

## DYNAMICS PROCESSOR TIPS

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### TIP-1: Judging Bassy

Bass is hard to judge by ear. That's because room acoustics and monitor idiosyncrasies can create "local" sonic peaks and dips making it hard to judge note consistency. Simple Limiters like the Teletronics LA-2A (vacuum tube), The LA-3A (solid-state) and the LA-4 (IC opamp) all feature a mechanical VU and Optical Gain Reduction that is perfectly suited for Bass, Guitars and Vocals.

First set the Meter Mode switch to read Input or Output — the VU meter is great for judging consistency of Bass notes. Then meter Gain Reduction, adjusting the Threshold to "level" the bumps, use more if there are "dips" are too deep. A gentle RATIO of 2:1 or 4:1 will do the job unless the Bass is aggressively played, such as the "slap" style. What could be easier?

### TIP-2: Delicate Under-Things

Conversely, a mechanical VU meter is slow to respond to transients — percussion instruments have a Fast Attack — so the recording engineer must be conservative when setting levels for tambourine, hand claps and snare especially when the destination is analog tape. For example, VU meter response to any of these instruments may indicate "-5dB," but the actual level could easily be 6-dB to 12-dB higher. (A clunky tambourine sound with low frequency artifacts indicates that clipping has occurred.)

When using a VU meter *only* to judge Gain Reduction, adjust Threshold until the meter just begins to move, then back off a hair. Be sure to listen. For a Compressor-Limiter equipped with LEDs, adjust Attack and Release to their FASTEST settings. Set Threshold for no more than 6dB of Gain Reduction, select the most aggressive RATIO ("infinite-to-one" or 20:1) to achieve the desired result — such as getting more "ambience" from a drum kit by peak limiting a stereo sub mix. Peak limiting a Stereo Program mix is a bit more complex, you can start aggressive and then back of the RATIO and threshold. Again, GR meter movement might just barely be detectable to get the job done.

### TIP-3: Reading Tea Leaves

Tip-1 and Tip-2 are examples of RMS Compression and PEAK Limiting, respectively. In the case of limiters like the LA-2 and LA-3, the Ratio and Response times are determined by an Optical Device that has a variable response - faster with conservative Threshold settings (not more than 6dB), slower with aggressive amounts of GR (6dB or more). Used aggressively the attack slows to a medium while the release becomes non linear, initially fast then slow.

NOTE: These GR examples are based on actual amounts, NOT as displayed by the meter.

For Dynamics Processing "Speed" and Depth of Gain Reduction are inter-related. Peak Limiting requires fast response times assuming conservative GR (6dB max). Otherwise one of the response times must be slower to avoid annoying modulation distortion. Typically the Attack is fast (5mS to 10mS) while the release is much longer 100mS and higher). Try this with Kick Drum, varying the Attack from Fastest to Slowest settings to hear what seems like an EQ change. Compression begins with low RATIOS, Medium-to-Slow Attack and Release times along with a soft knee can make processing transparent.

IF unsure, always start with the slowest settings and a minimal amount of meter movement. Then speed up the Attack until it "digs" more into the track. Some VCA compressors provide a pair of LEDs that assist the user in setting the Threshold as well as the Release Time so that the processing activity is centered around the "Knee" whether hard or soft. When effective but transparent processing is required, extending the Release time helps considerably.

At the risk of being repetitive, any dynamics processor that relies on a mechanical VU meter can become even more versatile once taking into account the meter's slow dynamic response time. This is especially true for transient instruments, where an almost undetectable deflection of "one-half dB" on the VU meter (in Gain Reduction mode) might yield 6dB of Peak Limiting. This is the starting point when trying to extract more meat and ambience from drum tracks.

#### **TIP-4: Find the Window**

Of the four primary dynamics processing topologies — optical (photo-resistor), variable-mu (vacuum tube), FET (Field-Effect-Transistor) or VCA (Voltage-Controlled Amplifier: transistor) — ALL have a "window," the optimum range where the device performs best. ALL also have a maximum amount of gain reduction as detailed in **Table-1**. The temptation is to smash a track within an inch of its life, but it is better to conservatively process twice — to and from a recording device, for example — rather than aggressively squash once.

| <b>TOPOLOGY</b> | <b>** Approximate Range<br/>of Gain Reduction **</b> |
|-----------------|--|
|                 |  |
| Variable-Mu     | 12~25 dB   |
| Optical         | 25~30 dB   |
| pwm-FET         | 30 dB  |
| FET             | 40~50 dB   |
| VCA             | 100 dB   |

## Table-1: Topology Gain Reduction "Window"

### TIP-5: Understanding The Black Box

All of these topologies can be considered a three-terminal black box — Input, Output and Control. Most of the time audio (AC) is converted to DC, then "shaped" via Resistor-Capacitor (RC) networks to create a Control Voltage (CV) that can be dynamically manipulated by Attack and Release pots (variable resistors). The exception are the classic optical Limiters — the LA-2a, the LA-3a and to a lesser extent the LA-4. The simple act of charging and discharging a capacitor is a "Time" issue that has a great effect on the overall dynamic envelope — the sound of the Compressor / Limiter *processing*. The emphasis here is that Input and Output circuitry of many Vintage Classics (Amplifiers and Transformers, for example) are equal contributors to the magic associated with these boxes.

The Optical Transmitter in the LA-2 and LA-3 is an Electro-luminescent panel directly driven by audio — the former from a tube and the latter from a transformer-coupled transistor-pair, most respectively. In this case, LIGHT is the Control Signal so it is not necessary to create a CV. In the LA-4, there is a detector (to convert AC to DC) followed by an op-amp (to manipulate Ratio and Threshold) feeding a transistor to drive the LED. While there is a capacitor in this circuit, it has more to do with gain than to create a charge and discharge characteristic.

### ROAD MAP

The addition of Attack, Release, Ratio, Soft Knee and Hard Knee controls are great when you know how to use them AND when enough metering is provided to correlate what is heard to what is seen. While for years the trend has been to add every possible feature to please every possible user, I think simplicity is one of vintage gear's "love-factors." Sure, the VU meter helps, so does the vast real estate required to accommodate the technology AND make front panels easier to see.

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