



**LMS-A6
LOUDSPEAKER
MANAGEMENT SYSTEM**

USER'S MANUAL

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An example of this equipment has been tested and found to comply with the following European and international Standards for Electromagnetic Compatibility and Electrical Safety:

Radiated Emissions (EU): EN55013-1 (1996)
RF Immunity (EU): EN55103-2 (1996) RF Immunity, ESD,
Burst Transient, Surge, Dips & Dwells
Electrical Safety (EU): EN60065 (1993)

IMPORTANT SAFETY INFORMATION

Do not remove Covers. There are no user serviceable parts inside, please refer servicing to qualified service personnel. This equipment must be earthed.



CAUTION
RISK OF ELECTRIC SHOCK
DO NOT OPEN
DO NOT EXPOSE TO RAIN OR MOISTURE



ATTENTION
RISQUE DE CHOC ELECTRIQUE
NE PAS ENLEVER
NE PAS EXPOSER A LA PLUIE NI A L'HUMITE



It should not be necessary to remove any protective earth or signal cable shield connections.

Do not defeat the purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wider blade and the third prong are provided for your safety. When the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.

Only use this equipment with an appropriate mains cord.

In the USA the cord should comply with the requirements contained in the Standard for Cord Sets and Power Supply Cords, UL 817, be marked VW-1, and have an ampacity rating not less than the marked rating of the apparatus.

THANKS

Thank you for choosing the TURBOSOUND LMS-A6 for your application. Please spare a little time to digest the contents of this manual, so that you obtain the best possible performance from this unit.

All TURBOSOUND products are carefully engineered for world class performance and reliability.

If you would like further information about this or any other TURBOSOUND product, please contact us.

We look forward to helping you in the near future.

UNPACKING THE LMS-A6

After unpacking the unit please check carefully for damage. If damage is found, please notify the carrier concerned at once. You, the consignee, must instigate any claim. Please retain all packaging in case of future re-shipment.

INTRODUCTION

The LMS-A6 is a versatile two input, six output, analogue loudspeaker management system in a 1U rack mount package that is designed for maximum sonic performance. It combines crossover and limiter functions and is uniquely configurable to custom requirements.

The LMS-A6 can be configured for the following modes of operation: stereo 3-way, stereo 2-way, mono 4-way, plus mono 2-way. The standard filter provided for the LMS-A6 is a Linkwitz Riley response based on two second order Butterworth circuits in series. The response is 24dB/octave slope with a corner frequency where the output of the filter is 6dB down from its pass band level. The use of these filter realisations has been well documented and provides the best possible phase and amplitude response for driving loudspeaker systems.

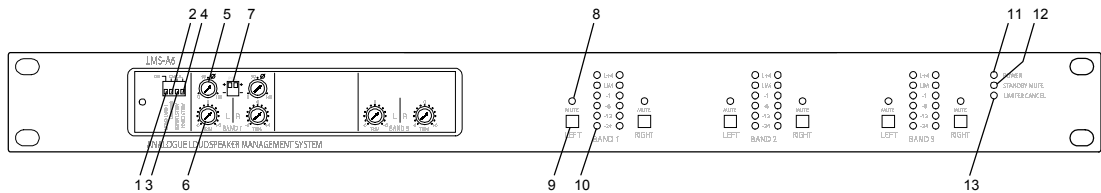
Active crossovers versus passive crossovers

Passive crossovers divide the frequency spectrum after the signal has been raised to high power levels. They are generally bulky, heavy and inefficient. Active crossovers utilise IC's and transistors, and divide the frequency spectrum at line level immediately ahead of the amplifiers. An active crossover does the same job as a passive crossover, but with more precision, flexibility, efficiency and quality. Crossover frequencies can be readily altered to suit different driver combinations, the level balance between two or three frequency bands can easily be trimmed, and line driving, system muting, signal summing, driver equalisation and phase adjustment facilities can all be incorporated into active crossovers.

FEATURES

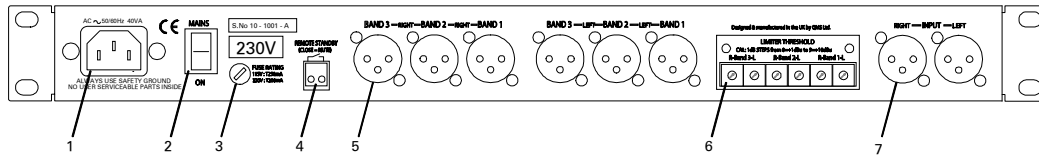
- **Maximum sonic performance:** advanced circuit design for exceptional dynamic range and sonic quality.
- **Interchangeable frequency programming cards:** set the required crossover frequency and slope of your loudspeaker system. These are supplied when the unit is shipped from the factory.
- **A flexible 2 input, 6 output** multi-mode format featuring a choice of stereo 3-way, stereo 2-way, mono 4-way plus mono 2-way crossover modes with limiters.
- **High performance limiters** are provided, one for each output band. Limiter threshold is set by means of 10-position switches located behind a security panel on the rear of the unit.
- **Electronically balanced inputs and outputs:** ensures a high level of rejection for common mode rejection signals and gives a professional connection to external equipment.

FRONT PANEL FUNCTIONS



1. **Mono Band 1** – sums the Left and Right Band signals together (up position) and feeds them in mono to both Band 1 outputs.
2. **Limiter cancel** – disables all limiter functions and causes the LIMITER CANCEL LED to light.
3. **Power Standby switch** – determines the power-up mode: in the up (cancel) position the unit automatically switches out of mute after six seconds; in the down position the unit remains in standby mode with all outputs muted.
4. **Remote Standby cancel** – enables (down position) or disables (up position) the REMOTE STANDBY function. Inoperable if the remote stanby function has not been wired up.
5. **Phase adjustment** – variable adjustment between 0° and 180°.
6. **Gain trim** – allows the band 1 gains and band 3 gains to be adjusted to match band 2 where speaker/amplifier sensitivities vary for each band.
7. **Polarity** – reverses the polarity of the selected frequency band.
8. **Mute LED** – indicates mute status of the selected channel.
9. **Mute key** – one latching mute switch per output channel. Press to mute; press again to un-mute.
10. **Output meters** – LED ladder displays headroom before limiting occurs. The lower four green LEDs indicate -24dB, -12dB, -6dB and -1dB respectively, with the orange 'LIM' LED set at the limiter threshold for that channel. The top, red LED indicates 4dB of limiting.
11. **Power** – green LED indicates that power is applied to the unit.
12. **Standby Mute** – red LED indicates when the standby mute mode is set.
13. **Limiter Cancel** – indicates when the limiter cancel mode is set.

REAR PANEL FUNCTIONS



- 1. Mains Power** - Connected via a standard IEC socket. A compatible power cord is supplied with the unit.
- 2. Power Switch.**
- 3. Mains Fuse** - Located in a finger-proof fuseholder adjacent to the mains inlet. Always replace this fuse with the correct type as shown on the rear panel legend.
- 4. Remote Standby connector** – for remote switch connection.
- 5. XLR Outputs** - 3 pin male XLR connectors are provided for each audio output. All terminations are fully balanced, pin 2 Hot, pin 3 Cold and pin 1 Screen (shield).
- 6. Limiter threshold** – sets limiter threshold for each output band.
- 7. XLR Inputs** – 3 pin female XLR connectors are provided for each audio input. All terminations are fully balanced, pin 2 Hot, pin 3 Cold and pin 1 Screen (shield).

SETTING UP AND OPERATING THE LMS-A6

This section describes the steps and checks to be taken when setting up the unit for the first time, and the operation of all the controls and indicators. Some of the custom operating parameters will have been set internally when unit left the factory. These are described in this section and you must check that these are appropriate for your system.

Internal factory set parameters

Check the supplied documentation to ensure these parameters are correct for the particular system you are setting up. Incorrect settings can damage the loudspeakers, especially the more delicate H.F. unit. If any internal settings are wrong for your system contact your Turbosound Dealer about obtaining the correct custom plug-in modules.

Crossover frequencies and slopes

There are two stereo frequency programming cards located internally. Card 1 handles band 1 information and card 2 band 2 & band 3 information. The crossover frequencies and slopes will have been specified when the unit was purchased. The limiter time constants and the band edge phase adjustment time constants will automatically have been optimised for the corner frequencies. The relevant frequency, slope and response type is recorded on a label attached to the respective cards and also on a label attached to the right hand side panel of your unit.

If in the future your unit is to be used to drive loudspeaker systems other than that for which it was originally configured, then replacement frequency programming cards can easily be fitted.

Band Gain

The gain of each band is normally set to unity, but for systems where the sensitivity of the Amplifier/Speaker combinations for each Band are different, the gain of each band may have been set to compensate. This allows the Level Trim controls to be nominally set to centre.

Equalisation

Either static or dynamic equalisation may have been installed on an optional internal module.

Mains Supply Voltage

The unit will have been set for either 115V AC or 230V AC operation as indicated by the label on the rear of the unit.

Connecting inputs and outputs

This section describes how to connect signals to the LMS-A6 loudspeaker management system.

The signal inputs are industry standard female XLR connectors and are wired as follows:-

Pin 1 = GROUND or COMMON

Pin 2 = HOT or (+) or In-phase

Pin 3 = COLD or (-) or Out of phase

The electronically balanced inputs will take a maximum level of +20dBu at 10k ohm impedance.

They will accept either balanced or unbalanced signals.

The signal outputs are industry standard male XLR connectors and are wired as follows:-

Pin 1 = GROUND or COMMON

Pin 2 = HOT or (+) or In-phase

Pin 3 = COLD or (-) or Out of phase

The output impedance is less than 100 ohms and the maximum signal level is +20dB. The electronically balanced output stage will drive either balanced or unbalanced loads.

THE POWER SUPPLY SECTION

The power supply section includes an IEC connector, ON/OFF switch and an AC fuse.

Check that the voltage label corresponds with your local mains supply and that the correct AC fuse is fitted. If it does not, contact your Turbosound Dealer for instructions on setting the LMS-A6 to the correct voltage.

Connecting to the wrong voltage may damage the unit.

The unit must be switched OFF before inserting or removing the mains cord.

When the system is powered and turned on, the green POWER LED on the front panel lights. If the LED fails to light when power is applied and switched on check and, if necessary, replace the AC fuse. If this does not solve the problem then an internal fuse may have blown. This indicates that the unit has a fault and you should contact your Turbosound Dealer for further advice.

Power On Standby Mode

When power is first switched on the LMS-A6 enters STANDBY mode. In this mode all outputs are muted to suppress any noise or transients while the circuitry settles down.

The POWER STDBY switch determines how the unit will behave after power is applied.:

Switch down: The unit will stay in standby mode. All outputs will stay muted and the red STANDBY MUTE LED will light.

The standby mode is cancelled by pressing any MUTE switch, or momentarily operating the REMOTE STANDBY switch.

Switch up (CANCEL). The unit will remain muted for about six seconds and then automatically come out of standby mode.

In either case the normal band MUTEs will remain as they were when the unit was last used.

REMOTE STANDBY

Connecting Remote Standby

A two wire connection may be made between this connector and a single pole switch located at your mixing console, or any other operating position. When this switch is open, the unit functions normally and the outputs follow the MUTE switches on the front panel. When the REMOTE switch is closed all outputs are muted and the red REMOTE STANDBY LED lights.

The switch should be floating and isolated from external grounds. No damage will occur if the wires short to ground, but proper operation is not guaranteed.

Remote Standby Cancel

This switch enables or disables the REMOTE STANDBY function. Putting this switch up (CANCEL) will disable the remote function. You may wish to cancel the remote switch if it has been left in standby mode but you wish to regain local control. If the Remote Standby function has not been wired up this switch does nothing and may be set to either position.

Mono Band 1

How loud a system of a given power will go is usually limited by the lower frequencies. This is because low frequency signals require higher voltage swings, hence more power, than high frequencies. In order to make best use of the headroom available from the amplifiers and low frequency loudspeakers it is common practice to send all low frequencies to both channels in a stereo system. This has little impact on the stereo image in most situations.

When this switch is up (on) the Left and Right Band 1 signals are summed together and fed in mono to both Band 1 outputs.

When the switch is down the Left and Right Band 1 signals remain independent from each other.

Level Trims

Band 1 and Band 3 have independent gain trims for fine adjustment of the system frequency response. If the internal preset band gains have been specified correctly these controls will nominally all be set central at 0dB. The +/-6dB range should be more than sufficient to balance your system in any realistic situation. Band 2 gain is taken as the reference level, and the Band 1 and Band 3 controls will be adjusted for correct spectral balance.

Phase Adjustment

In a theoretically ideal speaker design the drive units for adjacent bands would be in perfect alignment and their signals would combine to give perfect summation at the crossover point. However, realistically this seldom occurs and shifting the phase of one of the signals in the crossover region will improve the summing, and therefore the frequency response of the system. Each phase control gives nearly 180 degrees of adjustment. Used in combination with the POL Switch we can achieve continuous adjustment over a full 360 degrees.

There may be some interaction between the phase controls in each channel, especially if the MID Band, Band 2 is fairly narrow, so it is advisable to further fine tune the phase by repeating the above process a second time.

LIMITER SETTING AND OPERATION

The limiters should be set to a level that affords protection to the speaker drive units. The time constants for the limiters are set internally and are preset to be optimum for each frequency band being protected.

Limiter Threshold setting

The limiter threshold switches are located behind a security cover on the rear of the unit. Each Band has an independent 10 position switch to accurately set the threshold. The switches are calibrated in 1dB steps from +1dB (Pos0) to +10dB (Pos9)

In a high powered system where the amplifier output power is below or equal to the rating of the speakers the limiter thresholds will nominally be set to 1dB below the clipping level of the amplifier. This prevents severe clipping from driving the cones with square waves but does not

restrict the full undistorted output of the amplifiers. Note that the actual output power available often depends on the mains supply voltage, which may 'sag' during heavy performances.

In a system where the amplifiers are capable of exceeding the ratings of the speakers, set the threshold to a level appropriate to the speakers and NOT the clipping point of the amplifier. This is normally achieved by feeding the system with pink noise at the maximum level required and then turning down each limiter threshold switch until the yellow LIM LED is just flashing.

Limiter Cancel

When up (CANCEL), this switch will disable all limiters and the yellow LIMITER CANCEL LED will light. It is normally only used when setting up and calibrating - or trouble shooting - the system.

When the limiters are cancelled the output meters will continue to operate normally up to the limiter threshold.

Output Level and Limiter Meter

The lower four green LEDs show the signal level in dB relative to the limiter threshold. i.e. they always show the signal headroom that is available before the limiters will start operating. The yellow LIM LED lights when the threshold has been reached and the limiter is operating. The top red LED lights when the input signal is causing 4dB or more limiting to occur. If during use the +4 LEDs are on for more than occasional brief flashes the input signal is too hot and should be turned down at the mixing console to reduce distortion.

Band Mutes

Each output has an independent MUTE Switch and red MUTE LED. These are latching switches which will retain their settings even when power is turned off and on again.

Note that the MUTE LED will always follow the position of the MUTE switch regardless of the status of the standby mute. If the expected output signal appears to be muted but the MUTE LED is not lit then check the STANDBY MUTE LED

TECHNICAL SPECIFICATIONS

Inputs	Two electronically balanced
Impedance	> 10k ohms
CMRR	>65dB 50Hz - 10kHz
Outputs	Six electronically balanced
Source Imp	< 60ohms
Min. Load	600ohms
Max. Level	+20dBm into 600 ohm load
Frequency Response	±0.5dB 20Hz - 20kHz
Dynamic Range	>110dB 20Hz -20kHz. Unwtd
Distortion	< 0.02% @ 1kHz, +18dBm
Maximum Delay	650 mS. (Increment 2.6 μS)
Output gain	adjustable +6dB to -6dB
High and Lowpass Filters	
Filters	1 of each per output
Subsonic filter	user specified up to 24dB/octave
Low mid filter	user specified up to 24dB/octave
High mid filter	user specified up to 24dB/octave
Ultra sonic filter	user specified up to 12dB/octave
Response	Bessel / Butterworth 12/18/24dB /oct and Linkwitz-Riley 24dB /oct
Limiters	
Threshold	+1dB to -10dB in 1dB steps
Output meters	6 x 6 point, -24dB to +4dB into limit
Connectors	
Inputs	3 pin female XLR
Outputs	3 pin male XLR.
Power	3 pin IEC
Power	85 to 130V or 190 to 260V (set internally) @ 50/60Hz
Fuses	230V T200mA, 115V T1250mA
Consumption	25 VA
Net weight	3.9kg (8.6lbs)
Size	1.75"(1U) x 19" x 9.9" (44mm x 482mm x 252mm) excl. connectors.

Due to continuing product improvement the above specifications are subject to change.

WARRANTY

This product is warranted against defects in components and workmanship only, for a period of one year from the date of shipment to the end user. During the warranty period, TURBOSOUND will, at its discretion, either repair or replace products which prove to be defective, provided that the product is returned, shipping prepaid, to an authorised TURBOSOUND service facility.

Defects caused by unauthorised modifications, misuse, negligence, act of God or accident, or any use of this product that is not in accordance with the instructions provided by TURBOSOUND, are not covered by this warranty.

This warranty is exclusive and no other warranty is expressed or implied. TURBOSOUND is not liable for consequential damages.

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