

Analog Corner

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In 1982, while a graduate student in electrical engineering at Stanford University, Robert E. Stoddard proved the feasibility using laser optics and high-speed servos to retrieve analog information scribed into the grooves of a phonograph record. Though once the stuff of science fiction, lasers had by then long been a reality—as had the other technologies needed to implement Stoddard's idea. Still, none of his professors or colleagues thought the theoretical possibility could be turned into a reality, let alone a commercially viable one.

Stubborn Stoddard set out to prove them wrong, and founded Finial Technology in 1983 to research, design, and build a laser turntable. In 1984 he was joined by Robert N. Stark, an expert in servo and analog circuit design. Stark designed the turntable's high-speed servo and analog signal-processing circuits. The system's high-performance scanner alone took 18 months to design. Seven years and \$20 million later, Stoddard and his talented team of engineers had proven their point.¹

But a funny thing happened on the way to designing the Finial Technology laser turntable: at the same time that Finial was founded, Sony and Philips had already applied similar technology to scanning pits and land surfaces on 5" discs of aluminum-sputtered polycarbonate. By the time Stoddard's product was ready for production in 1990, the compact disc had all but consigned the vinyl LP to the trash heap of technological history.

Or so everyone thought. Like the LP itself, the dream of a turntable that could read grooves with a laser beam would not die. The Finial Technology laser turntable has been resurrected as the ELP Laser Turntable by the ELP



Some models of ELP turntables play 78s.

Corporation of Japan. ELP is headed by Sanju Chiba, an analog true believer; he and Stoddard spent another seven years to improve the quality and reliability of the invention, and to establish a manufacturing facility and the processes necessary to hand-build each 'table. Attempts at lower-cost, mass-produced models proved unfeasible.

ELP, which has been building and selling the Laser Turntable since 1997, recently announced three LT models with improved sonic performance and user interfaces, including CD-like programmability and remote control. More than 1000 turntables have been sold so far, and recently, Smart Devices began handling American distribution. Because the 'tables are assembled by hand, and because demand exceeds supply, you'll need to plunk down a \$400 deposit and wait eight to ten weeks before a unit arrives at your door, shipped directly from Japan. The three new models are the LT-1LRC (\$10,500, 33 $\frac{1}{3}$ and 45rpm), the LT-1XRC (\$13,300, 33 $\frac{1}{3}$, 45, and 78rpm), and the LT-2XRC (\$14,300, plays 7", 8", 9", 10", 11", and 12" records at all three speeds). Shipping to anywhere in the US costs approximately \$400; the buyer pays any additional import duties.

I was invited to a preview demonstration of one of the new ELP turntables, given by Chiba in June 2001 in a hotel adjacent to the World Trade Center in New York. While aspects of the presentation were impressive, it was impossible

to form any kind of opinion about the 'table's sound because of the unfamiliar associated equipment and the usual problems of show-demo conditions. In any case, memories of the demo itself were soon to be overshadowed by my decision to spend the rest of that spectacular sunny afternoon in the WTC's crowded, noisy central plaza, soaking up the sights and sounds. Images of families at play, and of young couples walking arm in arm amid the clowns, storytellers, clusters of high-flying balloons, and food vendors,

linger almost cruelly, but I'm grateful to have had that one last visit.

ELP LT-2XRC Laser Turntable

Judging by the many e-mails I've gotten asking for information about the ELP's Laser Turntables, most audiophiles automatically associate lasers with digital sound. While the ELP's information-retrieval system of servo and scanning laser is digital, the information itself remains in the analog domain throughout. There is *no* digitization of the audio signal. Whew! Bet you feel better now.

A five-laser pickup retrieves and transmits the groove information via a series of mirrors and lenses. Two lasers read the grooves, two locate the groove "shoulder," and the fifth laser focuses on the record surface to allow the pickup to retrieve data from a wide range of disc thicknesses—and to properly track most warped records. The two groove-reading lasers are constant-output. Each channel, or side of the groove, is read separately. The modulated light's reflection travels through a series of mirrors and lenses until it reaches a photo-sensitive device (PSD) analogous to the optical pickups used for film soundtracks. The five PSDs—one for each laser—generate voltages similar to those produced by moving-magnet cartridges (12mV peak-to-peak at 1kHz, 5cm/s). Unless you request the equalized version of the 'table, which can be run into a pre-amp's regular line-level input, the signal

¹ The development of and technology behind the Finial turntable was covered in depth in *Stereophile*. See the August 1986, October 1988, January, February, and November 1989, July 1990, and June 1991 issues.

requires RIAA equalization. My review sample was the standard version of the top-of-the-line, \$14,300 LT-2XRC.

The platter is belt-driven via a micro-processor-controlled industrial stepper motor that's user-adjustable from 30 to 90rpm: in increments of 0.1rpm below 50rpm, and of 0.2rpm above. There's no such thing as rumble or noise in such a design, and the system is claimed to be immune from any kind of external vibration, as well as from loudspeaker-induced acoustical feedback. (If you want more detail about how the optical pickup system works, along with informative diagrams, visit www.smartdev.com/LT/How_works.htm.)

Setup consisted of unscrewing two transit screws, placing the heavy unit on a suitable platform, then popping in the supplied laser pickup-alignment record, which does its thing after you follow a series of specific button commands. This is completed in less than a minute, and you're ready to play LPs. Believe me, it sure beats setting up a phono cartridge — not that there's anything wrong with that!

If you know how to use a CD player, you know how to use the ELP. Push a button to open the drawer, and slip a record onto the felt platter. This requires a bit of dexterity — part of the disc must be fitted into the narrow drawer opening. After selecting speed and record diameter — the default settings are 33 $\frac{1}{3}$ rpm and 12" — push Play. The drawer closes, the laser pickup scans the disc, marks the number of bands on the LCD screen, then scans back to the beginning of the disc and begins to play track 1. From the drawer closing to hearing the first notes took about 10 seconds.

During the month-plus I had the LT-2XRC, it never malfunctioned or gave me trouble of any kind. Which is not to say it was able to play every disc I threw at it. It wouldn't play transparent or translucent discs, or picture discs, or sparkly or colored discs. The White Stripes' *Elephant* consists of two LPs, one white, one red — both "no-plays" with the ELP. But original Mobile Fidelity Sound Lab JVC "supervinyl" discs, though somewhat translucent, played fine; so did Quix LPs (the original, not Classic Records' new version), which are also somewhat translucent. The LT played moderately warped discs, but not severely wavy ones. None of my records were too warped to play.

Issues of sound quality aside, the ELP LT would seem to be the perfect technical solution for vinyl playback, right? Sorry, but unless you're an audio re-

viewer, there's no free lunch: the LT-2XRC's laser pickup was unable to distinguish groove modulations from dirt. Worse, it gave them almost equal weight, though noise sounded softer, more muted, and less grating than via conventional playback. Noise also seemed to have more low-frequency and less high-frequency content; pops and clicks sounded thicker, more like blobs.

Records that sound dead quiet on a conventional turntable could sound as if I was munching potato chips while listening to the ELP. Bummer. There's a solution, of course: a record-cleaning machine. This can't be considered an "accessory" with the LT: it's mandatory. Even new records fresh out of the jacket can sound crunchy.

So before you play an LP on the ELP LT-2XRC, you *must* give the vinyl a wet vacuum cleaning. If you've previously cleaned a record and played it on your regular turntable, there's no guarantee that that cleaning will suffice for ELP LT playback. If any dust accumulated on the record as it spun, or if the flip side picked up dust from the platter, you'll hear every particle as loudly as the music itself.

But consider again the LT's many pluses: no rumble or background noise of any kind; no cartridge-induced resonances or frequency-response anomalies; no compromise in channel separation (the ELP guarantees channel separation in excess of what the best cutter heads offer); zero tracking or tracing error; no inner-groove distortion; no skating; no adjustments of VTA or azimuth to worry about; no tangency error (like the cutter head itself, the laser pickup is a linear tracker); no record wear; a claimed frequency response of 10Hz–25kHz; and, because the laser beam is less than a quarter the contact area of the smallest elliptical stylus, it can negotiate sections of the engraved waveform that even the smallest stylus misses.

Records that are already worn or scratched also benefit from this design. Since the laser reads the groove *walls*, it often misses or minimizes surface scratches — even radial ones that are reproduced as loud *pops* on conventional turntables. The laser beam normally focuses 10 μ m below the groove shoulder, but should that area be worn, you can, at the push of a button during playback, move the beam up and down among four settings. When you play mono LPs, you supposedly can select between groove walls, to find the one that's less worn. (The demo CD supplied by Smart Devices says you can, but

I found nothing in the instructions about it.) Speaking of the instructions, they need to be re-written by someone whose native language is English.

Once an LP has been scanned, you can choose to repeat the side from one to four times, or endlessly. You can program track order, pause play, and even “hover” over a single groove. You can audibly scan a track, or skip from track to track in either direction. There are even track time, elapsed time, and all of the other conveniences to which CD users have become accustomed. If the LP side has no bands, you can “insert” them manually. There are even track time, elapsed time, and all of the other conveniences to which CD users have become accustomed. If there are no bands on a record you can *insert* them manually and you can even skip tracks like “Mother” and “Miss Gradenko” on The Police’s *Synchronicity*. That’s worth \$13,000 right there! Having a remote control in your hand that can skip tracks, scan them and pause? Priceless!

How it sounds

David Chesky once remarked that there was something “magical” and inexplicable about the music generated by a stylus coursing through a record groove. Here was an opportunity to test that theory. Is the magic we love about LPs inherent in the analog nature of record playback, or is it something added by that process that creates the sense of “reality” that draws us to the old technology? Or is it a combination of both?

The first record I played on the LT-2XRC was a UK Island pressing (pink label) of Jethro Tull’s *Stand Up* that I’ve owned since it was first issued. It was in a rice-paper sleeve, which means that at some point I’d vacuum-cleaned it—but for all I know, that could have been when I lived in Los Angeles, in the late 1970s. I began playing it, but it sounded so crunchy that I immediately cleaned it on the Loricraft record cleaner.

I’ve had the Loricraft for some time. It’s a wonderful machine that uses a nylon thread to clean the record instead of felt lips, so that every record surface is cleaned with a new length of thread. I like that. The Loricraft is quieter than any of the standard cleaners, though it has some idiosyncrasies I’ll discuss in a future record-cleaner shoot-out. Like the ELP LTs, the Loricraft is distributed by Smart Devices.

After I’d cleaned *Stand Up*, I heard what the fuss is about. Drop the noise floor and rumble to zero, and remove the inherent scraping sound of needle in

groove (which, admittedly, the listener doesn’t hear as such), the inevitable resonances, and tracking error (minimal as it might be), and what’s left is something very different from what we’re used to from vinyl playback. The sound was both softer and sweeter than playback-by-stylus—sort of like when I listen for the first time to a relatively linear, non-peaky, resonance-free loudspeaker, and find it easy to confuse high resolution and detail with dullness. Couple that top-end sweetness with a robust bass response free of resonances and feedback, and it was easy to understand the complaints that have been made about the ELP’s overall softness.

It took time to get used to the LT-2XRC’s linear-response, distortion-free sound, but it didn’t take long to hear the incredibly clean high-frequency transients and effervescent decay of Clive Bunker’s drum kit, or the drive and body of Glen Cornick’s bass, and loxmeister Ian Anderson’s voice standing out front, his chest fully attached to his head. When the music got complex, as on the long break in “Back to the Family,” everything held together in an unusually coherent way. Musical complexity, deep bass, and wide dynamic swings did not affect the sound in any way. There was a consistency from first track to last that I noticed even on this, the very first LP I tried on the ELP. I like to think I’m used to the highest level of standard analog playback, but even I was struck by the differences between the optical and mechanical technologies—especially in the improvement in genuine, not “edge-enhanced,” detail and timbral nuance.

Still, there was that noise tradeoff: The LT-2XRC’s optical system definitely skewed the LP noise toward the audible zone. When I then played *Stand Up* on my Simon Yorke Designs S7 turntable, the results were much quieter; whatever “magic” is in the grooves made itself apparent via mechanical playback as image solidity and a slight bit of pleasant brightness.

New, vacuum-cleaned records sounded incredibly pure; old, worn ones got amazing new leases on life. It was the ones in the middle with which the results were unpredictable. For instance, for some reason my plain-vanilla Geffen pressing of Nirvana’s *Unplugged in New York* gave the LT-2XRC fits. No matter what adjustments I made, the ELP made a weird noise, as if it couldn’t find the groove. I suspect the LT was locking on to some kind of pressing defect that’s normally inaudible.

I bought what looked like a really clean

original British Apple “top loader” pressing of *The Beatles* (“The White Album”) during a visit to the UK a few years ago for \$75, but when I got it home I found a pretty serious scuff on “Back in the U.S.S.R.” Sure enough, there was an annoying *ch-ch-ch* with each revolution (no play on words intended!). Played optically, with the beam focused below the scuff, there was no noise whatsoever. Still, I found the overall sound on side 1 unpleasant and somehow congested compared to mechanical playback, even if the LT revealed far more true detail. For instance, on “The Continuing Story of Bungalow Bill,” Yoko Ono’s background vocals are far clearer. (I used the ASR Basis dual phono preamp, which has two independent preamps on one chassis: comparisons were thus quick, and eliminated a possible variable.)

At a garage sale the other week, I lucked into a couple of Sam Cooke mono originals on Keene Records—I’ve never even seen them in used-record stores. Though not in the best shape, after they’d been cleaned the LT sailed below the surface scratches and the music came

through unscathed, sounding far better than via mechanical playback. My copy of a Phil Spector compilation, *Today’s Hits* (Philles 4004), is a bit chewed-up but still playable—except for three tracks on side 1, which have a big, very audible gouge through them. This disc was resurrected by the LT! The gouge was inaudible, and Spector’s big Gold Star Studios sound came through undistorted, with the vibrancy and transparency of a brand-new record.

It was fun pulling out the most damaged records from my collection to hear what the LT could do. Years ago, although it was riddled with scratches, I picked up an RCA Living Stereo curiosity, *The Fabulous Josephine Baker* (LSC-2427), recorded in “Freedomland” and issued in 1960. Unlistenable via standard playback, it sounded amazingly vibrant, transparent, and clean through the LT, with just the occasional hint of surface noise. Amazing. Ditto some of my favorite Laurindo Almeida monos, such as *Impressions Do Brasil* (Capitol P 8381), with Ray Turner on piano. The LT sailed through, below the surface noises and pops and clicks, delivering Almeida’s Spanish guitar more believably than I’ve ever heard it—by a wide margin—and placing the piano in an acoustic environment previously obscured, all without a hint of distortion.

The LT-2XRC’s circuits include an easily defeatable analog “noise-blanker,” to rid the signal of the most egregious noise. I tried it turned off, but found this made no audible improvement. Noise impulses became more distinct.

I also played a bunch of 78rpm and 45rpm discs, and found the results to be the same as with LPs: dirty records needed to be scrupulously clean, badly scratched records could be brought back from the dead, and the music extracted from the grooves could sound stunningly transparent, detailed, and timbrally superior to the best mechanical playback—but not every time, and not predictably so. A chewed-up original of Del Shannon’s “Runaway,” on a Big Top 45, was totally resurrected, and unplayed original Otis Redding 45s on Volt were astounding. A *cracked* mono Beatles EP (UK pressing) played as if it wasn’t cracked at all, and a split-in-two 78 put together on the LT’s platter played with just a slight pop with each half-revolution. Don’t try *that* at home!

Verdict

When using an ELP Laser Turntable, cleanliness is next to godliness. You’ll find out that records you think you’ve cleaned


just aren’t—if you’ve cleaned it and then played it a few times, it’s now a dirty record. But even after thorough cleaning, your records will still have more pops, clicks, and problems than you’ll ever hear via mechanical playback—especially for the first minute or so of play, for some reason. But other records you long ago gave up on will suddenly sound absolutely wonderful, the music so compellingly real that you’ll easily hear “around” the noise. And if you own colored, transparent, or other unusual vinyl, you’ll need an auxiliary turntable to play it back on.

As I write this, I’m listening to what I thought was a very clean original pressing of Richard Strauss’s *Also sprach Zarathustra* (RCA LSC-1806). There are noises and tearing sounds I’ve never heard before. Still, the music itself has never sounded so magnificent: the always-stunning strings have never sounded so transparent and rich, the horns never so realistically brassy, the pipe organ at the beginning never so deeply solid or easy to hear, or with a noise floor of zero (despite the noise suspended in space above the floor!). Spatially, the rendering of this disc has never been so accomplished, and the banishing of inner-groove distortions on classical LPs is a true breakthrough.

I don’t mean to overemphasize the noise problems, and I don’t mean to say that most of the everyday records I played didn’t sound better than I’ve ever heard them. But you should know that the musical pleasure wrought by the ELP LT-2XRC might be accompanied by the pain of more noise than you’d like.

For archivists, and owners of big collections of 45s and 78s, the ELP LT-2XRC is a godsend, though again, noise will be an issue with many shellac recordings.

Some of you will hear this thing and think I’m crazy: You’ll hate what you think is softness, but what I think is actually a lack of peaky resonances. I played plenty of hard rock on the LT-2XRC, and let me tell you, “Rocks Off,” from the Rolling Stones’ *Exile on Main Street*, has never sounded better to my ears.

The demo CD only hints at what this system does correctly, timbrally and spatially. Ironically, if you listen to the *music* itself, you won’t know you’re listening to an LP. It’s almost like a reel-to-reel tape. Unfortunately, when there is noise, it will *always* make you aware that you’re listening to an LP. That’s the confounding thing about this fabulous contraption. 

In Heavy Rotation

- 1) Peggy Lee, *Bewitching-Lee: Her Greatest Hits*, S&P 180gm LP
- 2) Otis Redding, *The Dock of the Bay*, Sundazed 180gm LP
- 3) Steely Dan, *Everything Must Go*, Reprise 180gm import LP
- 4) Frank Black and the Catholics, *Show Me Your Tears*, Diverse 180gm import LP (test pressing)
- 5) *Masked and Anonymous*, various artists, original soundtrack, Classic 200gm Quix SV-P LPs (2)
- 6) The Jimmy Giuffrè 3, *The Easy Way*, Speakers Corner 180gm import LP
- 7) Nina Simone, *Sings the Blues*, Speakers Corner 180gm import LP
- 8) James White and the Blacks, “off white”, 4 Men With Beards 180gm LP
- 9) Peter Gabriel, *So*, Classic 200gm Quix SV-P LP
- 10) Albert King with Stevie Ray Vaughan, *In Session*, Analogue Productions 180gm 45rpm 12" EP

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