

RM 58 Classic Stereo Limiter with 456HD® Tape Simulation



Features:

- Golden Era Analogue Stereo Limiter Design
- 2 Dynamically Matched Channels
- 456HD® Analogue Tape Simulation
- 456HD® Output Level Trim Control for easy DAW setup with 21 stepped position
- Choice of Continuous or 21 position stepped Threshold and Output Potentiometers
- Wide Range 10 position Attack and Release time constants
- VU Monitoring of Gain Reduction, Input or Output Levels
- Ultra Wide Band Custom Ferrite Transformers for fully Balanced Inputs and Outputs
- Hand Built in the United Kingdom
- Ultra Low Noise Triple Shielding using 6 layer PC Card
- Channel Link Switch with LED Indication
- Channel Bypass Switch with LED indication
- 456HD® Bypass Switch with LED indication
- Front Panel access to VU Calibration
- Front Panel access to Gain Reduction VU Zero set
- Gold Plated XLR Connectors
- Stainless Steel Construction
- 48V DC Universal World AC Power Supply included

History:

The RM 57 and RM 58 Stereo Limiters were and still are regarded today by many leading producers as a Holy Grail piece of vintage analogue equipment and were manufactured in New York by Roger Mayer Electronics Inc. They have a 50 year studio history and heritage of being used on many hit records since their introduction. From Olympic studios in London famous for the Rolling Stones recordings and of course Jimi Hendrix's iconic "Axis Bold as Love" to New York's Record Plant, Electric Lady, Atlantic Records, Columbia Records, Hit Factory, Media Sound, Elektra Records, Vanguard Records, Mayfair Studios, A&R Studios the unique and musical properties of the RM 57 and 58 became a go to choice for producers who needed an alternative more dynamic sounding limiter than the traditional radio station type of limiter that were in use.

Other recording studios quickly followed both in the USA, England and Europe and the sound of the RM 57 and 58 can heard on the tracks from these famous studios who were responsible for many legendary iconic recordings of so many famous artists: Jimi Hendrix, Stevie Wonder, Led Zeppelin, Aerosmith, John Lennon, to name a few. Leading mastering studios also used RM Limiters and Atlantic Records, Record Plant; Elektra Records had custom versions made. So it would be accurate to say that you have already heard them in action.

Recording Console versions were also installed in our custom recording desks as well on a Custom Film Location Mixer with a RM 58 Stereo Limiter for Rolf Pardula used for main dialogue capture on many Hollywood major film releases. Rolf also went on to win an Emmy for TV series sound recording using his custom RM location recording mixer. Fred Weinberg Productions went on to win multiple Clio's for commercial TV Music using both a custom RM Console and RM 58 limiters.

OVERALL TECHNICAL INFORMATION:

A unique proprietary FET gain reduction circuit uses the input information in a feed forward manner to control both positive and negative peaks. This dynamically controlled gain reduction method enables the Stereo Centre image to be maintained whilst using significant amounts of gain reduction thus making it popular for vinyl mastering applications. It is almost the opposite of using the old type of limiter where the information is integrated over a period of time and then applied to control gain. The limiting ratios are not specified because with this dynamic gain reduction method occurring in real time they are always changing to produce a very natural and musical sounding result. The wide range of Attack and Release times available enables many difficult recording situations to be recorded perfectly.

The closely dynamically matching of our legacy 57 or 58 limiters was crucial to enable successful Master 2 Track Bus production tasks. Individual superb performance with Bass Guitars, Vocals, Drums. Strings and Brass for initial tracking etc also benefit from this dynamic matching to enhance the overall performance when using multiple microphones set-ups.

The audio circuit path is all Class A low noise advanced discrete design only using the best available components. The resulting Class A circuit path provides the ultimate audio transparency with an extended frequency response to 100 KHz. The output is also Class A - ultra low output impedance.

Technically the design was very advanced and today its performance still stands out and compares very favourably to newer designs. It is more open and dynamic sounding than many of the old type of traditional Radio Station or Broadcast Type of Limiters.

CHANNEL TECHNICAL INFORMATION:

TRANSFORMER BALANCED INPUTS AND OUTPUTS

We manufacture in house our own custom transformers using Ferrite Cores with wide bandwidth material specification to ensure ultimate high frequency, phase response and hum rejection. Perfect isolation and safety can be obtained in the most demanding situations with no chance of damaging delicate electronically balanced circuits.

Electronically balancing an Input or Output with a multiple IC's configuration is a cheaper option but then you have immediately created a compromised signal path. Also be aware that audio signals are not symmetrical about the zero axis and also differ with every 180° zero crossing so electronic balancing will always introduce input errors.

So it makes sense to use direct High Performance Balanced Transformers.

INPUT TRANSFORMER: The transformer is capable of accepting high levels in excess of +35dBu.

OUTPUT TRANSFORMER: This has an electronic specification that is perfectly matched to DAW input specifications. The headroom provided is at least 24dB above nominal operating conditions.

DIGITAL FRIENDLY: The use of a good limiter to control peaks effectively in real time before you go into the digital domain is the best way forward to record a great sound. Using a limiter plug-in for secondary digital processing will simply will not do the job as well. The peaks have already been recorded and have suffered time smearing and other artefact from the anti-aliasing filter. The signal you are trying to process does not contain the same amount of information as before digital capture so it make sense to use Primary Analogue Processing first. The updated RM 58 has been designed to perform this new task quickly and easily to bring a new sonic dimension and efficiency to digital recordings.

THRESHOLD:

Turning this control to position 10 will increase the amount of limiting or gain reduction and cause the GAIN REDUCTION METER to deflect if sufficient input level is available

OUTPUT:

Turning this control to position 10 will increase the overall level but will not alter the THRESHOLD LEVEL previously set. This means that the amount of GAIN REDUCTION or LIMITING is independent of output setting.

ATTACK TIME:

The 10 positions of attack time will cover a very wide range of recording situations and have been selected from real time experience and feedback from many famous producers. Generally speaking a slightly slower setting will suit instruments with low frequencies. The limiter will act on both negative and positive wave fronts independently so there is no latency involved when a negative wave front appears first. The result will sound very natural and the effect of changing to a slow or fast time can be easily seen from the GAIN REDUCTION METER.

RELEASE TIME:

This control is used together with the Attack Control to set the characteristics of the dynamics control that you desire. The range of time constants available can be used to provide many very different effects. The audible effect of release time is the time taken for the background sounds to come up or recover after the signal that caused a gain reduction has ended. Speech requires a relatively long time constant as it is undesirable to have background noise or hiss come up between syllables. Drums and other percussive sounds might require full recovery so that the apparent dynamic range is least effected whilst controlling the peaks.

Of course the limiter can be made to pump on purpose to create an artistic effect on a recording and this is quite a desirable feature for many people.

STARTING POSITIONS:

Set both Attack and Release to position 5 or 6

Set VU Monitor to Limiter Gain Reduction

Turn Threshold up until the Gain Reduction Meter just moves.

Turn Output Control so that output level is equal to the level when the Bypass switch is engaged.

The unit now has been set for unity gain.

Adjust Threshold for desired amount of Gain Reduction and make any other adjustments for Output and the Attack and Release times.

SUGGESTED SETTING OF ATTACK AND RELEASE CONTROLS:

	ATTACK	RELEASE
Electric Bass	7-10	7-10
Drums	1-5	1-5
Voice	1-5	7-10
Strings	4-7	6-9

The attack time should generally be made as fast as possible without inducing any clicks. However should the sound of a photocell limiter be required a setting of 7-10 will closely approach the sound for both attack and release.

The release time is so dependent on type of instrument or program material that it is very hard to give any hard and fast rules. Long release times do however reduce low frequency distortion and background modulation effects.

VU MONITORING FUNCTIONS:

LIMITER GAIN REDUCTION METER:

An illuminated backwards-reading large VU meter both shows Gain Reduction and the effect of the Attack and Release time constants on the amount of gain reduction.

The gain reduction is measured using an identical independent side chain as the audio path thus ensuring real time accuracy.

INPUT AND OUTPUT METERING:

A high input impedance custom designed VU meter driver with exceptional wideband frequency response interfaces to the meter giving very good ballistic response with all types of program material and is easy to use when recording.

High Accuracy of +/- 0.2dB 20Hz to 80KHz.

456HD® TAPE SIMULATION ANALOGUE DYNAMICS PROCESS:

The 456HD® Analogue Dynamics Process is an innovative new way to experience modern dynamic and harmonic control in real time with zero latency. It was inspired by the desirable qualities of tape recording and can reproduce their dynamics and harmonic properties accurately plus improves the overall dynamic performance of Digital Recording. It brings a far more sophisticated approach to dynamic control and its performance exceeds that of any tape recorder previously produced now setting a new benchmark.

The 456HD® High speed analogue dynamic process can be switched In and Out to instantly hear the effect of the tape simulation properties. This proprietary process is based upon and derived from the properties of a perfectly lined up STUDER A80 with 456 Tape without any of the problems associated with old mechanical tape recorders that were temperamental at the best of times and required dedicated in house technicians to maintain them daily at great expense.

Good quality 2 inch tape today has a cost (£250.00 for 15mins) and that is really not a viable financial option for the modern recording process with today's tight budgets.

The output level of the 456HD® process into a DAW can be adjusted by the TRIM control knob to simulate and control the over recording set ups that were used back in the day to push the tape into saturation with the correct desirable amount of sonic tape compression. Pushing the tape hard was an important tool in getting the correct thick musical sound for your tracks. You can rest easy and think of the 456HD® process as a solid state tape recorder being converted into digital by your DAW.

The 456HD® process has been in use for over 4 years by top producers and the RM 58 Classic Stereo Limiter has also been extensively field tested by some of the finest ears in the industry.

As this Classic RM 58 design has long history of success and has been used in so many landmark recordings the actual progress and evolution to our current model has been a case of simply bringing the design forwards using today's technological improvements. This great design is then combined with our latest high speed analogue dynamics process to produce a truly unique compact product with all the modern features for DAW recording

ANALOGUE ZERO LATENCY PROCESSING ADVANTAGES BEFORE RECORDING INTO A DAW:

The enemy of obtaining ultimate fidelity when recording audio using any DAW is the ANTI-ALIASING filter which is 1st in the signal chain before the converter. It is absolutely necessary to allow the converter to work properly at all. So we cannot get around this fact technically. The CD format was introduced in the 1980's with today's current standard of 44.1KHz / 16bit and all were produced from analogue tape masters. These CD versions of many legendary vinyl recordings today are considered by many to be the Holy Grail and Benchmark for many music listeners and their quality and detail have yet to be surpassed. Of course all the mixing and production work was done in the analogue domain and the final mix masters were then converted A to D one time to produce the CD Masters.

This simple piece of factual History inspired me to develop the 456HD® process to bring a practical solution to an important part of the puzzle when recording into the modern digital world.

The properties of a tape recording were very important in the initial success of the CD. The pre-processing of the audio by the tape recording process actually helped minimise the nasty artefacts that the ANTI-ALIASING filter produces.

The mathematics of this steep step filter is beyond a short explanation. It can however be partially understood through a simply analogy that “once detail is lost it cannot be reconstructed” this holds true for audio as it does with visual images.

This problem under mathematical analysis proves that this type of filter introduces significant phase shifts of 5 or more complete high frequency waves. This is no small error and the information is now time shifted or smeared and is held by the filter to cause further errors so new information appearing will be corrupted.

These types of artefacts result in the “white noise” high end you can hear and the indistinct audio quality of mid- level program material. The tape recording process helps eliminate most of these by actually reducing the slope of the audio peaks whilst still retaining the fidelity of the power portion of the program material.

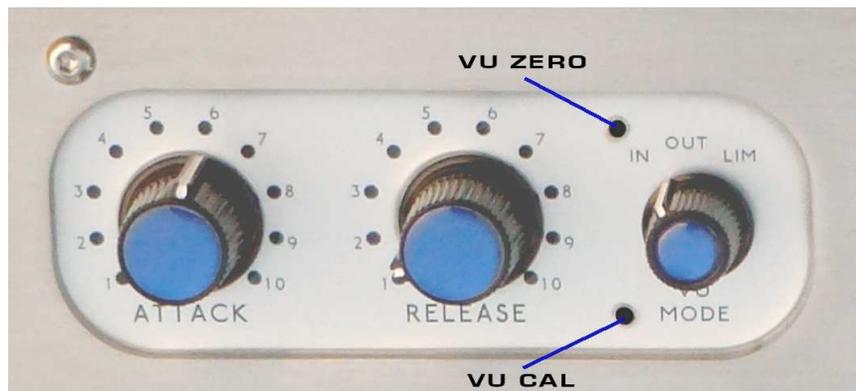
So it is obvious that analogue processing with zero latency before an A to D conversion is the preferred method. After all analogue information is continuous information and not a sampled digital representation of the original source. Modern digital audio products have evolved into a “fast food”, “one size fits all” solution but “when your instinctive good taste when mixing and listening is not satisfied” please take time out and listen to our modern alternative.

For further information on the 456HD® process follow this link:

<https://www.roger-mayer.co.uk/456manual.pdf>

<https://www.roger-mayer.co.uk>

VU METER CALIBRATION & 456HD® OFFSET SET UP



VU METER GAIN REDUCTION ZERO SET:

Set VU Mode to LIM position. Set Threshold to minimum position and adjust with a screwdriver through a small hole in the front panel to activate a 22 Turn Preset Potentiometer so that VU METER reads zero. When a signal exceeds the Threshold level the Meter will now measure the GAIN REDUCTION and display it as a backwards reading on the VU Meter. This is measured using an independent side chain that is identical to that of the input section of the limiter to give accurate real time readings. The effects of changing both the Attack and Release time constants can also be observed easily.

VU METER IN & OUT CALIBRATION:

Set VU Mode to IN. Set Channel to Bypass and 456HD to Bypass. The VU Meter will now measure the INPUT LEVEL after the INPUT Transformer.

Set VU Mode to OUT. Set Channel to Bypass and 456HD to Bypass. The VU Meter will now measure the OUTPUT LEVEL before the OUTPUT Transformer.

With both BYPASS FUNCTIONS activated connect +4dBu @ 1000Hz sine tone from your test oscillator to the INPUT XLR connector on back panel. Set VU Mode to IN and measure the actual output from the OUTPUT XLR connector using accurate Audio Test Equipment eg. Audio Precision. Then adjust the fine output control of Oscillator so that the actual output is exactly +4dBu.

The VU Reading can now be adjusted with a screwdriver through a small hole in the front panel to engage a 22 Turn Preset Potentiometer and rotate until the VU METER reads 0.

You have then calibrated the VU Meter to 0VU = +4dBu.

Other operational 0VU reference levels can also be set from -5dBu to +9dBu using the above procedure.

456HD® TAPE SIMULATION OFFSET SET UP

Activating the BYPASS function provides instant comparison between inserting the 456HD® function or normal LIMITER function so the effect of the process can be heard and levels to your DAW or converter monitored. The VU Meter in the OUT position is set to monitor the INPUT Level to the 456HD® so you can judge how hard you are pushing the 456HD® much in the same way you use a VU to judge input levels to a legacy Tape Recorder.

Output Level Calibration:

The maximum level of the simulated tape saturation or dynamic analogue effect can easily be adjusted so that the peak level reached does not ever exceed 0dBFS and thus enter digital distortion. The FRONT PANEL 456HD® TRIM POTENTIOMETER with 21 positions enables the final output level of the 456HD® to be set to interface with the various operating standards occurring with DAW software or outboard converters. Our suggested setting is +8dB above 0 VU so that the peak levels reach about -3dBFS with the current Avid Pro-Tools default setting for 0VU of -18dBFS.

Having the 456 TRIM CONTROL easily accessible enables changes on the fly to be made whilst recording to maximise the digital level without altering the limiter function.

Please check your operating manuals for individual calibration info regarding your own DAW equipment model.

Extensive studio testing over the past years has confirmed that +8dB offset will make for ultimate ease of use when monitoring with the VU Meters and will result in recordings that are up to the maximum digital levels whilst staying out of digital distortion.

Recording becomes very easy as the 456HD® process with its inbuilt tape characteristics produces that much sought after retro **GOLDEN ERA SOUND**.

TECHNICAL SPECIFICATIONS:

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, plastic film capacitors from the World's top manufacturers all combined in a design to provide ultimate studio quality audio. Gold Plated Neutrik XLR connectors are used, LED Status Indication and Custom Conductive Plastic 22 way Stepped Potentiometers manufactured for best tracking accuracy.

A 6 layer multi layer PC Card provides full shielding for all circuit traces with the Ground and Power Planes all contributing to outstanding high frequency phase performance and stability. The enclosure manufactured from stainless steel completes the 3 faraday cage triple shielding design necessary in today's RF congested environment.

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

Input Threshold Sensitivity: -16dBu to +30dBu

Input Level: Nominal +4dBu Balanced

Input Impedance: 10K

Operating Output Level: Nominal +4dBu Balanced

Output Impedance: 100ohms Balanced

Output Load Impedance: 10K or greater

Signal to noise ratio: 95dB

456HD® Dynamic Range: 95dB

Headroom: Maximum Line Input level +35dBm – Internal Headroom 25dB

Size: Standard 3U Rack Size – 483 x 90 x 210mm (19 x 5.25. x 8.25in).

Weight: 5.0Kg

Power Requirements: +48V DC regulated
Universal World AC / DC Switching Adaptor Supplied

www.roger-mayer.co.uk