



STEREO ANALOGUE SOLID STATE  
TAPE

**456 STEREO ANALOGUE SOLID STATE TAPE  
+ A80 RECORDER**



**456 STEREO  
HALF RACK**

The 456 range in essence is an All Analogue Solid State Tape Recorder the Output of which can be recorded by conventional Digital recording techniques whether the application is for Digital Mastering CD's, Stereo Bus Processing, Mixing and Tracking applications.

It uses the latest ultra-high speed analogue design techniques to accurately duplicate the dynamic and harmonic properties of analogue tape and vintage tape recorders in real time with zero latency or any other time smearing artefacts. 456 Tape was chosen as the model for the harmonic and dynamic properties and the A80 Studer Tape Recorder as a reference for overall frequency response with respect to tape speed, bias and tape head properties.

## **INTRODUCTION**

It is very quick and easy to use and can be used with conventional DAW setups or the more advanced professional setups that have external converters, analogue mixing and other analogue effects.

We feel confident that the 456 moves the goal post forwards in offering a solution that cannot be obtained by other Digital Plug Ins or combinations of other output effects.

Zero Latency and no extra CPU load plus the ability to multi track in real time recording applications are just some of the advantages. It continually processes each of the positive and negative peaks independently with zero attack and release time thus maintaining the full audio fidelity of the original signal with desirable analogue recording qualities.

The 456 extended Low and High frequency response exceeds that of an original Vintage Tape Recorder operating at 15ips or 30ips all of course without any tape hiss producing what is in effect HD TAPE RECORDING.

We have carefully crafted our 3 band EQ adjustments to enable final tweaking of the overall sound on final mixes and recording to emulate the effects of low frequency head bump and high frequency detail found with change of tape speed and bias variations. These optimised EQ adjustment ranges were developed in conjunction with leading producers and mastering engineers to make the 456 perform just like a Vintage Tape Recorder using Studio Mastering Tape.

## **PRIMARY TRACKING**

The 456 can be used after an outboard analogue microphone pre-amplifier and then into the DAW.

This effectively enables the tape compression and harmonics to be added at source and especially makes recording of difficult percussive sounds ie: Drums very easy as all the very fast high frequency peaks are controlled so as not to go into digital distortion.

The optimum recording level is set in seconds by simply turning up the Input Control until audible distortion is heard. This is the maximum tape saturation point being found.

You can now adjust the Digital Recording Level to your operating recording level with the DAW controls or with the Output control in the Stereo Model. The Input control can now be reduced until the right amount of Tape Saturation is found by ear.

“If it sounds right it is *right*”

## **POST PRODUCTION**

The 456 can be used as a Hard Insert or for Bus Mixing applications in typical DAW applications to give previously recorded tracks or mixes some added warmth and harmonic content.

Any previously recorded digital tracks can have analogue tape characteristics added as in CD Mastering or for final mixing.

## **OPERATIONAL ADVANTAGES**

The 456 will control and shape each positive or negative peak giving you confidence of never going into digital distortion and safely use the maximum digital range possible to obtain the best resolution and quality.

Without using a 456 you would only be aware of over recording on playback when it could be too late.

Constant meter monitoring can now be forgotten with DAW peak metering too slow to display and track the very fast peaks that give the A to D converters trouble.

You can of course set up the 456 with tone and monitor levels with VU Meters. This is very easy with our Stereo Model as it has a separate Bypass function on each channel for evaluation and set up.

The 456 Stereo can be set up for zero insertion loss so +4dBm or 0VU is obtained in both Bypass and Operational modes Output will be set at Maximum and Input adjusted to give zero insertion loss.

This would be exactly as a Vintage Tape Machine might be setup The 456 Tape saturation point will then be at +13dBm or +9VU the same as if actually using tape.

All peaks will be held at these levels and your initial calibration levels can be changed accordingly to take advantage of this.

Instead of using 0VU = -20dBFS our mastering engineers are setting up now to 0VU = -11dBFS knowing that all peaks are now held below digital distortion or 0dBFS.

So you can understand that the use of the 456 is unlike any other Digital Software Program and operates with zero latency and any number of them can be used in real time simultaneously thus saving significant Studio Time.

The 456 uses our latest triple shielding construction containing a 6 layer PC Card with 2 copper power planes. The internal PC connections are between these shielding layers. The metal box is the 3rd shielding element. This provides very effective shielding against EMI and RF interference from Mobile Phones, Routers and Computers that all are present in modern studios.

The digital recording process works best from analogue sources. Old legendary albums from analogue master tape recordings when re-mastered to CD format are considered to sound pleasing to the listener and in many cases set the benchmark to which people aspire to today.

## **APPLICATIONS AND SETTING UP**

The 456 has analogue inputs and outputs that have been optimised to work well with current studio configurations whether they use traditional analogue consoles or a modern DAW setup.

### **Primary Recording**

The 456 has many advantages when used to process the analogue output of a microphone pre-amplifier as it can now control the peak levels effortlessly whilst also adding the desirable tape qualities before the signal is recorded.

The benefits of the 456 can easily be appreciated when using drums and other difficult percussive sounds in this mode.

Multi microphone tracking using several 456 units can be done in real time with no latency or extra CPU Load as when using DAW recorders.

The ability to multi track live using the 456 reduces the work load on the operator as the danger of over recording can now be forgotten once the 456 levels have been initially set. You can enjoy the effect of tape saturation and added harmonics very easily.

This method has to be considered as the ultimate way to capture tape qualities at source.

### **Secondary Processing – Mastering – Mix Busses - Tracks**

The 456 is probably most useful in giving tape qualities to existing digital track or mixes and is proving very popular both in mastering and mixing applications. It can be calibrated as you would with a Tape Machine for zero gain. In this case 0VU Tone is sent to the input of the 456 and the Output control set to Maximum.

The Input control is then set so that 0VU appears at the 456 Output.

The Presence is set full anti-clockwise and the Treble and Bass controls set at 12 o'clock.

You now have set a Flat Frequency Response from 20Hz – 100Khz within 0.5dB.

The Tone controls are there to tweak the response but were not designed to work as program equalisers but more for optimising overall mixes and tracks. If the Treble control is rotated full anti clockwise or to 7 o'clock a small tape head bump curve will be introduced.

The 456 will now act as a Tape Machine with the saturation point being at +9dBVU or +13dBm.

So if you increase the input you will hear the effect of the Tape Saturation and harmonics and this can be compared to the original using the Bypass switch.

### **Digital Signal Level Optimisation**

Instead of using 0VU = -18dBFS mastering engineers are setting up now to 0VU = -12dBFS knowing that all peaks are now held below digital distortion or 0dBFS.

Peak Levels are now held to -2dBFS with all types of program material and without using a final Peak Limiter.

This has obvious advantages to Mastering when colouration is not desired from a Limiter. Peak Level assurance and maximum loudness can be obtained whilst maintaining the overall flavour and fidelity of the mix.

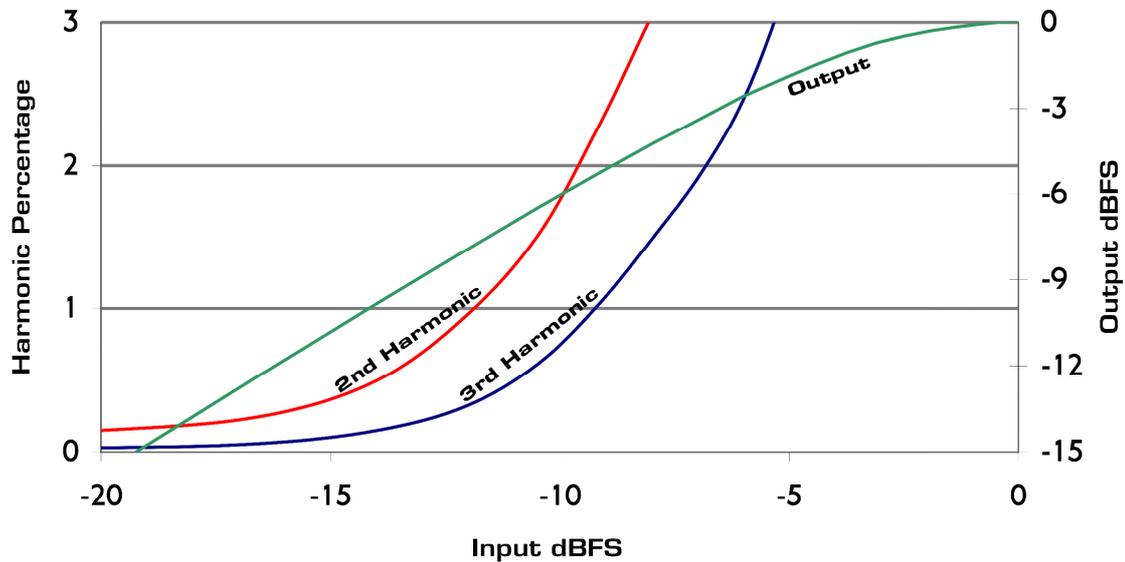
3rd Party Converters used by most professionals support the use of this elevated operating calibration level and the 456 has been expressly designed to operate at maximum efficiency at these levels with state of the art professional configurations.

Unfortunately current versions of Pro-Tools do not have the capability to work at these optimum levels and their converters can only be adjusted up to set 0VU = -16dBFS so when using a 456 in this configuration the peaks will be held to around -6dBFS. We do not have any plans to change our units to work at these semi-pro levels as the 456 has been optimised for professional levels and acts just like a Tape Recorder would if set up for zero gain input to output.

We feel the advantages of having peak control and tape compression and harmonics with easy setup work well with most DAW packages and for the ultimate performance to be realised by recording to maximum digital levels you will have to use the best available hardware that produces today's "State of the Art".

## TECHNICAL INFORMATION

### Roger Mayer 456



#### Output Curve:

The green output curve shows the soft knee compression characteristics. As the input increases to **0 dBFS** the output increases and is held to a maximum level of

**0 dBFS**. This corresponds to analogue tape saturation with the peak level no longer increasing.

#### 2nd Harmonic Curve:

The red 2nd harmonic curve shows the increase of harmonic content as the input nears **0 dBFS**. As with tape the 2nd order harmonics add warmth and are pleasing to the ear as they possess a direct musical relationship.

#### 3rd Harmonic Curve:

The blue 3rd harmonic curve increases to about 3% when the output is nearly at peak level. This is very similar to what happens when the tape is driven to near peak saturation.

#### Please note:

The values shown are for peak levels and the actual mean operating levels will be down around the **-20 dBFS** where the distortion is low in value. The actual output noise level is below **-96 dBFS** peak and the frequency and impulse performance exceed that obtained from analogue tape making it like HD Tape.

## TECHNICAL SPECIFICATION

The audio signal path is completely Class A with a very high bandwidth. The -3dB point has been set to above 100Khz. The low end extends to below 10Hz. Peaks are accurately high speed manipulated with ease and maintain the original phase position in the waveform. This fact can be observed using the latest high speed storage oscilloscope technology.

This is a completely discrete analogue design hand built using only selected low noise transistors, low noise metal film 1% resistors, metalised film capacitors from the World's top manufacturers all combined in a design to provided ultimate studio quality audio.

The 48V DC input power is further regulated and filtered onboard to provide *virtual battery* performance and the lowest possible noise under all conditions.

### Stereo Model Additional Features

Gold Plated Neutrik XLR connectors are used on the Stereo Model with Individual Bypass Switches with LED Status Indication and Output Control. Custom potentiometers manufactured for best stereo tracking accuracy.

**Input Level:** Nominal -20dB to +4dB Unbalanced

**Output Level:** +4dbu or 3.5V peak Unbalanced

**Output Impedance:** 50ohms

**Load Impedance:** 10K or greater

**Dynamic Range:** 96dB

**Headroom:** Maximum input level +32dBm – Internal Headroom 20dB

**Stereo 456 Size:** 220mm width x 185mm depth x 44mm height, weight 1162g

**Power Requirements:** +48V DC at 150mA regulated  
Universal World AC / DC Switching Adaptor Supplied

