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LMNO

MICROPHONE

PRE-AMPLIFIER

OPERATORS MANUAL

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Congratulations on your purchase of the Little Labs Lmnopre microphone preamplifier. In the late 1980s I built a handful of custom order preamps that have attained a legendary status in the industry. The Lmnopre, unlike the original, is truly full-featured and it will take some time getting your head wrapped around the flexibility it offers. This is not a preamp for the timid - it's original name before release was the "mic pre experimental module" and the variety of subtle and not so subtle control it gives you is pretty unique. Even with simple features, like the front and rear mic XLR inputs, will soon inspire uses like quickly A/B-ing mics or having the same type of mic in two places (and switching quickly between them without using a console) to determine the best positioning. Advanced features, such as the external input transformer select, will allow you to customize this pre for your own sound. The Lmnopre's list of features (which will be described in detail below) include lo freq resonance control, analog phase alignment, controllable output transformer saturation and incredible sounding dual DI inputs - features that will allow you to explore your sonic palette with control like you have never had before. Just like the legendary original preamp, the Lmnopre is based around the same discrete op amp design, but in a completely differential circuit topology to take that original Little Labs' sound to another level. Enjoy and please note this pre requires a good one hour warm up before using, and will sound even better after a good overnight on period (not because of some audiophile voodoo, but because the capacitors take time to form and get all the DC reference voltages right). Lastly I would like to thank Larry Crane of Tape Op magazine fame for taking the time to edit this manual.

All the best,
Jonathan Little, Little Labs

BEFORE YOU USE THE LMNOPRE **READ THIS!**

Most Importantly: Plug the Lmnopre in well ahead of the time you need to use it. An hour is okay but overnight is even better. It uses hefty power supply rail capacitors and they will come up to full voltage very slowly. When you first power the unit up the phase overload LED will turn red for approximately 20 to 30 seconds. That is a normal occurrence. As with any microphone preamp, I recommend engaging the mute function (either via toggling the mic / di or turn the output level trim all the way down and selecting output level trim in) while changing any other switch selections or connecting a microphone at high gain. With the Lmnopre capable of 74 dB of gain quiet things can become very loud. Be careful and protect your speakers and ears!

The low frequency resonance adjust is only enabled when the full / hi pass button is in. This might seem strange to require pushing two buttons to engage a function. The best way to compare sounds with it or without is to push the full / hi pass in and out (it doesn't function as a hi pass with the lf res in engaged. I'll explain more later in this manual.

The external input transformer jack is for an external transformer; please don't try and jumper the wires to make the mic pre transformer-less, although you could and it will work, but in this mode, if you select phantom you'll blow the discrete section up and it won't be a warranty-covered repair!

The phase alignment section does have a lower maximum level out than the mic-pre section. The phase align works like an analog EQ, and as you know, the more EQ you add the less maximum level out you have. Depending on the settings, your phase alignment being in circuit will reduce your maximum level by 12 dB. Maximum level out of the mic pre section is 31 dB.

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GETTING STARTED

Grab your favorite mic and plug it in the front or rear mic input. If you plug in the front, and you have the pre wired in the back to a patchbay, it's a good idea to push the mic in rear off button so you don't have all that wire capacitance interfering with your signal. Start with the mic pre in lo gain, select phantom power if needed and have a listen - adjusting the level with the lo gain potentiometer. If you need more level select hi gain and adjust the level with the hi gain potentiometer. Go ahead and try the lo freq resonance by selecting the lo freq res enable and the lf res in buttons. Rotate the low freq res potentiometer to fatten up your snare or deepen up a vocal take. Next try cranking the hi gain while selecting output level trim in and turning down the output level trim potentiometer. Select output xfrmr bypass in or out and listen. There is a wide variety of possible sounds and some settings of the Lmnopre will be extreme some very subtle.

If you are using two mics or DIs on a source and are combining them after the preamps, then try the phase alignment feature. If you are not sure if the phase aligned signal is something you want to commit to, you can always come back later when mixing and patch into the pre phase align insert on the rear of the unit and then phase align the track. Purists should appreciate the insert send return follows the discrete op amps, guaranteeing minimal circuitry in the signal path.

The DI section was not thrown in as an afterthought as on many pres. This special DI uses it's own dedicated transformer right before the discrete amplifier section and has a very hi impedance, 10 mega-ohm input (di in a, for passive instruments) and a 50 K ohm input (di in b) which connects directly to the primary of the transformer (for active instruments). If you find yourself only using one DI, you can configure the other jack to be used as a thru to feed an amp, complete with a di earth lift to eliminate pesky ground loops. For more detail on each feature keep reading this manual.

THE INPUT SECTION

There are two mic inputs on the pre and two DI inputs - the DI inputs will be explained later. The mic input on the front is meant for plugging a mic in the control room or to easily accommodate a client who has his own mic cables (more common than you might think these days).

mic in rear off

The mic in rear off switch can work two ways. In the default way (how the pre is delivered) you can select the front or rear mic in as basically an A/B switch. You can also set this up (through internal jumpers) to do as just what it says, "mic in rear, off". The advantage of that is the front mic input will be hardwired and not be traveling thru a switch contact. This might seem odd but I new a guy who hardwired his Studer 800 to his console and apparently it made a huge difference!

external mic input xfrmr select

The external mic in xfrmr (transformer) select is accessible on the rear of the preamp. It is a push switch, like those on the front, but set back so you have to use a prod of some sort to switch it. A "greenie" will do or any small screwdriver. The external transformer can either be plugged in the rear 5-pin XLR jack (the pinout is printed next to the XLR) or certain transformers can be soldered in internally. The internal PC board layout for the external transformer PC footprint will accommodate a standard transformer and a few different Lundahl transformers. Lundahls are very good neutral transformers and excellent in noisy EMF environments. The Little Labs supplied input mic transformer is custom wound, and we like it overall on most things, but it was a hard and difficult decision to go with just one transformer. We liked very few stock commercially available transformers and one oldie was very cool but with the core material unavailable it couldn't be duplicated exactly. One transformer to try was mentioned to me by Dave Amels - a Jensen DI transformer backwards, excellent on a SM57 or SM7. Neat-o!

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Please let me know your findings. The Little Labs transformer is however a little more susceptible to EMF (electromagnetic fields), so keep it away from any power transformers. If you are working in a high EMF environment please contact us for extra shielding options.

20 db pad

The 20 dB pad is just that. It's a typical pre-transformer pad. Please note: It will vary in attenuation with different mic input transformers. Use with very high level out mics. Just a suggestion if you are using a mic that you need a pad on and are turning the gain way down, try bypassing the pre all together and go line in. This works well on the old RFT radio mics (or the copies from FLEA or BLUE) and many other older German mics. I like my pre but if you don't need it don't use it - I won't be mad.

full/hi pass low freq res enable

This is a dual feature button that might confuse some. With the lo freq res in/out switch, which we will get into later on, out, this is your typical hi pass button with a 6 dB per octave roll off starting at 120 Hz. The way it works is by removing the high value cap in series with the gain stage, leaving only a small value polystyrene cap that can't pass the low frequencies. Simple and passive... that's a good thing. With the lo freq resonance in, it changes everything, but as I said we'll get to that later...

phantom power

This turns on phantom power. It is a soft start button, but turning down the output, using the output level trim, while engaging this is a good idea.

CONTACT INFORMATION

**LITTLE LABS
6711 WHITLEY TERRACE
HOLLYWOOD CA 90068**

**E-MAIL:
LITTLELABS@LITTLELABS.COM**

**WEB:
WWW.LITTLELABS.COM**

**SALES, SERVICE
TECHNICAL SUPPORT
& FAX:
323-851-6860**

MANUAL PRINTING & PDF FORMATTING 09/2006

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THE INSERT

post mic pre
pre phase align
insert
balanced only

This insert on the rear of the unit comes after the discrete gain section. As described in the gain section earlier, it is the purest output on the preamp - with the shortest signal path. Having the insert at this spot will allow you to feed a compressor or outboard EQ and still have the post level trim and phase align. However, it is very important that what is inserted here is balanced in and out. The discrete preamplifier section is differential and things get nasty when feeding it to a single ended unbalanced input, shorting one side (hot or cold) of the preamp signal. It won't break anything but driving signal to ground is not a good idea. You could feed the return unbalanced but it will significantly decrease the headroom of the phase section. Probably one of the best reasons for this insert is to be able to use the phase section completely separate from the preamp. The insert button separates the two and you could leave it in if you have it wired to a patchbay with a normal in place.

mic / di

Selects between the front DI inputs or the microphone inputs. The direct box part of the input section is unique, unlike other mic pre's built in DIs, it doesn't insert the signal after the mic transformer, instead it has its own dedicated transformer before the discrete gain stage. In the default configuration (the way the Lmnopre is delivered) the DI input A has a special Hi z active input buffer amplifier with a 10 M Ω input impedance buffering your signal before it sees the transformer. The B input sends your signal directly to the custom transformer with a 50 K Ω input impedance, perfect for active instruments. If you find that for your instruments you are only using one input you can configure the unused input to a thru to send to your guitar amp. The jumpers for setting the DI configurations are located internally behind the mic / di switch. They should be set as follows: Default setting: [1 & 3 on jumper 56], [2 & 3 on jumper 55], [2 & 3 on jumper 68], [2 & 3 on jumper 187] makes the first jack (di in a) a 10 M Ω input impedance with an active front end, the second jack (di in b) a 50 K Ω input impedance with a passive front end. Alternative setting 1: [2 & 3 on jumper 56], [1 & 3 on jumper 55], [1 & 3 on jumper 68], [2 & 3 on jumper 187] makes the first jack (di in a) a 10 M Ω input impedance with an active front end, the second jack a thru (or mult) of di in a for feeding a guitar amp input or any instrument level input with the same signal as you are feeding di in a. The di earth lift will allow you to lift the ground of this output if needed to avoid hum associated with ground loops. Alternative setting 2: [2 & 3 on jumper 56], [2 & 3 on jumper 55], [1 & 3 on jumper 68], [1 & 3 on jumper 187] makes the first jack (di in a) 50 k Ω input impedance with a passive front end, the second jack a thru (or mult) of di in a for feeding a guitar amp input or any instrument level input with the same signal as you are

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feeding di in a. The di earth lift will allow you to lift the ground of this output if needed to avoid hum associated with ground loops.

OUTPUT LEDs

overload mic

The discreet mic pre maximum level out is rated at 31dB. The overload led will turn red at 30dB so as to warn you just before clipping.

overload phase

The phase section maximum output level is 19 dB. The overload LED will turn red at 18 dB, so as to warn you just before clipping. The way the phase alignment works is all passive, and with the two all pass filters you lose 6 dB per filter so unfortunately there is no way around losing the 12 dB of headroom.

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THE OUTPUT SECTION

output
level
trim in

output
xfrmr
bypass

The output section of the preamplifier consists of a simple 1:1 output transformer and a level trim potentiometer with a nice volume taper. Pretty simple set up, the level trim is post output transformer. Let me tell you what makes this so nifty: You can hit the transformer with a loud signal and saturate it, using the low frequency resonance you can saturate it even more, then you can back the final output down to a useable level. Transformer saturation distortion can be nice sometimes, but being able to control it is much nicer! If you want zero transformer coloration you just push bypass (if you aren't hitting it hard it should not sound significantly different while in circuit). Please note though, if you do bypass the transformer be sure you are feeding a balanced input (tape deck/converter/etc.). Otherwise, because the mic preamp is differential, you would be shorting one output to ground. The output level trim and selector has a nice volume taper so it works well for riding levels on the fly. With it turned all the way down it can act as a mute, or a up a tiny amount as a volume dimmer. I always recommend muting while pushing any switch or connecting devices at high gain.

THE (DISCREET) GAIN STAGE

The gain section of the pre is discrete and differential from input to output. The amplifiers used were developed and improved over a long process of listening to and tweaking. Most manufacturers avoid fully differential circuits because they use twice the amount of components and twice the expense, but that extra expense can make an already great sounding circuit sound that crucial little bit better. To hear just the discrete section of the pre in its purest form, use the post mic pre, pre phase align insert balanced line out.

lo gang green
hi gain red

I hope you are still paying attention. When using the microphone lo gain setting you get a range of 20 dB to 48 dB of gain. The hi gain gives you a range of 40 dB to 74 dB. Now you are probably thinking, why two knobs? Well as I said before the gain stage is fully differential so a dual pot is needed and for optimum performance, higher gains require a different value pot than the lower gains. I could of used a quad pot, but the ones I liked I couldn't get in quad, hence two separate knobs, lo gain and hi gain. As for the DI you will have -5 to 23 dB of gain on the A input (active) in the lo gain setting. With the A input on hi gain setting you will have 15 dB to 49 dB of gain. With the B input (passive) lo gain setting you will have -11 dB to 17 dB of gain, hi gain 9 dB to 43 dB. The maximum input for the DI input A is 19 dB and for B it's 25 dB. The separate settings for hi and lo gain might prove useful to you over time.

LOW FREQUENCY RESONANCE ADJUST

If res in

The low frequency resonance feature of this microphone preamplifier creates an adjustable, musical, low frequency peak without adding any active stage into the circuit topology. To use this setting you have to select hi pass (this is due to the coupling cap I mentioned before) and If res in. The adjustments effects will vary at different gain settings. Unlike any equalizer circuit topology I know of, this came up as a result of using a certain type of coupling capacitor before the discrete gain stage. Any other type of cap used, even of the same value, would eliminate the resonance. In experimenting with it I found it very unique and decided it had some unexpected applications worth exploring.

It can be used in a subtle way when set to just below the bandwidth of what you are recording. This brings a presence to the signal that is created by the whole waveform basically bouncing at a very low frequency, dependent on the dynamics of what you are mic'ing. This presence is not just a low frequency thing, I think it's due to a kind of Doppler distortion but I'm not really sure.

The less subtle application is to use it as a proximity effect generator, to bring that chesty sound out of wimpy sounding vocals, or anything for that matter (turn a boogie into a Marshall). I like to say that it can turn Barry Gibb into Barry White! Another extreme use makes your signal sound like you are mic'ing it through a long tube.

I hope you find this low frequency resonance feature useful and keep in mind it's not adding a bunch of components in the circuit path to accomplish its mojo.

POLARITY AND PHASE ALIGNMENT

polarity 0/180°

phase align in

If you are familiar with the Little Labs IBP Analog Phase Alignment Tool, this feature of the Lmnope is exactly the same circuit. It also has an insert so you can use this feature completely separately from the preamplifier. If desired, the phase align feature can be monitored for reference while tracking, but only implemented while mixing. With phase alignment you are not limited to the two settings polarity switching allows you.

The most obvious uses for phase alignment would be direct bass combined with a mic'ed cabinet, inside/outside combined kick drum mic'ing or top/bottom combined snare mic'ing. Some of the less obvious would be multiple mic'ing of guitar cabinets or treating room mics to bring them into focus. It also eliminates phase issues when combining a vocal mic and acoustic guitar mic in a live take.

The phase alignment circuitry works by running the signal through two passive symmetrical all pass filters - entirely in the analog domain. All pass filters are like the high pass or lo pass filters in your EQ or speaker crossover network, but only the phase is affected, not amplitude. The phase alignment feature has flat amplitude response well past 96 kHz. In most cases at least two all pass filters are needed to correct a phase problem or emulate phase shift in nature. One filter is used for the bottom of the frequency spectrum and the other is used in series for the top end, creating a somewhat linear phase vs. frequency response. This is because you need to create a phase curve that is approximately twice the phase shift when you double the frequency. So for 45 degrees of phase shift at 40 Hz you need approximately 90 degrees of phase shift at 80 Hz for it to sound natural. I say approximately, because every situation is different with sound bouncing around, EQ added (with corresponding phase shift), phase response of speakers, microphones, etc. Phase curves in nature have many variables that determine the amount of phase shift vs. frequency.

Once you get used to using it I'm sure this feature will prove to be a valuable tool. One word of caution, as I said before: When using the phase align section you can reduce your maximum output level of the microphone preamp all the way down to 12 dB, depending on the settings.