

# DISTRESSOR

CLASSIC KNEE COMPRESSION

## USERS MANUAL



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**Empirical Labs**  
INC.

# ***DISTRESSOR***

## **FEATURES**

- **Classic knee sound** - With modern noise specs and improved performance. Really grabs.
- **Programmable analog distortion/warmth** - helpful in the pristine but unforgiving digital world. Three audio modes providing user programmable, warm harmonic distortion. Emphasized tube-like, 2nd harmonic in clean and Distort 2 mode. In Distort 3 mode, the distortion becomes dominated by 3rd harmonic, more similar to tape.
- **Distortion indicator lights** - A 1% LED and a "Redline" (3%) LED. No hard clipping until a few dB past "Redline".
- **Advanced built-in sidechain EQ** - High mid band emphasis prevents harsh, edgy guitars or vocals from hurting innocent ears. Low cut keeps the low "sum & difference" frequencies from pumping the upper frequencies of source material.
- **Fool proof operation** - Even though there are 384 possible settings (not counting knob settings), it's almost impossible to get a bad sound. Keep all knobs on 5 or 6 (around middle) with ratio at 6:1 and you won't go wrong.
- **Eight unique curves** - From the 1:1 mode that simply warms up signal with low order harmonics without intentional compression, to the "Nuke" setting - a brick wall limiting curve that shines on live drum room mics. Each curve has its own personality, and release shape. Most exceptional is the 10:1 "Opto" ratio which uses separate circuitry to emulate the oldest (and valued) "light controlled" devices, such as the LA-2A etc. See manual to emulate other compressors of old.
- **Discrete and integrated combination** - the best of speed/linearity with repeatability. Hand tested & selected components.
- **Huge knobs with high resolution numbering** - For easy readability and repeatable settings. They also go to  $10^{1/2}$ .
- **Locked, calibrated, output level** - Allows speed in setting tape and live mix levels.
- **Stereo Strappable**
- **Switchable 115/230 volt operation** - Extra fuse provided inside unit.
- **Over designed power supplies** - Runs cool, allowing cabinet to be sealed - without heat vents. Long life components.
- **Single height and light weight** - Classic sound in a small, extremely reliable package.
- **True bypass** - Know what it's really doing. All contacts doubled up for maximum reliability. No internal audio connectors.
- **XLR and 1/4" phone ins and outs** - XLR fully balanced, transformerless design, pin 2 hot. Changeable by user to pin 3 hot!
- **All metal film and Roederstein resistors in the audio path** - top quality components. Many military spec. parts.
- **Interface and features found nowhere else.**
- **Hand wired, calibrated in USA.** Shipping weight 12 Lbs.

## **SPECS**

- ❑ **Freq. response is 2 Hz to 160 kHz** in clean audio mode (+0, -3 dB). Response is shaped in distortion modes (Dist 2, Dist 3).
- ❑ **Dynamic range 110 dB** from max. output to min. output in 1:1 mode. Greater than 100 dB signal to noise in distort 3 mode.
- ❑ **Distortion ranges between .02% and 20%** depending on distortion mode and release times set on front panel.
- ❑ **DC coupled output** - High quality input caps.
- ❑ **Time constants** - Attack range 50uS - 30mS. Release range .05 sec to 3.5 seconds. Release goes up to 20 seconds in 10:1 "Opto" mode.
- ❑ **Power Consumption** - Typical is 10 Watts, maximum is 14 Watts.

**Empirical Labs** – *Something old, Something new*

## Using the Distressor for the first time

Hookup is straightforward. Either the XLR's or phone plugs can be used. In relation to the phone jack tips, pin 2 is wired "hot" on the XLR's. But if you're using the XLR's in and out, it doesn't matter which pin is hot, as long as you're cabling is in phase. If you use a single ended XLR output, leave unused pin floating! The ground pin (pin 1 on XLR) should, of course, always be connected. Connecting all input pins is preferred, but the unit will operate fine if unused pins aren't tied to ground. Hookup directions are also located on the rear panel of unit, near the connectors. See wiring section on page 9 for greater details.

### Where to start - 5 5 5 5

Start with 6:1 ratio and set all four knobs to 5, the midway position. This is a great starting place for anything. Push the ratio button until the LED's cycle to the 6:1 ratio (Yellow LED). Adjust input to drive into more compression. The harder you drive, the more knee you'll hit, and the greater the ratio will be. Only 1 LED should be lit - the 6:1 LED (not counting any bargraph LED's). If you need more obvious compression, push ratio button to progress to higher ratios. If you would like lower ratios, the very long knees of 2:1, 3:1, 4:1 are silky smooth. The 2:1 ratio has a +15 dB knee, where the ratio gradually increases! Unit will scroll around "Nuke" back to these lower ratios, but if you must cycle through 1:1 while unit is in use, do it quickly since compression will be turned "off" and the signal will swell to its peak input levels, possibly becoming dangerously loud. Waiting for a pause in the input before changing ratio is a safe thing to do. For a quick +4 tape levels, try setting output knob to 8.

### Distortion Settings

If all the LED's are off in the "Audio" area, your Distressor is operating in its cleanest mode. Distortion settings should be used when subtle analog distortion is desired. Dist 2 mode produces "Class A" type warmth, producing mostly 2nd harmonic when compressing (tube distortion is known for its 2nd harmonic) and Dist 3 adds 3rd along with 2nd harmonic. Dist 3 can look and sound very similar to tape distortion - it gradually flattens out the top and bottom of the waveform. If you want a digital signal to sound like an analog tape signal, try 2:1 mode with Dist 3 engaged, and compress 1 - 3 dB (as displayed on bargraph). Tape goes in and out of saturation quickly, so fast attacks and decays are appropriate. If you want to make it sound like over-saturated tape, you could try one of the higher ratios and drive the input to produce 1 - 5 dB of compression. With the quick release, 2nd harmonic will still be strong in Dist 3 mode. More than 3 to 5 dB of reduction will sound less like tape, more like compression.

### Advanced Detector functions

The new user may want to stick with a basic setup until he feels comfortable, but with the push of a button he can enable some advanced sidechain functions. While tracking vocals for instance, sometimes "p's" and "b's" can hit the mic with an air blast that shows up as a high amplitude, low frequency signal, causing the compressor to "kick in". The result may be a brief, unnatural drop in the apparent vocal level. By pushing the detector button once, you engage a high-pass (abbreviated with HP) filter in the detector (the part of the circuit that figures out how much to turn down the signal). This high-pass, or low cut, will not allow low, low frequencies to trigger compression, and in this case, prevent the unnatural drop in vocal level from a "p" or "b" blasting the mic with wind. It may also help to HP (high-pass) the audio in this case.

Another detector sidechain filter can be engaged with a second push of the button. This is the "band emphasis function" that inserts an Eq into the detector circuitry that makes the circuit much more sensitive to harsh, mid band frequencies. This is useful on vocals (for those singers with a nasty edge to their voice when they go up high), guitars, synths, and many other solo instruments that may become harsh and too loud in the mix. See "Detector Modes" on page 6 for more info.

## 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 5 on the release knob is a good starting spot. The attack is variable from 50µs to 30mS. 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** - Turn off all distort modes if you're going to tape, however the High-pass (HP) in both the detector and audio paths may be useful. Set ratio to 6:1 or less, attack 5, release 4. Adjust input to produce anywhere from 3 to 17 dB of compression. Sometimes the band emphasis setting is effective for those dynamic, "piercing" vocal passages. On mixdowns, Dist 2 can add a warm edge to vocals. The "Opto" mode in 10:1 is guaranteed to give you a classic compression curve. Try 10:1, with attack on 10, release on 0. Separate detector circuitry will be enabled.

A well known producer gave us another more aggressive vocal compressor setting: Ratio 6:1, Attack 2.5-3.5, Release 0 – 2, Audio modes HP & Dist 2. In soft passages, no compression should occur while on loud passages 17 – 20dB. This setting was used for tracking as well as mixing.

**Bass** - 4:1, 6:1 turn attack on 5, release 4. The distortion audio modes sound great on bass, but caution should be observed if you are going to tape/HD. You cannot un-distort. If you have a very "clacky" bass player, sometimes the band emphasis in the detector just flattens that stuff out. Use fast attack and release times to keep "clacks" from pumping. Also, try "Opto" mode.

**Elec. guitar** - A wide range of settings can be used. To get rid of edgy attacks, use quick attack, medium release. To smooth out solos, try the band emphasis in the detector to pull up the lower, softer notes and push back and sustain the higher, and often, thinner notes. Try "Opto".

**Acoustic guitar** - We've been told by a couple of engineers that the Distressor is one of the best sounding units for acoustic they've ever heard. Use 6:1, [ 7, 2, 5, 7 ] settings (i.e. Input 7, Attack 2, Release 5, Output 7). High-pass (HP) is often useful in both detector and audio modes. The fast attack will get you a "glassy" full sound since the pick noise will be attenuated and the sustain lengthened.

**Piano/Keys** - Start with quick attack (0-4) and medium release (4-6). Acoustic pianos often need less attack to fit into a mix, but there are millions of exceptions. Bruce Hornsbyish pianos are often real or samples of real pianos with medium attack and medium release, getting that "bite" followed by sustained body. Try attack 5, rel 5. Opto mode is very nice here, too. Sometimes brittle high notes can be extra compressed by using the "band emphasis" detector mode.

**Drums** - Start by keeping the attack over 3 to keep transients. Play with decay to get more or less "in your face" sounds. Because of the wide range of attack, the Distressor 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, 6,5,5,6]. Shorten decay if you need to bring up "after ring". If a tom has too much attack, turn attack down between 0 - 4. 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. Kick drums sound great using Opto mode (10:1, attack on 10, release 0) and Det HP on.

**Room mics** - For radical treatment, try 20:1 or "Nuke", [10, 6, 2.5, 6]. The "Nuke" ratio was originally developed for room mics, but we have since found it useful in many areas. "Nuke" and 20:1 are pretty much brick wall limiting, keeping any normal signal within 1 dB or so. Just patch in a room mic that is 10 - 25 feet from drums (or other instruments) and slam the meters. Try attack on 5 and release on 3. Fifteen to twenty dB of compression is starting to sound about right for the John Bonham thing, but don't be afraid to run the gain reduction meters right off scale. You will find the output a little lower than the other ratios in "Nuke". Better have quiet mic preamps too - as 20 dB of compression can bring the noise floor up by 20 dB. The release should be quick (< 3) 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 "grunge", experiment with Dist 2 and Dist 3.

# The Ratios and their Curves

Each "ratio mode" of the Distressor sets both the threshold and the ratio, in the standard sense of the word. This was done to provide an easy to set, yet versatile group of curves. The 1:1 mode provides no compression, but allows the audio to pass through the "warming" circuits of the unit (we'll get to the distortion modes in a moment). Ratio's 2 through 6 are general purpose curves great for tracking. The 2:1 and 3:1 ratios are "parabolic" knees - very gentle curves that won't typically go into hard limiting and therefore, also won't provide absolute overload protection. Ratios 4:1 and 6:1 have steeper knees and are good general purpose curves that gradually move towards hard limiting, "nailing" the signal in its place. The ratio of 6:1 is very useful for vocals, bass, and acoustic instruments. It has an easy slope at first until after the knee, where an increasing ratio "musically" limits the peaks of the signal before damage is done. The 6:1 and 10:1 Opto ratios employ shorter knee limiting, reminiscent of some old classics from the 60's and 70's (see Classic Emulation).

"Nuke" is a different story. The "Nuke" ratio was developed for room mics, but we have since found it useful in many areas. "Nuke" has a medium threshold but when the signal hits it, a nuclear blast won't budge the output level. It is brick wall limiting, keeping any normal signal within 1 dB or so. Just patch in a room mic while recording drums (or other instruments) and slam the meters. Try attack on 4 and release on 2. The release curve of "Nuke" is logarithmic, meaning it lets off quickly at first and then slows. This release curve is a big part of the Distressor's sound. Experiment with the release times - this guy can release really fast without too much crackling, even on bass. 20:1 can be used similarly to "Nuke". Each of these curves again has their own feel to them, with the release slopes slightly altered, and the knees falling in slightly different places. Most exceptional are the 2:1, 10:1 and Nuke ratios, which employ special detector circuitry.

## Just what is a soft knee?

A "soft knee" is a compression curve where the first few dB of gain reduction occur at very low ratios, gradually increasing as the signal increases (gets louder). This makes the onset of compression very hard to detect. The knee usually extends for a few dB and gradually flattens out toward a final ratio. All curves with the exception of 20:1 and "Nuke" have dominant knees. The 2:1 ratio has a knee that can be as long as 30 dB, depending on attack and decay settings.

## Classic Emulation

Since the unit is based on the oldest compressor topology, the unit can be made to sound very similar to older classics. The nonlinear nature of the older gain control elements of opto-couplers, FET's, pentode (or triode) tube bias or "mu" modulation, etc., can be closely emulated if proper settings are used. A special "Opto" mode has been provided in the 10:1 ratio.

### Some Examples:

- \* To simulate the opto-VCA models of old (the LA-2A, LA-3A, LA-4A), try 10:1 "Opto" ratio, with attack on 10, release on 0, Det HP on. Adjust input and outputs to your taste. Keep the attack above 4 to keep the OPTO flavor. Faster attacks will give you a more aggressive sound. Remember our LED metering deflects much faster than the old VU's so don't be afraid to hit the unit quite hard (10-20 dB of compression on peaks). To emulate tubes, try Dist 2 & 3 mode, but let your ears be your guide.
- \* For a classic "Over E-Z" type sound, try ratios 2:1 thru 6:1, att 9, release 2, clean mode.
- \* 1176LN 6:1, Att 0 - 3.5, rel 1 - 10.5. Use ratios 3:1, 4:1, 6:1, 20:1 to emulate 4 1176LN ratios. Clean mode is appropriate (Dist 2 or 3 off). Remember that the 1176LN attacks extremely fast and you must keep attack under 4 max. A familiar sound is 6:1, att2, rel 4.
- \* Old Fairchild IGFET - 6:1 att 3-5, rel 2 - 7 (start with att 4 and rel 4)

Due to the transformerless design, you will maintain a low transient intermodulation distortion, but will get the warming grunge of 2nd and 3rd harmonic distortion, if distortion modes are enabled. Also, unlike some of the older units, the Distressor is uniform and predictable from one unit to the next. Precise factory calibration assures that if you go from one Distressor to another, these settings will all sound the same.

Empirical Labs would like to thank Universal Audio for not only creating classic audio gear, but for kindly allowing us to refer to their model numbers. As they say "Once a classic, always a classic."

## The Audio Modes

To switch between the "Audio" modes, press the button labeled Audio. The LED's above the switch will cycle through 6 states. In order of occurrence:

- 1) Norm - (No LED's lit) Low distortion and full frequency range.
- 2) HP - High-pass (Green LED) Smoothly cuts low "mud" audio frequencies.
- 3) Dist 2 - (Yellow LED) Emphasized 2nd harmonic distortion.
- 4) Dist 2 & HP - Combination of 2 and 3 above.
- 5) Dist 3 - (Red LED) 3rd harmonic emphasized.
- 6) Dist 3 & HP - Combination of 2 and 5 above.

### The High-pass mode (HP)

The first mode cycled to after normal is HP (or High-pass). With the HP LED on, the unit rolls off low "sub" frequencies below 80 Hz in the audio. It is a very smooth Bessel filter, about 3 dB down at 65Hz and -12 @ 30Hz. Its final slope is 18 dB per octave but is below all but the very exceptionally low vocal tones. Rolling "subs" off of a singers mic is an excellent use for this filter. This can also be selected along with either Dist 2 or Dist 3 modes as explained below.

### *It's not only a compressor but a ... "Distortion Generator"*

The Distressor is a modern digitally controlled analog device that attempts to offer some of the "musical non-linearities" exhibited by the older tube, class A discrete, and magnetic tape mediums. The old, sought after vintage gear is not anywhere near as accurate (or linear) as devices made today, but certain "faults" or non-linearities are exactly the reason some sell today at 10 times their original value. They color the sound with distortion and frequency response shaping. Getting the frequency response flat to 20kHz and having distortion below .5% used to be an achievement. Today, a 35 cent op amp is flat to 3 MHz and produces distortion below .002%. Getting things accurate in the digital age is relatively cheap and easy. But getting the expert user to think a piece of gear is "musical" and fun to use is something else.

### The Distortion Modes

By using a design that allows pinpoint control of nonlinear analog devices, the Distressor is trimmed to produce three controllable distortion modes:

1. **Normal (Clean)** No induced distortion. THD hovering between .025 and .3%
2. **Dist 2** THD hovering between .05 and 3% Emphasized 2nd Harmonic
3. **Dist 3** THD hovering between .1% and 20% 3rd Harmonic increased.

### Dist 2 Mode

It is well known that the triode distortion in tube circuits produces lots of 2nd and 3rd harmonics, in somewhat varying ratios. These lower order harmonics form "the octave" and "the octave and a fifth" to the fundamental musical tones. They are actually "musical" distortion. Harmonics well above the 2nd and 3rd are usually considered more harsh and unmusical, and therefore should be lower in amplitude (<-60 dB) to keep with our line of thinking. Second harmonic is considered to be the warmest and most "consonant" harmonic distortion and is usually very hard to hear, especially on single tracks. The Dist 2 mode on the Distressor emphasizes the 2nd harmonic (octave), especially while compressing.

### Dist 3 mode & the Distortion indicators

This mode emphasizes the third harmonic. This is basically caused by nonlinear gain that results with the top and the bottom of waveforms being flattened out. Analog tape saturates in this manner. The 3rd harmonic is induced in the Distressor by increasing VCA output level. We have provided distortion indicator lights that come on most frequently in Dist 3 mode. A yellow LED light indicates .25% THD and the red "redline" LED indicates 3% THD or more. Though not always an exact indication of the distortion, these LED's are an excellent guide to where the user is in the "Grunge Department" and can help to avoid turning the music into an "overwell" mess. You will find that the harmonic distortion is generally more obvious on overall mixes and complex programs. On individual instruments, sometimes 3% distortion sounds "fat" and "analog" and isn't heard as distortion at all.

# The Detector Modes

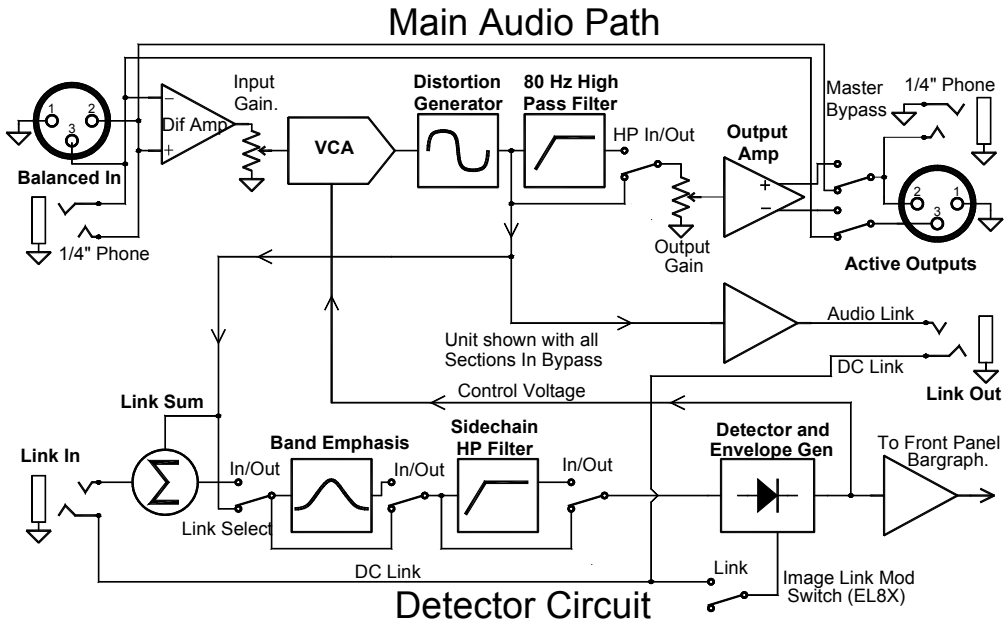
The detector is the part of the compressor circuit (or software) that figures out how much and how fast to turn down a signal. The actual audio you finally hear is not passed through this circuitry, only adjusted by it. In fact, you can put entirely different audio into the Stereo Link input that will affect the main audio coming out, but not be heard itself. See block diagram below and stereo hookup in this manual.

There are three additional modes that affect the detector part of this unit.

**Detector Modes** To switch between the "Detector" modes, press the button labeled "Detector". The LED's above the switch will cycle through eight states. In order of occurrence:

- 1) Norm - No detector LED's lit. Standard compressor operation.
- 2) HP High-pass - (Green LED) cuts low frequencies in detector to stop L.F. modulation.
- 3) Band Emphasis - (Yellow LED) emphasized 6kHz band makes unit overreact to harsh mids.
- 4) HP and Band Emphasis - Combination of 2 and 3 above.
- 5) Stereo Link - (Red LED) - Puts unit in Stereo operation mode to respond with 2nd unit.
- 6) Stereo Link and HP - Combination.
- 7) Stereo Link and Band Emphasis - Combination

## Distressor Block Diagram



Block diagram for the EL8 with the Stereo Image Link Mod. The Brit Mod is not shown.





## Basic Wiring

Wiring is straightforward. Connect AC line cord to 3 prong jack, plug in XLR or phone plug ins and outs, and you're wired. Both input jacks are differential but at the output, only the XLR is differential (balanced). The output phone jack tip is wired to pin 2 of the XLR out, and therefore is in phase with that pin. The only possible problem is if you attach one of the XLR output pins 2 or 3 to ground. A separate amplifier drives each of these pins, so grounding one of them will short the associated amplifier out. Therefore if you only use only pin 2 on your output cable, leave pin 3 floating (unconnected) and vice-versa. However, the Distressor will be un-harmed if you temporarily short an output pin. The phone jack ins and outs will be out of phase with pin 3 since the unit is wired pin 2 hot from the factory (see note below). Pin 1 should almost always be grounded on the XLR cables.

**Note:** It is possible to change the wiring of the connectors inside since they are hand wired. A user can therefore make XLR pin two or three hot in relation to the phone jacks. Always unplug unit before making any changes. Our company cannot be responsible for damage to unit or electric shock to anyone trying such a modification.

## Stereo Operation

Stereo operation requires only two things, - **1)** Two short stereo (TRS) 1/4" phone cables are plugged from Stereo Link input of one unit to Link output of second unit and vice versa, and that **2)** the unit has the Link function selected on the front (the RED "Link" LED in the detector mode should be on), or the Stereo Image Link Switch is on if provided on the unit (EL8-X). It is usually best to match all front panel settings on the two "left and right" units to maintain imaging. However, unlike most units, the user has the option to treat the left and right channels differently.

An example of this may be when one channel has a heavy low frequency source (such as a tom drum) that is causing both sides to pump. You could put the side without the L.F. source into DET HP mode to prevent that side from excessively modulating, allowing you to set the release a little faster on the side with the boomy tom. Sometimes for room mics, keeping the units unlinked actually makes them sound more stereo. This is due to unique left and right ambient envelopes widening the stereo image.

See "Stereo Image Link Mod" on page 13 for a method of linking two EL8-X's to prevent image shifting.

## Distressor "Pet" Tricks



- 1) To set quick +4 tape levels, try setting output at 8 and "drive" input knob under compression occurs.** For -10 equipment, try 6.5 on the output. For ADAT's try 6 to 7 output level.
- 2) You can elevate distortion levels by going to "link" with stereo links unplugged (on rear).** Obviously, the unit will not work in stereo now. "Link" sums 2 inputs, and with one missing, the distortion generator will receive a hotter signal since the detector is seeing half of what it would normally see in true stereo operation. Try this on bass guitar in Dist 3 mode for extra grunge.
- 3) It is also possible to sidechain process.** Take the "Link Out" of a unit, go to an EQ (and/or preamp), then return it to the "Link In" of the same unit. Then put the unit into link to further affect the compression in a more frequency dependent unit. The sidechain must not have appreciable delay nor be out of phase since the "link" signal gets mixed back in with the normal detector signal and the delay would cause "combing" of the frequency response, resulting in irrational compression behavior.
- 4) Submixing in a compressed signal with a dry (uncompressed) signal can be extremely useful on percussion and other sources.** On snare, a "submixed" compressed signal will bring up the ring and body if the release is set extremely quickly. This submix method is often called "Mulling" or "Splitting".
- 5) Here is an interesting bass instrument trick for the EL8-X version or a Distressor with the BRIT MOD.** You can emulate a "tube-y" type saturation by turning on the Brit Mod, Nuke, attack 1 – 2, release 0 – 5, 10 – 20dB of compression. This will saturate each low frequency note making it sound distorted, and if adjusted right, much like a bass amplifier. One could bring the Bass track in on two channels, one processed with the above "BRIT" setting, and one "drier" and cleaner. The engineer could then mix the "AMP" sound with the "DIRECT" bass sound, to his taste.

# Troubleshooting

- \* **No sign of life** - Check power cord for firm connection. If still no life open top cover by removing all top screws and check fuse toward rear next to transformer. If it is blown, pry it out and replace it with extra fuse provided in fuse holder toward front of chassis. If fuse is OK, make sure your Voltage select switch is set to current wall outlet voltage (115, 230 VAC).
- \* **Unit keeps blowing fuses** - Probably has short or power supply problem. Try to make sure there is nothing trapped under the PC board, shorting to the metal case. Attentive visual inspection is still the most effective troubleshooting tool available. Check internal voltage select switch for proper settings (115/230).
- \* **Unit is on but not doing anything** - The unit may be bypassed or in 1:1 mode. If bypassed, you need to press the "BY-PASS" button so red LED goes off. The 1:1 mode may be inaudible but the input and output levels will still affect it. Try another ratio for compression.
- \* **Bargraph shows gain reduction but very little or none is actually occurring** -The unit is probably severely out of adjustment. We use very stable trim pots and high quality components, but it is possible that long term component aging or failure may require factory re-calibration. Right now you will have to return the Distressor to factory for re-calibration. In the future there will be local dealers and/or service centers to help.
- \* **Distorted output** - If there is severe, un-musical distortion, chances are you're hard clipping. Check that the output cable is properly wired and any unused output pins (2 or 3) on XLR are floating (left unconnected). Shorting an output pin will not harm the unit but can show up as distortion in the output driver. The distortion this unit is meant to impart is harmonic and should not sound like crackly distortion caused by hard clipping. Long attack times can clip transients in lower ratios when Dist 2 or 3 are employed. If the attacks are too fast (towards 0), low frequency clipping and unpleasant distortion can occur. Try slowing up the attack or release.
- \* **No output level** - Make sure there is audio getting to unit, and that the input and output levels are turned up.
- \* **Unit pops or unnaturally pumps** with low frequencies at ultra fast attacks when compressing 20 dB or more - Possibly caused by the high-pass (HP) in the detector engaged, and not controlling the low frequency amplitude in the VCA, causing offset pumping. Turning up attack (to 5 or above) will often eliminate the effect. Remember that this unit has an extremely fast attack time that can show up as pumping or crackling on low frequency laden material. You can control this with a slower attack, or a slower decay. Also, try enabling and disabling the "HP" in the detector.
- \* **Unit seems noisy** - The dynamic range of the Distressor is greater than CD (16 bit) quality. However, if you are compressing a noisy signal, the noise is pushed up along with the soft signals. If you have 20 dB of gain reduction on a room mic that has a 90 dB S/N, the noise floor will be raised 20 dB in quiet areas, bringing the noise floor up to 70 dB. Since the Distressor is capable of lots of compression without sounding unnatural, you can often bring noise or hiss up undesirably. Remember your current input level, and then ensure that the noise is coming from outside the unit by turning the input knob off (to 0). All noise should disappear. Try gating before compressing.
- \* **Unit forgets where it was when power was shut off** - Non-Volatile cap backup may have become defective. Please call factory for information on replacement.
- \* **Unit quits working when Bypassed** – Pins 2 & 3 may be reversed on one of the XLR cables.
- \* **Unit only works in Bypass** – Input or Output are turned to 0, or input and output wiring is reversed.
- \* **The Stereo Link in the Detector doesn't seem to have an affect.** User may have a radically different source in the left and right channels. Consider installing the Stereo Image Link (see p13).

## A note on Bypass and the Multiplexed Controls

A hardwired bypass relay enables the user to compare processed and unprocessed signals accurately. When comparing the original signal from the processed signal, matching the output level with bypassed signal makes it very easy to hear the processing changes. Bypassing can cause audio "clicking".

To change ratio, audio, and detector modes, press the associated button and cycle through the options. These step function controls are sometimes inconvenient when trying to compare two settings, but if there was a control switch for every selection offered on the Distressor, there would be 15 switches on the front panel instead of four. We considered it very important to fit it all in the single height 1.75" cabinet - and 15 switches just won't go. The color encoded, indicator LED's were arranged in an easy to read pattern, with Red LEDs usually indicating radical or distorted settings.

# Fuses, Operating Voltage & Non-Volatile Memory

**Caution: Always unplug unit before removing cover!**

## Fuse

In the case of a blown fuse, pull out the power plug from the AC outlet, open unit, and ensure fuse closest to rear of the Distressor is blown. Note: The fuse closer to the front panel is a spare fuse and is not connected to anything. A small screw driver may be helpful. Gently pry out one end of the fuse and then the other, replacing it with extra fuse that is labeled nearer front of unit. Before putting cover on, plug in unit, keeping hands out of the box, ensure that the fuse doesn't blow again, indicating a possibly more serious problem (see troubleshooting). If unit turns on OK, unplug unit, replace spare fuse in front if available, screw down top cover and return the unit to normal use. For reference, any fuse from .3 to .6A should be safe, but .5A (1/5A) is what is specified and used at factory.

## Line Voltage Select

Changing the voltage for 230 or 115 operation also involves unplugging the unit and removing top cover. Inside on the right (as the front of the unit faces you), is a switch with 115 or 230V showing on its face. Select the desired voltage by sliding the switch until it indicates that voltage and you're done. Replace cover and screws.

## Non-Volatile Memory

A gold capacitor inside will store front panel settings for at least four weeks.

# Upgrades

There are several elements inside the Distressor that were designed to be "modifiable". Although we cannot guarantee it at this time, Empirical Labs may release information and hardware options that will allow owners to alter the curves and other important performance parameters of their Distressor in addition to the currently available Stereo Image Link and British Mod (1176 "All Buttons In"). Most of these modifiable elements will probably not improve the performance, but will offer other alternative signal processing variations. It may be possible for user to safely modify the Distressor and create unique sets of curves and filter options. If you have sent in a properly filled out warranty card, we will keep you apprised of these developments.

Do not attempt to modify or make adjustments to your Distressor until you have notified Empirical Labs and been sent the necessary information. There are a number of critical adjustments that cannot be made properly without the calibration tools we have here at the factory. Any sign of internal adjustment by the user will void your warranty with the exception of changing the fuses, or line voltage selection. Empirical Labs Inc. takes no responsibility for the safety of anyone opening the Distressor for any reason. There are dangerous voltages present when unit is plugged in. Refer unit to properly qualified service center or return to factory.

See the British Mod and Stereo Image Link Information on pages 12 and 13.

# The Distressor "British Mode" Option

Another Upgrade & Option for your Distressor!

**Basic Description** –The original concept of the "British Mode" came from an unusual setting on the classic UREI 1176LN limiter. The unit was designed to have only four ratios, each ratio being engaged by selecting one of four buttons. However, as early as 1980 (or before), renegade recording engineers, always on the lookout for something a little more "over the top", found that you could make all four buttons stay "in" if you pressed them just right. What resulted was a very, very aggressive sound that had some elements of the units 20:1 ratio, but with an unusual knee and new envelope shape. Somewhere along the line, someone called it a "British Mode" and the name has stuck. It is also called "all buttons in" and some other intuitive names.

The Distressor has the advantage of being able to apply this "aggressive" nature not only to the new British ratio (1:1) but also to all the ratios since a separate switch is installed, which can be enabled with any ratio. One should keep in mind however, that **an attack well below 3 or 4 is required to maintain the 1176LN character**. If you go above an attack of 3 you will also incur a rise in some grunge (distortion) and see the THD indicator lights come on a lot more.

## How to use the new British Mode Option for the first time

Put the unit in the 1:1 ratio and turn on the British Mode Switch (flip it up and the LED should be lit). That enables it. To sound like the 1176 the only constraint is to keep the attack well under 4 on the Distressors - their attack can go much longer than the 1176. Now you will find that the unit has a new attitude! The attack and release will generally be more aggressive and the unit will get in and out of the way very quickly. Interestingly, the unit will be slightly less colored when not compressing.

## Tips

Use this ratio to "skim" peaks. This means that most of the time it may not be doing anything, but when it does "hit" the signal, it will smoothly push back the signal and then get right out of the way again. If you are hitting the Gain Reduction all the time with the British mode on, you are going to be really "squashing" the signal. On the other hand, the Distressor will sound fairly subtle when compressing all the time in 2:1 mode, especially with a slower attack (>5). Once again, remember that the 1176's normal attack range falls below the 3 on the Distressor's Attack knob, so again, once you go above 4 in the British Mode, you are no longer going to get a standard 1176 sound.

Also, due to the nature of the added circuitry and complex non-linear interaction, the curves of the British Mode can vary by +/- .5 dB from unit to unit. We mention this because as we have said, all the other Distressor curves match uniformly from unit to unit. Therefore, a fraction of a dB is meaningful here only compared to the extreme accuracy of the standard Distressor ratios (the original 7 ratios shipped with all Distressors).

## British Mode Tricks

- ☐ Vocals! - This is a great final compression during mixdown. When not working it is very transparent, but when a vocal pops out and hits the compression, the British mode will get in and out of there quickly and smoothly. When you are really compressing a lot, breaths and background noises will become very loud (pushed up). There is not much you can do with this except gate before compression maybe or, mute or erase the noises and breaths out that you don't want to hear. Remember that breaths are natural and can add a lot of excitement sometimes, so don't gate or erase them by default. If you can, back up a vocal track before you start trying to punch out breaths and noises etc.
- ☐ Drums can be made to distort with long attack times in the British Mode. They can also be given a whole new character due to the aggressive attack and release shape. Try it on live room mics as well as close or overhead mics.
- ☐ Reverse effect. With Brit Mode enabled, and ratio set to NUKE, set attack to 2, and start with the release around 6.5, and 20 – 30dB of compression. Adjust release carefully and a swelling "reverse" affect can sometimes be achieved. An exact release time is critical depending on tempo and pattern.

# Stereo Image Linking for the Distressor

**Basic Description** - The original Distressor stereo link implementation used a summing and phase detection method which allowed stereo image shifting. "Image shifting" occurs when the interchannel balance (the relative volume between Left and Right channels) changes during compression. Although known for its phase correction, and its "thickening" on open room mics and other stereo sources, the original Distressor phase link approach has sometimes been a problem on stereo program material, where the producer/engineers want to maintain absolute left/right balance at all times.

With the new "Stereo Image Link" option, the Distressor user now has three link options - the original "phase" link, the new Image Link and the combination of the two, phase and image linking. This has never before been offered on any compressors or limiters. There can be very slight differences in the metering between the two units. Due to the high resolution of the Distressor's metering, 1/10th dB can make an LED on one unit go on or off earlier than the other unit's. Slight metering mismatch is to be expected. Also, don't readjust knob alignment - the output pots especially. They are often offset around "0" to allow for "dead spots" at the lower extremes.

## How to use the new Stereo Image Link Option for the first time

You must now use two stereo phone plugs in the link cabling. This means standard TRS phone plugs. They are supplied when you purchase the option. Plug one unit's Link Out to the other's Link In, and vice versa. Both units must have the "Stereo Image Link" switch on (both switches should be in the up position and the LEDs should be lit). The engineer must still match the units' front panel controls usually, but the units will now always match in their gain reduction amount - eliminating image shift. The most important thing the user must do is match the left and right input and output levels. If no change is going to be made to the left/right balance, using a tone to set the left right I/O levels is very direct and useful. See below.

**Setting I/O levels** - It's suggested that you set both units to their general expected settings, with Stereo Image link engaged, apply an identical tone to both Distressors, and adjust the inputs nearly the same, then "tweak" the outputs so that the output levels are identical. Use the meters on your board or recorders. This will ensure that the interchannel levels remains unchanged. Also, with the new linking, it is not as critical to exactly match either the input or outputs, since the gain reduction between the two channels is locked, and therefore once the overall throughput levels are matched, they will remain that way. However, the units can respond more to the louder channel if the input levels are not matched.

## Stereo Image Link Tricks

□ First, there is no limit to how many units can be linked - in theory. However, you must avoid long link cables since they will cause noise and degradation of operation. To wire up more than two units, go from the link output of the 1st unit's link to the next units link input, then take that units link out to the next ones input etc. Finally, take the last units link out and feed it back to the first units link in. You must use stereo phone plugs for the "Stereo Image Link" to work.

□ Try putting the lower unit into 1:1 mode with attack and release on 10. Then still matching the I/O levels, use the upper unit to select ratio and attack/release times. This will allow a longer attack time then otherwise available, since the top unit must drive both units timing circuitry. The down side is that the units will only respond to the top units signal, unless the original link is engaged (see below). There are a few well known compressors that have a master/slave mode that only looks at the "master units" audio - so this is not unheard of. You may switch the units and have the bottom one control the top unit (which is in 1:1 mode). Also, using the original link will sum both channels partially, so that there is some response to the "slave" units audio. This longer (slower) attack time is sometimes very useful on program material - a la SSL type compression.

□ Try not matching the units front panel controls - whole new ratios can be obtained. For instance, putting the left channel on 2:1 and the right channel on Nuke (pretty radical but...), then setting the left and right levels differently, you can get a combination of two ratio curves. Usually the lowest attack/decay settings will override the higher settings, i.e. if one channel has the attack set to 10 and the other to 3, the units will generally react at the faster 3 setting.

□ If no TRS stereo link cables are available, one may use a regular guitar cable to enable the new link. But you only insert the cable part way into the rear Link connectors - so that only the ring is in contact with the tip of phone plug. The normal EL8 link will be sacrificed, however, since it relies on the tip of the link connectors to be connected. It is best not to put the unit in normal link (in the Detector area) since it will make the unit operate with more distortion without the tip connections - then again this might be the perfect spice for your gumbo! 13

# 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." Joe Chicarelli

"After buying a Distressor I had an epiphany. Having used software plug-ins for years I often didn't hear or understand the affects of various controls. After getting my Distressor, and using it and hearing the obvious affects of the attack and release controls, I was able to go back and use the Plug-ins with a new understanding." (Email)

"One piece of gear I definitely recommend is a compressor called the Distressor. It's really great for just about everything and if you had to use just one compressor you could probably get away with just using that." Mitchell Froom

"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

## 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 (The Rolling Stones, Bonnie Raitt, Bob Dylan, Eric Clapton, Jackson Browne, Susan Tedeschi, Etta James, ... et al)

Best new Signal Processor-EQ AES Awards - "Empirical Labs Fatso took this category, despite the introduction of a variety of cool new processors. Who can resist the best aspects of analog tape combined with great compression" EQ Magazine

"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

## LIL FREQ

"Hey Dave... so I got the box, plugged it in on an Etta James vocal that I was having problems with... and it \$#%&\* rocks. This is a great box, my friend. I can see anybody with a DAW wanting to use this thing. I am using the shelving, DS'ing and transformer out, and I am just thrilled. Congratulations. It absolutely complements the digital crap that I am forced to use...wooo hooo." Ed Cherney

"I finally got to hear Empirical Labs' Lil FrEQ, a monster that will destroy the way you think about EQ. This single-channel unit has two shelving bands, tunable low cut, four parametric bands, dynamic EQ for de-essing and direct box input—all noiseless and distortion free. Best of all, its smooth processing is absolutely addictive. Sweet!" George Peterson (Mix Magazine)

## Warranty and Factory Service

All Empirical Labs Inc. products are covered by a limited warranty, which covers full parts and labor for one year from the purchase date. The warranty is only effective if the owner has returned his or her warranty card. See warranty card for further details.

Should problems arise, call your dealer or distributor to determine the state of your warranty and if it becomes necessary, pack the unit up well<sup>1</sup> with a note explaining the problem and return to Empirical Labs for repair. Include your name, address, phone, and the date of purchase. Send the unit with freight prepaid to the address below and mark it Attn: Service.

### **EMPIRICAL LABS**

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Also see our Website at [www.EmpiricalLabs.com](http://www.EmpiricalLabs.com). Additional Contact Email Information can be found there.

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

### **Other Empirical Labs Products:**

- 1) FATS0 – Full Analog Tape Simulator Optimizer with Compression
- 2) Lil FrEQ – The Ultimate Analog Equalizer & De-esser, with built in DI Box.
- 3) Masderring Lab for Eventide DSP4000 - Complete mastering facilities in a double height rack mount unit! Contact Eventide Inc. at (201) 641-1200
- 4) Three dimensional software for the Eventide DSP4000 and H3000. Contact Eventide Inc. at (201) 641-1200.

This product is dedicated to the memory of John Patterson, whose help, love, and extensive knowledge had a huge influence on the design of the Distressor. John was not only the "namer" of "NUKE", but also a great friend. He will be missed by all of us here at Empirical Labs, and by all who knew him.

# **Empirical Labs** inc.

Technology For The Artist

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