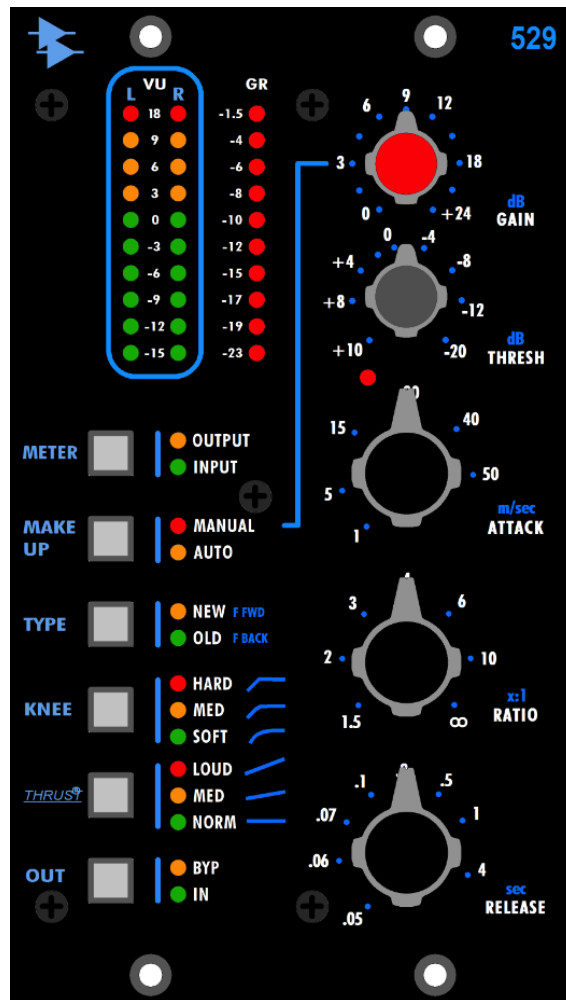




529 Stereo Compressor



OPERATOR'S MANUAL V1.5

Written for Automated Processes Incorporated
by Daniel Pfeifer 2018



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Introduction

The new 529 Stereo Compressor combines the unmistakable sound of API's compression technology with the convenience and popularity of the API 500 Series format.

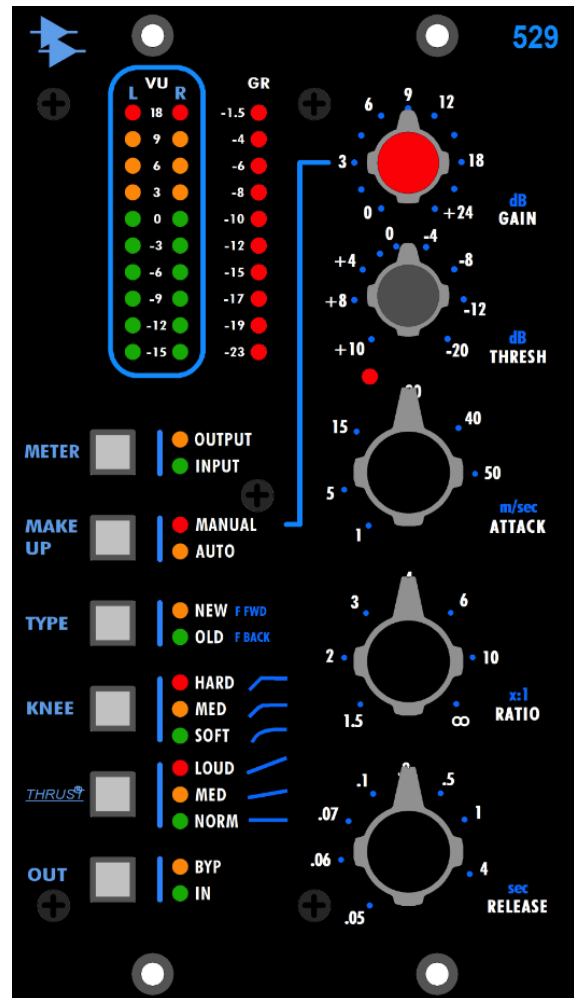
Carefully designed to deliver a wide range of compression options, the 529 delivers warmth, clarity and punch, whether used for subtle adjustments or heavy compression effects.

Based on the unprecedented success of the 2500, the 529 takes many of the features and controls from API's famous stereo bus compressor and puts them into the first dual slot 500 series module from API. Using API's discrete op-amps and transformer technology, the 529 delivers the legendary analog sound of API.

The 529 is a two-channel, stereo-linked dynamic processor designed for stereo program bus compression and compression of any stereo audio source. The audio input signals from both channels are combined in a true-RMS power summing fashion to create the compression control signal for the detection path. Then, the resulting compression signal is applied evenly to both channels for proper balance. All front panel settings control both channels simultaneously.

This stereo compressor features API's patented **THRUST**[®] circuitry for a punchy low end, along with an OLD/NEW switch that lets you choose between classic and modern compression characteristics: OLD for vintage-style feedback compression and NEW for today's more common feed-forward compression. The 3-position KNEE switch adjusts the shape of the curve at the onset of compression for an "over-easy" type compression resulting in a very natural, uncompressed sound or a typical sharp knee type that lends itself to a much more severe limiting effect.

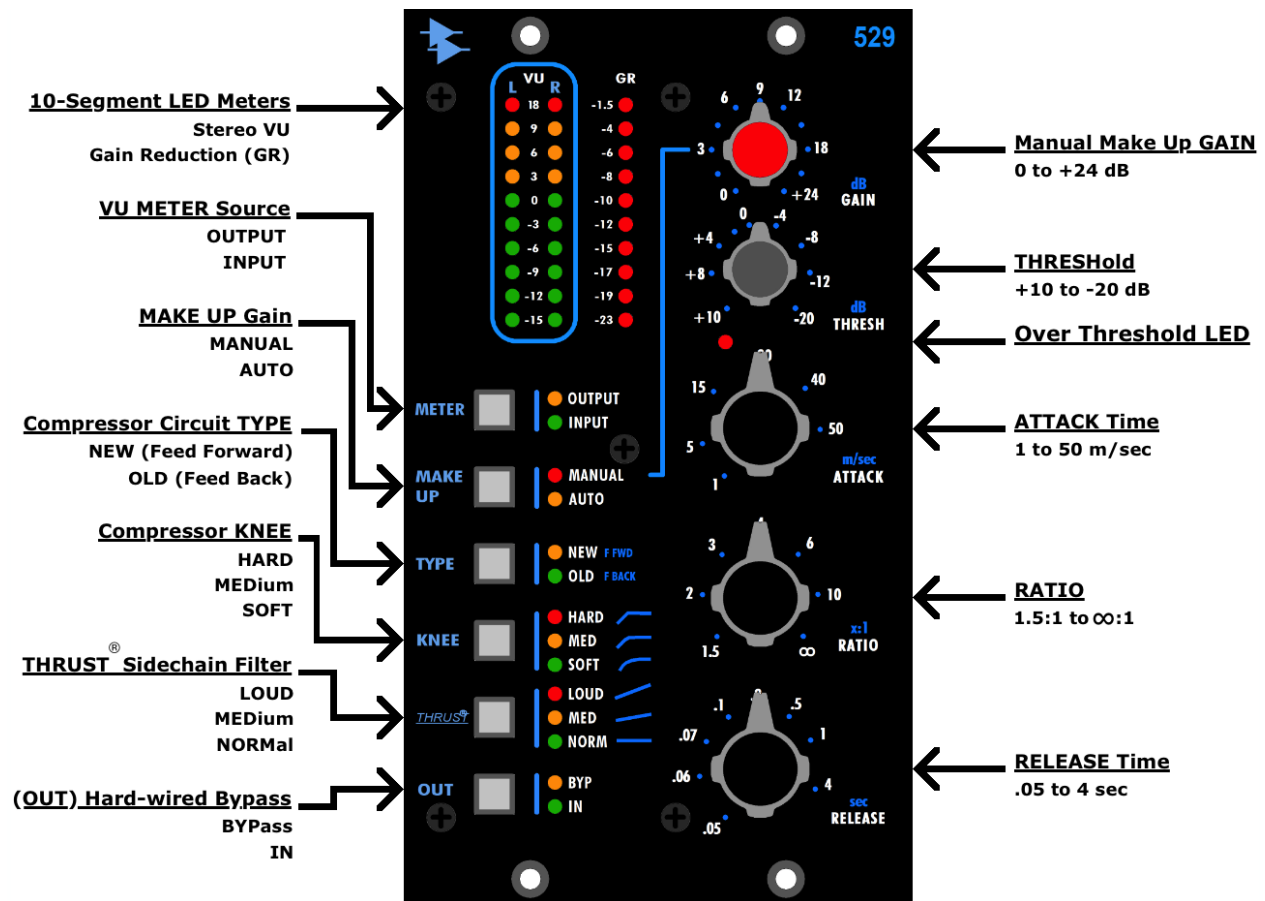
The Auto MAKE UP gain function lets you adjust ratio and threshold controls without affecting the output level. Alternately MAKE UP gain can be set manually.



Features

- Continuously variable 31-position detented controls for Gain, Threshold, Ratio, Attack & Release
- Stereo 10-segment LED VU meters show selectable Input or Output levels
- 10-segment LED Gain Reduction meter
- "Over Threshold" LED illuminates when input audio cross the set THRESHold
- Patented **THRUST**[®] filter for frequency dependent side chain control
- 3 selectable compressor curve KNEE settings
- Selectable NEW or OLD switch for feed-forward or feed-back operation
- Selectable automatic or manually variable compressor make-up gain
- Full hard-wired relay bypass
- Audio circuit uses 2510 and 2520 discrete op amps with transformer output
- 2-space 500 Series installation

Overview

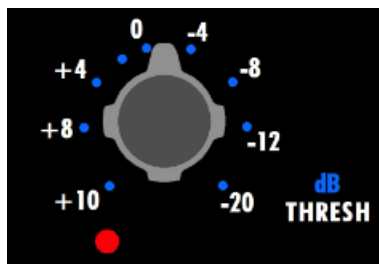


The 529 Compressor provides a comprehensive suite of controls:

- **THRESHold**: The level at which compression begins (+10dB to -20dB)
- **Threshold LED**: Indicates when the input audio crosses the selected THRESHold level
- **RATIO**: The amount of compression applied after threshold (1.5:1 to ∞:1)
- **ATTACK**: The time it takes for the compressor to respond (1 to 50 m/sec)
- **RELEASE**: The time it takes the compressor to return to unity gain (.05 to 4 seconds)
- **METER**: Selects OUTPUT or INPUT as the source for the stereo VU meter
- **VU (Stereo VU Meter)**: Stereo 10-segment LED VU meter (selectable OUTPUT or INPUT)
- **GR (Gain Reduction) Meter**: 10-segment LED gain reduction meter
- **MAKE UP**: Selects AUTOMatic or MANUAL MAKE UP gain
- **GAIN**: Manual MAKE Up gain control (0dB to +24dB of output gain when MANUAL is engaged)
- **TYPE**: NEW (feed-forward) or OLD (feedback) detection path topology
- **KNEE**: The characteristic of the response curve at the onset of compression.
- **THRUST[®]**: Patented circuit that inserts a filter before the RMS detector
- **OUT**: Toggles to swich gain reduction in or out or engages hard bypass

Compressor Controls

THRESHold



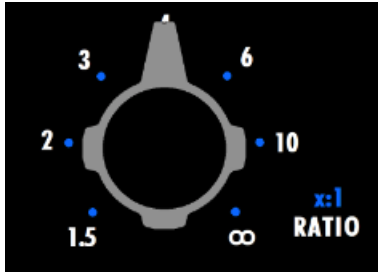
THRESHold: Sets the level at which compression begins

- Continuously variable range between +10dB and -20dB
- Detented rotary pot for easy recall

Threshold LED: Illuminates when the input audio crosses the level set by the THRESH control

- Illuminates in red when active

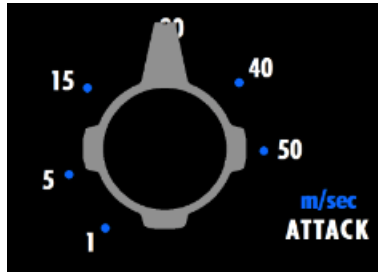
RATIO



RATIO: Sets the ratio of input vs. output levels for signals that fall above the set THRESHold

- Continuously variable between 1.5:1 and ∞:1 (x:1)
- Detented rotary pot for easy recall
- Compression with RATIOS of 10:1 or greater is generally considered to be limiting

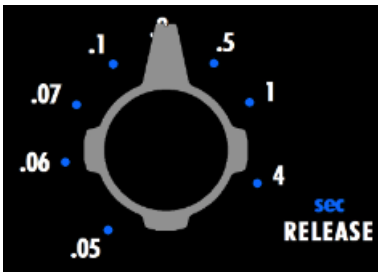
ATTACK



ATTACK: Sets the time it takes the compressor to react when the level exceeds the set THRESHold

- Continuously variable between 1 and 50 milliseconds (m/sec)
- Detented rotary pot for easy recall

RELEASE



RELEASE: Sets the time it takes the compressor to recover to unity gain after the level falls below the set THRESHold

- Continuously variable between .05 and 4 seconds (sec)
- Detented rotary pot for easy recall

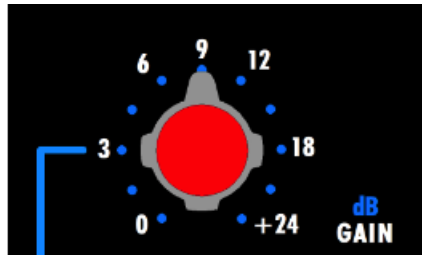
MAKE UP GAIN

The 529 Compressor provides automatic and manual make up gain functions.

AUTOMATIC make up gain allows the RATIO & THRESH controls to be adjusted without affecting the output level.

MANUAL make up gain engages the GAIN control to allow make gain to be set manually.

Use the MAKE UP switch to select MANUAL or AUTOMATIC make up gain functions.



GAIN: Manual make up gain (output level)

- Continuously variable between 0dB and +24dB
- Active only when the MAKE UP function is set to MANUAL
- Detented rotary pot for easy recall

MAKE UP (gain): Toggle to select the make up gain function

- MANUAL: Engages the manual make up gain function & GAIN control (red LED)
- AUTO: Engages the automatic make up gain function (yellow LED)

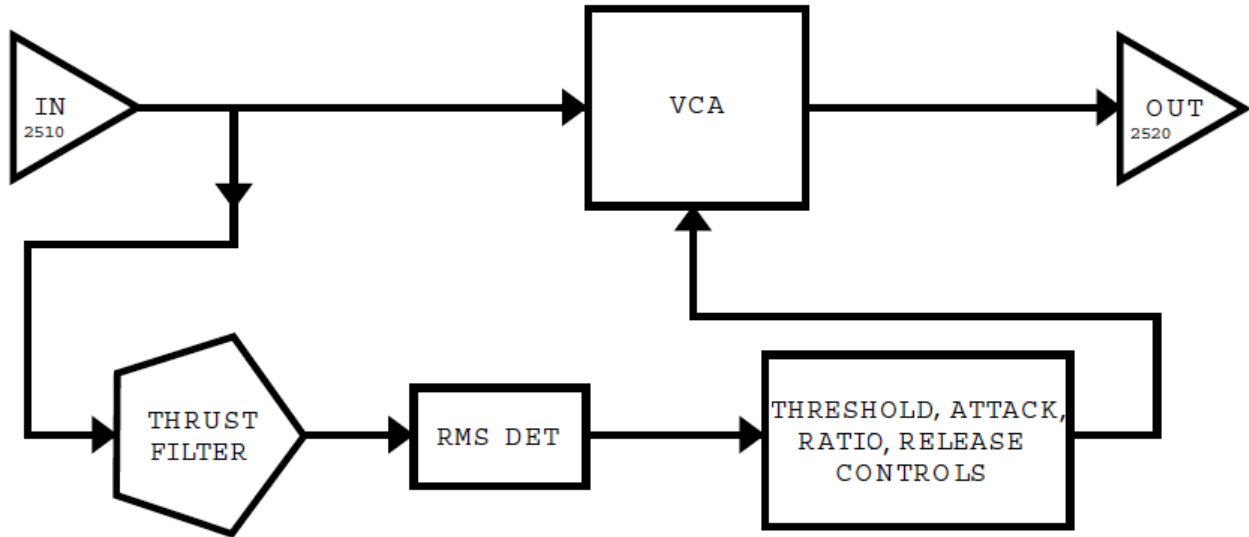
Compressor TYPE

The 529 Compressor can be set to operate in two circuit topologies that determine where the signal that feeds the RMS detector comes from:

- OLD: Feed-Back topology: The RMS detector receives the signal from after the VCA
- NEW: Feed-Forward topology: The RMS detector receives the signal from before the VCA

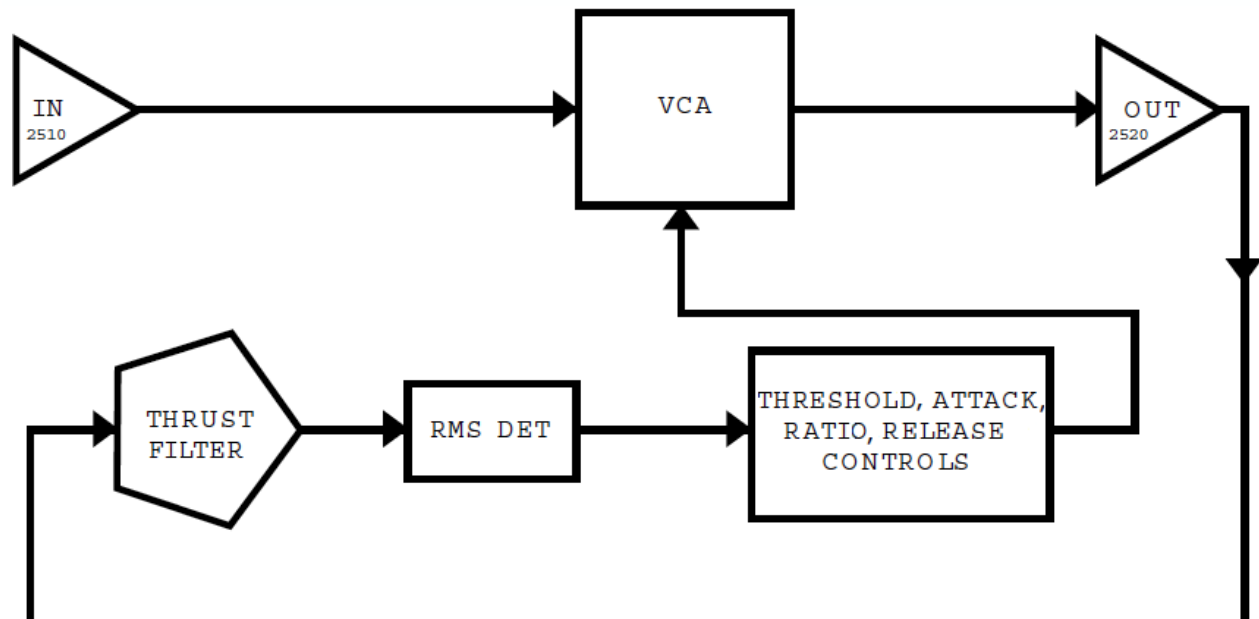
NEW (Feed-Forward)

In a feed-forward compressor, the RMS detector normally gets its signal from a split of the input signal. (The detector path can alternately get its signal from a Side Chain Input.) With this method, the RMS detector sends a signal to the VCA that is an exact ratio of the desired compression set by the RATIO control. This is how many new VCA based compressors work. This can yield more aggressive compression and a harder, more affected sound.



OLD (Feed-back)

In a feed-back compressor, the RMS detector gets its signal from the output of the gain reduction device (VCA). This is how older API 525, 1176 type, and 660 type compressors work. This yields a smoother, softer, more transparent sound.



The compressor circuit topology is selected using the TYPE switch.



- TYPE: Toggle to select the compressor circuit topology
- NEW: Engages the feed-forward topology (yellow LED)
 - OLD: Engages feed-back topology (green LED)

Compression KNEE

The KNEE function determines the shape of the 529 Compressor's response curve at the onset of compression.

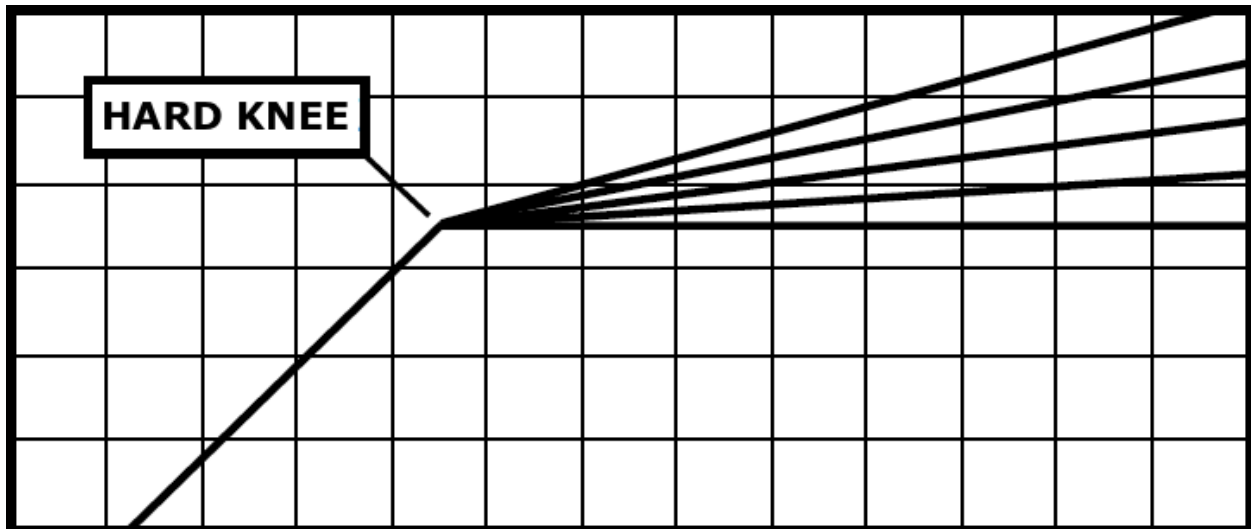
The 529 Compressor has three (3) KNEE settings that control how the compressor transitions into compression:

- HARD: Sharp response curve
- MEDium: Slightly rounded response curve
- SOFT: Rounded response curve

HARD KNEE Compression

HARD: Sharp response curve

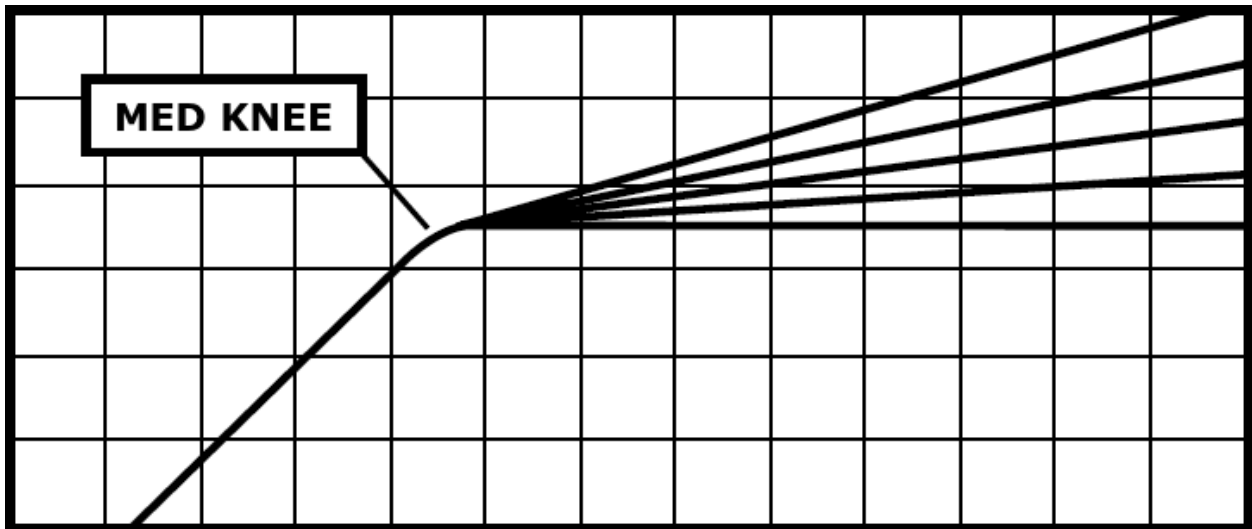
- Immediate onset of compression (sudden transition to set ratio)
- More aggressive and noticeable
- Red LED



MEDIUM KNEE Compression

MEDium: Slightly rounded response curve

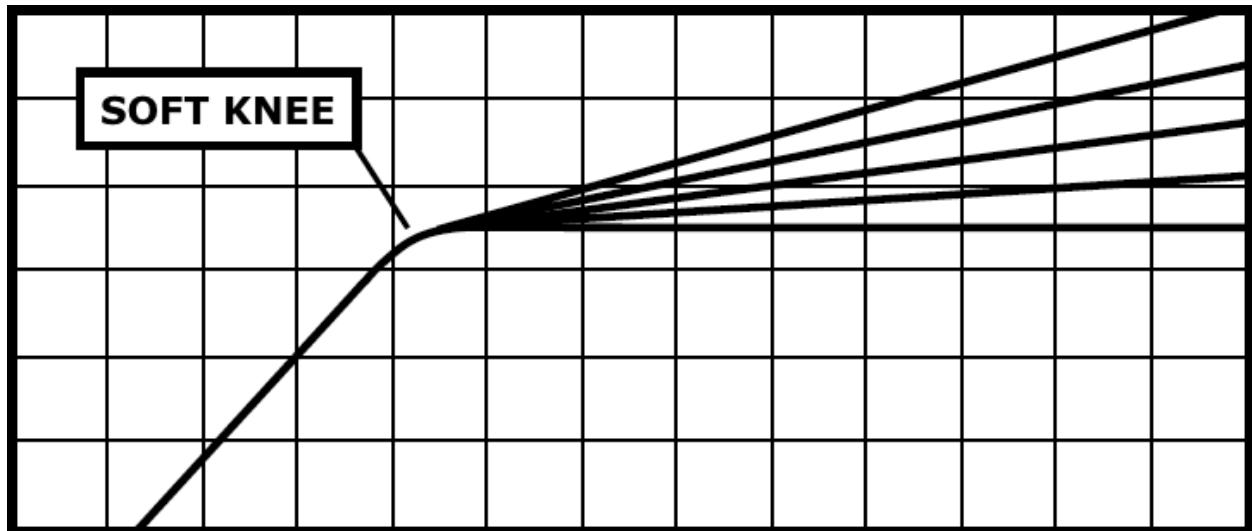
- Moderate onset of compression (firm, but less sudden transition to set ratio)
- Less aggressive and but still noticeable
- Yellow LED



SOFT KNEE Compression

SOFT: Rounded response curve

- Gradual onset of compression (fade-in up to the set ratio)
- Similar to an "over-easy" type knee
- More transparent
- Green LED



The knee of the compressor is selected using the KNEE switch.



KNEE: Cycle to select the response curve at the onset of compression

- HARD: Sharp response curve (red LED)
- MEDium: Slightly rounded response curve (yellow LED)
- SOFT: Rounded response curve (green LED)

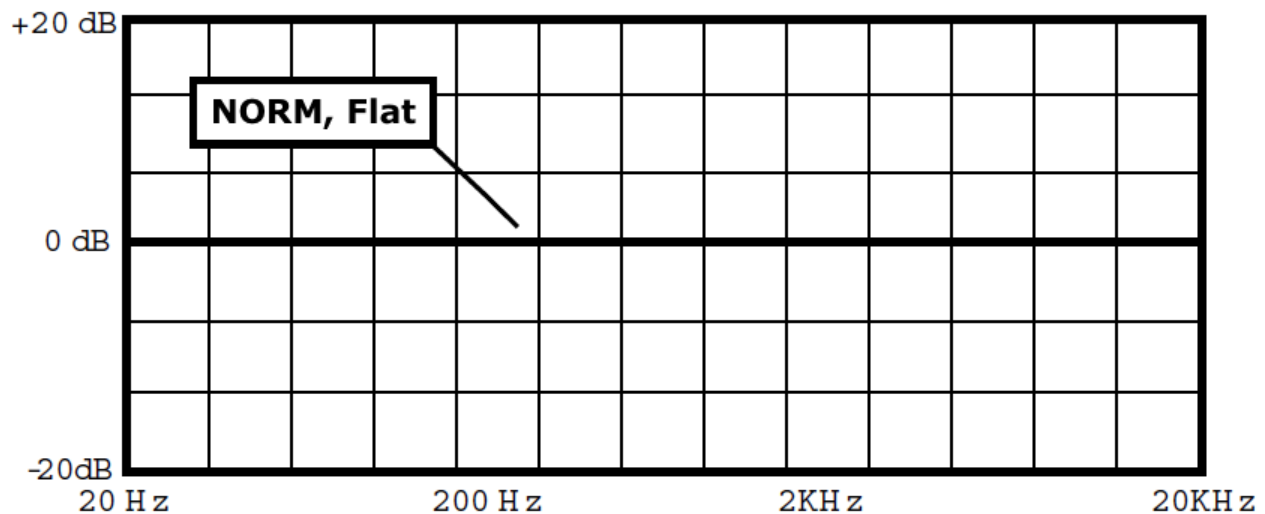
THRUST[®]

The 529 Compressor includes API's patented **THRUST**[®] circuit that can be switched in or out as needed. This places the **THRUST**[®] filter before the RMS detector that decreases the compressor's reaction to low frequency content. The result is a noticeable increase of punch and low frequencies, but a uniformly compressed signal. It's the "little more punch" switch!

The patented **THRUST**[®] circuit has been used for many years in the famed API 2500 Stereo Compressor, ATI Paragon and Paragon II consoles, as well as the Pro6 Input Strip. This circuit places a filter in front of the RMS detector with a slope of 10dB per decade (-3dB/8va), which is the inverse of the pink noise energy curve. In acoustics, the pink noise curve is used to equalize energy vs. frequency over the audio spectrum, as sound requires more low frequency energy than high frequency energy to sound correct to your ear. In Hi-fi equipment, a "LOUDNESS" contour is used to equalize the music at lower levels so it sounds correct. Even with this curve, there is still a substantial amount of low frequency information compared to high frequency information in the audio signal path. When that signal is fed into the RMS detector, the detector will process the signal into a DC control voltage based upon those louder low frequencies, resulting in a control voltage that favors the low frequencies of the signal, causing pumping and a loss of punch. Sometimes, this is not desirable. By engaging the **THRUST**[®] switch, this inverse filter is placed in front of the RMS detector, evening out the energy by lowering the energy in the low frequencies and increasing the energy in the high frequencies, so each octave has the same energy instead of each octave having half the energy as the one lower. This creates a unique compression effect that still reduces the overall gain, but the sound is much more punchy and the signal actually sounds less compressed.

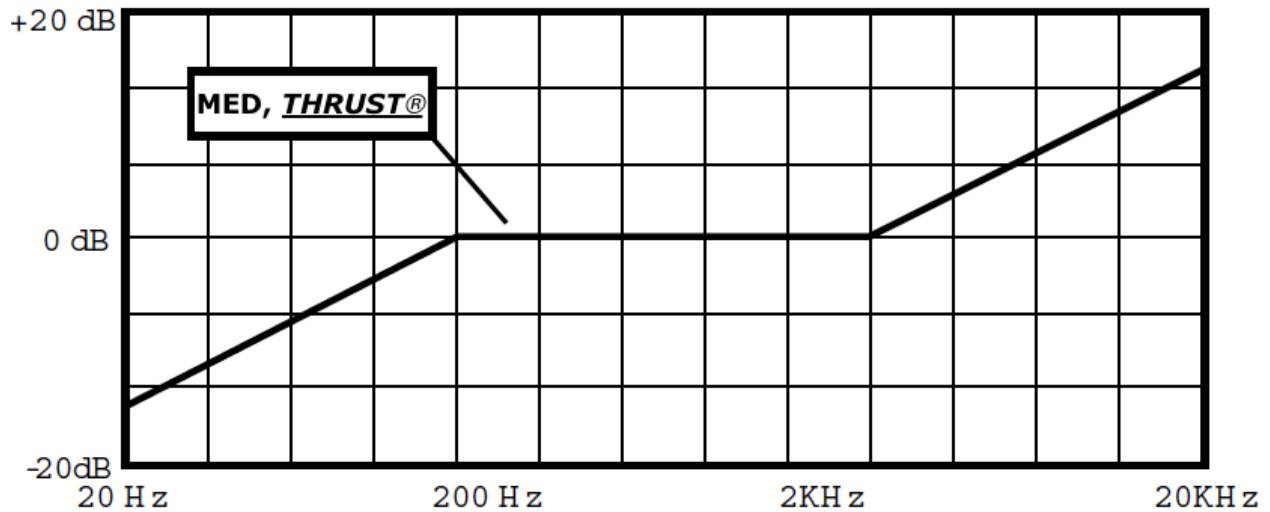
THRUST[®] NORMal

NORMal: Flat: There is no filter in the path to the RMS detector and the 529 compresses like most units on the market today.



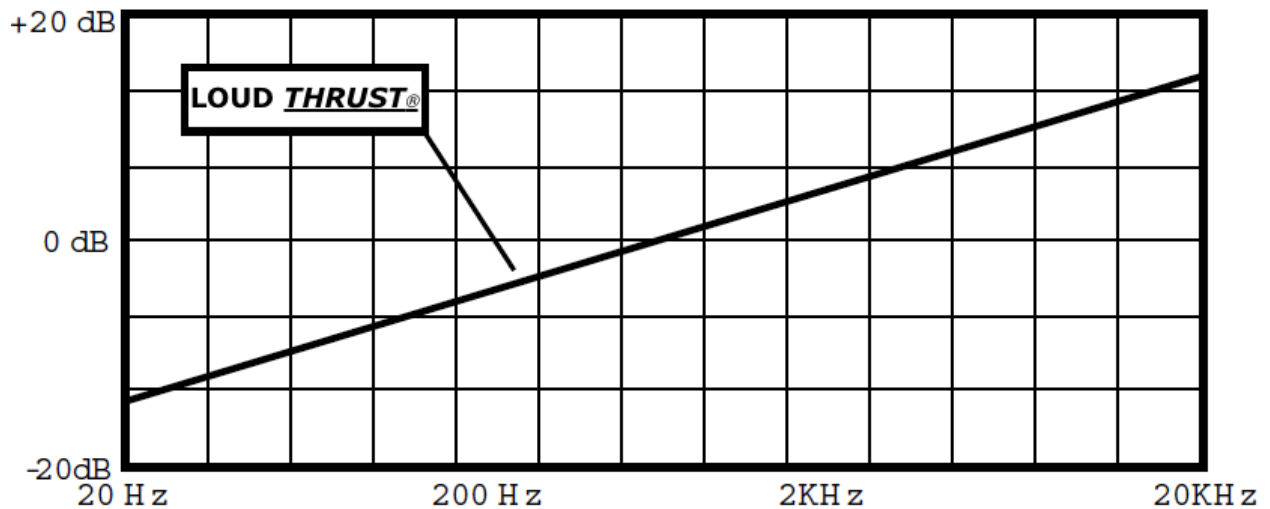
THRUST® MEDIUM

MEDIUM: A slight attenuation of the low frequencies and a slight boost in the high frequencies, with a flat mid-range are applied to the signal feeding the RMS detector. This reduces the low frequencies from pumping the compressor as much and increases the sensitivity of the RMS detector to the higher frequencies, affecting the higher frequency peaks of the signal.



THRUST® LOUD

LOUD: A gradual, linear filter, down 15dB at 20Hz and up 15dB at 20kHz is applied to the signal feeding the RMS detector, equalizing the energy going into the RMS detector. This decreases the way the higher frequencies are compressed. The overall difference is a noticeable increase of punch and low frequencies, but a uniformly compressed signal. It is the "little more punch" function.



The **THRUST®** circuit can be engaged using the **THRUST®** switch.



THRUST®: Cycle to select the **THRUST®** function

- **LOUD:** Inserts the LOUD **THRUST®** filter before the RMS detector (red LED)
- **MEDIUM:** Inserts the MEDIUM **THRUST®** filter before the RMS detector (yellow LED) and LOUD (red LED)
- **NORMAL:** No filter before the RMS detector (green LED)

Compressor Bypass (OUT)

The 529 is equipped with a relay-based, hard-wired bypass. Press-and-hold the OUT switch to toggle the BYPass control. When the compressor is in BYPass (yellow BYP LED illuminated), the hard-wired bypass is engaged. In this state, the input audio signals are routed directly to the audio output connectors and do not pass through the 529 electronics.

A momentary press of the OUT switch toggles the IN function. When the compressor is IN (green IN LED illuminated), the compressor is active and behaves normally. When IN is disengaged (green IN LED not illuminated), the control voltage signal is disengaged and the output signal is held at 0dB. Audio continues to pass through the 529 electronics.

NOTE: When the 529 is powered off, it is held in the BYPass state. When the compressor is not in the BYPass state (yellow BYP LED not illuminated), the 529 behaves normally.



OUT (Compressor Bypass): Toggle to engage and disengage the hard-wired bypass

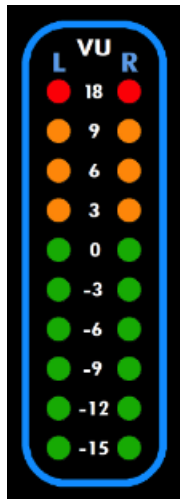
- **BYPass:** Engages the relay-based hard bypass (yellow LED)
- **IN:** Engages the compressor signal path (green LED)

Meters

The 529 Compressor is equipped with a 10-segment LED stereo VU meter and a 10-segment LED gain reduction meter.

Stereo VU Meter

The 10-segment LED stereo VU meter can be fed from the compressor inputs or outputs.



The 10-segment LEFT and RIGHT LED VU meters have the following values:

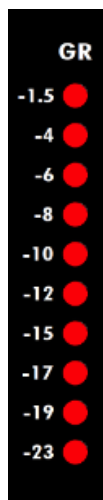
- +18dBu
- +9dBu
- +6dBu
- +3dBu
- 0dBu
- -3dBu
- -6dBu
- -7dBu
- -12dBu
- -15dBu



METER: Toggle to select OUTPUT or INPUT as the source for the stereo VU meters

- **OUTPUT:** Routes the compressor output to the stereo VU meters (yellow LED)
- **INPUT:** Routes the compressor input to the stereo VU meters (green LED)

GR (Gain Reduction) Meter



A 10-segment LED gain reduction (GR) meter is provided to indicate the amount of compression being applied. When no gain reduction is being applied, none of the LED's are lit on the Gain Reduction meter (GR). When compression occurs, the corresponding LED's illuminate to indicate the amount of gain reduction. The following gain reduction increments are provided:

- -1.5dB
- -4dB
- -6dB
- -8dB
- -10dB
- -12dB
- -15 dB
- -17dB
- -19dB
- -23dB



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