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BRYSTON 4B NRB AMPLIFIER

Manufacturer's Specifications

Power Output: 250 watts/channel into 8 ohms, 400 watts/channel into 4 ohms, or 800 watts bridged mode into 8 ohms.

Rated THD or IM: Less than 0.01% at 250 watts, from 20 Hz to 20 kHz.

S/N: 100 dB below full output.

Crosstalk: Below noise level, 20 Hz to 20 kHz at 250 watts.

Slewing Rate: More than 60 V/μS; more than 120 V/μS in bridged mode.

Power Bandwidth: From below 1 Hz to over 100 kHz.

Damping Factor: Greater than 500 at 20 Hz, re: 8 ohms.

Input Sensitivity and Impedance: 1.25 V for rated output, 50 kilohms.

Dimensions: 19 in. W × 5¼ in. H × 15½ in. D (48.3 cm × 13.3 cm × 39.4 cm).

Weight: 42 lbs. (19 kg).

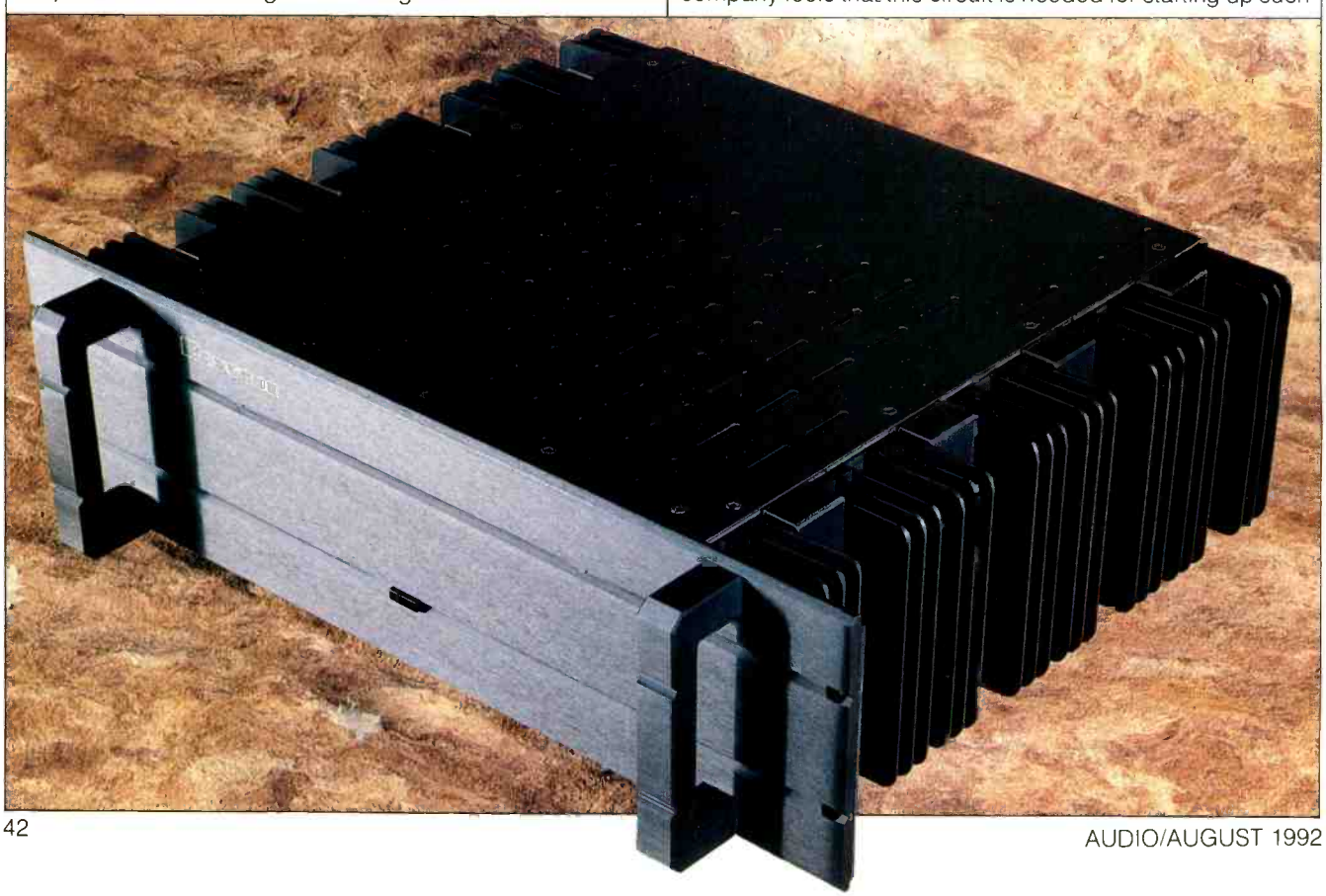
Price: $2,095.

Company Address: 57 Westmore Dr., Rexdale, Ont. M9V 3V6, Canada.

For literature, circle No. 90

Longtime readers of *Audio* may be puzzled by the model number of this Bryston power amplifier. After all, the widely acclaimed Model 4B has been a Bryston staple since the late 1970s, and I tested one for the November 1985 issue. According to Christopher Russell, Bryston's vice president of engineering, the current Model 4B (with its added NRB designation) represents the fifth generation of this power amp. Much of the design has changed.

To begin with, the power supply now employs multiple small filter capacitors rather than a single pair of large filter capacitors per channel, as in previous versions. This makes for better high-frequency response and a reduction of power loss in the supply. Bryston has added a proprietary soft-start circuit, using Triacs, that is in series with the power transformers (which, incidentally, are now toroids). The company feels that this circuit is needed for starting up such



a high-power, high-current amplifier without blowing circuit breakers or fuses. The NRB does not have the previous 4B's wiring harness, so its channels plug directly into the power supply's circuit board, reducing resistance for improved current flow and filtering.

An input buffering circuit has been added, which linearizes the signal when driven from moderately high source impedances, according to Bryston. The buffer is also used for the balanced inputs (another feature new since the original 4B) and as the inverting input for bridged operation.

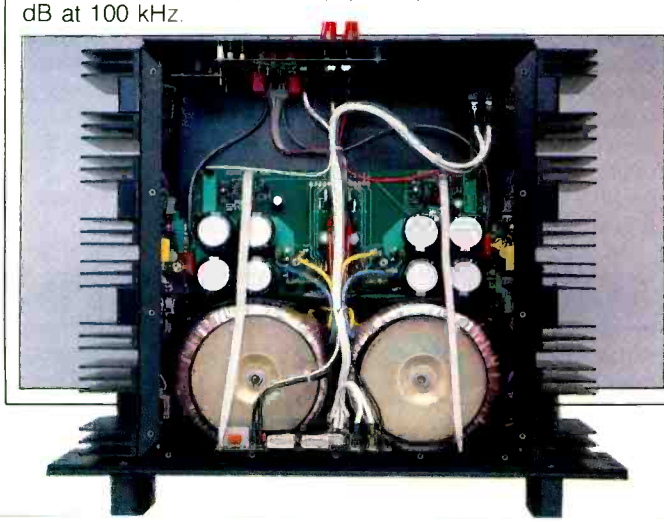
Even such simple functions as the front-panel clipping indicators have been improved. These LEDs now indicate any deviation from linearity, including shorted outputs or strong out-of-band information such as r.f. or d.c. The LEDs turn red in the presence of any distorted or inappropriate signal, however brief that signal may be, right down to the millisecond level. After transient overloads or other problems that go by too fast to be seen, the LEDs glow amber for a quarter of a second. For persistent conditions, the LEDs glow red.

The front panel of the 4B NRB has only the power switch and clipping indicators. The rear panel has a socket for the detachable grounded line cord at the left, output terminals and related switches in the center, and inputs at the right. For two-channel operation, speaker connections are made to each channel's red and black binding posts; in bridged mode, one speaker load is connected between the two red binding posts.

Further to the right are sets of unbalanced phono and balanced XLR input connectors. A tiny toggle switch is used to choose the type of input desired. Another small toggle switch selects dual-channel or bridged operation. A third toggle switch, "Ground Lift," can be used to break the connection between the signal and chassis grounds in installations where external ground loops cause hum problems. The switch is normally left in its shorted position. For safety's sake, the switch does not disconnect the chassis from the ground prong on the power cord.

Measurements

Figure 1 shows overall frequency response of the 4B NRB amplifier when driven to a nominal 1 watt per channel. Obviously, Bryston's engineers believe in ultra-wideband design. Response is flat down to 10 Hz (the lowest frequency available from my test equipment) and down a mere 1.3 dB at 100 kHz.



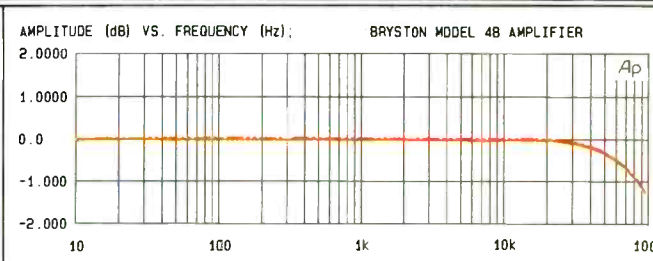


Fig. 1—Frequency response, at 1 watt output.

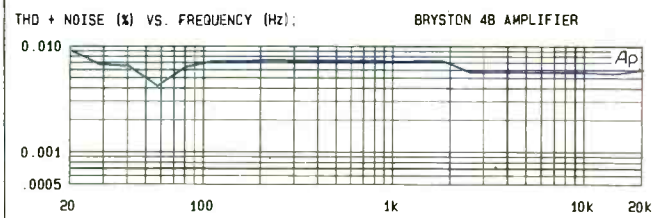


Fig. 2—THD + N vs. frequency at rated output.

For Fig. 2, generator input was varied dynamically to maintain a constant power output of 250 watts per channel into 8-ohm loads. Total harmonic distortion plus noise remains below the rated 0.01% level at all audio frequencies, measuring approximately 0.007% at mid-frequencies and an even lower 0.0058% at the high end of the spectrum.

When testing amps for THD + N as a function of power output, I nearly always find that distortion rises more rapidly at either 20 Hz or 20 kHz than at 1 kHz. However, this was not the case with the Bryston (Fig. 3), whose THD + N characteristics are virtually the same at the frequency extremes as they are at 1 kHz. Clipping occurs at about 280 watts per channel for all three test frequencies!

Figure 4 shows how SMPTE-IM distortion varied as a function of power output. In this case, the SMPTE-IM test signal consisted of a 60-Hz and a 7-kHz tone in a 4-to-1 amplitude ratio. The SMPTE IM remains under 0.01% for output levels below 100 watts per channel and rises to a still insignificant 0.025% before actual clipping occurs at an equivalent output level of about 300 watts per channel.

I made some additional tests using 4-ohm loads, and the Bryston 4B NRB delivered 423 watts per channel, with both channels driven, for the rated THD level of 0.01%. Limitations of my lab prevented me from operating the amp at rated output into 4-ohm loads for extended periods. After all, 400 watts per channel into 4-ohm loads represents a current flow of 10 amperes per channel (20 amps for both channels), a bit more than the Variac that I use to maintain a constant 120-V line voltage can take for long periods.

I made another quick check of power output for rated distortion with the amplifier operating in bridged mode. Before my noninductive 8-ohm load began to overheat, I was able to observe a power output level of 828 watts at mid-frequencies for the rated distortion level of 0.01%.

From the dynamic opening bars, the 4B pumped power into my speakers without any perceptible distortion or overload.

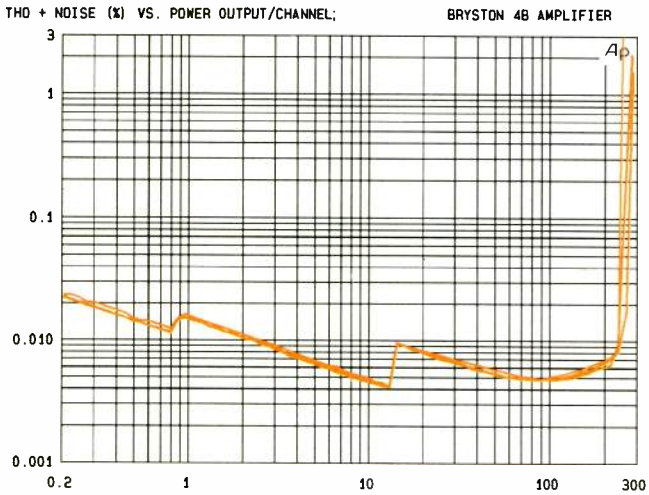


Fig. 3—THD + N vs. power output per channel into 8 ohms at 20 Hz, 1 kHz, and 20 kHz.

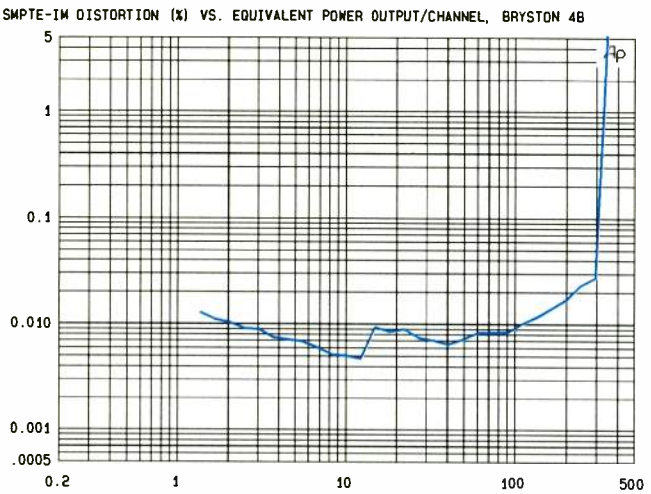


Fig. 4—SMPTE IM vs. power output per channel at 8 ohms.

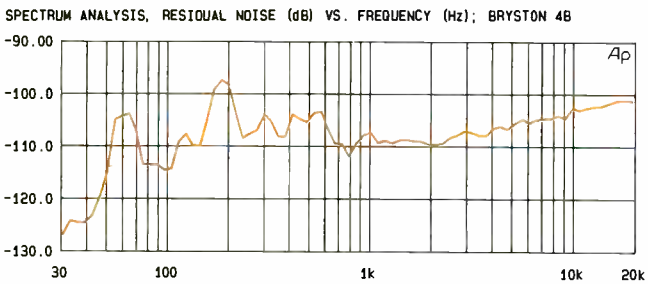


Fig. 5—Spectrum analysis of residual noise, referred to an output of 1 watt.

Returning to the dual-channel mode, and with 8-ohm loads connected, I measured the damping factor of the amplifier as 520 at a reference frequency of 50 Hz. Overall A-weighted S/N ratio measured 93.9 dBA for the left channel and 94.2 dBA for the right when referred to 1 watt output, which corresponds to 117.9 and 118.2 dBA, respectively, when referred to the full rated output of 250 watts. Bryston claims an S/N ratio of only 100 dB, which I suspect is an unweighted figure rather than the A-weighted one specified in the EIA Standards I use. Figure 5 is a spectrum analysis of residual noise as a function of frequency, plotted with a third-octave bandpass filter, again referred to 1 watt out. Notice that even the worst power-supply hum, at 180 Hz, is attenuated by nearly 100 dB.

Use and Listening Tests

My recollection of the earlier Bryston 4B is that it sounded superb, and I would have liked to have had it on hand for comparison. One can hardly be expected to remember the sound of a component evaluated almost a decade ago! To eliminate as many variables as possible, I connected my reference CD player directly to the amp and used the player's variable outputs to control loudness levels.

I chose a couple of new discs for use in evaluating the sound of this latest incarnation of the Bryston 4B. The first was a Delos release (DE 3109) featuring a suite from Richard Strauss' *Der Rosenkavalier*, the same composer's Burleske for piano and orchestra, and a suite from his opera *Die Frau Ohne Schatten*. The dynamic opening bars of this last selection, following on the heels of the hushed final bars of the Burleske, were an ideal test of the amplifier's ability to pump power into my less-than-high-efficiency KEF speakers without any perceptible distortion or overload. As for Carol Rosenberger's piano playing in the Burleske, her Yamaha CFIII concert grand never sounded better. Of course, credit here must go to John Eargle, who serves as recording engineer for all Delos projects, but I have no doubt that the transparency of sound and the remarkable musical realism I enjoyed was also attributable to the excellent design of the Bryston 4B NRB.

The second disc I used in my evaluation was *Classics for All Seasons: Spring* (Telarc CD-80321), which has 16 brief excerpts from previously released Telarc discs. I was especially impressed by the Schubert excerpt Scherzo: Presto, from the Piano Quintet in A Major, the "Trout" (track 9), where the chamber ensemble and John O'Conor's piano came through with an intimacy that seemed to bring the players right into my listening room. Another excellent selection on this disc (and one that I think would be useful in evaluating any piece of audio equipment) was the Allegro from Vivaldi's Mandolin Concerto in A Major (track 14). The overtones produced by a mandolin are quite complex and need to be reproduced in perfect amplitude relationships—a task not easily achieved by lesser amplifiers.

All in all, I could not fault this latest version of the 4B in any way. Of course, not everyone is prepared to spend in excess of $2,000 for a power amplifier, but I have come across some esoteric amps that cost considerably more without offering any significantly better area of performance than this latest contribution from Bryston. *Leonard Feldman*