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EQUIPMENT REPORT

Paradigm
Reference Studio 60
LOUDSPEAKER

Kalman Rubinson

Paradigm Reference Studio 60 loudspeaker

DESCRIPTION: 2½-way reflex-loaded, floorstanding loudspeaker with front and rear ports. Drive-units: 1″ aluminum-dome tweeter, 7″ mica-polymer cone midrange/bass unit, 7″ polypropylene-cone woofer. Crossover frequencies: 500Hz (7″ polypropylene cone only), 2kHz. Crossover slopes: 12dB/octave electro-acoustic network. Frequency responses: 46Hz-22kHz, M2dB (on axis); 46Hz-20kHz, M2dB (30° off axis). Low-frequency extension (DIN 45 500): 30Hz. Nominal Impedance: 8 ohms. Sensitivity: 91 dB/W/m (room), 88dB/W/m (anechoic). Recommended amplification:15-200w. Maximum input power: 150w, normal program content.
DIMENSIONS: 40.5″ (1029mm) H by 8.25″ (210mm) W by 17″ (432mm) D (including outrigger feet and floor spikes). Internal volume 2.2ft³. Weight 140 lbs/pair.
FINISHES: Sycamore, Cherry, Rosenut, Black Ash.
SERIAL NUMBERS OF UNITS REVIEWED: 36112, 36113.
Approximate number of dealers: 350.
MANUFACTURER:
Paradigm Electronics Inc.

I am biased in favor of Paradigm loudspeakers. I've used them for 10 years; they offer good sound and good value, properties they share with a number of other Canadian makes who have taken advantage of Canada's National Research Council facilities in Ottawa. In fact, the first components I bought specifically for what is now my multichannel system were Paradigm Esprit BP speakers, which had impressed me at a *Stereophile* show. When I took the step into multichannel and found that there wasn't a matching center-channel speaker for the Esprits, I replaced them with Paradigm's Reference Studio 60s. But while the smaller Reference Studio 20, and the larger Studio 100 have both been reviewed in *Stereophile*, the Studio 60 had not. The release of the new Reference Studio 60 was an opportunity to fill that gap.

Description

As I slipped them from their shipping carton (easy to open and reuse), the Studio 60s looked much more substantial and expensive than I'd expected — and I already owned an earlier version. My review samples, in Black Ash, had an extraordinarily high level of fit'n'finish. Just two examples: First, the cabinet's rubbery top grades smoothly into the side panels to provide a nonresonant surface, molding its contours to suit the tweeter's radiation; its shape and substance resist being marred by the cocktail glasses of inconsiderate guests. Second, the two pairs of multiway binding posts are clearly color-coded and can be operated with finger force alone. (The less said about the earlier Studio 60's terminals, the better.)

The Studio 60 is a gracefully proportioned but simple 2-1/2-way tower with two 7″ mid/bass drivers and a 1″ tweeter. It is significantly larger, though lighter and more complex, than its predecessors. A rap with a knuckle produced a sound of slightly higher pitch and lower amplitude, suggesting that it is both more rigid and less resonant. This may be due to the more complex cabinet construction and driver mounting, as well as to the cabinet's curved rubbery top, which surrounds the slightly protruding cowl enclosing the aluminum-dome, ferrofluid-cooled tweeter.

Other external differences from the earlier version are the front and back ports and the very substantial, stationary brass phase plug on its upper mid/bass driver. That driver has a mica-polymer cone and a 1-1/2″ voice-coil; the second order crossover hands off the signal to the tweeter at 2 kHz. The lower bass driver, which is rolled off above 500 Hz, is similar but has a mineral-filled polypropylene cone. All three drivers have diecast chassis and are resiliently mounted to the cabinet to minimize transmission of vibration via any medium but air. (Paradigm calls this system IMS/ShockMounting.) The removable front grille consists of an open-weave black fabric stretched over a plastic frame.

Sound

My reference speakers were given a brief vacation in the next room, and the Paradigms were connected to an admittedly overkill system — see Sidebar — that the Reference Studio 60s are unlikely to encounter in real life.

MEASUREMENTS

The Reference Studio 60 is above average voltage sensitivity, it is an estimated 89 dB/2.83 V/m. Its impedance doesn't drop below 4 ohms, and remains above 6 ohms for much of the audio band (fig.1), implying that it will work well with modestly specified amplifiers and receivers.

The traces in fig.1 are free from the midrange wrinkles and small discontinuities that would hint at the presence of panel resonances. Investigating the cabinet's vibrational behavior with an accelerometer confirmed that despite the panels' relatively large size, they are effectively braced and stiffened, pushing up the resonances to higher frequencies where they will be less annoying. Fig. 2, for example, is a cumulative spectral-decay plot calculated from the output of the accelerometer when it was fastened to the center of the side wall 12″ from the top of the speaker. Two ridges of delayed energy can be seen, the highest lying at 422 Hz, but both are commendably low in level.

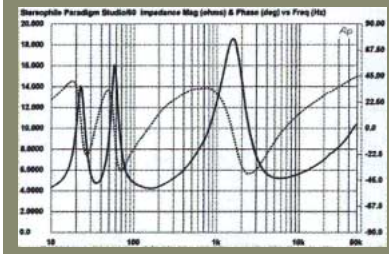

Fig.1 Paradigm Reference Studio 60 electrical impedance (solid) and phase (dashed). (2 ohms/vertical div.)

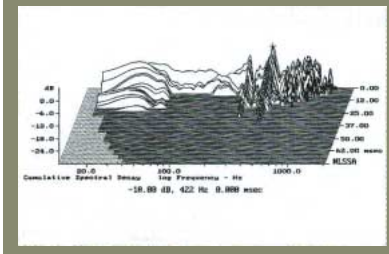

Fig. 2 Paradigm Reference Studio 60, cumulative spectral-decay plot calculated from the output of an accelerometer fastened to the cabinet's side panel 12″ from top (MLS driving voltage to speaker, 7.55V; measurement Bandwidth, 2 kHz).

The saddle centered at 35 Hz in the impedance magnitude trace (fig.1) suggests that this is the tuning frequency of the Studio 60's twin ports. To the left of fig. 3 are shown the nearfield responses of the midrange unit (red trace), the woofer (blue), the front port (magenta), and the rear port (green), as well as the sum of these responses, taking into account radiating area and distance from a nominal farfield microphone position (black). While the outputs of the ports peak in a band-pass centered between 25 Hz and 60 Hz, the midrange unit and woofer differ slightly; the former's minimum motion point occurs at 35 Hz, the latter's at 31 Hz. Overall, however, these curves suggest that the Studio 60 offers excellent low frequency extension. In-room, with the usual boundary reinforcement, the Paradigm should offer a full measure of bass down to the 31.5 Hz band, as Kal found.

To the right of fig. 3, the individual farfield responses of the midrange unit and woofer and the tweeter reveal smooth rolloffs out-of-band and confirm that the crossover is set at 2 kHz, a little lower than is usual for a 1" dome; this should optimize lateral dispersion. These measurements were taken with the grille off, which makes the speaker's response look peaky and uneven. Adding the grille, which eliminates sharp discontinuities in the dome's acoustic environment, smooths the tweeter's output. This can be seen in fig. 4 which

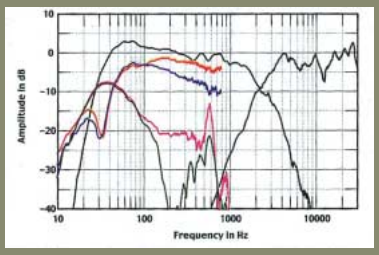

Fig. 3 Paradigm Reference Studio 60, acoustic crossover (without grille) on HF axis at 50″, with the complex sum of the woofer, midrange, and port nearfield responses (black). Also plotted are the nearfield responses of the midrange unit (red), woofer (blue), front port (magenta), and rear port (green), weighted in the ratio of the square roots of the radiating areas.

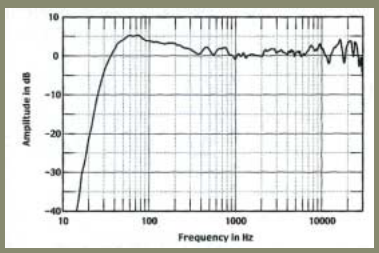

Fig. 4 Paradigm Reference Studio 60 are ane choic response with grille on HF axis at 50″, averaged across 30° horizontal window and corrected for microphone response, with the complex sum of the nearfield woofer and port responses, taking into account acoustic phase and distance from the nominal farfield point, plotted below 300 Hz.

But they were not embarrassed, sounding very much like the $10,000/pair speakers they'd replaced: ample, balanced, and open. In fact, in overall balance, there was little to choose between my reference speakers and the Paradigms. The latter were as full and warm as the others, with excellent and spacious treble, and the stability and dimensions of their soundstage were impressive. Over the month that the Studio 60s were driven by the Theta Gen. VIII and Classé Omicron monoblocks, they were consistently satisfying with all types of music, from large orchestral and choral pieces to smaller vocal and chamber works.

In the details, however, I did find areas that clearly favored my reference speakers. First, in the extreme bass, the 60's smaller drivers and considerably smaller enclosed volume could not quite load my large room (15' by 32', and open to other rooms) with either the pounding bass of rock or the imposing gravitas of the pipe organ, as could my reference speakers. On "Piano Smasher," from Blue Man Group's *The Complex* (DVD-Audio, DTS Entertainment 69286-01120-9-4), the tubular percussion was just dandy, with rounded resonance, but the bottom end of the triadic piano smashes was weak compared with my reference speakers. Second – and, again, only by direct comparison with the Revels – female voices, so limpidly clear via the other's smaller, more sophisticated titanium midrange cone, were ever so slightly veiled through the Studio 60.

Where the Paradigms did not fail was in their ability to throw as big a soundstage as my reference speakers, and in the inaudibility of their crossover transitions. Taken by themselves, the Paradigms did an impressive and musically satisfying job. If I couldn't afford better and more costly speakers, I could live happily ever after with Studio 60s in my two-channel listening system.

I then trucked the Paradigms up to Connecticut, to audition them in a different acoustic and to hear how they worked as part of a multichannel setup. Much as I like to describe a components inherent characteristics before making comparisons, the Studio 60s were replacing their immediate forebears, and comparisons were unavoidable.

At first, the new Studio 60 seemed to have a bit less bass extension, though it had substantially greater fullness and weight in the bass above 80 Hz. It was slightly more forward

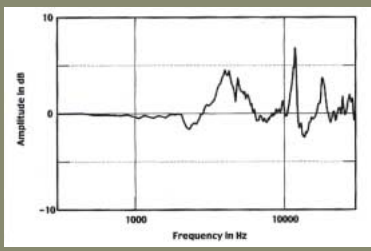

Fig. 5 Paradigm Reference Studio 60, effect of removing the grille on the farfield response on the HF axis (5 dB/vertical div.).

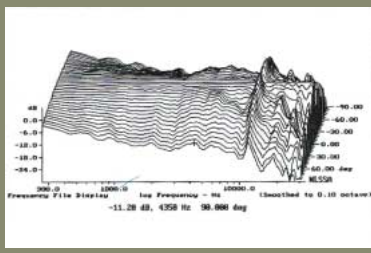

Fig. 6 Paradigm Reference Studio 60, lateral response family at 50˝, normalized to response on HF axis, from back to front: differences in response 90°-5° off-axis, reference response, differences in response 5°- 90° off-axis.

shows that the Studio 60's farfield response is impressively smooth and flat up to 10 kHz. Fig. 5 shows the effect on the Paradigm's response when the grille is removed: an audible peak appears in the mid-treble. As attractive as the Studio 60 looks without its grill, you must listen to this speaker with its grille in place if you are to get the treble smoothness you paid for.

The contouring of the baffle provided by the grille also optimizes the speaker's dispersion, evidenced by the smooth, even contour lines in the graph of the Paradigm's lateral dispersion (fig.6). Even with the grille, a slight flare in the off-axis behavior can be seen between 3 kHz and 6 kHz, which might make the speaker sound slightly bright in small or under dampened rooms. The apparent off-axis peak at 12 kHz in this graph is actually due to the on-axis notch at this frequency filling in to the speaker's sides — note that the graph shows only the changes in response on the tweeter axis. In the vertical plane (fig.7), the Studio 60's balance doesn't change very much over a wide 10° listening window centered on the tweeter axis — this is desirable, considering that the tweeter is a high 39˝ from the floor.

In the time domain, the speaker's step response (fig. 8) reveals that all three drive-units are connected in positive acoustic polarity. The farfield cumulative spectral-decay plot (fig. 9) is fairly clean, though a low level ridge of delayed energy can be seen at 4.4 kHz, this presumably emanating from a breakup mode of some kind in the midrange cone. (This graph was taken with the grille removed)

The Paradigm Reference Studio 60 offers excellent measured performance for an affordable price, contradicting the conventional wisdom that, dollar for dollar "big speakers have bigger problems" than small speakers.

– John Atkinson

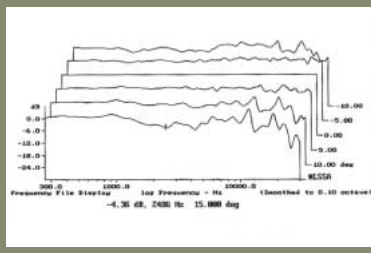

Fig. 7 Paradigm Reference Studio 60, vertical response family at 50˝, normalized to response on HF axis, from back to front: Differences in response 10°-5° above axis, reference response, differences in response 5°-15° below axis.

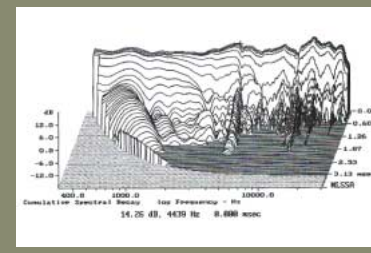

Fig. 8 Paradigm Reference Studio 60, step response on HF axis at 50˝ (5ms time window, 30kHz bandwidth).

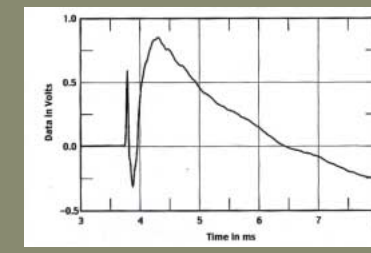

Fig. 9 Paradigm Reference Studio 60 v.3, cumulative spectral-decay plot at 50˝ (0.15ms rise time).

in the midrange, but also much clearer and more detailed. In the extreme high frequencies, brushed cymbals sounded comparable on both versions of the Studio 60, but small movements of my head influenced my perceptions, so I can't be adamant about that. Overall, the new version produced a slightly wider, deeper soundstage, and remained more engaging over long listening sessions.

However, in the midst of evaluating the new Studio 60, the acoustics of my multichannel listening room were drastically improved by the installation of a number of Real Traps[1], which changed everything. While the older version also sounded better in this new acoustic environment, the distinctions between the two versions of Studio 60 became much more distinct. With wideband white noise and a little head movement, on the older version of Studio 60 I could hear the crossover from the tweeter to the other drivers from as far away as 6'. With the new Studio 60, however, the white noise seemed to come from a single source, as long as my ears were at least 1 - 2' from the speaker. In this setup, at my normal listening distance of about 9', I heard subtle suggestions of the same difference with music. The new version was, as it had been in my two-channel system, integrated and seamless, with no excess sibilance, and normal sibilants were not disconnected from the main voice.

Esquina de SP (SACD, Saidera SD1027H) is a live recording of Brazilian singer Wilma de Oliveira, accompanied by guitar, drums, and a small vocal group. The two-channel tracks are spacious, with an intoxicating club atmosphere that the multichannel track enhances only slightly. (This SACD is strange; the multichannel tracks and the two-channel DSD and "Red Book" tracks have 11 songs in common, as well as several not found on the other tracks.) De Oliveira's warm, lilting voice was front and center, but I could easily hear her respond to each of the other performers without ever going off mike. Overall, I enjoyed a delightful evening of classic samba and bossa nova, the Studio 60s revealing the harmonies and the percussive spice; the earlier version of this speaker was caught out by several effects that excessively highlighted the cymbals.

The acoustic improvements wrought by the Real Traps also revealed my misjudgment of the Studio 60's bass performance. Apparently, the speaker's upper-bass output had been exciting room modes that now were damped by the Real Traps. As a result, the speaker went as deep as its predecessor, and more smoothly — even though, on paper, the earlier version has a bit greater extension.

Listening to Buster Williams' piccolo bass variations on a theme from Rodrigo's *Concierto de Aranjuez, on Griot Liberte* (CD, High Note HCD7123), I was impressed with the tightness and power across the instrument's range. Admittedly, this was no bass stress test in the audiophile sense, but as one follows Buster's explication of Rodrigo in detail, it is a musical stress test of the speaker and room. Rudy Van Gelder's production and the Studio 60s delivered, whether in two or five channels, with no help needed from a subwoofer. Indeed, switching in my Paradigm Servo-15 below 40 Hz via an Outlaw ICBM bass manager was counterproductive – it emphasized room sound more than the instrument.

The Studio 60s handled the really big stuff, such as the *Berlioz Requiem* with Robert Spano and the Atlanta Symphony Orchestra and Chorus (SACD, Telarc SACD-80627), with power and aplomb, whether in two channels or many. Their multichannel performance was particularly extraordinary: I ran the Studio 60s full-range as the main left and right speakers, aided by an earlier version of Studio 60 in the center and a pair of earlier version Studio 20s in the rear. The purity of the voices was never corrupted by the need to simultaneously invest huge acoustical power in reproducing the orchestra and brass bands. When I added Paradigm's Servo-15 subwoofer, it mostly just gilded the lily — the new Studio 60s didn't need much help to sound absolutely spectacular.

Conclusions

I originally bought my Paradigm Studio 60s because I wanted small floorstanding speakers that had fullrange sound, and they filled the bill. The new Studio 60 is significantly bigger and significantly better. Perhaps the most important improvement is in its overall smoothness and balance, from the low bass all the way to the top. This is difficult to achieve, and has been the downfall of many speakers, especially low- to mid-priced floorstanders. Its also why many listeners forego deep bass altogether in this price range, preferring to go with small two-way monitor speakers. The Paradigm Reference Studio 60 however, has a seamlessness and a wide frequency range that I usually associate with speakers many times its price.

THE **PARADIGM** REFERENCE STUDIO 60 HAS A SEAMLESSNESS *AND* A **WIDE FREQUENCY** RANGE THAT I USUALLY ASSOCIATE WITH SPEAKERS MANY TIMES ITS PRICE.

Over the years, I've reviewed a number of speakers in the $1000 – $2000/pair range because this is where, it seems to me, the going gets tough. Speakers costing less than $1000/pair usually include serious compromises, and those costing more than $2000/pair, no matter how good they are, can be enjoyed only by the relative few that can afford them. In this range, several other speakers have outstanding and desirable traits, but no speaker costing anywhere near this price has better integration of all performance parameters than Paradigm's Reference Studio 60.

ASSOCIATED EQUIPMENT

Two-Channel System

DIGITAL SOURCES Sony XA-777ES SACD/CD player, McCormack UDP-1 universal player, Theta Gen. VIII DAC.
PREAMPLIFIER Sonic Frontiers Line-3.
POWER AMPLIFIERS Sonic Frontiers Power-3, Classé Omiciron monoblocks.
LOUD SPEAKERS Revel Ultima Studio
CABLES Digital: Stereovox HDVX. Interconnect all (all-balanced): Audio-Quest Granite. AC: JPS Aluminata.

Multi-channel System

DIGITAL SOURCES Sony SCD-XA9000ES SACD player, Denon DV-5900 universal player.
PREAMPLIFICATION McCormack MAP-1 preamplifier, Outlaw ICBM bass management system.
POWER AMPLIFIER Bryston 9B-STT.
LOUD SPEAKERS Paradigm Reference Studio/60 v.2, and Studio/20 v.2, Paradigm Servo-15 subwoofer; Magnepan MGMC1.
CABLES Harmonic Technology Harmony rainbow & Crystal Cable Cinemax Multichannel. Interconnect: Alpha-Core Goertz Micro-Purl copper. Speaker: Kubala-Sosna Fascination. AC: Kubala-Sosna Emotion.

-Kalman Rubinson

1 Real Traps (www.realtraps.com) is based only a few miles from my house - owners Ethan Winer and Doug Ferrara drove over with a truckload of their panels. I'll discuss the specifics of the installation and how it affected my room and up coming installment of my column, "Music in the Round."