

M2/V

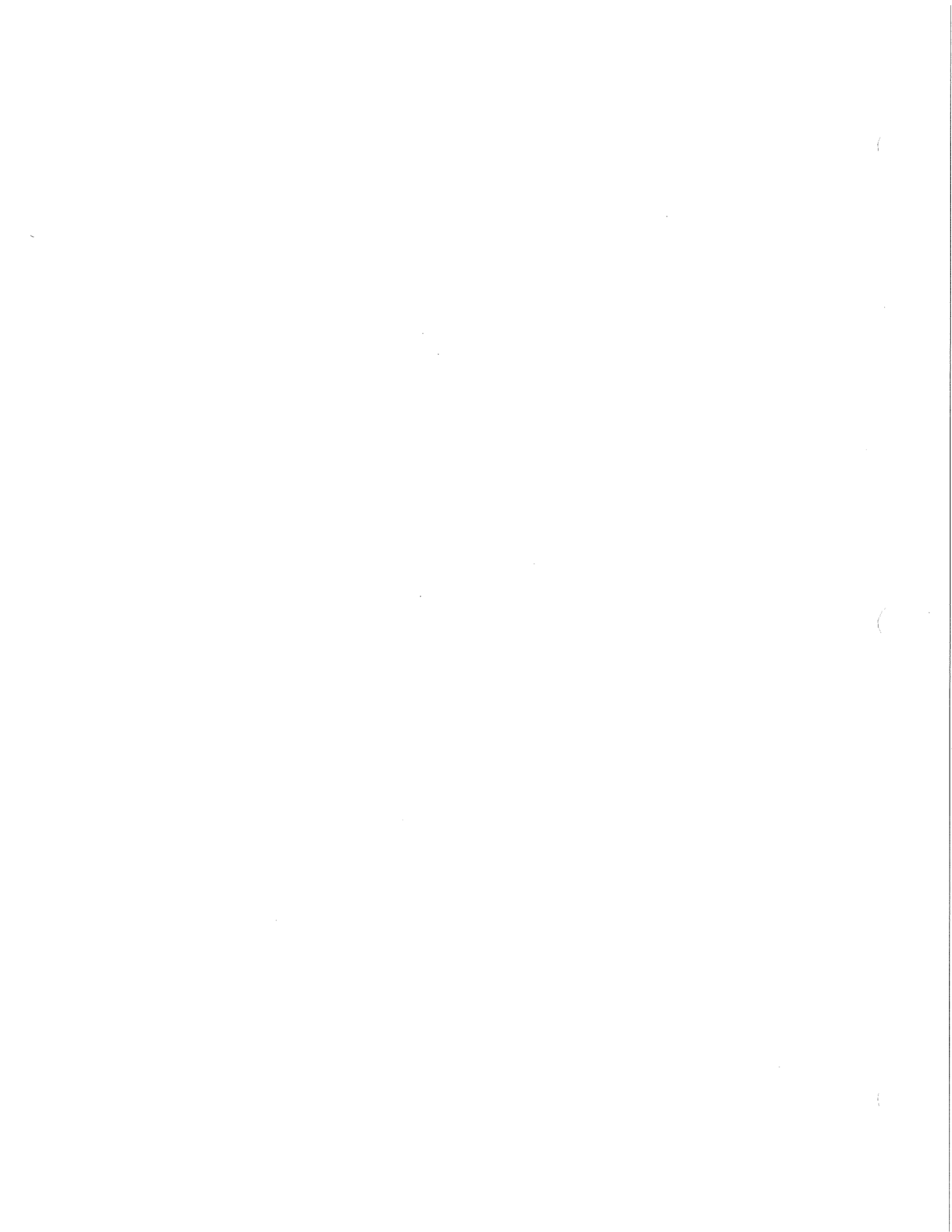
# Operation Manual

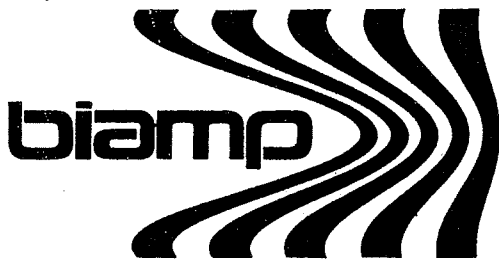
**B I A M P**<sup>®</sup>

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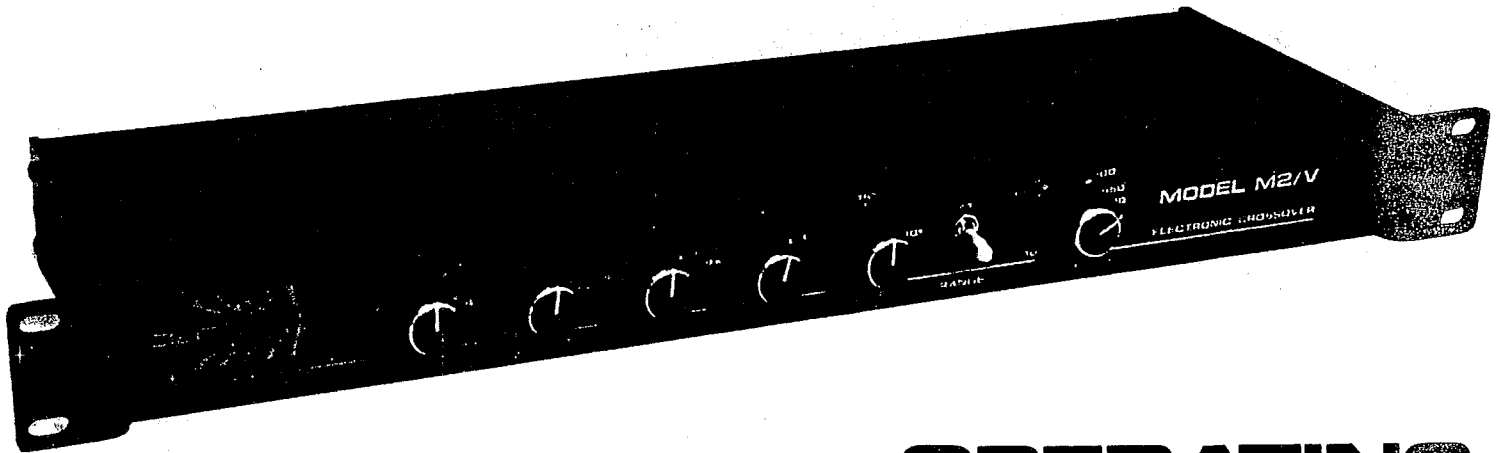
S Y S T E M S

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## MODEL M2/V ELECTRONIC CROSSOVER



# OPERATING INSTRUCTIONS

### GENERAL DESCRIPTION

The performing artist seeking the best possible sound in live performance sooner or later discovers the versatility and flexibility of a multi-amplifier system just can't be beat for high level undistorted sound. The essential key to the success of a multi-amplifier system is the quality of the active electronic crossover network in the heart of the system.

This is why Biamp has created the M2/V Electronic Crossover for high performance multi-amplifier sound systems. A single M2/V gives you a mono 2-way capability. A pair of M2/V's provides either stereo 2-way or mono 3-way operation. Three M2/V's are ideally suited for mono 4-way installations.

You will find no other electronic crossover on the market at this price that performs as well as the M2/V, feature for feature.

### FEATURES

- Professional performance and studio specifications.
- Transformerless balanced line inputs and outputs or conventional single-ended operation.
- Built-in line drivers with system gain control 0 - +15dB.
- Low noise and distortion.
- Continuously variable crossover frequencies 100Hz to 10KHz.
- Continuously variable bass filter 20Hz to 100Hz.
- Continuously variable high frequency output inversion control (0° to -180°).
- Minimum phase shift Constant "Q" circuitry.
- Outputs short circuit and reverse surge protected.
- Rugged 19" rack mount design (only 1¾" of rack space).

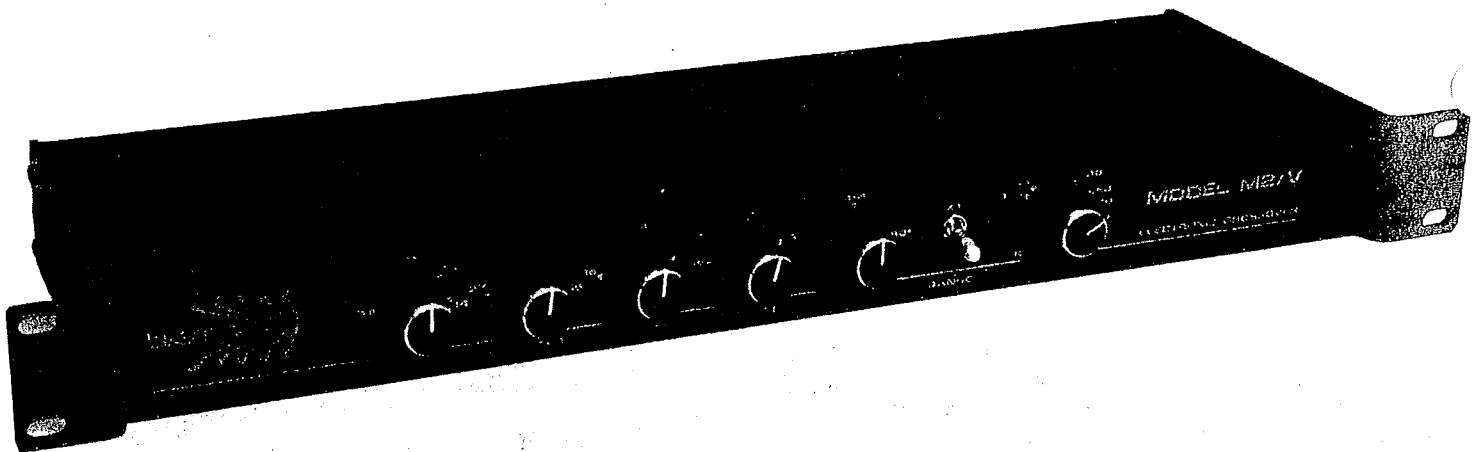
### LATEST CIRCUIT DESIGNS

Modified active state variable filter circuitry is employed to replace active RC and LC filters which are subject to phase shift and "Q" variation.

This state of the art approach insures instrument grade accuracy with minimum phase shift and constant "Q" at any given crossover frequency (100Hz to 10KHz).

High headroom makes it virtually impossible to overdrive the M2/V before your power amplifier clips.

The latest transformerless balanced line techniques are employed to insure low noise operation under any condition. Balanced lines of the M2/V make it completely compatible with standard recording studio and broadcast equipment as well as professional mixing consoles. The single-ended inputs and outputs match the M2/V to standard P.A. equipment, power amps, and home hi-fi systems.



## FRONT PANEL CONTROLS

### A. GAIN CONTROL

The gain control gives you added boost when needed because the M2/V has line driving capability. Numerous power amplifiers can be driven by the M2/V outputs because of its voltage swing and low output impedance.

### B. L.F. FILTER (High Pass Filter)

This continuously variable control, 18dB per octave High Pass Filter, can be used to "roll off" unwanted low frequency response without appreciably changing the nature of the sound. Bass speaker enclosures attempting to reproduce fundamental frequencies below their capability will distort all frequencies. Rumble, wind noise, and dangerous dropped microphone transients are eliminated from the M2/V output, improving the sound and protecting speaker cones from excessive excursion. The filter will improve many vocals by removing pops and some unwanted breathing noises. The control is continuously variable from 20 Hz to 100 Hz.

To use, set the control at 20 Hz. During heavy bass passages or when the bass gets muddy, bring up the control slowly until you notice the low end tightening up. Loud yet tight low end can be achieved by boosting the low end in your graphic equalized or mixer and then advancing the L. F. Filter control until desired sound is achieved.

### C. LOW FREQUENCY LEVEL

This control sets the output level of the low frequency output jacks. (balanced and unbalanced).

#### D. HIGH FREQUENCY LEVEL

This rotary control establishes the output level of the high frequency output jacks (balanced and unbalanced).

#### E. HIGH FREQUENCY PHASE

This control electronically compensates for phase shift between the high frequency and low frequency speakers. Experienced sound men know that to achieve the highest possible sound quality, it is extremely important to adjust the placement of the high frequency horn driver diaphragms in relation to the low frequency cone driver diaphragms. This reduces phase distortion and flattens frequency response. However, it is often inconvenient and not always possible to do this and sometimes requires extra manpower or more time to get set up properly.

The M2/V H. F. phase control electronically shifts the phase of the H. F. outputs. This control will not affect the frequency response, or wave form sent to the low or high frequency speakers. However, when both low and high frequency speakers are put together and their levels balanced, this control will have a surprising effect. To set this control, use a vocal passage, and notice as the control is rotated the voice will "move" between the horn and the bass cabinet. The voice will sound deep in the bass cabinet and bright in the horns. For best overall sound, set the voice "physically" between the horn driver and low frequency cabinet.

#### F. RANGE SWITCH

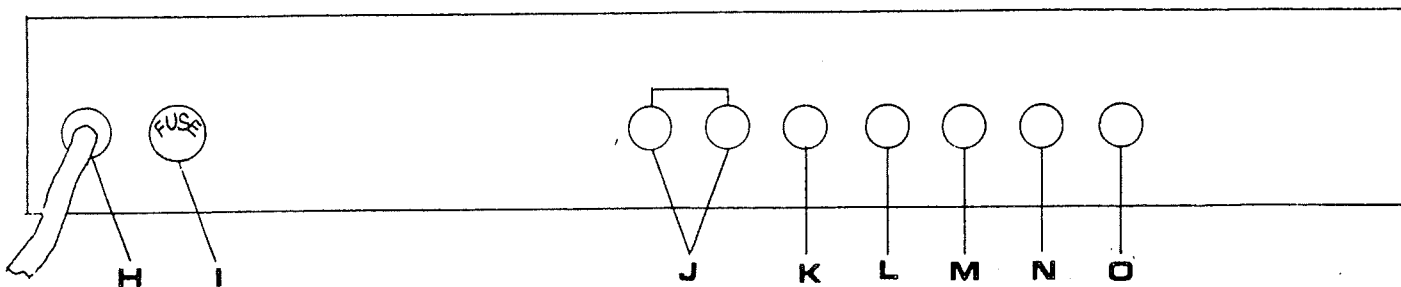
When the range switch is in the X1 (up) position, the crossover frequency is as indicated on the front panel. In the X10 (down) position, the crossover frequency will be ten times the frequency indicated on the front panel:

X1	100hZ to 1KHz
X10	1KHz to 10KHz.

This switch is of the locking type to prevent accidental tripping to the wrong range. To actuate the switch, pull straight out on the lever and switch as desired.

#### G. FREQUENCY SELECT

This control sets the crossover point of both the low and high frequency outputs. Because of the "state variable" filter design, -3dB at the crossover point is accurately maintained no matter which crossover frequency is selected. Accurate tracing, constant "Q" and amplitude are assured with the M2/V circuit design.



## REAR PANEL

### H. POWER CORD

This 3-wire AC Cord (grounded type) is for connection to 50 or 60Hz 110 to 120V AC power outlets.

### I. FUSE

This fuse (.1 amp) protects the primary AC line and is the standard, easy-to-replace 3 AG style fuse.

### J. UNBALANCED HIGH FREQUENCY OUTPUTS

The unbalanced H. F. output jack is used to connect to your H. F. amplifier, which has an unbalanced input.

These two outputs are paralleled so that a jumper to another M2/V unbalanced input will facilitate mono 3-way crossover capability.

### K. BALANCED HIGH FREQUENCY OUTPUT

This jack is a 3-conductor stereo phone jack and requires a 3-conductor stereo phone plug (see explanation under heading "USING TRANSFORMERLESS BALANCED LINES"). Use this jack when the power amp input is 600 ohm balanced.

### L. LOW FREQUENCY UNBALANCED OUTPUT

This output jack is used to drive low frequency power amps with unbalanced inputs.

### M. BALANCED LOW FREQUENCY OUTPUT

This output jack is a 3-conductor stereo phone jack and requires a 3-conductor stereo phone plug. Use this jack when the low frequency power amp has balanced line inputs.

#### N. UNBALANCED INPUT

This input jack is used to receive unbalanced signals from unbalanced output sources (preamps, mixers, graphic equalizers, etc.).

#### O. BALANCED INPUT

This input jack is a 3-conductor stereo phone jack and requires a 3-conductor stereo phone plug. Use this jack when the input signal is from a balanced line source.

### INPUT AND OUTPUT JACKS

USE STANDARD (2-conductor) PHONE PLUGS FOR UNBALANCED INPUTS AND OUTPUTS. USE STEREO (3-conductor) PHONE PLUGS FOR BALANCED INPUTS AND OUTPUTS.

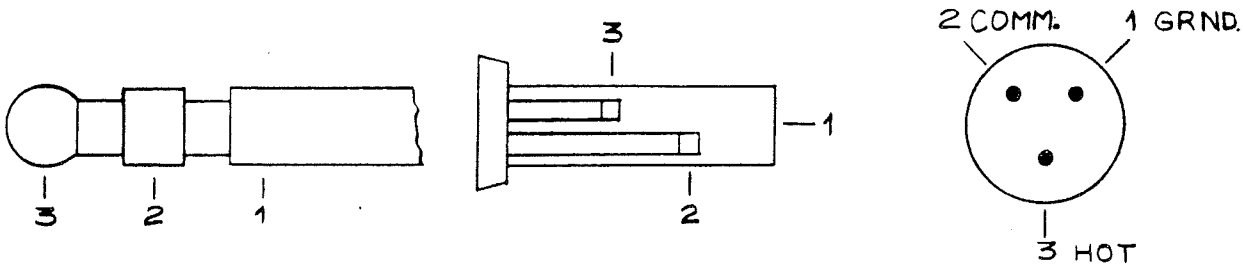
Two jacks are provided for each input and output; use a stereo phone plug for balanced lines and a mono phone plug for unbalanced lines. However, a standard phone plug should not be plugged into the balanced output, because one of the output driver amplifiers will be shorted to ground and will not function until the short is removed. However, the tip of a stereo phone jack may be used in the balanced output jack as a second unbalanced output, if desired. The second or center connector on the stereo phone jack may be used separately or in conjunction if a 180° out-of-phase signal is required.

### USING TRANSFORMERLESS BALANCED LINES

Transformerless balanced lines are the newest approach in audio for low noise interconnecting. This new system does not have the loss and distortion inherent in transformer designs, and yet has excellent line noise reduction capabilities and improved transient response. Many new and advanced products now coming on the market are using this approach. A good deal of expense can be saved by using stereo phone plugs instead of expensive XLR type connectors. The balanced line cable is the same, only the connector is different.

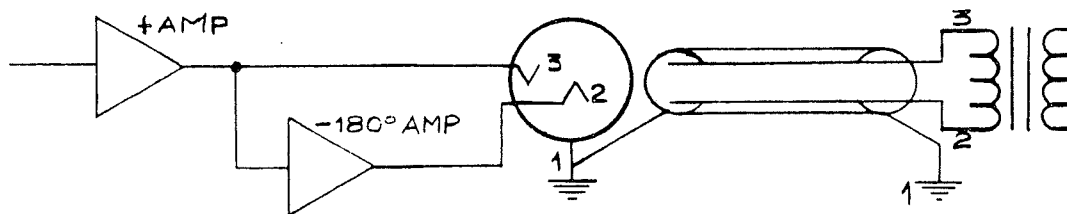
Interconnecting transformerless balanced lines is simple; just plug them together. Impedance matching is no longer a problem. Impedance matching is necessary when using transformers, because an improperly matched transformer will not have a flat frequency response and may have a negative effect on sound quality.

## HOW TO USE TRANSFORMER BALANCED LINES WITH TRANSFORMERLESS BALANCED OUTPUT



The outputs of the M2/V can drive any line transformer 600 ohm up. No termination is necessary; because of the high output capability of the M2/V (+24dBm), most line transformers will saturate and distort before the output amplifiers clip. Therefore, note the capability of your transformers for setting your maximum line levels.

Driving more than one transformer is okay as long as the load does not go below 600 ohms.



## DRIVING THE M2/V BALANCED INPUTS WITH LINE TRANSFORMERS

When driving the inputs with a transformer, termination of the driving transformer is advisable. A 680 ohm to 2,200 ohm 1/4 Watt resistor soldered inside the male stereo phone plug will do the job. Simply unscrew the housing on the phone plug and solder the resistor across the hot/common (3 and 2) terminals. Do not allow the resistor leads to touch the ground shield or hum may result. If the driving transformer is of studio quality, a 680 ohm value will give the lowest noise. If a standard transformer is used, a 2.2k value will give the least loss due to reduced transformer loading.



## RESETTING INPUT DIFFERENTIAL BALANCED ADJUSTMENT (BALANCED INPUT)

If necessary, turn on power and allow the M2/V to warm up for 30 minutes. Ground signal generator to input ground. Use stereo phone plug, connect hot side of generator to the two hot terminals of the phone plug. Now you are putting the same signal on both the + and - inputs. With all controls flat, output signal should be at least -75dB below 1 volt set from the generator. If not, reset internal adjustment.

## INTERNAL FREQUENCY CALIBRATION

These two internal adjustments are factory calibrations for the crossover frequency. The other 5k-trim potentiometer on the circuit board sets the maximum crossover frequency control, (1KHz or 10KHz), at maximum clockwise rotation of the frequency control. The frequency control and the 1 Meg. trimmer potentiometer on the circuit board sets the crossover frequency at the extreme counter clockwise position of the frequency control. (100Hz or 1KHz).

**WARNING!** If you desire to move these internal frequency calibrations, do not rely on the dial reading on a frequency generator. A frequency counter should be used to insure accuracy.

BIAMP SYSTEMS, INC. IS NOT RESPONSIBLE FOR BLOWN SPEAKERS  
OR HIGH FREQUENCY DIAPHRAMS WHEN USING THE M2/V ELECTRONIC  
CROSSOVER

(Good clean sound encourages one to turn up power levels  
and push speakers beyond their power limits).

If you must run your sound system to its maximum, raise the crossover frequency and bring up the L. F. Filter; this will improve the life expectancy of your speakers.

Never run the crossover frequency below the recommended crossover points of your speakers or high frequency drivers, or speaker damage may result.

## LIMITED WARRANTY

BIAMP SYSTEMS, INC. warrants to the original consumer purchaser of each BIAMP product that the unit is free from defects in materials and workmanship. This express warranty commences on the date of purchase from an authorized BIAMP dealer and extends for one year. Completion and return of the warranty registration card enclosed with each unit within ten days of the date of purchase is a condition precedent to coverage and performance under this express warranty.

**EXCLUSIONS AND LIMITATIONS:** This warranty will be VOIDED if the serial number has been removed or defaced, or if the unit has been subjected to abuse, alterations, attempted repair by any person not authorized by warrantor to make repairs, accident, or installation contrary to the warrantor's instructions. Cosmetic blemishes, such as handles, feet, and knobs are not warranted. All implied warranties, including the warranty of MERCHANTABILITY are limited to the duration of this express warranty, and, if the registration card is not promptly returned, the implied warranties are limited to the duration of the express warranty if it had been effective. In no event will BIAMP SYSTEMS, INC. be responsible for incidental or consequential damages, except for injury to the person.

**HOW TO OBTAIN REMEDY:** Carefully pack your BIAMP product and return it to one of the BIAMP Authorized Service Centers or write the BIAMP Customer Service Department at the address below for instructions on how to return your unit to the factory. Pack a letter with the unit explaining the nature of the problem and giving your name and address. You are responsible for freight and insurance charges to the Authorized Service Center or the factory.

**WHAT BIAMP WILL DO:** BIAMP will repair or, at its option, replace each unit covered by this warranty. Units sent to the factory will be returned to the owner freight collect. Units brought to Authorized Service Centers will be held for pickup by the owner for a period of time established by the individual Authorized Service Center, or, at the owner's option, returned to the owner freight collect.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. For instance, some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

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