

does half-speed cutting for some of the audiophile disc manufacturers) that appeared in one of the perfectionist-underground audio magazines which panned the V-15-IV for glaring deficiencies. During the course of the interview, Mr. Ricker allowed the interviewer (a regular contributor

to that magazine) to compare the sound of an original tape with its lacquer-disc playback. The writer duly reported that he had considerable difficulty telling which was which. The playback cartridge was the V-15-IV.

(Manufacturer's comment next issue)

Infinity RS-4.5 Speaker System

Three-way system using 12-inch Watkins dual-voice-coil woofers in sealed enclosure, 4 EMIN (electromagnetic-induction-midrange) drivers and 5 EMIT ribbon tweeters (1 rear-facing); 13 dB, 24 to 32,000 Hz; 100 watts/channel minimum power required; 4 ohms impedance; nominal 150 and 5,000-Hz crossovers (lower crossover point adjustable); supplied with active Bi-Channel crossover/equalizer for connection between preamp and power amp(s); speaker dimensions 65" H by 27" W by 15" D; equalizer dimensions 10" D by 14" W by 2" H; loudspeaker weight (each) 150 lbs; \$2000 complete system. Infinity Systems, Inc., 7930 Deering Ave., Canoga Park, Ca. 91304.

There are certain manufacturers for whom every new product implies the promise of countless modifi-

cations, usually a month or so apart, culminating inevitably in a version so far removed from the original that it must be assigned a new model designation-- usually a letter suffix ranging from A to D. By the time E is envisioned, another CES show is approaching, so the decision is made to give the unit an exterior facelift and a brand-new model number. Presto! A new product for CES.

Infinity has rarely played the modification game. Only when a new product developed production gremlins and started pooping out all over the map has Infinity taken it back to the drawing board, for purposes of increased reliability rather than improved sound. The RS-4.5 is the only exception here that we can recall.

Our first pair were among the first off the production line (Serial #s 70025-86/1). Our immediate reaction was that they had

superb bass and high-treble performance but lacked lower middle range and were quite hard-sounding. We expressed our dissatisfaction to Infinity, and were informed shortly thereafter that some changes were being made in the crossover network. Several weeks later Infinity's chief designer Bascom King paid us a visit to make the modifications and assess the results. We agreed that there was a dramatic improvement. The hardness was gone, but we still felt that the lower-mid-range performance left something to be desired. There was still, to our way of thinking, not nearly enough guttiness to the sound of trombones and bowed cellos.

Two weeks later, Infinity informed us that another crossover modification was in the works, and asked that we not review the speaker until we had heard the results of that change. We agreed. (We must point out, though, that a number of RS-4.5s had already been shipped to dealers, and that most of them were the second version we auditioned -- the one with the tamed hardness but the deficiency of fatness and lower-mid-range bite.)

The third version was finally set up in our main listening room, and we have been living with it for two weeks now. The review which follows is of that version -- which is the one Infinity will be shipping to dealers as this is being written.

The RS-4.5 comes with an accessory black box -- a speaker control center which serves the dual purpose of electronic crossover and equalizer. A front-panel switch selects either mode of operation (while a rear-panel one enables the entire unit to be bypassed, although the input buffer stage remains in-circuit). In either of its in-circuit modes of operation, the control provides 11 different crossover frequencies



for the low end of the mid-range drivers and the upper end of the woofers. These can be set independently either for overlapping crossovers or for separated crossovers, to provide (in theory

PERFECTION...

While home will improve significantly until mechanical disc reproduction is superseded by digital.

The final area for improvement as of now is in the recreation of spatial information. SQ had the potential for doing this, but most record pro-

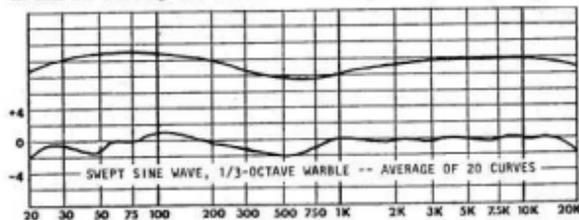
ducers abused it, and truly effective decoders never became available in time to rescue SQ from oblivion. Today, most audiophiles seeking spatial effects use ambience synthesizers such as the Audipulse and ADS. Digital recordings will be able to produce discrete 4-channel sound, and probably will.

at least) a slight over-all boost or dip through the crossover region, as well as "flat" response. In addition, there are level controls for the woofers and for the tweeters -- both providing shelved rather than sloped adjustments -- and a level control for over-all signal, providing unity gain (no gain, no loss) at its mid setting.

The speakers can if desired be used without the control center, as there are level adjustments on them for mid-range and tweeter

ally very good but not outstanding in all respects. Bass was superb -- awesomely tight, very deep (measuring flat to 27 Hz in our listening room), and very smooth.

The high end was exquisite -- very open, and silky-smooth, yet as super-fast as the best electrostatics but without their high-end sizzle (resulting from treble beaming). There were numerous timbres, though, when the listenability of the sound could have been improved by a slight high-



Subjective (above) and measured frequency response of the RS-4.5a.

drivers, as well as a switch that gives flat or tapering response from the woofers.

We tested the speakers in all three operating modes. Without the control center, we found the level-set adjustments on the speakers to be adequate, but barely. There was more than the necessary adjustment range on the mid-range potentiometer, but the two-position tweeter switch did not give enough range or precision of adjustment to meet all exigencies. With a slightly "hot" input source, for example, it was not possible to reduce the tweeter level to the point where the sound could be listened to without annoyance. Using Infinity's own HCA amplifier, and neutral signal sources, the sound from the full-range 4.5s (without the control) was gener-

ally very good (few microphones, disc cutterheads or cartridges are free from high-end peaks) -- something it was not possible to obtain without the use of tone controls or an octave equalizer. The high end of the 4.5s is best described as highly analytical (i.e., accurate), which is fine for program-evaluation purposes but frequently a liability when listening to recordings that have more going for them musically than sonically.

Many instrumental timbres were only moderately-well reproduced. High percussion was rendered flawlessly, but mused-violin sound was judged to be very slightly on the bright side, while lower-pitched instruments were distinctly lacking in warmth. Like the two earlier

versions of the system, although to a lesser degree, the ones we ended up with seemed unable to quite cope with the sounds of trombones and bowed cellos. The hackle-raising roundness and blat of the trombone were markedly deficient, as was the gutty bite of the cellos. Woodwinds and violas were less affected, sounding merely a little thin. No further adjustment of the speaker balance controls, or the room placement, could improve matters.

With the speaker control box in-circuit (and the speaker leads reversed -- the box is phase-inverting), there was a subtle deterioration in high-end accuracy, characterized by a very slight roughness, but there were gains made in other areas. The ability to overlap the lower crossovers made it possible to bring up the lower-middle range, to the benefit of trombone and cello reproduction, while the tweeter-level control bestowed enough range of adjustment to mate the system to a wider variety of associated components, including hot-top signal sources. With all adjustments optimized, there was now only a trace of brightness, but we were still not happy with what the system was doing to trombones (which are the guts of symphonic and big-band sound) and cellos. At no time did the system have the richness and roundness which is characteristic of live-music sound.

This should not be too much to ask of a speaker costing this much. We have heard systems costing as little as \$100 each that rendered cellos and trombones more convincingly (although they did many other things rather badly). It occurs to us in fact that very few of the large and costly systems we have heard in recent years have done a better job of reproducing those instruments than do the Infinities,

but this hardly excuses any of them. We would be inclined to wonder if low-end and high-end range aren't in some way inimical to natural mid-range performance, were it not for the fact that we have heard an occasional monster system which could pull off all three with disarming aplomb (and Infinity's SS-1A was one of them).

Other observations: The 4.5s will produce very high listening levels in the home -- up to 107 dB -- without strain, but they are not recommended for high-level public-address work because, when they overload, they do it in a rather ungraceful manner, sounding suddenly as though their voice coils are rubbing. (This, we would guess, is because the mid-range diaphragms, which do not have voice coils anyway, can move just so far and no farther. When pushed beyond that, they just clip the signal in a manner similar to that of a cleanly-overloading amplifier.)

The speakers are quite neutral insofar as perspective is concerned. They reproduce sounds at the proper apparent distance, being neither up-close nor backed-off. Stereo imaging is excellent but not superb, as a result of some very slight phasing-interference effects between the tweeters and the mid-range drivers. (A slight vertical-venetian-blind effect is audible with pink noise and, to a lesser extent, with program material.)

Sampling the system, with the Infinity HCA and an Audio Research Dual 150, brought about the expected improvements in low-end detail (moderate) and over-all cleanliness and definition, but could not change the speaker's basic attributes. (Highs or lows were slightly degraded depending on which amplifier was handling the upper or lower range, but we only had one HCA on hand. And we wonder how many people are going

to shell out \$8,000 for the relatively small improvements incurred by going from full-range to biamp operation with that amplifier.)

The RS-4.5 has a lot going for it, and is already good enough that many audiophiles may never again feel the need for up-grading from it to something "better." But the fact that some systems which

are vastly inferior in other respects (and a lot cheaper) are nonetheless more-accurate reproducers of certain musical timbres does justify, to our way of thinking, some rather strong reservations about the RS-4.5 (See the Audio Verity on issue 4-3.)

(Manufacturer's comment on Pg. 48.)

Quickies

Infinity RS-4.5 Speaker System Follow-Up

More on the continuing saga of the 4.5, now into its 5th modification in a relentless attempt to conquer the sounds of trombones and cellos...

The latest version is better than any of the previous ones, which is only to be expected after all. The original hardness is completely gone, the stupendous low end and high end remain unscathed, and while that elusive (at least for the 4.5) capacity for vulgarity when called on has been improved, the system is still more lushly polite than aggressively outspoken.

We have an old Phase-Four London recording of Stokowsky doing his arrangement of Mussorgsky's "Night on Bare (Bald) Mountain" which contains some of the most flamboyantly flatulent trombone passages ever committed to a disc. They almost made the grade through the 4.5s, but both the stentorian "aww" quality and the requisite spikes were tamed by the system.

So, the 4.5 *isn't* perfect yet. So, some other, cheaper, systems do a better job with trombones and cellos than the 4.5. It is still one of the best speaker systems available today, regardless of cost -- one that is quite capable of making most instruments sound palpably alive and just as gorgeously rich and smooth as they do

in a live situation. Perhaps we are making too much of its one, really minor shortcoming, but much music does lose some of its dramatic impact because of that shortcoming. Despite it, we are adopting the RS-4.5 as our reference test system simply because it is now the best full-range dynamic system we know of (and is thus ideal for power-amplifier testing), and because -- all cavils aside -- it does everything else so blessedly well. It has been added to our Recommended Components list in Class A, with that one little reservation.

Incidentally, the RS-4.5 is the only speaker system currently in-house that will handle the humongous cannon-shot impacts on Telarc's new "1812 Overture" recording without (1) bottoming, (2) developing acute hangover, or (3) going "Phht"! And that is an accomplishment.

(No Mfr's Comment Received)



The Infinity Reference Standard 4.5 Loudspeaker System

It is safe to say that one of the most frustrating experiences of audio reviewing occurs after a reviewer has painstakingly compiled an extensive analysis of a given product, only to have the manufacturer "modify" said product, thereby rendering the reviewer's budding *magnum opus* moot. Those familiar with the constantly shifting world of perfectionist audio are all too aware of Infinity System's prominent place in the "modification-of-the-month" club. Woe to those affected with audiophile fever, who momentarily forsake their sanity and purchase an early sample of Infinity's latest technological marvel. It takes no psychic prowess to predict that these poor souls will soon be the exasperated owners of yesterday's obsolete also-ran. Nonetheless, it is probably no coincidence that some of the industry's finest efforts come from manufacturers who seem to be incessantly upgrading their products. In their eyes, the all-consuming quest for the state-of-the-art

must not be shackled by such mundane concerns as practicality and legions of agitated consumers. The inveterate procrastinators in the audiophile community can readily be forgiven for such statements as "What, buy one now? Not me. I've heard that they're working on an SP-6C!" [Only joking.]

Despite the frustrations engendered by the ever-changing approach of such manufacturers, the end does seem to justify the means when the products do indeed achieve a significantly greater sense of musical verisimilitude. Such is the case with the Infinity Reference Series 4.5 speaker system.¹

¹Owners of older 4.5 systems would be well advised to have their speakers updated, irrespective of the practical problems this imposes. The older 4.5 systems (those manufactured before 8/1/79) were beset by a host of problems, including an icy coil, thin midrange, a hard, glassy upper treble, and an excessively hot high end. Although the system's potential was still undiscovered, this disappointing series of hot and cold spots, it was strikingly and basically antithetical to successful balance.

The RS 4.5 is a strikingly graceful system from a visual standpoint. Crafted from beautifully grained oak and sculpted with rounded symmetry, the 4.5 system is aesthetically complementary to many decors. Its physical dimensions are, thankfully, not of gargantuan proportions. With the exception that a dipolar radiator such as the 4.5 cannot be placed too close to the walls, it should fit comfortably in a wide variety of listening rooms.

As with previous offerings from Infinity, the 4.5 system clearly reflects that company's ongoing attempts at innovative driver technology. Starting at the bottom, each 4.5 uses two twelve inch cone woofers which are fashioned out of polypropylene, a plastic material. Its proponents claim that polypropylene offers a significant reduction of undesirable resonances over conventional paper drivers. The midrange units of the RS 4.5 are designated EMIM (electro-magnetic induction midrange) by Infinity and represent an extension of their now-established EMIT system down into the midrange. The midrange elements of the 4.5 are not the same as those of the QRS. The QRS uses midrange drivers that were designed and produced by Strathearn, an Irish firm that is no longer in business. The EMIM units found in the 4.5 (and in the less expensive 2.5)² are visually and structurally akin to the EMIT, while the Strathearn elements of the QRS are not. There are four dipolar EMIM units per side in the 4.5. High frequencies are handled by four EMITs. Three of these fire forward and one is rearward firing. The EMIM and EMIT elements are mounted on a flat, relatively thin baffle while the woofers are enclosed in a separate cabinet below. The two sections are structurally joined.

Some description of the marvelously flexible crossover system of the RS 4.5 seems in order. The speakers may be used with a single amplifier or they may be bi-amped. An electronic crossover/equalizer is included with the system. In the single amp mode, the electronic crossover may be bypassed completely or used as an equalizer to compensate for the properties of varying listening environments. When used as an equalizer, the crossover offers

²For those interested, the RS 2.5 is visually similar to the 4.5 and utilizes (per channel) a single twelve-inch polypropylene woofer, two EMIM units, and two EMITs, resulting in the line of \$2500 per pair. The QRS, which comes in the line of \$5000 per pair, Infinity plans, to replace the drivers in the QRS with those of the 4.5.

level adjustment of both the bass and midrange/high frequency regions as well as a high frequency boost/cut control. Housed in the speaker cabinet itself is the passive crossover. It offers similar, although less flexible, functions for those who choose to bypass the electronic crossover when using a single amplifier. There is a bass cut switch (primarily affecting the very low frequencies), a continuously variable midrange output control level, and a three position tweeter output switch (decrease/normal/increase).

When bi-amplifying the system, the user has two basic options. The first is to use the electronic crossover in the conventional way. This affords maximum flexibility since the crossover points of the woofers and midrange drivers, the output levels of the low and mid/high frequency sections, and the tweeter output level may all be adjusted. The second option is to use the electronic crossover as a variable electronic low pass filter, which functions as a passive highpass filter for the midrange/high frequency amplifier (à la the Dahlquist DQ-LP1). The significant advantage of this method is that it bypasses the active high pass stage of the electronic crossover and allows the high pass amplifier to drive the speakers directly. Although the Infinity electronic crossover is good, it does audibly degrade the sound. Incurable purists will undoubtedly prefer the second option.³ Of course the bass level and crossover points are still adjustable at the electronic crossover. Crude level adjustments of the midrange and high frequencies can be made using the controls on the passive crossover. Thus, reasonable flexibility is retained and one stage of active electronics is eliminated.

The RS 4.5 has generated more than a modicum of excitement among audiophiles. Its development has been closely followed by those hoping to approximate the sonic splendor of the Infinity QRS (or, better yet, the QRS/D) for a less princely price. Does the RS 4.5 meet these fervently held expectations? As we shall see, it is surprisingly dissimilar in aural flavor to its illustrious predecessor. It is a speaker system whose virtues and flaws are pronounced and readily apparent.

Without a doubt, the most arresting quality of the 4.5 speaker system is its

³To use the electronic crossover in this way one must switch it to "bypass" (a rear panel switch) and insert the polarity of the bass amplifier leads.

crystal clear transparency. There is an addictive sense of palpable lucidity with these speakers that is entrancing. No longer are instruments and voices swimming in a sea of hazy fog. By comparison, even the vaunted QRS system sounds veiled, particularly in the midrange. Concomitant with this breathtaking clarity is a quality of unsmudged, unmeared purity, instrumental reproduction is quick and clear. Not surprisingly, definition is also excellent. Subtle background voices and instruments are preserved with great distinction by the 4.5 system. The speaker is also refreshingly free of the spurious resonant colorations marring most of its competition. If clarity, purity, speed and definition collectively form the apex of your audio value hierarchy, you will find the 4.5 to be a captivating system.

Another immediately arresting quality of the 4.5 is its superlative reproduction of high frequencies. Highs are extended, clear, fast, and highly defined, with very good retention of upper harmonic overtones. The top end of the 4.5 is much more analytical and revealing than that of the QRS. The older EMIT units found in the QRS are sweeter, softer and more romantic. They are more forgiving of the all-too-common flaws found in recordings and associated equipment. The 4.5 is capable of sounding downright nasty when fed artificially bright source material. The top end of the 4.5 is a bit drier and crisper than that of the QRS. Overall I would judge it as significantly more accurate than the QRS or anything else I have auditioned.

There is a slight problem with midrange-to-high end coherency, however. The listener's attention is periodically drawn to the tweeters, which seem to stand out on their own more than they should. The QRS better captures that seamless blend between midrange fundamentals and high frequency overtones that is such an intrinsic quality of live music. To their credit, however, Infinity has steadily improved the 4.5 since its inception, in terms of mid/high frequency coherence. Perhaps some additional fine tuning will iron out the small remaining discontinuity in this region.

Moving down the frequency ladder, the 4.5 has, arguably, the most colorless midrange reproduction of any available loudspeaker. As mentioned previously, the midrange is characterized by an almost tangibly real clarity. Inner details are superbly articulated by the 4.5 system. Individual voices in choral works and sub-

tle background instruments retain distinct identities and are not lost amidst the engulfing waves of the dominant instrumentation. The 4.5 system also does an excellent job of authentically capturing musical timbre in the midrange (a very formidable task for any loudspeaker). In addition, there is an elusive sense of "aliveness" with these speakers that is due, at least in part, to their transient speed and overall quickness. Slurring and blurring of sharp instrumental attack is minimal.

Alas, all is not perfect in the midrange. (1) There is a glassy, garish quality to the upper midrange of this system. In the lower incarnation of the speaker, it is not overly obtrusive on most occasions. Its noxious presence seems to be exacerbated by wide dynamic range material being played at you-are-there sound pressure levels. (2) Related to the above glare is an underlying sense of hardness in the midrange. Again this seems to be concentrated in the upper midrange and is at its worst during demanding passages. The composite effect of the above two flaws lends a raw-edged quality to the upper midrange at times. In particular, female voices and horns are adversely affected. (3) The midrange of the 4.5 is also marred by traces of a hollowish, rough-textured, diffracted quality. This anomaly is audible on a wide variety of material but seems particularly evident on short, staccato bursts of energy (e.g., try the audience applause on a Roger Wagner Encore disc from M&K). This coloration becomes pronounced when one stands behind the speakers*, which leads me to speculate that the problem may be caused by diffraction effects attributable to the cavity behind the dipolar midrange elements or by the large reflective baffle area[†]. (4) The sense of midrange warmth and fullness is just adequate on the 4.5. Earlier versions were sadly lacking in body-giving richness. As it currently stands, the 4.5 system is a bit on the cool side of neutral. This necessitates the usage of electronics that have an adequate degree of midrange fullness (such as today's better vacuum

^{*}I do not want the reader to think that I in my sacred role as Ultra Critic, was so frustrated by the lack of midrange coloration in the 4.5 that I was driven to prancing around the speaker at every conceivable angle, straddling its flanks, in quest of the dorsal bassoon as a solution. This hollowish quality is, in fact, quite audible from the normal listening position. It is merely more audible from behind the speaker.

[†]Humor has it that some enterprising souls have affixed a sheet of sponge to the back of the large baffle on the 4.5 to minimize diffraction problems.

tube products). One can, to be sure, augment the sense of midrange fullness by elevating the crossover point of the woofers. This, to me, introduces unpleasant box-like colorations in the lower midrange that more than offset any gain realized in added fullness. This is a constant trade-off in the 4.5, which I find myself continually readjusting for optimal balance (i.e., a choice between lower midrange suck-out which results in a thin, anemic sense of midrange fundamentals, or an increasingly intrusive boxy sound in this area caused by operating the woofers at higher frequencies).

Descending into the subterranean regions, we find (not unexpectedly) continuity problems between the box-enclosed cone woofers and the bipolar EMIM and EMIT drivers. I must acknowledge that Infinity has achieved a more successful blend between the lower and upper ranges in the 4.5 than they did in their earlier hybrid design efforts (the QRS, the Servostatic, etc.). Still, a notable lack of coherence is evident. The woofers are beset by mildly resonant, drum-like, boxy colorations that become increasingly evident as the woofers are operated at progressively higher frequencies. These constrictive, boxy resonances inject a discontinuity that is easily discernible on choral works featuring low bass vocals, or the reproduction of various drums such as tom-toms and tympani. The higher tuned drums (emanating from the EMIM units) sound distinctly quicker, clearer and more open. By comparison the lower pitched drums are sluggish, constricted and boxy in quality.

The resonant coloration of the bass on this system, like the Magneplanar Tympani series, is unique in character. It does not sound like any other cone woofer I have heard, nor does it sound quite like real music. I am not sure if this distinctive, plastic-like tonal flavor is a result of some inherent property of polypropylene or merely a reflection of Infinity's applications thereof. In any event, it lends a distinctive flavor to bass instruments.

On a positive note, the bass of this system is deep, taut, and punchy. Its most remarkable characteristic is an astonishing freedom from spurious overhang. When the bass information reaching the speaker stops, so does the woofer. The effect of this ability on the reproduction of deep bass transients can be startling. Subjectively, it sounds as though the amplifier's damping factor has been in-

creased one hundred fold, and that it is exerting far greater control over the woofer. In this regard, the woofers of the RS 4.5 are substantially better than any other cone woofer I have auditioned.

It could be argued that the bass of this system is excessively lean, dry, and overdamped (i.e., more so than real music, like some solid state amplifiers). Although there is doubtless some truth in this criticism, it seems rather unimportant to me when I am revelling in the freedom from murky, ill-defined mud that is the main strength of this bass system. The sense of control and bass lushness actually seems to increase as the woofers operate at lower frequencies. Overall, the 4.5 has an excellent bass system whose main faults are the residual, box-like resonances common to all the "in-box" woofer systems I have heard, and blending problems with the upper range drivers. I do wish that Infinity would apply their not inconsiderable engineering talents in an attempt to develop a dipolar bass system using some extension of their EMIM technology. It is my belief that some of the superior sound field characteristics of the QRS/ID system (cited below) are directly attributable to the similarity of radiation pattern between the upper and lower range elements. With respect to the RS 4.5, I cannot totally ignore its fundamental lack of coherency from bass to midrange.

Turning now to the sonic stage presented by the 4.5, we find that it is haunted by the specter of the QRS/ID system's unparalleled excellence in this area. It is my growing conviction that I may have been (irrevocably) spoiled by certain outstanding aspects of the QRS/ID. Its sonic stage is one such asset. Although the RS 4.5 is basically quite good in this area, it does pale somewhat by comparison. To attain the maximum performance of which the RS 4.5 is capable, time-consuming placement exactitude is necessary. When so placed, the sound field of the 4.5 is open and spacious, with excellent separation of instruments. Relative to the QRS/ID (and live sound), however, it does lack that last remnant of unbounded openness, of each instrument floating unconstrained in its own space. The sound tends, to a slight degree, to focus on the panels themselves and to be less "free space" in nature. To put it another way, the 4.5 system exhibits more of a point-source effect. Additionally, its lateral image width is not equal to that of the QRS/ID. The sound does not

extend appreciably past the speakers themselves. When viewed comparatively against other speakers, however, the 4.5 is very open and spacious.

With respect to lateral focus, the 4.5 does quite well at the sides of the sound stage. Instruments are precisely placed in space. I did, however, have some problems with a splattered, vague, horizontally elongated center image. Auspicious placement mitigated the problem, but the center image is still somewhat diffuse.

Depth of field is very good on the 4.5 system. This is true both in terms of the quantitative amount of depth present and in terms of the gradation of perceived distance between the listener and various sections of the performing ensemble (try *Sonic Fireworks* from Crystal Clear Records to see how well the 4.5 performs in this area). Obviously the nature of the depth perspective offered by this speaker is contingent upon its proximity to the rear wall as well as the degree of reflectivity of that rear wall.

Another performance area that I would give the 4.5 top marks on, prior to my corruption at the hands of the QRS/ID, is dynamic range. With the QRS/ID, dynamic peaks reproduced at high amplitudes simply get louder, not more distorted or frazzled. The listener experiences virtually no distortion-based cringing during extreme dynamic peaks. Although the 4.5 will play comfortably at high levels and reproduces a convincing sense of dynamic range, material which is demanding in this way seems to aggravate some of the speaker's flaws. I suspect that part of the QRS system's superiority in this area is a direct result of its larger number of driver elements.

In closing the review, I would like to place my critical assessment of this speaker in the proper overall perspective. It is my contention (which is shared by others at TAS) that loudspeakers are themselves musical instruments, rather than truly neutral transducers. Every loudspeaker system imparts a distinctive sonic signature on the music passing through it. Although I have painstakingly delineated what I envision as the salient failings of the 4.5 system, I consider it to be an outstanding loudspeaker relative to the cruder, more pervasive colorations of its competition. Its aberrations are fairly mild in nature. Its virtues are vividly apparent: clarity, definition, and—most importantly—a relative freedom from idiosyncratic aural character, that is, a relative

neutrality. From a theoretical perspective, there would be very little to say in a positive vein about the world's first perfect transducer. It would not sound "shimmering" or "thundering," nor be described by excited, emotion-inducing, adjective-laced phrases. Rather, its output would be an exact replica of its input. The RS 4.5, in many respects, comes closer to this theoretical ideal than any other speaker. It is not a big, romantic loudspeaker that "sounds good." Perhaps the greatest tribute I can pay to the 4.5 is that it "sounds" very little at all. It is likely to be a very controversial product, because many audiophiles—despite their proclaimed intentions—do not really want neutrality at all. The 4.5 is an excruciatingly analytical device which passes on the weaknesses of associated components and recordings all too clearly.* As I have mentioned previously in these pages, the ability to reveal differences in associated components and recordings is, in my view, a key index of a speaker's neutrality. Obviously the less character that the speaker has of its own, the less it will tend to obscure these differences with its own colorations.

It is customary to close a protracted and ambivalent review such as this with some sage words of wisdom. My advice is simply this: there are those of you who will dislike this speaker intensely. Be certain when you are auditioning it for yourself, however, that the system is optimally set up and is being driven by components of requisite quality. Otherwise you will be listening to the shortcomings of said associated components and/or how the speaker sounds when it is improperly set up. All of which tells you virtually nothing about this very good speaker itself. It is so good over most of its range that it virtually coerces potential owners to use only the best associated equipment.

My overall assessment of the RS 4.5 is that this is one of the finest speaker systems available in the here and now. Yes, it does have the problems I have described, but it is still a stunning feat of engineering on the part of Infinity Systems. It is unquestionably worthy of serious consideration by those seeking the finest reproduced sound available.

—JN

*Not surprisingly, the RS 4.5 makes an extremely good sounding studio monitor. It is also quite useful to sit next to audiophile record reviewers who are perpetually purporting the same personality of equipment being tested.

Reviewer's Postscript:

In some rather startling listening sessions, I was able to ameliorate some of the more vexing flaws in this speaker (the upper midrange glare, the sense of hardness, the subtle constriction) by substituting the Dahlquist DQ-LP1 for Infinity's electronic crossover and by (briefly) driving the upper range of the system with an Audio Research D-79. Since listening sessions were rather brief, a more extended appraisal will have to wait. Nonetheless, it does seem clear that . . .

Hark! I am being interrupted by a sharp series of transients centered in frequency around 125 Hz (aka: someone is knocking at the door). Ah, it is an air express delivery. What exotic, exciting audio goody lurks beneath the exterior of this brown box? No, it can't be! Yet another crossover modification from Infinity for the 4.5 system. I'm beginning to feel like a novelist, ensconced unwittingly in the surrealistic world of the *Twilight Zone*, who is perpetually writing and yet will never get beyond chapter one. . . .

—JN

Manufacturer: Infinity Systems, Inc., 7930 Deering Ave., Canoga Park, California 91304. **Source:** Dealer loan. **Price:** \$3000 per pair.

HP Comments:

I wish to meditate (in the Aurelian sense) upon some of John Norik's observations while approaching the Infinity Reference Standard 4.5 from (what the manufacturer will construe as) a more jaded viewpoint.

At the outset, let me say that JN and I are in almost exact agreement. If I choose to play the devil's advocate in this instance, and I do, it is because I would rather consider what this speaker system might have been, rather than what it is. I could have, as easily, written the sort of review he did, with the same undertone of white-hot anti-enthusiasm. But then JN is comparing the 4.5 against the competition and I am about to measure it against an ideal.

There are those who will argue that it is commercially sufficient to build a speaker system that is, on balance, the best high-end system on the market (excluding, to QRS-ID), and hybrid combinations such as the first time all-out assault on the state-of-the-speaker-art from Infinity, whether I might not agree?

I am troubled, however, because this speaker system is, in so many ways, superlative and that is not hyperbole. And yet the ways in which it falls short of the state-of-the-art are ways in which Infinity has, over the years, consistently fallen short. That is, every major speaker system that I have heard from Infinity has similar flaws. There will be a discontinuity between the bass drivers and the rest of the system, a sacrifice made in the name of very deep bass capability. There will be a "suck-out" in the midbass that constricts and thus out the sound, robbing the upper midbass of its bloom and richness. Midrange and high frequency reproduction will verge upon the state-of-the-art, though the two won't sound entirely coherent or exactly alike. Infinity's crossovers will degrade the sound in some fashion. Good, as opposed to acceptable, imaging will not be easily achieved. And yet JN is substantially right—the 4.5 is less flawed than virtually all of the competition in its price range and its flaws, though similar to past Infinity design efforts, are not nearly so pronounced as they have been in some speakers, notably the original Servo-Statik, the QLS, and the original QRS. The chief designer intends for these systems to be heard in large (reverberant) spaces—those more common in California architecture than in East Coast designs—spaces that will go a long way toward masking most of these problems, especially the discontinuities. This reviewer listens in a more intimate, less reverberant room than the designer intends—sitting, as it were, right on top of the sound, which makes him less forgiving than many a West Coast audiophile. He contends, however, that even with the masking effects of a large room, the more accurate the system, the more accurately it will sound independently of room volume and reverberation times.

You should keep this perspective in mind as you read on:

The single most aggravating and irritatingly consistent flaw in Infinity speakers has been that lack of coherency between the bass and the remainder of the spectrum. The manufacturer has, in my estimation, made a deliberate and even commercially sound choice between coherency and deep bass. Infinity's super systems have always achieved considerable energy below 32 Hz and, over the years, that deep bass has gotten cleaner and less colored.

If, however, Infinity chose to go for coherency and continuity in the midbass area, then it would almost necessarily have to sacrifice response below approximately 36 Hz. That's because the designer, Arnold Nudell, normally opts for dipolar operation in the middle frequencies (excepting, to be sure, the QLS, which, in retrospect, was clearly a transitional system between the romanticism of the Servos and the rather cool asceticism and accuracy of more recent efforts).

Let us forget, aside from the discontinuities introduced into a multiple-driver system when the manufacturer mixes speakers of differing materials, there are the more significant discontinuities that result if the manufacturer opts for drivers with radically different sound radiation patterns from one another. For Infinity to achieve low-end coherency, given its present midrange radiation pattern predilections, it would, necessarily, have to adopt dipolar radiation characteristics at the low frequencies. And that would, for all practical purposes, eliminate those very deep nearly sub-sonic signals to which Infinity seems wed.¹

By conjugating the dipolar midrange of the QRS panels with the dipolar bass panels of Magnepan's Tympani I-Ds, both JN and I were able to demonstrate, to the satisfaction of some of the most critical ears in the business, the state-of-the-art in reproduced sound. The absence of frequency response below 32 Hz in that system has been a matter of no particular moment to most who have auditioned the QRS-1D system, and, one must note, that a flat 32 Hz is not only quite low but such response will encompass just about everything in way of recorded sound, with the exception of cannon shots and organ pedals.

My own philosophical precept about reproduced sound is that one should get the midrange right first and then proceed up and down the frequency range from there. In other words, getting the highs and, at the opposite end, the midbass and bass right is the correct order of things—not getting the deep bass there at the ex-

panse of coherency and continuity in the midbass. I realize, however, that this argument, even if it is compelling, is an aesthetic—and hence, subjective—one. But before Infinity takes up the aesthetic cudgel, I have to note that the Reference 4.5, like the company's prior designs, does not get the deep bass "right" even while sacrificing coherency and midbass accuracy.

You may rest assured tonight that Infinity took note of the widespread criticism of its system's low frequency reproductions. Most of the criticism, however, concerned the quality of the bass, rather than its coherency—and a good deal of technical jive-talk (negative) centered on the Watkins woofer idea, itself the successor to Infinity's notions of a servo-controlled woofer. Either way, servo or Watkins, it is blue-eyed true that the early Servos, the QLS and the original QRS had loose, woolly bass. And, just so, it is that which the Reference 4.5 solves—overly solves.

In the QRS Revised, Infinity abandoned the Watkins principle and issued a set of bass boxes employing 16 five-inch drivers in order to get bass tautness and, through driver coupling, bass below 32 Hz. It was a good compromise—especially in the loose, woolly area—though not in terms of overall coherency. Polypropylene, theoretically, can give the piston-like action, without cone breakup, of much smaller drivers. Why then Infinity returned to the Watkins principle with the Reference 4.5 is certainly a mystery to me.

Nonetheless, despite the tightness conferred by the polypropylene-treated 12-inch cones in the 4.5 (and the advantage of this material is audible), there is still that characteristic "sound" of the Watkins design. That is, the bass gets tighter and tighter and it approaches the woofer's fundamental frequency. At the fundamental, bass output actually increases (this is not a measured increase, but one we hear). Low bass, in the 30-45 Hz region, actually sounds too tight. Overdamped, perhaps, or too clean. It's impressive, I'll admit, but of like nothing I ever heard. The "blom" of air and ambience on big bass notes, especially the bass drum, simply isn't there, although the initial transient attack wave is. You may be interested to learn that—at 25 Hz—the impedance of the woofers drops into the one-ohm region.

Infinity has provided a bass cut switch on the back of the 4.5 that will, it says, roll the response and prevent sensitive amplifiers from blowing their minds when

confronted with this impedance. We were not aware of this impedance-dip when we hooked up Bongiorno's new (and very powerful) Sumo amp to the bass units. Upon playing the Telarc 1812 with its sensational and nearly untrackable cannon shots, we managed to make the woofer bottom and "crack" at the same time, evidently displacing the voice coil in one of the driver units. The 4.5s were equally uncomfortable with MKK's new direct-disc organ recording—a recording replete with lotsa and I mean lotsa 16 Hz pedal material!—producing a pumping and breathing not unlike a dbx box run amuck. I would suggest, at this point, that the 4.5's usefulness in reproducing the bottom octave (let's say 16 Hz to 28 Hz) is very limited.²

There are also at least two other audible problems with the bass system of the 4.5. JN noted the cabinet resonance/coloration. [You may determine its fundamental for yourself by smartly rapping the cabinet.] Its principal audible effect is in the 60-80 Hz region, not far from the crossover point. Its effect might be mitigated were it not for the audible dip that starts near 80 Hz, the suck-out that extends well up in the upper midbass region. The suck-out itself affects different listeners in different ways—the more picky and particular the listener (especially those exposed to "live" music), the more offense he takes at the midbass dip. Now, it is not by chance that a similar sort of dip is present in the QRS-1D system but perhaps because of the radiation pattern continuity and the system's overall coherency, the QRS-1D dip is not only less annoying, but far less evident as well—few listeners have, in fact, spotted it. One might well be tempted to argue that frequency response deviations are less troublesome in really coherent systems.

Beside the woofer system, the rest of the 4.5 is, comparatively speaking, a smashing success. But I'm afraid that

¹Did the organist's foot go to sleep on that pedal?

²This is a conditional finding. It is possible that the unfortunate symptoms—such as a low frequency instability in the Audio Research SP16 preamp—could have contributed to infinity's new woofer system. This is a point that our present device does not allow us to reduce to our total satisfaction. Considering that the manufacturer uses the SP16 as a reference and that the "a" series specifically evinces most low frequency instability—except in the case of the silver voltage dividers which we were not experiencing at the time of the tests—we think the symphonic possibility unlikely.

comparatively speaking is the operative clause. The most serious remaining problems with the 4.5 are twofold:

(1) Infinity's crossover has a not-so-"passive" high end. When the 4.5 first arrived, the single most irritating aspect of its behavior was, at moderate to high levels, an increasing "glare", brightness and glassiness in the upper midrange, presumably around the crossover point between the ENIRM and EMT units. To enjoy the speaker at all, a listener was compelled to keep the playback levels below approximately 90 dba. We had assumed that Infinity's crossover could not be causing the sonic problem we heard because, after all, it was a passive device, right? Wrong. Strictly by chance, we had an opportunity to audition Audio Research's prototype of an active/passive crossover (similar—except for the tubes—to both the Dahlquist and Infinity designs) along with the Audio Research D-79 amp. Those of us who were familiar with the 4.5 noted an absence of the "glare" at high levels when both the amp and crossover were in the system. We assumed, again incorrectly, that the D-79 was the reason the glare disappeared and that we had been wrong in assuming that the new midrange (ENIRMs) had problems. Only later, after bi-amping the 4.5s with two Sumo amps and being forced, (because the Audio Research crossover was incompatible with these amps) to revert to the Infinity crossover, did we again hear the "glare." That led to a three-way comparison of the Infinity, Dahlquist & Audio Research units. With both the Dahlquist and the Audio Research (using, to be sure, several varieties of amplifiers), there was no "glare" and distortion in the upper midrange; with the Infinity crossover, regardless of amplifier, there was. Furthermore, the degree of the midbass "suck-out" was reduced with the Audio Research, though this was not so evident with the Dahlquist (a few listeners did find the Dahlquist preferable in this region, however). Conclusion: Drop Infinity's crossover.

(2) The speaker's imaging. In this case, good but not great. Image width, vis-a-vis the QRS-1D, is limited to the speaker's outer edges; it does not extend wall-to-wall as it should. Image depth—that is, front-to-back—is stunning. You can actually hear the back wall of the concert hall in minimal-miked recordings. On the Telarc discs, particularly the 1812, there is a sculpted sense of space that is, in my ex-

³Of course, we should note that there is nothing—except commercial cost and practicability—to stop Infinity from using a four-way design that includes dipolar ENIRM units down into the 30 Hertz region and a polypropylene sub-woofer below that. We've had spectacular results from the QRS-1D by adding a subwoofer below the Magnepan panels. It would seem true, at least in the here and now, that the ear is less affected by discontinuities at very, very low frequencies.

perience, unparalleled, even awesome. The problem area is center fill. With careful positioning, one can, if sitting in the optimal area, get adequate center fill. But anyone sitting just a few inches away won't. In terms of spaciousness and image size—qualities, I think, that are interrelated—the 4.5 is the inferior of the QRS (which has many more midrange and high-frequency drivers). The overall soundfield doesn't develop that sense of "bloom" that one gets from the very best speaker systems and, of course, from live performances.

Some of the imaging problems may I'm speculating at this point) be the result of the convex arrangement of the midrange units or, more likely, the result of diffraction effects caused by a wooden panel behind the midrange units.

The fact is that both the midrange and high frequency drivers in the Reference 4.5 are significantly better reproducers than those available in the QRS system. The dynamic range of the mid-frequency driver has been improved; the distortion has been reduced and the ultra-high frequency response extended in the tweeter units. [I find it curious that the QRS system, Infinity's flagship, was not first improved.]

It is true that there is a subtle discontinuity (excluding the "hollowness" JN detected in the midrange—a function, almost certainly, of the rear cabinet diffraction) between middles and highs. The new tweeters are a touch "sweeter" than the somewhat dry and icy midrange drivers, but that sweetness is entirely consonant with reproduction of super high frequencies. If those highs lack some of the "airiness," that the midrange drivers capture, it is, I suspect, a function of the discontinuity between the dipolar ENIRMS and the tweeter elements, which are not dipolar—a similar problem exists in the QRS, one that Nudell has, in both cases, alleviated through the use of one or more rear-firing tweeters.³

In terms of pure sonic accuracy, these drivers are at the state-of-the-art. I fear, however, that JN is correct in suggesting that the "neutrality" of these drivers will not be appreciated in all quarters, itself a sorry commentary on audiophile delusions. Excluding the bass, the 4.5 is the most neutral system I have heard. Its lack

of character, though disturbing at first for those accustomed to euphonic colorations, is finally exhilarating. The source material (and the associated electronics) may finally speak with their own voices, without major colorations. There is a dazzling clarity here, one that illuminates the densest orchestral textures.

It is the kind of high accuracy reproduction that one has come to expect from the smoothest and least colored headphones. [In one such test, the reference headphones and the 4.5 were virtually indistinguishable from the midbass on up.] I wouldn't, if I were there, expect to hear all these virtues in the typical hi-fi environment.

I could recommend a home playback system, employing these drivers, that would indeed be at the professional audio reviewers' level. That system would include the Koetsu cartridge used with the Musical Fidelity head amp, the Audio Research SP-6A and two D-79 tube amps, along with the (as yet unreleased) Audio Research electronic low pass filter. We have used this as reference the past few months and the sound, when the system is in perfect adjustment and the weather is cooperative (the Infinity units don't like high humidity), is superlative, lacking only the imaging precision, airiness and spaciousness, and continuity/coherency of the QRS-10 that exceed this system's performance. You won't get the bass that a more authoritative transistorized design would provide at the bottom, but then you will get greater coherency between the bass and midrange of the system. Since it is unlikely that you'll ever hear the Infinity set up this way, you will, in showroom demonstrations, have to allow for the colorations introduced by other components.

Nudell has suggested (recently) that he has another modification to the speaker that will smooth out the discontinuity and reduce the "suck-out" between the upper bass and lower midrange. We have not heard this unit, but we will endeavor to find out when the change is made and what it does for the overall sound.

Unless you can afford a hybrid speaker design, I don't think it likely that, for sheer mid and high frequency accuracy, you'll find it easy to surpass the 4.5. It belongs to that happy class (with the Magnepan MG-1, the Snell Type A Revised, and the Dahlquist) of speakers that return maximum performance with the fewest compromises and annoyances of a product in its price range. That's what it is. What it

could have been—well, that's the reason for this comment.

Manufacturer's Comment:

Addressing this review, as well as HP's comment, is nearly as formidable a job as designing a new speaker system. At the outset, I should like to clearly establish my basic agreement with the main review's conclusions concerning the 4.5 itself. My comments then will be mainly directed at the various speculative comments concerning "How to make it Better" and also some of the specific quasi-technical judgments made.

The first issue I shall pursue is the attack on the 4.5's bass system. There is no question in my mind that there are certain advantages to dipolar bass speakers. There is equally no question about the inherent disadvantages manifest in all of these systems that I have heard to date and some experimental units we at Infinity have fabricated. One pays an enormous price (at this point in time) for the slightly more coherent sound in the midbass. The obvious loss of frequency response smoothness (the dipolar cancellation effect) and ultimate bass extension below about 40 Hz is in our judgment unacceptable for the reproduction of classical music. The power of the fundamentals of the large bass instruments and the ever present sub-harmonies of the orchestra, add a certain sense of air and ambience to the perceived sound field. We have made a choice between coherency and bass reproduction below 40 Hz. However, contrary to the reviewer's suggestion, it was not a commercial consideration, unless one realizes that all speakers that would sell for under about \$10,000 are to some extent "commercial" compromises. We have experimented in our own rooms with dipolar bass panels and to our perception of music, they were far less satisfactory than the 4.5's bass speaker. In fact, to indulge in a kind of reverse hearsay, I digress. Addressing the remark about "Some of the most critical ears in the industry being satisfied," (with the QRS10 amalgamation), one of the most critical, respected, and innovative ears in the industry, upon hearing the 4.5's in the HP's listening room, remarked that this was "the best bass he had heard in that room to date."

What all this proves is moot. One man's meat is another man's poison?

J.N. suggests that the bass is "deep, taut, and punchy; its most remarkable characteristic is the astounding freedom from overhang."

This is precisely what we were trying to achieve!

It is, however, painfully true that the homogeneity of the 4.5 system and its real deep bass capability can only be realized to full benefit in larger rooms. This has nothing whatsoever to do with dipolar radiation pattern matching, or coloration due to the liveness or deadness of the listening room. It has mainly to do with the superior modal structure of the large listening space. This is especially true with speakers that have ultrawide bandwidths and large radiation areas.

We have investigated the electronic crossover phenomenon with great concern and care. In the passive mode for the midrange and top end, there cannot be anything added by the Infinity crossover. It is merely a connection from input to output. The other crossovers mentioned in the review have a capacitor in series with the series capacitor. This capacitor may result in easier listening for record reproduction; but in my experience with first class master tapes, it detracts markedly.

Any 4.5 owner who wants the capacitor should write us; we will send you the appropriate high quality capacitor (the value of which will be determined by the input impedance of your amplifier) free of charge.

Harry, we are only human. Unfortunately, we cannot pull off so many technological achievements as fast as you would like or in the order you would like to see them. It took two years of agonizing and arduous labor to perfect the EMIM driver and improve the EMIT. Additionally, it took over a year of experimenting to even learn how to glue polypropylene to other substances. And ultimately, we spent over nine months to amalgamate these elements together into the 4.5 system.

For you to wax on unfavorably about Infinity speakers because you felt that the bass is not as good as it should be, is as ludicrous and outrageous as Infinity not pursuing the state-of-the-art anymore because we think the latest review in TAS was not as good as it should be.

Arnold Nudell
President
Infinity Systems, Inc.

³The tendency of certain instruments to sit on the tweeter panels is, in my opinion, a function of the EMIT's radiation pattern.