

# EAR 324 phono preamplifier

**W**hen we last heard from Englishman Tim de Paravicini, whose EAR 890 amp I reviewed in *Stereophile's* April 2004 issue, the veteran audio designer suggested that he could make a transistor amplifier equal in performance to any of his successful tube designs. Whatever else it may be, the new EAR 324 is my first chance to test that claim: a stereo phono preamplifier without a single tube in sight. It isn't TdP's first all-solid-state product: That would be the line-plus-phono EAR 321 preamplifier, introduced to no small fanfare a little over three years ago. For all intents and purposes, the 324 is a standalone version of the phono section of that \$17,000 flagship: The designs are virtually identical—excepting, of course, their casework and power supplies.

The 324 presents the serious LP enthusiast with two pairs of inputs, selectable via a pushbutton switch on the front panel. Gain for both input pairs is supplied by a trio of discrete transistors per channel, operating as a class-A amplifier. On the Phono 1 inputs, the additional gain necessary to bring the very low voltage of a traditional moving-coil (MC) cartridge up to par with that of a moving-magnet (MM) cartridge is supplied by a pair of step-up transformers, each comprising three separate primaries and one secondary in a shielded can, nicely chrome-finished. Another switch on the front panel allows the user to choose between 4, 15, and 40 ohm primaries, corresponding to additional voltage gains of 30x, 20x, and 10x, respectively. Each primary for each channel is addressed with a relay, for greater signal integrity



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than would be possible using a switch. (The same trannies are available in the company's standalone step-up transformer, the MC3, but that \$1195 product uses separate pairs of input jacks instead of relays.) The transformers can also be switched out of the Phono 1 circuits entirely, for use with any cartridge whose output exceeds 1.0mV or so.

The pair of inputs labeled Phono 2

are optimized for an MM cartridge: These bypass the trannies altogether, but route the phono signal through a brace of capacitance and impedance choices: 20, 100, 220, 330, and 470 picofarads for the former, and 15k, 22k, 33k, 47k, and 100k ohms for the latter. As with the transformer primaries and input impedances described above for Phono 1, the Phono 2 choices are also

**Description:** Solid-state phono preamplifier. Input impedance: switchable between 4 and 40 ohms (moving-coil), 15k and 100k ohms (moving-magnet). Output impedance: 60 ohms. Gain: 54dB maximum. Input sensitivity: 2.5mV (moving-magnet). Signal/noise ratio: 68dB ref. 2.5mV input. RIAA accuracy:

$\pm 0.3$ dB. Channel balance:  $\pm 0.2$ dB. THD: 0.2%.

**Dimensions:** 12.7" W by 4" H by 10.5" D. Weight: 11 lbs.

**Serial number of unit reviewed:** 02521001.

**Price:** \$3595. Approximate number of dealers: 24.

**Manufacturer:** Esoteric Audio

Research/Yoshino Ltd., Coombe Grove Farm, Ermine Street, Arrington, Cambridgeshire SG8 0AL, England, UK. Tel: (44) 1223-208877. Web: [www.ear-yoshino.com](http://www.ear-yoshino.com). US distributor: EAR USA, Inc., 1087 East Ridgewood Street, Long Beach, CA 90807. Tel: (562) 422-4747. Web: [www.ear-usa.com](http://www.ear-usa.com).

switched from the front panel, also addressing a bank of relays.

Before moving on to the 324's other features, let's consider the technical reasons a designer would choose a combination of step-up transformers and active gain for his phono preamp, rather than using active devices alone. As you know, a phono cartridge can't drive an active gain stage unless the input of the latter presents an impedance that's significantly higher than the cartridge's own coils: Ohm's Law says that, all other things being equal, signal voltage can't go up unless its current goes down—so

people generally try to have active inputs that are higher in impedance than the cartridge's own relative handful of ohms, all the way up to a whopping 47k ohms and beyond.

But when we speak of impedance instead of mere resistance, we're speaking of something that's frequency-dependent—and that's where things get sticky. The impedance differential required for a source to drive a gain stage effectively, taken by most people to be a factor between 50 and 100, is unlikely to make this stickiness an issue. But when you load a 4 ohm source

with 47k ohms of shunt resistance, you will exaggerate, rather than flatten, any frequency-related response anomalies that are present in that source. And an MC cartridge has at least one of those anomalies, notwithstanding its theoretical superiority in other regards.<sup>1</sup>

The loading game changes when we

<sup>1</sup> It's also important to choose a precisely correct load impedance so the MC cartridge can damp itself, electrically. I'm reluctant to put my hand in the hornets' nest by suggesting, even approximately, what the right number should be, but I'll speak from personal experience and say that I don't believe I've ever heard a cartridge perform properly into a 47k ohm load.

## Measurements

The EAR 324's gain in MM mode was a little lower than specified, at 50.6dB at 1kHz from both inputs, and was the same in both balanced and unbalanced output modes. The “-6dB” and “-12dB” settings reduced the gain by exactly those amounts. Switching in the MC transformer set to its “40 ohm” winding added another 19.5dB of gain, which will make the 324 suitable for use with low-output MC cartridges, particularly as its signal/noise ratios are respectably high: 82dB for the MM input (ref. 5mV input at 1kHz), 79dB for the MC input (ref. 0.5mV input at 1kHz). Both these figures are A-weighted; they worsen slightly when unweighted over a wide measurement bandwidth (to 75.4dB for the MM input and 66.3dB for the MC input), due to the presence of some low-level 120Hz hum that I could not eliminate by experimenting with the grounding between the 324 and my Audio Precision System One test set.

The preamp's output impedance was a usefully low 33 ohms from both the balanced and unbalanced output jacks, and it preserved absolute polarity with the front-panel button set to Normal (the XLRs are wired with pin 2 hot, the IEC standard). The MM stage's input impedance could be varied with the front-panel control. Set to “15k,” it measured 16.7k ohms at 1kHz; to “22k,” 23k ohms; to “33k,” 42k ohms; to “47k,” 64k ohms; and to “100k,” 107k ohms. The MC stage's input impedance varied from 100 to 780 ohms at 1kHz, depending on

the transformer winding used. I did not find any interaction between the phono inputs. However, the EAR was very fussy about the grounding between its inputs and the Audio Precision's outputs, with some low-frequency instability evident if the ground connection was not to its liking.

The EAR's RIAA error, measured through its MM input set to 100k ohms to minimize any interaction between the preamp and the signal generator, is shown in fig.1. Other than a small, 0.5dB rolloff at the frequency extremes, the response is very flat, with just a slight (0.2dB) emphasis in the lower treble. Channel separation, again measured through the MM input, was good in the treble, with the R-L leakage lower than in the opposite direction (fig.2), but degraded at lower frequencies, this presumably due to the action of the RIAA de-emphasis. (The input signal decreases with the frequency, meaning that the constant noise floor increasingly affects the measured separation.)

Above 100Hz, with the level of the signal fed to the EAR 324's MM

input set to 5mV at 1kHz, and pre-equalized with the appropriate RIAA curve, the THD+noise percentage remained close to 0.01% at all settings

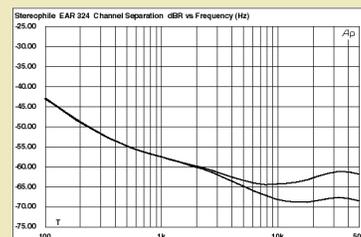


Fig.2 EAR 324, MM input, channel separation (10dB/vertical div., R-L dashed).

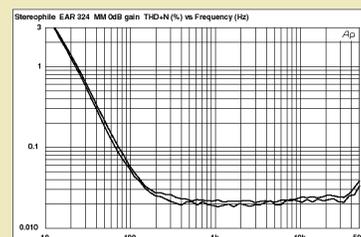


Fig.3 EAR 324 line stage, MM input, THD+N (%) vs frequency at 5mV at 1kHz, right channel top, left bottom.

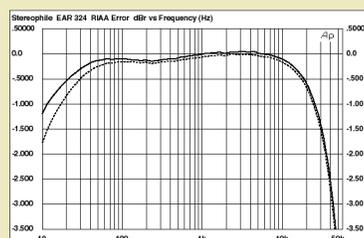


Fig.1 EAR 324, MM input, RIAA error at 1mV input at 1kHz (0.5dB/vertical div., right channel dashed).

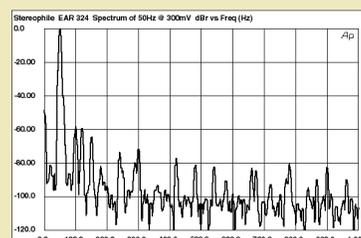


Fig.4 EAR 324 MM input, spectrum of 50Hz sine wave, DC-1kHz, at 300mV into 100k ohms (linear frequency scale).

precede our active stage with a transformer, which works by inverting the ratio between voltage and current: low voltage and high current at the primary (input) become low current and high voltage at the secondary (output). With a step-up transformer, then, we don't need to create an impedance differential between source and load at all: All the voltage we need appears at the secondary, virtually without cost.

Conditions at the secondary are such that no reasonable gain stage could complain: There's enough voltage to drive any number of different devices.

Back at the primary, the only requirement is that source and input impedances be at least reasonably close to one another, for the sake of electrical efficiency at most frequencies. Thus, a step-up transformer is kind to the **music signal in many** ways: It does not blow frequency-related response bumps out of proportion, it is electrically efficient, it does not create unwanted impedance "reflections," and it provides an operating condition in which the cartridge can control itself—which is to say, there is no electromotive force interfering with the cantilever's work. A fanciful term

for such an electromotive force might be "electrically induced mistracking" or perhaps "backward mistracking.")

And in case you detect the unmistakable scent of sympathy in the preceding paragraphs, let me confess: I do in fact think that an MC cartridge that's well-matched to a step-up transformer is capable of much more drama, and much less distortion of the sort I find objectionable, than an MC cartridge driving active devices—or even an MM cartridge driving fewer of those devices. The only time when **simpler isn't better is when simpler is worse.**

of the gain control (fig.3), which is superb performance. However, again there was some incompatibility between the EAR and the Audio Precision: I only obtained this low distortion if I measured each channel separately; with both left and right inputs connected to the AP, the THD rose to 0.06% in both channels.

And whether I connected one or both channels, the measured distortion rose steeply with decreasing frequency below 100Hz, reaching our definition of "overload"—1% THD—just above 20Hz. I checked and rechecked this figure, using an unequalized signal and a different generator—a battery-powered Neutrik—with the same result. This means that the EAR's circuit has virtually no headroom in the low bass. While this may not have any

subjective consequences with music recordings, which tend to have little energy below 40Hz (unless they are of pipe organs or synthesizers), it means that record warps will drive the preamp into nonlinear behavior. It should be noted that AD noted no audible problems with any of the cartridge/arm combinations he tried, but I was alarmed by this behavior regardless.

Moving higher in frequency, the 324's overload margins were only moderate, this correlating with the higher-than-normal MM-stage gain. I measured around 13dB through both the MM and MC inputs at 1kHz and 20kHz, this figure not affected by the front-panel gain setting. (The 13dB figure is referenced to standard 1kHz input levels of 5mV, MM, and 0.5mV MC.) This perfor-

mance suggests that the EAR is best used with low-output cartridges.

Fig.4 shows the spectrum of the EAR's output while its MM input was driven with a 50Hz tone at 440 $\mu$ V; *ie*, just below reference level. The second harmonic is the highest in level, at -60dB (0.1%), followed by the third, at -64dB (0.06%). You can also see the 120Hz hum components I referred to earlier. Fig.5 shows a similar spectrum for a 1kHz tone at a high 15mV input level, again taken through the MM input. Even though this signal approaches the overload point, the harmonics are only just visible above the noise floor, the latter shaped by the RIAA de-emphasis. The EAR also turned in low levels of intermodulation distortion when reproducing high levels of 19 and 20kHz tones (fig.6).

With the exception of its very limited low-frequency headroom, the EAR 324 turns in good measured performance provided it is used with low-output MM or MC cartridges through the appropriate inputs. But that LF performance is still a matter for concern.

—John Atkinson

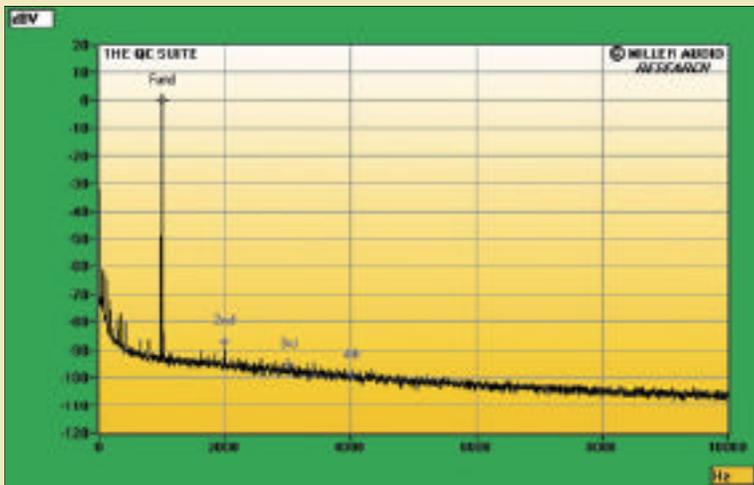


Fig.5 EAR 324 MM input, spectrum of 1kHz sine wave, DC–10kHz, at 1V into 8k ohms (linear frequency scale).

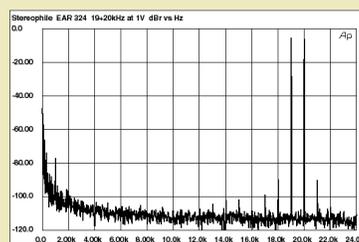


Fig.6 EAR 324, MM input, HF intermodulation spectrum, DC–24kHz, 19+20kHz at 1V into 8k ohms (linear frequency scale).

Back to the EAR 324's technical features: In addition to the front-panel switches and knobs for selecting phono inputs and choosing between various loading parameters, there are a few other, equally useful things. A pushbutton mono switch serves an obvious, important duty when listening to Toscanini (all) or Eddie Cochran (most) records. Another pushbutton lets you invert the absolute polarity of the signal, which can be useful ...albeit only with recordings that are not egregiously multimiked, and only to the extent that its use doesn't encourage fiddling, sound worshipping, or out-and-out weirdness. And a three-position knob lets you choose between full gain (54dB) and 6 or 12dB of attenuation, the latter two being useful when you're comparing an MC's performance into different transformer primaries and you want a quick and positive way of effecting at least approximate level matching for the sake of a fair comparison.

The 324's signal output comes in unbalanced (phono jacks) and balanced (XLR sockets) flavors, the latter being true balanced in the sense that it is not derived through the use of an extra inverter—but not quite as true as can be, since there are no balanced inputs, which would of course require special [tonearm wiring](#).<sup>2</sup> Both unbalanced and balanced outputs are taken from the secondaries of two very hefty transformers. That's right: output *transformers*, just as in the Audio Note M2 preamp I reviewed last issue. Thus, the EAR 324 can be expected to drive the line inputs of any preamp or amp without difficulty. In fact, in a moment of what passes for whimsy around here, I connected the 324's balanced outputs straight to the balanced inputs of my own EAR 890 power amplifier, using the latter's input level controls to adjust listening volume. It worked. (But the sound was not, to my way of hearing, superior in any way to the system's performance with my regular preamp in place.)

In true EAR fashion, the 324's power supply is elegantly simple, being centered around a smallish toroidal trans-



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former that's nicely shielded in its own metal sub-enclosure. Four smoothing caps complete the scene—but there is no power-supply regulation at all, Tim de P relying instead on passive filtering in both the power supply itself and within the active circuitry. (There's a pair of nicely shielded can-type inductors in the latter for this purpose, which I originally mistook for trannies.) There is also an inductor in the power supply, between the rectifier bridge and the first smoothing caps, which helps reduce electrical *and* mechanical noise, and which provides some measure of regulation in the bargain.

The 324 remained cool to the touch at all times, even when powered up around the clock—although it seemed to reach full potential after just half an hour. Construction quality is fine, with an especially robust chassis that's cleverly reinforced, apparently to resist the torsional forces exerted by the two heavy output transformers. My only complaint is that the brushed-alloy faceplate, while nice enough, isn't as pretty as the heavily chromed brass faceplates of other EAR products.

Well, that's not my *only* complaint: When I took off the bottom cover for a glimpse of the underside of the main circuit board, I found the following message etched onto the board: "The milenium has begun already"—misspelled in precisely that way. Oh, Tim, Tim, Tim...

### Listening

The EAR 324 is so flexible, with so many choices of inputs and settings, and with provisions for accommodating so many different phono cartridges, that any reviewer could easily blow 3000 words just describing its sound in every reasonable combination. Instead, I'll start by giving you a general sense of what the 324 sounded like in my system.

First and foremost, it had what I think of as an *organic, as distinct from artificial*, presentation. Its ability to let the music flow in an unmechanical way, and to let the sound breathe in and out naturally, was *at least* the equal of the best I've heard in my home. The 324 was tight in that it played notes and rhythms correctly, without sloppiness or ambiguity of pitch and tempo—but it didn't have that (forgive me) tight-assed sound that characterizes so much expensive

playback gear, and which tells me, in an instant, that I'm hearing an electro-mechanical fake and not real people playing music.

Those strengths were especially clear with a beautiful recording of Purcell songs by the Deller Consort (French Harmonia Mundi HM 247). The sounds of the instruments on "My song shall be alway" had solidity and presence—but, again, without seeming too tight or rigid, musically. Listening closer, I heard the EAR do a better job than my own combination of Tamura transformer and Fi preamplifier at keeping the violins—and, ultimately, the choral voices—separate and distinct from the bass-and-organ continuo. The latter had what I thought was the right amount of heft and weight, yet the other parts were free to shine and move about, without sounding stony or thick. And the colors of the instruments were lovely and convincing, too: no solid-state "graying-out" of timbres.

Yes, though it may sound simplistic or wrongheaded to say so, the 324 never sounded to me like a solid-state amplifier. My own trannies and tubes were no better at portraying true instrumental colors—as with the very distinctive and realistically recorded brass instruments on Knappertsbusch's studio recording of Prelude to Wagner's *Parsifal* (Westminster/Speakers Corner WST-17032)—and the EAR had a consistently, pleasingly great sense of flow and ease on LP after LP. That it ran cool and could be left powered up indefinitely was, as they say, icing. Or gravy. Or something.

The EAR also played music with a better sense of scale than my reference. Take that great live recording of Procol Harum with the Edmonton Symphony Orchestra (the British LP, Chrysalis CHR 1004, more than the comparatively thin-sounding US release on

<sup>2</sup> Because a phono cartridge is that rare component that naturally exists in a balanced state—its AC goes back and forth in a symmetrical circuit, without being referenced to ground—I'm anxious to try this some day. It's on my "to do" list, along with remodeling the kitchen and saving up for a horse.



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A&M): The space from which the orchestra plays seemed larger, in addition to which the orchestral drums and all the smaller drums in Barrie Wilson's kit took on a much bigger sound, with more impact and drama. Even the sound of applause seemed to come from a larger chunk of space.

While it isn't uncommon—and may not even be objectionable, depending on the system and the listener—for an otherwise good component to have some sonic signature, the EAR 324 simply didn't. It sounded neither brighter nor darker than what I expected, with no surplus of smoothness or grain, and no little timbral hiccups that I could hear in my system. If one were to take the parlor-trick approach to judging a piece of playback gear—trying to prove what we can or cannot hear in a blind test—I'm reasonably confident I could identify the sounds of certain other favorite products: transformers, preamps, and what have you. But not this one: I sincerely doubt if I could identify the EAR 324 in use, other than to say that it makes music quite well.

### Comparisons

Comparisons are tempting nonetheless—one of the most tempting involved the highly regarded Linn Linto (\$1600), which has long been the finest solid-state phono preamp of my experience. So I jogged my memory with a borrowed Linto (serial number 833669), noting, among other things, the Scottish preamp's unsurprisingly accurate pitches and apparently uncolored sound. And, mother of pearl, was it ever *quiet*. The EAR was just as quiet in my system, and just as musical—yet it rewarded even casual listening with a notably better flow and naturalness than the Linn. The EAR was, simply, more organic.

Working in the other direction—back toward my reference setup—I'm not sure that comparing a given trannie-plus-active phono device to different types and combinations of those same things, gathered from different suppliers and assembled in different combinations, would be anything but dubious. And so it went.

For example, I tend to mate low-output MCs with the lowest-impedance primaries possible when using a step-up transformer: The Tubaphon TU3 prefers the Tamura transformer's 3 ohm primary over its 40 ohm choice, and it prefers

my Audio Note AN-S2's Low setting over its High (precise specs are not given). Yet with the EAR 324, things weren't so pat. Some slight ringing signaled a mismatch between the TU3 and the EAR's 4 ohm setting, which was audible on tenor Peter Pears' singing in the Britten *Nocturne* (Decca/Speakers Corner SXL-2189). Playing that cartridge into either the 15 ohm or 40 ohm primaries eliminated the distortion, if indeed that's what it was, and did a better job of preserving very subtle high-frequency contributions to the sound—the natural sibilance of Pears' very precise delivery, the realistic sound of the skin of Denis Byth's kettledrum, and so forth.

But I wondered: Was this a function of the relationship between the cartridge's coil impedance and the impedances of the various primaries, or was it something else? I've imagined an active gain stage would be difficult to overload with a well-chosen step-up transformer, since a comparatively high voltage on the transformer's primary—and its concomitantly relatively high impedance—

### Associated Equipment

**Analog sources:** Linn LP12 turntable, Naim Armageddon power supply, Naim Aro tonearm; Rega Planar 3 turntable, Rega RB-300 tonearm; Tubaphon TU3, Lyra Helikon Mono, Miyabi 47, Linn Adikt, Linn Akiva phono cartridges.

**Preamplification:** Audio Note AN-S2, Tamura TKS-83 step-up transformers; Linn Linto phono preamplifier; Fi, Audio Note M2 preamplifiers.

**Power amplifiers:** Audio Note Kit One, EAR 890.

**Loudspeakers:** Quad ESL-989.

**Cables:** Interconnect: Audio Note AN-Vx, DNМ solid-core, Nordost Valhalla, homemades. Speaker: Nordost Valhalla, Audio Note AN-SPx, homemades.

**Accessories:** Mana stand (under Linn LP12, preamps); Rega wall shelf (under Rega Planar 3); Wally Tools.

—Art Dudley

will produce *lower* gain on the secondary, proportionally. But I don't really know for sure. Perhaps what I'm hearing is simply the different "sounds" of different primaries. (But please don't tell me they "break in," and that the one I use least often will always sound worse than the others...)

### Permutations & Combinations

Rather than waxing all techno-philosophical, I decided to tackle something knowable: How would the different cartridges in my collection fare with the EAR 324, and what combinations of settings would work best for each? Here's what I've learned so far:

• **Tubaphon TU3:** As suggested, this one sounded best driving either the 15 ohm or 40 ohm primaries. The Tubaphon is somewhat warmish—not as warm as an old Supex or Koetsu, mind, just slightly and pleasantly thick—and the EAR preserved that characteristic, while still honoring the timing and pitch specifics of the notes. This combo also had a great bottom end, as heard on the Bax tone poem *November Woods* (Lyrita SRCs.37): The center-stage kettledrum had more weight and impact here than when I used the same cartridge with my reference gear. (By the way, this is pretty nice music, even if it's a bit obvious and traveloguey in spots.)

• **Helikon Mono:** This cartridge sounded best with the 4 or 15 ohm primaries—the latter getting the nod on most pop records, especially ones that are cut a little too hot. The Helikon sounded immediate, colorful, and super-dynamic through the EAR 324. Toscanini's late recording of the "Good Friday Spell," from Wagner's *Parsifal* (RCA LM-6020), was especially fine, with a great room sound and very present, if unavoidably colored, strings and woodwinds. Notwithstanding the fine sense of breathing and flow, the EAR's tight musicality fit the deliberateness of Toscanini's performance well.

• **Linn Adikt:** This MM cartridge sounded best at an impedance setting of 22k ohms (47k was too relentless and sibilant for my tastes), with a capacitance of 100pF. Even at its best, it was never the most substantial- or colorful-sounding thing—but then, it isn't terribly meaty with my reference gear, either. In any event, the Adikt played music well, with the bonus that it shrugged off surface noise better than most other cartridges in its price range. (A mildly off-topic note:

For some reason, the Adikt doesn't have the same stylus-to-mounting-bolt distance as Linn's MC cartridges, making it a less than optimal choice for use with the non-adjustable Naim Aro tonearm—which is designed around “the Linn standard” in that regard.)

• **Miyabi 47:** *Wow.* Together with the EAR 324, this already dynamic cartridge made some of the most immediate and downright thrilling music I've enjoyed at home. It worked best with the 4 ohm primaries, but with the gain knocked down a full 12dB: For whatever reason, it liked that part of the Fi's volume range best of all. Other combinations had more color and slightly gooshier, more liquid textures—whether or not you like that sort of thing—but nothing was more dramatic.

• **Linn Akiva:** I've saved what I consider the best for last. Unsurprisingly, this recent review sample sounded great driving Linn's own Linto preamp: superb *all-around* performance that would please Flat-Earthers and high-end salon jockeys alike, with faultless pitch and tempo performance and at least decent color and texture—plus groove noise that was as low as I've ever heard.

But imagine my surprise when the

Linn cartridge and EAR trannies and preamp did a lip-lock from which they have yet to emerge. The bass was nothing short of awesome in its combination of depth, power, pitch, and speed (try virtually any cut on Leonard Cohen's *New Skin for the Old Ceremony*, Columbia 33167), and stereo imaging

**Imagine my surprise when the Linn cartridge and EAR trannies and preamp did a lip-lock from which they have yet to emerge.**

and scale were superb: The great Solti-Culshaw recording of Wagner's *Die Walküre* (London/King Records KIJC-9180) was so spatially convincing it had me grinning like a fool. Tracking was good, too (after I'd run it in for a week, before which it was itchy on those loud, loud voices). Buying a \$2995 phono cartridge and a \$3595 phono preamplifier in the same year may seem dizzying to people, like me, of average

means, but based on this combination's performance in my system, no record lover could call it a mistake.

### Conclusions

If the EAR 324 has a shortcoming, it might be the price. Of course, there's nothing *cheap* about it: The 324 is well-designed and superbly engineered, and its musical performance speaks for itself. Especially if you want this kind of flexibility—this exact combination of features—then \$3595 is the not-unreasonable asking price.

If the 324 has another shortcoming, it might be that its features don't happen to suit every enthusiast who might be interested in such a thing. There are probably record collectors out there who would appreciate the 324's performance, but who would also insist on such additional features as switchable EQ curves for various LP types, or perhaps more than one pair of MC inputs. Again, this is not unreasonable.

But there's no point in reviewing what the 324 isn't. Take it for what it is—a serious and downright scary assault on the state of the art of phono amplification. Recommended with great enthusiasm and no small amount of envy. ☒