



# **MX5 SYSTEM CONTROLLER**

## **USER'S GUIDE**

### **ISSUE 2**

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## **1 Unpacking**

Each Martin MX5 controller is built to the highest standards and thoroughly inspected before it leaves the factory. After unpacking the unit, examine it carefully for any signs of transit damage and inform your dealer if any such damage is found. It is suggested that you retain the original packaging so that the unit can be repacked at a future date if necessary.

Please note that Martin Audio and its distributors cannot accept responsibility for damage to any returned product through the use of non-approved packaging.

## **2 Warranty**

MARTIN AUDIO products are warranted against manufacturing defects in material or craftsmanship over a period of 12 months from the date of purchase. This warranty is in addition to your statutory rights. MARTIN AUDIO cannot, however, be held responsible for failures caused by abuse, unauthorised modifications, improper operation or damage caused elsewhere within your system. The determination of the cause of failure will be made by MARTIN AUDIO LTD or its authorised service agent or distributor based upon physical inspection of the failed parts. Due to our policy of continuous improvement all specifications are subject to change without notice.

### 3 Introduction

Thank you for purchasing a Martin Audio MX5 system controller.

The MX5 is the latest and most advanced analogue Martin Audio loudspeaker management system and can be configured to optimise the performance of any combination of Martin Audio high end loudspeakers.

The MX5 includes the following features:

1. Single plug-in board system specific
2. Accurate level controls with  $\pm 6\text{dB}$ 's of gain (further 6dB's available internal modification)
3. All star grounding with separate buses for signal 0v, output 0v and digital 0v giving extreme low noise capabilities
4. Individual voltage regulation of analogue display and output sections
5. Enhanced output drive capabilities and balancing
6. Absolute phase adjustment and band edge phase trim
7. Ten sections of signal delay all pass filters for driver offset compensation
8. Program dependant selectable attack times on each limiter section
9. Configurable as a '1 in - 4 out' line level distribution amplifier with all level and limiter functions operable
10. LED peak program meters on each band. Circuit building blocks within the MX5 include:
  - \* Dual fixed bandpass filters 25Hz-35kHz
  - \* Dual low frequency eq sections 2nd order
  - \* Dual high frequency eq sections 2nd order
  - \* Dual 2 band fully parametric equaliser sections (gain, Q, frequency adjustable)
  - \* 4 channels of bandpass filters

Any of the above in any combination can be configured in the MX5 on the general purpose plug-in board.

### 3.1 Mechanical

The MX5 is housed in an all steel 1U 19" rack case. In permanent installations, the MX5 should be rack mounted using the four holes in the front panel. Additional support may be required for heavy duty road use.

**WARNING: THIS APPLIANCE MUST BE EARTHED.**

**IMPORTANT:** The mains lead supplied must be connected

Green and yellow - Earth  
Blue - Neutral  
Brown - Live

Mains voltage tolerance  $\pm 10\%$  on each setting.

Fuses type T semi-delay  
100-120V 500mA  
220-240V 250mA

### 3.2 Initial Settings

MX5 Controllers are supplied with the adjustments set as follows:

Mains voltage	240V
Ground switch	On
Limiter threshold	2V setting
Plug-in board	System specific

## 4 Connections

Power is supplied to the unit via an IEC connector with integral fuse holder/voltage selector. To change to a different mains voltage remove the rectangular fuse cap, rotate and replace so that the correct voltage is indicated by the arrow on the body of the receptacle.

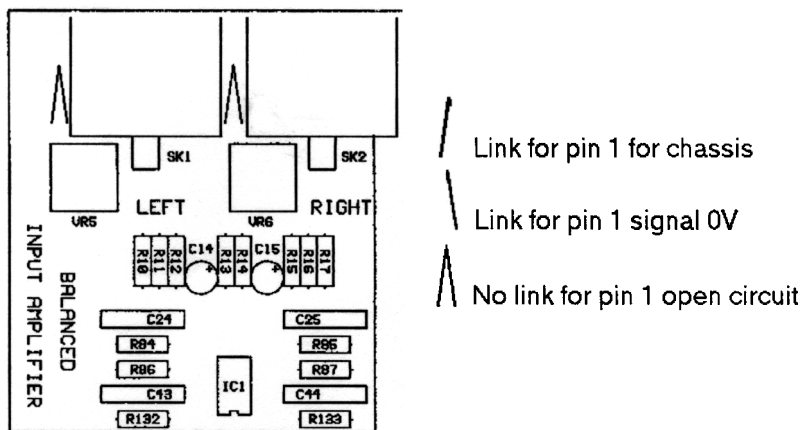
The earth terminal on the IEC connector is permanently connected to the chassis.

The electronic reference 0v is taken to chassis via the rear panel signal ground switch. This inserts a ground lift resistor when switched to off.

The inputs and outputs of the MX5 are electronically balanced, pin 2 being designated + (hot). Because both inputs and outputs are balanced either pin can be assigned as + (hot) provided the convention is maintained through the controller.

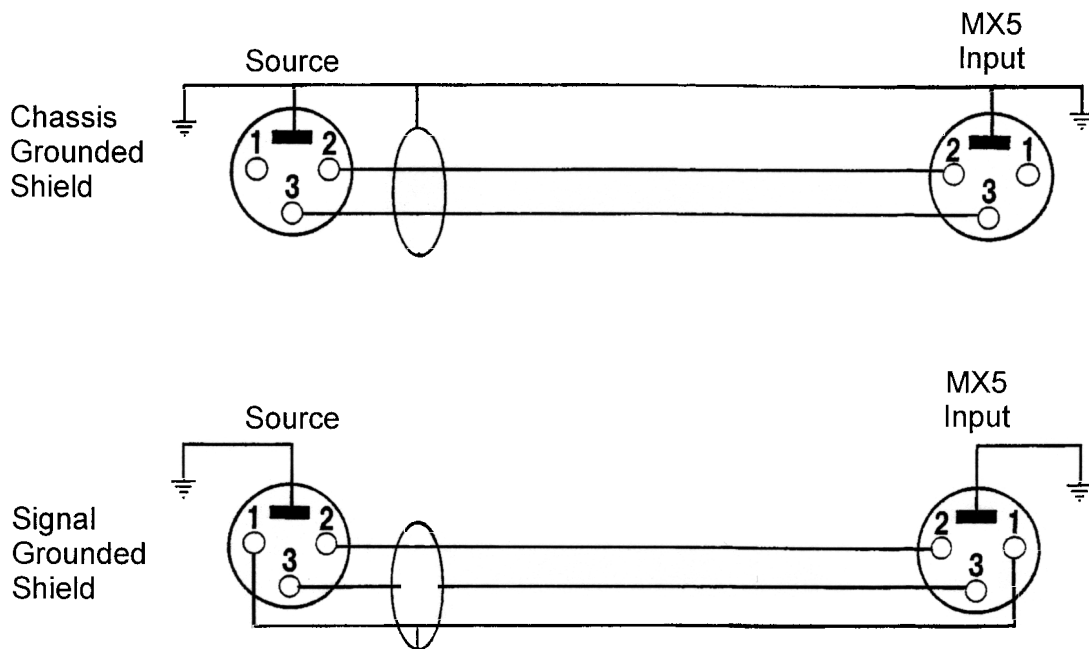
### 4.1 Input Connections

The MX5 inputs are on female XLR-type connectors and are electronically balanced. Pin 1 is normally open circuit but may be linked to sig 0v or chassis earth by inserting a link on the PCB (see diagram below). The signal is always applied between Pin 2 (hot +) and Pin 3 (cold -).



Always use 2-core + screen 'balanced' type signal leads, even for unbalanced circuits. The screen should be regarded as separate from the signal return, even if they are connected together at one end of the line.

For either balanced or unbalanced operation, always connect the signal between Pins 2 and 3. The input cable shield should be derived from equipment which is sourcing the input provided that normal safety requirements are met (ie the mains earth is correctly connected).



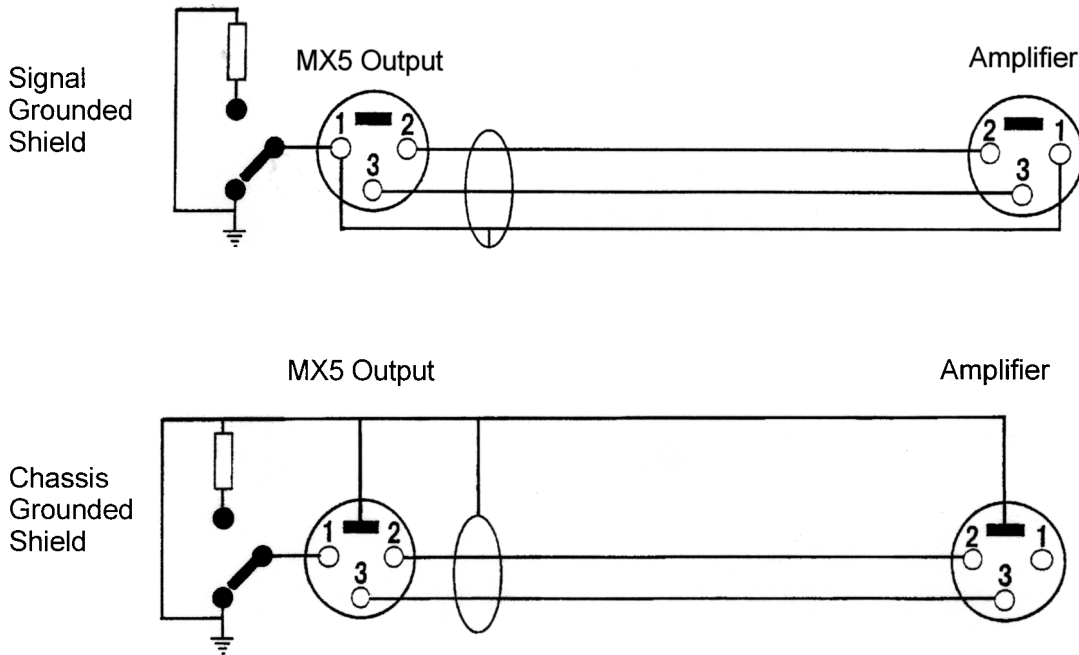
## 4.2 Output Connections

The MX5 outputs are electronically balanced auto compensating via male XLR-type connectors. Pin 1 is the (ground) connection and the signal appears between Pins 2 and 3.

Always use 2-core + screen 'balanced' type signal leads, even for unbalanced circuits. The screen should be regarded as separate from the signal return, even if they are connected together at one end of the line. This is to keep the screen a true screen so that no signal return currents flow through it which can induce signals in adjacent cables.

For unbalanced use, having decided which pin is 'hot' (see above), connect the 'cold' pin and (Pin 1) together. The signal ground switch should be placed in the Lift position at the MX5 outputs which permit the amplifier to be locally grounded (as required for safety reasons) without causing a hum loop. If the signal is merely taken between either Pin 2 or 3 and Pin 1, a level loss and signal degradation will occur.

For balanced operation, the screen should be connected to ground at the amplifier end. To eliminate ground current loops, it can be lifted at the MX5 output, provided normal safety requirements have been met (ie the mains earths are correctly connected).





## 5 Controls

### 5.1 Mode Switch

This is mounted internally on the plug-in card and allows the unit to be switched from 3-way to 4-way operation.

In 3-way mode the ('mid') output will function up to the upper bandpass filter or as defined by system parameters, band 4 ('high') remains available and may be used for driving additional VHF units in 'overlap' mode.

### 5.2 Level Controls

Each frequency bands level can be adjusted over a 12dB range from -6dB's to +6dB's relative to its nominal level to allow the user to precisely balance each level with respect to each other. An additional +6dB's of gain is available on each band (factory/dealer modification) should it be required.

### 5.3 Limiters

Each output is fitted with a limiter which provides momentary gain reduction when the signal level exceeds a preset threshold value. A red LED indicates the onset of limiting.

Threshold settings for the limiters may be adjusted by first removing the MX5 top cover (two screws on each side) to gain access to the 16 way switches which are located on the main motherboard. Setting the limiter threshold automatically sets the range of the LED display which will indicate dB's below threshold.

Threshold values corresponding to the switch positions are printed on the main motherboard reproduced here for your information.

0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.4	1.6	1.8	2.0	2.2	2.3	2.5	2.7	2.9

Each channel limiter sets a maximum drive level from the MX5, which in turn sets the maximum continuous voltage that the amplifier can present to its load.

The plug-in top card has pre-set time constants that optimise the limiters for each frequency band.

The limiters in the MX5 may be used to control the average continuous power applied to the loudspeakers if power amplifiers with a higher maximum rating than that of the loudspeakers are being used. Alternatively, if the speakers will handle the full amplifier rated power or if maximum system headroom is required, the limiters may be set to prevent the amplifiers from being driven into hard clipping. This also provides loudspeaker protection, as an amplifier driven into continuous clipping will deliver considerably more than its rated power. Although the high level of distortion will normally provide an audible warning of overloading, the operator's reaction time may be too long to avoid damage. Correct adjustment of the limiters will solve this problem.

Each limiter may be completely defeated, if desired, by setting a jumper located on the main mother board (J1-J4). If another MX5 is to be driven from any of the output channels (eg where one MX5 splits the signal between sub-bass loudspeakers and the main system crossovers), then the limiters should be defeated on those channels to prevent them from operating before the limiters in the following units.

	JUMPER	POSITION	LIMITER
BAND 1	J1	RIGHT	ON
		LEFT	OFF
BAND 2	J2	RIGHT	ON
		LEFT	OFF
BAND 3	J3	RIGHT	ON
		LEFT	OFF
BAND 4	J4	RIGHT	ON
		LEFT	OFF

#### 5.4 Phase Correctors

Phase correction adjustment is available for each crossover point. This may be set to optimise the on-axis frequency response of the loudspeaker system through the crossover region and help to minimise phase-induced anomalies in the system dispersion pattern.

Although the outputs from the MX5 are normally in phase at the crossover points, the acoustic outputs from the associated drive units may not be. Correct adjustment of the MX5 can compensate for the phase characteristics of the drive units and associated protective filter circuitry.

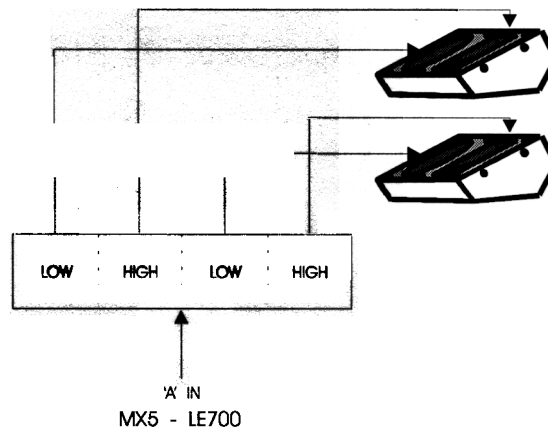
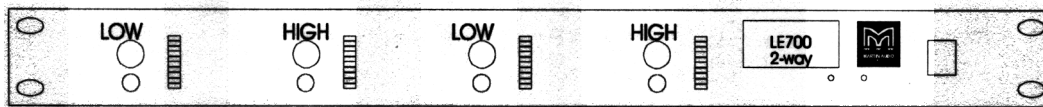
Phase alignment on an MX5 'system' board is accurately set for the speaker system for which it is supplied, and is **not** adjustable.

## 6 System Configuration

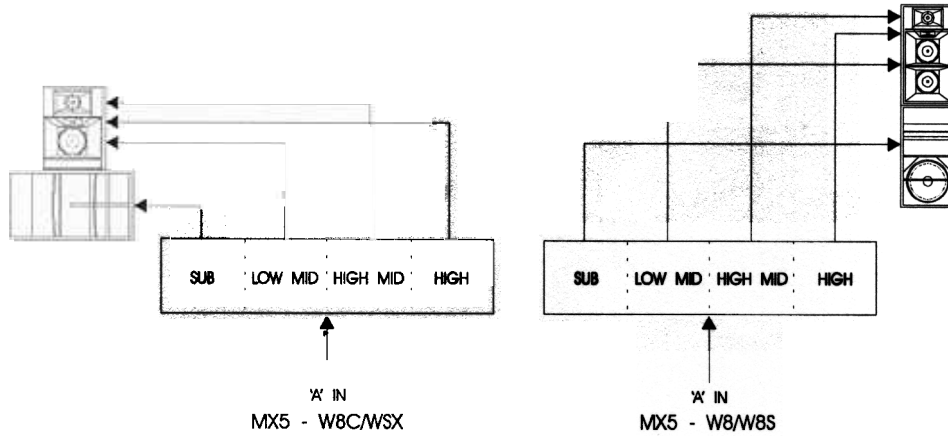
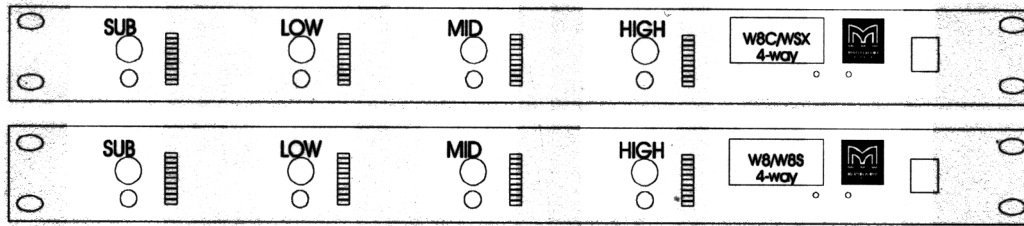
The MX5 used in conjunction with a plug-in board becomes a dedicated system controller. Depending on the plug-in system specific board, the MX5 is automatically configured either as a stereo 2-way or mono 3/4 way controller.

Each plug-in board dictates a system specific crossover function, equalisation and, in some cases, group delay. User options include low frequency EQ in/out (J1 and J2), 3/4 way operation (S2) and mono bass in 2-way stereo configurations. Where a particular option is not available it will be hard wired out.

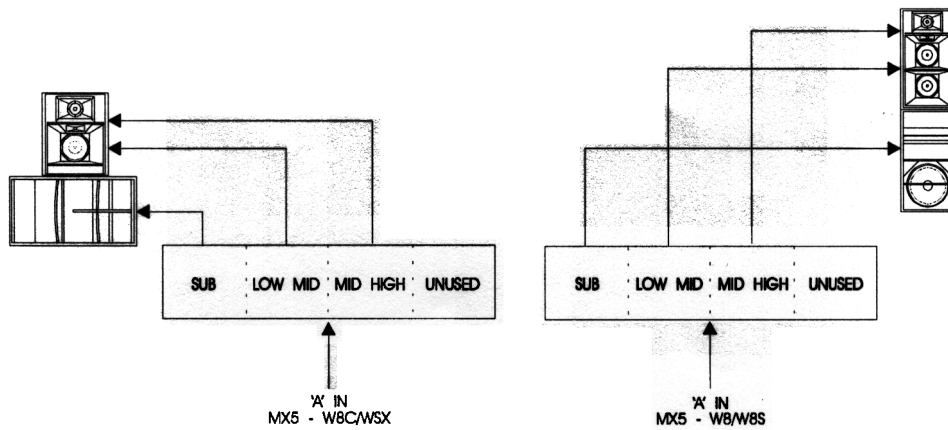
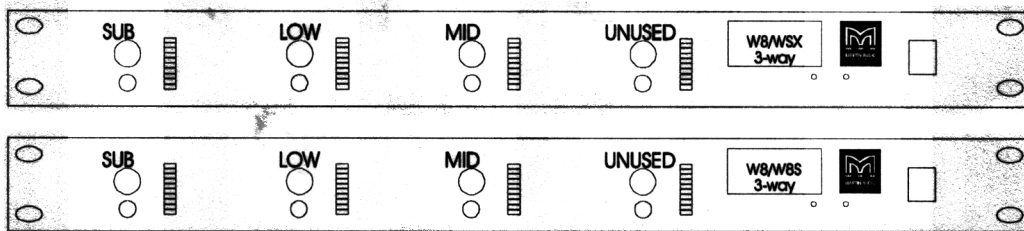
## 7 Connection Diagrams



2-way system



4-way system with sub-bass



3-way system with sub-bass

## 8 Technical Specification

Nominal Gain	0dB
Frequency Response	-3dB's @ 25Hz 24dB/octave -3dB's @ 35kHz 12dB/octave Ultimately 18dB/octave (or set by system parameters)
Distortion + Noise	0.009% THD @ 2V output limiter cancelled 1kHz
Crosstalk	-76dB below 2V @ 10kHz
CMRR	67dB's @ 10kHz
Inputs	36Kohms Balanced 18Kohms Single Ended
Outputs	47R output impedance max output +20dBu into 500 ohms Auto correction for unbalanced termination
Signal + Noise Ratio	>97dB @ 2V output 20Hz-20kHz Quasi peak open circuit input
Limiters	Individual for each band program related attack times Ratio 20:1 Threshold range -12dBv to +12dBv in 16 steps
Protection	Auto muting relay and soft start (4 seconds)
Indicators	10 section LED PPM indicating signal level, onset of limiting and limit