Little Labs Lmnopre

When was the last time a mic preamplifier really, REALLY startled you?

BY PAUL J. STAMLER

It took me a while to figure it out. It's not just a preamp (too much extra stuff), and it's not a channel strip (no compressor and—almost—no eq). What this is, in fact, is a *preamp with plug-ins.*

How's that again? The Lmnopre (formally, the LMNO Microphone Preamplifier), in its simplest form, is a straightforward preamp, with mic and DI inputs and a balanced output. Look a little harder, though, and you realize designer Jonathan Little has included a galaxy of unusual analog signal processing.

Little Labs has produced this sort of magic before. Its IBP phase-tweaking box (*Recording*, October 2003) was something completely new, designed to be flexible in its applications; you didn't always need it, but when you did, you needed it badly—and it delivered.

Off the blocks

The manual doesn't provide a block diagram or spec sheet, so we'll have to work our way through the signal chain without a map. It starts the usual way, with an XLR mic input—except that there are two of them, on the front and back panels, switchable. As usual, there's phantom power, turned on via a push switch (but with no indicator light—Little Labs tells us this was a metal-fabrication error and that future units will have one).

The mic preamp looks normal, until you start checking out the details. The gain control—wait, there are two of those as well. You have your choice of low gain or high, with separate, stepped controls for each. There's also a 20 dB pad, for today's hotter microphones.

The preamp's input transformer has an excellent pedigree; it's patterned after the famous ZUTT transformer from Trident's A-Range consoles. Fine if that's the sound you want, but what if it's not? No problem; there's a space on the board where you can install any of several Lundahl units. Or, if you like, there's a 5-pin XLR jack on the back which you can connect to just about any external input transformer you like, without losing the Lmnopre's phantom power. (For the techies in the room, the termination for the external transformer's secondary winding is 50k, which suggests turns ratios of 1:5 or less for proper loading. A Jensen JT-13K7-A, for example, would provide a very neutral alternative.) You can't make it transformerless, though; as the manual warns you, the phantom power would fry the amplifier.

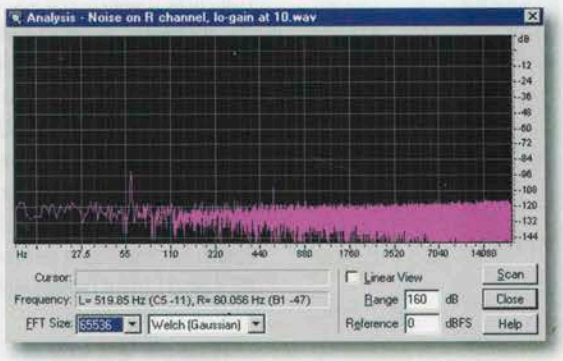


Figure 1: The Lmnopre's noise spectrum at 50 dB gain.

Next comes the DI, and again things aren't quite so simple. You see, there are *two* DIs. As the preamp comes from the factory, DI-A is an active device with a high input impedance and a buffer amplifier before the DI transformer, while DI-B is a passive device that connects directly to the primary of the DI transformer to feed the mic amplifier. (The DI signal doens't pass through the mic transformer.) Internal jumpers let you reverse these connections, or wire one of the DIs to both jacks, creating a "pass-through" to simultaneously feed an instrument amp.

Next comes a highpass filter, and this is where things get weird. The filter itself is pretty normal, 6 dB/octave, corner frequency 120 Hz—just where I like it, but in classic Little Labs fashion, you can choose to make it do something else. Push in the "LF Res In" switch, and the 6 dB/octave slope is replaced by a resonant highpass filter, with a low-frequency boost you can dial in with the adjacent knob. (More about this in the test results.)

Not quite next comes the phase alignment section, essentially an IBP box incorporated into the preamp. Why not quite next? Because on the back panel there's a pair of XLR jacks which form an external loop. These let you insert an external device into the chain (selectable by a button, also on the back), but they also allow you to feed an external source into the IBP section without going through the rest of the preamp. (Whatever you connect to this loop, however, must be balanced, or the amplifiers before and after will misbehave.) The phase alignment section includes a choice of normal or inverted polarity.

Almost last and definitely not least, the output section is normally transformer-coupled. But again you have a choice; if you prefer a balanced transformerless output, a front-panel button bypasses the transformer.

You might want to leave it in, though, because the Lmnopre has one more trick. Clean sound is all very well, but sometimes a bit of transformer saturation can add oomph to a signal. This box lets you overdrive the output transformer, then attenuate the post-transformer signal with a switchable output level trim control to avoid overloading the next box in your signal chain.

Whew—that's a lot of possibilities. (I calculate 4,096 ways to configure the Lmnopre's signal chain, and I may have missed a few.) But how does it perform?

Preliminary trials

For its size, I found the Lmnopre to be slightly hefty (suggesting big transformers, a good thing); its power supply, a line cube, was huge and heavy. The manual suggests warming it up for at least an hour before use, and preferably overnight, so I did.

When I opened the lid, I found that, indeed, the transformers were big. The input transformer, in fact, was as big as most people's output transformers. That's good news; just as there's no substitute for cubic inches in a car engine, there's no substitute for iron in a transformer. The rest of the parts were high-quality, too—1% resistors, high-grade electrolytic capacitors, a bunch of polystyrene capacitors (the best dielectric that's easily available), and 8 OPA604 opamps, which are among my favorites. (They're in the IBP section, not in the preamp itself.) The pots, switches and connectors looked good too.

I checked the input impedances of the mic preamp at various frequencies, with and without the pad switched in. Unpadded, they were pretty typical for a transformer-coupled preamp; with the pad in, the input impedance was essentially resistive:

Frequency (Hz)	Input Z Pad out (ohms)	Input Z Pad in (ohms)
20	1340	1640
1000	1460	1640
20,000	784	1616

What about the DI inputs? Unfortunately, my lab setup can't measure extremely high impedances accurately, so I stipulated the specified 10M and 50k impedances for the active and passive options.

Maximum mic preamp gain using the low gain option was 50 dB, while the high-gain option yielded a maximum 74 dB of gain. That's a whopping lot of gain. In practice, you probably won't use that much in music recording, since inherent microphone noise would become quite noticeable, but it might be useful for spies.

Speaking of noise, I checked out the preamp's performance with a dummy 150 ohm load on the input (mimicking a typical microphone). Using the low-gain option, turned up to max (50 dB gain), I calculated that the equivalent input noise was –130.6 dBu.

That's astonishingly quiet; the resistor's inherent noise is –131.2 dBu, meaning that the preamp is only adding 0.6 dB of noise. Unless there's something faulty in my measurements, that makes the Lmnopre, in this configuration, the quietest preamp I've ever tested.

At lower gain settings the equivalent input noise was a bit higher, but with less gain the signal-to-noise ratios (referenced to standard +4 dBu output levels) were still remarkable:

Gain	S/N
30 dB	100.6 dB
40 dB	92.7 dB
50 dB	84.6 dB

What about the high-gain option? It was still remarkably quiet; at 74 dB gain, the equivalent input noise was –129.2 dBu. Of course, with this much gain, the output noise was pretty high—signal-to-noise ratio was 59.2 dB, almost entirely from microphone noise. There's no way to avoid that, since the noise is generated thermally. (Of course, you could always stick the microphone in liquid nitrogen...)

In short, this preamp is very, very quiet.

Figure 1 shows the noise spectrum of the Lmnopre at 50 dB gain. Little Labs warns users to keep the Lmnopre away from hum-radiating power transformers, and they're right; the 60 Hz component seen in Fig. 1 came from a tape deck 18" away. When I turned it off, the induced hum dropped to negligible levels. Putting the Lmnopre in a rack with only wall-wart-powered gear would be a good idea.

I measured the frequency response through the (active) DI input and the mic input. Via the DI, running into a 10k load with the output transformer bypassed, the response was good and flat: at all low gain settings, –3 dB at 50 kHz and 2 Hz, with a 5 dB infrasonic peak (possibly a measurement artifact) at 3 Hz. Remarkably, the response didn't change a bit when I switched in the output transformer, nor when I ran the preamp into a 600 ohm load. That's truly professional performance, the kind I don't see often. Using the high-gain option, with the knob set to 5 (about 56 dB gain), the response was the same.

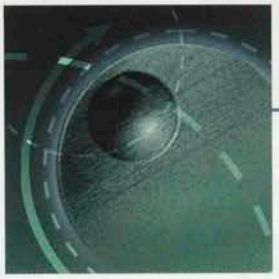
Via the mic input, using the low-gain option and no output transformer, the high-frequency response rose to a gentle 1.7 dB peak at 25 kHz, dipped, showed a small rise at 40 kHz, and was –3 dB at 58 kHz. Low frequencies were –3 dB at 4.5 Hz (30 dB gain) or 8 Hz (50 dB gain). Switching in the output transformer adds a small infrasonic bump at 6 Hz but otherwise leaves the frequency response alone. The high-gain option behaves about the same as the low.

I checked out the low-frequency resonance option; here's what I got:

Knob setting	Bump level & frequency
5	+7 dB @ 20 Hz, +2.2dB @ 40 Hz
8	+10 dB @ 30 Hz, +2.1dB @ 60 Hz
10	+13.5 dB @ 70 Hz

In short, you can use the control to add a bit of subtle boost at low frequencies, or the boom-boom of a jukebox if that's what you need.

Finally, I ran my usual harmonic and intermodulation distortion tests. At 30 dB gain, with the output transformer bypassed, and operating at +24 dBu into a 10k load, I found a very small amount of harmonic distortion at midband (see Figure 2), probably generated in the input transformer,



which was seeing –6 dBu. (The 3rd harmonic is at –100 dB, the equivalent of 0.001%.) Intermodulation distortions were similarly low.

At higher gains, however, the Lmnopre flunked the distortion test, because it didn't have any. You read that right: with the output transformer bypassed, at +24 dB into a 10k load, I measured *no* distortion above the instruments' residual when the gain was 40 dB or greater, on either gain range. That's remarkable performance.

Operating into a 600 ohm load, the distortion was a *little* worse; at 30 dB gain, 3rd-harmonic distortion was now –97.6 dB, or 0.0013%. I'd have no hesitation about using this preamp into a piece of 600 ohm gear like, say, an LA-2 compressor. It just doesn't seem to care.

Switching in the output transformer, the 3rd harmonic of a 440 Hz signal was –84 dB (into 10k or 600 ohms), or 0.0063% (Figure 3). There's a bit of distortion at low frequencies; 0.045% 3rd harmonic at 70 Hz.

This is very clean. (I should note that these measurements were done with the phase alignment section switched out; it clips at +19 dBu, which means you'd need to be careful with levels when you're using this function. Happily, it has its own clip light.)

Perhaps as significant as the amount of distortion was its character; I never saw a harmonic higher than the 5th; most of the time the harmonic distortion (when I could detect any) comprised only 2nd and 3rd, the least objectionable.

In short, this is one exceptionally clean, quiet preamp. But enough with the numbers; how does it sound?

Freestyle

(Can you tell from my section headings that I've been watching the Olympics?)

I didn't formally test the phase-alignment feature of the Lmnopre, because I already ran that through its paces when I reviewed the IBP box, and the version in the Lmnopre seems identical.

The Lmnopre arrived at a time that was both bad and good. Bad, because the university's studio was closed for the summer, so I couldn't test it out on drums. Good, because... well, there's this mockingbird. Every summer it takes up residence in a tree across from my house, and sings all night, improvising like a cross between Mozart and Coltrane (but with feathers).

I couldn't resist; one warm night I hauled a stand-mounted Microtech Gefell M930 out to the lawn and plugged it into the Lmnopre, with the low gain control set to maximum and the output connected to my computer.

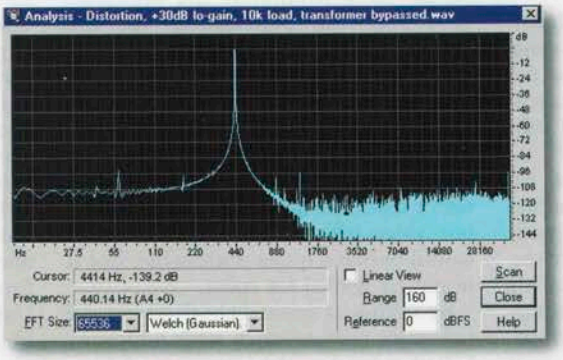


Figure 2: Harmonic distortion at 440 Hz, 30 dB gain, +24 dBu out, 10k load, output transformer bypassed.

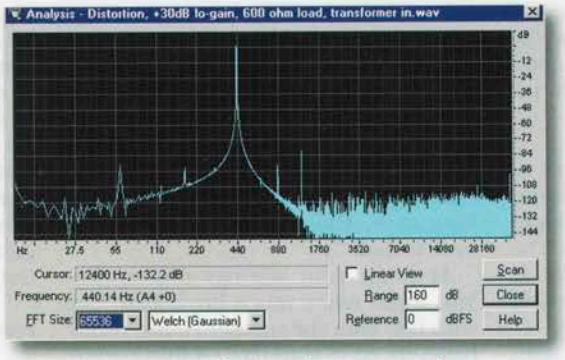


Figure 3: Harmonic distortion, same settings, with 600 ohm load and output transfomer in circuit.

I hit record, and saw... not much. This bird sang clearly, but it wasn't that loud. So I hit the high gain option and—*where did all that signal come from?*

The bird across the street was now clipping the computer's inputs. So I turned the gain down, hit record, and left it running for 20 minutes. With some judicious editing and high-pass filtering (to take out some of the city's deeper rumbles), I had a very clean, clear documentation of that night's song. My first field recording, you might say.

On to the human side of the news. I always begin with my acoustic guitar, the instrument I've known best for a quarter century. I miked it with the same M930 that I used on the mockingbird, about 6" above the 16th fret, with my reference preamp (a version of the project-r described in these pages a decade or so ago) and the Lmnopre gain-matched.

Through the project-r, the microphone sounded pretty straightforward. When I switched to the Lmnopre (with its output transformer bypassed), things changed; the transients softened a bit, and it was as if someone had suddenly switched in a bit of reverb, or added more room sound. There was definitely more space around the guitar, even though this was a mono recording.

What can cause something like that? Remember that the Lmnopre has a small peak in the ultrasonic range, in the part of the audio spectrum that another manufacturer calls the "air band". Along with many others, I've found that adding a bit of boost in the air band increases the recording's sense of, well, air.

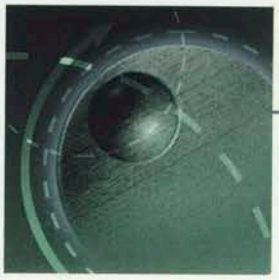
Did I like it? I did. I don't know which recording was more "natural" (I use the quotes because no recording is completely natural), but I find in my notes that I kept returning to the word "beautiful" in describing the sound.

When I switched in the output transformer, the sound changed again, to a point midway between the two previous recordings. There was a bit less air than in the transformerless take, but the transients were still softer than with the project-r.

My preference was, in order, Lmnopre (with the transformer bypassed), project-r, and then Lmnopre (transformer in); all sounded good, though, and which one I chose in a real session would probably depend on the music, player and instrument.

I tried adding a bass bump with the low-frequency resonance control set to 5; the effect was very subtle, with a hint of added richness but no other change in the sound. What it didn't do, however, was important: it didn't add mud, which too many low-frequency equalizers do. If I was recording a thin-sounding guitar, I'd find this feature useful.

Finally, I tried some output transformer saturation, but couldn't hear much difference. Perhaps I didn't do enough.



Next I tried a vocal, despite a froggy voice from summer pollen. Singing through the M930, I definitely liked the Lmnopre (transformer bypassed) better than the project-r; the latter seemed to add a boxy coloration that did my voice no good, while the Lmnopre didn't. Switching in the transformer made very little difference.

This time the saturation worked; the sound became rawer, more meaty. Since I was singing an a capella Irish song, this wasn't really what I wanted, but it would work like gangbusters for rock or rap.

I tried the vocal again through an Electro-Voice RE15, a dynamic microphone, but the results were a wash; the preamps sounded pretty much the same. I suspect the microphone's own colorations swamped any preamp differences.

I pulled out the mandolin and worked over "Black Bottom Strut" several times, playing through a Beyer M260 ribbon mic, with the Lmnopre on both the low and high gain settings.

On low gain, with the output transformer bypassed, I liked the Lmnopre and project-r equally, but for different reasons; the project-r was a hair sweeter, the Lmnopre a hair crisper. Switching in the output transformer didn't help; the sound got bright and edgy in a way that didn't compliment the instrument.

With the Lmnopre set to high gain, I found that I didn't like the results, with or without transformer; the mandolin got boomy and loose on the bottom, with poor pitch definition on the lower strings. In this case, the project-r won.

Finally, I pulled out the G&L ASAT (a neo-Telecaster). It was too late at night to play through an amp, but there were those DI inputs. Now, here I must confess a prejudice: I don't like the sound of my electric guitar, or most electric guitars, through most DIs. Keep that in mind for the next couple of paragraphs.

The passive DI did about what I expected: it rounded off the sound and flattened the dynamics, the same as every other passive DI in my

experience. Adding some saturation by turning the high gain control up and the output trim to down helped, but it's still not my kind of sound.

The active DI? Ah, that was another story. It was very late when I recorded my test tracks, so I really wasn't paying much attention to what I heard through the monitors. When I came back and listened the next day, however, I was surprised to realize that the active DI had recorded a more-than-passable guitar track, one which actually sounded like my guitar. I could have used it clean, reamped it, or run it through an amp simulator to add dirt; the point was, I got a DI to sound good on my single-coil guitar, for only the third time in my life. (It's noteworthy that, on both other occasions, the DIs were active.) The specified impedance, 10M, is high enough that it might even make a piezo pickup sound good, or at least better than usual.

Through either DI input the gain was fairly low; I had to turn both the guitar's volume pot and the preamp's (low) gain control to max to get a decent input level on the computer; no doubt this would be less true with higher-output pickups like humbuckers.

What about bass? The pawnshop special, which seems to like DIs, was okay through the passive, but positively sang via the active.

In short, the DI, at least the active one, worked for me. If I were setting up an Lmnopre for my own use, I'd probably use the passive DI only for synths and the like, or set the jumpers to make the second jack into a pass-through. The instruction book tells you how.

Speaking of that, the instruction book is fun to read, and goes into surprising detail about the workings of the box and the thought behind the design. I do wish they'd included a block diagram and a spec sheet, but overall it's one of the better manuals I've read. (Given the remarkable technical performance of the unit, it's possible that Little Labs left out the spec sheet because they thought no one would believe them.)

Final scores

What can I say about a preamp that performs superbly, is 100% professional, and most of the time sounds better than my own reference? Despite a couple of technical quibbles (mainly the sensitivity to hum fields), the Lmnopre is a remarkable design that, like every Little Labs product I've seen, offers great flexibility and performance. As shipped, it's a "color" preamp, not a "neutral" one—but you can add a neutral option with the right external transformer, and switch between them at will.

Jonathan Little has designed another winner; once again, along with fine performance, he's come up with features you didn't know you needed until now. I'm a bit sorry to see the words "Limited Edition" on the front panel, because a design this good deserves to be a best-seller. Of course, they didn't say what the limit will be...

Never mind. This one gets the gold.

Price: $1680

More from: Little Labs, 6711 Whitley Terrace, Los Angeles, CA 90068. www.littlelabs.com.

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