MANLEY LABORATORIES, INC.

nu mu™

VACUUM TUBE STEREO LIMITER / COMPRESSOR



OWNER'S MANUAL

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This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
* Reorient or relocate the receiving antenna.
* Increase the separation between the equipment and receiver.
* Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
* Consult the dealer or an experienced radio/TV technician for help.

i) An Introduction To The Manley Nu Mu Limiter & Compressor

Thank you for selecting the Manley Nu Mu™ Stereo Vacuum Tube, Limiter & Compressor. The Manley Nu Mu builds upon the legacy of the Variable Mu, combining the "T-Bar" vacuum tube front end used in the Variable Mu with a new discrete FET output stage. This marriage of tubes and solid-state electronics gives the Nu Mu a remarkable tonal character which will always make it a hit in the studio!

Using the new "HIP" control gives the engineer more freedom, allowing more of the music to come through. This function raises soft dynamics without squashing the louder passages.

Your Nu Mu is powered by our highly developed audiophile switched-mode power supply, offering super low impedance, rigid regulation and very, very low noise. Congratulations on your new purchase! Don't forget to register your warranty with us.

Thank you for choosing our MANLEY Nu Mu. Enjoy!

ii) Manual Conventions

Please take a few moments to read through this manual carefully. It contains essential information for the proper operation of your Manley Nu Mu Limiter & Compressor.

Also in the following pages you will find useful hints and tips, allowing us to help you achieve the utmost performance from your equipment.

Below are the following conventions, used to pick out particularly important parts of the manual. The symbols are found in the margin next to the body of text of interest.



Especially Useful Tip



Important Information. Read Carefully



Caution! Pay Attention!



Refer to another section in this Manual

iii) Notice

This manual provides general and technical information for use, installation, and operating instructions for the Manley Nu Mu Limiter & Compressor. Manley Laboratories, Inc. reserves the right to make changes in specifications and other information contained in this publication without prior notice. Manley Laboratories, Inc. shall not be liable for errors contained herein or direct, indirect, incidental or consequential damages in connection with the furnishing, performance, or use of this material. No statement contained in this publication, including statements regarding suitability or performance of products shall be considered a warranty by Manley Laboratories, Inc. for any purpose or give rise to any liability of Manley Laboratories, Inc.

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1. Important Safety Instructions

1. **Water and Moisture** – Do not use The Nu Mu near any source of water or in excessively moist environments.
2. **Object and Liquid Entry** – Care should be taken so that objects do not fall, and liquids are not spilled, into the enclosure through the openings.
3. **Heat & Ventilation** – When installing The Nu Mu in a rack or any other location, be sure there is adequate ventilation. Improper ventilation will cause overheating, and can damage the unit. The unit should be situated away from heat sources, or other equipment that produce heat. As a general rule with tube equipment, it is wise to keep a 1U gap below and above if possible.
4. **Power Sources** – The Nu Mu has a universal power supply which can operate in any country. It has an input voltage range of 90-260 VAC at 50/60 Hz.
5. **Cleaning** - The Nu Mu can be cleaned with just a damp cloth, or alcohol/methylated spirits for more stubborn marks.
6. **Damage** - If after unpacking your Nu Mu there are signs of shipping damage, contact your dealer.
7. **Servicing** - Do not attempt any servicing without consulting your dealer or Manley Laboratories, Inc. The user should not attempt to service the unit beyond that described in the operating instructions. All other servicing should be referred to qualified service personnel. This unit has **high voltages** present, even after the power has been switched off.
8. **DO NOT** connect the AC supply cord until all other connections have been made. Afer initial power up the VU Meter will “blink” for thirty seconds. The unit remains in MUTE until this warm up period has elapsed.

2. Getting Started

Unpacking your MANLEY Nu Mu:

The Nu Mu is secured in its packing carton by two end-caps.

Hold the unit by the middle and simply lift the unit vertically straight out of the box.

After it has been unpacked, check that nothing is loose inside when handling the unit. The unit is shipped with the vacuum tubes installed. Make sure they are not loose by looking through the vent holes on the top cover. Ensure they are standing upright in their sockets.



It is advisable to keep the original packaging. In the event of servicing or relocating, the original packaging ensures that the unit will always be shipped safely.

This package contains the following;

1 x Manley Nu Mu Reference Channel Strip
1 x Manley Nu Mu Owner’s Manual
1 x IEC Power Cable
1 x Warranty Registration Card
1 x Warranty Statement

3. Front Panel

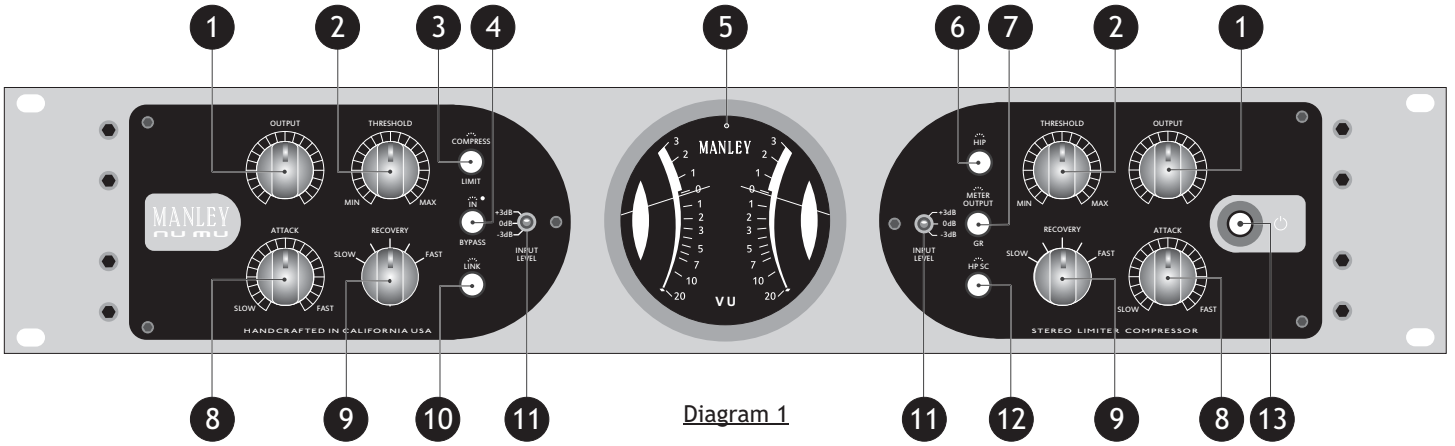


Diagram 1

1 OUTPUT CONTROL

The OUTPUT control is available on both the left and the right channel. It adjusts the output level of that audio channel. Unity gain is about the ninth marking, or 11 o'clock.

2 THRESHOLD CONTROL

The THRESHOLD control is available on both the left and the right channel. THRESHOLD or gain reduction sets the necessary amplitude for compression or limiting to take effect. The most extreme effect is when the control knob is set to MIN or fully counter-clockwise.

3 COMPRESS / LIMIT SWITCH

This switch allows the Nu Mu to use two different compression ratios. Offering either Compression at approximately 3:1 when the switch is engaged and illuminated or Limiting at approximately a 10:1 ratio.

4 IN / BYPASS SWITCH

The BYPASS switch in the Nu Mu is a 'Hardwire' bypass for maximum performance. This switch dictates whether your audio flows through the Limiter/Compressor or just straight through the unit, even if the unit is switched off audio will still flow through the unit. If the switch is engaged and illuminated to the "IN" position the audio will pass through either the Limiter or Compressor, so all the front panel controls will function. Use this switch to verify that the limiting or compressing is not messing up the original sound but enhancing it or at least leveling the volume.

5 VU METER

The Large custom VU meters allow easy tracking of both channels with the Nu Mu. It shows the amount of gain reduction in dB from the 0 dB mark, when the switch (7) is set to REDUCTION. When this switch is selected to O/P and illuminated, the meter measures the output in decibels.

Note: VU meters and PEAK meters rarely agree, digital recorders usually use peak meters - Rely on those for a precisie recording. VU meters are standard with analog tape machines and big consoles because they correspond well with perceived loudness.

6 HIP CONTROL

The "Hip" control allows compression to happen at lower volumes (lower in the dynamic range spectrum) but leaves the louder dynamics alone while still compressing the overall signal. You get louder soft sections and original dynamics of the louder sections. Previously the only way to get around this issue has been parallel compression, where the compressed signal is mixed with the uncompressed signal. Our "Hip" control achieves a similar effect while being easier to use, requiring less hardware (no need for extra mixing externally)

More notes on the HIP control in Chapter 5 Operational Notes

3. Front Panel

7 METER SELECT SWITCH

The Meter select switch allows the user to monitor either Gain Reduction or the Output of the unit. When the switch is engaged and illuminated, the output of the particular channel you are monitoring is visible in the corresponding VU Meter.

8 ATTACK CONTROL

The ATTACK control determines how long the compressor takes to respond to signals above the threshold. The Attack control is continuously variable and determines the necessary length of a transient to initiate gain reduction.

With 63% gain reduction: SLOW 0.13s, MID 0.07s, FAST 0.013s.
With 90% gain reduction: SLOW 0.64s, MID 0.35s, FAST 0.064s.

Fully counter clockwise at the slowest setting will prevent most percussive signals from causing limiting or compression. It is available on both the left and the right channel.

9 RECOVERY CONTROL

The RECOVERY control determines how long the compressor takes to recover after the signal falls below the threshold level.
With 63% gain reduction recovery, five selections: 0.1s, 0.16, 0.32, 0.64s, 1.7s.
With 90% gain reduction recovery five selections: 0.227s, 0.368s, 0.736s, 1.6s, 3.87s.

10 LINK FUNCTION

When The LINK function is used it links the two Stereo channels together. The Left channel controls become the master linking THRESHOLD, ATTACK & the RECOVERY CONTROLS.

11 INPUT LEVEL SWITCH

The Input Level is controlled by a toggle switch. There is an Input Level control for each cannel. Three levels of attenuation are available. +3dB, 0dB and -3dB.

12 HP SC SWITCH

The High Pass Side Chain filter is factory set a 100Hz. When this switch is engaged and illuminated, everything above 100Hz will have the effect of limiting or compression. Useful if you want the bass to come through with full impact and limit or compress everything else.

13 POWER SWITCH

The Power Switch glows a soft blue color when an IEC power lead is connected to the unit. This indicates that the Nu Mu is in STANDBY mode. Engaging the power switch takes the Nu Mu out of standby mode and into warm-up mode. The power switch will illuminate to a brighter blue and the backlit VU meters will start to flash. This warm-up process last 30 seconds after which the MUTE relays will lift and the VU meters will stop flashing.

4. Rear Panel

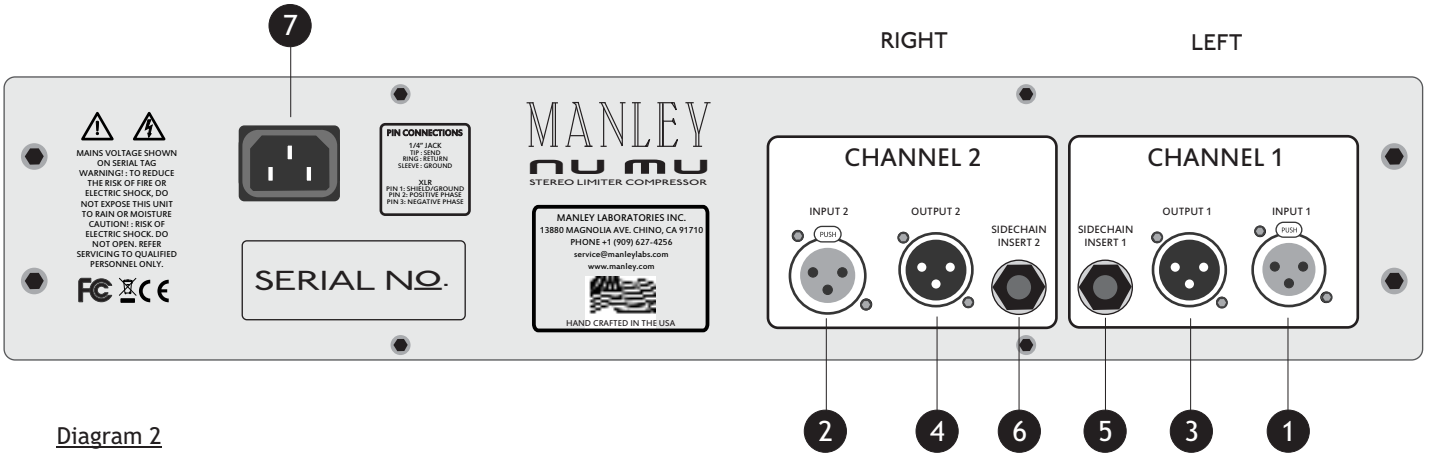


Diagram 2

1 **XLR INPUT 1** (TRANSFORMER BALANCED) (CH1, LEFT)
PIN 1: GROUND
PIN 2: (+)
PIN 3: (-)

2 **XLR INPUT 2** (TRANSFORMER BALANCED) (CH2, RIGHT)
PIN 1: GROUND
PIN 2: (+)
PIN 3: (-)

3 **XLR OUTPUT 1** (IMPEDANCE BALANCED) (CH1, LEFT)
PIN 1: GROUND
PIN 2: (+)
PIN 3: (-)

4 **XLR OUTPUT 2** (IMPEDANCE BALANCED) (CH2, RIGHT)
PIN 1: GROUND
PIN 2: (+)
PIN 3: (-)

5 **SIDE-CHAIN INSERT INPUT CH1**

This TRS 1/4” jack interrupts the connection to the input drive of the side-chain of Channel 1, allowing external gear to be inserted to trigger the side-chain circuitry. The pinout is TIP: SEND, RING: RETURN, SLEEVE: GROUND.

6 **SIDE-CHAIN INSERT INPUT CH2**

This TRS 1/4” jack interrupts the connection to the input drive of the side-chain of Channel 2, allowing external gear to be inserted to trigger the side-chain circuitry. The pinout is TIP: SEND, RING: RETURN, SLEEVE: GROUND.

7 **IEC MAINS CONNECTOR**
Standard IEC mains connector for 50 /60 Hz AC.
(INPUT MAINS VOLTAGE 90 V AC - 250 V AC)

The cleanest settings are easiest to set up and most recommended for mixes. Set the THRESHOLD near "MIN", set the ATTACK near "FAST" and adjust the INPUT for 2 to 4 dB of LIMITING, then adjust the OUTPUTS to reach the levels you want or by comparing with BYPASS.

You can fine tune the ATTACK, RECOVERY and THRESHOLD to taste from this. Compression with this unit begins at the same threshold so to achieve similar amounts of gain reduction you may have to turn up the INPUT or turn the THRESHOLD to "MIN".

We also suggest while in "LINK" that both channels are set up the same or similar. LINKing with one channel in LIMIT and the other in COMPRESS is not possible.

The gain control chain is technically called a feedback circuit. Most modern compressors use a feed foward circuit which sounds unmusical to us but for features sake usually offers a Ratio control. Some engineers get great results from blending the output of the limiter with the "straight" signal. This trick obviously is easier to do on individual tracks and sounds like a very gentle compressor that lifts quiet sections.

The general goal of compression is to reduce the overall dynamic range of the signal. Traditional compression reduces the loudest sections of the music which can squash the most exciting transients.

HIP CONTROL

The "HIP" control allows compression to happen at lower volumes (lower in the dynamic range spectrum) but leaves the louder dynamics alone while still compressing the overall signal. You get louder soft sections and original dynamics of the louder sections.

Previously the only way to get around this issue has been parallel compression, where the compressed signal is mixed with the uncompressed signal. Our "HIP" control achieves a similar effect while being easier to use, requiring less hardware (no need for extra mixing externally) - all while keeping a constant Manley color/tone to the music since there is no mixing between the wet and dry signals through the dynamics of the music. Users of our Variable Mu often want to just kiss the sound with a bit of compression while getting the "Manley Sound", the hip control makes this easier, when using the Nu Mu.

When the "HIP" control is active, you will want to adjust the Threshold control so that compression is active more often than you are used to. It should release on quieter passages, but you should see constant compression on louder passages.

You can also think of the "HIP" control as Safety or Easy mode - it will keep you from over compressing the signal, even if the controls aren't quite set right. You can get the Manley Sound without excessive compression.

5. Operational Notes

The MANLEY NU MU LIMITER / COMPRESSOR is designed for multiple purposes. The unit can be used in stereo or as 2 individual channels of limiting or compression. With higher input gain settings the unit can be used to create gentle tube distortion if desired. Modest settings will often enhance the signal in ways difficult to describe however the range includes "tube warmth", richness and enhanced clarity and magic.

The attack and recovery controls are important to understand. The response to transients and percussive sounds are affected by the attack control. Recovery is the time it takes for the gain to return to normal or zero reduction. This is called "RELEASE" on some limiters.

We can use a typical mix with dynamic vocals, drums and bass for an example. With this example a fast attack setting will react to the drums and reduce the overall gain. If the recovery is very fast then the gain will return to normal quickly. This will have an audible effect of reducing some of the level and attack of the drums in the mix. As the recovery is set slower the gain changes so that the drums might be heard as "pumping". Now these gain changes caused by the drums are pulling down vocals, some bass and causing volume changes. Slower recovery settings will usually keep the gain changes more inaudible but will also lower the perceived volume.

A slow attack setting will tend to ignore drums and other fast signals but will react to the vocals and bass in our example. A slow attack might also let a hard kick drum transient distort the next piece of equipment in the chain. We have set up the unit so that medium settings of both controls provide good gain control and little change in mix values.

LIMITING OR COMPRESSION
Two basic rules of thumb with any compressor or limiter should be reminded. Typical amounts of gain reduction shown by GR meter should be 2 to 6 dB. The more that the needle swings the more likely the gain changes will be audible. Listen for objectionable "pumping" with fast settings.

Use your ears to determine optimum settings more than the meters. Some limiters add unpleasant artifacts with any reasonable looking setting. This limiter may give some magic at unexpected settings. It may help to use the bypass switch to compare the original input with the processed output to verify that an improvement is real. Then, because the peaks are reduced, the final output can be adjusted a little louder than the input.

It should be borne in mind that the intended usage, and function therefore, is very different between limiting and compression. In limiting mode we are seeking to control PEAK overshoots or the 'ceiling' level as inaudibly as possible, normally in the 2 to 4 dB area. By using compression we seek to "fold in" a ratio of, say, 20 or more into 10 dB. Both limiting and compression can produce the effect of increasing the average levels and background noise - depending on the degree or amount of limiting / compression used. Because dynamic range and peaks can be reduced, often overall loudness can be increased at the output. This is called MAKE-UP GAIN on some compressors and is simply the OUTPUT ATTENUATOR with this unit.

Limiters often are designed for very fast attack times only. This assumes that the unit will almost always be used to prevent electronic clipping or overload. Typically the release with these is slow to prevent audible damage to the mix.

With this unit you can adjust the attack, release and even the overload point in musical ways. Distortion can be creatively used by turning up the INPUT and turning down the OUTPUTs while using very little or no COMPRESSION.

6. Advanced Tricks

Here are a few tricks that are not really for rookies. They come from guys doing major records for years and won't work unless you've mastered the basics. In other words if we gave you a Strat and Marshall it won't make you another Jimi. Also we don't suggest that you try these out while paying big-time studio rates - they may not be easy to get right at first.

Trick#1
Each compressor or device in the chain has certain flavors and characteristics and with experience we grab the ones we like because of the sound - not because "it is a compressor". The idea is to use several cool compressors in a chain getting flavors from each depending on how much GR (gain reduction) is used in each and how hard they are driven. It's this second concept that can be tricky.

How far to turn up each Make-up Gain to overdrive or not overdrive the next unit - and still not get flooded with noise when the music stops. You can chain the two channels of the Nu Mu and turn up the make-up of the first channel. This works best with classic discrete and tube units and usually IC units are to be avoided.

The finesse comes from which order they are patched. See how long it might take to get best results.

Trick#2
This one is easier, but also requires serious listening. Rather than just "inserting" a limiter, try driving the limiter from the tape patch (pre EQ), returning it to a spare fader and mixing it with the original.

So what is so tricky ? How you EQ and automate and add effects to these channels. You can also have fun phase reversing one of the channels. You get cancellation but only at a certain level. It is sort of like gating, but different - it is a way of controlling the "ambiance".

Trick#3
Using one track to "duck" another. This may work better with compressors with attack and release and ratio controls if you are thinking drums. Bass and vocal is very cool with the Nu Mu. Set it up like trick#2 with bass in one channel and vocal in the other (in LINK mode) and experiment with each threshold.

Two guitar tracks also work here sometimes. Obviously, we pull out this trick when two tracks are stepping on each other and EQ isn't making enough room for clarity.

Trick#4
Drive the compressor from an AUX send and return it to a channel. Once you have some limiting, carefully turn up that aux send on the return channel to "feed back" into the limiter. Watch out for real howling feedback and over the top limiting. If you are lucky it won't scream during the quiet parts.

The key is balancing the faders, track auxes, the return auxes, the thresholds, and make-up gains. The technique can get pretty crunchy and wild. Works best with not-so-clean compressors, but is interesting with the Nu Mu.

Trick#5
This one is a way to get a very good single channel De-esser from the Nu Mu or other compressor good enough for lead vocals. Split the Insert send of the vocal to the Nu Mu and to a spare channel. EQ the snot out of that second channel -boosting the 5 or 6 kHz band and chopping everything below that.

Use the insert from this channel to drive the other channel of the Nu Mu, but it is unlikely that you want this fader up. Set the Nu Mu to Link. The threshold of the first channel sets compression and the second channel sets de-essing.

Unlike some de-essers it will not chop highs, but reduce wide-band which is less obvious. The only drag is that the release is a little slow. Remember good de-essing is not to remove esses - the idea is to reduce esses and make them natural sounding.

BTW if you need to de-ess, you might want to re-think your choice of gear. There are 3 main reasons we get horrible esses:

1) a gap in the singer's teeth or just a strange voice,
2) too much or wrongly chosen EQ, or,
3) gear that distorts the highs.

If the cause is "1", try sticking some dental wax in the gap. No joke! If the cause is "2" then we can tell you some EQs allow one to boost highs with less problems with the esses or you might try boosting a higher freq, or less during tracking. If it is "3" you may want a better mic or sell off some of that cheap IC gear that seems to be distorting the top in a way that you don't like.

Actually we have heard some pretty expensive gear - both tube and solid state - that has this particularly ugly distortion. If in doubt, try some tough percussion through it like shakers or tambourines, and see how they sound...

7. Questions & Troubleshooting

Q: No Power, No Indicators ?
Ensure the IEC plug at the rear of the unit is inserted all the way. Wait at least five minutes before trying the power switch again. If the unit does not power up then check the fuse on the PSU. (See Servicing, Diagram 3)

Q: The Unit Is Switched On, No Sound ?
First try plugging the IN and OUT cables into some other piece of gear to verify that your cables are OK. Next check the front panel, try BYPASS. If you have sound now it might be a good idea to turn up the output levels to about 1 o'clock (rather than fully counterclockwise which is "minus infinity".

Q: Levels Seem To Be Wrong, No Bottom ?
Several possible scenarios. Manley uses the professional standard of +4 dBm = Zero VU = 1.23 volts AC RMS. A lot of semi-pro gear uses the hi-fi reference of -10 dBm = Zero VU. This is a 14 dB difference that will certainly look odd and may tend to distort. Often there are switches on semi-pro gear to choose the pro reference level. We do not provide that kind of switch because of inevitable compromises in the signal path. If the loss looks close to 6 dB and it sounds thin then one half of the signal is lost. The cause is probably wiring again. One of the two signal carrying wires (the third is ground / shield on pin 1) is not happening. Check the cables carefully because occasionally a cable gets modified to work with a certain unit and it seems to work but its wrong in other situations. If only one side of the Nu Mu exhibits this problem, it may be a problem in the unit itself.

Q: Only One Channel Is Functioning ?
This may be due to a faulty tube. Most Manley gear is two channel, meaning you can swap tubes to determine the faulty tube. Switch one pair at a time. VT1 & VT2, VT3 & VT4 are matched pairs.Leave the unit switched off for at least 15 minutes before removing any covers. If upon examination you see a white topped tube instead of a silver top this tube is likely to have cracked its glass envelope, fracturing the vacuum, this tube will need to be replaced.

Q: How Can I Cure Low Frequency Hum?

Method 1- The most likely cause is a ground loop. This can be cured by lifting the chassis to signal ground lift jumpers which are located inside the unit. Please refer to the Servicing Chapter, Diagram 3.

Method 2 - Cutting the shield on one side of the cable (PIN 1). This is done by some studios at every female XLR to "break" all loops. You may get a loop simply from the rack. All the other gear in the rack is "dumping" ground noise onto the rack rails. Try removing the Nu Mu from the rack so that it is not touching any metal. You may have cured a non-loop hum. Some gear radiates a magnetic field and some gear (especially if it has transformers) might receive that hum.

Method 3 -Another method of reducing all sorts of hum and noise is to use a 60-0-60 balanced AC power transformer. Hum is more likely with the unbalanced inputs and outputs because these signals are ground referenced. A common situation is using the Nu Mu in a way that significantly boosts the low level signals and what may have started out as a little hum becomes nasty. Check out the gear feeding the Nu Mu or use less limiting and make-up gain.

Q: Why is my Nu Mu Not Completing its Power-Up Cycle?
The Nu Mu utilizes a custom designed, sophisticated high voltage switched-mode power supply. This power supply features protection circuitry to stop any damage being caused to itself. If at anytime the unit will not power-up the protection circuitry may have been triggered. It is in protection mode if after switch-on the power LED blinks for a fraction of second then after a pause it blinks again. The PSU is now in protection mode as the supply is trying to reset. This condition will occur if the unit suffers excessive heat exposure or there is a damaged tube or component. Allow the unit to cool and try powering-up again. If the protection mode persists, the unit will have to be returned for service.

Q: Nu Mu Makes Noises When The Front Panel Is Tapped?
Some tubes become microphonic over time. That means they start acting like a bad microphone. Vibration and aging has caused the supports for the small internal parts in the tube to loosen and now the tube is sensitive to vibration. The only remedy is to replace the tube.

Q: Nu Mu Sounds Distorted?
This might be a tube. Swapping is a good way to find out. It may be a wiring issue or mismatch. Wiring problems usually accompany the distortion with a major loss of signal. Mismatches are a bit tougher. The Nu Mu has a high input impedance (HI Z) but some of our gear has a reasonably low input impedance. Without even explaining the term "impedance" it is enough to say that a lot of gear is simply not capable of driving pro levels and low impedances. It will sound like lost headroom, early clipping, distortion on peaks. Often changing the order of processors will do the trick. Also check your patch bay in case there is a problem there too.

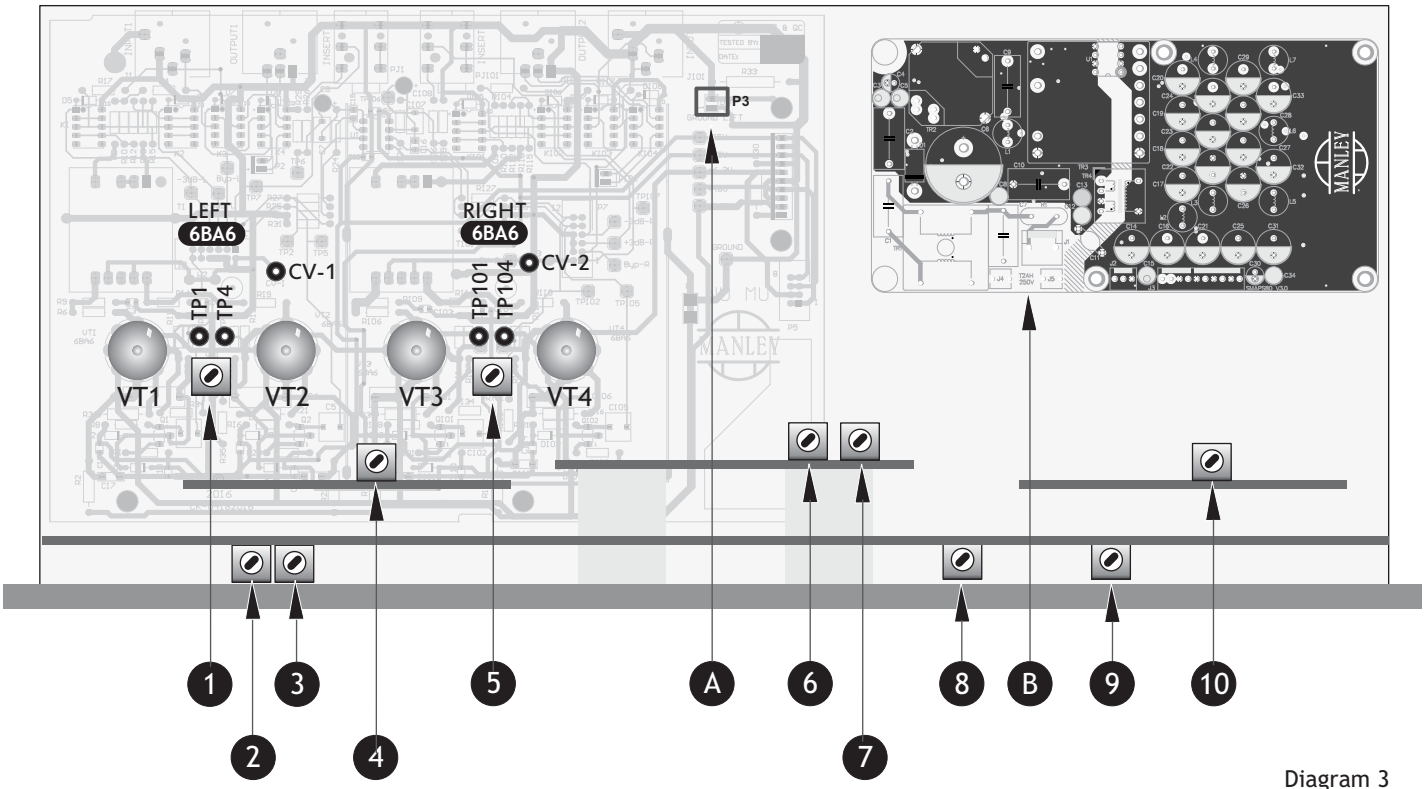


Diagram 3

KEY

4 10 -DC Offset	3 9 -Meter GR "0" VU
1 5 -6BA6 Pair Balance	2 8 -Meter GR Adjust
6 7 -Meter Output,"0"VU	A -Chassis Ground Lift

VACUUM TUBES

The Nu Mu utilizes two 6BA6 tubes per channel, which are hand matched at the factory. The life span of these tubes is in the order of 5000-6000 hours, after which time the tubes should be replaced. If the Nu Mu has become noisy, this could be related to tube wear. Consult your dealer or purchase new tubes from Manley Labs. We suggest low noise and graded quality. Simply hold the tube firmly at its base and vertically pull upwards, freeing the tube from its socket. When inserting a new tube ensure all the pins are straight and align with the receptacles of the tube base before pressing down firmly to locate the tube correctly. In most cases the unit will require calibration after a tube change. Consult the Manley website or contact us for the calibration procedure required after a tube change.

A GROUND LIFT JUMPER

If necessary the Circuit Ground can be disconnected from the Chassis Ground. This practice is usually required if hum-loops cannot be cured in any other way. Removing both jumpers JP6 will break the chassis signal ground.

B PSU FUSE

The PSU fuse is a safety fuse rated at 2A (T) 250V AC. If this fuse fails the switched-mode PSU has suffered a catastrophic failure and it is unlikely that it can be repaired. The unit will have to be returned for service.

10. Calibration Procedure

*** Experienced Technicians Only**
The calibration procedures mentioned here are to aid the servicing of the unit. They should only be attempted by a skilled Technician. These adjustments should not be attempted by the user without experience. Trimming these potentiometers without the correct understanding will result in poor performance of the unit.

Before starting any procedure, please set the front panel controls to the settings below & remove the top cover;

- LIMIT/COMPRESS switch set to "LIMIT"
- LINK switch disengage
- OUTPUT control set to 11 O'clock
- ATTACK control set to "FAST"
- HIP switch disengage
- HP SC switch disengage
- BYPASS switch set to "IN"
- INPUT LEVEL switch set to "0 dB"
- THRESHOLD control set to "MAX"
- RECOVERY control set to "FAST"
- METER switch set to "GR"

THERE ARE HIGH VOLTAGES INSIDE. DO NOT HOLD THE METAL SHAFT OF THE SCREWDRIVER OR PROBE AROUND WITH FINGERS OR ANY TOOL.

The unit should be switched on for about 15 minutes to allow for the correct "warm up" period. It is preferable to use an insulated trimming tool.

Note: NU MU unity gain settings: INPUT LEVEL switch set to "0dB" and, the OUTPUT control set roughly to 11:00 O'clock. The position of the output control for unity gain will vary slightly from unit to unit.

❹❿ DC OFFSET ADJUST

This trimmer adjusts the DC offset of the output stage in the side chain circuitry. The remote cut-off 6BA6 tube is controlled by the side chain circuitry. The control grid (Pin 1) of the 6BA6 must have 0Vdc when idle. With no signal through the unit, no limiting or compression the output of the side chain circuitry must be set for an output of zero volts.

1. Set a multi-meter to read DC volts on its lowest scale (expect a small voltage reading : <200mV).
2. Connect black probe to test point "ground", connect the red probe to test point "CV-1" adjust ❹ (VR11) for a meter reading of zero volts. Switch red probe to test point "CV-2" adjust ❿ (VR12) for a meter reading of zero volts.

❶❺ 6BA6 PAIR BALANCE

We recommend that this control be reset only after changing 6BA6 tubes. This trimmer adjusts internal balance and trims for the lowest distortion. This "balance" sets the relative gains of the 2 halves of a differential circuit (matched pair 6BA6= lowest distortion & thumps). **THIS IS NOT LEFT /RIGHT BALANCE.**

1. Set a multi-meter to read DC volts on its lowest scale (expect a very small voltage reading : <1.0VDC).
2. Adjust one channel at a time.
3. This is a "null adjustment". Adjust corresponding trimmer until the meter reads zero volts. A meter reading less than 50mV is acceptable.
4. Connect the meter probes to test points TP1 & TP4 for Left channel, adjust ❶ (VR1) until the meter reads zero volts.
5. Connect the meter probes to test points TP101 & TP104 for Right channel, adjust ❺ (VR101) until the meter reads zero volts.

Tip: Trimmer should not be set more than 10deg from the center position to null voltage to zero, if this is the case this would indicate an unbalanced pair, try replacing one or both tubes. In a perfect world a pair of well matched 6BA6 tubes, trimmer position should be dead center of its range to null to zero volts, as well as giving you the lowest distortion reading.

The Manley Nu Mu features two independent large VU meters (1 per channel), which allow you to read the amount of gain reduction (GR) or read the output level at the main output XLR. A push button (common for both channels) allows you to switch between the two options.

3 9 METER-GR SET "0" VU

This trimmer adjusts the VU METER to read "0" VU for zero gain reduction.

1. No signal through the unit, no limiting, no compression.
2. Meter switch set to "GR".
3. L-CH 3 (VR8) adjust to set Left meter to read "0" VU.
4. R-CH 9 (VR10) adjust to set Right meter to read "0" VU.

6 7 METER-OUTPUT SET "0" VU

This trimmer adjusts the VU METER to read "0" VU = +4dBu Output.

1. Apply a 1kHz sine at +4dBu/1.23Vrms to both Balanced inputs.
2. Connect an Audio Analyzer or a RMS voltmeter (set to read AC volts), to the main outputs.
3. Adjust OUTPUT control for unity gain (+4dBu/1.23Vrms) at main outputs.
4. Meter switch set to "OUTPUT".
5. L-CH 6 (VR13) adjust to set Left meter to read "0" VU.
6. R-CH 7 (VR14) adjust to set Right meter to read "0" VU.

2 8 METER-GR ADJUST

This trimmer calibrates VU meter gain reduction read, to match actual audio gain reduction at the main output.

1. Set Meter to "OUTPUT"
2. Confirm VU meter reads "0" VU.
3. Adjust the threshold controls (ccw) for a gain reduction of 2dB. Meter drops to the "-2" mark (main output level drops to +2dBu / 0.977Vrms)
4. Meter switch set to "GR".
5. L-CH 2 (VR7) adjust to set Left meter to read "-2" VU.
6. R-CH 8 (VR9) adjust to set Right meter to read "-2" VU.
7. Switch between "OUTPUT" and "GR" to confirm meter tracking. (2dB of output level drop = 2dB of gain reduction).
8. Adjust the threshold controls (ccw) for a gain reduction of 6dB. Switch between "OUTPUT" and "GR" to confirm meter tracking under heavier gain reduction.
9. Engaged LINK (left channel master: threshold, attack & release controls) switch between "OUTPUT" and "GR" to confirm meter tracking through out range. (There is no trimmer to adjust L/R gain reduction balance in LINK mode).

Note: (1kHz sine at I/O: +4dBu/1.23Vrms)
Audio GR Vs Meter GR tracking tolerance: +/- 0.1dB (from 0 to 2 dB of gain reduction).
Audio GR Vs Meter GR tracking tolerance: +/- 0.5dB (from 3 to 7 dB of gain reduction).
(Matched PAIR of VU meters provides best tracking)

Note:
LINK Audio GR tracking Left CH Vs Right CH Tolerance: (1kHz sine at I/O: +4dBu/1.23Vrms)
+/- 0.1dB @ 2dB of GR
+/- 0.3dB @ Up to 7dB of GR
(Matched QUAD of 6B6A's provides best link tracking)

Note:
LINK Meter GR tracking Left CH Vs Right CH Tolerance: (1kHz sine at I/O: +4dBu/1.23Vrms)
+/- 0.1dB @ 2dB of GR
+/- 0.5dB @ Up to 7dB of GR
(Matched QUAD of 6B6A's and Matched VU meter provides best link tracking)

Things to remember about VU Meters:

Our VU meters being passive electro mechanical devices, no two meters are 100% identical (Electrical specification: 1.228V = “0” VU +/- 10% tolerance), we test and match stereo VU meter assemblies to obtain the best possible tracking.

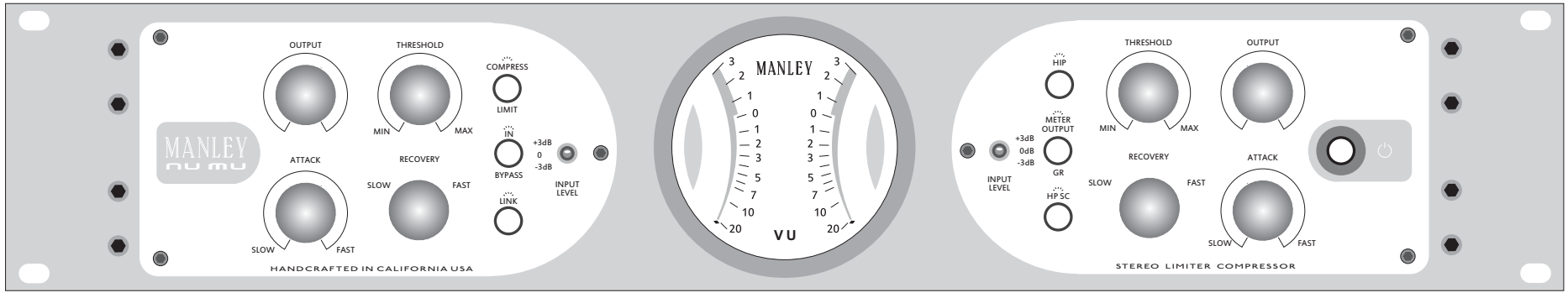
The VU meter was not designed to measure signal, but to let users target a signal level of 0 VU (sometimes labeled 100%), so it is not important that the device is non-linear and not precise at low levels. The VU-meter (intentionally) "slows" measurement, averaging out peaks and troughs of short duration, and reflects more of the perceived loudness of the material than the more modern and initially more expensive PPM meters.

For this reason many audio practitioners prefer the VU meter to its alternatives, though the meter indication does not reflect some of the key features of the signal, most notably its peak level, which in many cases must not pass a defined limit. Since a VU meter is a mechanical device it can never reflect the instantaneous signal peaks of complex audio signals. A VU meter does NOT measure peaks but simply infer them. The engineer must know that with music or speech the Peak levels will always be "inferred" to be between 6dB to 10dB higher than the reference level.

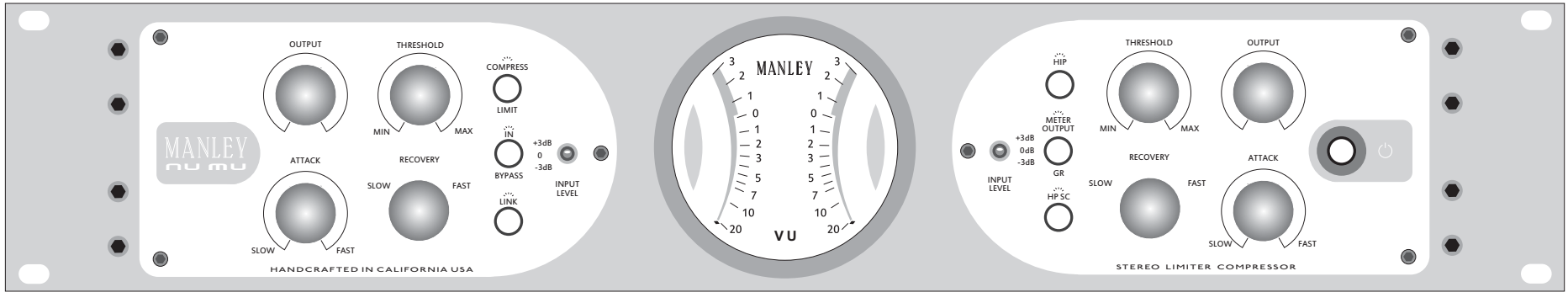
9. Specifications

MANLEY NU MU STEREO VACUUM TUBE LIMITER / COMPRESSOR

- Fully differential front end, with Manley IRON input transformers
- Two pairs of hand matched 6BA6's vacuum tubes per channel.
- New solid state output stage. High voltage, discrete transistor design with high headroom for a smooth, punchy and dynamic action
- Hard-wire BYPASS switch
- Transformer BALANCED INPUTS.
- Impedance BALANCED OUTPUTS.
- INPUT LEVEL switch: -3dB, 0dB, +3dB
- Silent Conductive Plastic, continuously variable OUTPUT controls.
- MIN: -40dB~11 O'clock: 0dB (+/- 1 indent mark)MAX: +10dB
- RECOVERY 5 steps switch:
    - 63% gain reduction recovery: 0.1s, 0.16, 0.32, 0.64s, 1.7s.
    - 30% gain reduction recovery: 0.227s, 0.368s, 0.736s, 1.6s, 3.87s.
- Continuously variable ATTACK control:
    - 63% gain reduction: SLOW 0.13s, MID 0.07s, FAST 0.013s.
    - 90% gain reduction: SLOW 0.64s, MID 0.35s, FAST 0.064s.
- Continuously variable THRESHOLD control.
- LIMIT/COMPRESS Mode switch.
- LIMIT (1.5:1 to 12:1) or COMPRESS (1.2:1 to 3:1)
- HP Side Chain Filter: 6dB per octave, approximately -3dB at 100Hz.
- STEREO LINK SWITCH Left Channel Master. Links threshold, attack & recovery controls.
- HIP control function: Raises soft dynamics without squashing louder passages
- Large Illuminated Stereo VU meters. Reads Output level or Gain reduction.
- Sidechain INSERT: Insert point for limiter/compressor sidechain. Two Stereo Phone Jacks (TIP= Send, RING= Return, SLEEVE= ground)
- For Unity Gain set: Input level switch to “0” and, Output control to ~11: O'clock. (Input source Z= 150 Ohms Output load Z= 100k Ohms)
- Maximum Input level: (1 kHz Sine, <0.3% THD+N)
    - -3= +25 dBu
    - 0 = +21 dBu
    - +3= +18 dBu
- Maximum gain: 13dB
- Gain Make-Up: 10dB (gain above unity)
- Output Headroom: 23dB (Reference to +4dBu)
- Maximum output: +27dBu (18Vrms) 100K Ohm load, +24.5dBu (13Vrms) 600 Ohm load. (1kHz Sine, < 0.3% THD+N, BW 20Hz- 20kHz).
- Frequency Response: - 0.8dB @ 20Hz, -0.5dB @ 50kHz
- Total Harmonic Distortion: <0.05% THD+N (1kHz Sine, +4dBu, BW: 20Hz - 22kHz)
- Noise floor: -85dB typical (BW: 20Hz - 22kHz)
- Dynamic Range: 112dB
- Signal to Noise Ratio: 89dB (referenced to +4dBu, BW 20Hz – 20kHz)
- Common-Mode Rejection Ratio (CMRR): 74dB (BW: 20Hz - 22kHz, +4dBu, 1kHz Sine)
- Output Impedance: 100 Ohms
- Input Impedance: -3= 1k, 0= 2.5k, +3= 4.5k Ohms
- Sidechain Insert: Send output Z= 50 Ohms, Return Input Z= 50k Ohms
- “Warm-Up” mute timer: ~30 Seconds
- Universal high voltage switched mode power supply custom designed for our vacuum tube audio circuits.
- Mains Voltage & Frequency: Operates worldwide 90-250V~ AC 50/60 Hz.
- Power Consumption (120/240VAC): 25 Watts
- Standby power on switch.
- Standby Power Consumption (120/240VAC): 0.5W



ARTIST		INSTRUMENT / TRACK		DATE	
SONG		MIC NOTES		ENGINEER	



ARTIST		INSTRUMENT / TRACK		DATE	
SONG		MIC NOTES		ENGINEER	

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