

# Owner's Manual

## M120



## WARNING

TO PREVENT THE RISK OF SHOCK OR FIRE. DO NOT USE THIS CORD WITH AN EXTENSION, RECEPTACLE OR ANY OTHER OUTLET UNLESS THE BLADES CAN BE FULLY CUT. PLEASE MATCH THE WIDE BLADE WITH THE WIDE SOCKET OPENING. TO PREVENT THE RISK OF SHOCK OR FIRE. DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.



The lightning bolt with the arrow symbol within an equilateral triangle is intended to alert the user to the presence of "dangerous voltage" within the product's enclosure and may be of sufficient magnitude to constitute a risk of electric shock .

### CAUTION

**RISK OF ELECTRIC SHOCK  
DO NOT OPEN**

CAUTION: To reduce the risk of electric shock, do not remove cover. No user serviceable parts. Refer servicing to a qualified service technician.



The exclamation mark within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance information in the literature accompanying this device.

## IMPORTANT SAFETY INSTRUCTIONS

1. Please read all instructions before using the device.
2. Keep these instructions for future reference.
3. Read all safety instructions carefully.
4. Follow the manufacturer's instructions.
5. Do not use this device near a liquid source or in a humid place.
6. Only clean the device with a damp cloth.
7. Please do not obstruct the slots provided for the ventilation of the device. Install the device according to the manufacturer's instructions.
8. Do not install near a heat source (radiators, etc.) or any equipment likely to generate heat (power amplifiers for example).
9. Do not remove the ground from the power cord or wall outlet. Canadian plugs with polarization (with a wider blade) should not be modified. If your wall outlet does not match the model provided, consult your electrician.
10. Protect the power cord against all possible damage (pinching, tension, twisting, etc.). Make sure that the power cord is free, in particular when it comes out of the box.
11. Disconnect the device from the mains in the presence of a storm or during prolonged periods of non-use.
12. Consult a qualified repair service center for any malfunction (damage to the power cord, drop in performance, exposure to rain, liquid splashing into the device, introduction of an object into the case, etc.).

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## M120

### Welcome!

Thank you for choosing this Quest Commercial M-Series Mixer Amplifier!

Quest Commercial Mixing Amplifiers are the ultimate solution for sound distribution systems in small to medium sized commercial premises, delivering the best and highest quality audio at an affordable price. These models have a constant voltage power amplifier allowing use at 25/70V or at low impedance of 4 or 8 Ohms. The M120 can deliver a power of 120 Watts. It offers three input channels (terminal block/RCA and 3.5mm on the front panel) with independent level controls to facilitate the connection of sound sources. A music-on-hold feature is also available for businesses wishing to enhance their customers' telephone experience. So when you connect this mixer to a telecommunications system, customers can listen to music or pre-recorded messages while they wait.

With proper maintenance and sufficient ventilation, your product will give you satisfaction for many, many years. Record the serial number below for future reference:

Serial Number : \_\_\_\_\_

Date of Purchase : \_\_\_\_\_

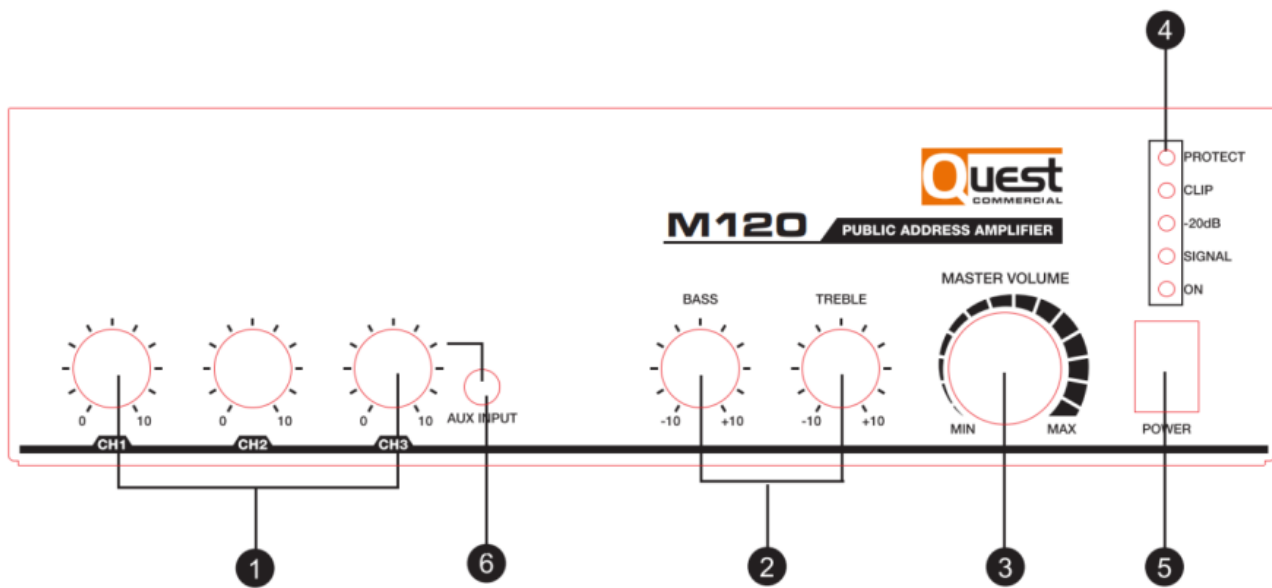
### Unpacking and installation

Although your Quest Commercial amplifier is not complicated to install or difficult to operate, it will take a few minutes of your time to read this manual to get the installation wired correctly and to familiarize yourself with its features and how to use them.

Connect your device to the system components as described on the following pages.

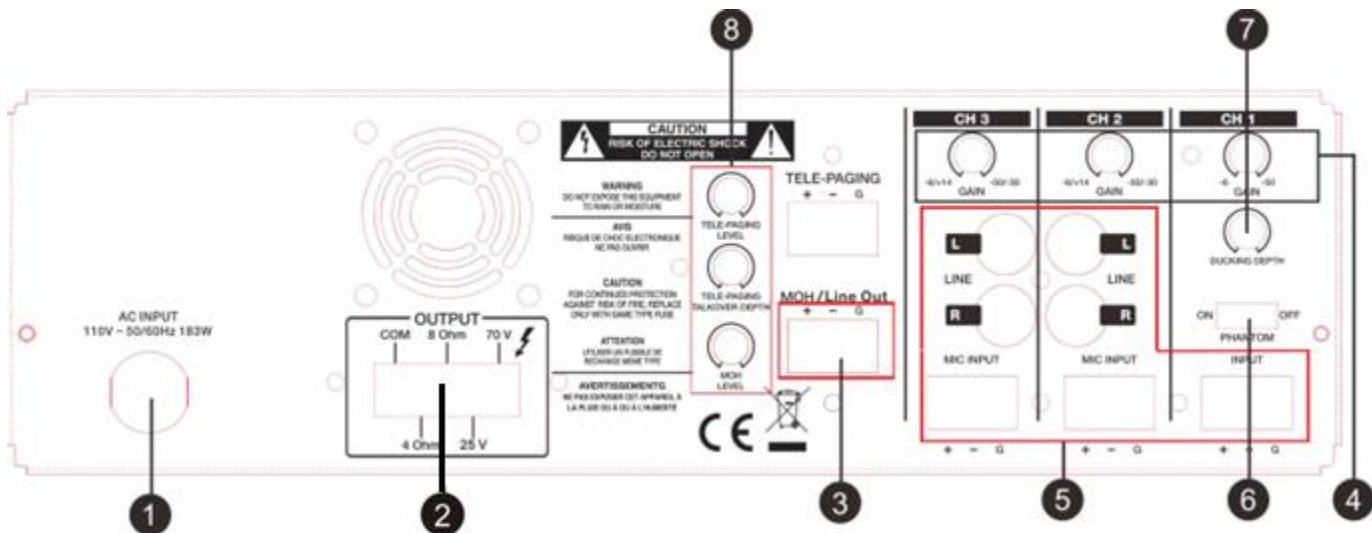
*The M120 mixer amplifiers are complete all-in-one mixer amplifier solutions for commercial and industrial applications. These low-cost units offer all the necessary features in a simple format.*

- Three (3) microphone inputs and two (2) line inputs (terminal block, RCA and 3.5mm on the front panel).
- Rated power output: 120 Watts.
- A 2-band tone control helps correct the overall sonic response of the PA system.
- Acceptable wide-range input level (up to 44 dB)
- Terminal block telephone paging input with volume and attenuation level controls.
- Two (2) layer priority muting.
- Music on hold (M.O.H.) output used to connect the mixer to the telephone system to play music or pre-recorded messages. This output can also be used to supply a line level signal to a power amplifier.
- Microphone inputs 1 with phantom power for connecting condenser microphones.
- Low distortion and low noise level.
- To ensure long-term reliability, M-Series mixers are equipped with a sophisticated protection circuit with current limiting to avoid problems associated with overloading and overheating.
- Compact size makes it easy to install on a work desk or in a standard 48.3 cm (19 in) rack using optional brackets.
- An ideal solution for commercial and industrial applications.
- An extended three-year warranty.



[Figure 1.1 Front panel diagram]

- 1. Input Channel Volume** – These three knobs determine the level of the sound sources connected to the inputs.
- 2. Tone Control** – These two knobs adjust the overall frequency response of the system. They allow up to 10dB of cut/boost on the 100Hz and 10kHz bands.
- 3. Master Volume Control** – This knob determines the overall volume of the system.
- 4. Indicators (3)** – The “Protect” indicator lights when the protection circuit is activated. The outputs are then deactivated. The “Signal, -20dB and Clip” LEDs indicate the output level. The “Power” indicator lights up when the device is powered on and ready for use.
- 5. POWER switch** - This switch turns the device on/off. The POWER indicator lights up when the power is on.
- 6. AUX input**



[Figure 1.2 Rear panel diagram]

### 1. Power Cable.

**2. Speaker output connector** – This 5-contact terminal block connector allows the use of 25V or 70V constant voltage loudspeakers, as well as low impedance loudspeakers of 4 or 8 ohms.

**3. MoH (Music on Hold) terminal** - This 3-contact terminal block connector allows the mixer to be linked to a commercial telephone system to provide a music source when a call is put on hold. This output can also be used to supply the line level signal to a power amplifier.

**4. Gain Controls for variable input level.** – These knobs are used to adjust the input sensitivity of each channel.

**5. Mic/Line input connectors** – Channel 1 is equipped with a terminal block connector and channels 2 and 3 are equipped with RCA connector and terminal block connectors allowing the connection of microphone or line signals.

**6. Phantom Power ON/OFF switch** – This switch activates phantom power on microphone input 1.

**7. Ducking Depth Control** – Allows you to adjust the attenuation level of sources when a priority signal is detected.

**8. TELE PAGING (connector) with volume and attenuation level with MoH level adjustment**– This 3-contact terminal Block connector allows the mixer-amplifier to be connected to a company's telecommunications system, so that you can make announcements from a telephone handset. The MoH level adjustment is to adjust the volume of the MoH output.

**CAUTION:** Before you begin, make sure your mixer amplifier is unplugged from the power source, the power switch is in the "OFF" position, and all volume controls are set to minimum level (turned counterclockwise).

#### **Location:**

Take the unit out of its packaging (keep it for any return to the workshop). The M120 mixing amplifier can be installed in a standard 19" equipment rack or on a shelf. To install the unit in a standard 19" equipment rack, the optional RK-M3565 Rack Bracket Kit must be ordered at time of purchase. If a table or shelf installation is the chosen route, be sure to choose a flat surface, with enough space around the unit to allow good ventilation, and that is free of liquids or other such hazards.

To select an appropriate location for your equipment, you must consider the distance between the mixer amplifier and the speakers, the need to access the equipment to change the source or adjust the volume, the proximity of the sockets electrical, etc. You must determine the length of the cables used to connect your equipment to the speakers. Depending on the type of loudspeakers and the length of the cables, you can choose to route the signals to the loudspeakers in low impedance or in constant voltage.

If you are using low impedance speakers, you must connect them to one of the low impedance outputs (4 ohms or 8 ohms) of the mixer amplifier with speaker cables. However, pay attention to the diameter and length of the cables.

The other type of installation is using enclosures with built-in 70V transformers, often referred to as constant voltage systems. The advantage of these systems is that they allow the use of long cables to connect several loudspeakers to the same amplifier. You can also adjust the level of each speaker by changing the configuration of the transformer. The M-Series mixer amplifiers are ideal for this type of application as they are equipped with 25/70V output transformers.

#### **Speaker selection**

When selecting loudspeakers, you must consider a few important factors, such as the location of the mixer amplifier, the type of loudspeakers and the need to use a 70V distribution system. The following sections explain how to connect loudspeakers or a constant voltage system in a typical installation.

#### **Using passive speakers**

Before using low impedance speakers (4 or 8 ohms), you must first determine the location of your mixer amplifier. If the speakers are less than 30 meters away, you can connect the amplifier directly to the speakers in low impedance mode.

Be sure to check the impedance of the speakers. The 4 Ohms output allows you to connect a 4 Ohms speaker or two 8 Ohms speakers in parallel. The 8 Ohms output allows you to connect an 8 Ohms speaker or 2 4 Ohms speakers in series. If the speakers are more than 30 meters away (approximately), it is best to use a constant voltage system.

#### **Using a constant voltage system**

If your setup has many loudspeakers and long cables, you might consider using a 25 or 70V constant voltage system. This type of system became standard in the field of installations in the middle of the 20th century because it offered an efficient solution for the use of multiple enclosures and long cables. It is inspired by long distance electrical networks which use increased voltage and reduced current to carry very high power over long distances with more affordable and relatively small diameter cables. The voltage is then reduced and then routed to the consumer on a short, large-diameter cable.

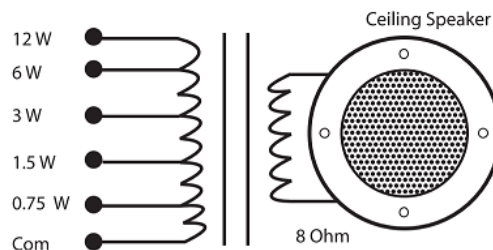


### Using a constant voltage system – continued

The same principle applies to constant voltage audio systems. A transformer connected to the output of the amplifier increases the voltage and reduces the output current, allowing the use of long, smaller-diameter cables to link multiple speakers with step-down transformers. For economy, the 70V standard was adopted in the United States because electrical conduit is required on lines with voltages greater than 100V peak-to-peak. Commercial sound systems, such as those installed in schools, office buildings and restaurants, often use a constant voltage distribution system when multiple loudspeakers are connected in different areas.

Many loudspeakers with transformers are produced by various manufacturers. Most of these loudspeakers provide tap points on the transformer to allow power to be distributed to the loudspeakers and their levels to be adjusted separately. Quest Commercial mixer amplifiers have a built-in transformer to step up the output voltage and step down the current so that multiple speakers (with transformers) can be connected using long cables. Constant tension systems allow the use of cables from 1 to 1.6 mm in diameter, depending on their length (long cables must be larger in diameter).

A simple way to represent a constant voltage is to divide the power in Watts of the amplifier by the number of loudspeakers used. For example, to connect ten loudspeakers to the output of an M120 amplifier, use a loudspeaker whose transformer provides a tap point of approximately 10 Watts. 120 Watts divided by 10 speakers gives 12 Watts per loudspeaker, but we must always keep a cushion of about 15 to 20% of the power of the amp to make sure not to overload the amp.

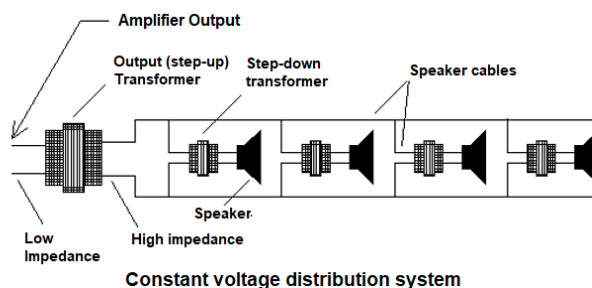


*Typical ceiling speaker with onboard transformer and six power taps. These power taps also control volume level for sound balancing.*

### Connecting speakers

Connect the speakers to the terminal block output connectors on the rear. Never turn on the amplifier when the speakers are not connected to the outputs. When using the 4 Ohm output, you must connect speakers with a minimum impedance of 4 Ohms (4 Ohms or more).

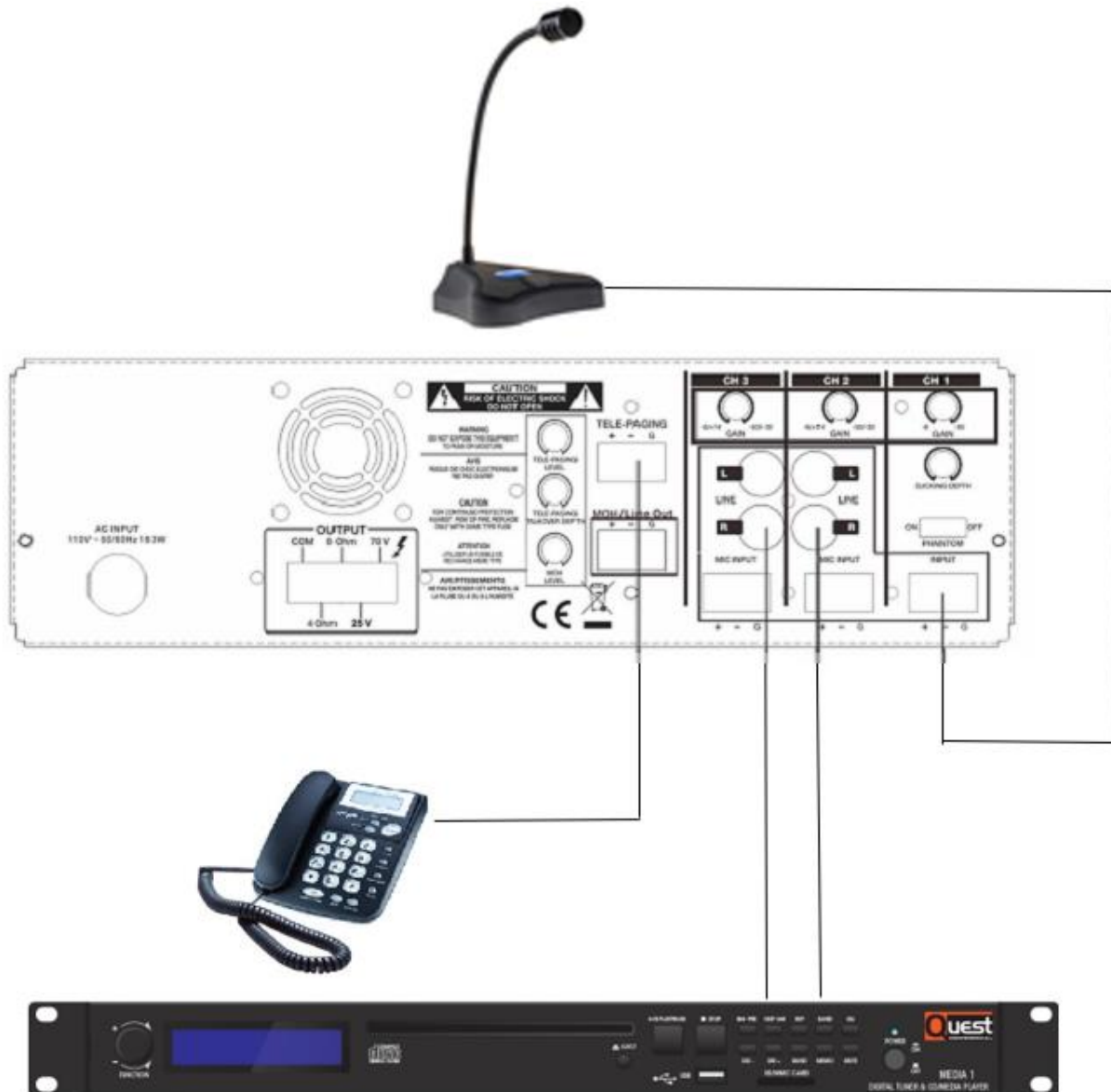
For 70V operation, connect the speaker's positive input to the 70V terminal, and the negative input to the COM (ground) terminal. Then connect the other speakers one after the other in parallel.



### Connecting sound sources

Then connect the sound source to the terminal block input connectors on the back. If your console has balanced outputs, use balanced three-conductor connections and connectors (you can use unbalanced connections, but you'll get better sound quality and less noise if you use balanced connections).

Set all input level controls (on the front) to minimum ("MIN"). Then connect the mains lead to an earthed mains socket.



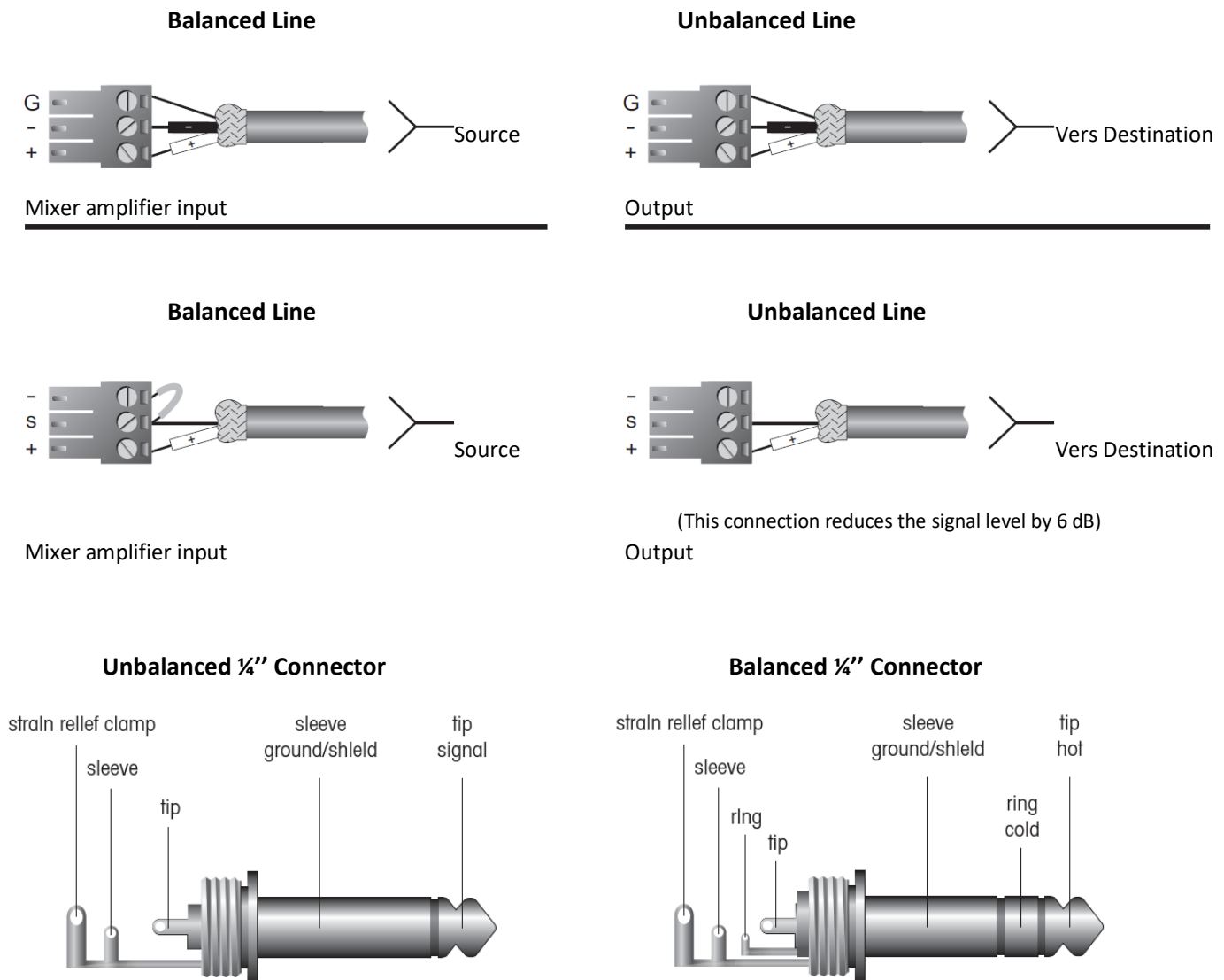
[Figure 1.3 Connection example]

### Wiring plans

Choose the input connector and the appropriate cable for each source.

We recommend the use of pre-assembled or professionally assembled 22-to-24-gauge balanced cables.

Figure 2.1 shows the connection diagrams for the different connectors. RCA input connectors can also be used as unbalanced inputs.



[Figure 2.1 Input cables and connectors]

**INPUT:** Connect microphones or balanced line-level sources to the balanced inputs of the mixer amplifier. Adjust the Gain accordingly. Connect unbalanced line-level signals to RCA connectors.

Wiring plans – Continued

Choose the output connector and the appropriate cable for each source.

For the amplifier output connectors, we recommend the use of pre-assembled or professionally assembled speaker cables of high quality and of sufficient gauge. You can use pluggable terminal blocks for your output connectors.

To prevent the possibility of shorting, wrap or insulate exposed speaker connectors.

Using the guidelines below, select the speaker wire gauge based on the distance between the amplifier and the speakers. Wire gauges apply to 4 ohm output.

Distance	Recommended Gauge
Up to 25 ft.	16 AWG
26 ~ 40 ft.	14 AWG
41 ~ 60 ft.	12 AWG
61 ~ 100 ft.	10 AWH
101ft ~ 150 ft.	8 AWG
151 ~ 200 ft.	6 AWG

NOTE: Custom wiring should be performed by qualified personnel only. Class 2 wiring is required.

CAUTION: Never use shielded cable for speaker output.

Maintain correct polarity on output connectors.

For each output channel, connect the output terminal block connector to the speakers.

Use terminals marked COM and 4Ω / 8Ω for low impedance speakers, or use terminals marked 25V or 70V, and COM for high impedance speakers.

Connect the COM terminal to the negative (-) terminal of the speaker; connect one of the other terminals to the positive (+) terminal of the speaker.

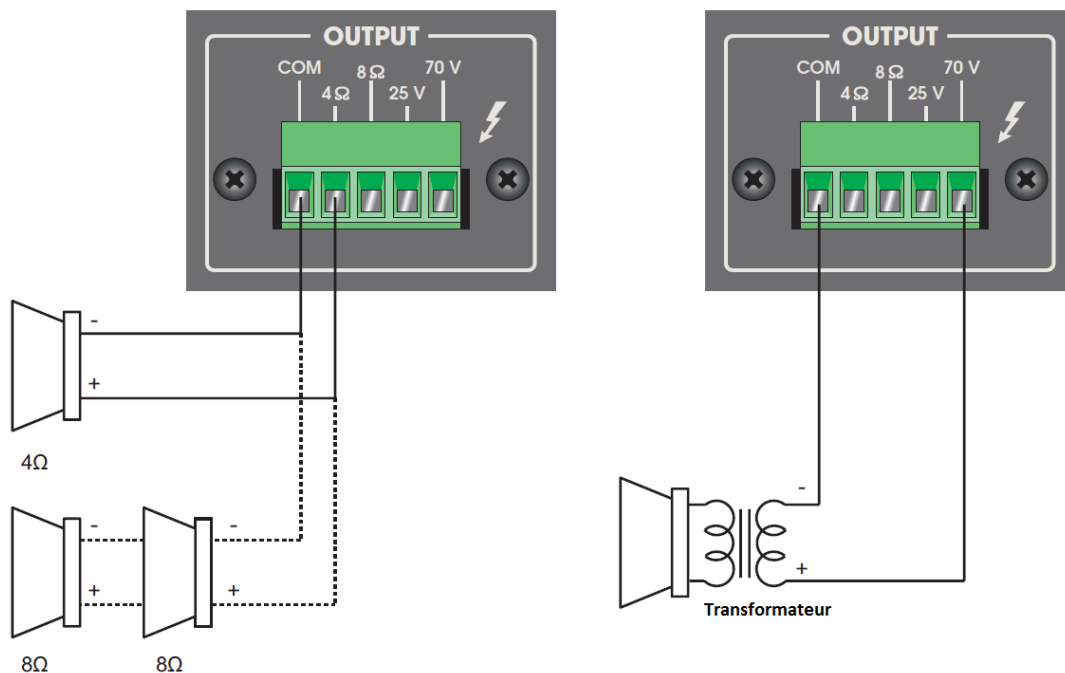
Output impedance and voltage are as shown in Table 2.1

M120	4Ω / 22 V	8Ω / 31V	41Ω / 70V	5.3Ω / 25V
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[Table 2.1 Output voltage and impedance]

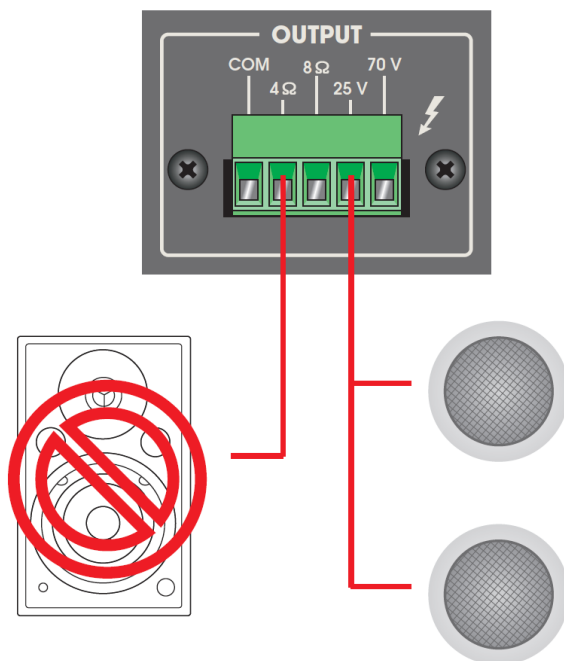
NOTE: The impedances listed in Table 2.1 represent the total impedance of all speakers connected.

Speaker connections are shown in Figure 2.2



[Figure 2.2 How to connect speakers]

**WARNING:** Never use the low impedance (4Ω / 8Ω) and high impedance (25V, 70V) outputs simultaneously.



[Figure 2.3 Wrong connection]

**Power On**

Press the power switch on the front to turn on the device. The Power indicator lights up, as well as the Protection indicator. The Protection indicator turns off after approximately five seconds (a click is then heard).

Apply an input signal of approximately +4 dBu. Then set the input level control to the center position



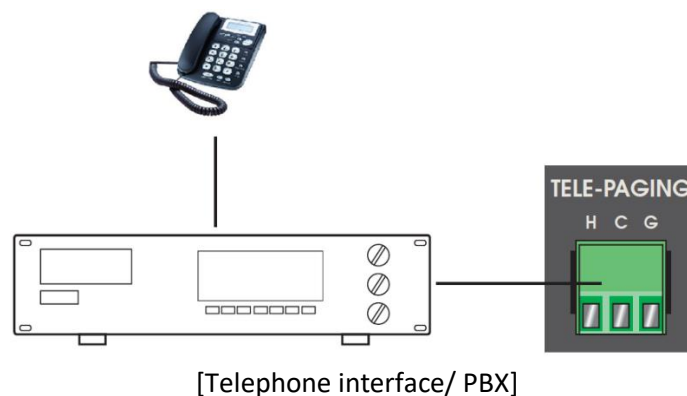
While the signal is audible, gradually increase the master level control (Master Volume) to on the desired sound level.



The SIGNAL and CLIP LEDs tell you the output power of the amp. To achieve the best signal-to-noise ratio, the Master Volume knob should normally be set near maximum ("MAX") and the CLIP indicator should light occasionally (but not frequently) on signal spikes. You can use the input level controls to attenuate the signal to the desired level.

**Telephone Paging**

The TELE-PAGING connector allows the device to be connected to a commercial telephone system to broadcast announcements from a telephone. Telephone systems normally have a dedicated output for playing announcements using an extension number. For details, refer to the instruction manual supplied with the telephone system.

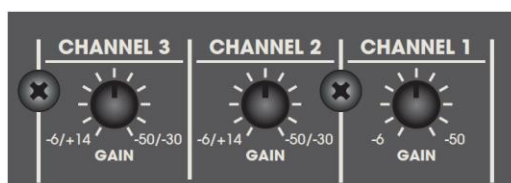


[Figure 3.1 Telephone paging connections]

## Input Signals Gain Control.

The Quest Commercial Mixer Amplifier can accept wide range and variable input signals thanks to the gain adjustment potentiometers.

Adjust the gain potentiometer within a range of 44dB to accommodate different external equipment. Figure 3.2 shows the detail of input sensitivity.



[Figure 3.2 Acceptable input sensitivity per channel]

## Priority Control

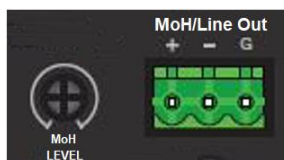
The Quest Commercial Mixer Amplifier has a two-level priority mute function. When the higher-level source is activated, other input signals are automatically cut off except for input signals of the same priority level.

**CH2, CH3, AUX > CH1 > Telephone Paging.**

## Using Music on Hold (MoH)

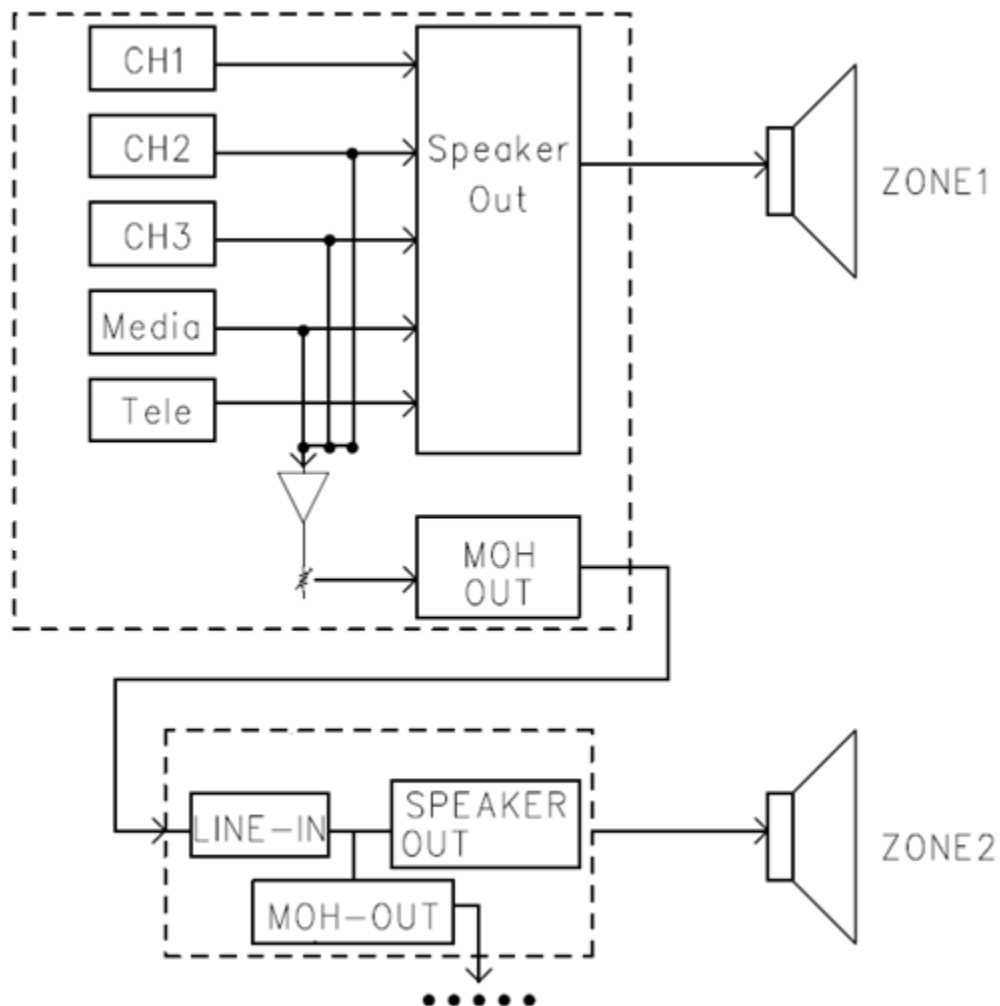
Quest Commercial mixer amplifiers offer music-on-hold functionality for linking to a commercial telephone system. With this feature, when customer calls are put on hold, they can listen to background music from an external or internal sound source. You can also use this function to play pre-recorded messages while waiting.

To determine the volume of the music on hold function, use the MOH Level control located just next to the MOH connector.

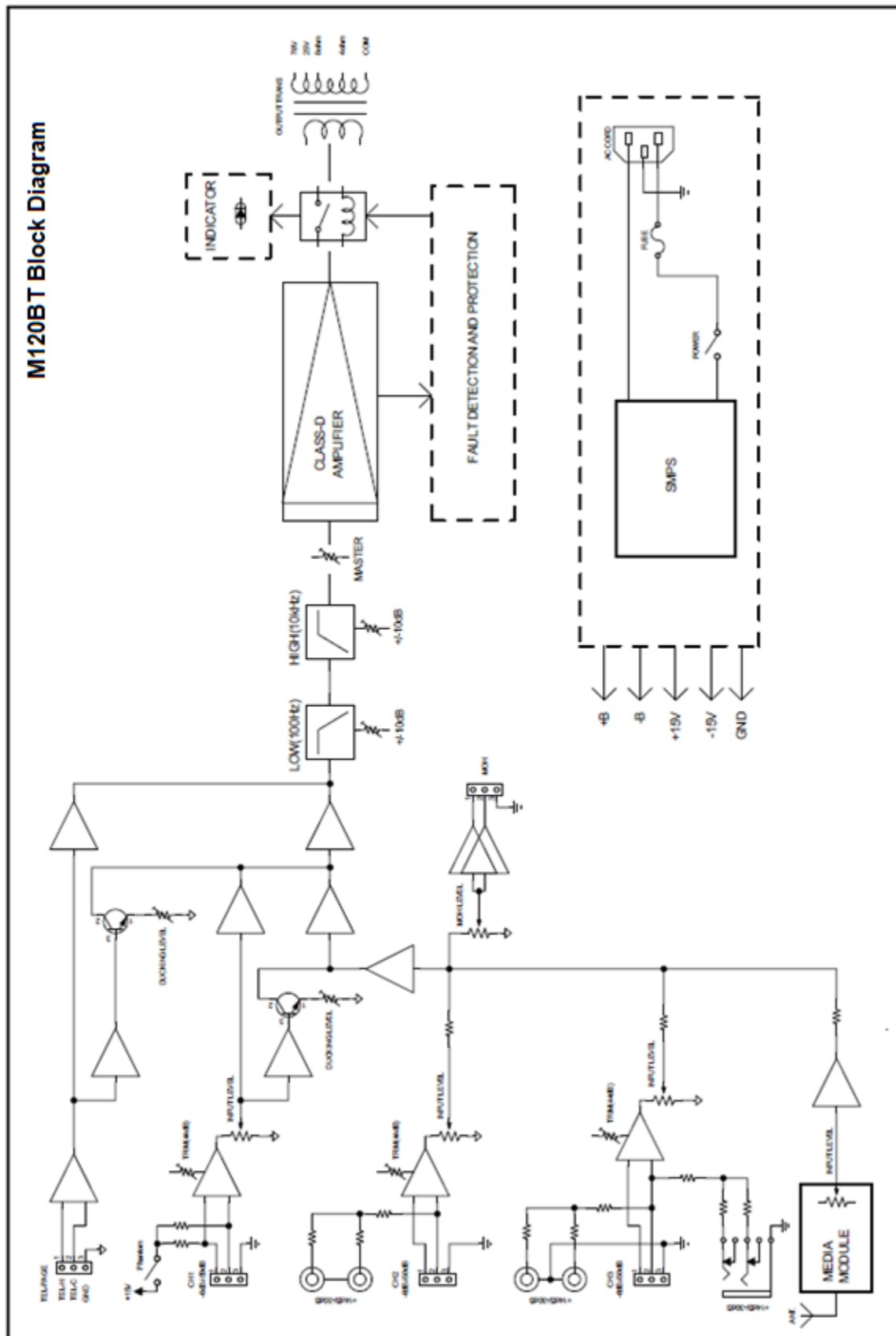


### Using the Music on Hold (MoH) output to power a 2nd zone

For use for 2 or more zones, the example below illustrates the installation that can be done when the unit is used in conjunction with a 2nd unit. The MOH connector of the first is used to power the second and so on.







Performance	
	M120
<b>Input Sensitivity for full output at maximum gain</b>	
Balanced Microphone inputs	-50dB ± 3dB
Unbalanced & AUX inputs	-30dB ± 3dB
Telephone Paging	-21dB ± 3dB
<b>Frequency Response</b>	
at 1watt from speaker out tap, 80Hz ~18kHz	+1.5/-3dB
<b>Tone Controls</b>	
100Hz,10kHz	±12dB ±3dB
Signal to Noise Ratio at rated power output	Less than 90dB
Crosstalk at all control maximum	-70dB at 1kHz
Rated Output Power at THD 0.5%	120 Watts
Total Harmonic Distortion (THD) at 1kHz rated power	Less than 0.5%
Power Band Width at 1kHz from speaker out tap	80Hz~18kHz with less than 0.5% THD
DC Output Offset	Less than ±3mV
Operating Temperature/Humidity at non-condensing	0°~40°C at 95% humidity
<b>Output Voltage and Impedance</b>	
4Ω	22V
8Ω	31V
25V	5.3Ω
70V	41Ω
Construction	
Cooling	Convection Cooled
Dimensions (Width/Height/Depth)	10.63" x 3" x 9.06" (270 X 76 X 230 mm)
Net Weight	12.13 lbs. (5.5 kg)

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