MTI MPA82000

User Manual

Compact 8 Channel Professional Audio Amplifier with Integrated DSP Control

$\mathsf{C}\,\mathsf{E}$

Declaration of Conformity

The following apparatus is manufactured in Denmark by MTI Danmark A/S of Smedeholm 15-17, DK-2730 Herlev, Denmark, and conforms to the protection requirements of the European Electromagnetic Compatibility Standards and Directives relevant to Professional Electrical Equipment. The apparatus is designed and constructed such that electromagnetic disturbances generated do not exceed levels allowing radio and telecommunications equipment and other apparatus to operate as intended, and, the apparatus has an adequate level of intrinsic immunity to electromagnetic disturbance to enable operation as specified and intended.

Details of the Apparatus: MTI Danmark A/S 8 Channel PA-Amplifier
Model Number: MTI MPA82000
Associated Technical File: Not applicable

Directives this equipment complies with:
                               73/23/EWG
                               93/68/EWG
                               CENELEC 1996-07-02

Harmonised Standard applied:
                               IEC 61000-3-4

In order to verify compliance with directives:
                               EN 55103-1 Emission, Issue June 1997
                               EN 55103-2 Immunity, Issue June 1997

Signed: _____ (Klit Lubich)

Date: 01/09/2005

For MTI Danmark A/S

Important notice

Please read the following carefully:

This equipment is for use on lines with more than 16 Amps per phase.

This equipment is intended for use on sites that have their own dedicated distribution.

This equipment is regarded as "professional". The user is required to ask the supply authority for permission before connecting to mains supply.

Contents

Welcome

Thank-you for purchasing an MPA82000 Amplifier from MTI.

MTI is a Danish company with more than 30 years experience of designing and manufacturing for the professional audio industry. The MPA82000 is one of many high-quality, state-of-the-art professional audio products manufactured by MTI.

With a continuing quest for innovative technology and manufacturing techniques, MTI is committed to producing products of the highest standards, superior performance and reliability.

The MPA82000 Amplifier

The MTI MPA82000 is a compact 19" high power amplifier housing:
- Up to 8 x 500W or 1000W modules in any configuration *
- Built in 8-channel DSP controller with full 8 x 8 signal routing matrix, EQ, Crossover, Delay, Gain and Limiter functions
- Global delay up to 1.6 seconds
- 16 user programmable present programmes
- RS485 interface for controlling up to 16 amplifiers by one PC (up to 1200m/4000ft)
- Balanced line input XLR connector panel
- Neutrik Speakon Speaker connector panel
- Only 3U high in an industry standard 19" width
- 26 Kg (58lbs).

*Standard configuration is 4 x 500 Watt and 4 x 1000 Watt modules. 1000 watt modules are bandwidth limited @ 3kHz -3dB. Other configurations on request. Module 1 is to the left when the amp is viewed from the front.

The design of this amplifier is a culmination of over three decades of professional audio product development by MTI. It features a very sophisticated construction, resulting in considerable advances over traditional amplifier design. All circuit designs are based on extremely reliable and sophisticated technology, insuring stability into "difficult" loads.

A single MPA82000 at just 3U high can typically replace a 12-16 unit amplifier rack. A built-in 8-channel DSP controller provides a full 8x8 signal routing matrix, EQ, crossover, delay, limiter and gain control, with global delay of up to 1.6 seconds. Settings can be stored in 16 user presets. The MPA82000 can be remotely controlled via an RS485 interface with up to 16 MPA82000s running from a single RS485 interface over a maximum distance of 1200m (4000ft).

Unpacking

All MTI products are fully tested and inspected before leaving the factory. After unpacking your amplifier please inspect it for any physical damage. In the unlikely event of damage caused in transit please contact your MTI dealer immediately so that a written claim for damages can be made. Please retain the shipping carton and all packing materials in case the unit needs to be returned.

MPA 82000 Overwiew
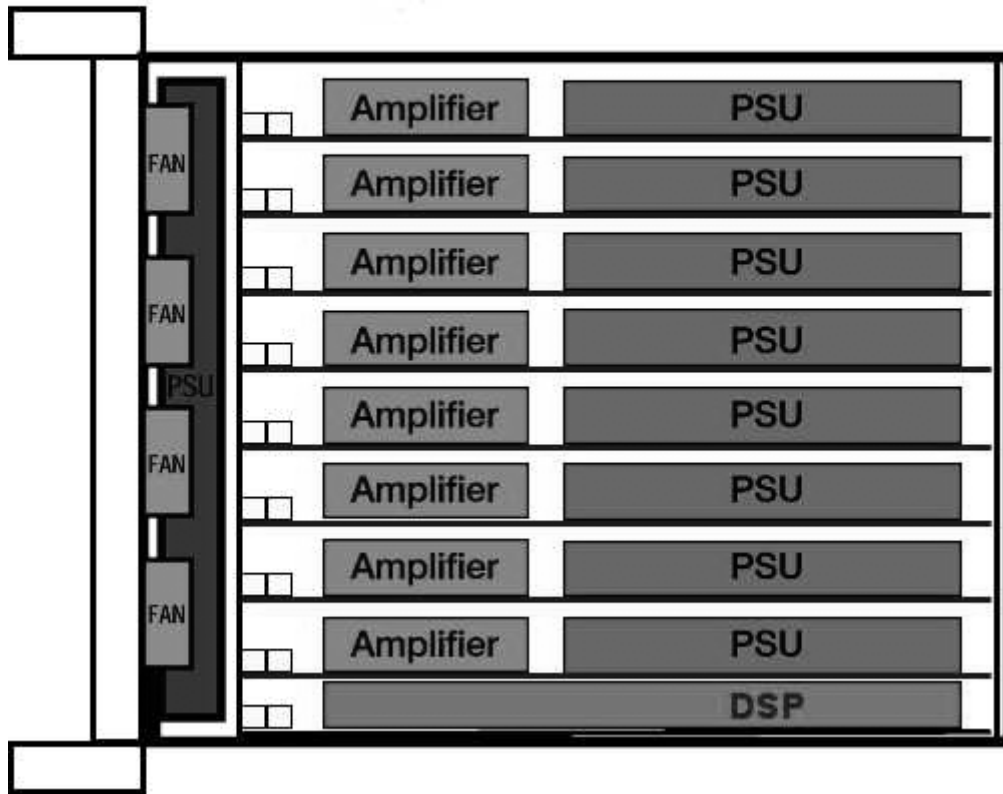
MPA 82000 Signal Flow
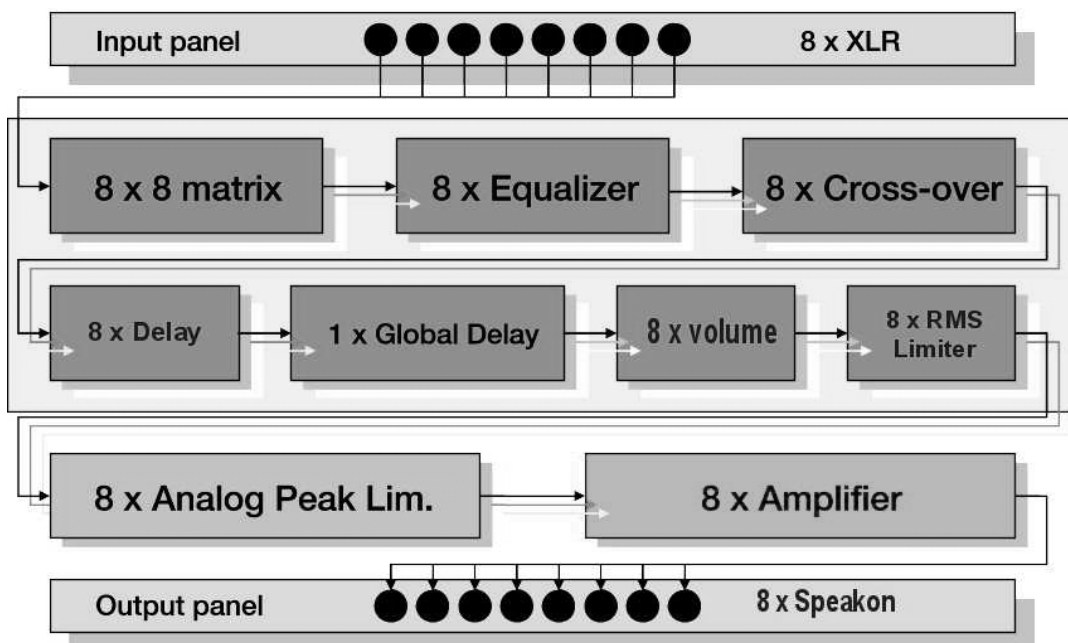
Cables and Connections

The MTI MPA82000 uses industry standard 3-pole XLR sockets for the signal inputs and 4-pole Neutrik Speakon™ Connectors for the speaker outputs.

There are many manufacturers of XLR connectors in the world and whilst they will generally work with each other the reliability of cheaper connectors from less well-known manufacturers is questionable. Therefore MTI recommends that good quality XLR connectors should be used with this product. There are some connectors that may mate with the Speakon™ sockets but MTI recommends the use of genuine Neutrik Speakon™ connectors with this product.

When choosing signal cables and speaker cables for your system always select a professional grade of cable with an overall round sheath that will be hardwearing and easy to handle. Cables should always be coiled freely and not coiled over the hand and elbow which forces the conductors to twist within the outer sheath making the cable difficult to handle.

Signal cables should consist of two inner conductors with a single overall shield. The use of balanced signal wiring is recommended whenever possible for maximum noise immunity.

Speaker cables should be made with a minimum of 2.5mm² csa (12 gauge) cable. However for cable runs over 50m a minimum of 4mm² (10 gauge) cable should used.
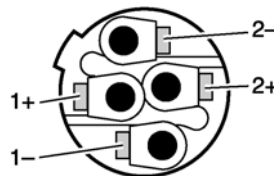
XLR-3 Pin Assignment (Inputs)

Pin 1   Signal ground (shield)
Pin 2   Signal + (hot)
Pin 3   Signal – (cold)
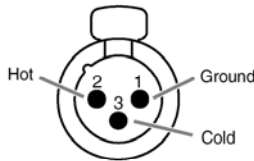
Speakon Pin Assignment (Speaker Outputs)

Speakon	1A	1B	2A	2B	3A	3B	4A	4B
1+	Ch 1+	Ch 2+	Ch 3+	Ch 4+	Ch 5+	Ch 6+	Ch 7+	Ch 8+
1-	Ch 1-	Ch 2-	Ch 3-	Ch 4-	Ch 5-	Ch 6-	Ch 7-	Ch 8-
2+	Ch 2+	nc	Ch 4+	nc	Ch 6+	nc	Ch 8+	nc
2-	Ch 2-	nc	Ch 4-	nc	Ch 6-	nc	Ch 8-	nc

Standard configuration of MPA82000 is four 2-way active outputs. Modules 1,3, 5 and 7 are all low frequency modules, 1000W/4Ohm bandwidth limited to 3kHz (-3dB). Channels 2,4,6 and 8 are full range modules, 500W/4Ohm. Output Speakons are configured so that pins 1+ and 1- are connected to the amplifier module for that channel and pins 2+ and 2- are connected to the amplifier module to the next channel on the right. This allows quick and simple wiring to two-way speaker cabinets using 4-core Speakon cables.

Mutipole Pin Assignment (Outputs)

pin 1+ 9 output module 1   Speakon 1A pin 1+ and 1-
pin 2+10 output module 2   Speakon 1A pin 2+ and 2-, Speakon 1B pin 1+ and 1-
pin 3+11 output module 3   Speakon 2A pin 1+ and 1-
pin 4+12 output module 4   Speakon 2A pin 2+ and 2-, Speakon 2B pin 1+ and 1-
pin 5+13 output module 5   Speakon 3A pin 1+ and 1-
pin 6+14 output module 6   Speakon 3A pin 2+ and 2-, Speakon 3B pin 1+ and 1-
pin 7+15 output module 7   Speakon 4A pin 1+ and 1-
pin 8+16 output module 8   Speakon 4A pin 2+ and 2-, Speakon 4B pin 1+ and 1-

Please note that module number corresponds to processing channel number in the DSP GUI

! DO NOT short speaker outputs !   **! DO NOT ground speaker outputs !**

Communication adapters

Neutrik Minicon Pin Assignment (Communication adapter)

Pin 1	TX +
Pin 2	No Connection
Pin 3	No Connection
Pin 4	TX -
Pin 5	No Connection
Pin 6	RX -
Pin 7	No Connection
Pin 8	RX +

Female pinout numbers CW as seen from the front of amplifier
Male pinout numbers CCW as seen from the front of amplifier
Female dongle for preset switching has pin10 and pin12 connected

Roline Pin Assignment

Pin 1	TX +
Pin 2	TX -
Pin 3	RX -
Pin 4	RX +

Switch Settings for Roline adapter

Switch 1	DCE
Switch 2	T.ON/R.ON

USB COMi Pin Assignment

Pin 1	TX +
Pin 2	TX -
Pin 3	RX -
Pin 4	RX +
Pin 5	GND

Jumper Settings

1-2	Connected
9-10	Connected
13-14	Connected
19-20	Connected (All other jumpers are not connected)

Software Installation

Minimum System Requirements:
Intel Pentium or equivalent processor
Microsoft Windows XP, 2000, NT 4.0 (w/Service Pack 5 or later), 98, 98SE or Me
64 MB RAM
20 MB hard drive space
SVGA (800x600) or higher resolution display card and monitor
1 free USB port or 1 free COM port or 1 free RS485 port
Keyboard
Mouse or other pointing device

Please visit **www.mtidanmark.dk** to ensure that you have the most up to date version of the MPA82000 speaker management software.

The MPA82000 speaker management software consists of a single application (.exe) file. Simply copy this file to the hard drive on your computer. If the program is used frequently it is recommended that it is placed in the Windows Desktop for quick access. Please see your Windows documentation for further information.

Using the Speaker Management Software

To start the MPA82000 speaker Management Software click on the MPA82000 logo.

Select COM

Whenever you launch MPA82000 speaker management software you will be asked to Select COM. Simply highlight the COM port that your amplifier(s) are connected to and press SELECT. If you wish to explore the software without an amplifier connected then select DEMO.
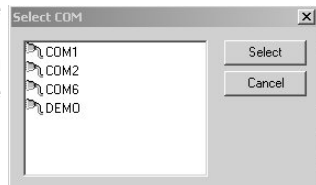
The Main Screen consists of four control buttons in the top left corner:

**Detect:** Searches COM port for any connected MPA82000 amplifiers
Update: Uploads on-screen settings to MPA82000 memory
Load: Recalls previously saved preset information from hard drive or floppy drive
Save: Saves on-screen preset information to PC

Beneath the control buttons is a connection tree showing all devices that are connected and have been successfully detected by the software. Double click on a Unit to create a preset. The default preset

name (e.g. Preset 0) then appears beneath the unit. To edit the preset name first right click then left-click the name and enter a new name.
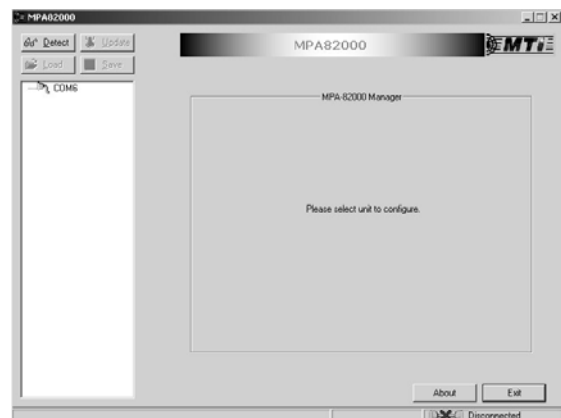
To the right of the screen is the function control panel showing the programmed settings for Matrix, Equaliser, Crossover, Delay, Volume and Limiter. Clicking on the tabs at the top accesses each individual screen.

Matrix
The connection matrix selects the routing through the amplifier. All inputs are shown in a horizontal line across the top of the matrix and all outputs in a vertical line down the right hand side of the matrix. Any input can be connected to any combination of outputs simply by placing a tick at the appropriate junction in the matrix. The default setting is for Input 1 to connect to Output 1, Input 2 to Output 2, etc, but in some situations it may be required that a
single input feeds all the outputs. If two inputs need to be summed (e.g. to add left and right channels together from a stereo source to make a mono output), then multiple inputs can be selected for the same output channel.
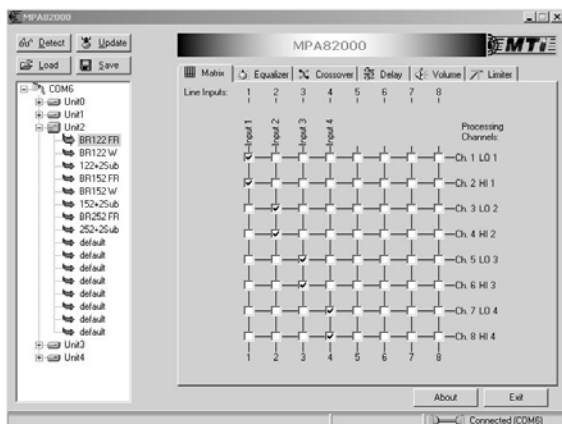
The default names for inputs and outputs can be modified simply by double-clicking on any name and entering a new name in the edit box.

Equaliser
The Equaliser page provides up to six bands of parametric EQ for each amplifier channel. EQ parameters of gain, frequency and filter Q can be adjusted by manually entering figures or using the up/down buttons by each value.
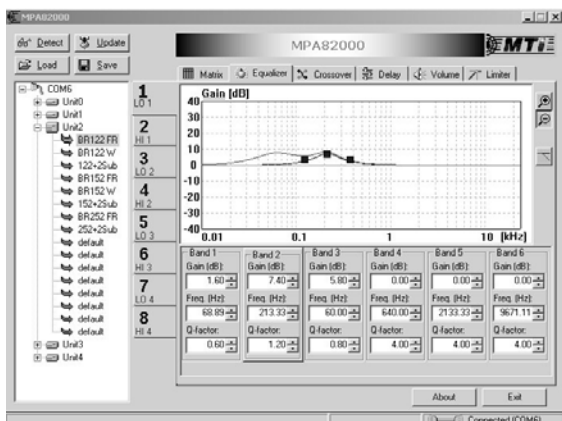

When the mouse is moved over the EQ screen a cursor provides precise information regarding the frequency and gain. An "add crossover" button to the

right of the screen will overlay crossover points onto the frequency curve. A *click and drag* function is provided so simply double-clicking on the equaliser curve creates blue index points which can then be dragged by the mouse allowing the EQ curve to be adjusted visually.

Crossover
The crossover page provides both a low pass filter and a high pass filter for each channel. None, one or both filter functions can be used for each channel. Because of the importance of crossover points in maintaining system performance and reliability it is only possible to add or remove a crossover function by simultaneously holding down CTRL and ALT keys and clicking the tick box adjacent to LPF Enable or
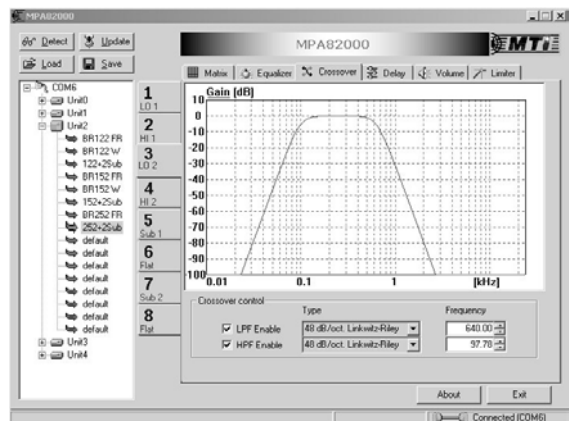
HPF Enable. A *click and drag* function is provided so simply double-clicking on the crossover curve creates blue index points which can then be dragged by the mouse allowing the crossover point to be adjusted visually.

Delay
The delay page offers individual delay settings for each channel of 0-104ms and a common delay (for all channels) of 0-1.6s. Delay times are displayed in
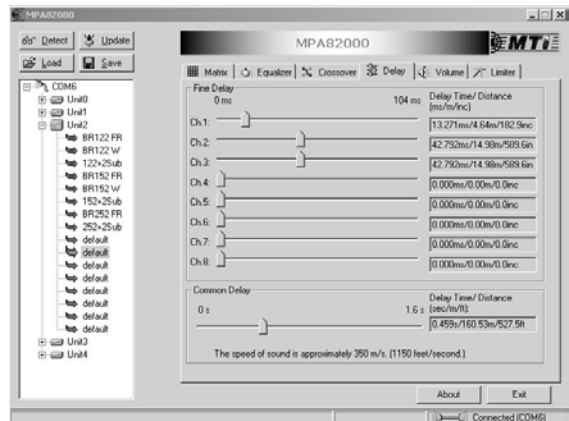
seconds, metres and feet, calculated using the speed of sound at 350 metres per second and 1150 feet per second.

Volume

The volume page controls individual gain for each channel from –90 to +18dBu. It also features individual channel mutes and channel polarity switches.
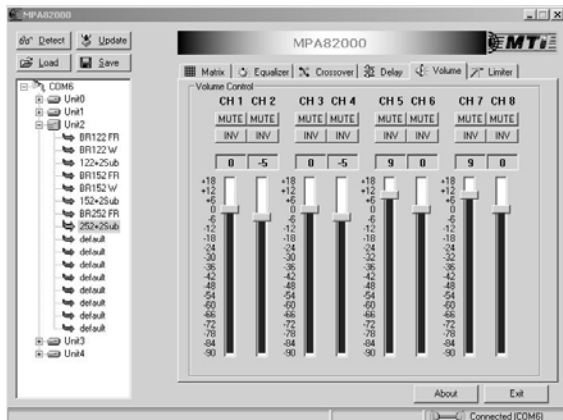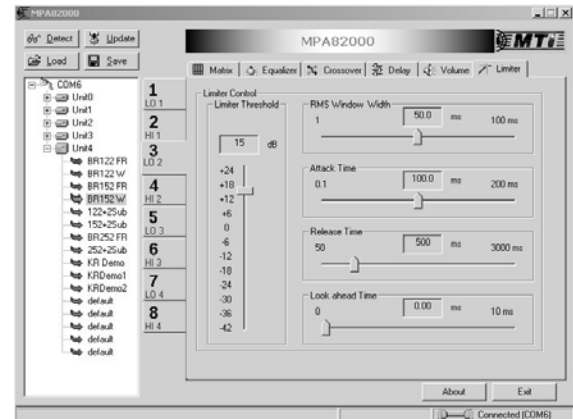

Limiter

Individual limiters are provided for each amplifier channel and allow separate control of limiter threshold, rms window width, attack time, release time and look ahead time. With such comprehensive control of the limiter functions it is possible to achieve excellent performance from the system while still providing a high level of protection against drive unit failure. However it is also possible that incorrect settings will create very audible distortion to the

signal. Therefore some care has to be taken when adjusting limiter parameters.

In particular fast limiter settings cause significant degradation of low frequency signals so particular attention has to be made when setting limiters for bass or full-range signals.

Peak limiting takes place in the analogue domain. Limiting is done by highly sophisticated laser trimmed VCA's without any compression. Each limiter is adjusted after amplifier configuration to insure optimum performance. For further guidance please contact us directly.

Copying settings between channels or between presets

Right clicking on an individual channel tab allows settings to be copied to a clipboard that can then be pasted to another channel within the preset.
Right clicking on the Equaliser, Crossover, Delay, Volume or Limiter tabs allows settings to be copied to a clipboard that can then be pasted to another preset.

Specifications

	500W Module	**1000W Module**
Output Power (measured @1kHz) RMS	310W / 8Ω	670W / 8Ω
	580W / 4 Ω	1300W / 4Ω
Peak Power (measured @1kHz) 1 cycle	900W / 2Ω	2000W / 2Ω
Peak output current	>45A	>50A
Dynamic Range	117dBA	120dBA
THD+N	< 0.1%, 0.1W – 500W, 4Ω	< 0.09%, 0.1W – 1000W, 4Ω
Efficiency	93% @ 300W / 8Ω	93% @ 500W / 8Ω
Output impedance	< 5mΩ @ 1kHz	< 5mΩ @ 1kHz
Power Supply Rejection Ratio	> 60dB	> 60dB
Output DC-offset	< 25mV	< 40mV
Nominal Voltage Gain @ 1kHz	+27dB	+28dB
Frequency Response +/- 0.5dB	20Hz-20000Hz	20Hz-1000Hz
DF Damping factor ZL = 8, f = 100Hz	2000	2000
Minimum Load Impedance	2 Ω	2 Ω
Dimensions H x W x D	133mm (3U) x 483mm (19") x 535mm	
Weight	26kg	
Power Requirements	200-250VAC (50-60Hz). 1A standby, 2A quiescent, 32A peak	

Accessories
> **Hardware:**
> USB to RS485 adapter
> COM Port (RS232) to RS485 adapter
> Hardware dongle for changing presets
> RS485 termination for long cable runs
> Data cable for connecting amps
> **Software:** Presets for MTI speaker range

Routine Maintenance
MTI MPA82000 Amplifiers are designed to give long and reliable operation and require very little maintenance.

SAFETY NOTICE: Please note that power to the amplifier modules is ALWAYS on when the amplifier is connected to the mains supply. Therefore when carrying out any maintenance the amplifier must be disconnected from the mains supply.

As with all power amplifiers it is important to ensure that the cooling vents are not blocked and that adequate airflow is maintained through the amplifier. Periodically check that no obstructions exist around any of the amplifier ventilation paths. This is particularly important when the amplifier is in a rack or case.

Dust and debris can accumulate in fan-cooled equipment over time. Therefore it is recommended that every 2 years the amplifier is disconnected from the mains supply and the lid removed so that dust can be carefully removed. One method is to use a high-pressure airline to blow dust from the amplifier chassis. Care should be taken to ensure airflow is not excessive and also the airline should be clean and dry (i.e. oiled machine tool airlines are not suitable for this operation). Safety goggles must be worn at all times when using high-pressure air. Alternatively a vacuum cleaner and a soft paintbrush can be used, with care, to remove built up dust within the unit.

The amplifier case can be cleaned with 3M Stainless Steel Cleaner & Polish or similar products suitable for delicate electronic equipment. Do not spray cleaning products directly at grilles or connectors.

Replacement of an amplifier module

Because of the simple modular layout of the MPA82000 it is very straightforward to replace an amplifier module by following these simple steps:

SAFETY NOTICE: The mains supply MUST be disconnected before removing any part of the amplifier casing

1. Switch off power and disconnect mains lead from supply
2. Remove 4 x 6mm screws and 4 x 4mm screws from rear panel, noting screw positions
3. Remove rear panel and disconnect power connections to modules
4. To remove a module push it backwards and slide it out
5. Slide replacement module into position
6. Reconnect all power connectors
7. Refit rear panel with 8 screws
8. Reconnect mains supply and test unit for correct operation

MTI Limited Warranty

MTI MPA82000 Amplifiers are warranted to the original end purchaser against manufacturing or materials defects for a period of one year from the original date of purchase. Faults arising from misuse, unauthorised modifications or accidents are not covered under this warranty. No other warranty is expressed or implied.
In the event of malfunction, contact your authorised MTI dealer or distributor for information.

Be aware that warranty details may differ from country to country. Contact your dealer or distributor for information. These terms do not infringe your statutory rights.

MTI Danmark A/S, Smedeholm 15-17, DK-2730 Herlev, Denmark
www.mtidanmark.com