

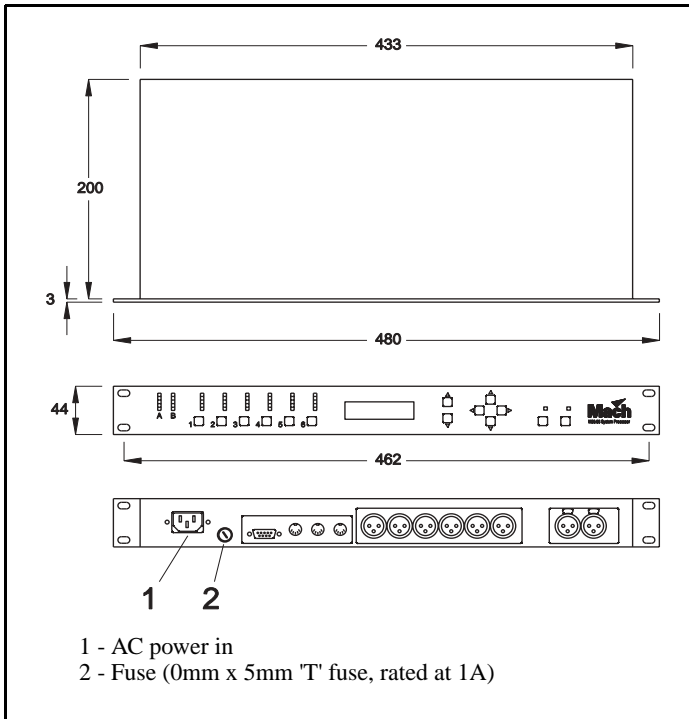
M20.06 Controller

user manual



Mach

Measurements are in millimeters



© 2001 Martin Professional A/S, Denmark.

All rights reserved. No part of this manual may be reproduced, in any form or by any means, without permission in writing from Martin Professional A/S, Denmark.

Printed in Denmark.

P/N 35020002, Rev B

Introduction	5
Safety information.....	5
Compliance	6
Quick start	7
1 - Connect AC power.....	7
2 - Attach audio connections.....	7
3 - Access pre-loaded program settings	7
Installation	9
Power.....	9
Voltage setting	9
AC power fusing.....	9
Mains power connection	10
Mechanical installation.....	10
Controls	11
Input section	11
Store/Recall keys	11
RIGHT/LEFT keys.....	11
RIGHT/LEFT/UP/DOWN access keys	11
Main display	11
Input meter	11
Output section.....	12
Mute LED	12
Mute key.....	12
Output meter	12
Rear panel	12
Mains power input	12
RS-232 connector	12
6 band outputs	12
2 channel inputs	13
Operation	14
Moving about the screens.....	14
Utilities menu	14
Stereo link	15
Delay units	15
Lock out.....	15
MIDI channel.....	15
Contrast.....	15
MIDI dump.....	15
Delete program	16
Inputs menu	17
Delay	17
EQ	17
Outputs menu	17
Name.....	17

Source	18
Band gain	18
Limiter threshold	18
Delay	18
Delay link	18
Polarity	19
Low Xover	19
High shape	19
High Xover.....	19
EQ	20
EQ screens	20
Adding a new EQ	20
EQ shape	20
Frequency	20
Cut/Boost.....	20
Width (BELL only)	21
Store and recall	21
Storing	21
Recalling.....	22
System Security	23
Program lock.....	23
Lock mode.....	23
Specifications	24

INTRODUCTION

1

Thank you for selecting the Martin M20.06 Controller. The M20.06 Controller is a one unit loudspeaker management system, capable of operating all speakers in the Mach product range. This digital circuitry is based on BSS OMNIDRIVE™ DSP technology and comes equipped with 24-bit A-D and D-A converters. Fast and easy set-up of Mach speaker systems is ensured by 50 pre-set programs with settings for all Mach speaker models. Each preset offers carefully optimized crossover points and slopes, polarity, delay and EQ settings to exactly fit the individual characteristics of each Mach loudspeaker.

SAFETY INFORMATION

Read this manual before powering or installing the fixture, follow the safety precautions listed below and observe all warnings in this manual and on the fixture. If you have questions about how to operate the fixture safely, please contact your Mach dealer.

This product is not for household use.

Do not removed the covers. There are no user-serviceable parts inside.

Refer all servicing to qualified service personnel.

This equipment must be earthed.

Use only a source of AC power that complies with local building and electrical codes and has both overload and ground-fault protection.

Do not removed any of the protective earth, or signal cable shield, connections. Such action is against recommended practise and will render any EMC or safety certification void.

Compliance

The M20.06 has been tested and found to comply with the following European and international Standards for Electromagnetic Compatibility and Electrical Safety:

Radiated Emissions (EU)	EN55013	(1990)Associated Equipment
RF Immunity (EU)	EN50082/1	(1992)RF Immunity, Fast Transients ESD
Mains Disturbance (EU)	EN61000/3/2	(1995)
Electrical Safety (EU)	EN60065	(1993)
Radiated Emissions (USA)	FCC part 15 Class B	
Electrical Safety (USA)	UL813/ETL	(1996)Commercial Audio Equipment
Electrical Safety (CAN)	UL813/ETLc	(1996)Commercial Audio Equipment

For continued compliance with international EMC legislation ensure that all input and output cables are wired with the cable screen connected to Pin 1 of the XLR connectors. The input XLR Pin 1 is connected to the chassis via a low value capacitor, providing high immunity from ground loops whilst ensuring good EMC performance.

QUICK START

1 - Connect AC power

The M20.06 has a universal voltage AC Power input. Connect the unit to AC Power with the lead supplied. It will switch on automatically (there is no separate on/off switch). The display will show the default screen, with the name and program number of the current program. (This will be either the last program recalled before the unit was switched off, or, in the case of a unit with no stored programs, the default: 1 UNUSED)

2 - Attach audio connections

Connect the inputs and outputs as required. All inputs and outputs are electronically balanced, with Pin 2 hot signal (+ve). Do not put any audio through the unit at this time.

3 - Access pre-loaded program settings

The pre-loaded programs supplied in version 230701 are:

Program #:	Supports
1	M12T and M182T
2	M15T and M182T
3	M30T and M182T
4	M154i and M182T or i
5	M129i and M182T or i
6	M156i and M182T or i
7	M12T full range ch 2+3+5+6
8	M15T full range ch 2+3+5+6
9	Slingshot 3 Way passive XO stereo. MS1262, MS118
10	Slingshot 4 Way mono. MS1262, MS118
11	Slingshot 5 Way mono. MS1262, MS15X2, M182T or MS118.
12	Slingshot 5Way mono. MS1262, MS15X2, Ballister SUB
13	M1502T active x 3 input A.
14	M1201T active x 3 input A.

Program #:	Supports
15	M127i Passive and M152i. In A: 1+2. In B 3+4. In A+B 5+6
16	M154i Passive and M182i. In A: 1+2. In B 3+4. In A+B 5+6
17	M129i Passive and M182i. In A: 1+2. In B 3+4. In A+B 5+6
18	M156i Passive and M182i. In A: 1+2. In B 3+4

To access the pre-loaded programs:

- 1 Press **RECALL**.
- 2 Use the Parameter **UP/DOWN** keys to select the designated program.
- 3 Press **RECALL** again. Programs marked with the letter M are Master programs and have been designed to match the different Mach speaker systems.

Note: ***It is very important that your settings have the right gain structure depending on the amplifier size and manufacturer you are using.***

For optimizing the system with regard to gain and time alignment between subwoofers and top boxes, the SIA Smaart Live program is very useful. If you use SmaartLive, you can download some Smaart starting point set-ups from the following Internet address and save them on the M20.06:

http://www.mach.dk/accessories/SmaartLive_M20.06_settings.zip

INSTALLATION

This section describes how to mount the M20.06 Controller and how to connect it to AC power.

POWER

Voltage setting

The M20.06 uses a switched-mode power supply which offers high efficiency and low heat generation. This power supply accepts universal AC Power input voltages in the range 100V AC to 240V AC (nominal), and requires no setting adjustment for AC power voltages in this range. Minimum AC input voltage is 90 Volts, and the maximum is 264 volts. Outside these ranges the unit will not work satisfactorily, if at all. Voltages in excess of the maximum will probably cause damage. Voltages below the minimum will cause complete system shutdown. The flash memory in the M20.06 will preserve all data in the event of a power failure.

AC power fusing

The green-and-yellow wire of the mains cord must always be connected to an installation safety earth or ground. The earth is essential for personal safety as well as the correct operation of the system, and is internally connected to all exposed metal surfaces. Any rack framework into which this unit may be mounted is assumed to be connected to the same grounding circuit.

The incoming mains power is fused within the M20.06 by the fuse holder mounted on the rear panel. Always replace with an identical 20mm x 5mm 'T' fuse, rated at 1A for continued protection from equipment damage and fire.

It is for safety reasons that this specification is strictly adhered to.

Mains power connection

WARNING: *The appliance must be earthed.*

The wires in the mains lead are color coded in accordance with the following code. The wire which is coloured:

- *Green and yellow, or green*, must be connected to the terminal which is marked with the letter 'E' or by the earth signal or which is coloured green and yellow or green.
- *Blue* must be connected to the terminal labelled 'N' or coloured black or blue.
- *Brown* must be connected to the terminal labelled 'L' or coloured red or brown.

MECHANICAL INSTALLATION

A vertical rack space of 1U (1¾" / 44.5 mm high) is required. Ventilation gaps are unnecessary.

If the M20.06 is likely to undergo extreme vibration through extensive road trucking and touring, it is advisable to support the unit at the rear and/or sides to lessen the stress on the front mounting flange. The necessary support can generally be bought ready-built as a rack tray. As with any low-level signal processing electronics, it is best to avoid mounting the unit next to a strong source of magnetic radiation, for example, a high power amplifier, to help keep residual noise levels in the system to a minimum.

CONTROLS

This section describes the physical interfaces to the M20.06 Controller.

INPUT SECTION

Store/Recall keys

Program data can be stored to one of 60 internal memory locations using the Store facility. The **STORE** key also doubles as an **ENTER** key for confirmation of some actions.

Program data is recalled to the unit from internal memory using the Recall facility.

RIGHT/LEFT keys

Controller keys for editing parameters displayed on the LCD screen.

RIGHT/LEFT/UP/DOWN access keys

Controller keys for moving between screens to access different parameters to edit.

Main display

The main LCD screen displays current parameters being edited.

Input meter

Input signal level referenced to the clip level. Actual signal clipping will occur slightly above the 'clip' indicator.

OUTPUT SECTION

Mute LED

Shows the mute status of the output band.

Mute key

Pressing a mute key will toggle the associated band output on and off. The mute LED is illuminated when the output is MUTED. Mute status is saved when a program is stored.

Output meter

Shows the output of each channel relative to the limiter threshold.

REAR PANEL

Mains power input

The Power inlet for the M20.06. Note that there is no On/Off switch for the unit.

RS-232 connector

For connection to a PC for access to one or more units on a MIDI loop, which provides an easy way to upload new software.

6 band outputs

The audio outputs are electronically balanced and floating. Transformer balancing is available as a retrofit option.

Pin 1	Shield/Ground
Pin 2	Signal Hot (+)
Pin 3	Signal Cold (-)



2 channel inputs

The audio inputs on the M20.06 are electronically balanced. Transformer balancing is available as a retrofit option.

Pin 1	Open circuit
Pin 2	Signal Hot (+)
Pin 3	Signal Cold (-)



The chapter describes:

- “Moving about the screens”
- “Utilities menu”
- “Inputs menu” on page 17
- “Outputs menu” on page 17
- “EQ screens” on page 20
- “Store and recall” on page 21

After powering up, the unit performs internal checks and sets up the audio path before releasing the output mute relays. This takes a few seconds.

When the unit is powered up the **Default Screen** is shown. This shows the current program name and number.

MOVING ABOUT THE SCREENS

Use the:

- **UP/DOWN** access keys to move between Default, Utility, Input and Output menus (Horizontal columns).
- **RIGHT** and **LEFT** keys to move along each menu.
- Parameter **UP/DOWN** keys to adjust a parameter. (When adjusting a value, pressing a key once will usually give a small increment/decrement whilst holding a key down will give a larger increment/decrement).

Moving to a new menu may not bring up the first screen shown in each row, as the unit remembers, and moves you to, the last screen accessed in each menu.

Store and **Recall** are accessed by pressing their respective keys.

UTILITIES MENU

Pushing the **RIGHT** key while viewing the default screen will move you into the Utilities menu. The **RIGHT** and **LEFT** keys are used to move along the

Utilities path, and the Parameter **UP/DOWN** keys are used to change the selected parameter.

Stereo link

This mode selects whether parameters will be adjusted together or independently on each channel. The stereo link pairs in:

- 2-channel 3-way are 1 & 2, 3 & 4 and 5 & 6.
- 3-channel 2-way are 1 & 3, and 4 & 6.

Pushing the Parameter **UP/DOWN** keys selects Stereo Link: ON or OFF.

Delay units

This selects the units used for displaying and adjusting delays. 'ms' represents milliseconds, 'ft' represents feet (and feet and inches for short delays), and 'm' represents metres.

Lock out

The Lock Out mode prevents access to editing functions on the input and output channels. Since this utility is not password-protected, Lock Out can still be accessed and turned off. This mode is intended only as a precaution against accidental adjustments, and not as a tamper-proof security lock.

MIDI channel

Here, you can select the MIDI channel that the unit is assigned to (Channels 1 through 16 are available).

Contrast

This allows you to change the contrast of the LCD display.

MIDI dump

This utility allows you to dump the current program settings to another unit, or a MIDI storage device for backup, or for the purpose of synchronizing a pair of units for stereo operation. Performing a MIDI dump will completely overwrite all programs in the receiving device (Rx), including the current program, with those from the sending device (Tx). If you are using the MIDI Dump to transfer data to another unit via MIDI ensure that both devices are set to the same MIDI channel, and connect either the MIDI OUT of the Tx device to the MIDI IN of the Rx device. Alternatively, the M20.06 can be linked via their RS232 ports.

Each unit must be set to the correct MIDI mode, from a choice of Multi, Master or PCPort on the **MIDI mode** screen in the **Utilities** menu. The MIDI mode setting for each device will depend on the protocol used and whether synchronization between the units is required.

Protocol	Tx	Rx	Sync. Status
RS232	PCPort	Multi	-
RS232	PCPort	PCPort	-
RS232	Multi	Multi	-
RS232	Multi	PCPort	-
RS232	Master	Multi	Synchronized
RS232	Master	PCPort	Synchronized
MIDI	Multi	Master	-
MIDI	Master	Master	Synchronized after dump.

Note that all units connected via MIDI port will only be synchronized after a MIDI dump has been performed. Units connected via RS232 do not require a MIDI dump in order to synchronize, but if a MIDI dump is not performed, each unit will contain different stored programs and current program settings until changes are made to each setting individually on the Tx unit).

The default position for the **MIDI dump** screen is MIDI DUMP: NO. Use the Parameter **UP/DOWN** keys to select YES on the Tx unit, then press **STORE** at the prompt, to confirm the dump. A percentage complete figure on the Tx screen will show how much data has been transferred. The Rx screen will read Warning! Incoming Dump. When the dump is complete, the Tx screen will default to NO. The Rx screen will display the name of the new current program.

Notes that all parameter edits in all stored programs will be overwritten in any CUSTOMER UNIT set to the same MIDI channel. Use MIDI Dump with care!)

Delete program

This facility allows any stored program to be removed from the unit. Use the Parameter **UP/DOWN** keys to select the desired program, and press **STORE** to confirm deletion.

Note that programs marked M cannot be deleted from USER units.

INPUTS MENU

There are two inputs available for routing to outputs plus an internal mono sum of inputs A and B, referred to as A+B. This gives the Input Channels: A, B, and A+B.

The facilities described in this section are common to all inputs, except EQ, which is not possible on the mono sum A+B signal.

Delay

The first screen in the input menu is the **Delay** screen. Pressing the **RIGHT** key will access the **EQ** screens.

The delay on each input channel can be adjusted individually, in 22 microsecond steps by pushing the Parameter **UP/DOWN** keys. (Holding a Parameter **UP/DOWN** key down will increment/decrement the amount of delay in larger steps). This delay is typically used to set the delay for delay towers etc., or to stagger the delays between the left and right channels to 'move' sound lobes in an installation.

Delays can be viewed and adjusted in metres (default), feet/inches, or milliseconds.

Note that the maximum delay value is restricted by any delay on an output that is fed by the current input.

Input delay and output delay for any signal path is limited to 630ms.

EQ

To add EQ to an input, step through the functions on the desired channel using the **RIGHT/LEFT** keys until you reach the screen that shows the EQ parameter you wish to edit. (See "EQ screens" on page 20 for more details).

OUTPUTS MENU

To select any of the output bands, press the **UP/DOWN** keys until the output is shown on the screen.

Name

The first screen in the **Output** menu is the Name function. Here you can identify each output with a name suitable to its function, selecting from a list of names in the unit, such as SUB, or 2" HORN. Use the Parameter **UP/DOWN** keys to select the desired name. If the name selected while

stereo is NOT linked begins with L<space> or R<space>, then the L or R will not be displayed when stereo linking is on.

Source

To change the source input, use the Parameter **UP/DOWN** keys until the desired input source is selected.

Band gain

Adjusts the output gain from -25dB to +4dB using the Parameter **UP/DOWN** keys.

Limiter threshold

The band limiter threshold can be adjusted between -20 to +10dBu in 0.2 dBu steps by pushing the Parameter **UP/DOWN** keys to set the desired value to match the sensitivity of the amplifier in use. Setting the limiter thresholds below the amplifier clipping sensitivity by about 2dB is recommended. This prevents any transient overshoot driving the amplifier into clip and so damaging your loudspeakers. Threshold setting also determines the output meter sensitivity.

Delay

The output delays are most often used to electronically align the driver voice coils with the other drivers in the system, so the sound sources are coherent to the listener.

Each increment is only 22 microseconds, which translates in physical terms to a distance of 6.8mm

Delay link

The **Delay Link** option allows you to control several band delays with a single adjustment. This means that once all the drivers in a single cabinet have been aligned, the whole cabinet can be delayed relative to the input signal, or another cabinet, by linking these band delays as one. Any offsets applied before linking will be retained after linking. In the **Delay Link** screen, Use the Parameter **UP/DOWN** keys until the desired linking configuration is shown. In:

- Mono configuration, 1 will link to 2, 2 will link to 3 etc.
- 2-channel 3-way configuration, 1 will link to 3, 3 will link to 5, 2 will link to 4 and 4 will link to 6.

- 3-channel 2-way configuration, 1 will link to 4, 2 will link to 5 and 3 will link to 6.

Polarity

The polarity invert function allows the phase of an output to be rotated by 180 degrees. Default is un-inverted. Pushing the Parameter **UP** key will invert the polarity of the output. Pushing the Parameter **DOWN** key will return the polarity of the output to un-inverted.

This screen is used to select the filter type/shape for the lower band edge (high-pass) of the current output band. The band edge will be highlighted on the graphic on the screen.

The available filter types are as follows, in this order:

- Butterworth 12dB /Octave
- Linkwitz-Riley 12dB Octave
- Butterworth 18dB / Octave
- Butterworth 24dB / Octave
- Linkwitz-Riley 24dB / Octave
- Butterworth 48dB / Octave
- Linkwitz-Riley 48dB / Octave

Pushing the Parameter **UP/DOWN** keys will scroll through the above list.

Low Xover

The lower edge (high-pass) of the crossover band can be set over a wide frequency range from OUT (no roll off) through 15Hz to 16kHz. Pushing the Parameter **UP** key will increase the frequency, with OUT as the final step. Pushing the Parameter **DOWN** key will increase the frequency, to the final clockwise position OFF, which mutes the output.

High shape

Selects the Edge filter type and slope as for the higher (low-pass) band edge.

High Xover

This function works in a similar way to the Low Xover, except that OUT is the last step at the clockwise position.

Pushing the Parameter **UP/DOWN** keys will decrease the frequency, to the final clockwise position OUT, which DOES NOT mute the output.

EQ

To add EQ to an input, step through the functions on the desired channel using the RIGHT/LEFT keys until you reach the screen that shows the EQ parameter you wish to edit. (See “EQ screens” on page 20 for more details).

EQ SCREENS

If the M20.06 is configured for MONO, all EQs will be mono. If configured for 2x2+1 ("stereo"), EQs will be marked as Stereo 'S' when STEREO LINK is ON, and the stereo marker will show an 'S' next to the EQ number. Available spare EQ filters are also shown.

Adding a new EQ

If you press the **RIGHT** key and the screen does not change, then you have reached the last EQ currently in use. To add an EQ, the cut/boost of the highest EQ must be edited. Another EQ (assuming there are spare EQs) will then be inserted automatically.

NOTE: The A+B signal is summed after the EQ sections on A and B, so the A+B signal is affected by A and B EQ.

EQ shape

The shape of the EQ can be selected from one of the following by pushing the Parameter **UP/DOWN** keys:

- Hi shelving with 6dB slope (Hi6)
- Hi shelving with 12dB slope (Hi12)
- BELL
- Low shelving with 6dB slope (Lo6)
- Low shelving with 12dB slope (Lo12).

Frequency

Pushing the Parameter **UP/DOWN** keys adjusts the EQ frequency. The filter position is shown graphically by the cursor, and the Frequency of EQs can range between 15Hz and 16kHz.

Cut/Boost

Pushing the Parameter **UP** key to add boost (+ gain) or **DOWN** for cut (- gain). Cut/boost is available between +15dB and -15dB, in 0.2dB increments.

Width (BELL only)

Pushing the Parameter **UP** key widens the EQ (lower Q), pushing the **DOWN** key makes the EQ narrower (higher Q). EQ Width is available between 0.05 and 3 Octaves, in 0.05 increments.

STORE AND RECALL

Storing and Recalling a program can be done at any time using the **STORE** and **RECALL** keys on the left hand side of the LCD. The M20.06 can hold 60 programs internally. To reset a unit to default values, use the configuration parameter in the **Utilities** screen.

If the unit is prompting for confirmation of an action at any time, the **STORE** key is used to conform the action, and pressing it at this point will not access the **STORE** facility.

Storing

Pressing the **STORE** key will access the **Store** screen.

Use the **RIGHT/LEFT** keys (or push the Parameter **UP/DOWN** keys) to move along the program name.

While the Program number is highlighted, pushing the Parameter **UP/DOWN** keys will cycle through programs 1-60.

Whilst each of the letters in the Program name are highlighted, pushing the Parameter **UP/DOWN** keys will cycle through all available characters.

The last space in the program name is reserved for Program lock. Pushing the Parameter **UP/DOWN** keys will turn this on/off. If a program has this flag set to on (so the program name displays a key at the right hand side), a new program, or edited version of the current program, cannot later be stored in this location. This lock can be turned off at any time in order to delete or overwrite the program. If you try to store a program in place of a locked program, the unit will display PROGRAM LOCKED!, but will then highlight the key icon,

Which gives you the option of turning off the lock if you wish to overwrite the existing program.

Note that the edit flag * appears when there are unsaved changes to a program, compared to the initial status of the last recalled/stored program. When a program is stored to internal memory, the edit flag will disappear. Once the program name has been entered, and the Program lock status cleared, pressing the **STORE** key again will prompt the message STORE

UNLOCKED?, asking whether the program should be stored with a Program lock on/off. Use the Parameter **UP/DOWN** keys to turn the Lock on/off, the default setting being ON. Once the Lock status is set, push the **STORE** key a final time to commit the program to memory. The display will now default back to the screen displayed before the **STORE** facility was accessed. To exit from the store screen without storing a program, press the **RECALL** button.

Recalling

Pressing the **RECALL** key will access the **Recall** screen. This facility is displayed in the same way as the store facility.

The Parameter **UP/DOWN** keys are used to select the program number to recall (when highlighted). When the program you wish to recall has been selected, push the **RECALL** key again to recall the program. The unit will display a message showing that data is being recalled, and will then display the default screen once the recall is complete.

To exit from the recall screen without recalling a program, press the store button.

SYSTEM SECURITY

Any changes made to an audio system have the potential to be damaging, even if only accidentally made. For this reason several different security systems are built in to the M20.06 to protect the speakers. Each of the security levels locks different groups of variables away from accidental or malicious adjustment.

PROGRAM LOCK

This is a flag that is available for each stored program. A program can be locked when it is stored - the user is prompted when Store is pressed for the second time. Locking a program in this way is purely to protect the user against accidentally overwriting a stored file. The lock status can be changed by anyone unless the program is locked (see “Lock mode”). A program locked in this way is indicated by a key symbol.

LOCK MODE

The Lock Mode in the **Utility** menu can be turned on at any time.

When Lock Mode is set to ON, the user can move around the screens but no variables can be changed except for the LCD screen contrast and, of course, the Lock Mode.

Locking the M20.06 in this way is only to protect the user against other users changing the system setup accidentally or against unauthorized people intentionally changing the system. This status can be changed by anyone who knows how to operate the M20.06.

SPECIFICATIONS



Dynamic Range	Typically 108dB, unweighted. 22Hz to 22kHz
Noise Floor	-98dBu (default gain set -10dB)
Frequency Response	$\leq \pm 0.25$ dB, 15Hz-20kHz with filters out
Distortion (THD)	$< 0.007\%$, 20Hz-20kHz @ +10dBu input level
Inputs	Electronically balanced & floating
Input Impedance	10k Ω
Maximum Input Level	+20dBu, balanced
Outputs	Electronically balanced & floating
Maximum Output Level	+10dBu into 600 Ω
Channel Separation	> 80 dB, 20Hz-20kHz
Power Supply	AC Mains 50/60Hz, 90V - 264V
Power Consumption	< 30 VA

The logo for Mach features the word "Mach" in a bold, black, sans-serif font. A dark green triangle is positioned above the letter 'a', pointing downwards and to the right.

Mach

Martin Professional A/S
Olof Palmes Allé 18, DK 8200 Århus N, Denmark
Phone: +45 8740 0000, Fax: +45 8740 0010
URL: <http://www.martin.dk>