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**EQUALIZING A MASKING AND PAGING SYSTEM with the MG2500**

## Introduction

The AVLELEC MG2500 is a two channel unit. Internally the unit has a masking generator/equalizer and one input. Each channel has separate equalizers.

Theoretically, the unit can be set up in any combination of the functions listed below.

| **Channel 1** | **Channel 2** |
|---|---|
| Masking | Masking |
| Paging | Paging |
| Masking + Paging | Masking + Paging |
| None | - |

Practically, the following combinations are used:

| Function | Channels Used | Channel 1 Function | Channel 2 Function |
|---|---|---|---|
| Masking Only | One | None | Masking |
| | Two | Masking | Masking |
| Paging Only | One | None | Page |
| | Two | Page | Page |
| Masking + Paging | One | None | Masking+Page |
| | Two | Masking+Page | Masking+Page |
| Mixed | One | Page | Masking |
| | Two | Page | Masking+Page |

The purpose of this note is to demonstrate how to navigate through the equalization process for each of the combinations. The MG2500 is controlled by software on your laptop computer. The software MG 2500 is provided with each unit. or can be requested by calling Sales at 602-438-4545 X1305. The preferred method of equalizing the sound masking system is by coupled use of the MG2500 software and MEQ 1.0.

## Equipment Required

A laptop computer with MEQ and MG2500 installed.

A Male/Female 9 pin RS232 cable, long enough to reach the unit in a rack cabinet from wherever the computer can be placed.

A sound level meter (Real Time Analyzer) to measure 1/3 octave band levels, such as the Larson-Davis (LD) Model 824, or Ivie 30.

## Procedural Steps for Initial Set Up for a Clean Unit

NOTES This procedure is recommended until you are more familiar with the product. Clean means you have not loaded any data into the MG unit from a diskette. 0 dB means full output. Everything else is a minus number. There are a lot of steps, but most are self-explanatory.

### Steps Applicable to all Combinations

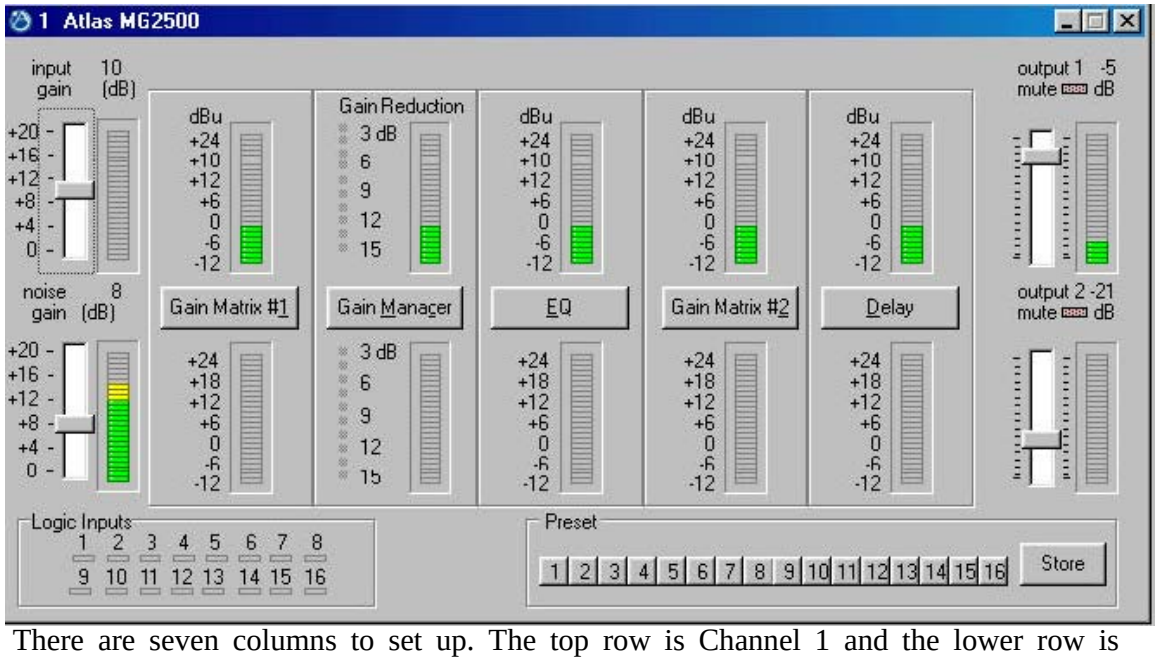
1 Turn on the masking system. Set the power amplifiers to minimum gain. Set the zone controls (E-408) to mid range.

2 Connect the cable from the RS232 port of your computer to the rear RS232 port on the MG2500.

3 Turn on the MG2500 by connecting the power cable; there is no power switch. You should see a front panel light turn red.

4 Start the MG2500 software. Click on **Settings/Communication** and verify that the correct COM port is chosen, and set the Baud rate to 38400. Click on the menu item **File/Connect**. It should find the unit and show the Main Menu.

Col 1 2 3 4 5 6 7

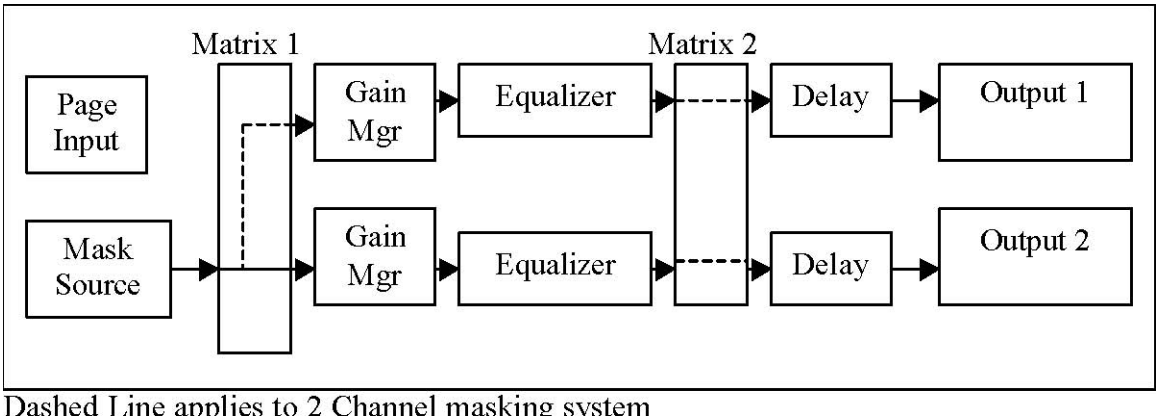



There are seven columns to set up. The top row is Channel 1 and the lower row is Channel 2.

# One or Two Channels of Sound Masking Only

*Signal Flow*

Col 1 2 3 4 5 6 7




Dashed Line applies to 2 Channel masking system

*Procedure*

**Column 1- Input and Noise Gain**

Input Gain 0 dB Noise Gain 0 dB (0.3 VAC out) or +6 dB (0.5 VAC out)

**Column 2 – Gain Matrix 1**

*One Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | -127 dB | Noise Level | 0 dB |
| Input | -127 dB | Input | -127 dB |

*Two Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | 0 dB | Noise Level | 0 dB |
| Input | -127 dB | Input | -127 dB |

**Column 3 – Gain Manager**

*One Channel System*

Output 1 Output 2 Bypass GM Bypass GM

*Two Channel System*

Output 1 Output 2 Bypass GM Bypass GM

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**Column 4 - Equalizer**

*One Channel System*

| Output 1 | Output 2 |
|---|---|
| No Action | Check Graphic HPF –12 dB/Octave Drag to 101 Hz LPF –12 dB/Octave Drage to 7000 Hz 1/3 Octave filter – No action |

*Two Channel System*

Output 1 Output 2 Check Graphic Check Graphic HPF –12 dB/Octave Drag to 101 Hz HPF –12 dB/Octave Drag to 101 Hz LPF –12 dB/Octave Drage to 7000 Hz LPF –12 dB/Octave Drag to 7000 Hz 1/3 Octave filter – No action 1/3 Octave filter – No action

**Column 5 – Gain Matrix 2**

*One Channel System*

Output 1 Channel 1 -127 dB Channel 2 -127 dB *Two Channel System* Output 1 Channel 1 -127 dB Channel 2 0 dB

Output 2 Channel 1 Channel 2 Output 2 Channel 1 Channel 2

-127 dB 0 dB -127 dB 0 dB

**Column 6 - Delay** *One Channel System* Output 1 1.33 msec *Two Channel System* Output 1 500 msec

Output 2 Output 2

1.33 msec 1.33 msec

**Column 7 – Output Level** *One Channel System* Output 1 -60 dB

Output 2

0 dB

*Two Channel System* Output 1 0 dB

Output 2

0 dB

*Initial Results* System partially equalized.

For two channel system, each channel can be equalized independently For two channel system, each channel is statistically independent.

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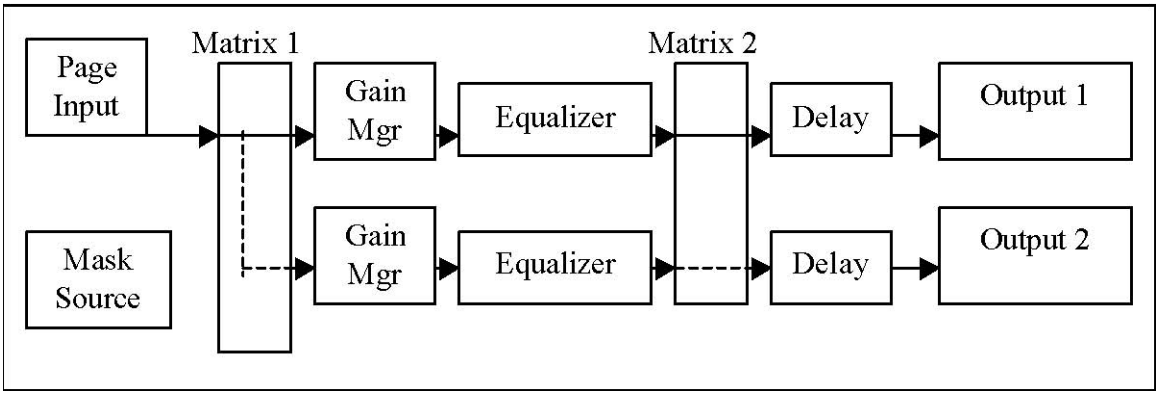
# One or Two Channels of Paging Only




## *Procedure*

Input level 0.4 VAC

**Column 1- Input and Noise Gain**

Input Gain 0 dB (0.25 VAC out) or +6 dB (0.4 VAC out) Noise Gain 0 dB

**Column 2 – Gain Matrix 1**

*One Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | -127 dB | Noise Level | -127 dB |
| Input | 0 dB | Input | -127 dB |

*Two Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | -127 dB | Noise Level | -127 dB |
| Input | 0 dB | Input | 0 dB |

**Column 3 – Gain Manager**

*One Channel System*

Output 1 Output 2 No Bypass GM No Bypass GM Leveler 18dBu No Bypass Leveler 18dBu No Bypass Compressor 18 dBu Bypass Compressor 18 dBu Bypass Limiter 18 dBu ByPass Limiter 18 dBu ByPass

*Two Channel System*

Output 1 Output 2 No Bypass GM No Bypass GM Leveler 18dBu No Bypass Leveler 18dBu No Bypass Compressor 18 dBu Bypass Compressor 18 dBu Bypass Limiter 18 dBu ByPass Limiter 18 dBu ByPass

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**Column 4 - Equalizer**

*One Channel System*

Output 1 Output 2 Check Graphic No Action HPF –12 dB/Octave Drag to 101 Hz LPF –6 dB/Octave

Paging Drag to 5000 Hz
Music Drag to 3000 Hz 1/3 Octave filter – No action

*Two Channel System*

Output 1 Output 2 Check Graphic Check Graphic HPF –12 dB/Octave Drag to 101 Hz HPF –12 dB/Octave Drag to 101 Hz LPF –6 dB/Octave LPF –6 dB/Octave

Paging Drag to 5000 Hz Paging Drag to 5000 Hz Music Drag to 3000 Hz Music Drag to 3000 Hz 1/3 Octave filter – No action 1/3 Octave filter – No action

**Column 5 – Gain Matrix 2**

*One Channel System*

| | | |
|---|---|---|
| Output 1 Channel 1 0 dB Channel 2 -127 dB *Two Channel System* Output 1 Channel 1 0 dB Channel 2 -127 dB | Output 2<br>Channel 1<br>Channel 2<br>Output 2<br>Channel 1<br>Channel 2 | -127 dB -127 dB 0 dB -127 dB |

**Column 6 - Delay** *One Channel System* Output 1 1.33 msec *Two Channel System* Output 1 1.33 msec

| | | |
|---|---|---|
| | Output 2<br>Output 2 | 1.33 msec 1.33 msec |

**Column 7 – Output Level** *One Channel System* Output 1 0 dB

| | | |
|---|---|---|
| | Output 2 | -60 dB |
| *Two Channel System* Output 1 0 dB | Output 2 | 0 dB |

*Initial Results* System partially equalized.

For two channel system, each channel can be equalized and leveled independently

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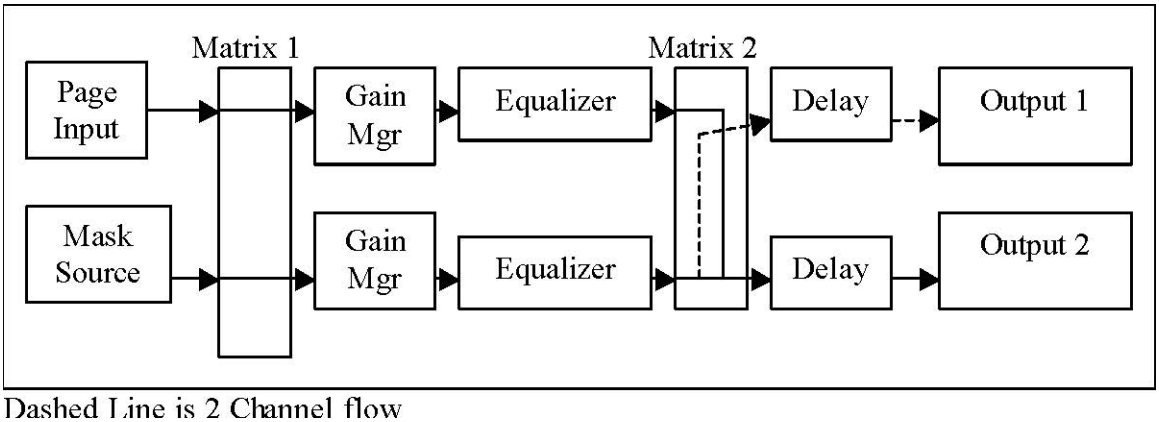
# One or Two Channels of Masking + Paging

*Signal Flow*




Dashed Line is 2 Channel flow

## *Procedure*

Input level 0.4 VAC

**Column 1- Input and Noise Gain**

Input Gain 0 dB (0.25 VAC out) or +6 dB (0.4 VAC out) Noise Gain 0 dB

**Column 2 – Gain Matrix 1**

*One Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | -127 dB | Noise Level | 0 dB |
| Input | 0 dB | Input | -127 dB |

*Two Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | -127 dB | Noise Level | 0 dB |
| Input | 0 dB | Input | -127 dB |

**Column 3 – Gain Manager**

*One Channel System*

Output 1 Output 2 No Bypass GM Bypass
GM Leveler 18dBu No Bypass Compressor
18 dBu Bypass Limiter 18 dBu ByPass

*Two Channel System*

Output 1 Output 2 No Bypass GM Bypass
GM Leveler 18dBu No Bypass Compressor
18 dBu Bypass Limiter 18 dBu ByPass

**Column 4 - Equalizer**

*One Channel System*

Output 1 Output 2 Check Graphic Check Graphic HPF –12 dB/Octave Drag to 101Hz HPF –12 dB/Octave Drag to 101 Hz LPF –6 dB/Octave LPF –12 dB/Octave Drag to 7000 Hz

Paging Drag to 5000 Hz 1/3 Octave filter – No action Music Drag to 3000 Hz 1/3 Octave filter – No action

*Two Channel System*

Output 1 Output 2 Check Graphic Check Graphic HPF –12 dB/Octave Drag to 101 Hz HPF –12 dB/Octave Drag to 101 Hz LPF –6 dB/Octave LPF –12 dB/Octave Drag to 7000 Hz

Paging Drag to 5000 Hz 1/3 Octave filter – No action Music Drag to 3000 Hz 1/3 Octave filter – No action

**Column 5 – Gain Matrix 2**

*One Channel System*

| | | |
|---|---|---|
| Output 1 Channel 1 -127 dB Channel 2 -127 dB *Two Channel System* Output 1 Channel 1 0 dB Channel 2 -10 dB | Output 2 Channel 1 Channel 2 Output 2 Channel 1 Channel 2 | 0 dB -10 dB 0 dB -10 dB |

**Column 6 - Delay** *One Channel System* Output 1 1.33 msec *Two Channel System* Output 1 1.33 msec

| | | |
|---|---|---|
| | Output 2 Output 2 | 1.33 msec 1.33 msec |

**Column 7 – Output Level** *One Channel System* Output 1 -60 dB

| | | |
|---|---|---|
| | Output 2 | 0 dB |
| *Two Channel System* Output 1 0 dB | Output 2 | 0 dB |

*Initial Results* System partially equalized.

The masking is set 10 dB lower than the paging for intelligibility. Amplifier gain must offset changes..

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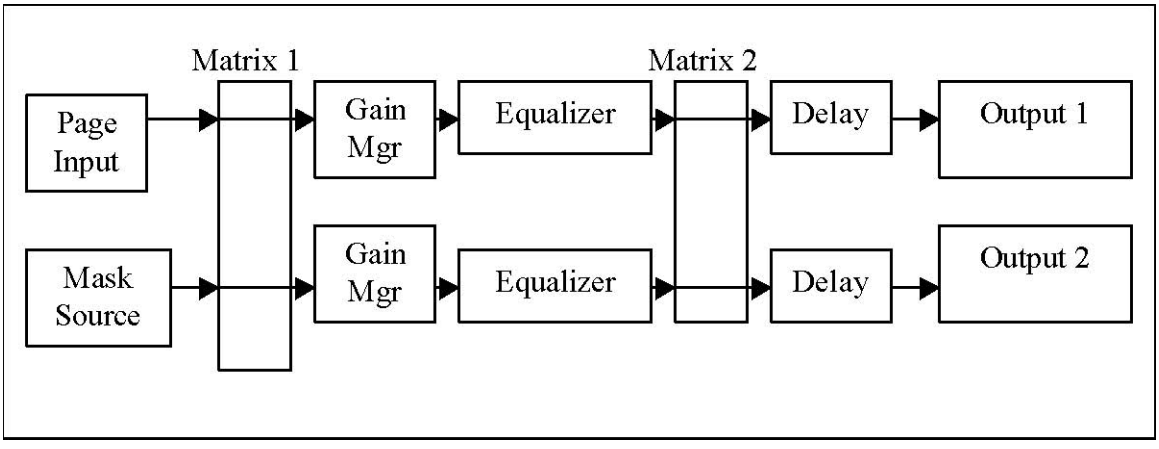
# One Channel of Masking, One Channel of Paging




*Procedure*

Input level 0.4 VAC

**Column 1- Input and Noise Gain**

Input Gain 0 dB (0.25 VAC out) or +6 dB (0.4 VAC out) Noise Gain 0 dB (0.3 VAC out) or +6 dB (0.5 VAC out)

**Column 2 – Gain Matrix 1**

Two *Channel System*

| Output 1 | | Output 2 | |
|---|---|---|---|
| Noise Level | -127 dB | Noise Level | 0 dB |
| Input | 0 dB | Input | -127 dB |

**Column 3 – Gain Manager**

*Two Channel System*

Output 1 Output 2 No Bypass GM Bypass GM Leveler 18dBu No Bypass Compressor 18 dBu Bypass Limiter 18 dBu ByPass

**Column 4 - Equalizer**

*Two Channel System*

Output 1 Output 2 Check Graphic Check Graphic HPF –12 dB/Octave Drag to 101 Hz HPF –12 dB/Octave Drag to 101 Hz LPF –6 dB/Octave LPF –12 dB/Octave Drag to 7000 Hz

Paging Drag to 5000 Hz 1/3 Octave filter – No action Music Drag to 3000 Hz 1/3 Octave filter – No action

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**Column 5 – Gain Matrix 2**
*Two Channel System*

Output 1 Channel 1 0 dB Channel 2 -127 dB

Output 2
Channel 1
Channel 2 -127 dB 0 dB

**Column 6 - Delay** *Two Channel System* Output 1 1.33 msec

Output 2 1.33 msec

**Column 7 – Output Level** *Two Channel System* Output 1 0 dB

Output 2 0 dB

*Initial Results* System partially equalized.

Both channels are equalized independently and have similar outputs.

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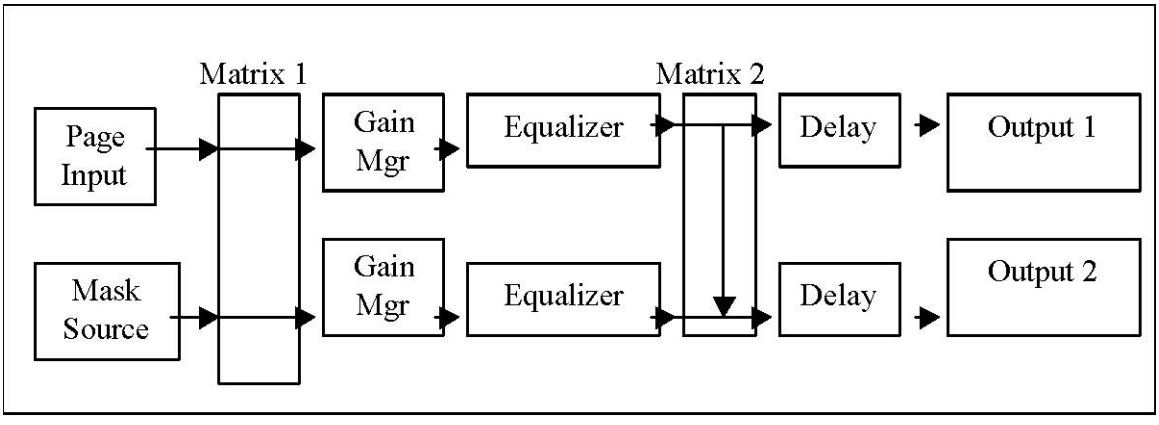
# One Channel of Masking + Paging, One Channel of Paging

*Signal Flow*




*Procedure*

Input level 0.4 VAC

**Column 1- Input and Noise Gain**

Input Gain 0 dB (0.25 VAC out) or +6 dB (0.4 VAC out) Noise Gain 0 dB (0.3 VAC out) or +6 dB (0.5 VAC out)

**Column 2 – Gain Matrix 1**

*Two Channel System*

| | | | |
|---|---|---|---|
| Output 1 | | Output 2 | |
| Noise Level | -127 dB | Noise Level | 0 dB |
| Input | 0 dB | Input | -127 dB |

**Column 3 – Gain Manager**

*Two Channel System*

Output 1 Output 2 No Bypass GM Bypass
GM Leveler 18dBu No Bypass Compressor
18 dBu Bypass Limiter 18 dBu ByPass

**Column 4 - Equalizer**

*Two Channel System*

Output 1 Output 2 Check Graphic Check Graphic HPF –12 dB/Octave Drag to 101 Hz HPF –12 dB/Octave Drag to 101 Hz LPF –6 dB/Octave LPF –12 dB/Octave Drag to 7000 Hz

Paging Drag to 5000 Hz 1/3 Octave filter – No action Music Drag to 3000 Hz 1/3 Octave filter – No action

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**Column 5 – Gain Matrix 2**

*Two Channel System*

Output 1 Output 2 Channel 1 0 dB Channel 1 0 dB
Channel 2 -127 dB Channel 2 -10 dB

**Column 6 - Delay**

*Two Channel System*

Output 1 1.33 msec Output 2 1.33 msec

**Column 7 – Output Level**

*Two Channel System*

Output 1 0 dB Output 2 0 dB

### *Initial Results*

System partially equalized. The masking is set 10 dB lower than the paging on Output 2 for intelligibility.

## Procedural Steps for Equalization of the Sound Masking using MEQ

1. If you are adding paging or music, turn off these signals.
2. Turn up the power amplifier for the area you are going to make masking spectrum measurements. Set the sound to about 47 to 48 dBA. It will be reduced later.
3. Measure and record up to a maximum of 10 masking spectra in various areas of the office. If you have an LD 824, you can take snapshots for later downloading. If you have MEQ.xls, you can enter these data into the spreadsheet. Now you have the initial masking spectrum recorded as determined by the initial unit settings. The next step is to determine what spectrum is desired.
4. If you have an LD 824, close the MG2500 program and disconnect the cable from the MG2500 unit. Connect the cable to the LD 824.
5. Open MEQ. If you have no file, you must go to **Project ID** and add data. After that it is recommended that you save these data to a file. Go to **Equalize Masking System**.
6. Click on the desired spectrum, then press the **+ dB** or **– dB** buttons to set the desired level of that spectrum. Click on **Choose** to set the desired masking spectrum for the project. You will be asked if you have the Low Pass Filter Frequency. Click on Yes. If you used the above instructions it will be 7000 Hz.
7. You will now have to enter the masking spectrum that you measured. If you have LD824 data, press the **Download from LD824** button, choose the file numbers within the sound meter that apply and press **Download**. Data are automatically loaded. If you have filled in an Excel spreadsheet, click on **Download from Excel.** If you do not have either, you will have to enter the data manually from a data sheet you created. You can add a test, drop a test or clear all data and start over. For each method the average masking spectrum will appear in a left column. This is the measured masking spectrum. The next step is to make it match the desired spectrum.

8. Press **Start Calculation**. The desired spectrum will show in Yellow and the measured spectrum will show in blue. Enter the low pass frequency in the **Initial Low Pass** box. Press **Enter**. Press **Fit the Measured spectrum to the Desired Spectrum** button. The program will attempt to best match the two spectra and will provide the corrections to be applied to each 1/3 octave band, the overall level and the recommended low pass and high pass frequencies.

9. Press **Set Corrections in Unit Equalizer**. The MEQ screen will be reduced in size and the necessary corrections will be listed at the left of the screen.

10. If you had the LD 824 connected, disconnect the cable and reconnect the MG2500 unit cable. Open the **MG2500** program; size and position it so it is near the MEQ form.

11. Set the equalization. First, adjust the level; it should be negative. Go to **Column 7** (Output level) and reduce the relevant output the recommended amount. Next, go to **Column 4** and press the **EQ** button and choose the relevant output. Drag the low pass icon **X** until the recommended low pass frequency is achieved. Do the same for the high pass filter, if needed. For the 1/3 octave band filer settings, start with the 160 Hz band. If the correction is –2.7 then drag the relevant Blue Square down to –2.75. Do this for each band. Close the form. If your measurements were well distributed, THE SYSTEM IS NOW TUNED. You can do this routine several times if desired.

## Procedural Steps for Equalization of the Music or Paging

1 If there is sound masking in the area, equalize the masking first..
2 Listen to the music or paging and determine the intelligibility. If you need to enhance the intelligibility of speech, particularly in the presence of sound masking, go to **Column 4** and press **EQ**. The corrections here are subjective. Raise the levels in the 1/3 octave bands from 2000 Hz to 4000 Hz up to +9 dB. Slope the bands below 2000 Hz smoothly to 0 dB at 800 Hz. Slope the bands above 4000 Hz down more sharply. If necessary, you may wish to drag the low pass filter to a higher frequency.

## Saving the Equalization Data

1 All settings are now programmed into the MG2500's memory. In the **Main Menu**, press the **Store** button and choose a **PreSet** in which to store the data.. You may wish to record to what project that PreSet applies. Note that the settings are not affected by power failures. If power is disconnected to the MG2500, the unit will recall all previously loaded parameters.
2 Save the MG2500 settings to your computer. In the **Main Menu,** press **File/Save** and save the file in a directory as you would any other document type. Use a name that is applicable, the file name extension is always .amg.

## Recalling Saved Equalization Data

1 Open the MG2500 software.
2 Press **File/Open**, locate the file and open it.
3 Make sure the newly open file is highlighted in the MG2500 software.
4 Press **File/Download.** The software will prompt you to select, which MG2500 you would like the software loaded into (even if only unit is connected). Press OK. This will load the file settings into the MG2500.

## Recalling PreSets

The only presets worth recalling are those in which you have stored data. Press the applicable **PreSet** to recall these settings into active memory. This technique is useful for new projects that are similar to previously completed projects. Equalization is approximately correct to start**.**

***Disclaimer***
AVLELEC provides this instructional information as a general guide and makes no claims as to completeness. Actual performance of the unit is dependent on actual sound measurements.

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