

AM6

AUTOMATIC MIXER

OPERATING INSTRUCTIONS and trouble-shooting guide

LECTROSONICS, INC.

Rio Rancho, NM

INTRODUCTION

The AM6 is the first automatic mixer to include notch filters and basic tone control in a single, cost-effective package. Although the AM6 is an affordable unit, performance is equivalent to much more expensive separates. The AM6 has 6 input channels which will accept either mic or line level signals. The AM6 will be an ideal choice for small churches, conference rooms, or anywhere a state of the art integrated automatic mixer is desirable.

The AM6 has many features not found in systems composed of separate components. The AM6 includes an automatic (switchable to manual) ambient threshold sensing circuit to eliminate the need to adjust the ambient threshold for varying background noise conditions. This makes the initial setup of the AM6 quick and simple. The Last Mic Hold function is also included. With Last Mic Hold in the "On" position, the last active mic is held in the open mode until another microphone comes on. In this way, much better performance is achieved in marginal situations (i.e. very soft talkers, or talkers who turn away from the mic).

Each channel is jumperable to allow bypass of the notch filters and tone controls. This is advantageous when connecting outside music sources such as CD players or tape decks. Each channel also has remote volume control capability with the addition of a single linear potentiometer per channel. In addition, the Main level may also be remotely controlled. Two balanced line outputs are provided for amplifier feed or tape recording.

TABLE OF CONTENTS

INTRODUCTION	1
GENERAL TECHNICAL DESCRIPTION	2
FRONT PANEL DESCRIPTION	4
REAR PANEL DESCRIPTION	5
INSTALLATION	6
OPERATING INSTRUCTIONS	7
TROUBLESHOOTING	7
SPECIFICATIONS	8
SERVICE AND REPAIR	9
RETURNING UNITS FOR REPAIR	9
WARRANTY	Back cover

GENERAL TECHNICAL DESCRIPTION

Please refer to the block diagram of the AM6 for the following discussion.

The microphone preamp is designed around an ultra-low noise, dedicated preamplifier IC. This IC provides noise and distortion performance previously available only in discrete preamp designs. The preamp is fully balanced and RF protected. Phantom power (15 Volts) is jumperable on each channel to accommodate both dynamic and electret type microphones. The gain of the preamp is variable via a rear panel trim pot from 6dB to 55dB of gain. This adjustment of gain range allows the preamp to accept signals from mic to line level, while optimizing the preamp gain for any input signal level.

The microphone preamp feeds a low noise Voltage Controlled Amplifier (VCA). The VCA implements the automatic function, as well as allowing remote level control of any channel using a linear potentiometer.

The AM6 has two modes of operation for each channel; Auto and Direct. The operational mode is selected via the front panel Auto/Direct switch on each channel. In the Direct mode, the channel is always on. The Direct mode is analogous to a standard channel in a non-automatic mixer.

In the Auto mode, each channel is attenuated 15dB when there is no activity on the channel. When activity is detected, the channel gain increases 1dB for each 1dB that the input signal level is above threshold. The channel gain increases for 15dB, until channel attenuation is unity (0dB). After the channel attenuation reaches unity, no more gain modulation occurs even if signal levels continue to increase. This 2:1 gain modulation gives a smooth transition from full attenuation to unity gain, unlike the choppy action of automatic mixers that use gates (i.e. instantaneous change from full attenuation to unity gain).

The presence or absence of signal is determined by the Speech Filter and Log Amplifier section. Speech signals are filtered to emphasize the voice band, and converted to decibels by the log amplifier. The signal is then compared against the instantaneous value of the Fixed Threshold plus the Variable Threshold, and the appropriate channel gain is derived. The Variable Threshold introduces a threshold offset proportional to the signal to prevent sound from the system loudspeakers from turning on unused microphones.

The level of individual channels is adjusted by the front panel Channel Level control. Each channel is jumperable to tone/notch or no tone/notch. Typically, channels using microphones as their source would be jumpered for notch filtering and tone control. Line level signals, such as recorded music, would normally be jumpered to bypass the tone controls to give flat frequency response reproduction. Note that when a channel is jumpered for bypass, the volume of that channel will not be affected by the Main Level control. In this way, the volume level of a line source may be preset using the Channel Level control, and will not be disturbed if the system volume is adjusted via the Main Level control.

The signals are summed, and their volume is controlled by the Main Level control. The signal is then sent to the Notch/tone controls section.

The balanced line outputs are low impedance (100 ohms) line level drivers that may be used for amplification and tape recording.

Each channel has connections for remote gain control via linear pots (10K). Additionally, a single linear potentiometer is may be used to control overall system volume. Linear to audio taper signal conditioning is provided by the AM6 to maximize control resolution.

Threshold setting (i.e. the input signal level at which the channel begins to come on) may be accomplished in one of two modes; Auto or Manual. In Manual mode, a front panel pot is used to adjust the minimum level at which the channels begin to come on. In the Auto mode, the ambient level is continuously monitored, and the minimum level at which channels begin to come on is set a few dB above ambient. With the AM6 set in the Auto Threshold mode, the chances of misadjustment are considerably less.

Another feature of the AM6 that simplifies setup and operation is Last Mic Hold. With Last Mic Hold in the "On" position, the last active mic is held in the open mode until another microphone comes on. In this way, much better performance is achieved in marginal situations (i.e. very soft talkers, or talkers who turn away from the mic).

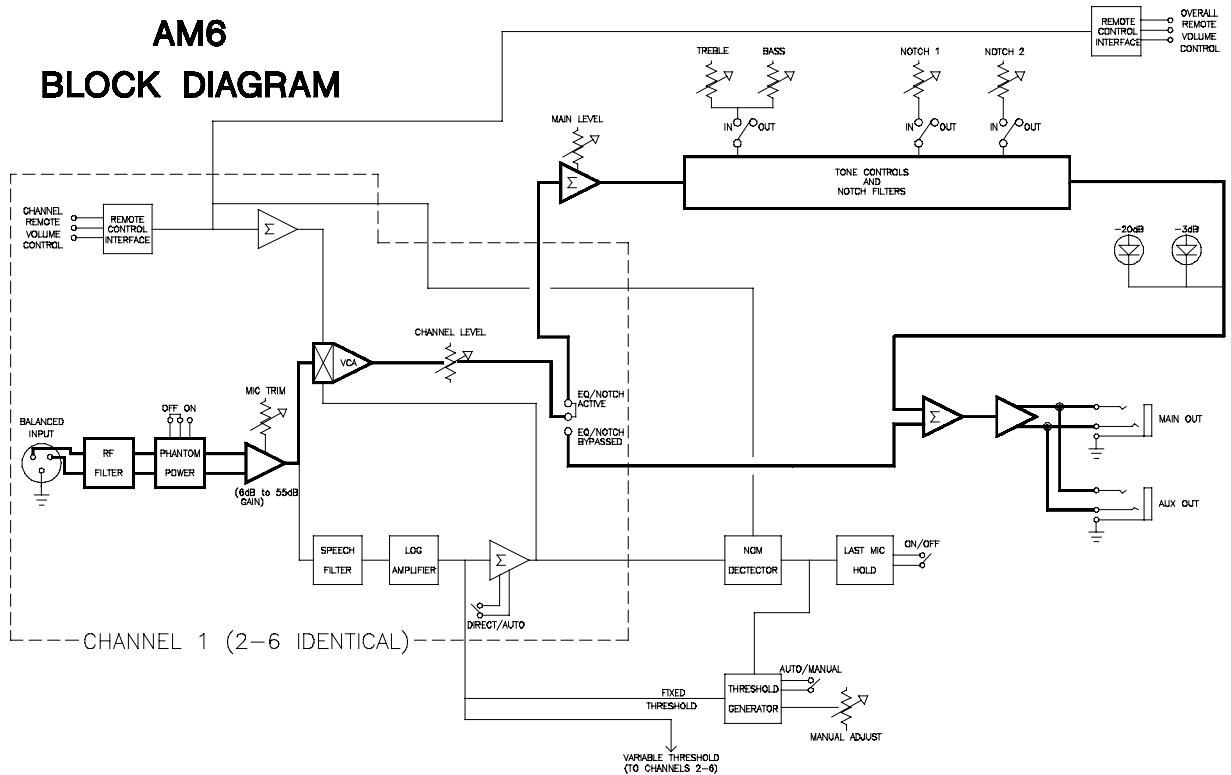


Figure 1 - AM6 Block Diagram

FRONT PANEL DESCRIPTION

CHANNEL LEVEL - Controls the level of signal from the channel sent to the main buss. Maximum gain occurs when this control is fully clockwise.

ON LED - Indicates when a channel is active.

AUTO/DIRECT MODE SWITCH - Controls the mode of operation of each channel. Direct mode keeps the channel ON regardless of the signal on that channel. Auto puts the channel in the automatic mode.

NOTCH 1/NOTCH 2 - Adjustable for an audio range of 500Hz to 5KHz applying a notch of -12dB on a 1/5 octave band to eliminate feedback.

NOTCH OUT/IN - These switches turn the notch filters off or on. Out is the off or deactivated position.

TONE CONTROLS (BASS/TREBLE) - Controls the amount of boost or attenuation in the chosen band. Fully clockwise is +12dB and fully counterclockwise is -12dB.

TONE OUT/IN - This switch turns the tone controls off or on. Out is the off or deactivated position.

OUTPUT LEVEL - Controls the system output level. Both of the balanced line outputs are driven from the Output Level control. Note that all channels that are jumpered to bypass the notch filters and tone controls are not affected by the Output Level control.

THRESHOLD MANUAL/AUTO SWITCH - Determines the mode of the fixed Threshold for the AM6. In Manual mode, the Threshold Level pot determines the Threshold. In Auto mode, the ambient noise is monitored and the Threshold is set relative to the ambient noise.

THRESHOLD LEVEL - Sets the Threshold level when the Manual Mode is selected.

LAST MIC HOLD - Enables or disables the Last Mic Hold function. With Last Mic Hold in the "On" position, the last active mic is held in the open mode until another microphone comes on.

POWER LED - Indicates the presence of AC power to the AM6.

POWER SWITCH - Turns the AM6 on or off.

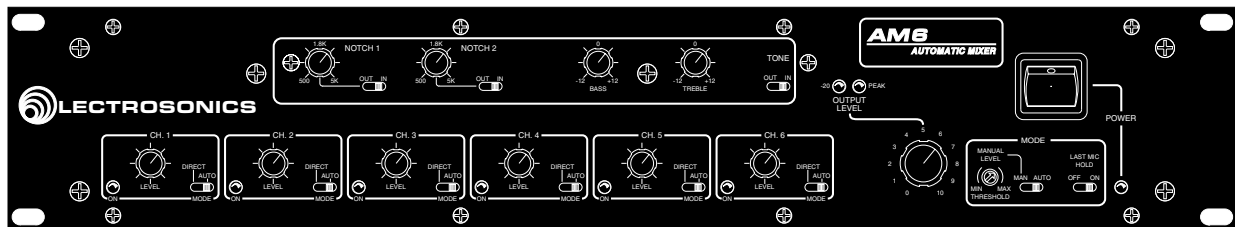


Figure 2 - AM6 Front Panel

REAR PANEL DESCRIPTION

MIC/LINE INPUT - Accepts a balanced or unbalanced signal. Can accommodate signal levels from mic to line. Fully balanced differential input, RF filtered, internally selectable 15 volt phantom supply. XLR type connector, Pin 2 is "+", Pin 3 is "-", and Pin 1 is ground.

TRIM - Sets the mic/line preamp gain from 6dB to 55dB.

MAIN OUT - Provides a balanced line level output signal for sending the signal to an amplifier or other equipment.

AUX OUT - Provides a balanced line level output signal for sending the signal to an amplifier or other equipment.

VCA REMOTE - Provides remote control capability for each channel and overall gain using a linear pot.

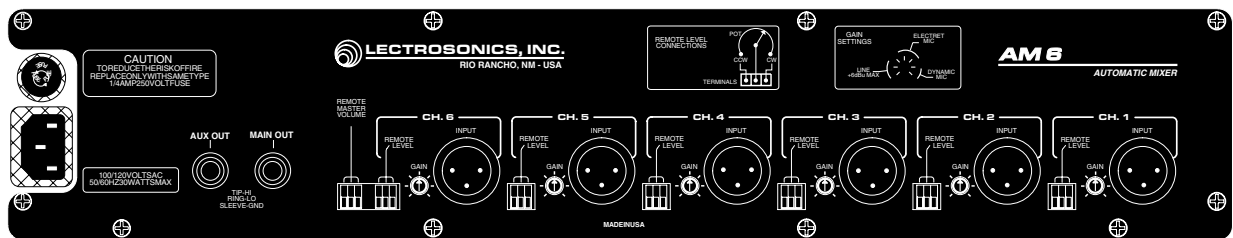


Figure 3 - AM6 Rear Panel

INSTALLATION

Installation of the AM6 is straightforward. If the AM6 is not installed in a rack, the four self-adhesive rubber feet (included) may be affixed to the bottom of the unit.

If the remote volume control capability of the AM6 is used, the rear panel must be temporarily removed* to attach the wiring. Wire gauge is not critical for connection to the remote pot, as the current levels are very low. Tinning the wires before terminating them into the gray connectors is strongly recommended. The white lever on each slot of the connector must be pushed back with a screwdriver before the wire is inserted. Any pot value between 10K and 100K, linear taper, will work. Connect the pot as follows:

Clockwise pot terminal - Right most slot in gray connector

Wiper pot terminal - Center slot in gray connector

Counterclockwise pot terminal - Left most slot in gray connector

Refer to the illustration screened onto the rear panel of the AM6.

If phantom power is needed on any or all channels, the rear panel of the AM6 must be temporarily removed*. The 3-pin jumper nearest each input connector is the phantom power jumper. The AM6 is shipped with phantom power OFF, but phantom power for any channel may be enabled by switching the jumper to ON as shown in Figure 4.

Channels 1-6 are factory jumpered for tone control and notch filtering. If these functions need to be disabled, set the jumpers to BYPASS as shown in Figure 4. To gain access to these jumpers the top cover of the AM6 should be temporarily removed*. Channel one is easily accessed. To access channels 2-6 remove the knobs of the tone and notch controls, remove the two 6-32 screws which secure the EQ board, and carefully remove the EQ board. The six 3-pin jumpers close to the front panel are the EQ jumpers.

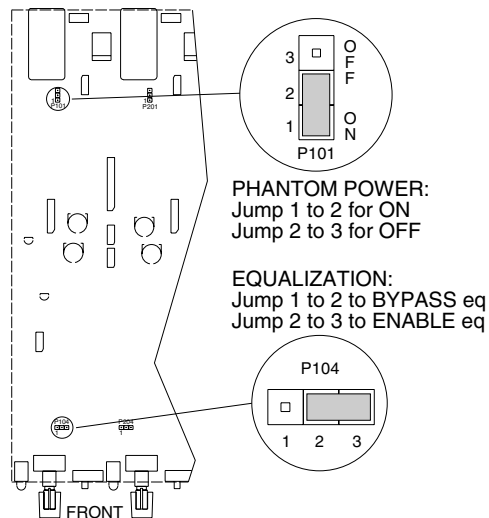


Figure 4 - Phantom Power & EQ Bypass Jumpers

***Disconnect the power cord prior to removing any panels and observe standard safety precautions when changing internal jumpers and connectors. There are electrolytic capacitors that can discharge power, resulting in electric shock.**

OPERATING INSTRUCTIONS

- 1) Phantom Power Selection - If phantom power is desired for any channel, see the Installation section (page 6) for details.
- 2) Remote Control - If remote control of either individual channels or the overall system level is desired, see the Installation section (page 6) for details.
- 3) Tone/Notch filter Jumpers - If an Tone/Notch jumpering scheme other than the factory standard setup (all channels equalized) is desired, see the Installation section (page 6) for details.
- 4) Connect microphones and amplifier(s) to the AM6 and place them in the positions in which they will be used.
- 5) Set the rear panel trim controls as appropriate for the signal source (i.e. line, electret, or dynamic). Select Auto or Direct mode on each channel as desired. Auto mode should be used for microphones and Direct mode is handy for testing microphone operation. Select Manual or Auto Threshold as desired. If Manual mode is selected, a good starting point for the Threshold Level pot is about 1/3 of full rotation.
- 6) With all Channel Level controls fully open clockwise and the Output Level control fully counterclockwise, turn on the power for the AM6 and the amplifier. If Auto Threshold was selected in step 5, wait about 10 seconds after turning the power on before proceeding. This will allow the Auto Threshold to initialize its sampling of the ambient noise.
- 7) Speak normally into each mic in turn, and be sure that the green ON LED lights when speaking. If not, increase the rear panel Trim level setting. After the Trim settings are determined, do not adjust them again.
- 8) Adjust the Output Level of the AM6 for adequate sound system level. If necessary, readjust the Channel Level controls to balance individual microphones.
- 9) Adjust the Tone controls for best sound.
- 10) Turn up the system until ringing (the onset of feedback) begins. Turn the Notch 1 control slowly until the ringing subsides. Increase the amplification of the system until ringing occurs again. Turn the Notch 2 control slowly until the ringing subsides. Return the system volume level to normal levels.

TROUBLESHOOTING

<u>SYMPTOM</u>	<u>POSSIBLE CAUSE</u>
1) No POWER LED	1) Power switch not on 2) Unit not plugged in
2) No sound from system	1) Output Level control turned down 2) Channel Level controls on mic channels not turned up 3) THRESHOLD control set too high (if in Manual Threshold mode; check channel ON LEDs on mic channels) 4) INPUT TRIM controls on preamp channels too low 5) Remote control pots (if used) turned down 6) Remote control switches (if used) turned off 7) Phantom power not on for phantom powered mics
2) Excessive feedback	1) System not notched properly 2) System volume set too high 3) Microphone too far from person 4) Speaker too close to microphone

SPECIFICATIONS

Mic/Line Input:

Type:	Electronically balanced RF filtered
Impedance:	10K balanced, for standard 200 Ohm mics
Trim Gain Range:	6dB-55dB
EIN, 20-20KHz	-127dBu
Nominal Attenuation:	15dB
Maximum Input Level: (Gain set at 6dB)	+12dBu

Phantom Power:

+15 Volts, internal jumper

Notch/tone controls Section:

Notch Filters:	Variable 500Hz to 5KHz, 1/5 octave bandwidth
Tone controls:	Bass, Treble. Switchable on/off

Maximum System Gain:

Mic/Line In to Line Out	75dB
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System THD, 1KHz:

Less than .1%

System THD, 20-20KHz:

Less than .25%

System IMD, 60/7KHz:

Less than .25%

Power Consumption

30 Watts max at 120VAC

SERVICE AND REPAIR

If your system malfunctions, you should attempt to correct or isolate the trouble before concluding that the equipment needs repair. Make sure you have followed the setup procedure and operating instructions. Check out the inter-connecting cords and then go through the TROUBLE SHOOTING section in the manual

We strongly recommend that you **do not** try to repair the equipment yourself and **do not** have the local repair shop attempt anything other than the simplest repair. If the repair is more complicated than a broken wire or loose connection, send the unit to the factory for repair and service. Don't attempt to adjust any controls inside the units. Once set at the factory, the various controls and trimmers do not drift with age or vibration and never require readjustment. **There are no adjustments inside that will make a malfunctioning unit start working.**

LECTROSONICS service department is equipped and staffed to quickly repair your equipment. In-warranty repairs are made at no charge in accordance with the terms of the warranty. Out of warranty repairs are charged at a modest flat rate plus parts and shipping. Since it takes almost as much time and effort to determine what is wrong as it does to make the repair, there is a charge for an exact quotation. We will be happy to quote approximate charges by phone for out of warranty repairs.

RETURNING UNITS FOR REPAIR

You will save yourself time and trouble if you will follow the steps below:

- A. DO NOT return equipment to the factory for repair without first contacting us by letter or by phone. We need to know the nature of the problem, the model number and the serial number of the equipment. We also need a phone number where you can be reached 8 am to 4 pm (Mountain Standard Time).
- B. After receiving your request, we will issue you a return authorization number (R.A.). This number will help speed your repair through our receiving and repair departments. The return authorization number must be clearly shown on the outside of the shipping container.
- C. Pack the equipment carefully and ship to us, shipping costs prepaid. If necessary, we can provide you with the proper packing materials. UPS is usually the best way to ship the units. Heavy units should be "double-boxed" for safe transport.
- D. We also strongly recommend that you insure the equipment, since we cannot be responsible for loss of or damage to equipment that you ship. Of course, we insure the equipment when we ship it back to you.

Mailing address:
Lectrosonics, Inc.
PO Box 15900
Rio Rancho, NM 87174
USA

Shipping address:
Lectrosonics, Inc.
581 Laser Rd.
Rio Rancho, NM 87124
USA

Telephones:
(505) 892-4501
(800) 821-1121
FAX: (505) 892-6243

World Wide Web: <http://www.lectrosonics.com>

email: sales@lectrosonics.com

LIMITED ONE YEAR WARRANTY

The equipment is warranted for one year from date of purchase against defects in materials or workmanship provided it was purchased from an authorized dealer. This warranty does not cover equipment which has been abused or damaged by careless handling or shipping. This warranty does not apply to used or demonstrator equipment.

Should any defect develop, we will, at our option, repair or replace any defective parts without charge for either parts or labor. If we cannot correct the defect in your equipment, we will replace it at no charge with a similar new item. We will pay for the cost of returning your merchandise to you.

This warranty applies only to items returned to us, shipping costs prepaid, within one year from the date of purchase.

This warranty gives you specific legal rights. You may have additional legal rights which vary from state to state.

LECTROSONICS, INC.

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July 6, 1999