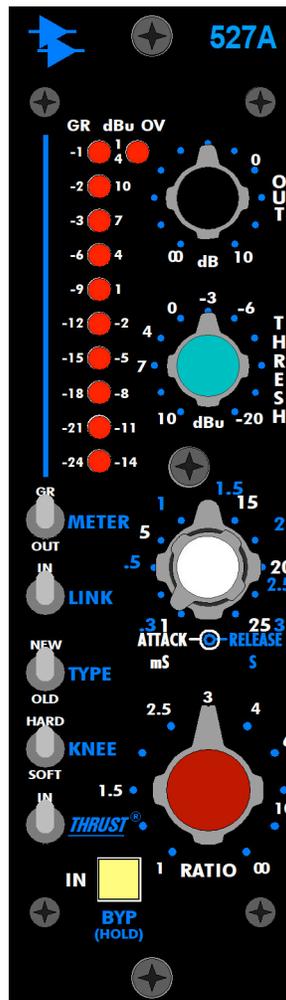




527A Compressor/Limiter



OPERATOR'S MANUAL v20-07-13

Written for Automated Processes Incorporated
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About This Manual

This manual explains the operation and applications of the "A" version of the famous API "527" compressor/limiter. The functions and sonic qualities of the "527A" are identical to the "527," except the "527A" includes an improved gain reduction meter and "IN/Bypass" switch functions. Original "527A" units can be modified so the gain reduction meter functions like the original "527."

Legend:

UPPER-CASE BOLD = SWITCHES, BUTTONS, & POTENTIOMETERS

UPPER-CASE = REAR PANEL CONNECTIONS

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1.0 Introduction

The API 527A Compressor/Limiter takes its place alongside the family of API VCA based compressors, the 225L compressor and 529, 2500, and 2500+ stereo bus compressors. Anyone familiar with these units will immediately be at home with the 527A.

Features common to the line include "feed forward" (**NEW**) and "feed-back" (**OLD**) gain reduction methods selectable on the front panel, provide a choice of "that old way" or "the new way" of compression, for the highest level of flexibility in signal gain control. The "old way" or feed-back method is what most of the classic compressors used for the gain control circuit. The "new way" gain reduction is more typical of the newer VCA type compressors that rely on RMS detectors for the gain control voltage.

There is a "**SOFT**"/"**HARD**" knee switch 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 patented **THRUST**[®] function can be switched in and out via the front panel as well, applying a filter before the RMS detector circuit that preserves that punchy bottom end.

Two or more 527A Compressor/Limiters can be linked together via a DC link allowing multiple units to be combined for stereo and multichannel applications.

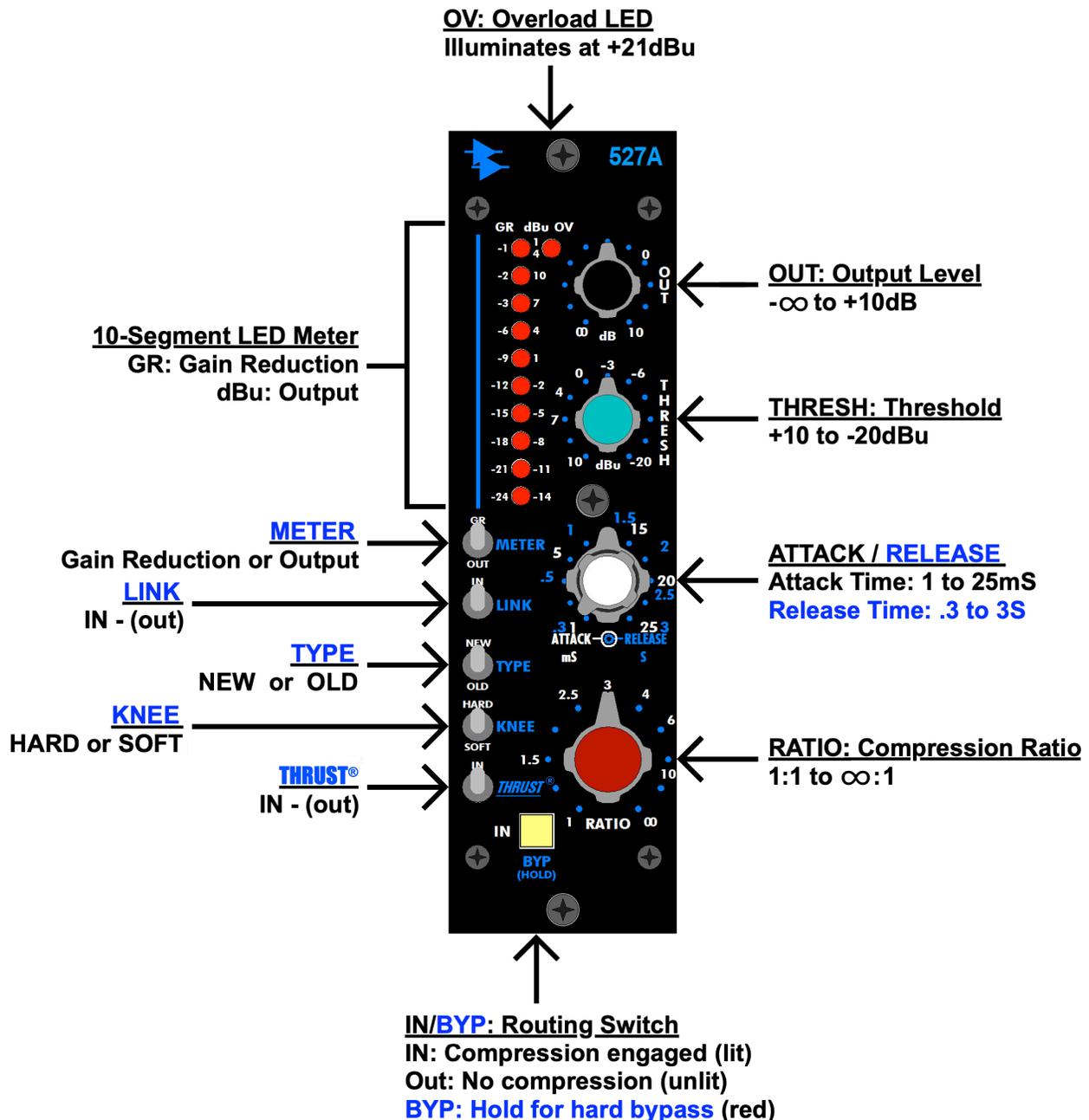
The output level remains fairly constant regardless of the threshold or ratio control, much like the "more/less" Ceiling control on the API 525 Compressor. This allows for live adjustments without any noticeable gain changes in the program level.

The 527A Compressor/Limiter makes use of the 2510 and 2520 discrete op-amps and exhibits the reliability, long life, and signature sound which are characteristic of API products.

Features

- Feed-forward or feed-back compression
- Hard or soft knee compression
- Patented **THRUST**[®] switch for frequency-dependent side chain control
- Continuously variable, 31 position detented **THRESHOLD** control
- Continuously variable, 31 position detented **RATIO** control
- Continuously variable, 31 position detented **ATTACK** and **RELEASE** controls
- Continuously variable, 31 position detented **OUT** (output) level control
- 10-segment gain reduction/VU meter (**GR/Output**)
- Overload LED
- **IN** switch with soft and hard relay bypass
- Audio circuit uses the 2510 and 2520 discrete op-amps

2.0 Overview

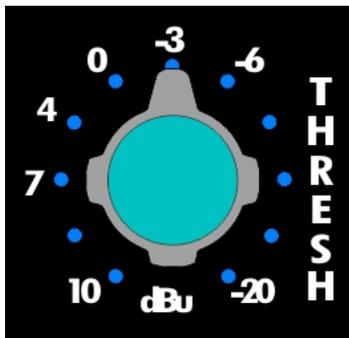


The 527A Compressor provides a comprehensive suite of controls:

- **THRESHold**: The level at which compression begins (+10dB to -20dB)
- **RATIO**: The amount of compression applied after threshold (1:1 to ∞:1)
- **ATTACK**: The time it takes for the compressor to respond (1 to 25 milliseconds)
- **RELEASE**: The time it takes the compressor to return to unity gain (.3 to 3 seconds)
- **OUTput**: Manual output level (make-up gain) control (-∞ to +10dB)
- **LINK**: Activates the DC link for stereo/multichannel operation with other 527A & 527 modules
- **TYPE**: **NEW** (feed-forward) or **OLD** (feedback) detection path topology
- **KNEE**: The **HARD** or **SOFT** response curve at the onset of compression.
- **THRUST®**: Patented circuit that inserts a filter before the RMS detector
- **IN/BYP**: Press to toggle compression **IN** or out or hold to engage hard bypass (**BYP**)
- **10-Segment LED Meter**: 10-segment LED meter (selectable gain reduction or output level)
- **METER**: Selects gain reduction (**GR**) or output (**OUT**) as the meter source
- **OV (overload)**: LED peak LED (illuminates at +21dBu)

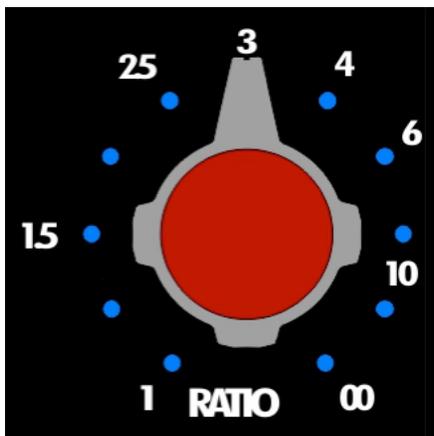
3.0 Compressor Controls

3.1 Threshold



- THRESHold:** Sets the level at which compression begins
- Continuously variable range between +10dB and -20dB
 - 31-position detented rotary pot for easy recall

3.2 Ratio



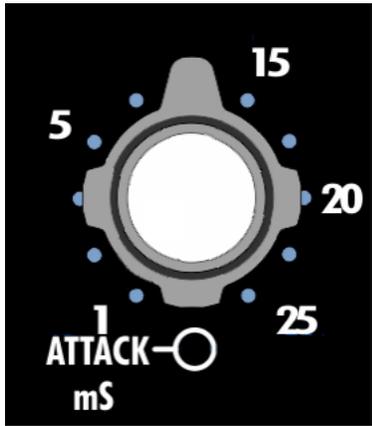
- RATIO:** Sets the ratio of input vs. output levels for signals that fall above the set THRESHold
- Continuously variable between 1:1 and ∞ :1 (x:1)
 - 31-position detented rotary pot for easy recall
 - Compression with RATIOS of 10:1 or greater is generally considered to be limiting

3.3 Attack & Release



Attack and Release times are controlled via a dual-concentric potentiometer. The outside pot (ring) controls attack time and the inside pot (center) controls release time. For ease of understanding these controls are show separately below.

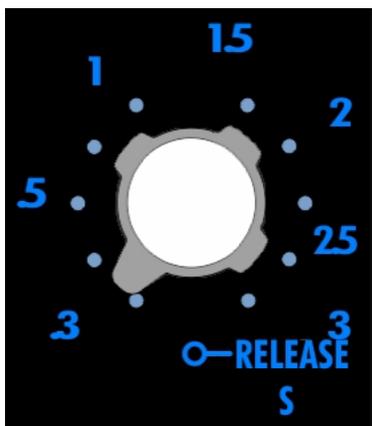
3.3.1 Attack



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

- Continuously variable between 1 and 25 milliseconds (mS)
- 31-position detented rotary pot for easy recall

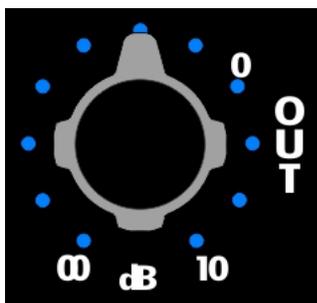
3.3.2 Release



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

- Continuously variable between .3 and 3 seconds (S)
- 31-position detented rotary pot for easy recall

3.4 Output



OUT: Manual output level control (make up gain)

- Continuously variable between $-\infty$ and +10dB
- 0 = unity gain
- 31-position detented rotary pot for easy recall

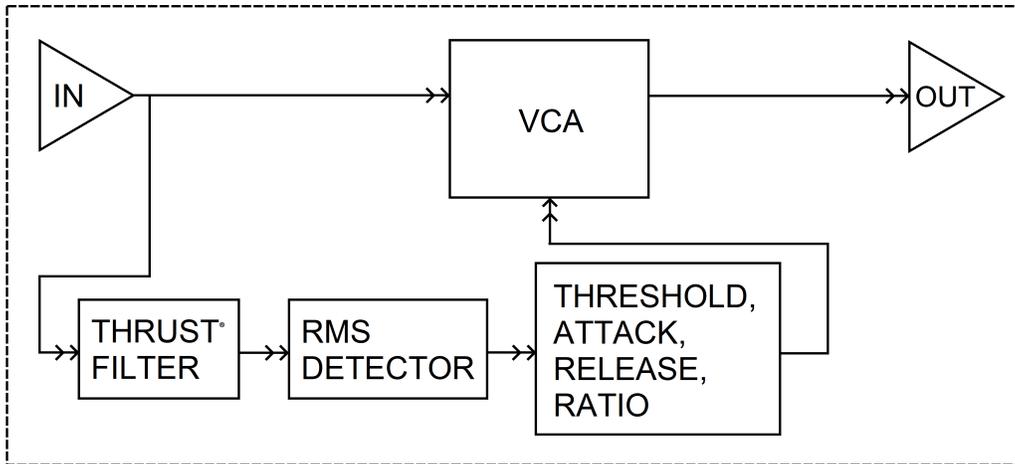
4.0 Compressor TYPE

The 527A compressor can be set to operate in two circuit topologies or “**TYPEs**” 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

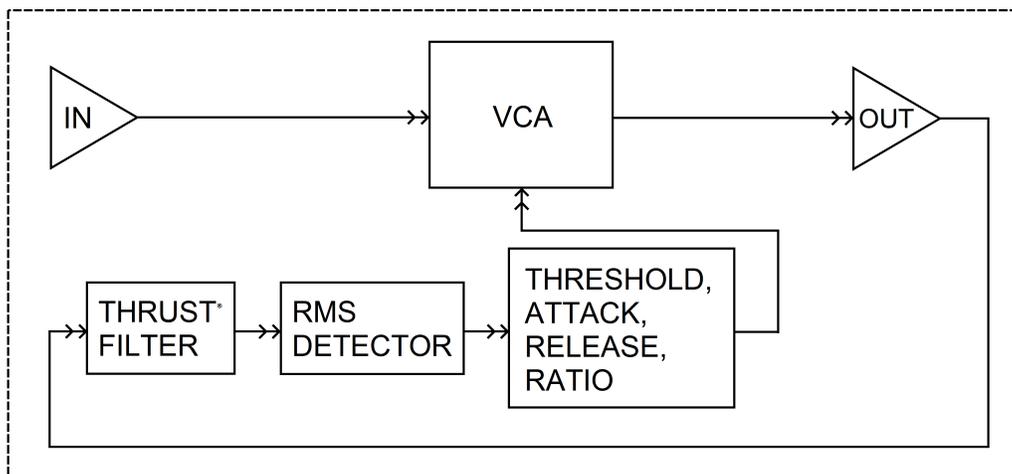
4.1 NEW (Feed-Forward)

In a feed-forward compressor, the RMS detector normally gets its signal from a split of the input signal. 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.



4.2 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
- **OLD**: Engages feed-back topology

5.0 Compressor KNEE

The **KNEE** function determines the shape of the 527A compressor's response curve at the onset of compression.

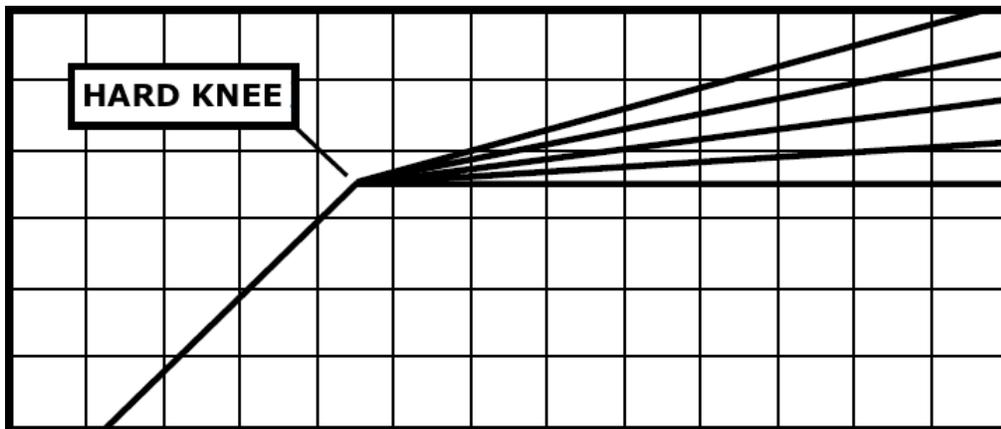
The 527A compressor has two (2) **KNEE** settings that control how the compressor transitions into compression:

- **HARD**: Sharp response curve
- **SOFT**: Rounded response curve

5.1 HARD KNEE Compression

HARD: Sharp response curve

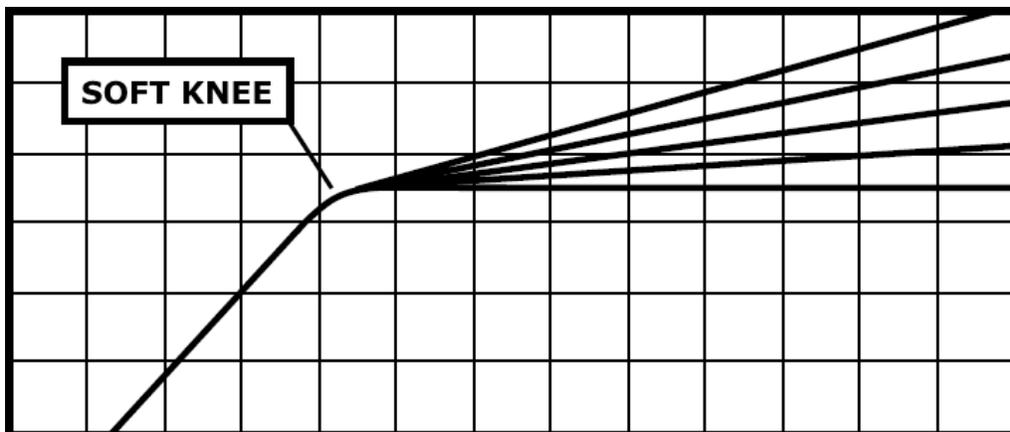
- Immediate onset of compression (sudden transition to set ratio)
- More aggressive and noticeable



5.2 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



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



- KNEE**: Set to select the response curve at the onset of compression
- **HARD**: Sharp response curve

6.0 ***THRUST***[®]

The 527A 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, the new 2500+, 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.

With ***THRUST***[®] engaged (IN) 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[®]: Set to engage the ***THRUST***[®] function

- **IN**: Inserts the ***THRUST***[®] filter before the RMS detector
- **Out**: No filter before the RMS detector

7.0 Compressor Bypass (IN)

The 527A is equipped with a relay-based, hard-wired **IN** switch and hard bypass.

A momentary press of the **IN** switch toggles the IN function. When the compressor is **IN**, the compressor processes audio and behaves normally. This is indicated by the **IN** switch being illuminated in yellow. When **IN** is disengaged (switch not illuminated), the control voltage signal is disengaged and the output signal is held at 0dB, but audio continues to pass through the 527A electronics without any gain reduction.

Press-and-hold the **IN** switch to toggle the **BYPass** control. When the compressor is in **BYPass**, the hard-wired bypass is engaged and the **IN** switch illuminates in red. In this state, the audio INPUT signal is routed directly to the audio OUTPUT connectors and do not pass through the 527A electronics.



IN/BYP (Bypass): Press to engage the compressor or the hard-wired bypass

- **IN**: Press to engage the compressor in signal path (switch illuminates)
- **Out**: Press to remove the compressor in signal path (switch unlit)
- **BYPass**: Press and hold to engage the relay-based hard bypass (switch illuminates in red)

*NOTE: When the 527A is powered off, it is held in the **BYPass** state. When the compressor is not in the **BYPass** state (red **BYP** LED not illuminated), the 527A behaves normally.*

8.0 DC Control Voltage Link

The 527A compressor can be linked with other 527 and 527A compressors for stereo and multichannel applications. Other VPR Alliance compressors that utilize the backplane link can also be linked with the 527A compressors for stereo and multi-channel applications.

When connected together and the **LINK** switches are engaged, the DC control voltages from all units are summed together. This results in the same control changes being applied to all compressors. While this is not a "Master/Slave" configuration, the Threshold, Attack/Release Times, and Ratio of all units should be set to the same value to prevent one channel from generating a disproportionate contribution to the summed control voltage.



LINK: Set to engage DC control voltage summing with other units

- **IN**: Activates the DC control voltage summing on this unit

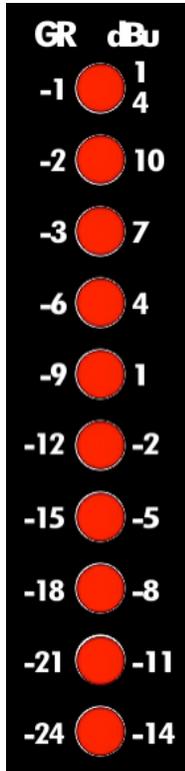
IMPORTANT NOTE: The **LINK** function of the 527A does NOT operate as other master/slave linked compressor pairs do, where the master unit's controls become the master control for both units while the slave unit's controls are disabled. Instead, when each of the 527As' **LINK** switches are pressed, they will contribute their control signals to be SUMMED into the common link bus and each of their front panel controls will affect the compression of any other linked 527A's audio signal. Units that have the **LINK** switch in the OUT position are unaffected. Setting the **LINK** switch to the "IN" position connects the 527A's compression DC side chain circuitry to a DC summing bus on the 500 series module motherboard. This allows for any number of 527A compressors to "LINK" their side chain signals into a common control bus for tasks such as maintaining stereo image or surround image during compression, or affecting one audio signal with another's dynamic characteristics. Front panel controls that affect the DC side chain signal (and therefore the compression parameters of ALL linked units), include the **THRESHOLD**, **ATTACK**, **RELEASE**, **HARD/SOFT**, **NEW/OLD**, **THRUST**[®] and **RATIO** controls. Adjusting ANY of these controls will affect the signal that will be sent out and summed with the **LINK** switch, and the dynamics that affect all linked 527A's. The DC link bus exists in the Lunchbox and is tied from channel to channel with zero ohm jumpers that can be clipped out if desired, to limit the ability to link channels. The 500V rack and 1608, 1608-II, & 2448 consoles have solder pads that one can connect with insulated wire to create the DC Link bus.

9.0 Meters

The 527A compressor is equipped with a 10-segment LED meter that displays gain reduction and output level, as well as an overload LED (**OV**).

9.1 10-Segment LED Meter

The 10-segment LED meter display gain reduction (**GR**) in decibels or output level (**dBu**).



The 10-segment meter can display the following gain reduction values (**GR**):

- -1dB
- -2dB
- -3dB
- -6dB
- -9dB
- -12dB
- -15dB
- -18dB
- -21dB
- -24dB

The 10-segment meter can display the output level at the following values (**dBu**):

- +14dBu
- +10dBu
- +7dBu
- +4dBu
- +1dBu
- -2dBu
- -5dBu
- -8dBu
- -11dBu
- -14dBu

The meter function is selected by the **METER** switch.



METER: Set to select the gain reduction (**GR**) or output level (**OUT**) meter function

- **GR (Gain Reduction)**: Selects the gain reduction meter function (**GR**)
- **OUT (Output)**: Selects the output level meter function (**dBu**)

9.2 Overload LED



The 527A is equipped with a LED peak indicator (**OV**) that illuminates when the output level reaches or exceeds +21dBu.

APPENDIX

A1 527A Specifications

Connector:	API 500 Edge Connector - VPR Alliance Compliant
Input Impedance:	120 K Ohms, Balanced
Output Impedance:	75 Ohms, Transformer coupled, Balanced
Maximum Input Level:	+26 dBu
Maximum Output Level:	+30 dBu
Output Fader Control Gain:	-Infinity to +10 dB
Attack Times:	1 millisecond to 25 milliseconds
Release Times:	0.3 seconds to 3 seconds
Compression Ratios:	1:1 to 1:Infinity
Threshold Control Range:	+10dBu to -20dBu
Metering:	10 Segment LED Meter showing either Gain Reduction (-1 to -24 dB) or Output Level (14 to +14 dBu). Overload LED: +21 dBu
Frequency Response:	+/- 0.5 dB 20 Hz to 40 kHz
Signal to Noise:	110 dB
Power Requirements:	3.5 Watts - VPR Alliance Compliant
Unit Size:	1.5" x 5.25" x 7"
Shipping Size:	4.5" x 6.5" x 10"
Unit Weight:	1.8 lbs.
Shipping Weight:	2.2 lbs.

527A Set Up Sheet

ARTIST:
ENGINEER:
DATE:

NOTES:
DRAWN BY:
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