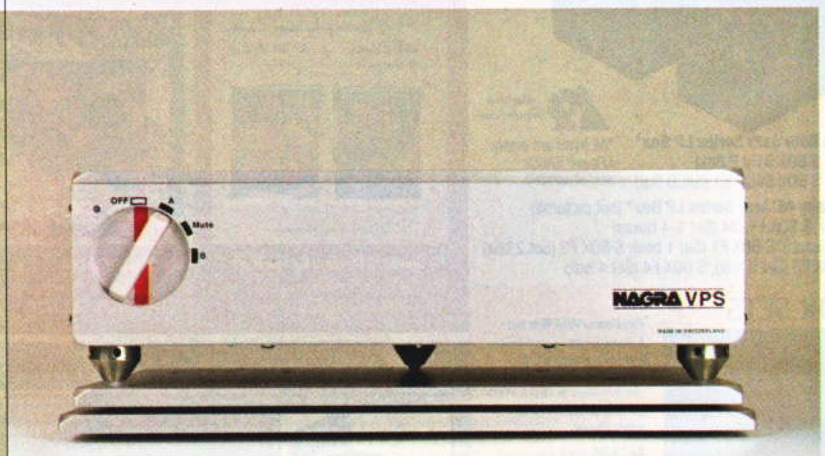
Nagra VPS & VFS

PHONO PREAMPLIFIER & ANTI-VIBRATION SUPPORT

MICHAEL FREMER

DESCRIPTION Single-ended, hybrid moving-magnet/moving-coil phono preamplifier with separate power supply. Inputs: 1 MC; second MM or MC input optional. Outputs: RCA, XLR (unbalanced). Tube complement: one 12AX7, one 12AT7. Input impedance: variable (with supplied load cards). Voltage gain: transformer input, 11dB; tube stage, 34dB; solid-state stage, 15dB. Frequency response: 20Hz–30kHz, +1/0dB. THD: <0.15%. Crosstalk: typically 60dB. Signal/noise (MC): >77dB (A-weighted. Output levels: 300mV (low mode, direct from tubes), 2V (high mode, via solid-state buffer stage).
DIMENSIONS 12.2" (310mm) W by 3" (75mm) H by 10" (255mm) D. Weight: 7.3 lbs (3.3kg).
SERIAL NUMBER OF UNIT REVIEWED 5500310201039.
PRICE $5995. Additional MC input, $1495; additional MM input, $395. Nagra Spike feet (3), add $349. VFS stand and 3 Nagra Spikes, add $1495. Approximate number of dealers: 16.
MANUFACTURER Nagra-Kudelski Group, 22 route de Genève, 1023 Cheseaux-sur Lausanne, Switzerland. Tel: (41) (021) 732-01-01. Web: www.nagra.com. US distributor: Nagra USA Inc., 357 Riverside Drive, Suite 230C, Franklin, TN 37064. Tel: (615) 726 5191. Fax: (615) 726 5189. Web: www.nagraaudio.com.



Nagra VPS phono preamplifier atop Nagra VFS anti-vibration support

Not that many years ago, it seems, every sound crew in Hollywood and around the world recorded production sound using a compact, open-reel analog tape recorder made by Nagra. The first iteration of the Swiss-made machine appeared in the early 1950s. Shortly thereafter, with the addition of an inaudible recorded tone that allowed easy syncing to picture, the Nagra recorder became the industry standard, and remained so through the 1980s. To this day, Nagra's line of audio products retains the look of those early recorders.

Nagra concentrated on recorders until the introduction of the battery-powered, vacuum-tubed PL-P preamplifier, which made its world debut at *Stereophile*'s HI-FI '97 Show, in San Francisco. Including a built-in phono preamplifier was an interesting choice 11 years ago, and demonstrated that someone at Nagra was prescient, or at least had his or her ear to the audio ground, under which the vinyl revival was just beginning to stir. That was only two years after I'd begun to write "Analog Corner" for *Stereophile*, with a nod from editor John Atkinson, as well as his warning that I was likely to "write myself out of a job" because "analog playback was going away."

But in 2008 the vinyl revival is in full swing, reaching levels of interest and commerce that not even its most vociferous and optimistic proponents could have

predicted a decade ago. Seeing that, Nagra decided it was time to put its considerable resources (most of which are committed to making broadcasting and video distribution equipment) into the VPS (for Valve Phono Stage), a dedicated, no-compromise, moving-coil (MC) phono preamplifier that costs $5995. Add $1495 for a second MC input, or $395 for moving-magnet (MM).

A seemingly simple task with many solutions

The phono preamplifier's job seems straightforward enough: amplify the phono cartridge's minuscule output to line level (around 2V), and, to restore flat frequency response, reverse the effects of the RIAA equalization, which cuts the bass and boosts the treble of the signal sent to the cutter-head amplifier. (The large groove excursions required by a signal with unattenuated bass would be difficult to track, and would limit the playing time of an LP side to fewer than 10 minutes. And without the treble boost and subsequent rolloff, mechanical cutter-head noise would be overwhelming.)

The problems associated with phono preamps include those found in any processing of low-level signals: noise, both self-generated and as EMI and RFI from outside; and overload margins. Phono preamps must deal with wide ranges of voltage inputs and their own internal impedances, and each MM or MC cartridge presents a different signal-processing challenge.

Phono preamps come in all sizes, shapes, and configurations: MM-only, MC-only, or both; big multibox or small single-chassis designs; all-tube, solid-state, or hybrid; with or without transformers; active or passive RIAA; inboard or outboard power supplies driven by DC batteries or mains AC—you name it, it's been used in a phono preamp, and every design choice has its defenders and its detractors.

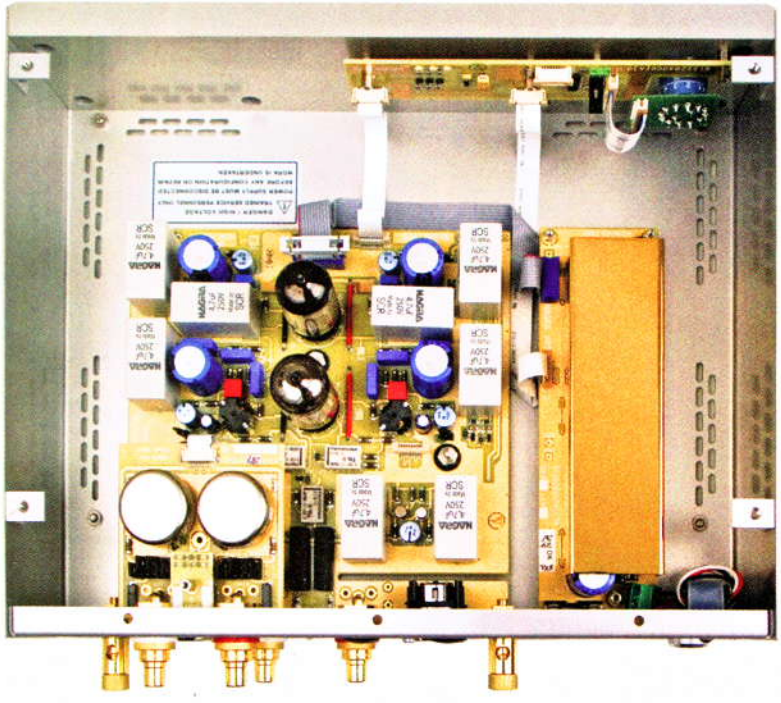
The VPS draws on the PL-P's tubed phono section, which it takes to a new level of configurability and, Nagra says, performance; but while the PL-P is battery-powered, the VPS is not. The elegant-looking VPS is relatively compact, with a single front-panel rotary control that resembles those originally found on Nagra's analog tape recorders. It turns the unit on, and lets you select Mute or a second, optional input. The rear panel has a pair each of rugged, chassis-mounted RCA input and output jacks, a pair of "convenience" XLR output jacks (the VPS's circuit is unbalanced and the XLRs have pin 3 tied to ground), and a high-quality multipin LEMO connector for the umbilical to the outboard ACPS II power supply.

THE RIGOROUSLY SELECTED AND MATCHED ELECTRO-HARMONIX 12AT7 AND 12AX7 TUBES ARE SUBJECTED TO 48 HOURS OF BURN-IN.

There are also one pair each of ground lugs and plugged openings for the optional second input.

Removing the VPS's top plate, which is smoothly machined and finished, reveals a compact, modular interior designed around a circuit board that has been meticulously laid out and built and is floated on "gel" stand-offs. Among other components, this board contains two of the familiar dual-triode tubes found in many other phono preamps. The rigorously selected and matched Electro-Harmonix 12AT7 and 12AX7 tubes are subjected to 48 hours of burn-in, after which 80% of them are rejected by Nagra because of noise and/or other performance problems. Nagra claims the VPS's tube sets should last for more than 5000 hours. A second, shielded board contains the power-supply circuits.

Because of the small voltages generated by phono cartridges, Nagra has made sure that the signal paths are extremely short. The standard VPS comes configured for a MC cartridge: a small module soldered directly to the RCA input jacks connects to the main board via a short ribbon cable. This module includes two step-up transformers and a jumper block that accepts supplied circuit cards of different impedances (33, 100, and 330 ohms) and capacitance (100, 220, and 470pF). For a limited time after a VPS is purchased, Nagra will supply the buyer with up to three additional custom-configured cards. My review sample came with 500- and 1000-ohm cards. Two additional sets of internal jumper blocks permits a wide range of configurations, including bypassing the loading card (for 47k ohm loading) and the transformers, should you wish to use an external step-up device, or use the primary input for a MM cartridge.



Elegantly laid-out VPS interior. Refer to text for details.

The small, circular, 11dB step-up transformers—designed and wound by Nagra based on the company's years of experience building microphone input transformers for tape recorders—are newly developed, not adapted from those used in the PL-P. Each transformer has a glass-magnetic core similar to that used in tape-recorder heads, and is said to offer greater linearity, an extended saturation threshold, and be better able to handle low frequencies. Magnetically shielded covers of annealed mu-metal protect them against outside interference.

The main amplification stage—the two tubes—provides 34dB of gain. Jumpers at that point in the circuit offer the choice of standard, wide-bandwidth RIAA equalization or the 1976 IEC curve, which rolls off the response below 50Hz and is useful for rumbly turntables. Why Nagra figured anyone would hook up a six-grand phono preamp to a cheap turntable is something I don't understand.

A microprocessor-controlled circuit mounted on the back of the front panel regulates those functions selected via the rotary switch, including a two-minute soft start that should prolong tube life.

Finally, should the VPS tube stage's 300mV output prove insufficient to drive your preamplifier—which, based on my experience of many preamps, it likely will—a solid-state gain stage, based on Nagra-designed circuits for microphone preamps and offering 16dB of gain, can be selected with a rear-panel switch, to give a total gain of 60dB.

MEASUREMENTS

I measured the Nagra VPS using, for most tests, Audio Precision's top-model SYS2722 system (see www.ap.com), with some use made of the older AP System One. I used the internal jumpers to set the preamplifier to moving-magnet (MM) or moving-coil (MC) operation, and also looked at the effect of the solid-state output buffer by operating the rear-panel switch.

As used by Michael Fremer, the preamp was set to MC with the internal step-up transformers engaged and the input loading set to 1000 ohms. The input impedance measured 1024 ohms at 1kHz, dropping slightly at the frequency extremes, to 982 ohms at 20Hz and 800 ohms at 20kHz. Without any loading selected, and without the optional 47k ohm tube grid resistor engaged, the input impedance was very high, at >100k ohms. With the 47k ohm grid resistor, the input impedance was 47k ohms across the band.

With the solid-state output buffer in-circuit, the VPS's output impedance was a low 15 ohms at high and middle frequencies, this rising to 1205 ohms at 20Hz. The VPS needs to be partnered with a preamplifier having a high input impedance if the lows are not to be a little rolled off. The output of a preamplifier with an input impedance of 10k ohms, for example, will be down by around 1dB at 20Hz compared with its output at 1kHz, which might be perceived as "tighter" low frequencies. The tubed output had a low source impedance of 98.5 ohms at 20kHz, rising to 644 ohms at 1kHz and to a very high value of 7.7k ohms at 20kHz. Even more so than from the solid-state outputs, the VPS's tube outputs need to be used with a preamplifier having a suitably high input impedance, at least 50k ohms and preferably 100k ohms, if the bass is not to sound a little lean. Surprisingly, Nagra's own PL-L preamplifier, which I reviewed in June 2008, has a fairly low input impedance of 29k ohms, which will give a bass that is down nearly 2dB at 20Hz with the VPS's tube output. The darTZeel preamp used by MF has an unbalanced input impedance of 22k ohms, which will reduce the level at 20Hz by 2.3dB compared with the level at 1kHz. Fortunately, Michael used the VPS's buffered outputs, because he needed the extra gain.

Both the tube output and the solid-state buffer preserved absolute polarity. A significant difference between the two output conditions, however, concerns the preamp's overall gain. Set to MC, the gain at 1kHz from the tubed outputs was 45.2dB, 11dB of this coming from the step-up transformer. Switching the solid-state buffer in-circuit added another 16.3dB of gain, for a total of 61.5dB. In combination with the A-weighted signal/noise ratio of 61dB (ref. 500µV input at 1kHz), this will be sufficient for use with low-output MC phono cartridges. Set to MM, the gain figures were 34.1dB (tubed output) and 50.6dB (solid-state), though the A-weighted S/N ratio was not much different, at 62.6dB. (The same circuit is used for both conditions, but with the transformers engaged for MC operation.)

The Nagra's RIAA equalization can be set internally to either full-range low-frequency extension or with a 3dB rolloff at 20Hz. MF used the VPS set to full-range; the RIAA error is shown in fig.1. I was surprised to see a slight hump in the upper bass (+0.9dB at 150Hz, left channel; +1.2dB at 150Hz, right), which will be audible. However, this same error is apparent in the measurements of the VPS supplied by Nagra. (Commendably, Nagra includes a set of measured data for every sample of their products.) A slight rise in the treble is accentuated above the audioband, suggesting that Nagra implements a version of the Neumann modification of the RIAA deemphasis curve, to compensate for the fact that the gain of the disc-cutting amplifier doesn't continue to rise at ultrasonic frequencies, but eventually reaches a plateau. I have some philosophical problems with the Neumann compensation—not the least of which is the fact that it will accentuate the ultrasonic content of record clicks—but manufacturers who use it, such as Hervé Delétraz of darTZeel, vigorously defend it on

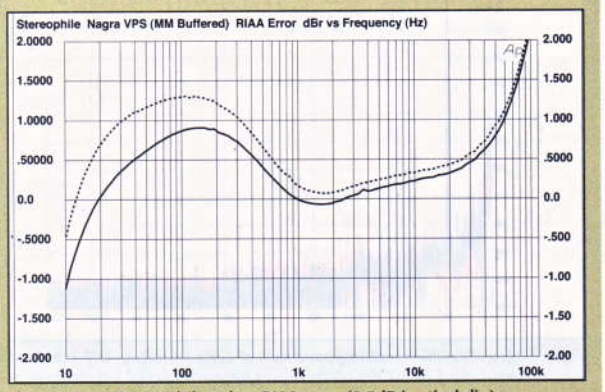


Fig.1 Nagra VPS, MC/Hi setting, RIAA error (0.5dB/vertical div.).

Setup and Use

The VPS comes configured with its jumpers set for the signal to pass through the internal transformers with "no additional loading." To make use of the supplied loading cards, turn the unit off and wait at least 10 minutes, to avoid a potentially lethal shock. Remove the chassis top plate, then move the two jumpers from their B to A positions. The jumpers' tight spacing makes this all but impossible without the aid of the supplied pliers, but keeping the signal path as short as possible is well worth this minor inconvenience. Changing out the loading boards was easier.

Nagra offers two more options: a set of three Nagra Spikes ($395), which are metal cone feet tipped with Delrin resin that you can screw into the chassis bottom (after removing the four rubber-ringed standard feet); and the Nagra VFS, an isolation stand consisting of two aluminum plates, each fitted with four cushioned feet of different densities. The feet are made of alpha-GEL, a silicone-based absorptive material. The VFS costs $1495 (price includes three Nagra Spikes).

My first listening was without these options. I placed the VPS first on a Continuum Audio Labs Castellon shelf, then on the top shelf of a Finite Elemente Pagode Master Reference stand. The optional 1000-ohm loading card worked best with the Lyra Titan *i* and Einstein TU3 cartridges I used in my listening. The 100-ohm card, too, sounded attractive, if a bit dark; 47k ohms, while open and extended, lacked body and control.

measurements, *continued*

the grounds that the system phase response is more linear at high frequencies. The VPS's channel separation (not shown) was better than specified, at 82dB L–R and 60dB R–L, both figures measured at 1kHz.

The THD percentage was relatively uniform with frequency, but a slight rise is evident at low frequencies (fig.2). This may well be due to the effect of noise, as the spectrum of a 1kHz tone at a high level (fig.3) reveals that the only significant harmonic content present is the subjectively innocuous second harmonic, at a fairly low –66dB (0.05%). Tested with a combination of high-frequency tones at a level close to overload, the Nagra VPS produced relatively low levels of high-order intermodulation products (fig.4), though the second-order difference component at 1kHz was higher, at just above –70dB (0.03%). The rise in the noise floor around the lower of the two tones is odd. It was repeatable, however, which can't be said of the lower-frequency noise-floor modulation that can be seen in this graph. This behavior was slightly different every time I captured the spectrum.

Set to MC mode, the overload margins (referenced to a typical MC output level of 500µV at 1kHz) were good rather than great, ranging from 13.73dB at 20Hz to 12.5dB at 20kHz. (These figures are equivalent to an output of around 2.65V from the buffered outputs; above that voltage, the waveform began to clip asymmetrically.) Set to MM, however, the overload margin decreased by 9dB at all frequencies, referenced to a typical MM output level of 5mV at 1kHz. MM cartridges with a "hot" output should not be used with the VPS, I feel.

As I have come to expect from Nagra, the VPS is a nicely engineered component, though it will work better when used with MC cartridges of medium to low output, I feel, than with MM types. I wonder at that slightly unflat RIAA equalization, however. I suspect that it underlies MF's finding that the VPS had a "bit of mid-bass boost" but also his feeling that the preamp's bottom octaves had "satisfying extension and weight." **–John Atkinson**

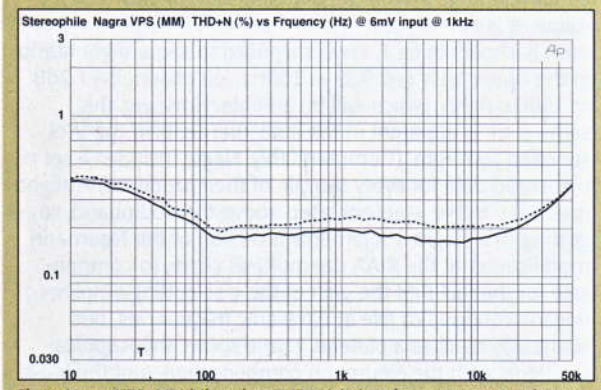


Fig.2 Nagra VPS, MM/Hi setting, THD+N (%) *vs* frequency at 6mV input into 100k ohms (right channel dashed).

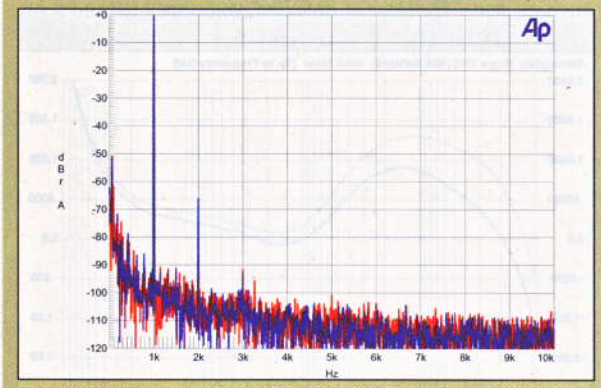


Fig.3 Nagra VPS, MC/Hi setting, spectrum of 1kHz sinewave, DC–10kHz, at 1mV input into 100k ohms (linear frequency scale; left channel blue, right red).

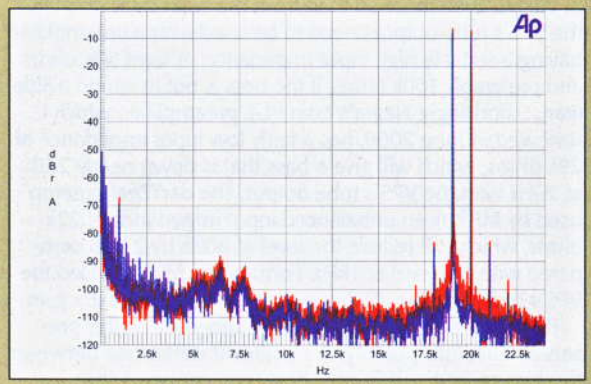


Fig.4 Nagra VPS, MC/Hi setting, HF intermodulation spectrum, DC–24kHz, 19+20kHz at 1.5V peak into 100k ohms (linear frequency scale; left channel red, right blue).

The VPS tubed output was not sufficient to drive the DarTZeel preamps to a usefully high level, even with a high-ish output Lyra Titan *I* phono cartridge. I therefore auditioned the VPS using its solid-state gain stage.

Warm and Lovely

With front-end tube amplification, the expectation is of somewhat weak, soft, or plummy bass that has less of the weight and grip offered by the best solid-state gear. Worse, you might hear generic "bass" instead of the instrument(s) that produced it, an effect often caused by midbass-amplitude creep overwhelming and clouding the attacks of notes.

The VPS produced none of the latter but some of the former. In other words, if you prefer taut, snappy bass, this Nagra might not be for you. But whether originally produced by acoustic or electric bass, the VPS's bottom octaves had satisfying extension and weight, along with well-developed, reasonably nimble textures, all sufficient enough to not call attention to its modestly ripe low end.

In fact, the Nagra's bottom-end control was very good. The VPS produced all you might want in the bottom octaves: clarity of attack, impressive drive and extension, forceful rhythmic grip, superb three-dimensionality, and textural subtlety and believability. But again, the Nagra might not be the ticket for those who prefer a leaner, more nimble approach, or whose systems might already be too warm and rich. If you already have a lush, bass-rich cartridge that you like, the VPS might add too much on the bottom.

Immediately apparent was the VPS's ability to vividly, believably reproduce instrumental textures, whether of massed strings, brass, keyboards, percussion, reeds, or electronic instruments. Do you like your analog textures full-bodied, unusually varied, and reach-out-and-touch-'em *visceral*? I thought you did. Evidently, so does Nagra. If you expect unrelenting tube warmth and a velvety softness in the sound of *everything* passed through a VPS, forget it. When a crash cymbal was supposed to *bite*, it did. When an overdriven, brittle-sounding electric guitar was meant to *sear*, it did—even as, in the same tune, a conga drum might reveal pure, supple human skin on drum skin with no hint of cardboardy residue or brittleness.

This was demonstrated by a new reissue of the Allman Brothers Band's *Idlewild South* (LP, Mobile Fidelity Sound Labs MFSL 1-301). The wealth of textural subtlety in both Butch Trucks' drum kit and Jai Johanny Johanson's percussion was noteworthy. Could it have been MoFi's remastering? I played my original pressing (Capricorn/Atco SD 33-342), and no, it wasn't the remastering—it was the Nagra. In fact, the MoFi, while very detailed and sweet in the midrange and more dynamic overall, couldn't compete with the original's "pop," and its brash—though not bright or edgy—sound. The original sounded as if it had been kissed by a tubed compressor to give it that "pop." Clearly, MoFi was more interested in putting its own spin on the reissue than in reproducing the original. In other words, while the VPS leaned toward the warm and forgiving, it was sufficiently revealing to not cloud over these pressings' audible differences.

High-frequency transients had enough grit and speed of attack to sound convincing. Cymbals rang metallically, brasses were bold and not fogged-over, and vocal sibilants hit crisply but without aggression. The attacks of well-recorded massed strings had a pleasing, edgy sheen, with follow-throughs that were warm and silky-smooth but never thick or lumpy.

The VPS provided the warmth and body needed for orchestral music and acoustic jazz to sound convincing, while also producing sufficiently hard edges and the necessary grit for rock to sound right. Cymbals chimed convincingly and snares "popped," yet solo singers, and stringed instruments in chamber ensembles, were bathed in warmth and silk, as you'd wish them to be. Quite an achievement.

A million colors

The VPS's reproduction of tonal colors and the harmonic structures of instruments was as startling, inviting, and *believable* as was its ability to delineate textures. Well-recorded solo pianos produced a depth of fundamentally correct colors across the instrument's range.

While on the rich side, the VPS never sounded soft or cloaked in velvet in the lower registers, or hard and brittle in the upper ones. Aldo Ciccolini's recording of Liszt's *Troisième Année*, the third and final suite for solo piano from his *Les Années de Pelérinage* (LP, EMI-Pathé Marconi ASDF 774), can sound distant, indistinct, and cardboardy. Through the Nagra VPS, his piano was bathed in warm, rich colors and textures, particularly in the upper registers, yet there was no shortage of the necessary transient information required to communicate Ciccolini's touch on the keys. This mesmerizing performance had never sounded so involving or so harmonically complex.

IMMEDIATELY APPARENT WAS THE VPS'S ABILITY **TO VIVIDLY, BELIEVABLY REPRODUCE INSTRUMENTAL TEXTURES**, WHETHER OF MASSED STRINGS, BRASS, KEYBOARDS, PERCUSSION, REEDS, OR ELECTRONIC INSTRUMENTS.

Soundstaging, imaging, and the VFS anti-vibration support

The VPS produced a big, full, and, especially, deep soundstage, on which appeared dense, full-bodied, yet transparent images. In fact, I was forced to pull out that hoary audiophile chestnut, Dick Schory's *Music for Bang, Baaroom and Harp* (LP, RCA LSP-1866), something I happily seldom do. The VPS managed an *enormous* soundstage—a reproduction

Rear panel layout showing RCA ins and outs, XLR outs, optional input blanks, Leemo jack, ground lugs, and additional gain switch, which, in most cases, will be "On."

of the acoustic of Chicago's Orchestra Hall that was bigger and deeper than I'd ever heard it before. While I *know* that the tonal picture was warm, the tubular bells sounded round and chimey, the tap dancers' taps hitting the boards were as hard and bright as I'd ever hoped for, and the overall sound of the percussion was as fast and frantic as old Dick Schory probably intended.

This 1958 audio spectacular of imaging and soundstaging also seemed a good choice for testing the efficacy of Nagra's optional VFS platform. After enduring an entire side of Schory's percussive silliness, I removed the VFS, then listened to the side again. Even though the VPS was now resting on Finite Elemente's excellent Pagode Master Reference stand, and even though Nagra's main circuit board floats within the chassis, removing the VFS platform produced a profound change: images became somewhat bloated and indistinct, bass got boomier and less well controlled, and the overall sound lost some of its grip and, especially, its focus. The VFS is a worthwhile addition.

Amazing sonic sleight-of-hand

Some phono preamps seem to encourage the listener to select recordings that complement the preamp's own sonic signature. The Nagra VPS made switching among different sorts of music—from solo piano to piano and violin concertos to symphonic recordings to Elvis Costello, the Clash, Air, or Cat Power—about as effortless and free of compromise as I've experienced. *Everything* sounded enticing and fully developed. I don't think I've ever heard Elvis Costello's excellent-sounding *Trust* (LP, F-Beat XXLP11) sound quite this spacious or tonally *perfect*, especially the piano and drum kit.

The VPS did have a distinctive sonic character, an identifiable personality—but its sleight-of-hand was so seamless, and so carefully tailored in every respect, that I never noticed what was going on until I switched to a different familiar recording. The VPS's midrange was ripe, warm, and fully developed. The bottom was somewhat slow and sticky, the top end slightly less than forthcoming, the air somewhat high-altitude in quantity, and the transient sparkle a little truncated. Everything was shaved with surgical precision at the margins and delicately enriched in the middle, to produce a subtle overall impression of comfort-food warmth.

That went for dynamics as well. I've heard wider dynamics from a number of other phono preamps, but not by a wide enough margin to make it an issue. As for transparency, the VPS need make no apologies.

Although the Nagra VPS had more personality and color than some other, I suspect more "accurate," phono preamps, its overall sound was one of overflowing harmonic structures, deliberate but not sluggish pace, meaty but not obscured textures, chewy but well-structured bass, and an overall vividness that was enticing, mesmerizing, addicting, revealing, and absolutely convincing. Go figure.

Conclusion

No audio product can attain true neutrality, but the best ones achieve a sense of completeness that can fool you into thinking that that's exactly what you're hearing. The Nagra VPS is such a product.

This doesn't mean that it doesn't have a distinct sonic personality that places it at the warm, rich end of the spectrum, with perhaps a slightly recessed upper-mid/lower-treble region and perhaps a bit of midbass boost. Nor would I recommend it for use in a system that's already too warm and soft. But the VPS's overall balance, and especially its seamlessness in every parameter, makes it among the most captivating and enticing phono preamps I've heard.

THE VPS'S OVERALL BALANCE, **AND ESPECIALLY ITS SEAMLESSNESS IN EVERY PARAMETER, MAKES IT AMONG THE MOST CAPTIVATING AND ENTICING** PHONO PREAMPS I'VE HEARD.

Like an exquisitely complex recipe that results in a meal whose flavors reveal none of the tastes of the original ingredients, the VPS manages to so carefully and precisely blend all of the elements of its sound that all I hear is music—none of the usual audio parameters matter, every instrument sounding fundamentally correct and properly blended into the entire aural picture. The VPS is clearly a product born of both engineering and listening acumen.

I'll leave it to others to debate whether, in a world of inaccurate-sounding recordings (no mike-feed sounds like the real thing in my experience and most recordings are too bright), an audio product's job is to be accurate to the incoming signal or is to attempt to produce a final result that sounds "real" from imperfect source material. All I can say is that the Nagra VPS was an utterly silent performer literally and figuratively. It had no obvious errors of commission—no audible noise, grain, grit or edge—and whatever it might have omitted wasn't missed and was in the service of one of the most enticing, addictive, listenable and believable phono preamps I've been fortunate to hear. You need to hear it.

ASSOCIATED EQUIPMENT

ANALOG SOURCES Continuum Audio Labs Caliburn turntable & Cobra tonearm & Castellon stand; Graham Phantom tonearm; Lyra Titan *i*, Einstein TU-3 cartridges.
DIGITAL SOURCES Musical Fidelity kW DM 25 CD transport & DAC, dCS 904 A/D converter, BPT-modified Alesis Masterlink hard-disk recorder.
PREAMPLIFICATION Manley Steelhead, Einstein Turntable's Choice phono preamplifiers; DarTZeel NHB-18NS, Luxman C-800f preamplifiers.
POWER AMPLIFIERS Musical Fidelity kW monoblocks, Luxman M-800A.
LOUDSPEAKERS Wilson Audio Specialties MAXX 2.
CABLES Interconnect: TARA Labs Zero. Speaker: TARA Labs Omega Gold. AC: TARA Labs The One Cobalt, Shunyata Research Anaconda Helix.
ACCESSORIES Finite Elemente Pagode Master Reference stand, Symposium Rollerblocks; Furutech DeMag & deStat LP treatments; Audiodharma Cable Cooker; Shunyata Research V-Ray Reference power conditioner; Oyaide AC wall box & receptacles; ASC Tube Traps, RPG BAD & Abffusor panels; VPI HW-17F, Loricraft PRC4 Deluxe record-cleaning machines.

—Michael Fremer