

axiom



AXIOM AX1.5

"A DEFINITE BEST BUY CANADIAN SPEAKER."

 **audio ideas**
PRODUCT ANALYSIS

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AXIOM AX1.5

Inexpensive speakers tend to be studies in compromise, attempts to achieve smooth response with low-priced drivers and very simple crossover networks. Recently, however, the quality of models at under \$500 a pair has dramatically increased, and the **Axiom Ax 1.5 is an example of minimizing both cost and compromise.** A 2 way system in a somewhat tall, narrow box, **the AX 1.5 is a very listenable reproducer.** Response is $+4/-2$ dB from just over 500 to 16 kHz. Without the 7 dB bump at 400 Hz, response would be within these limits right down to 50 Hz, which is very respectable performance.

Top end response is elevated in a fashion similar to the AR but doesn't sound quite as etched. There are two reasons for this seeming anomaly: first, though we reference our measurement to 1 kHz, this frequency is actually in a trough, so much of the midrange is balanced in level with the top end peak, another dip being seen in the first overtone frequency range between 5 and 10 kHz. These characteristics, combined with the boost at 400 kHz, make for a quite natural balance, marred only by some midrange coloration.

In music tests this manifested itself in the voice test as a mildly muffled quality and some edginess in female voice a result of the 4 kHz peak. **Sound was generally forward with good imaging.**

The surprise, however, in this very low-priced speaker was the bass extension, down only 6 dB at 40 Hz and about 12 dB at 32 Hz. Measurements of exact cutoff points in bass response are always hard to make, especially in small speakers,

because woofer harmonic distortion (or doubling) is high, and tends to be hard to separate from the fundamental. **But there was appreciable pure bass below 40 Hz, so judicious placement, as well as reasonable levels, will provide excellent bass response from the 1.5.** They should be mounted on stands about 20" high, but will not become boomy from corner placement because of the smooth bass curve.

A few years ago, this level of performance from a speaker at under \$500 a pair would have been called exceptional. Though it will not play as loud cleanly as the other bigger speakers, the **Axiom** will provide good sound for budget-conscious buyers. **It's a definite best buy Canadian speaker.**



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AXIOM AX2

"WHEN THE SCORES WERE TOTALED, IT
CONSISTENTLY OUTPERFORMED WELL-RESPECTED
MODELS COSTING A GREAT DEAL MORE."

Sound & Vision

PRODUCT ANALYSIS

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AXIOM AX2

Observers of the audio scene in this country – and elsewhere – have come to acknowledge that **Canadian speaker manufacturers are at the very forefront of speaker design, and in our tests it is never a surprise when speakers made here match or outperform the best the world has to offer.** And this is by no means limited to the larger firms with considerable resources, both financial and technical. Witness Axiom, a small company based in the out-of-the-way community of Dwight, Ontario. Although tiny compared with some of its competitors, **Axiom has consistently come up with speakers as good as anybody's.**

A fine example is the AX-2, an uncomplicated two-way design available in real oak finish or vinyl-clad version. The ported enclosure is specially damped, according to Axiom, and contains an 8-inch woofer with foam surround along with a 1-inch soft-dome tweeter; the port is on the rear panel. Duplicate binding posts are provided, along with an associated switch, for biamplication.

MEASUREMENTS

The frequency response measurements suggest that this should be a very neutral-sounding speaker. The listening window which is an average of readings taken on-axis and 15 degrees off-axis, horizontally and vertically, is exceptionally linear but for a small "blip" at 3 kHz, so the spectral balance in the "sweet spot" of the listening room should be balanced. Elsewhere, the sound should be almost as good as shown by the curve made up of measurements taken from 30 to 45 degrees off axis. The reflected sound – and, hence, much of the speaker's overall sonic impression, is well behaved also, other than a fairly prominent midrange depression at about 1.2 kHz.

In all three curves, and in the total radiated response, several things are apparent. One is the midrange dip, which was noticed by our listeners, although it was most clearly apparent when listening to pink noise; otherwise its effect was minimal. The high-frequency roll-off was more audible, as was a relative weakness

in the bass – the –10 dB low-frequency cut-off was at a relatively high 39 Hz. Overall sensitivity, for a 1-watt input measured anechoically at a distance of 1 metre, was 87.6 dB – a fairly typical mid-sensitivity reading. **The directivity was well-behaved up to 10 kHz, indicating good dispersion,** above which high frequencies become more directional.

Total harmonic distortion for an output level of 90 dB SPL (6.5 watts input) is fairly high at low frequencies but, combined with the roll-off in that region, was not obtrusive in our listening tests. Impedance stayed above the 6-ohm specification, except for a narrow band from 100 to about 300 Hz; it's unlikely that this speaker would present problems to most amplifiers.

LISTING TESTS

Throughout our blind auditioning, the expert listeners commented on the open, natural quality of the AX-2. If there was a common complaint, it was that bass was a bit light: "A very good – small speaker," "could use a little more low end," and "treble emphasis makes some music hard-edged," the latter a result of the 3 kHz rise following the midrange dip.

More often, however, **our panel said things like "good overall balance," "very open," "good, natural, uncolored," and "guitar sounds great – natural."** Small faults were apparent, to be sure, but **the overall impression was of a fine performer with fewer problems than most of the speakers we have listened to recently. In fact, when the scores were totaled, it consistently out-performed several well-respected models costing a great deal more. The Axiom AX-2 is definitely a pleasing performer.**

— I.G.M.

PRODUCT ANALYSIS

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AXIOM AX2 SPEAKER SYSTEM

“THERE WAS A REFRESHING LACK OF COLORATION IN THE SOUND OF THE AXIOM AX2, AND IT DELIVERED A SURPRISINGLY DEEP AND CLEAN LOWER REGISTER WHEN CALLED ON TO DO SO.”

Stereo Review

Julian Hirsch, Hirsch-Houck Laboratories



AXIOM AX2 SPEAKER

The Canadian-made Axiom AX2 Reference Monitor is an eight-inch two-way speaker system measuring 24 inches high, 10 inches wide, and 9 inches deep. It weighs approximately 25 pounds. The cabinet is attractively finished on all sides (our test sample was covered in a natural oak veneer), and its black cloth grille is easily removable.

The AX2's 8-inch woofer operates in a vented enclosure, with the vent on the rear of the cabinet. High frequencies (above an unspecified crossover frequency) are radiated by a 1-inch soft-dome tweeter. There are no external level adjustments, but the back panel has two pairs of binding posts (their $\frac{3}{4}$ -inch spacing is compatible with dual banana plugs) and a toggle switch. In its up position, the switch disconnects the tweeter from the main speaker inputs and makes it available at the second pair of terminals for biamplified operation. The crossover network's high-pass filter protects the tweeter against damage from low-frequency inputs in the biamplified mode.

According to Axiom, the AX2's woofer is designed to handle a wide dynamic range without "bottoming" or distorting. The damping material in the enclosure is said to be optimally placed to eliminate internal standing waves, and the front edge of the cabinet has a 45-degree bevel to eliminate diffraction.

The AX2's rated frequency response is 40 to 22,000 Hz \pm 2 dB, and its sensitivity is rated as 89 dB sound-pressure level (SPL) in an anechoic environment. Minimum impedance is specified as 6 ohms. Amplifiers capable of delivering from 15 to 250 watts per channel are recommended for use with the AX2.

LAB TESTS

For listening and most of our measurements, we mounted the Axiom speakers on 7-inch stands so that the tweeters would be closer to ear level. They were about 2 feet in front of a wall and 7 feet apart. **The average room response of the two speakers, despite the bumps and dips typical of room-boundary effects, was unusually uniform, varying only about \pm 5 dB from 50 to 20,000 Hz.** The close-miked woofer response, combined with the response measured at the rear port, was within \pm 2 dB from 20 to 400 Hz. Above that frequency the close-miked measurement is no longer valid, since the wavelength of the sound becomes comparable to the dimensions of the driver.

The low-frequency portion of the bass curve was also somewhat misleading. The port radiation was dominant below about 60 Hz, giving the appearance of a nearly uniform output down to 20 Hz. Actually, the fundamental acoustic output is too low in the bottom octave to be useful, and the effective lower limit of the speaker's response was about 40 Hz – still very creditable for a small box with an 8-inch woofer.

Splicing the woofer response to the average room-response curve resulted in a composite frequency response flat within \pm 4 dB from 40 to 20,000 Hz. The tweeter's horizontal directivity was excellent up to about 7,000 Hz, although the response 45 degrees off-axis dropped off rapidly above 8,000 Hz. **Group-delay variation was less than 0.2 millisecond in the tweeter's operating range from 3,000 to 20,000 Hz.**

Sensitivity was 90 dB SPL at 1 meter with a 2.83-volt input of pink noise. The woofer distortion at that level was 4 percent at 40 Hz, decreasing to 0.9 percent at 90 Hz and varying between 0.3 and 0.65 percent from 100 to 1,000 Hz. The system's impedance reached a minimum of 4 ohms at 170 Hz, with other dips to 5 ohms at 30 Hz and 6 ohms from 5,000 to 9,000 Hz. The highest readings were 24 ohms at 65 Hz and 21 ohms at 1,500 Hz.

Pulse power tests confirmed the exceptional power-handling ability of the Axiom woofer. At 100 Hz, the onset of sharp overload sounds coincided with the amplifier's clipping, at 1,100 watts into the speaker's 5.5-ohm impedance. At higher frequencies (1,000 and 10,000 Hz), the amplifier clipped before any obvious distortion appeared in the speaker's acoustic output.

COMMENTS

Despite the proliferation of similar-looking small speakers from numerous manufacturers, there are very real differences among them. **The Axiom AX2 is an excellent illustration. It sounded astonishingly the way its response curves and other test data indicated it would. There was a refreshing lack of coloration in its sound, and while it did not emphasize the upper bass, it delivered a surprisingly deep and clean lower register when called on to do so. Although the highs were never shrill, the sound had a crispness and an airy quality that resulted from the flatness of its response up to and beyond the limits of human hearing.**

Those qualities are not found in many higher-priced speakers and are still rarer in or near the price range of the AX2. Obviously, they were not achieved by an exotic design or expensive construction techniques, and most certainly not by accident.

A bonus is the speaker's very attractive appearance, with or without its grille in place. The two-page instruction "manual" tells the user everything he needs to know to install and use the speakers effectively. I was especially impressed by the way the AX2 lived up to the claims made for it, including its excellent sound stage and high power-handling ability in the low frequencies. Altogether the Axiom AX2 is a very good value in today's well-filled speaker market.

Julian Hirsch, Hirsch-Houck Laboratories

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AXIOM AX3

"THE AX3 PRODUCES A VERY WIDE STEREO
IMAGE WITH LEVELS OF DEPTH AND
ACCURACY WELL ABOVE STANDARD..."

SON
HI-FI
VIDEO®



AXIOM AX3

We were very eager to audition the Axiom AX-3 Reference Monitor loudspeaker system, and having done so we were not disappointed ... quite the contrary.

The Axiom line consists of a dozen traditional models including the fine "Reference Monitor" series, and the sub-woofers including one with a Centre Channel for integrated audio/video systems. The most expensive pair of speakers is the AX-5 Reference Monitor. The next model down is the AX-3, the subject of this test.

The AX-3 bears a striking family resemblance with the AX-5 we previously tested. In fact, it looks like a twin on a diet! And the similarities do not end there...

CONSTRUCTION

This speaker measures 760mm H x 250mm W x 250mm L. It is designed to stand directly on the floor on spikes provided for this purpose. The cabinet is made of 19mm thick particle board veneered on both sides. **The midrange and the tweeter are mounted together in their own internal enclosure, completely sealed as it should be. The exterior finishing is a high quality genuine oak veneer.** The interior of the enclosure is fully reinforced with several braces and the damping is a dual system. Two pairs of gold plated input connectors are mounted on moulded plastic rear input plates. A switch located between the two allows various input combinations as we shall discuss later.

Axiom prefers the following configuration for its three way speakers. The midrange, tweeter and vent are located on the front baffle while the woofer is located at the rear. **These drivers are very well made, with the midrange being of special interest. It is an extremely rigid 75mm (5") dome-type driver with a flexible suspension.** The AX-3 delivers 87 dB/W/m (anechoic) and a maximum power rating of 300 watts.

The cross-over in the AX-3 begins with a straightforward design and adds some very unique modifications. Four different hook-up procedures are outlined in the Owner's Manual. A single amplifier can drive

the system in either 2 or 4 ohm mode. A single amplifier can also be used to drive the system through two pairs of speaker wires, in which case the system runs at 2 ohm. The last alternative is bi-amping at 4 ohm.

Our curiosity lead us to try the single amp/2 ohm alternative. Our tests however were not conclusive with either the Naim or the Sima systems. In both cases, the amps quickly ran out of breath, and the sound became understandably harsh. We completed our tests in the single amp/4 ohm mode.

LISTENING TESTS

As with the AX-5 we tested two years ago, we thoroughly enjoyed the Axiom AX-3's listening qualities, especially the fine balance between frequency response and spacious sound stage. Indeed, this configuration produces a very wide stereo image with levels of depth and accuracy well above standard.

The placement of the woofer at the rear of the cabinet requires the installation precautions mentioned when we tested the AX-5. However, with the AX-3 this characteristic is possibly less critical. The matching of the speaker to the room is less of a problem, possibly because of the smaller diameter woofer and the narrower enclosure.

The AX-3 Reference Monitor offers the consumer a different and unique product in both appearance and performance. It provides finely balanced listening in terms of both frequency response and sound-stage. There is very little to criticize. Even the price is well balanced.



Stereo Review®



AXIOM AX-5 SPEAKER

Julian Hirsch, Hirsch-Houck Laboratories

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AXIOM AX-5 SPEAKER

Julian Hirsch, Hirsch-Houck Laboratories

THE Canadian-made Axiom AX-5, which its manufacturer calls a Reference Monitor, is a three-way speaker system whose cabinet measures 30 inches high, 12 inches wide, and 11 inches deep. Sold in mirror-image pairs, the AX-5's are supplied with 6-inch-high pedestals that place the tweeters about 33 inches from the floor. The pedestals are fitted with removable spikes to improve floor contact. The speakers weigh about 50 pounds each.

The 10-inch woofer of the AX-5 is mounted in the rear of the cabinet and has a port on the front panel. The woofer cone, which appears to be aluminum, has a compliant edge-surround that permits large cone excursions. The high- and mid-frequency drivers are vertically aligned near the inside edge of the front panel. The midrange driver is a 3-inch dome, also with a compliant edge-surround, and the tweeter is a 1-inch dome radiator.

The cabinets of our test samples were finished in an attractive blond wood except for the rear panel, which is flat black, as are the front and rear grilles. The grilles are retained by plastic snaps, and even with the front grille removed, the speakers present an attractive appearance. Spring-clip connectors are recessed into the rear panel, and there are no external level controls.

Lab Tests

The room response for the Axiom AX-5 was exceptionally flat and smooth, within ± 2 dB from 100 to 20,000 Hz. The close-miked measurements from the woofer cone and its port combined to produce a bass-response curve flat within ± 2 dB from 20 to 250 Hz. Together with the room curve, this resulted in a composite frequency

response of ± 2.5 dB from 20 to 20,000 Hz.

Although this is most impressive performance, it must be remembered that our composite curve is merely an educated estimate of the speaker's potential and not an actual response that could be realized in *any* real room. Nevertheless, *the AX-5 produced what may be the flattest response we have yet measured from a loud-speaker.* (The rated frequency response is 32 to 22,000 Hz ± 2 dB.)

The system's sensitivity was about average, producing an 86-dB sound-pressure level (SPL) at 1 meter when it was driven by 2.83 volts of pink noise. The impedance dipped to a low of 2.5 ohms at 350 Hz and was less than 4 ohms from 70 to 750 Hz. Its maximum value of about 11 ohms was reached at 40 and 1,700 Hz. *The bass distortion measured at the woofer cone was very low just over 1 percent at 50 Hz*, but the cone's output dropped rapidly below that frequency, which was the effective crossover between the woofer's cone and port. The distortion at the port was much higher. *The woofer was able to absorb a very high input, about 700 watts* into its 3.5-ohm impedance at 100 Hz, before giving audible indications of cone "bottoming."

Our quasi-anechoic FFT measurements confirmed the smoothness and breadth of the AX-5's frequency response. *The phase linearity of the system was excellent in the tweeter range, with a total variation of ± 0.1 millisecond (ms) from 2,500 to 20,000 Hz.* The group delay increased linearly at the lower frequencies, reaching 1 ms at about 500 Hz.

Although only a couple of specifications on the AX-5 were provided by the manufacturer, we were able to estimate the approximate crossover frequencies

from the measurements and the driver dimensions. The crossover from woofer to midrange appeared to be at about 250 or 300 Hz, and the crossover to the tweeter was around 2,000 Hz.

Comments

The sound of the Axiom AX-5 was consistent with its measured performance. In other words, *it was very smooth and uncolored, with no discernible emphasis or deficiency in any part of its operating frequency range.* In spite of the very low minimum impedance of the system, we had no problems driving it with any good amplifier. It was altogether listenable, comparing more than favorably with other speakers we had on hand. It is also a very handsome speaker.

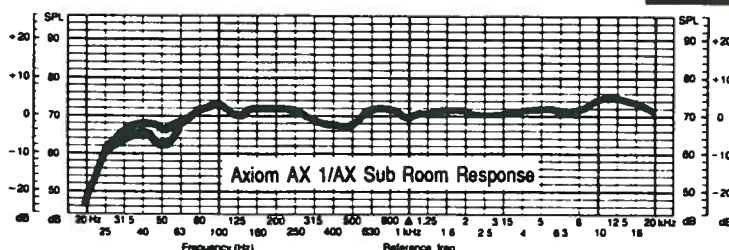
We have some doubts about the efficacy of the AX-5's spiked pedestals, however. The spikes do not fasten rigidly to the pedestal bottom but are merely inserted in holes near its corners. Our listening room is carpeted, and the spikes were not long enough to penetrate to the concrete floor below. The result was a total negation of any possible benefit from the spikes; the pedestal made only a tenuous contact with the floor and in effect was merely resting on the carpet. Moreover, since the speaker cabinet actually rests on four small rubber discs on the top of the pedestal, we doubt the value of the mounting system even if the spikes were in simultaneous contact with a floor surface.

That is a minor matter, however, since the benefits of mounting spikes are debatable anyway. Basically, *the Axiom AX-5 is a very smooth, fine-sounding speaker that looks as good as it sounds and should be compatible with almost any size room.*

Axiom

 audio ideas

ANDREW MARSHALL



Axiom AX 1/Ax Sub Satellite/Subwoofer System

If you are seeking the most attractive and compact way to add stereo, or even surround sound to your video system, this may be it. The Axiom components that make up this system include the **AX 1** satellites, the **AX Sub** subwoofer, and the Video Shelf, which, as you can see, allows a VCR inside and a monitor on top; it is shown here with a 20" one on top, and can accommodate up to 33" screen sizes. There is a new variant to the subwoofer which includes an internal centre-channel system, in fact, an **AX 1** in the box, this woofer and tweeter right under the video screen; it will require a separate amplifier. For surround systems 4 **AX 1**'s can be used to match everything up acoustically without taking over the room physically. All these boxes of varying sizes are finished in light oak or black ash veneer.

In our tests of the **AX 1/Sub** trio, the subwoofer was also placed out in the room beside its measured satellite to be consistent with other speaker tests, but a second curve was run with the subwoofer moved back to within 18" of the rear wall, which, as the room curve shows, increased the smooth bass output by about 3 dB. Overall response was very linear, as both curves indicate.

I should also comment on the quasi-anechoic curve for the trio. **The Sub has a rear-panel toggle to switch its crossover point to the AX 1 between 120 and 250 Hz (it also has inputs for bi-amping the**

system, making it quite versatile). The top curve was run with the switch in the 120 Hz position, and it is clear that it is there for use with other speakers which go deeper in response, the trough between 200 and 500 Hz the result. When I switched to the 250 Hz crossover point, things smoothed.

In general, bass performance was very clean and tight down to 25 Hz, rolling off steeply below. I was a bit disappointed in that, since my feeling is that a subwoofer should be able to get down to 20, or even 16 Hz, the latter the lowest fundamental produced by an organ. But few records (or video sources) have all that much energy down that low, anyway, though Jabba The Hut's voice gets close. Though rear-ported **the AX Sub's response is smooth and not all that room sensitive. It was impossible to make it sound boomy.** I should note in passing that the **Video Shelf** has shock mounted feet to prevent bass from rattling your TV.

Response across the rest of the audio spectrum was quite smooth, with a rising top end above 10 kHz, which is not heard as much more than a bit of sparkle. **On-axis midrange response is very smooth,** with some roughness just above where the satellites cross over to the subwoofer. That crossover, by the way is, in the subwoofer, and can be bypassed using the separate bi-amp inputs. **You will note that**

in the room curve this frequency range (200-700 Hz) is much smoother, with just a 3 dB dip indicating the excellent integration of the system. The off-axis response (the lower trace in the quasi-anechoic curve) tracks the on-axis curve into the upper midrange, where it has a 5 KHz peak before rolling off smoothly.

That peak could be heard in the listening tests as a slight edge, but the only other personality shown by this system was a bit of coloration in the female voice caused by the lower midrange variations. Transients were just a hair hashy, but clean in general, while male voice was natural. There was great authority without thumpiness on piano, while **the 1812 cannons were impressively tight and deep.**

The AX 1 was capable of providing good depth in addition to its excellent lateral imaging, and had a nicely realistic quality on live recordings. It should be capable of exciting surround sound with all video media, especially musical programs and spectacular film soundtracks.

This speaker lacks the refinement (and price) of some of the others reviewed here, but it was clearly designed for special applications, for which use it is a superb value. As well, for the person who wants unobtrusive speakers with very wide-range performance, **the Axiom AX 1/Sub is an excellent and relatively economical choice.**



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**CRITIC'S CHOICE
AWARD**

to

Axiom Audio

for the

Axiom AX 1 Reference Loudspeaker

in recognition of
Technical Excellence
&
Exceptional Value



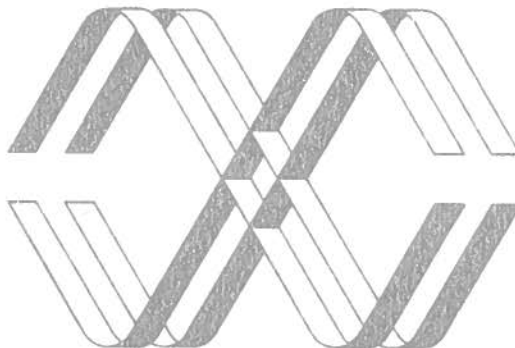
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