



# OWNER'S MANUAL

**STEREO "VARIABLE-MU"  
LIMITER / COMPRESSOR**

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# CONTENTS

<b>SECTION</b>	<b>PAGE</b>
INTRODUCTION	3
MAINS CONNECTIONS	4
INSTALLATION	5
FRONT PANEL	6
REAR PANEL	7
EXAMPLE SETTINGS	8
FRONT PANEL ADJUSTMENTS	9
OPERATIONAL NOTES	10
TECHNICAL NOTES	11
MASTERING AND M/S MODELS	12
GAIN REDUCTION CURVES	13
SPECIFICATIONS	14
SERVICE ADJUSTMENTS	15
WARRANTY	16
WARRANTY REGISTRATION	17
BLANK TEMPLATE TO STORE SETTINGS	18

## INTRODUCTION

### THANK YOU!...

for choosing the Manley Laboratories Stereo Variable-MU Limiter Compressor . The heart of this limiter is the variable gain vacuum tube. In tube-talk MU refers to gain and only a few types of tubes were ever designed for variable-mu operation. This limiting circuitry was designed by David Manley over thirty years ago. Our current version of this unique piece combines that classic sound with the precise cleanliness of modern componentry. The circuit is entirely differential which tends to cancel distortion and hum. It can handle a widely varying range of input signals in a rapid-acting manner without introducing audible coloration common in many limiters. The Attack and Recovery (Release) times have been carefully chosen for todays applications. These properties make this a superb compressor for both individual tracks, mixes and final mastering.

### GENERAL NOTES

#### LOCATION & VENTILATION

The Limiter Compressor Amplifier must be installed in a stable location with ample ventilation. It is recommended, if this unit is rack mounted, that you allow enough clearance on the top and bottom of the unit such that constant movement of air can flow through the ventilation holes. There are 8 tubes inside this unit so it does run quite hot. Good ventilation is definitely encouraged.

#### WATER & MOISTURE

As with any electrical equipment, this unit should not be used near water or moisture.

#### SPECIAL NOTES

Tubes may become loose during transit. Straighten and press down each tube before plugging this unit into the mains socket. Furthermore, don't touch the tubes after the unit has been switched on, the tubes become very hot during operation and should only be handled after the power has been turned off and the tubes have cooled.



**WARNING!**



**TO PREVENT THE RISK OF ELECTRIC SHOCK  
DO NOT OPEN THE CABINET  
REFER SERVICING TO  
QUALIFIED PERSONNEL**

## MAINS CONNECTIONS

Your unit has been factory set to the correct mains voltage for your country. The voltage setting is marked on the serial badge, located on the rear panel. Check that this complies with your local supply.

Export units for certain markets have a moulded mains plug fitted to comply with local requirements. If your unit does not have a plug fitted the coloured wires should be connected to the appropriate plug terminals in accordance with the following code.

GREEN/YELLOW	EARTH	terminal
BLUE	NEUTRAL	terminal
BROWN	LIVE	terminal

As the colours of the wires in the mains lead may not correspond with the coloured marking identifying the terminals in your plug proceed as follows;

The wire which is coloured GREEN/YELLOW must be connected to the terminal in the plug which is marked by the letter E or by the safety earth symbol or coloured GREEN or GREEN and YELLOW.

The wire which is coloured BLUE must be connected to the terminal in the plug which is marked by the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal in the plug which is marked by the letter L or coloured RED.

**DO NOT CONNECT/SWITCH ON THE MAINS SUPPLY UNTIL ALL OTHER CONNECTIONS HAVE BEEN MADE.**

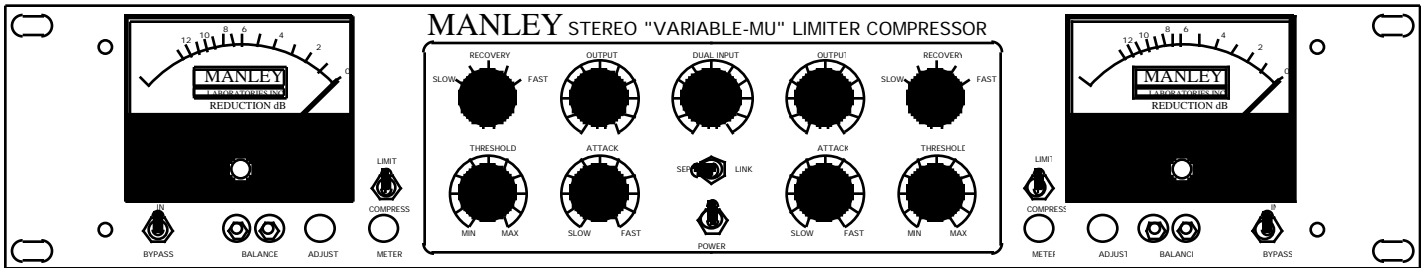
**TROUBLESHOOTING NOTE:** Occasionally we have had units sent to us to service that had no problem. The symptom was clipping only when the unit was in the processing chain. Remove the unit and distortion gone. However in the shop - no problem. The cause was a combination of the somewhat low input impedance of the Limiter/Compressor and the somewhat "wimpy" line driver of the preceding device. The solution - change the order of processing so that a more professional device fed the Limiter / Compressor. The input impedance is over 1.2 Kohm and most devices are supposed to drive 600 ohms (which is twice as hard) but in this era of ICs and semi-pro gear claiming to be pro well.....

## INSTALLATION

Please refer to the REAR PANEL section for a full layout of the rear panel of your Stereo limiter compressor.

1. Set the voltage change-over switch on the back of the unit to the voltage you are using.
2. Be certain that the unit has a 2 Amp SLO-BLO (120 Volt operation) or 1 Amp SLO-BLO (for 240/220 Volt use) fuse.
3. Connect the input signal(s) to the 3 pin female XLR's on the rear panel. The input XLR's are TRANSFORMER COUPLED balanced wired as follows:  
PIN 1: GROUND  
PIN 2: (+) POSITIVE GOING PHASE  
PIN 3: (-) NEGATIVE GOING PHASE
4. Connect a 3 pin XLR cable to the male output XLR on the rear panel. The output XLR is balanced and the pinout is wired as follows:  
PIN 1: GROUND  
PIN 2: (+) POSITIVE GOING PHASE  
PIN 3: (-) NEGATIVE GOING PHASE  
The output impedance is 600 Ohms nominal.
5. Connect a standard IEC mains cable to the IEC mains socket on the rear panel.
6. Check that the power is switched off on the unit.
7. Connect the IEC mains cable to a 50/60 Hz AC source of the proper selected voltage.
8. Power up the unit and allow it enough time to stabilize before using (approx 15 to 30 minutes).

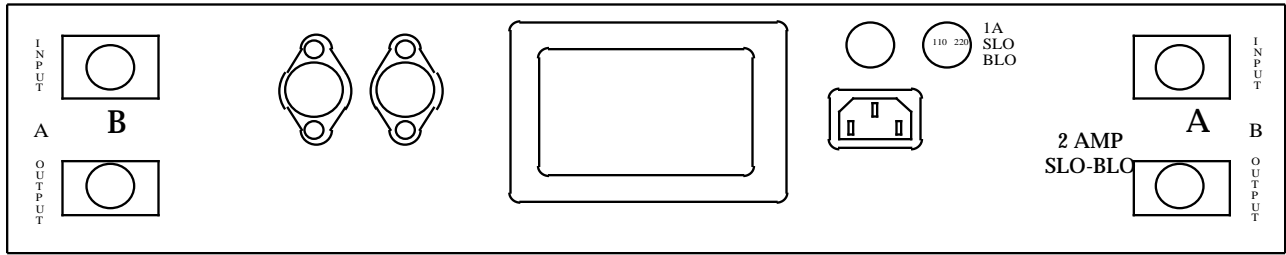
# FRONT PANEL



- A**     **IN / BYPASS**     Switched in bypass mode, (down position) all effects of the limiting circuitry are bypassed and will not affect the audio signal. In the bypass mode , the audio signal passes from the input directly to the output.
- B.**     **COMP. / LIMIT**     Selects compression ( 1.5:1) or limiting (4:1) function. Compression is soft -knee, Limit is a sharper knee. At greater than 12dB of limiting the ratio increases (up to 20:1 maximum)
- C.**     **RECOVERY**     Recovery times can be selected between

  - a.     **VERY SLOW**     8 seconds
  - b.     **SLOW**     4 seconds
  - c.     **MEDIUM**     .6 seconds
  - d.     **FAST**     .4 second
  - e.     **VERY FAST**     .2 second
- D.**     **THRESHOLD**     Continuously variable gain reduction threshold control. Determines the necessary amplitude for compression or limiting to take effect. Most extreme effect is at the MIN (fully counter clockwise) position. The lower the threshold, the more that gets limited.
- E.**     **OUTPUT ATTENUATE**     Continuously variable attenuation of output signal leaving the amplifier circuitry. Full attenuation occurs at the full counterclockwise position. This control is active only in IN mode.
- F.**     **ATTACK**     Continuously variable sensitivity of transient detection. Determines the necessary length of transient to initiate gain reduction. Fast =25mS, Med =50mS, Slow =70mS. Fully counter clockwise at the slowest setting will prevent most percussive signals from causing limiting or compression.
- G.**     **DUAL INPUT**     Continuously variable attenuation of input signal entering the amplifier limiting circuitry. Full attenuation occurs at the fully counterclockwise position. This control is active only in IN mode.
- I.**     **LINK**     When switched to "SEP" left side is independent from the right side. When switched to "LINK" both channels are reduced in gain by the same number of dB. This insures that the stereo image is unchanged. The METERS remain independent to help set THRESHOLDS.
- I.**     **POWER ON/OFF**     Power is supplied to the unit when switched UP. Meters will illuminate
- H.**     **GR METER**     Measures in decibels amount of reduction

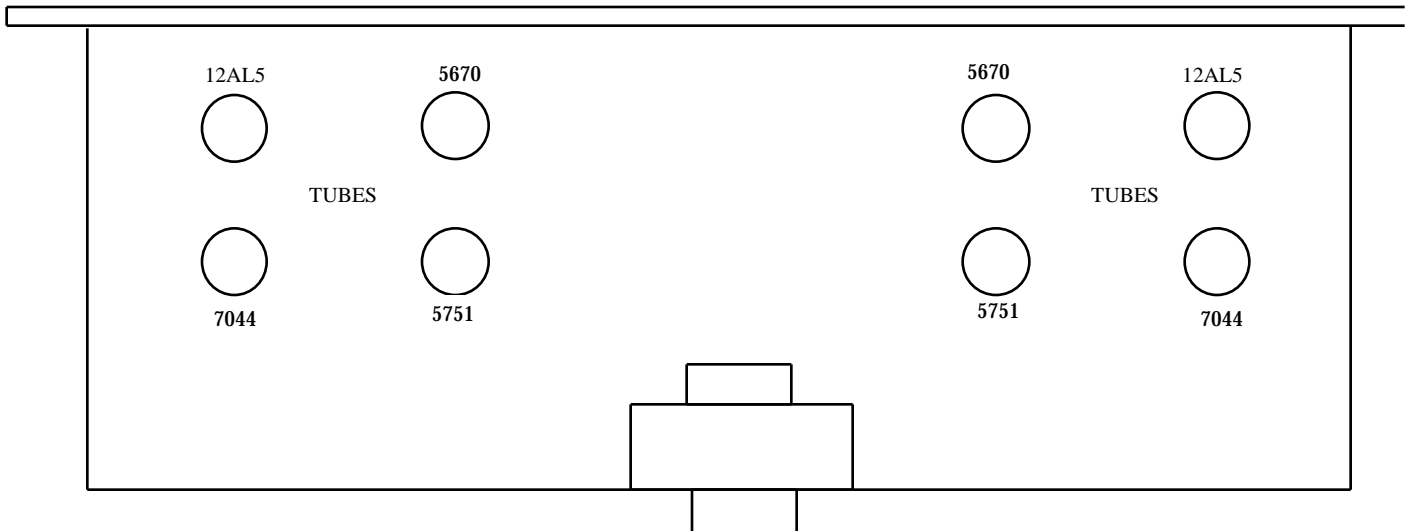
# REAR PANEL



A

- |          |                                  |   |
|----------|----------------------------------|---|
| <b>A</b> | <b>FUSE HOLDER</b>               | Houses a standard 2 Amp SLO-BLO fuse. Replace only with the same type and size.   |
| <b>B</b> | <b>IEC MAINS SOCKET</b>          | Standard 3 pin AC mains socket. See the section MAINS CONNECTIONS for more details.   |
| <b>C</b> | <b>VOLTAGE CHANGEOVER SWITCH</b> | Selects between 110,117,120 Volts or 220,227,240 Volts. This switch should be set for the mains AC voltage of your country. Units destined for Japan have been hard wired for 100V. operation |
| <b>D</b> | <b>OUTPUT XLR</b>                | 3 Pin XLR BALANCED.    Pin 1 - Ground<br>Pin 2 - Positive going phase (+)<br>Pin 3 - Negative going phase (-)   |
| <b>E</b> | <b>INPUT XLR</b>                 | 3 Pin XLR BALANCED.    Pin 1 - Ground<br>Pin 2 - Positive going phase (+)<br>Pin 3 - Negative going phase (-)   |

# TUBE LAYOUT



**this page for  
example settings**



# FRONT PANEL ADJUSTMENTS

## Initial basic settings for line level use:

- 1 -Begin with POWER ON, BYPASS, SEP and COMPRESS
- 2 -Set all controls at 12:00 ( or THRESHOLD at min)  
(for calibration feed in a 1Khz oscillator at 0 VU and confirm the return from the unit is actually 0 VU. Switch from BYPASS to IN and adjust the individual OUTPUTs to also return 0 VU.)
- 3 -Switch from BYPASS to IN and adjust the DUAL INPUT to get 3 to 6 dB of gain reduction on the meter with either COMPRESS or LIMIT. Fine adjust with the Thresholds.
- 4 -Adjust the individual OUTPUTs to either have a comparable level with BYPASS or provide the desired level to tape. Use the recorder's meters. Digital recorders use Peak Meters and Analog usually uses VU meters. Machines may use different calibrations.

If the source is "stereo" then the best method is to switch from SEP to LINK. This insures that both left and right sides will change gain the same amount at the same time. That way a sound located in center will stay in center and not move around. This unit uses both the channels to control the gain. That means that similar settings should be set up on both sides. You should not just depend on adjusting one side. The usual mistake is forgetting about the LIMIT / COMPRESS switch, so check that they match first. Use both meters. Some compressors mix left and right then use that mono signal to control compression with the left side controls. This makes it easy for some to adjust but its not right. We combine the "DC" control signals not the audio.

Because Compress has lower "ratios" than Limit the Threshold will seem to have less range. Actually the range is the same - only the result is less gain reduction. Turn up the Input.

If the source is too percussive or has loud drums in the mix: try adjusting the ATTACK and RECOVERY controls. Sometimes fast Attack and medium Recovery helps tame drums. Conversely if the drums are "sitting pretty" then slow the attack. Fast ATTACK & RECOVERY settings tend to reduce transients. Slower ATTACK preserves the mix and drums should not trigger compression - overall level will.

Only the fastest settings are the only way to make this unit pump like a cheap old solid state limiter. Even then you have to do some drastic Limiting. We designed the Variable-MU to be difficult to dial in a "bad" setting. The control range is wide but not extreme - not zero to infinity. Music before spec sheets.

Slower RECOVERY settings tend to be the most inaudible. The more bouncy the meter seems - the more likely that limiting is audible and may be regrettable. Pumping is no longer in "fashion" now, we hear.

If you want a fast analog "brick-wall" limiter that doesn't mess up the music - dream on - they don't exist. The Variable-MU will probably do what you actually need. The trick is to use slow Recovery and less than 5 dB of Limit which often translates to "lower the input". In this unit the "knee" softens as more limiting is used. This tends to act like a compressor followed by a limiter. This is good but not perfect. Up to about 10 dB of gain reduction should be mostly inaudible. This is why the original name of the unit was the 10 dB Limiter. However, watch out for quiet passages - they will get loud - a giveaway that somebody is seriously "over-compressing". Rather than heavily limiting the mix - Gently compress individual tracks during recording, gently compress the mix and save the final limiting to the mastering engineer who is probably also going to use a Variable-MU - followed by their state-of-the-art digital limiter. That way, only the radio stations and MTV will "over-compress". Did you know that the louder the CD, the more it is likely to push the station's limiters into the cringe zone. For broadcast, average loudness is often a better goal than the loudest possible CD. It all comes out the same in the end. Controlling dynamic range is important for pop. Watch out for big peaks in the extreme lows and highs - broadcasters use and abuse multi-band limiters. Your call...

## OPERATION NOTES

The "MANLEY STEREO VARIABLE MU LIMITER - COMPRESSOR" is designed for multiple purposes. The unit can be used stereo or as 2 individual channels of limiting or compression. It can be used as a balanced line amp capable of 24 db! of gain and as a pre-amp for low level signals. 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. We know several famous producers and engineers that record every possible track, and the mix and then master through these LIMITER-COMPRESSORS.

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 that the drums cause 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 GAIN MAKE-UP 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. 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 will not work.

The gain control chain is technically called a feedback circuit. Most modern compressors use a feedforward 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.

## TECHNICAL NOTES

### SWITCHING ON

The power switch is located on the right hand corner of the front panel. Flip the switch up to turn on the Limiter Compressor and down to turn off.

### TUBE LIFE

As with all tubes, their quality degrades with age. This is due to cathode emission, a natural process found in all tubes. We recommend that you have your unit checked every 4-5 years, depending on usage, usually the limiter will require re-tubing after this time has elapsed. Furthermore, any adjustments such as meter calibration should be performed when the unit has sufficiently 'warmed up'.

### NOTE

Almost all compressors have only two "gain" controls of a possible three: Input, Threshold and Output. With all three theoretically one is redundant. Utilizing a Dual Input has confused some "engineers" when it was needed for two different sounds. Simply find a good compromise position on the Dual Input and use the Threshold and Output as usual. The Input control is very useful with stereo material - try it - but it is not meant to be used for stereo "fades". Use it to set up a general level and final tweaking.

### OPERATION

The principle of operation of this unit is based around a 5670 variable-mu (variable gain) double triode operating in a fully balanced or symmetrical circuit.

Because of the need to preserve symmetry, a balance-adjustment pre-set potentiometer is placed on the vertical circuit board adjacent to the 5670 variable-mu double triode. This control is set so that the two individual triodes amplify equally. (See Adjustments Section).

The benefits of utilizing a variable-mu vacuum tube as the 'heart' of the limiting (or compression) function is that a widely varying range of input signals can be handled in a rapid-acting without introducing harmonic distortion - unless the operator / engineer wishes to do so for creative reasons.

As with all compressor limiters there will be little change of gain reduction with various settings of ATTACK and RELEASE controls using a sine wave source. With music there will be changes in the amount of gain reduction with changes of these controls.

### OPTIONS

Also available: MASTERING VERSION-- with 1/2dB THRESHOLD, and OUTPUT CONTROLS, 5 POSITION INPUT PRESET SWITCH, 12 POSITION ATTACK CONTROL. All built up on Grayhill sealed gold contact switches for maximum sonic integrity, repeatability, and accuracy within immeasurable tolerances. The panel has each step marked for precise recall. Retail price is \$5,000 USD.

There is also an option to emulate the vertical/lateral switch found on Fairchild 670s. This provides for some M/S coding/decoding. We provide both input and output switches.

Other possibilities include sidechain inserts, remote metering, etc. Avoid ordering all possible options - there is only so much we can fit.

### EARLY VERSIONS

Originally we used 6386's as the variable MU tube. These are now too rare. They will not directly replace the 5670 in your unit without component changes. The 7044 output tubes are an improvement on the original 12BH7 - Higher output current and better consistency being the prime reasons. We also improved the transformers from the first units made.

## NOTES ON MASTERING MODIFICATIONS

The Mastering Version of the Variable MU Limiter Compressor uses expensive Greyhill rotary switches with gold contacts where conductive plastic pots were used. The steps are determined with a large number of 1% precision metal film 1/2 watt resistors. The best conductive plastic pots only have 10% or 20% tolerance. The ten fold improvement in precision helps a great deal in left-right matching. There is a subtle audible improvement with stepped switches as well. Audiophile HI-FI often uses that technique to wring the last drop of performance out of a pre-amplifier. And I bet you wanted stepped switches mostly for resets.

The Dual Input is a five position switch with a generic optimum setting of "0" in the 12:00 position. Each step in either direction is 2 dB. For reference Unity Gain is "0".

The Output Attenuators are in half dB steps. Reference Unity is -11.5 or fully counter-clockwise. You might think of these as "gain makeup". They are marked technically, in that "0" or fully clockwise has zero attenuation in the circuit. The tube circuit actually has 15.5 dB of gain. The Input attenuator at "0" removes 4 dB and the Output attenuator removes the last 11.5 producing "unity". With a little compression the "gain make-up" available with the Output Attenuator is very handy.

The Threshold is in half dB steps calibrated to LIMIT mode. In Compress the steps are approximately 1/4 dB. There are 24 steps so LIMIT gets a 12 dB range and Compress has a 6 dB range of adjustment. In some cases it is common to use the Input Attenuator to find a good starting point. Some Mastering engineers find using the combination of Input, Output and Threshold to achieve a little different "drive". Another good reason for stepped gains.

The Attack Time has been slightly extended in both directions compared to a regular Variable-MU and divided into 11 steps. The approximate values are: CW (fast) 15mS, 20, 25, 30, 35, 40, 50, 60, 70, 80, 90mS (slow) CCW.

The Recovery has always been a 5 position switch. The times are: 200mS, 400mS, 600mS, 4S, 8 Seconds.

## NOTES ON M/S MODIFICATIONS

The M/S modification allows various approaches to Mid/Side recording, playback and processing. There are separate switches for both input and output. Normal STEREO operation is with both switches pushed towards the right. M/S mode is with the switches to the left. The left switch changes the way the transformer inputs are wired (instead of an "active circuit") to derive M/S. The right switch changes the output wiring.

When both the Input and Output switches are in M/S, then if one feeds normal left and right signals - the output will also be left and right. The signal would be "encoded" then "decoded". This can be useful because the compressor can process mid and side differently. Now the "Channel One" Threshold, Attack and Recovery are for the mid, sum or mono part of the sound - "Channel Two" Threshold, Attack and Recovery are for the side or difference part of the sound. If the Link switch is SEP then adjustment of "width" is possible using the Threshold controls and some gain reduction. To "widen" simply compress more in Channel One. In LINK mode the adjustment of width is not possible but one can use more of the "Mid" (or "Side") to control overall Limiting. This is useful for material meant for stereo broadcast. FM splits the signal into M/S and transmits as M/S. Broadcast engineers are generally more concerned that the mono component is solid because it transmits much further - and that relates to audience size and perceived quality.

To "decode" mics in the M/S configuration one can either switch the input or output to M/S. Generally the input would be switched to M/S and the compressor and all after it will now have left and right.

To "encode" program for FM broadcast and bypass the transmitter encoder, either the input or output switches can be used. If the unit is to be used for compression then it is normal to follow the output with a very good Limiter. This approach sounds louder and less "processed" than multi-band processors. It also allows a finer degree of control to the critical mono signal.

**this page is for  
G.R. Curves**

## SPECIFICATIONS

Electronics	Transformer Input, 3 dual triodes in balanced symmetrical variable mu circuit / line amp and Transformer Output per channel. Vacuum tube audio rectification for side chain. Custom Meters, Attenuators, etc. Input and output transformers designed by David Manley and wound in-house at Manley Lab's magnetics department.
Input Impedance	600 ohms Balanced, PIN 2 HOT
Output Impedance	600 ohms Balanced, PIN 2 HOT
Gain (line amplifier)	30 dB Minimum, 35 dB typical
Maximum Input	+36 dB (52 V RMS) (estimated for 1% THD) Input attenuator is before input transformer
GR Thresholds	Onset of LIMIT -20 dBM to +10 dBM (input at 9:00) Onset of COMPRESS -10 dBM to +10 dBM "
Maximum Output	+30 dB (26 V RMS) (26 dB headroom) Output attenuator is T pad after Output Transformer
Noise Floor	-80 dB : 20Hz to 80Khz: -90 dB typical
Distortion	.1 % at unity gain 100 Hz to 3 Khz typical .2 %: 20Hz to 10Khz at typical settings
Frequency Response	+/- 1dB from 20 Hz to 20 Khz
Recovery Time	.2 sec , .4 sec , .6 sec , 4 sec , 8 sec
Attack Time	25 ms (Fast) (50 mS at 12:00) to 70 ms (Slow)
Applications	Professional audio recording, mixing and mastering.
Power Consumption	48 watts
Fuse type:	2 Amp slo-blo for 120 Volt mains 1 Amp slo-blo for 240 Volt mains

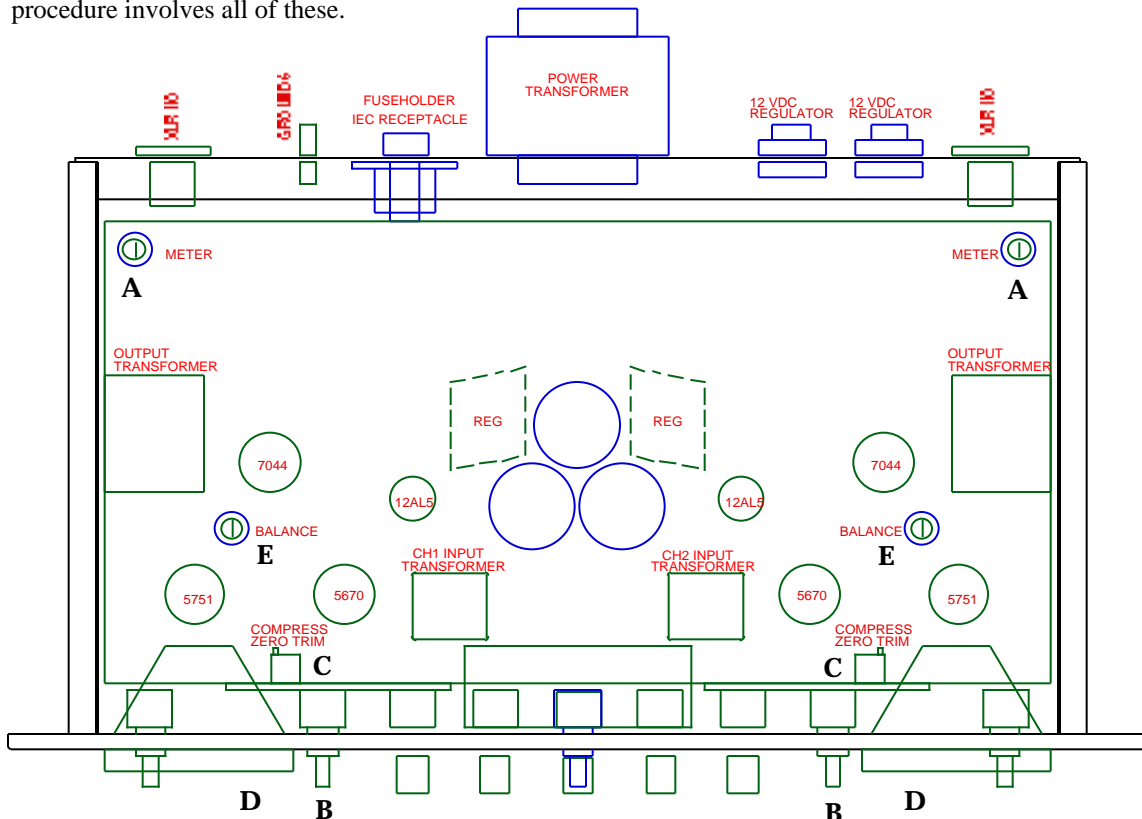
# SERVICE ADJUSTMENTS

**These are factory presets. These should only be altered after a re-tube.**

- A METER CAL - GR ACCURACY**
1. Supply a line level input signal 1K TONE @ 0 VU (or between 1 and 1.5 volts)(0 VU = 1.228 volts )
  2. Adjust front controls for NO LIMITING
  3. Back down the reduction control to achieve 6dB of actual limiting as observed on an external VU meter or AC volt meter. 6 dB of limiting will reduce the volts by 1/2. If you start with 1 volt expect .5 volts after limiting 6dB.
  4. Adjust each channel's trimpot located on the extreme back corners on the main circuit board.
- B METER** - Adjusts meter "ZERO". Needs to be well warmed up. This simply sets meter "rest" position.
1. Set in Limit Mode. No Signal
  2. Adjust front panel METER ADJUST so that meter reads ZERO gain reduction.

The above adjustments interact - You may want to repeat these two steps for best accuracy.

- C**
3. COMPRESS TRIM - Also adjusts meter ZERO but in compress mode. Stable & unlikely to need adjustment.
  4. Locate the internal trimmers directly next to the meters.
  5. Switch to COMPRESS and adjust trimmer for ZERO on the meter.
- D.** To adjust internal balance and lowest distortion: We recommend that this control be reset only after changing 5670 tubes. This is not Left /Right balance. This "balance" sets the relative gains of the 2 halves of a differential circuit. Exact balance = lowest distortion & thumps. Step E sets the balance further down the path. Another method for well equipped techs, is to use a distortion analyser.
1. Adjusting the front panel BALANCE control balances the current draw of the 5670 cathodes.
  2. Set a multimeter to read DC volts and connect the probes to the two test points below the GR Meters. Expect a very small voltage, this is a "null adjustment"
  3. Adjust the small trim pot located on the front panel and marked "ADJUST" until the METER nulls to zero.
- E**
5. This procedure is best done by ear with loud drum tracks. Set Attack and Recovery for fastest settings and at least 6 dB of Limiting. Start the trimmer at center and while listening carefully to the output adjust the trim for minimum "thumping". We select 5670's to minimise this. Trim procedure "D" also affects "thumping". The best procedure involves all of these.



## WARRANTY

All Manley Laboratories equipment is covered by a limited warranty against defects in materials and workmanship for a period of 90 days from date of purchase to the original purchaser only. A further optional limited 5 year warranty is available to the original purchaser upon proper registration of ownership within 30 days of date of first purchase.

Proper registration is made by filling out and returning to the factory the warranty card attached to this general warranty statement, along with a copy of the original sales receipt as proof of the original date of purchase. Only 1 card is issued with each unit, and the serial number is already recorded on it.

If the warranty registration card has already been removed then this is not a new unit, and is therefore not warranted by the factory. If you believe this to be a new unit then please contact the factory with the details of purchase.

This warranty is provided by the dealer where the unit was purchased, and by Manley Laboratories, Inc. Under the terms of the warranty defective parts will be repaired or replaced without charge, excepting the cost of tubes. No warranty is offered on tubes, unless:

1. a Manley Laboratories preamplifier is used with a Manley Laboratories amplifier, and
2. the warranty registration card is filled out.

In such a case a 6 month warranty on tubes is available with the correct recording of the serial number of the preamplifier on your warranty registration card.

If a Manley Laboratories product fails to meet the above warranty, then the purchaser's sole remedy shall be to return the product to Manley Laboratories, where the defect will be repaired without charge for parts and labour. The product will then be returned via prepaid, insured freight, method and carrier to be determined solely by Manley Laboratories. All returns to the factory must be in the original packing, (new packing will be supplied for no charge if needed), accompanied by a written description of the defect, and must be shipped to Manley Laboratories via insured freight at the customer's own expense. Charges for unauthorized service and transportation costs are not reimbursable under this warranty, and all warranties, express or implied, become null and void where the product has been damaged by misuse, accident, neglect, modification, tampering or unauthorized alteration by anyone other than Manley Laboratories.

The warrantor assumes no liability for property damage or any other incidental or consequential damage whatsoever which may result from failure of this product. Any and all warranties of merchantability and fitness implied by law are limited to the duration of the expressed warranty. All warranties apply only to Manley Laboratories products purchased and used in the USA.

Some states do not allow limitations on how long an implied warranty lasts, so the above limitations may not apply to you. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above exclusion may not apply to you.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.



# WARRANTY REGISTRATION

We ask that you please fill out this registration form and send the bottom half to:

MANLEY LABORATORIES  
REGISTRATION DEPARTMENT  
13880 MAGNOLIA AVE.  
CHINO CA, 91710

Or you can FAX this page in: (909) 628-2482

Registration entitles you to product support, full warranty benefits, and notice of product enhancements and upgrades. You **MUST** complete and return the following to validate your warranty and registration. Thank you again for choosing to use Manley Laboratories.

MODEL \_\_\_\_\_ SERIAL No. \_\_\_\_\_

PURCHASE DATE \_\_\_\_\_ SUPPLIER \_\_\_\_\_

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*PLEASE DETACH THIS PORTION AND SEND IT TO MANLEY LABORATORIES*

MODEL \_\_\_\_\_ SERIAL No. \_\_\_\_\_

PURCHASE DATE \_\_\_\_\_ SUPPLIER \_\_\_\_\_

NAME OF OWNER \_\_\_\_\_

NAME OF STUDIO \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY, STATE, ZIP \_\_\_\_\_

TELEPHONE NUMBER \_\_\_\_\_

EMAIL ADDRESS \_\_\_\_\_

COMMENTS ????? \_\_\_\_\_

\_\_\_\_\_

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templates**