

PUMP

Index

- [2](#) [What is PUMP?](#)
- [2](#) [Features](#)
- [3](#) [Specifications](#)
- [3](#) [Using PUMP for the First Time](#)
- [6](#) [Example Settings](#)
- [9](#) [The Jumpers on the PC Board](#)
- [9](#) [The Saturator](#)
- [10](#) [PUMP Pet Tricks](#)
- [10](#) [Troubleshooting](#)
- [11](#) [Stereo Operation](#)
- [12](#) [Customer Comments](#)
- [14](#) [Warranty](#)
- [15](#) [Block Diagram](#)
- [16](#) [Recall Sheet](#)



What is PUMP?

PUMP is a single-channel, 500 series rack mount Compressor that's loaded with the kinds of features and performance you've come to expect from ELI. PUMP's fully analog signal path has serious heritage and shares family DNA with our renowned Distressor, as well as our Arousor and Mike-E products. The PUMP is destined to be a "go-to" processor for the creative audio pro as a tool built with no compromise on performance, quality, and value.

Features

- Classic Knee topology inspired by our ubiquitous Distressor.
- Distressor Compressor envelope generator. Fast, yet musically saturates at high gain reduction.
- Digitally stepped Attack and Release controls for easy recall.
- Saturation circuit that scrunches the highs and allows hotter levels like tape, and uses filtering combined with germanium circuitry to add famous Empirical Labs color.
- Attack Modification (AtMod) first seen in the Arousor plug-in.
- Switchable 110Hz Detector High Pass Filter stops low frequencies from triggering the compressor.
- DC Coupled Input and Outputs.
- Selectable Single Ended or Differential output.
- A "BAD!" Hard Clip Indicator lights – A "Bad" Clip LED that lets user know they are within 1dB of hard clipping. It monitors almost every section for internal clipping.
- Highest quality components. All metal film and 1% resistors in the audio path - top quality components, most being high temperature military spec parts.
- Three year limited warranty. Built and calibrated in USA.

Specifications

- > **Frequency Response:** 5Hz to 130kHz, no Saturation.
- > **Dynamic Range:** 130.5dB from max output (0.5%THD soft clipping) to minimum output
- > **Noise Floor:** -101dBu typical with output @ 0
- > **Distortion:** 0.009% to 15% @ 1kHz, mode and configuration dependent
- > **I/O:** +22dBm maximum input before hard clip. +28.5 dBm maximum output
- > **Compressor Type:** Feedback compressor using Distressor-like detector and envelope generator
- > **Compressor Time Constants:** Attack – 200 μ s to 40ms; Release – 50ms to 500ms, plus a program-dependent Opto release mode
- > **Eight Compressor Ratios:** 2:1, 3:1, 4:1, 6:1, 8:1, 10:1, 12:1, 20:1
- > **Detector High Pass:** Selectable @ 110Hz
- > **Chassis:** 500 Series, single slot
- > **Supply Voltage:** 500 Series standard \pm 16v, 1mA
- > **Power Consumption:** 150mA max. 2 Watts typical with 16Volt power supplies.
- > **Shipping Weight:** 1.3lbs

Using PUMP for the First Time

Insert your new PUMP module into an API 500 compatible powered rack, while the rack is turned OFF. Hookup is straightforward, using the racks I/O connectors as you do for any module. Connecting all input pins is preferred, but the unit will operate as long as either XLR Pin 1 or 3 is grounded.

Where to start - 6:1 Ratio, Input 5, Attack 6mS, Release .2sec, Output 5

Start with 6:1 ratio and set Input and Output knobs to 5, the midway position. Then set the Attack control to 6mS, and the Release to .2 sec, and AtMod to 0. This 6:1 setting is a great starting place for any vocal or instrument track. Only one LED (6:1) will be lit. The harder you drive the Input knob, the more knee you'll hit, and the greater the ratio, and compression will be. For Buss duties, use lower Ratios and slower attacks. The Attack and Release knobs step through 8 time constants each, allowing accurate recall. **The 30dB GR LED will flash quickly to indicate when an attack or release setting has changed to a new value.**

If you need more "obvious" compression, press the Ratio button to progress to higher Ratios, where the "Grab" is more severe. For lower ratios, the very long knees of 2:1 & 3:1 are silky smooth and transparent, making them even safe to track with. Unit will scroll through "20:1" back to the lower ratios. If you do cycle through 1:1 while the unit is in use, do it quickly since compression will be turned "off" and the signal could possibly become dangerously loud. For a quick +4 tape level, try setting the output knob to 7.5.

Details About the Eight PUMP Controls

- **Input Knob** – This controls the amount of Compression. Like the Distressor, turning this up (CW) will increase any compression being applied, and with higher ratios, the output level will change little.
- **Output Knob** – This controls the output level going to the next device in your audio path. It is useful to match the apparent Bypassed Level to the Compressed level, matching by ear is recommended.

- **Ratio Button** – This button steps through the Ratios. Holding for a second will step backwards.

NOTE: The two highest Ratios (12:1 and 20:1) have a higher threshold.

- **Attack and Release Knobs** – These are pots that step through 8 selected ATT/REL times. There are no detents, but a change to a new value as one rotates is indicated by flashing the 30dB GR LED. OPTO Release is a special release unto itself, adding a complex program dependent tail on the last few dB of release. Great for Vocals, Bass, and has the general character that Opto Compressors are known for. Try 3:1, Attack 10mS, OPTO Release, Sat and Det HP on.

NOTE: The two longest Release settings (.5sec and Opto) will lower the compressor threshold

- **Saturation (Sat) and Det HP Button** – This middle button steps through two modes: (1) Saturation Mode adds a fixed amount of soft clipping and harmonics to the signal, while (2) Det HP helps prevent low sub-frequencies from unnatural pumping the source. The Saturation is fixed, but different Ratios and Attack times can increase or decrease the amount of soft clipping during compression.
- **AtMod Knob** – AtMod is a proprietary function used first in Empirical Labs Arouser Plug-in. The PUMP makes it available as a controllable hardware process, for the first time. This slows up the initial attack, especially when compressing well over 6dB where this control is usually used. As you turn AtMod up from zero, the AtMod LED will start lighting, indicating a subtle effect on percussive attacks, adding a unique "Smack" to them. As you go further into AtMod, the peak compression will start to be affected, and limited. This is usually beyond its intended subtle use, but... who cares, if it sounds great? AtMod is greatly affected by Ratio and Attack settings.
- **Bypass Button** – True Bypass of processed signal. In Bypass, all GR LEDs will light and pulse. Gain Reduction continues behind the scenes, so going OUT of bypass does not cause a jarring level change.

NOTE: *You cannot plug a microphone directly into the XLR input with a PUMP Module. Use a Mic Preamp before the PUMP to boost the mic signal up to line level, which is where it likes to work.*

Example Settings

Generally, it is difficult to make the unit sound unnatural due to its vintage topology. The ratio and release times are the most critical settings. Again, around .2s on the release knob is a good starting spot. The attack is variable from 50uS to 40mS. The release is variable from 50mS to 3 seconds. For percussive material, if you need to add attack, add attack. That is, slow the attack by turning the knob clockwise towards 10. Conversely, if you need to get rid of some pick noise, or over transient sounds, the fast attack and release is the way to go. With these tools, an engineer can mold the envelope of sounds in a very controlled manner, adding or softening attack, sustaining, smoothing, and evening until the sounds fit into the mix as desired.

Vocals – The PUMP loves vocals! All of ELI’s “Knee compressors” work magic on voices at a wide variety of settings. For tracking, it’s best to use Ratios below 8:1, and avoid doing more than 10dB of GR (Gain Reduction) even though the PUMP can sound natural with 20dB or more. You want to be conservative during tracking, unless... you are experienced and feel sure higher compression fits the song. What you track cannot be undone, and vocals are usually the single most important tracks.

But while mixing, have no fear! Try 6:1 Ratio to 6:1 or less, Attack 10ms, Release .15ms. Adjust input to produce anywhere from 3 to 17 dB of compression. The "Opto" release mode is guaranteed to allow you a classic compression curve. A nice OPTO Mode setting is 3:1, ATT 10ms, REL Opto.

Turning on the Detector High-pass (Det) can stop P's and breaths from "popping" the compression.

Bass - 4:1 or 6:1, turn attack to 10ms, release .2s. The SAT mode sounds great on bass, but caution should be used during recording/tracking. You cannot un-distort. Use fast attack and release times to keep "clacks" from pumping (the bad kind) and add "Growl" to bass. Also, try "Opto" mode.

Elec. Guitar - A wide range of settings can be used. To get rid of edgy attacks on Clean parts, use quick attack, medium release, and try SAT which can also "soften". Try the 1176 setting suggestions.

Acoustic guitar - We've been told by a couple of engineers that the PUMP is simply marvelous sounding on acoustic guitar. Try 6:1, In 7, ATT 3ms, REL .2s, Out 7. The fast attack will give you a "glassy" full sound since the pick noise will be attenuated and the sustain lengthened. Turn up the AtMod knob or slow Attack to bring back some of the pick attack. The Detector High-pass (Det) may help if you hear annoying pumping.

Piano/Keys - Start with quick attack (.2ms – 6ms) and medium release (.2s - .3s). Acoustic pianos often need less attack to fit into a mix, but there are millions of exceptions. Bruce Hornsby-ish pianos are often real or samples of real pianos with medium attack and medium release, getting that "bite" followed by sustained body. Also try attack 5, REL 5. Opto Release can be very natural sounding in a track. A solo Piano often needs different treatment (less compression often).

Drums - Start by keeping the attack over 3ms to keep transients. Play with the release to get more or less "in your face" sounds. Because of the wide range of attack, the PUMP puts the drum "percussiveness" much more into the engineer's control than the older, classic units.

Snares/Kicks/Toms - Try 3:1 to 6:1, [6, 20ms, .2s, 6]. Shorten decay if you need to bring up "after ring". If a tom has too much attack, turn attack down between .2ms – 3ms. If crackling from L.F., modulation occurs, play with longer attack or release times, or Det HP. Since you can load compression on without sounding funny, watch "mic leakage" which can become a problem. Gate before compression in this case. A gate can also improve "Smack" on a drum.

Room mics – With the PUMP, "Room Mics 'R' Us". It is so fun to use. On percussion, try radical ratios like 10:1 or 20:1 to liven up any room. Just patch in a mic 10 - 25 feet from the drums (or other instruments) and slam the meters. Try attack on 1mS - 20ms and release on .15s. Fifteen to twenty dB of compression is starting to sound about right for a John Bonham thing, but don't be afraid to run the gain reduction meters to 20dB and beyond. Better have quiet mic preamps too, as 20 dB of compression will bring the noise floor up by 20 dB. The release should be quick (< .5sec) for the largest sound, but slower releases can often be effective when mixed in with the rest of the kit. Room ambience can be made to "swell up" on the tom and snare rings later, filling in behind the close mics. If you want to add a bit of "grunge", engage the Saturation (Sat) circuit.

OPTO Setting – To get an OPTO (or LA2a) type sound, Try 3:1, ATT 10 – 20mS, REL on OPTO.

1176 Setting – Keep the Attack around 1mS (3mS or under) and use ratios 4:1 thru 20:1. 1176's are very fast and attack in less than a millisecond

The Jumpers on the PC Board

LINK JUMPER – If you wish to “Link” two or more PUMPs for stereo operation, move the Link Jumper towards the rear of the PCB position. The gain reduction will match, preventing image shift in Stereo or surround applications.

DIFFERENTIAL OUT JUMPER – Changes output configuration. This jumper sets the XLR output pin 3 to either balanced ground, or the inverted phase of what’s on pin 2 of the output XLR. It is set to the left, differential mode, from the factory, adding 6 dB more gain. Setting the jumper to the right (towards the rear) disconnects the amplifier on pin 3, decreasing the output gain by 6dB.

The Saturator

The saturation circuit follows the compressor and tends to catch high frequency peaks that get through, softly flattening them out. It was largely tailored to simulate the characteristics of tape saturation. Germanium semiconductors are used to more smoothly round the peaks to produce lower order harmonics. We use special filter circuits to shape how different frequencies are soft clipped. The saturator will add lots of harmonics to low frequencies and soften high frequencies.

Note: The Saturator (Sat) is heavily dependent on which Ratio is selected. Generally, 8:1 and 10:1 will be slightly cleaner, while 4:1 and 6:1 (etc.) have higher thresholds and will saturate a little more quickly.

PUMP Pet Tricks

- **Holding the Ratio or Sat/Det button** for 1 second makes them step backwards to the previous setting.
- **PCB Jumpers Default** – If you want to set all the jumpers back to their factory default, move them to the front position. IE towards the front panel. A diagram is included on the PCB.
- **Use the PUMP as a Tape-like Saturator** – Enable Sat, and go to 1:1, and turn up input. It's ok if the BAD light just flickers occasionally.
- Gate a “live snare” before compression for more intense attacks – A gate prevents bleed from starting compression before the actual Snare is hit.
- The **BAD LED** - This indicator can momentarily flash often and is usually not a concern as it was set a couple dB below unpleasant hard clipping. But do not let it stay ON most of the time.

Troubleshooting

Compressor quits working – You may have inadvertently switched PUMP into the 1:1 (no ratio) mode. If no compression occurs with any of the Ratio LEDs lit, it is best to return it to the factory for servicing.

Hum – Unit may be too close to power transformer in the powered rack. Move to a slot farther away from supply.

Distorted or Thin output – If the “BAD!” light is coming on constantly, lower the signal going into the PUMP.

Unit seems noisy – If you are compressing a lot, or boosting frequencies on a noisy signal, the noise could be accentuated. Try turning down the input gain and see if noise from the compression gain goes away. If so, noise is coming from before the unit, and being amplified by the compressor.

Unit forgets where it was when power was shut off – Wait 8 seconds before turning it off after changing setting. There is a 6 second delay to lengthen the lifetime of the non-volatile RAM to long after we are gone. If it still loses its memory, contact the factory for warranty support.

No sign of life – Check power cord for firm connection to powered rack, and that the card is firmly seated in connector. If there is still no sign of life, check the fuse on the rack. If fuse is OK, ensure Voltage select switch is set to current wall outlet voltage (115, 230 VAC). If the unit keeps blowing fuses, and there is not another module being used, it is best to return it to the factory for servicing.

Stereo Operation

Move the LINK jumper into the LINKED position. The user needs to enable linking of two units in the powered rack, if Link switch is provided. Pin 6 on the EDAC card connector needs to be connected between the modules that will be linked. Once the pins are linked (connected), two units will have the compression locked together, and no image shifting will occur. The user would usually match the other controls, especially the input drive, and the MIX control. On some power supplied racks, the manufacturer provides a jumper to enable linking. Note: It is possible to link many PUMPs for Surround mix processing, and we look forward to our PUMP's first use on a major immersive mix.

Our Valued Customer Comments

Comments About the DISTRESSOR

"Every once in a while a product comes along with "classic" written all over it. And in a certain sense of the word, this product actually is a classic already." Mix Magazine

"Dear Empirical, I'm an LA based producer and an owner of a Distressor. The unit is really awesome! I've used it on guitars, bass, room mics, vocals it works great on everything. I've used it on records I've made with Beck, U2, Etta James, Hole and lots of others. All The Best, Joe Chiccarelli"

"Distressors: I can't get over HOW GREAT they sound. On everything. It's truly the best compressor made today." Greg Wells (Katy Perry, Pink, Jesse McCartney, Natasha Bedingfield)

"I sold a couple of 1176's and have replaced them with the Distressors, which do a great job of emulating the 1176's. Michael Wagener "(Ozzy Osbourne, Extreme, Metallica)

"In General, I really like where Dave Derr's ear leads him; one of pro audios truly independent thinkers, I'm a huge fan of the box (the Distressor), I use it for bringing up the "goosh" on ambient sources, and for saturating snares, toms, and kicks." George Massenburg

"For those who have come to love and depend on the sound of the Distressor, the new British Mode turns it into a new fun-loving animal. At the flick of a switch, the Distressor becomes more aggressive and stressful on any instrument you desire. Dave Derr should win the "(explicative)" award for coming up with such a nice but nasty box." Michael Brauer (Cold Play, John Mayer, Aretha Franklin, Paul McCartney)

Comments About the FATSO Jr

“In a word, the FATSO is a very good answer to what a lot of people loathe about digital recording. It smoothes out the sharp, brittle edges to exactly the extent you choose, and fills in the hairline cracks just right. I use one on almost every mix I do. I could easily use one and possibly two more.”

George Massenburg

“People used to have to hunt for old, expensive gear to get the kind of sounds that the FATSO gives me.” Ed Cherney (Lenny Kravitz, Dave Mathews, Eric Clapton, The Wallflowers, Goo Goo Dolls, Jackson Brown, Bonnie Raitt, Stones, etc.)

"The winner of the highly coveted, "I'm going to write you a check right after the show award was picked up by Empirical Labs for its FATSO processor." Craig Anderton

Warranty and Factory Service

This Empirical Labs Inc. product is covered by a limited warranty covering full parts and labor for 3 years from the purchase date. The warranty is only effective if the owner has filled out the warranty registration form on our website.

Should problems arise, please contact us from our website below to obtain an RA number (Return Authorization). Pack the unit up well¹, with a note explaining the problem and return it to Empirical Labs for repair. Include your name, address, phone number, and the date of purchase, and RA number. Send the unit with freight prepaid to the address below:

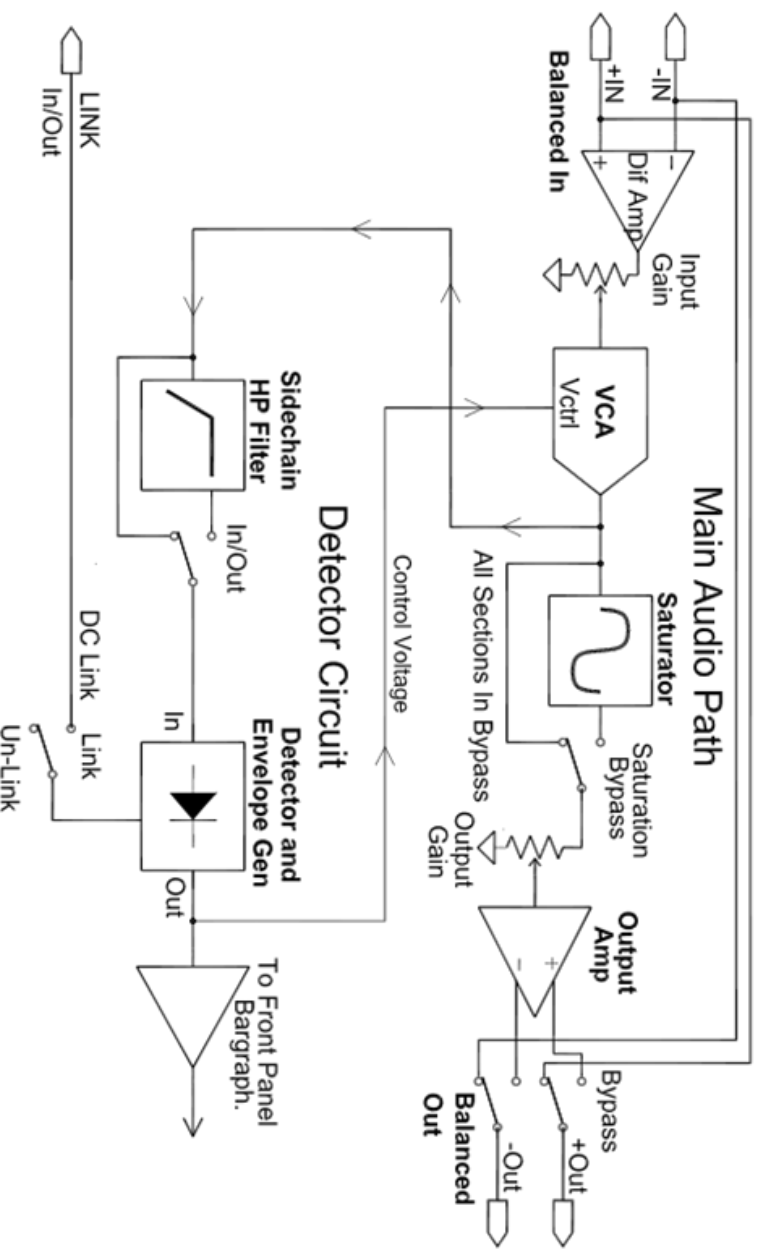
**Empirical Labs (Repairs)
41 N. Beverwyck Rd.
Lake Hiawatha, NJ. 07034**

We can be reached on the Web at **www.empiricallabs.com** by selecting “Support” and then “Contact Us” to email repair requests or information to Empirical Labs. The repaired unit will be returned to you via UPS Ground at our expense.

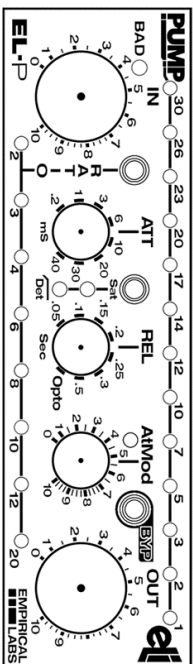
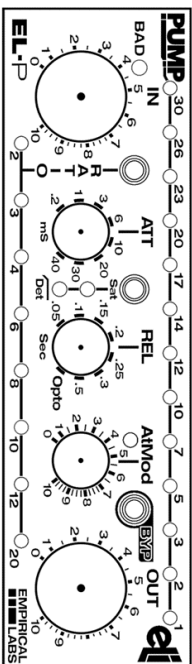
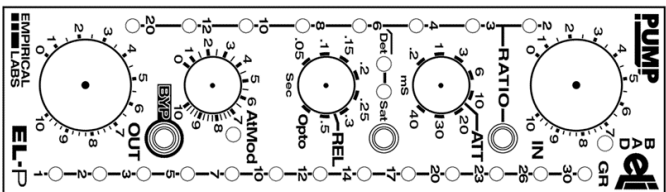
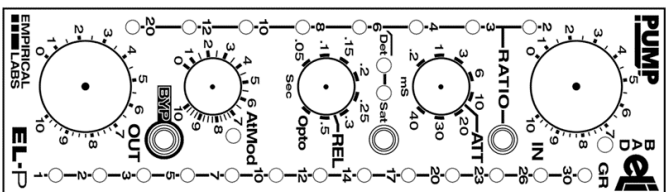
1) Pack the unit in the original carton if possible. Otherwise, pack with bubble wrap and/or foam in a thick corrugated box. Shipping people are absolutely brutal to large packages, and you must take every precaution against constant dropping, throwing, and crushing. We are not liable for products damaged during shipping.

Do not attempt to modify or make adjustments to your PUMP until you have notified Empirical Labs and been sent the necessary information. Any sign of internal adjustment by the user will void your warranty, with the exception of changing the Jumpers, detailed in manual.

PUMP Block Diagram



Recall Sheet



Inst/Track _____
 Input is from _____
 Max GR _____
 Session _____
 Song _____

Inst/Track _____
 Input is from _____
 Max GR _____
 Session _____
 Song _____

Inst/Track _____
 Input is from _____
 Max GR _____
 Session _____
 Song _____