

# EQUIPMENT REPORTS

## INFINITY IRS BETA LOUDSPEAKER SYSTEM

J. Gordon Holt

Five-way, four-piece satellite/subwoofer dynamic speaker system. Rated frequency response: 25Hz-44kHz  $\pm 2$ dB. Minimum recommended amplifier power: 75Wpc. Sensitivity: 87dB/W/m. Drivers (per side): 4 12" cone woofers, 1 large EMIM, 1 EMIM, 1 EMIT, 1 Super EMIT. Level controls for uppermost 3 drivers & woofers. Crossover frequencies: 70Hz, 700Hz, 4kHz, 8kHz. Nominal impedance: 4 ohms. Subwoofer crossover network: electronic (line-level), with hard-wired feed to fullrange amplifier. Dimensions: woofer columns 65" H by 15" D by 16" W; upper-range panels (including base) 65" H by 17" W by 17" D. Weight: 1550 lbs, system. Price: \$10,500. Approximate number of dealers: 30. Manufacturer: Infinity Systems, Inc., 9409 Owensmouth Ave., Chatsworth, CA 91311. Tel: (818) 709-9400.

In 1966, two avid audiophile/music lovers—a nuclear physicist named Arnold Nudell and an airline pilot named Cary Christie—labored over weekends and evenings for 18 months in Nudell's garage to put together the world's first hybrid electrostatic/dynamic loudspeaker system. It cost them \$5000 for materials, launched a company (New Technology Enterprises), and helped contribute to the popular myth that all of the really *important* audiophile manufacturers got started in somebody's basement or garage! The system was marketed as the Servo-Statik I, for the princely sum of \$1795. (At the time, the most expensive loudspeaker listed in *Stereo Review's* "Stereo/Hi-Fi Directory" was JBL's "Metregon," at \$1230.)

It was in 1968, though, when this fledgling enterprise went "legit," with funding from outside investors, the rental of industrial space for a factory, and adoption of the name Infinity Systems, Inc. (If you're good at mental arithmetic, you may have reason to surmise that 1988 is Infinity's 20th anniversary). The first review of the SS-1 appeared in our Winter, 1968 issue, and it was an unqualified rave. But we had to return the system to Infinity shortly thereafter. We did so grudgingly.

Despite the subsequent release of two "affordable" hybrids, the models 2000 (\$239) and 1000 (\$119), Infinity Systems remained conspicuously inconspicuous in the audio field until 1970, when they were "discovered" by *High Fidelity* magazine, which gave the SS-1 an intemperately enthusiastic review.

<sup>1</sup> This is consistent with the equally popular myth that people will beat a path to the door of anyone who invents a better mousetrap. They will, but only if the inventor spends half a million dollars on advertising and promotion.

Five years later, we got a revised version to test. By then, the SS-I had become the SS-1A. It was a three-way system consisting of a single 18" servo-controlled woofer in a cubic enclosure, plus two separate screens combining six largish electrostatic midrange panels with about the same number of electrostatic tweeters ranged in a single horizontal row and aimed in half a dozen different directions to "average" their HF beaminess. The tweeters were designed and built by the Jantszen company, which had had many years to debug the design, but the Infinity-designed midrange panels were far from bug-free. They had a tendency to arc-over at high listening levels, and when this happened, the spark would burn a hole in the diaphragm and the sharp edges around this from then on became a source of weakness, causing arc-over at much lower volume. Admittedly, our sample SS-1A was a "pre-production prototype," but the number of midrange-panel failures we experienced during the course of our tests did not augur well for the system's viability as a commercial product. Nonetheless, I was immensely impressed by the SS-1A's sound when it worked, describing it (in my review, Vol.III No.9) as one of the two "most accurate" speaker systems available. (The other, reviewed in the same issue, was the FMI J-Modular.)

Infinity apparently never did solve the problem of midrange-panel breakdown. Instead, they bypassed the issue by abandoning the electrostatic approach entirely. In 1976, after using the Strathearn planar driver for a while, they introduced their EMIT, the name being an acronym for "Electro-Magnetic Induction Tweeter." Essentially a push-pull ribbon trans-



Infinity IRS Beta loudspeaker

ducer with an etched voice-coil, EMIT was later supplemented by a midrange version, called EMIM, and both became the basis of all subsequent loudspeakers from Infinity, other than their beer-budget models, from car-stereo speakers to the huge \$45,000 IRS V.

At a bit over \$10,000, the IRS Beta should by all rights be a poor cousin to the "flagship" IRS V. After all, higher price buys higher quality, right? Particularly when the same manufacturer makes both models. But put that question to the people at Infinity, and you get a lot of hemming and hawing and scrabbling of toes in the dust. No, they won't come right out and tell you the IRS V is better than the Beta. (See, I resisted the urge to make a Terrible Pun.) But neither will they tell you the Beta is beta than the IRS. (I couldn't resist!) But the implication is clear; the folks at Infinity are *proud* of what they've pulled off in the Beta. And not without justification.

The IRS Beta is a five-way design, with the usual cone woofers (eight 12" in all) and a vertical array of five EMI drivers on each of two separate upper-range panels. These drivers have acronymic appellations of LEMIM (large midrange), EMIM (midrange), EMIT (tweeter), and SEMIT (supertweeter). All the crossover filters for the EMI drivers are contained in the bases of the free-standing panels, as are the level controls for the three uppermost drivers. (The two LEMIMs are the only drivers without level controls, which is okay because all the others have them.) An electronic crossover (supplied) contains an active low-pass section, with response-contouring controls for the woofer towers, and a passive (straight-through) signal path for the upper-range panels. The Beta system *must* be bi-amplified, although it is unusual in that it feeds the full audio range to the upper-range amplifiers.

On the electronic crossover are a woofer level control, a crossover control—labeled "low-pass filter"—which changes the woofer low-pass turnover, a "high-pass filter" that establishes the system's LF cutoff frequency, a bass contour control (for rising, falling, or flat response below 40Hz), and a woofer polarity switch. On the rear of the crossover is a toggle switch labeled Open Loop Gain Comp, which is essentially a gain-compensating switch for the bass amplifier.

I mentioned earlier that Infinity's original hybrid systems had a "servo-controlled"

woofer. A second voice-coil was connected via a second pair of speaker wires to what amounted to a feedback circuit in the electronic crossover, which compared the cone's actual motion with the input signal, and automatically corrected for any discrepancy. The Beta uses a much more sophisticated form of servo control. One of the four woofers in each column has a high-quality accelerometer attached to its cone which measures the cone's changes in motional velocity. A second pair of (lightweight) wires carries the accelerometer output back to the crossover unit, and the signal is compared with the input signal, the difference being applied out-of-phase to the signal to correct for the discrepancy. (The woofers are said to be closely enough matched that the behavior of one will be typical of all.)

Because the servo control involves a large amount of negative feedback, signal polarity is crucially important. The servo connecting plugs are polarized, and can only be connected one way, but if the bass amplifier is polarity-inverting, or if the woofer cables are reversed, plus for minus, the negative feedback becomes positive and the system will go into violent full-power oscillation at around 35Hz, which is (I can assure you!) one of the most frightening (and potentially destructive) sounds you will have ever heard! This can also happen if everything is phased properly but the bass amplifier has very high gain, which explains the "Open Loop Gain Comp" switch. So, regardless of how absolutely certain you may be that your bass amp is noninverting and has the right gain and the speaker cables are properly polarized, you should *always* set the crossover's Woofer Level control all the way down before turning everything on the first time, and raise the level *slowly* to ascertain that everything is okay. If it isn't, a rising roar will warn you to turn the control down again before the woofer cones turn inside out, and to reverse the polarity of the speaker cables. Test one woofer channel at a time so that, if you get oscillation, you'll know for certain which channel is bass backwards.

*Nota bene:* The crossover's front-panel Polarity switch does not have the same effect as reversing the woofer connections. It reverses the woofer polarity *independent* of the feedback loop, so it does not change the negative feedback to positive feedback or vice versa. The Polarity switch is used only to

achieve correct *absolute* system phase, in conjunction with the upper-range panel polarity, when (for example) the preamp/control unit is polarity-reversing. Infinity's instructions stress the importance of overall absolute phase, but I seem to be one of those people who are stone-deaf to absolute phase. My advice: Try to phase the system properly, just in case your ears *are* polarity-sensitive, but don't worry if you can't hear the difference. You're in good company.

Three Infinity staffers descended upon us prior to my tests of the Beta. First, chief design engineer John Miller arrived to modify our speakers—removing their overload protection circuitry—and to install and check them out. The protection mod on my Betas was done because the Infinity people felt they could trust us not to abuse them and because, apparently, the overload protection causes a slight degradation of the sound. (Considering *Stereophile* Santa Fe's record to date—six woofers and two tweeters trashed in a mere three years—I would say his confidence was misplaced.) But I had, and still have, some misgivings about reviewing a modified version of the Betas. If Infinity is not prepared to sell the unprotected version to consumers, I would have preferred to test a stock pair. As it is, I have no way of knowing how much the overload protection affects the sound, and, as a consequence, how much better my samples may have sounded than the average production speakers. (Perhaps Infinity can enlighten us about this, in a Manufacturer's Comment.)

After Mr. Miller left, Infinity president Arnie Nudell and senior veep Leon Kuby arrived, to re-tweak the loudspeakers and "make sure everything was working right." Having the manufacturer install his speakers for us is not exactly SOP at *Stereophile*, nor is it at all unusual. I usually undo most of what they've done after they leave, anyway, because my priorities for reproduced sound tend to be different from that of most manufacturers. But in this case, such undoing was minor.

Equipment used for these tests included the Ortofon MC-3000 cartridge in the Versa Dynamics arm and turntable, a Stax Quattro CD player, a PCM-F1 digital tape system, Threshold's FET-10 preamp and line controller and SA-1 power amplifiers, an Audio Research SP11 preamp, and pairs of Audio Research M-300 and VTL 300 mono amplifiers. Audio intercon-

nects were Monster M-1000s, speaker cables were Monsters and AudioQuest Clears. Program material was some of my own and others' original tapes, and CDs and analog discs from Sheffield, Opus 3, Telarc, and Reference Recordings.

Prior to the visitations, LA and I had done some preliminary listening to the Betas with the FET-10 preamp, the SA-1s on the upper-range panels, and a Mark Levinson No.23 and a dbx BX1 (in turn) on the bass towers. The sound was excellent but not exactly what I would call superb. When Nudell arrived, he insisted that we try using tube electronics. He even brought along one of his own Audio Research SP11 preamps (the man owns *five* of them!), just in case we didn't have one gathering dust in the corner. We didn't, Arnie Balgalvis currently giving house-room to our Mk.II SP11. However, we did have a pair of ARC's M-300 amplifiers on hand, and these were pressed into service until, after about half an hour, one of them blew a screen fuse and died. (Evidently a tube let go, but with eight of them in each amplifier, we were not about to take the time to try and figure out which was the culprit.) Fortunately, we had just taken delivery of a pair of the new VTL 300W tube monoblocks.

With the solid-state electronics, the sound was rather dry—more so, in fact, than with the same electronics through the Sound Lab A-3s. With the SP11 and the VTLs, the sound was transformed, becoming much more liquid, open, and *musical*. Did this mean the tubed electronics were *better* than the solid-state ones, or just different? In fact, subsequent bypass tests confirmed that the FET-10 was slightly more *accurate* than the SP11, but there was no denying that, with the SP11, the Betas sounded more musically natural. Nudell confirmed that the Betas, like Infinity's other top systems, were designed in conjunction with Audio Research tube electronics, so it was hardly surprising that they sounded a little less decent with solid-state electronics, no matter how "accurate" these may have been. This report, then, applies only to the sound of the Betas with some of the best tubed electronics available. I think I can state with confidence that the system *must* be so used in order to fully exploit its performance capabilities.

It must also be said that the Betas need a lot of breathing space. Because the woofers are capable of moving a hell of a lot of air, they

should be placed well away from the room corners, to avoid as much as possible the generation of standing-wave resonances. The upper-range panels, too, should be at least 4' out from the rear wall, to permit their fullest reproduction of depth. Even more distance is needed in front of them. Because the panels are so high, and the drive-units occupy quite a large chunk of vertical space, the listening seat should be at least 8' away from them, and preferably several feet more, in order to give the wavefronts sufficient distance to integrate properly. Like the IRS Vs, these are simply not small-room loudspeakers; using them in anything less than a *big* room is a waste of much of their purchase price.

Four driver-balancing adjustments may seem to pose a formidable setup challenge, but the job is a lot simpler than it may appear. To begin with, the EMI controls have rather limited range—only about  $\pm 2$ dB from center, and the system is designed to be close to "right" with all of them centered. Usually, little change in any of them will be required, and the final tweaking should be done over a period of some weeks, using a wide variety of recordings known to have been carefully engineered for realism. (That rules out all product from major record companies.)

Woofer adjustment is by far the most daunting aspect of Beta setup, because of the number of interacting controls provided. With a claimed lower limit of 25Hz, and (by my own measurements<sup>2</sup>) flat response down to at least 20Hz, these are quite capable of revealing stuff on recordings that you didn't know was there and were better off not knowing. I have heard and read criticisms of Infinity's bass towers as being sodden and heavy in quality, and, indeed, when Nudell was here, he set up the woofers for what I felt privately to be too much of a good thing. The instructions for the Betas suggest that one should never operate the subsonic (high-pass) filter wide open when listening to LPs, and with the system setup Nudell left me, the unfiltered bottom revealed all sorts of obnoxious rumbles, thumps, and

<sup>2</sup> In fact, I could not tell what the Beta's lower limit was, because my oscillator does not range below 20Hz, and the system (in my room) produced as much output there as at 100Hz! The subjective effect of a very strong 20Hz is at once awesome and nauseating: awesome because of the impression of incredible power it gives, and nauseating because it apparently does nasty things to the ear's balance-sensing semicircular canals. I estimated that five minutes of exposure to it would have cost me my lunch.

thuds when playing analog discs. But after he left, I turned down the bass level, moved the woofer towers about 6" farther out from the room corner, and shoved my sofa around until the low end I was hearing was as smooth and extended as I could get it. Guess what? The LF filter was no longer necessary on discs. Yes, there were still many records from which you could hear very deep noises in the background, but the noises were under control. They were neither prominent nor annoying, and even added a measure of realism to the sound because the noises *were* present during the original performance. The moral of this is that the most bass is often not the best bass.<sup>3</sup>

Shortly into my private listening tests, I noticed that I was consistently running the preamp's balance control to one side of center. I had also been starting to observe that the system's imaging wasn't as good as it might have been. Phantom images were broader than life, and were rather unspecific in lateral placement. Playing a mono disc confirmed what I suspected: Center bunching was rather loose, and seemed to wander ever so slightly with changes in the music. I tried rotating the balance control from extreme to extreme, so as to listen first to one channel only, then the other. There was a definite difference, all the more obvious when using pink noise as a signal source. All the drivers in both panels were operating, and apparently at the proper sensitivity levels, but it was not possible to make the two channels sound alike by adjusting their balance controls. It sounded to me as though the crossover between one set of LEMIMs and the EMIM above them was out of whack: either the LEMIMs were going out too far or the EMIM was going down too low. (The difference was too great to be compensated for with the individual driver level controls.)

Reversing the speaker cables, left for right, confirmed that this was not due to a difference in input signal; the problem remained in the same speaker. Interchanging the speaker units caused the problem to switch sides. The panels were unquestionably different. No wonder the imaging was mediocre!

That nobody had picked this up during the

<sup>3</sup> To be fair to Arnie Nudell, he set the bass level in Gordon's system using master tapes and CDs as reference material. The absence of subsonic spurious with these sources, and the generally clean nature of their very low frequencies compared with LP, allows the subwoofers to be set higher without sounding unnatural. —JA

two previous days of listening seems hard to believe, as it was not at all subtle once I started listening for it. (Though Arnie Nudell's listening seat *was* off to one side of the central listening seat.) But there's the point. It has been said that audiophiles tend to hear what they expect to hear, but less recognized is the fact that we are often amazingly oblivious to what we *don't* expect to hear.<sup>4</sup> But was the problem I had found a result of poor quality control, or a defective crossover part, or something else? John Miller messed around in both crossovers with a soldering iron while he was here; could he have miswired something? I may never know what happened. What I do know is that Arnie Nudell was horrified at the news when I phoned him about it, and got another (also modified) panel to us almost overnight.

I assumed that, when the replacement panel arrived, it would be a simple enough matter to determine which of my samples was out of whack. Just listen to the new one against the other two, with pink noise, and throw out the one that didn't match the replacement. What I found instead was rather distressing, to say the least. The new panel did not match *either* of the originals!

Instead of two different sounds, I now had three. The fact that the new one sounded midway between the other two made it impossible for me to ascertain with any certainty which of the originals was "right" and which was wrong. So I gave Infinity the benefit of the doubt, and culled for rejection the one which, in my judgment, sounded the least agreeable. Whether it was more or less typical of average production, I have no way of knowing. But I must say I was shocked at the variability I found between three samples of the Beta's upper-range panels. There is no way this system will ever be able to provide tight, natural-width imaging with that kind of QC!

Not surprisingly, the Beta's imaging was now substantially better than it had been, but it still wasn't as stable or specific as I have heard from many other speakers. I cannot believe my Betas are imaging as well as they could. But—and here is the point to continuing with the review—I also find it hard to believe they

<sup>4</sup> I am reminded of a CES exhibitor some years ago who was proudly promoting a new noise-reduction system with a demo in which his decoder was *switched out of circuit*. For my part, I must confess that I have on occasion listened blissfully to several minutes of a stereo recording before realizing I had the preamp set to Mono.

could sound much *better* than they do.

The word that most aptly describes the Infinity Betas is "awesome." These loudspeakers have a greater capability for standing one's hair on end than any system I have ever heard. I got goose bumps from recordings of solo accordion and harmonica, which is unprecedented, since I normally consider neither of them to be thrilling instruments to listen to. These speakers sounded as if they were *made* for big, dramatic musical works of the kind that inspired the high-fidelity movement from its very inception. (Why US audiophiles so often use their \$20,000 systems, with 200Wpc of amplifier power, to listen to "original baroque instruments," solo guitar, and vocal sextets, is beyond my comprehension. Are Americans the only people in the world who would not see anything ludicrous about using a Stinger missile to kill a fly on the wall?) The Betas had tremendous dynamic range, an incredible feeling of power, and a remarkable effortlessness during the loudest passages. The overall impression they gave of real, live music was something that must be heard to be appreciated.

Yet, quite unlike other immensely "impressive" speakers I have heard, these were equally at home with small-scale, intimate musical works. The Wilson Audio Beethoven violin-and-piano sonata recording sounded almost as realistic as the time Dave played the original tape through his factory reference system. In fact, the fiddle sounded a bit more natural to me through the Betas, which is to say it almost *could* have been right in the same room with me.

In terms of harmonic structure—accuracy of timbre—the Betas are going to be hard to beat. When something is this close to the proper tonality, then it becomes hard to describe its "sound" as such. Heard through the Betas, every instrument seemed to have just the "right" combination of weight and texture. Cellos, piano bass, and large brass instruments—whose sounds are most slighted by the majority of audiophile speakers—were reproduced by the Betas with breathtaking authority and power, and the effect that had on the apparent dynamic range of orchestral (and piano) music was quite dramatic.

Bass was positively awesome, with the

<sup>5</sup> JGH! For shame! Thus to equate muscle with music is unworthy! —JA

capability of producing a *huge* sound from large-scale kitchen-sink works like the Mahler 8th and Mozart *Requiem*. Properly balanced and contoured, the Beta's low end seems totally absent most of the time. Then an unbelievably deep sound comes from the system, and the floor shakes. As the floor of my listening room is concrete, I know this is impossible, but there were times when I would have sworn it was happening. (What was shaking was probably my sofa.) And the *quality* of that bass was just as impressive as its quantity. Only the Synthesis subwoofers have equalled the Beta's low-end detail and focus in my listening room, and nothing I have heard has surpassed either of those in that area.

Oh yes (ho hum), the matter of soundstaging. The only systems I have heard that can touch these for soundstage presentation are a few mini-monitors. With good recordings, the stage almost literally "floats" between and behind the speakers, and the awareness of side walls beyond the speakers and the rear wall behind them is more definite than I had believed possible. Only in imaging specificity is the Beta less than impressive, and we know now why that is. (At least, in the case of my samples.)

Is the Beta a winner in every respect? Almost, but not quite. It does not have quite the "snap" of such full-range electrostatics as the Sound Lab A-3, which is capable of making sounds seem palpably, in-the-flesh alive. Without a direct comparison, this small deficiency is hardly noticeable; the Beta sounds very convincingly real. Under side-by-side

conditions, the A-3s have the edge on realism. There is also a quality of brightness I hear from the Sound Labs which can verge on irritation under the wrong circumstances, but which contributes a great deal to the illusion of you-are-there reality when under control. This was one of the biggest differences I observed between the speakers. Whether the Sound Labs have too much of it or the Betas have too little is moot, but there is no doubt but that the Betas sounded more agreeable, and more *musical* under more conditions and with more program material than do the A-3s. The Betas have, if anything, a slight deficiency through this range (around 5kHz), which may conceivably account for the Sound Labs' superior aliveness.

In short, I *love* these speakers, and I cannot imagine anyone not being absolutely blown away by their performance. If you can afford them, and have the space, buy them. If I could, and had, I would. But if you do, be prepared to give up any smug preconceptions about the superiority of solid-state over tubes. A good transistor amp will work fine on the woofers, but only with the best tube preamps and upper-range power amps will these speakers deliver the remarkable musicality and realism of which they are capable. Also, make sure your panels are at least similar in sound. Perhaps my experience with three of them was unusual, but then again, it may not have been. Consider yourself warned!

The Infinity Betas' pricewise competition? Forget it. There isn't any that I know of. **S**

## MARK LEVINSON No.23 DUAL MONAURAL POWER AMPLIFIER

Lewis Lipnick

Rated power: 200W minimum continuous sinewave power into 8 ohms, both channels driven from 20Hz to 20kHz with no more than 0.1% THD; 400W minimum continuous sinewave power into 4 ohms with both channels driven from 20Hz to 20kHz with no more than 0.2% THD. Peak output voltage: 67V at rated line voltage into 8 ohms. Frequency response: 4Hz-140kHz (-3dB). Input impedance: 50k ohms shunted by 1.5nF. Voltage gain: 26dB. Power consumption: typically 225W at idle, 1200W rated power, 8 ohms. Dimensions: 8 1/4" H x 17 1/2" W x 14 3/8" D (excluding front and rear handles). Weight: 100 lbs (46kg). Price: \$4700. Approximate number of dealers: 45. Manufacturer: Madrigal Audio Laboratories, Inc., 2081 South Main Street, Rt.17, PO Box 781, Middletown, CT 06457. Tel: (203) 346-0896/344-9300.

## MANUFACTURERS' COMMENTS

### Quad/Ross Walker

Editor:

Whatever can be wrong with Ken Kessler that a perfectly harmless press release and a letter to *Hi-Fi News* should provoke 135 lines of breathless prose? Have I inadvertently trodden upon one of his subjective corns?

I happily admit that Quad makes fine products for a certain type of customer, and agree to disagree. However, Quad will continue to advocate a scientific approach to the design of product. If, from time to time, that advocacy causes Ken to feel uncomfortable, then I suggest he pick up the telephone so that we can discuss the matter and come up with something that really is worth writing about.

Ross Walker

Quad Electroacoustics Ltd.

### Infinity IRS Beta

Editor:

First and foremost, we are pleased that JGH was able to achieve the high level of sound quality from our IRS Betas. We know the tedious job of positioning and subsequently balancing the system to optimize all its parameters, and we applaud JGH's obvious tenacity. Sometimes the results obtained from speakers like these are directly proportional to the effort expended in the set-up procedures. Again, thank you for your patience, Gordon.

On another subject, and just to clarify a little ancient history, we sent JGH a pair of original Servo Statik-I loudspeakers even before the *High Fidelity* review. We were very pleased that, at that time, they also gave him "goose bumps."

With respect to matching pairs of IRS Betas, Infinity QCs *every* driver and component (as opposed to AQL which only samples some fraction of each component). Even with these strict standards, we can only match to  $\pm 1$ dB across the audio band. Sometimes one can hear slight differences in the sound of pink noise even when Beta screens are matched so closely that one cannot even measure a difference. These speakers can be so revealing that they can even reveal inconsistencies in themselves. Furthermore, one can pick a pair of *any*

loudspeakers and hear slight differences in pink noise (even if they are closely matched). I guess that we are really incapable of matching two loudspeakers over a 15Hz to 20kHz bandwidth any closer than  $\pm 1$ dB. Differences this small usually can be trimmed by the plethora of controls provided on the IRS Beta. But to the extent that JGH is correct and some of these small fluctuations interfere substantially with image specificity, we will have to develop other, more sensitive, measurements.

Finally, I must confess my personal bias for vacuum-tube electronics; however, I have heard some mighty musical sounds emanate from the Betas using top-end solid-state electronics.

Again, on behalf of all of the staff at Infinity, we would like to thank JGH; and let's hope we can all keep those "goose bumps" alive.

Arnie Nudell, President  
Infinity Systems, Inc.

### Acoustic Energy AE1

Editor:

Thank you for your very favorable review. The AE1 was designed as the first exponent of our metal-cone technology and we are delighted that it should be described as the state-of-the-art miniature loudspeaker. By the way, the 84dB sensitivity under anechoic conditions becomes 88dB in-room, as measured by Martin Colloms (*Hi-Fi Choice*, June 1988).

Phil Jones

Technical Director, Acoustic Energy

### Celestion SL700

Editor:

We are obviously pleased with John Atkinson's review of the SL700 and would like to take the opportunity to express our appreciation to the dealers and customers (and reviewers!) who patiently waited for the arrival of this product. Our feelings match JA's comments. The SL600's performance has been surpassed in virtually all respects (at an extra cost, of course), particularly in the low frequencies, where there is an underlying solidity and ease. We have not experienced the thickening in the lower mid-range at high level referred to in the review;

## FOLLOW UP

### Infinity IRS Beta loudspeaker

Rave or not, my report in Vol. 11 No. 9 (September 1988) on this Infinity flagship system ended on a note of uncertainty, concerning an audible difference between the sound of the two mid/high-frequency-range panels which was messing up the imaging and exacerbating program grudge in one channel.

When I phoned Infinity president Arnie Nudell and reported that my upper-range panels weren't matched, he didn't believe me. "Why," he asked, "didn't any of us notice it during our visit?" I explained it was probably because no one was listening for it, and besides, the brighter, more sizzly side had been at the right, out of reach of such things as massed violins, which were most affected. At the right, it only added additional guttiness to cellos and basses. So, on the (reasonable) assumption that one of my two upper-range panels was out of whack, Infinity sent a single replacement.

The idea was to compare the new one with the two originals, and toss out (as defective) the one that didn't match. But it wasn't that simple. (Things rarely are.) Instead of two different sounds, I now had *three*. The new panel sounded almost exactly halfway between the other two. Of those, I put aside the most sizzly-sounding one, and phoned Arnie again. This time, he sent John Miller to Santa Fe again, with two large boxes of test equipment.

First, we listened. Yes, John could clearly hear the difference I was talking about; no, it wasn't "normal," and no, he didn't know yet what was causing it. After a full day of measuring, during which I went off and tended to other matters, John felt he had the problem pinned down. He told me he had found a very small inaccuracy in the value of a crossover capacitor, resulting in a 1dB reduction in the level of the *rear-firing tweeter*, which spans the 5-12kHz range. He corrected it, and we listened to the result.

Now the speakers sounded virtually identical, and I expressed disbelief that such a small change could have had such a noticeable effect on the sound. But... the panel he claimed to have found the problem in was the one whose sound I had liked the most. Now I did not care for the system's sound at all.

After John left, I continued to work over the speakers, adjusting driver levels, changing room placements, trying other electronics, all the while becoming increasingly convinced that something was drastically wrong. I could not get them to sound nearly as good as they had originally. There was now a persistent coloration—best described as a steely sizzle—in *both* panels, which made any loud orchestral music sound so relentlessly strident as to set my teeth on edge. (Of course, that *had* to be the week of *Stereophile's* annual reviewer convention, and everyone wanted to hear my system. Only a few of them were polite enough—or embarrassed enough—not to tell me they thought it sounded dreadful!)

Meanwhile, a couple of other things developed that put the Betas in a less than favorable light. First one, then several, then all of the loudspeaker terminals came loose. They didn't actually fall off, but they became so wobbly that I started to wonder when their electrical connections would start to become intermittent. (None has, yet.) Then the crossover module's turnover control knob started to slip on its shaft and, with continued use, finally came completely off in my hand. The reason for this then became obvious: The knob had only one set screw to lock it to the shaft, the screw was very small, and the shaft had no flatted side for the screw to seat itself against. (Worse, the set screw is recessed behind the front panel when the knob is in place; it would have been necessary to dismantle the whole case to replace the knob. I just used pliers for future adjustments.)

Granted, these are minor mechanical problems which seem to have no effect on the sound, but to my way of mind they are inexcusable in a \$10,000 product. It's not as if we're dealing with frontiers of technology here; control knobs and 5-way binding posts have been around for longer than I have! I have a cheap Sears-Roebuck radio that has been in use for more than 25 years, and nothing has ever fallen off *that*.

I placed another call to Arnie, and learned that John hadn't just made a small crossover-part "correction," but had also replaced the EMIM and EMIT drivers on both panels, "just to be safe." Arnie declared he was sending

another matched set for me to try.

The drivers were a cinch to replace, but did they solve the problem? Well, yes, no, and maybe. The speakers now sounded quite a bit more pleasant than they had, but they still lacked the gorgeous richness and ease that had attracted me so much to the sound of the original panels. (I should say, "to *one* of the original panels," because it was what that panel was doing to left-channel sounds that made the system so appealing.)

It seemed to me that most of the sizzle still remaining was coming from the EMITs, so, just on a hunch, I swapped out the latest pair for the previous pair. Sure enough, the problem was slightly worse.

Accordingly, we arranged for Infinity to send us yet another pair of upper-range panels. These, which I am assured are "right out of stock," are the best-sounding of any I have heard to date. The steeliness which afflicted some of the previous samples is completely absent, and nothing else of value has been lost. The system now sounds just as magnificently rich and powerful as did the first samples I reviewed, but with far better imaging than that first pair. However, the very fact that the latest pair are *different* from the previous pair, even if only slightly, has not helped to dispel the

impression that there is some sort of quality control problem here. Unfortunately, it doesn't seem to be susceptible to the usual QC solutions.

The problem *sounds* very much like a simple frequency-response aberration, which should be easily measurable. In fact, we tried early on to find a frequency-response anomaly that would account for the perceived brightness difference between the two panels which had sounded the most dissimilar, and failed. The probe mike was not moved between comparative tests, the speaker locations were identical to within as small a fraction of an inch as we could get them, and the two people in the room during the tests were as far as possible from the soundfield and in identical poses for each response run. No consistent differences were measurable, and the *inconsistent* differences measured (on the order of  $\pm 1$  to 2dB) were of insufficient amplitude to account for the audible differences. Indeed, it took almost 3dB of EQ (downward, at 5kHz) on the Accuphase G-18 equalizer to make the two panels *sound* fairly similar, but they then *measured* almost 3dB different at that frequency.

The problem for a manufacturer, of course, is that it is impractical to do QC by ear. The challenge is to find an objective substitute.

—JGH

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speakers were both optimized for much lower impedance loads than the 208B provides. This caveat is not from our personal experience, but comes from an amplifier-designer friend of mine, whose designs are highly regarded in these pages. He stated that an amp will sound hard and strident if used with a load which is much higher impedance than it is designed to drive. The average impedance of 10 to 12 ohms which makes the 208B a great match for affordable equipment may well cause problems when used with \$3000 super amps. As you know, the Krell will drive 1-ohm loads with ease, and the VTL's transformers are tapped for 5- to 7-ohm loads. Circumstantial evidence confirming this hypothesis is that sonic problems were heard exactly where the 208B has its highest impedance. Our suggestion is that future reviews be done both with the reference amps, and with amps more appropriate to the price of the speakers. Please note that we are not implying that our speakers are perfect, merely that in a more typical system the problems noted may be greatly reduced.

**Late-breaking news:** All of the above may well turn out to be moot in the case of the 208B, as we have just been informed that the tweeter may not be available to us any longer. We apologize for the inconvenience and frustration this causes *Stereophile* and its readers. Your only consolation is that we are the most frustrated of all. We will submit the new version for review as soon as possible. Thank you for your patience.

**Eric Johanson**

President, Spectrum Loudspeakers, Inc.

## Lexicon CP-1

Editor:

Undertaking a review of a product as complex as the CP-1 is a rather daunting task. The plethora of configurations and operating modes that make the CP-1 so flexible and musically useful represent a gargantuan review project. What I am most impressed with is Bill Sommerwerck's ability to report not only what the product does and how well it does it, but more importantly, his understanding of the philosophy behind the product.

Digital signal processing holds enormous potential for music lovers. While we have come a long way since the introduction of the first "perfect sound forever" machines, dramatic and profound improvements lie ahead. Many of these advances will have implications for

analog technologies as well, particularly as the boundaries defining pro audio *vs* the high end are removed. Keith Yates's article on audio minimalism and knob surfers (Vol.11 No.11) was very thought-provoking. Bill Sommerwerck's review of the CP-1 continues in this direction of looking at what can be done with signal processing now and in the future. This makes for exciting, interesting reading.

I guess getting a great review doesn't hurt either. Thanks again.

**Buzz Goddard**

Consumer Products Manager, Lexicon

## Infinity IRS Beta

Editor:

First, we would like to again thank Gordon for his initial rave review of the IRS Beta loudspeaker. However, it initially seemed somewhat confusing to us how a product review could begin with "In short, I love these speakers, and I cannot imagine anyone not being absolutely blown away by their performance. If you can afford them, and have the space, buy them. If I could, and had, I would." Then, on further comment, JGH uses the word "dreadful." However, in retrospect, we can try to piece together what happened.

With regard to the obvious mechanical flaws that Gordon found in the Betas, we have to plead guilty. In any system as complex as the Beta, it seems ridiculous that such apparently simple ideas, such as keeping the potentiometer knobs properly attached to the control unit and the input terminals from rotating, were under-designed. We, like every other perfectionist company on the planet, try to do the right thing the first time, but, alas, are not perfect; and considering the myriad of complex issues that we have successfully dealt with in the IRS Beta's development, it is not unheard of that a few details might have been conducted in a better way. Each time we find an apparent defect, we institute an engineering change in order to correct the problem. Current Beta Systems now have two screws to properly secure the knobs and a stronger, reinforced anti-rotation plate on the input terminals.

With regard to the sonic problems encountered by Gordon, the original system which earned the rave review appearing in Vol.11 No.9 (Sept. 1988) was, in fact, a factory-checked production system. Indeed, when Leon Kuby and I left Santa Fe, we were convinced that what we had heard was not only representa-

tive of the IRS Beta's capabilities, but we also thought the sound to be glorious (especially on some tapes made by JGH and JA). I must confess we thought the imaging and sonics were fine, and were confident that everything was in good order. About two weeks later, Gordon did indeed call and complain about an imaging shift due to an apparent difference in the Beta's midrange/tweeter panels. He claimed it was extremely subtle but there, and he could not measure any difference in the panels. At this point, I should have left well enough alone. I knew that his Beta System was thoroughly factory-checked before it was shipped to him. I also recalled that Leon and I did not detect the problem during our visit. But then I was overcome with nagging doubts. What if something had really gone wrong with the Betas? What if something else in the system went awry? On the other hand, JGH was still overjoyed with the Beta's sonic performance.

It was at this point that I believe we made a series of poor judgments. Instead of leaving well enough alone, we elected to embark on a series of "patchwork" repairs which we should have known would probably be a losing proposition. The IRS Beta System is extremely complex, and requires very careful quality control, including the measurement of each component and checking the final product using sophisticated equipment such as Fast Fourier Transform analysis for very sensitive frequency and phase response. The point being that it requires all these techniques to ensure that the system's performance falls within the factory specifications. And, surely as JGH quickly found out, such measurements as are able to be performed with even good "field-type" equipment will not adequately explain all the subtle information that can be discriminated by the human ear. It is clear, in retrospect, that this series of *ad hoc* repairs was the incorrect approach to the "problem," and should not have been attempted by us. The only other proper approach (if we felt that there was something genuinely wrong) would have been to replace both upper end panels, again a pair that had properly gone through our factory QC process. In fact, that is what we ultimately did, with the fortunate result that JGH commented "The system now sounds just as magnificently rich and powerful as the first samples I reviewed, but with even better imaging."

If we have caused *Stereophile*, and in partic-

ular JGH, any additional hardships, we apologize for them. I truly could not believe that there was a problem of the magnitude he described, and therefore I overreacted.

There is a lesson to be learned from this unfortunate incident: Never attempt "patchwork" field repairs on systems of this complexity.

Again, we thank you for the excellent review you have given the IRS Betas, and hopefully we at Infinity are a little wiser.

**Arnold Nudell**

President, Infinity Systems, Inc.

## GSI Musical Electronics

Editor:

Most recently GSI was faced with an almost instantaneous doubling of our rent. I regret waiting until the last month to discover what a charming landlord I had. As reports of our death have been greatly blown out of proportion, I have sent this note to the major publications in which much of our business is found.

As we evacuated as though our building was facing demolition, I am almost certain orders may have been lost or misplaced. I presently have an entire audio company in a garage (floor to ceiling), and am hoping to have space by the time you read this. Mail to 622 Bloomfield Avenue will be forwarded to my home. If you do not have our form-letter mailing yet, please drop us a note with a copy of your order, a photocopy of your canceled check if possible, and give us a bit of time to sort things out.

I also wish to use this forum to point out that GSI will no longer be producing any manufactured products. (Mods and service and rebuilds will continue.) We are currently hammering out an agreement with Mondial/Aragon for the X-1 crossover to join their line, and a tube product line in the future is under serious consideration. Parts and service will still be available from GSI for our products and for NYAL/Futerman products as in the past. A new address and phone number will be published as soon as possible.

On a more positive note: On September 20, 1988, God graced Annette and I with Andrew Anthony, 7 lbs, 8 oz., 20" (most of which are ears). As the balance appears to be mouth, I am conducting serious research into the effects of Sonex and Tube Traps on cribs. A copy will surely be in the *Journal of the AES* sometime next year.

**Andy Fuchs**

GSI