



# 5500

# DUAL EQUALIZER



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## **Thank You for purchasing API's 5500 Dual Equalizer**

Whether you're seeking a truly superior analog sound, or simply want to be part of the nearly 40-year tradition of API excellence, we appreciate your purchase.

API takes great pride - and great care - in the hand assembly of all our professional audio products. Above all, we appreciate our loyal users, who have made the Company what it is today.

Larry Droppa  
President



# AN OVERVIEW OF THE 5500 DUAL EQUALIZER

## History of the API Equalizer

The lineage of the 5500 circuit can be traced back to the original 550 equalizer designed by Saul Walker, the founder of Automated Processes Inc. That three band EQ was originally used in the earliest API consoles built in the 1960s. Engineers were immediately captivated by its fully reciprocal boost/cut characteristic and its proportional Q design, one of API's many industry firsts.

The sound of the 550, 550A, and 550B console equalizers was so highly prized by engineers that many purchased API equalizers separately or took apart old consoles in order to install the equalizers into a hand made chassis. This allowed them to have that same API console sound available no matter where they were working. Today, API manufactures the six-space Lunchbox and the 10-space VPR rack, making it easier for engineers to bring the API sound to all of their recordings.

The 550 was designed as a console equalizer which, due to the architecture of the recording console, uses an unbalanced input. Also, the ergonomics of a console dictates that controls take up little space, sometimes limiting the number of functions that can be included in a design. The 5500 is specifically designed to continue the tradition of API's precision equalization. It features a balanced input, a true straight-wire bypass, an integrated power supply with noiseless muting, and a range control that expands its versatility to mastering applications.

## All Discrete Design

Like all API products, the 5500 contains no integrated circuits in its signal path. The gain comes from two hand-built 2520 operational amplifiers in each channel and the balanced input is handled by a 2510 discrete operational amplifier. Besides being a key component of the API sound, the 2520 coupled with the API 2503 output transformer is capable of delivering +30dBm before clipping. With this much headroom, it is unlikely that the 5500 can be driven to distortion.

## Proportional Q Circuitry

The Twin "T" topology is found in many equalizer circuits, but the legendary Saul Walker included a novel **Proportional Q** section that makes it truly musical. **Proportional Q** works by spreading the equalizer's action over a broad bandwidth at low degrees of boost or cut. This provides delicate shading and subtle coloring of the signal's tone, without leaving the impression that signal processing was applied. As the amplitude is advanced to more extreme settings, the equalizer's bandwidth narrows to provide the user with surgical precision. This allows the equalizer to be useful in removing undesirable noises or radically emphasizing an aspect of an instrument's character, such as its attack.

The additional circuitry necessary to provide proportional Q is not included in most other equalizers because it adds nothing to the spec sheet. Listening to musicality in the signal is the only way to appreciate the benefits of the added cost and complexity required for Proportional Q design.

# Fully Reciprocal Operation

Before the 1960s, few equalizers had the same characteristics in boost mode as in cut mode. (In fact, many earlier designs did not have both boost and cut to begin with.) Today, it is common for equalizers to be reciprocal, but again, Saul Walkers design is special. When switching an API EQ from boost to cut, the exact same components are used, reorganized around the amplifier for the appropriate function. This guarantees 100% reciprocity. The benefit becomes apparent when a track is re-equalized to remove the previously applied equalization. The engineer can be confident that, because of the 5500s fully reciprocal design, a truly flat frequency response will be restored

# Range Control

Each of the 5500s four band EQs features a separate Range Control, which allows the users to choose from several API module boost and cut specifications, detailed below:

Boost / Cut	Application	API Module Reference
+/- 2dB	Standard Equalization	550B
+/- 1dB	Higher Resolution Equalization	550D
+/- 1/2dB	Mastering Equalization	550M

The range of the amplitude controls can be reduced to 1/2 or 1/4 of their stated scale, with the Q altered identically as before. Range Control provides a means of adjusting the tonal balance with finer resolution in an even gentler manner. This should be especially useful for complex program as contained in stems or submixes, and is ideally suited for mastering purposes. The combination of reduced range equalization coupled with APIs characteristic “warmth” can be useful in helping breathing life to the sterile sound often found in digital recordings.

# Power Mute and Bypass

The 5500 features a true hard-wire bypass. In this mode the output connector is wired directly to the input. Shortly after power is first applied, or immediately after it is lost, a special circuit forces this mode so **signal is never lost** and **power thumps are never heard**. The BYP button lights orange in bypass mode whenever either the circuit or the operator put it into bypass.

## FRONT PANEL CONTROLS AND CONNECTIONS

### RANGE and Amplitude Controls

The range control is a unique and powerful addition to the traditional 550 circuit. It is a formal implementation of a popular factory modification of the 550 EQ.

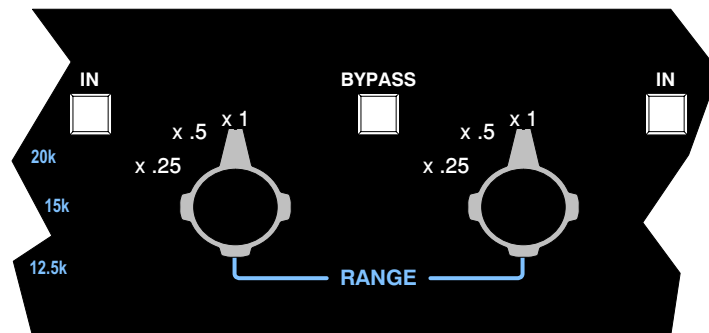
In **x1 mode**, the equalizer behaves identically to the classic 550A and B. In **.5** and **.25 modes** the amplitude scale as shown on the front panel is reduced proportionally. True to the design of the 550, the Q is reduced in an equivalent fashion, meaning that if 6dB of boost is selected in the x1 range, you will get the same amount of boost and an identical shape of the EQ curve by selecting 12dB in the .5 range. The classic subtlety of the 550 when used at low amplitude settings is enhanced by the ability to perform micro-adjustments of tonal color. Mastering engineers also prefer an equalizer that has exactly repeatable switch settings and the capability of truly reciprocal operation, features that are common to all API equalizers.

### BYPASS

When this is selected, the unit enters a true straight-wire bypass, the output is connected directly to the input and there are **no electronics in the signal path**.

### IN

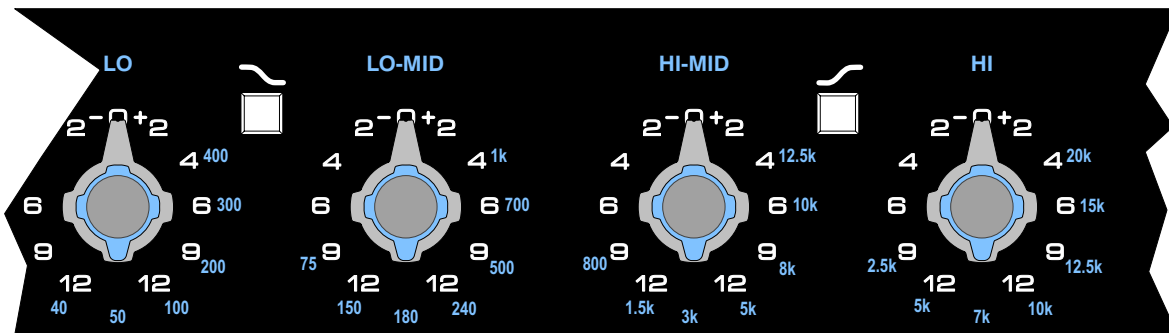
When IN is selected, the equalizer is fully operational. When it is out there is no equalization applied. It differs from BYPASS in that **the electronics and output transformer are still in the signal path**.



## PEAK/SHELF Switch

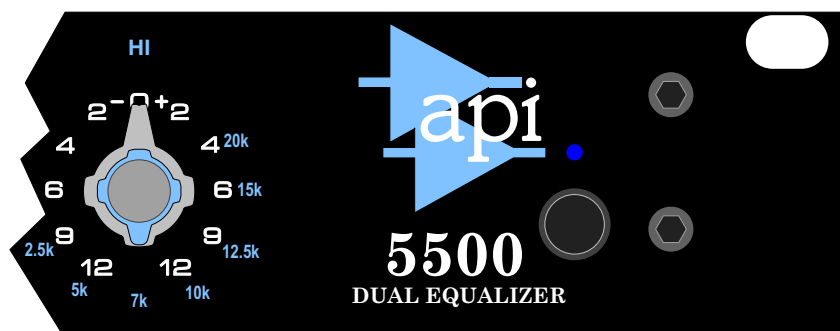
All equalizer sections have peaking (also called “bell” in the UK) response characteristics. While the central frequency of that boost (or cut) is the one engraved on the panel, there is of course amplitude variation that occurs to a lesser extent on nearby frequencies. This is termed the Q where higher Q’s have less effect on adjacent frequencies. As mentioned before, the API equalizers have a Proportional Q that gets larger as more amplitude change is selected.

On the highest and lowest bands there is an option to select shelving response. When in shelving mode, **the equalizer reaches the indicated amplitude at the indicated frequency and remains with that amplitude change for all frequencies to the edge of the audio spectrum.** For frequencies towards the center of the spectrum the change is gradual, but the slope differs slightly from the peaking mode. This can have important effects on the midrange character of the sound, but that is not the typical reason to select shelving. The two principal reasons for using a shelving response is either to eliminate noises like rumble that are outside the frequency range of the desired sound, or to give a general “tilt” to the tonal balance towards treble or bass. The API 5500 accomplishes both of these tasks without sounding resonant.



## POWER

This power switch has a unique transient bypass capability. When powered down, the unit is automatically forced into bypass, regardless of the BYPASS selection. Upon power-up there is a delay which allows all the electronics to stabilize for a approximately two seconds by enforcing bypass mode. Also, if power is removed or lost for any reason, the bypass mode is immediately invoked in order to maintain signal throughput without any interruption. The BYPASS button’s light is orange whenever the unit is in bypass.



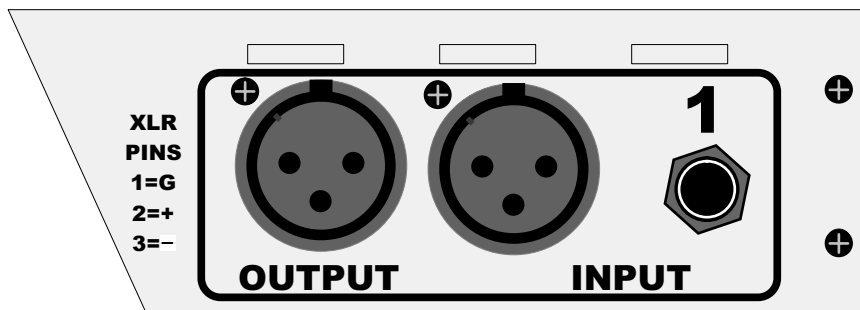
## REAR PANEL CONTROLS AND CONNECTIONS

### Balanced IN and OUT Connections

The input XLR is connected to an active balanced circuit. The output XLR is driven from a transformer coupled output and can drive any load from 600 ohms or greater to full output capability. The polarity is such that there is no change from input to output, so it is suitable in studios using either pin 2 or pin 3 as the “hot” connection.

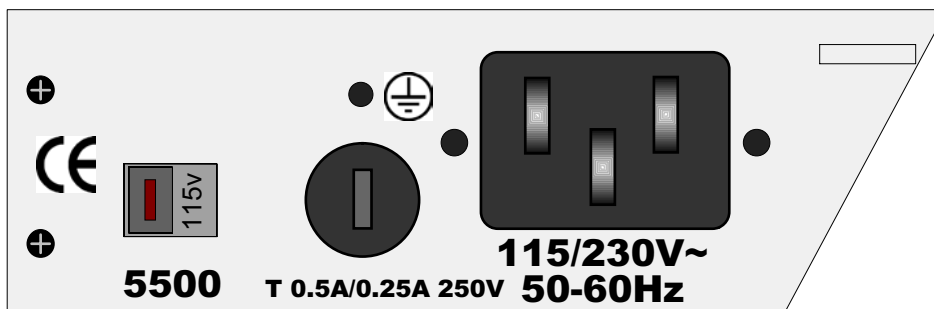
### Unbalanced Input

There is a ¼ inch connector that interrupts any signal that is present on the input XLR. It is balanced and can be driven from either balanced or unbalanced sources. A positive signal on the tip will deliver a positive signal on pin 2 of the output XLR. Using the ¼ inch input does not bypass any internal circuitry and does not change gain or operating level.



### Voltage Selection and Fuse

For line voltages from 100v to 120v, set the switch to 115v. The 230v position is good for all line voltages from 200-240 volts. When set to the 115v position use a 500mA GMA fuse with Slo-Blo characteristics. At the 230v setting use a 250mA Slo-Blo fuse. **It is important to change the fuse when changing the supply voltage.**



## 5500 SPECIFICATIONS

Input Impedance	> 100Kohm balanced
Output Impedance	< 75 ohm floating
Maximum output Level	> +28dBm with 600 ohm or greater load
Frequency response	< $\pm$ 1dB from 10Hz to 30KHz
Distortion	< 0.1% @+20dBu from 100Hz to 20KHz
Noise	< -70dBu unweighted
Power Requirement	15 watts (130mA at 115v, 65mA at 230v)

### Transformer Option

There is a field upgradable option for a transformer -coupled input. The discrete balanced input circuitry is bypassed using this transformer. It uses the highest quality line input transformer, which can provide low distortion and wide bandwidth when fed from conventional professional gear. Other brands of audio equipment will encounter clipping at around +24dBu, but another API device could distort any input transformer since it is capable of an undistorted +30dBu output. Since API equipment is capable of signal voltages that are typically twice as large as most professional equipment, it is possible that the input transformer will experience some distortion in the low frequencies when fed signals beyond +24dBu.



**Housekeeping:**

Here is a great place to write down the serial number of your 5500 and your purchase date, just in case you need that information someday in the future.

API 5500 serial number \_\_\_\_\_

Purchase date: \_\_\_\_/\_\_\_\_/\_\_\_\_