the impression that they're a little twitchy or on edge. The Dussun sounds fundamentally stable and easily handled any sane listening level in my apartment. What it doesn't do as well as the more expensive reference separates is capture the subtle dynamic pulsations, inflections and micro-explosions in the music; compared to the ME or Edge, it's a tad flat and not as expressive.

Nits are relatively minor, and I suspect that the ones I heard related in large part to the passive nature of the Dussun's preamp section. The soundstage is nicely focused but a bit narrow, particularly when the volume control is at a low position. It doesn't have the

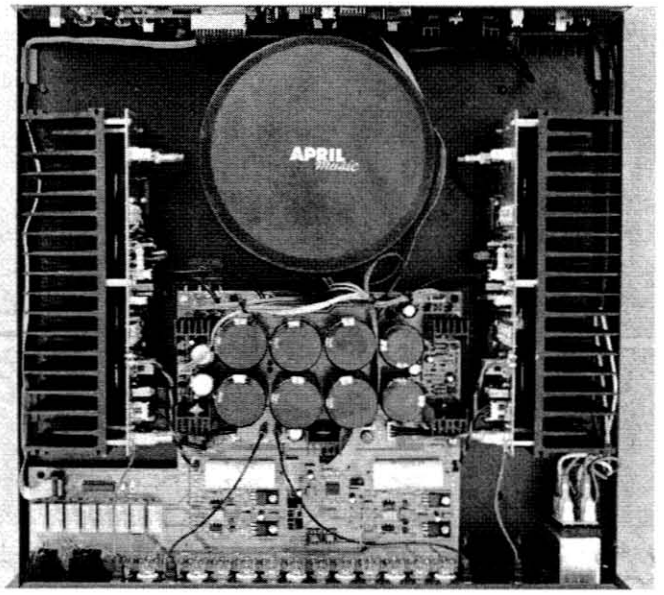
width and space of the separates, nor the lateral placement and spread of the Stello. Adding the MSB preamp and cranking the Dussun's volume to the max (essentially making it a regular amp) resulted in a more open and detailed sound with a much better sense of stage width; thus confirming my suspicions. The upper midrange has a bit of grain and roughness compared to the ME or Edge, but then those are two of the smoother, more grain-free solid state amps I've heard. All in all, when one considers the mass-fi price of the Dussun vs. the decidedly excellent sound quality, one can't find a whole lot to bemoan.

Head-to-Head with the Bryston. The Dussun comes off a bit cooler and more distant than the warm-n'-cozy Bryston... listening to Mahler Symphony No. 5 (Zander/ Philharmonia Orchestra, Telarc SACD), the Dusson puts you about 2/3rd of the way back in the hall, vs. 1/3rd on the Bryston. Perhaps due to its forwardness, the Bryston also tends to communicate the rhythm and pace of the music more convincingly. The Dussun's soundstage is slightly narrower, but with a bit more air and clarity to winds and brass at the back of the stage – individual voices are a little less homogenized. Midrange completeness and richness goes to the Bryston, while bass definition and extension goes to the Dussun.

Listening to Saint-Saens Cello Concerto (Pieter Wispelwey, Channel Classics SACD), the tables turn a bit... the orchestral accompaniment which sounds a little muddy on the Bryston comes through clearer and more incisively on the Dussun. The Dussun is also slightly more detailed, revealing a bit more ambient glow around instruments. Wispelwey's performance of the Frank Sonata transcribed for cello exhibits greater clarity with the Dussun, the piano opening sounding a bit less muddy and the cello's lower registers coming across more distinctly from the piano's. The bottom end of the cello also sounds a tad deeper, more articulate and more controlled, though the Bryston has a bit more warmth on the cello's D string.

An interesting experiment was using the Dussun as an amp with the Bryston's preamp section; the sound took on a lot of the quality of the Bryston, including some of the negatives like the loss of specificity at the back of stage, yet retained the cooler, more even character of the Dussun. Regardless, the Dussun on its own is a very fine performer that, while not quite trumping the venerable Bryston, it certainly gives it a run for its money.

April Music Stello AI320 - 140wpc into 8 ohms • THD: 0.005% @ 30W • 17" x 4.1" x 16.4", 27 lbs. MSRP $2,795 • April Music • www.aprilmusic.com



April Music Stello AI320 interior

The Stello is the priciest piece in this survey, and it shows from the moment you unpack it. The brushed-aluminum chassis is classy and upscale, the neatly organized back panel revealing numerous connection options of obvious quality. The front panel has a series of stylish round buttons for the various functions and an electronic display that shows the selected input and volume level when the unit is on (or superfluously reads "STANDBY" when it's off). In addition to four line-level RCA inputs, there's a pair of balanced XLR inputs and a "bypass" RCA input that feeds the amplifier section directly – perfect for hooking up a separate surround sound processor in a double-duty audio/home-theater rig. RCA preamp outputs are available, and the insulated binding posts are excellent. Unlike so many posts I come across that are too chunky for 1/4" spades, the posts themselves are rectangular cut; so smaller spades will fit one way while larger ones will fit the other. The plastic knobs are easy to grip and tighten down, and the banana jacks have a nice snug fit. If only all binding posts worked this well.

All functions can be controlled via the extruded aluminum remote control, which also controls the companion CD player in the Stello line. I never cared for the Krell-style solid metal remotes that are so fashionable in the high-end – they're heavy and awkward, can damage coffee tables and usually have poor ergonomics. Nevertheless the remote worked fine and includes a handy dimmer switch for the front-panel display. I liked the operation of the electronic volume control, which was plenty fine enough (0.5dB) yet easy to adjust quickly, and also memorized its setting for each input source. In every aspect of its operation the Stello was smooth and a pleasure to use.

Under the hood. Popping the top reveals the Stello's beauty to be more than skin-deep. All input jacks are directly connected to a multi-layer PCB that neatly holds all preamp and power supply circuitry. A completely separate circuit board mounted behind the front panel keeps all noisy control and display circuitry well removed from the audio circuits. The relay-selected inputs are routed to a discrete transistor buffer stage with dual-differential JFET inputs, indicating a truly balanced input circuit. A Cirrus (Crystal) CS3310 IC handles electronic volume control and drives the amplifier section directly. Despite the manual claiming a DC coupled signal path, I found a 10uF film cap at the input to the amp section. The preamp and tape outputs are buffered by OPA2604 IC op-amps; note that these are only in the signal path for the external RCA outputs. Like the Dussun, the amp section is a classic JFET input/bipolar output affair, though in this case the two pairs of output devices per channel are newer Sanken devices that incorporate multiple parallel transistors into a single large package. These relatively expensive devices are known for their excellent bandwidth and power handling, and are mounted on appropriately beefy heatsinks. Muting relays protect the speakers from unpleasant hiccups during operation. Powering all this is an impressive fully shielded 800VA toroidal transformer feeding a 90,000uF capacitor bank for the amp and another 23,000uF for the preamp. The amp runs warm at idle and could get toasty in operation, but never burning hot. The IEC power input module appears to include AC line filtering. Parts quality and build quality are top-notch.

The Setup. This amp deserves better than the stock 18-3 cord, and the always-reliable Audience PowerChord proved up to the task. The Silverline Prelude was used for the majority of listening (as is typical with most solid state amps, the Merlin TSM's were not a good match). Other than that, the Stello was pretty much as plug-and-play as they get. Though I had a balanced CD player on hand (the Stello CDA320), I did not have a chance to test the XLR input, which is unfortunate–unlike so many XLR connections that are not fully differential or use IC op-amps to convert to and from single-ended, both the CD player and integrated implement truly balanced discrete circuits. As with the Dussun, the review unit was previously used, so break-in time could not be ascertained.

The Sound. Of all the amps in the survey, the Stello had the least personality. That's meant neither as an indictment nor a commendation per se; but at the end of the day, that's just how it came across. Tonally it's well fleshed-out, with more weight than the Dussun and bit more lower-midrange heft than the MSB/ME or MSB/Edge combos, but less warmth than the Bryston. It's also a tad less bright than the Dussun, with a less prominent upper midrange, though there was still some steeliness to Zehetmair's E string in the Mozart concertos. At the same time, it has a slightly "flatter" quality than either the lithe Dussun, the lively Bryston or the more transparent separates... there's nothing unduly electronic or artificial about it, it just comes across as a bit more reticent than the others.

Detail-wise it does a good job of capturing the general ambience of a concert hall, if not the "air" of each individual instrument - the varying ambient colors from different sections of an orchestral stage sound a little homogenized. Dynamics have a similar quality, with subtle inflections being glossed over; in musical terms, there's a sort of *mezzo-forte* and *sostenuto* quality to the sound which makes things sound a little uniform vs. the more varied dynamic palette of the reference separates. Normally these are things MGD and I would ascribe to the sound of IC op-amps... in this case, the culprit could very well be the Crystal volume control IC, which has internal op-amps. To test this theory, I tried using the "direct" amp input on the Stello with the MSB preamp. The result was a lighter, more open and detailed sound, with a sense of agility and clarity missing when using the internal preamp. The downside was that it was tonally a bit too light, and in the end I found the internal preamp to be a better match overall.

In fairness, I might be erring on the overly critical side, because this is good-sounding amp with plenty of clean power. Britten Suites for solo cello (Wispelwey, Channel Classics) sounded remarkably life-like on the Silverline Preludes, the cello having spot-on tone quality and a perfect balance of body and texture. Of all the integrateds, the Stello sounded the most open and at ease when playing the Britten at realistic volume levels; in this respect it was very much a match for the reference separates.

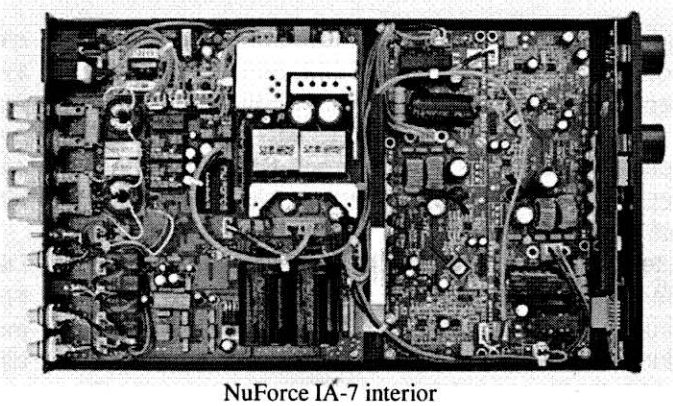
Head-to-Head with the Bryston. Switching from the Stello to the Bryston immediately reveals the latter's superb tactile qualities and richness of images. The Stello has a dryer midrange that's just a hair tizzy in the transition area to the treble. Images in center stage are a tad defuse; listening to Wispelwey's Frank Sonata, piano and cello seem a bit unfocused. On the plus side, its lower midrange is less congested than the Bryston's, and its presentation will appeal to those who prefer a bit more delicacy and subtlety. With more than double the power, it also possesses far more dynamic headroom. Though the Bryston is good for all of its rated 60 watts (and maybe more), the beefier power supply and output section of the Stello will keep on cranking long after Bryston has run out of steam. At the same time, the Stello has a more subdued sense of rhythm, and comes across less vibrant and alive than the Bryston. Still, there will no doubt be those who prefer the Stello's even-keeled demeanor and ample power.

NuForce IA-7
50wpc max, damping factor > 4000 • THD: 0.05% @ 10W • 8.5" x 1.75" x 16", 6 lbs.
MSRP $1195 • www.nuforce.com

Looking more like a car stereo amp than a home hi-fi component, the NuForce is the lone Class D amp of the bunch, and also the quirkiest. Perusing the manual reveals numerous ominous warnings. "WARNING! Do not connect NuForce outputs to the line-level inputs of active devices such as active subwoofers..." "WARNING! Use only grounded AC power cords." "Always immediately disconnect the power to the equipment in the event the devices emits an unusual odor or sound or generates smoke." Yikes... sounds more like one of my hacked-together DIY projects than a mature consumer product. As is common with many switching amps, the speaker outputs are not referenced to ground and can become unstable with no load, so much care must be exercised during setup. During everyday use a lot of clicks and pops can be heard through the speakers, further reinforcing the dread of a catastrophic explosion or similar audio meltdown. In contrast to the elegant and refined Stello, the NuForce was less than confidence-inspiring in its operation.

The back panel has two pairs of RCA inputs and two stereo mini-plug inputs for iPods or what not, along with a pair of preamp outputs. A "booster" switch allows one to turn off the amplifier section. The insulated binding posts are par for the course and necessary to meet EU safety regulations. The front panel has two knobs which electronically control input and volume. Pressing in the input knob turns the unit on and off, while pressing the volume knob activates the mute function. The volume control was a nightmare to use – each detent of the knob makes an absolutely infinitesimal change in volume level, thus requiring many turns to effect any major change in level. The small full-function remote control had the same issue; one needs to hold down the volume control buttons for what seems like an eternity before the volume level changes significantly. Even with my best video game button-mashing technique I would still find myself pumping the button endlessly. This is something that definitely needs to be fixed in firmware.

So how does it work? First, a little primer on "Class D" switching amplifiers. A traditional linear amplifier, usually of the Class A or Class AB variety, attempts to preserve the signal in its original form from input to output, only higher in power level – the "straight wire with gain" concept. In contrast, Class D amplifiers generate a high power pulse signal at a frequency many times the intended bandwidth (usually at least a couple hundred kilohertz.) and modulate it with the input signal in a technique called pulse width modulation (PWM). By



NuForce IA-7 interior

passing that modulated pulse through a low-pass filter, the original waveform is magically reconstructed.

Okay, that doesn't sound very intuitive, so let me present a rough analogy. Let's say you're trying to drive a car on the highway. A linear amplifier would be akin to the way we normally drive – the car has an infinitely adjustable throttle control in the form of a gas pedal, and you put your foot on it a certain amount to get to the desired speed. You adjust your foot pressure based on what the speedometer says in a form of negative feedback – just like in an amplifier. A Class D amp on the other hand would be like a car that had only an on-off throttle switch in place of the gas pedal, and some kid on ten shots of espresso at the wheel. Since the kid can't fine-tune the throttle, he has to selectively pump the throttle switch between on and off, watching the speedometer to tell if he's under or over the desired speed. How in the world will he ever maintain a steady 55 mph? Well, the car has inertia – turn on the throttle, and it takes time for the car to reach top speed; turn off the throttle and the car gradually cruises to a stop. This is the function of the low-pass filter in a Class D amplifier; it creates "inertia" in the signal and integrates the high-speed pulses into a relatively smooth output. In this fashion and with some skill (a high-enough switching speed and conscientious speedometer reading), one can actually control the speed of the car with great precision.

This is basically how PWM works, and it's employed in everything from Class D amps to 1-bit D/A converters to the motorized arm of the robot that welded the door of your Ford Explorer together. But I digress... why exactly would one bother with this convoluted amplification scheme? Because transistors are intrinsically non-linear devices that are more efficient when used as on/off switches rather than linear amplifiers. Class D amps that also employ switching power supplies often boast power efficiency ratings of 80% or higher; compare that to the typical Class A brutes that MGD so loves, which are constantly burning off hundreds of watts of heat even when delivering just fractions of a watt to the speakers. Class D's efficiency gives it obvious cost, size and weight benefits.

A common misconception is that the "D" in Class D means "digital," thus implying some sort of conversion of the input signal to the digital domain. This is only true of Class D designs that employ a digital pulse modulator, such as TI's "PurePath" technology commonly used in home theater receivers. The analog approach preferred in audiophile circles is to use an oscillator as the pulse source, modulated with an appropriate comparator circuit and with negative feedback applied to smooth out frequency response errors and distortion. Class D implementations that fall into this category include the NuForce, analog ICEPower modules from B&O and the Hypex UcD modules. Tripath's "Class T" chips popularized by the $30 Sonic Frontier T-amp are a bit of a hybrid, using both analog and digital signal processing techniques to generate a spread-spectrum pulse modulation.

A big problem with Class D is radiated high frequency noise. Because of the output transistors rapidly switching at full power, the entire amplifier can become an RFI nightmare, spewing all kinds of nasty harmonics into the gigahertz range. Another challenge is ensuring linearity and flat frequency response into the complex load presented by a typical speaker. Fine-tuning the modulation scheme, low-pass reconstruction filter and feedback loop into a single stable, linear and consistent system is a challenge, and as with any technology that hasn't fully matured, designers are still learning the art of making it all sound good. Early examples of Class D were pretty hard on the ears and relegated to car stereos and active subwoofers, but the technology has clearly made large strides towards audiophile legitimacy in the last several years... whether it's truly ready to challenge the finest traditional amps is still questionable, but just as with digital audio in the 90's, Class D is rapidly gaining ground.

Under the hood. Unlike many companies which repackage existing Class D solutions, NuForce employs their own fully-analog implementation. The slim extruded aluminum chassis is absolutely jam-packed with circuitry, most of it looking nothing like your typical audio component. The preamp section uses the ubiquitous NE5532 op-amp in surface-mount form. (Before you write off the much-maligned '5532, keep in mind it is still used extensively in some pretty good-sounding products like the Benchmark DAC-1.) The 16-pin volume control IC has been stripped of its part number and covered with a NuForce sticker; my best guess is a Burr-Brown PGA2311 or similar part. The preamp is connected to the amp module using several inches of spaghetti-thick coax wire. The amp front-end also uses NE5532 op-amps, along with LM319 comparators and a Xilinx FPGA. The output stage uses a Harris HIP4081 FET driver IC operating off a single supply and feeding four small power MOSFETs in a full bridged (push-pull) configuration. Both speaker terminals are actively driven and floated at half the supply voltage (24V), so one must be careful not to connect either of them to ground in any way. The output filter consists of numerous toroidal inductors and capacitors, including some large NuForce-branded electrolytics. An additional common-mode inductor and film cap are placed at the speaker terminals to further filter HF noise. The power supply appears to be an off-the-shelf switching supply rated at 100 watts; it's about the size of a cassette tape (remember those?) and outputs a single +48VDC rail which NuForce stiffens with an additional 24,000uF of capacitance. An even tinier auxiliary switching supply powers the control circuitry.

Each amp comes with a printout of actual bench measurements such as THD, S/N and frequency response for that particular unit. Component quality is generally okay, though there are some ho-hum touches like the cheap coaxial wire connecting the preamp to the amp. The small power supply (even by switching standards) is also cause for concern, but one must take into account the cost of engineering and manufacturing a proprietary implementation versus simply repackaging an off-the-shelf solution like ICEPower or Tripath.

There have been reports of NuForce amplifiers generating substantial RFI to the point of interfering with ancillary audio gear and nearby electronic devices. I was unable to set up a measurement rig to test this in time for this review, but it's something I'll need to investigate with Class D amps in future installments.

The Setup. The NuForce comes with a decent 16-3 cord with an attached ferrite bead. Normally I'm not a big fan of ferrites, but in this case it's probably necessary to keep the NuForce from spewing too much RFI junk back into your power lines. Switching to the Audience PowerChord lifted some of the deadness I attributed in part to the ferrite, but also introduced a bit of grain and hash and thinned out the lower midrange. Also remember that the floating ground cords some audiophiles use are a no-no. I wound up sticking to the stock cord for the majority of my listening.

The entire chassis runs quite warm to the touch at idle but doesn't get too much hotter when you crank up the volume – that's Class D power efficiency for you. The review unit was factory-fresh and spent a lot of time on the burn-in rack continuously playing MP3s at high power levels into 4? dummy loads. Break-in time was an eternity... after a few hundred hours I'm still not convinced it's really settled down. For some reason modern audio electronics like CD players and switching amps seem to require an incredible amount of break-in to really loosen up... perhaps it's the lower power dissipation of the circuits, or the high speed of operation. Whatever it

is, I would recommend at least 100 hours playing time before doing any serious listening.

The Sound. Before the aforementioned burn-in period, the NuForce sounds bad, really bad, and the first few dozen hours of burn-in seem to do little good. I'm sure there must be at least a few NuForce owners out there who experienced a week or two of disenchantment immediately following their purchase. With patience however, the NuForce develops into a formidable amp in two areas: bass and midrange articulation.

With a claimed damping factor of 4000 and the efficiency of Class D, you'd expect the NuForce to exhibit excellent dynamics and grip in the low end, which it does. What caught me by surprise, however, was the balance and transparency throughout the bass and lower midrange. Listening to the Scherzo movement from Mahler 5, bass and trombones have well-centered pitch and timbre throughout their range; there's weight without heaviness, definition without dryness. Bass drum has an uncanny steadiness of timbre from impact to decay... it's a unique sensation that's difficult to describe, but once you hear it, other amps sound slightly lumpy and clouded in comparison. What I suspect I'm hearing is not necessarily the superiority of Class D at low frequencies (though that could also be a factor), but the absence of low-frequency coloration by using a switching power supply. Traditional linear power supplies rectify the incoming 60Hz AC and attempt to smooth it out using large capacitors and sometimes active regulation, but even with such measures there are lingering issues of ripple currents, varying source impedance and distortion. With a switching supply, the issues are pushed much higher in frequency, usually above 10kHz, and for good measure NuForce has augmented the supply with fairly large storage caps to ensure ample current reserves. When used with the Silverline Preludes, one couldn't help doing a double-take at the quality, control and extension of the bass from such a small speaker and amp.

The good news continues in the midrange, which manages to be silky-smooth and detailed in a way I've found typical of the better switching amps, but with a surprising degree of warmth and fullness. Going back to the Scherzo movement of Mahler 5, midrange resolution was striking; the back-and-forth repartee of thematic fragments played by different sections of the orchestra came across with articulation and clarity, allowing one to make out the complex score with ease. On the other end of the musical spectrum, the midrange resolution brought alive all sorts of little inflections and details in tracks from Red Hot Chili Peppers *One Hot Minute*. Spoiling this a tad is a mild case of opaqueness and thickness in the midrange, something I've heard from the '5532 op-amp before. But above the midrange, we start to see more serious transgressions. Out of the box the treble has a tingy, unnatural quality that mostly burns off, but never quite disappears. There's a lingering grit to the upper harmonics of string instruments and a brittleness to brass instruments. Musical passages with a lot of sustained high-frequency energy can take on a "white noise" quality. At the same time, the upper midrange errs on the soft and recessed side, with a clear loss of resolution with increasing frequency. It's akin to the fidelity loss one often hears with IC op-amps, but more severe... I suspect it could be coloration and signal loss from the fairly extensive but necessary filtering employed in the amp's output stage.

At times there's also an odd coloration that I can only describe as a "whooshing," like some sort of weird high-frequency Doppler distortion. The issue is in the top two octaves, and depending on your HF sensitivity it could range from mildly observable to maddeningly annoying. I found that I was able to adjust to it to a degree, but switching back and forth with the other amps would immediately put the spotlight back on the problem. My more sensitive fiancée could never quite put her finger on what was bothering her, but in the end she found it quite distracting. I've heard these kinds of HF aberrations from other Class D amps before, and it's something you really have to hear for yourself before deciding if it's acceptable.

Last but not least is a weird "noise gate" effect where the background is artificially black and the tail end of notes die out a little too quickly – something akin to what MGD complained about with SACD reproduction, which interestingly enough is also a PWM-based technology.* This basically decimates subtle ambient cues and low-level information like the air around instruments on the stage, something I refer to as the "glue" of the soundstage. Without this glue, instruments can still image clearly, but they are not held together and related to one another in a singular acoustic space. With solo work like the Britten cello suites, the sense of hall space was mostly obliterated, and the instrument lost much of its silky sheen and treble texture. Some of this is due to the softness of the upper midrange, which can be balanced with the right speaker; the more forward Merlin TSM was actually a good tonal match and minimized the loss of texture, but also further revealed the other low-level resolution issues.

Individually these issues aren't necessarily deal-breakers, but in combination they give the sound a synthetic feeling, as if you're listening to a re-enactment of the original musical performance rather than a reproduction. It's odd because in some ways the NuForce is extremely detailed and musical; in others, it sounds very electronic. To a purist 'phile bent on capturing the closest facsimile of the original event, its faults will no doubt seem wholly unacceptable. Yet I can't help wondering

if there are some music lovers out there for whom the articulation of individual voices and the solidity of the music's foundation are more important, and the other issues are less critical to their enjoyment of the music. More so than any of the others in the survey, the NuForce is an amp that will evoke strongly varying reactions from different sets of ears.

Head-to-Head with the Bryston. The Bryston and the NuForce have modest power ratings of 50wpc and 60wpc respectively, but both are dynamic beyond what the numbers would suggest. The Bryston is better able to sustain its power, while the NuForce is a bit more explosive. Both are on the warmish side of neutral, with the Bryston being fuller in the upper bass and more forward in the presence region, while the NuForce is more recessed through the upper midrange. Treble fidelity goes hands down to the Bryston, while bass extension and dynamics go to the NuForce. The Bryston also runs out of steam more gracefully than the NuForce, which sounds very harsh at its limit most likely due to the small power supply pooping out at 100 watts. The NuForce is able to better distinguish individual images, but overall soundstaging goes easily to the Bryston, which just sounds hands-down more natural than the NuForce. With the Mahler 5 recording, the NuForce articulates the different voices more clearly, but in the end the Bryston paints a more cohesive and convincing "big picture."

The Wrap-up

For an urban 'phile like myself where time, money and space are all at a premium, integrated amps make obvious sense. One less power cord, one less pair of interconnects, one less spot on the audio rack... the convenience afforded is compelling to the point where I'd be willing to make some sacrifices in sound quality. Thankfully, with this bunch, I never felt sonically compromised for having taken the easy way out; in fact, in terms of sound quality for the money one would have a pretty hard time finding separates combos on a comparable level.

The Dussun proved itself to be a real audiophile's amp, with a combination of neutrality, detail and musicality that amps costing 3-4 times as much would do well to imitate. Even if it cost double what it did I'd consider it a solid value; at $500, it's an unqualified steal. If you're on a tight budget, or simply looking for a great amp that doesn't cost a fortune – heck, even if you're prepared to spend hundreds more – definitely give the Dussun a listen.

The Stello was hands down the most complete and refined package, and had it been a tad more transparent and emotional it could have taken the crown as the finest integrated of the bunch. It's a good-sounding amp, clean and powerful with a slightly cool take on the music that caters more to the cerebral classical or acoustic jazz listener than the tube-loving romantic or head-banging rocker. For the price, I was hoping for more in the areas of harmonic completeness and dynamic richness, and at less than 1/5th the price the Dussun had the edge in midrange purity and openness, and to a lesser degree bass response. Nevertheless I'm sure the Stello will appeal strongly to those looking for something more upscale and flexible, particularly in a rig that also sees home theater duty.

The NuForce is the most idiosyncratic of the bunch, and the hardest to recommend. Its bass response and midrange articulation are exceptional, while the forgiving upper midrange helps balance more forward ancillary gear. When used with the right speaker, its strengths will clearly appeal to some music lovers; to others, its treble fidelity and low-level resolution issues will compromise the credibility of the reproduced event. Ultimately my feeling was that it has some kinks to work out and isn't quite ready for prime time, but based on my experience with it I can say that Class D has great potential and will continue to gain followers. If you have the opportunity, the NuForce is at least worth a serious listen with an open mind.

So where does this leave the venerable Bryston? Each of the contenders was able to equal or surpass it in at least a couple areas, the Dussun in particular being musically competitive at a fraction of the price. But after dozens of hours of listening and countless A-B tests, there was always something special about coming back to the Bryston... I can't say it any better than MGD, who a decade ago described it as a "warm audio nest." It had the sweetest and most natural treble reproduction of any of them, and was the run-away winner in musical involvement. If the newest "SST" model is upgraded in performance without losing any of the "magic," I have a feeling it will easily defend the B-60's title as a BFS reference.

* MGD comments: I find this statement by Marc extremely gratifying. Gratifying, in that while Marc has been a dedicated supporter of SACD, he was able to hear and describe the sonic ailments of the NuForce in terms of the similar technology used in it and SACD. He was obviously able to hear in the NuForce what I hear in the SACD digital format. The fact that both technologies are so similar was lost on me until reading Marc's article, and yet, knowing what I now know, it all makes sense. The SACD format as a whole is necessarily colored due to the high frequency filtering and digital reconstruction required, a filtering absolutely mandated by the technology itself. It is incident to, and endemic of the format itself and as of this point in audio time, no one, not Sony, not NuForce, not Ed Meitner can overcome the sonic problems that so devastate the sonic qualities of every product based on some form of PWM technology. Bravo Marc Yun, your insights have proven beyond value.