

M•Flex 12

M•Flex 15

M•Flex S

user manual


Mach

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INTRODUCTION

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Thank you for choosing the M•Flex speaker system. The M•Flex series is the next generation of compact, lightweight speakers and offers a vast variety of innovative functions and features.

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 or call the Martin Professional 24-hour service hotline at +45 70 200 201.

You are cautioned that any change or modifications not expressly approved in this manual could void your authority to operate this equipment.

Warning! *To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.*

Please heed all warnings and follow all instructions in this user manual when using the M•Flex products.

- Do not block any ventilation openings.
- Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus. Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- Do not install in a confined space.
- Do not open the unit because of the risk of electric shock.
- This device must be earthed.
- Be advised that different operating voltages require the use of different types of line cord and attachment plugs. Check the voltage in your area and use the correct type.

- Do not removed the covers. There are no user-serviceable parts inside.
- When installing the fixture above ground level, verify that the structure can hold at least 10 times the weight of all installed devices.
- Block access below the work area whenever installing or removing the fixture.
- Do not modify the fixture or install other than genuine Mach parts.
- Refer all service to a Mach service technician.

DESIGN CONCEPT

The M•Flex powered speaker series consists of three models. M•Flex 12, M•Flex 15 and M•Flex Sub. Applications include sound reinforcement for live bands, DJ's and AV work, but also monitoring, mixing, installations in bars, cafes, retail stores, fitness studios, airports and other places where ease of use and high output from a compact and light weight speaker system is needed.

All powered M•Flex products features built-in switch-mode amplification and Digital Signal Processing made by **l.c. electronic**. As such it represent the next generation of composite moulded speaker designs. In addition, the co-axial design of the M•Flex 12 makes it the lightest and most compact 12" speaker in the market for moulded speakers. And it opens up new application areas in the installation segment with its ability to be flown horizontally due to its uniform dispersion pattern.

A separate amplifier for the woofer and compression driver makes all M•Flex speakers true active speakers. The switch-mode amplification technology runs at relatively low temperatures and lets out very little heat. For this reason no heat sinks are required on the M•Flex speakers thus offering the possibility of flying the speakers directly below the ceiling without going into heat protection.

By adding a DSP to the M•Flex series our R&D team where enabled to have complete freedom in dealing with the overall optimization of frequency and impulse response. Having full control over the acoustics inside the cabinet pushes the limits of what is theoretically possible. The result is a series of speakers with excellent performance and output. In addition to the advantages in sound quality, the digital limiter in the DSP offers excellent protection and reliability with nearly unlimited limiting capabilities, especially when compared to a typical analogue limiter with a modest 20-25 dB limiting. Apart from working as a limiter, the DSP also control crossover slopes, EQ points, high pass filter and delay. But still, acoustical problems have been addressed with acoustic measures. At Mach we recognizes that not even the most powerful processor can correct even basic acoustic challenges. In order to get the most out of a DSP, the foundation must always be an acoustically well-designed speaker system.

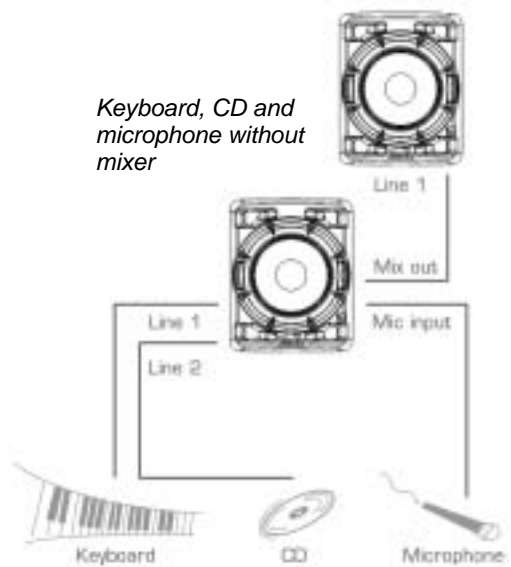
For this reason, all drive units have been customized to the M•Flex series and developed with emphasis on ultra flat frequency response, highly controlled dispersion patterns and very low distortion. In addition to this, power compression has been kept at an absolute minimum in all models in the M•Flex series and the internal cabinet design has reduced resonances to a minimum.

APPLICATION

M•Flex 12

The M•Flex 12 is a full range cabinet designed around a co-axial 12" woofer and 1" compression driver. The co-axial design makes the M•Flex 12 an ultra compact and lightweight speaker, which can be used for a large verity of applications. Another advantage of the co-axial design is the uniform dispersion pattern of 110 x 110 degrees, enabling the M•Flex 12 to be flown horizontally or vertically.

The coverage pattern also allows the M•Flex 12 to be flown in a line source configuration and it will therefore work well in highly reverberant applications such as churches, airports or railway stations. When flown in a line source array the output of the M•Flex 12 is very high and opens up for use in high power applications such as live or large disco applications up to 300 people.



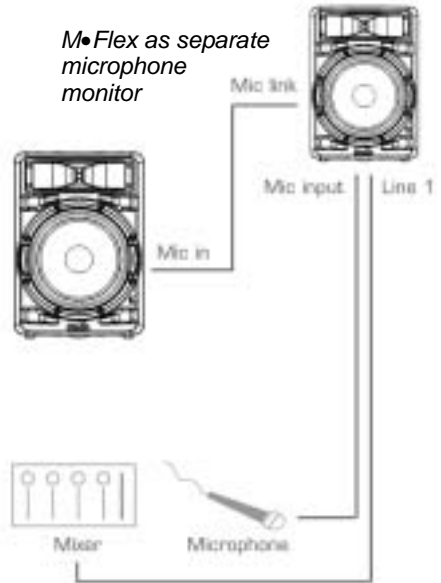
Keyboard, CD and microphone without mixer

M•Flex 15

M•Flex 15 is the largest model in the M•Flex family and offers true full-range sound reproduction with high SPL. It is aimed especially at top performance in live venues, but applications also include AV productions, small-scale touring, fixed installations and mobile DJ applications. M•Flex 15 can be mounted on a stand and even used as a stage monitor. The integrated handles, lightweight design and sturdy mechanical protection features allow you to handle M•Flex 15 with ease in all applications.

The 15" unit is a unique construction that features a lightweight chassis. The chassis is very open and enables excellent coupling of the diaphragm to the air in the cabinet. It incorporates venting below the spider to reduce power compression and improve clarity. A special Soft-Roll design is featured in the spider. This design allows for more than ± 18 mm excursion. A Kapton voice coil former ensures excellent mechanical stability. The 1" compression driver incorporated a very lightweight diaphragm and with 107 dB sensitivity the unit is more efficient than many 2" drivers. But it still has the advantage of a very wide frequency response and runs flat to 19 kHz. It is mounted behind a 90 x 40 constant directivity horn with excellent coverage control.

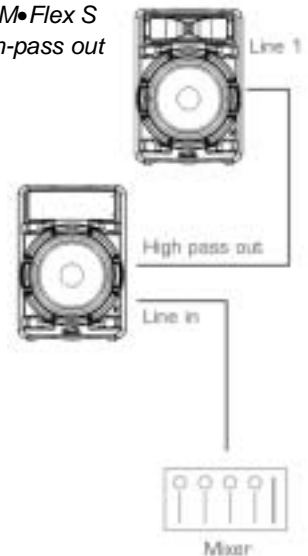
M•Flex as separate microphone monitor



M•Flex S

For stronger reproduction of frequencies from 100 Hz and down, the M•Flex S is designed to deliver the punchy kick from a bass drum or a hard low-frequency bass line. At the same time it contributes to an overall increase of dynamics and sound pressure of the M•Flex top-boxes. The 15" unit in M•Flex S is a powerful construction that features a lightweight chassis. The chassis is very open and enables excellent coupling of the diaphragm to the air in the cabinet. It incorporates venting below the spider to reduce power compression and improve clarity. A special SoftRoll design is featured in the spider. This design allows for more than ± 18 mm excursion and extended sub bass output. The 39 mm. voice coil former is made of aluminium and ensures excellent heat dissipation and very low power compression. A strong Kapton voice coil former ensures excellent mechanical stability. Digitally powered the concept of a lightweight design in the entire M•Flex series is maintained and an active crossover with hi-output link option ensures optimum integration of M•Flex S with the rest of your M•Flex speakers.

M•Flex 15" connected via M•Flex S high-pass out



REAR PANEL INTERFACES

This section describes the rear panel interfaces.

POWER SECTION

Power input

The enclosed power cable features a Neutric PowerCon plug. The PowerCon plug is locked into the socket thus eliminating the risk of accidentally having the main power connector pulled out of the socket.

Note: *Remember to bring the cord at all times, as it is a custom component often not yet found in normal electrical components.*

Connect the power Plug in the power cord to an AC socket with a voltage, which correspond to the amplifier current (110 or 220 volt depending on model – refer to the M•Flex label on the rear panel).

Power switch

Before turning on the M•Flex speaker, make sure that all sources such as mixer, musical instruments or CD players have been turned on, and the input gain controls have been turned down.

When shutting down the system, reverse the process, i.e. turn off the speaker and then all external sources.

LED indicators

| | |
|--------------|------------------|
| Blue | AC power on |
| Green | Receiving signal |
| Red | Limiter active |

Note that on the front of the unit there is an additional:

- Blue LED that turns off when the unit is in standby waiting for a signal
- Red LED that indicates when the limiter is active

Note: *When the limiter LED comes on now and then, the speaker is approaching the maximum output. The indicator comes on 2 dB before limiting sets in, and occasional flickering of the LED is fully normal. It does not mean that the speaker is overloaded. However, pushing the volume up until the LED lights up almost continuously might result in clipping the input and can in extreme situations cause damage to the amplifier or drive units. In this case, either reduce output level from the source, reduce bass or treble boost on the EQ, or reduce master volume or microphone gain.*

See also “Stand-by function” on page 12.

INPUT SECTION

Microphone input

The microphone input accepts a standard XLR connector. Apart from accepting microphones, the input can be switched to accept line signals by pressing the Mic/line selector.

Mic./line selector

Pressing the Mic/Line selector button enables the microphone input to be used as a line input.

The Mic/line selector control the sensitivity of the input as follows:

- Mic.: +5 dB to +40 dB
- Line: PAD -20 dB to +15 dB

Signal Input Volume is controlled by the Mic. gain control.

Microphone link

This XLR output enables you to link the microphone signal to other M•Flex speakers. It is a passive thru link so the output signal of the plug is similar to the input signal.

Line input 1 & 2

Line 1 and 2 feature a ¼” Jack plug, which accepts a balanced or unbalanced line level signal from sources such as CD players, cassette, MP3 players, computer sound-card outputs, keyboard and other electrical instruments.

Note: *Input cables must be balanced. Unbalanced cables will reduce the input level by 6 dB.*

Volume control on these inputs is controlled by the Master volume control.

OUTPUT SECTION

Master volume

Adjusts the master output signal from $-\infty$ to 0 dB.

Mix out

This output enables link of the mixed signal microphone/line signal to other M•Flex boxes. Note that normally, a link output will only allow for a few boxes to be linked, before the quality of the signal is reduced. In the M•Flex speakers, an active line driver operates the link output, so an unlimited number of M•Flex speakers can be linked while perfect signal quality is maintained.

Bass

Adjust the bass output of the speaker (Shelv - 100 Hz +- 10 dB)

Treble

Adjust the high frequency output of the speaker (Shelv – 10 kHz +- 10 dB)

MOUNTING THE SPEAKERS

FLYING OPTIONS

The M•Flex models can be flown in three different ways:

- Use the custom designed U brackets. Typically used for flying horizontally in low ceiling applications or on truss.
- Insert M6 eye bolts in the four flying points. Typically used when flying vertically.
- Insert the custom designed flying bracket in the four flying points. Typically used for flying M•Flex in horizontal or vertical clusters

Caution: *Rigging should only be performed by professionals following safe rigging standards and methods.*

TRIPOD MOUNTING

Apart from the versatile flying options, the M•Flex 12 and M•Flex 15 also feature an integrated 35mm aluminium top-hat adaptor, which enables the box to be placed on a tripod. When using a tripod, note the following:

- Make sure that the tripod is capable of supporting the weight of the speaker (refer to specifications in the back of this manual)
- Check that the tripod is placed on a stable surface
- Remember that tripod legs are trip hazards. Place them away from the audience or place additional weight on the base of the stand to improve stability.

STAND-BY FUNCTION

The active M•Flex models feature a stand-by function. When this function is enabled and no input signal has been sensed for one hour (or the signal is at a very low level), the amplifier automatically shuts down. When signal is restored to the speaker, the amplifier will automatically be turned on.

The stand-by function is *disabled* by default in models after and including:

- M•Flex 12 (115 volt) models - serial number 701124
- M•Flex 12 (230 volt) models - serial number 701316
- M•Flex 15 (115 volt) models - serial number 701555
- M•Flex 15 (230 volt) models - serial number 701694

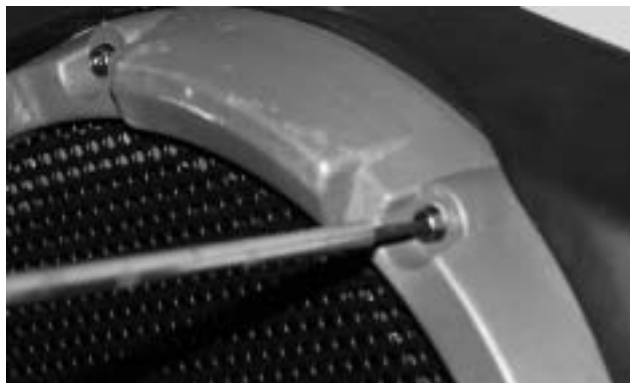
Note that the serial number label can be found on the back of the speaker unit. The stand-by function is *enabled* by default in all models with serial numbers prior to these.

ENABLING OR DISABLING THE STAND-BY FUNCTION

The stand-by function is enabled by removing a jumper from a printed circuit board (PCB) inside the fixture.

To access the PCB:

- 1 Using a Torx 20 screwdriver, remove the 8 screws that hold the woofer cover in place.



- 2 Remove the woofer cover.
- 3 Using a Phillips screwdriver, remove the woofer from the speaker casing.



- 4 Once you remove the woofer you will be able to see the PCB inside the fixture casing.



Refer all service, other than that described here, to qualified service personnel.

CARE AND MAINTENANCE

The M•Flex speakers have been designed for mobile use and will - when used with common sense care - provide flawless performance for many years. However, we recommend that the following points are noted:

- If the speakers have been subjected to very low temperatures, it is advisable to allow for a one hour warm up period before operating them at full output. This to avoid the risk of short-circuiting the amplifier and processor PCB due to condense water.
- The M•Flex cabinets can be used in short-term out-door applications, but have not been designed for long-term outdoor installations.
- Clean the cabinets with a general-purpose household detergent. Grease or marking tape residue can be removed with alcohol or mineral spirits.
- Protective speaker covers are available for the M•Flex models and we strongly recommend these if the speakers are frequently transported.

TROUBLESHOOTING

A

| Problem | Remedy |
|---|---|
| No sound. | Make sure that all XLR cables are wired according to the AES standards: Hot (+) - Pin2 Cold (-) - Pin3 Shield (ground) - Pin1 |
| | Make sure that the signal is strong enough. A weak signal may result in the unit shutting down if the stand-by function is enabled. |
| No sound when microphone is connected to mic. input. | The microphone requires phantom power. Switch to a dynamic microphone. |
| Distorted sound, but peak indicator does not come on. | Mixer or other sources is overdriven/clipping. Turn down the signal from the source. |
| Low input signal. | Ensure that the input cables are balanced. |
| Feedback when microphone is turned up. | Microphones have very different characteristics depending on which application they are designed for. Make sure that the microphone is a vocal microphone with a Cardioid (unidirectional) characteristic. Shure offer good help to choosing the right microphone. Check: http://www.shure.com/microphones/microphone_help.asp |
| | Turn Microphone away from the speaker. |
| | Reduce bass and treble EQ |

Table 1: Troubleshooting

SPECIFICATIONS



M•Flex 12 Specifications

SYSTEM PERFORMANCE

| | |
|--|-------------------|
| Max long term SPL (calculated) | 122 dB |
| Max peak SPL (calculated) | 128 dB |
| Frequency range +/- 10dB | 69 Hz - 20 kHz |
| Dispersion (-6 dB) | 110 x 110 degrees |
| Auto stand-by | 12 min |
| Mix output impedance | .40 ohm |
| LF EQ, Shelving | +/-10 dB @ 100 Hz |
| HF EQ, Shelving | +/-10 dB @ 10 kHz |

HF TRANSDUCER

| | |
|---------------------------------|---|
| Type | 1" compression driver with 1.4" diaphragm |
| Power rating, IEC 268 | 50 W |
| Power rating, peak | 200 W |
| Sensitivity | 105 dB |

LF TRANSDUCER

| | |
|---------------------------------|--------------------------------|
| Type | 12" coaxial with 2" voice coil |
| Power rating, IEC 268 | 250 W |
| Power rating, peak | 1000 W |
| Sensitivity | .98 dB |

AMPLIFIER

| | |
|-------------------------------------|-------|
| LF output, continuous RMS | 350 W |
| HF output, continuous RMS | 70 W |

LINE INPUT

| | |
|----------------------------------|------------|
| Type | Balanced |
| Impedance | .27 K ohm |
| Line 1 & 2 sensitivity | -∞ to 0 dB |

MICROPHONE INPUT

| | |
|--------------------------------------|---------------|
| Type | Balanced |
| Impedance, pad on | 3.5 K ohm |
| Impedance, pad off | .4 K ohm |
| Input sensitivity, pad on | -21 to +14 dB |
| Input sensitivity, pad off | +5 to +40 dB |

ELECTRICAL

| | |
|--|--------------------------------|
| AC input, US model | 110 V, 60 Hz |
| AC input, EU model | 230 V, 50 Hz |
| Power consumption, peak | 420 W |
| Power consumption, average | 145 W |
| Power consumption, no signal | 53 W |
| Power consumption, standby | 5 W |
| Maximum current consumption | 2.23 A @ 230 V, 4.46 A @ 115 V |

PHYSICAL

| | |
|------------------------------|--|
| Dimensions | 50 x 39 x 32 cm (19.7 x 15.4 x 12.6 in.) |
| Weight | 15 kg (33 lbs) |
| Flying attachment: | 4 points for M6 threaded hardware |

ACCESSORIES

- Speaker cover
- Flying bracket for cluster and array configuration

M•Flex 15 Specifications

SYSTEM PERFORMANCE

| | |
|--|-------------------|
| Max long term SPL (calculated) | 126 dB |
| Max peak SPL (calculated) | 132 dB |
| Frequency range +/- 10dB | 49 Hz - 20 kHz |
| Dispersion (-6 dB) | 90 x 40 degrees |
| Auto stand-by | 12 min |
| Mix output impedance | 40 ohm |
| LF EQ, Shelving | +/-10 dB @ 100 Hz |
| HF EQ, Shelving | +/-10 dB @ 10 kHz |

HF TRANSDUCER

| | |
|---------------------------------|---|
| Type | 1" compression driver with 1 3/4" diaphragm |
| Power rating, IEC 268 | 60 W |
| Power rating, peak | 240 W |
| Sensitivity | 107 dB |

LF TRANSDUCER

| | |
|---------------------------------|-------------------------------|
| Type | 15" woofer with 3" voice coil |
| Power rating, IEC 268 | 320 W |
| Power rating, peak | 1280 W |
| Sensitivity | 101 dB |

AMPLIFIER

| | |
|-------------------------------------|-------|
| LF output, continuous RMS | 350 W |
| HF output, continuous RMS | 70 W |

LINE INPUT

| | |
|----------------------------------|-------------|
| Type | Balanced |
| Impedance | 27 K ohm |
| Line 1 & 2 sensitivity | - • to 0 dB |

MICROPHONE INPUT

| | |
|----------------------------|---------------|
| Type | Balanced |
| Impedance, pad on | 3.5 K ohm |
| Impedance, pad off | 4 K ohm |
| Input sensitivity, pad on | -21 to +14 dB |
| Input sensitivity, pad off | +5 to +40 dB |

ELECTRICAL

| | |
|------------------------------|--------------------------------|
| AC input, US model | 110 V, 60 Hz |
| AC input, EU model | 230 V, 50 Hz |
| Power consumption, peak | 510 W |
| Power consumption, average | 185 W |
| Power consumption, no signal | 53 W |
| Power consumption, standby | 5 W |
| Maximum current consumption | 2.23 A @ 230 V, 4.46 A @ 115 V |

PHYSICAL

| | |
|-------------------|------------------------------------|
| Dimensions | 67 x 48 x 40 cm (26 x 19 x 16 in.) |
| Weight | .25 kg (55 lbs) |
| Flying attachment | 4 points for M6 threaded hardware |

ACCESSORIES

- Speaker cover
- Flying bracket for cluster and array configuration

M•Flex Sub Specifications

SYSTEM PERFORMANCE

| | |
|--------------------------------|-------------|
| Max long term SPL (calculated) | 123 dB |
| Max peak SPL (calculated) | 129 dB |
| Frequency range +/- 10dB | 45 - 250 Hz |
| Auto stand-by | 1 hour |

TRANSDUCER

| | |
|-----------------------|-------------------------------|
| Type | 15" woofer with 3" voice coil |
| Power rating, IEC 268 | 320 W |
| Power rating, peak | 1280 W |
| Sensitivity | 97 dB |

AMPLIFIER

| | |
|---------------------------|------------------|
| LF output, continuous RMS | 350 W |
| High pass filter | 115 Hz, 24 dB LR |

LINE INPUT

| | |
|-----------|----------|
| Type | Balanced |
| Impedance | 22 K ohm |

ELECTRICAL

| | |
|--|--------------------------------|
| AC input, US model | 110 V, 60 Hz |
| AC input, EU model | 230 V, 50 Hz |
| Power consumption, peak | 510 W |
| Power consumption, average | 185 W |
| Power consumption, no signal | 53 W |
| Power consumption, standby | 5 W |
| Maximum current consumption | 2.23 A @ 230 V, 4.46 A @ 115 V |

PHYSICAL

| | |
|----------------------|------------------------------------|
| Dimensions | 67 x 48 x 40 cm (26 x 19 x 16 in.) |
|----------------------|------------------------------------|

ACCESSORIES

- Speaker cover
- Flying bracket for cluster and array configuration

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

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