



Q-Tech

Commercial Series

QTM60P

Pre Amplifier

User Manual





IMPORTANT

The wires in the mains lead are coloured in accordance with the following code:

Green and Yellow: Earth (E)

Blue: Neutral (N)

Brown: Live (L)

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured green and yellow must be connected to the terminal which is marked with the letter N or coloured black. The wire which is marked with the letter L or coloured red.

If a 13 Amp (B.S.1363) plug or any other type of plug is used, a 5 Amp fuse must be fitted either in the plug or at the distribution board.

General Installation

DO NOT run unbalanced high impedance microphone cables near mains, data, telephone or 70/100V line cables.

DO NOT run 70/100V line cable near data, telephone or other low voltage cables.

DO NOT exceed 90% of the amplifiers output power when using 70/100V line (speech only).

DO NOT exceed 70% of the amplifiers output power when using 70/100V line (high level background music).

DO NOT use voice paging horn loudspeakers for background music unless the loudspeaker has been specifically designed for this purpose.

AVOID jointing the microphone cable, when this is unavoidable make sure a good screened connector is used.

ALWAYS use balanced low impedance microphone cable terminating to balanced inputs on long cable runs.

ALWAYS use a mains grade double insulated cable for the loudspeaker cable runs when run in conduit together with power cables.

ENSURE that all loudspeakers are in-phase.

ENSURE that there are no short circuits on the loudspeaker line before connecting to the amplifier. It is also advisable to check the final impedance to the amplifier with a dedicated impedance meter to determine power draw is within the amplifiers limits.

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Introduction

Congratulations on your purchase of a new Q-Tech Commercial series mixer. Quest Engineering Q-Tech Series products are engineered and built to a standard that will satisfy the most demanding environments of commercial installation audio.

For your safety and continuing reliability of your Quest mixer, please read all the safety instructions and familiarize yourself with the mixer's functions and installation procedure section before installing and operating the sound system. Quest has paid great attention to detail in order to maintain strict quality assurance standards of all Q-Tech Series products.

It follows that if your audio installation is completed with the same attention to detail, your mixer will deliver its best results. Please read the section: **Constant Voltage Distributed Speaker Systems Demystified**

Unpacking: Please inspect the Mixer carefully immediately after unpacking. If you find any damage, notify your supplier/dealer immediately. Only the shipper may file a damage claim with the carrier for damage incurred during shipping.

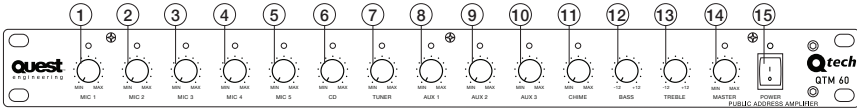
Description

The QTM-60P Mixer is full featured very high quality mixer.

- 11 inputs
- 5 mic inputs with selectable phantom power
- CD Input
- Tuner Input
- Chime input
- 3 auxiliary inputs
- Record out
- Built in muting circuit
- 3 levels of priority
- 24v DC terminals for external power source
- Input signal/Clip: LEDS on each input

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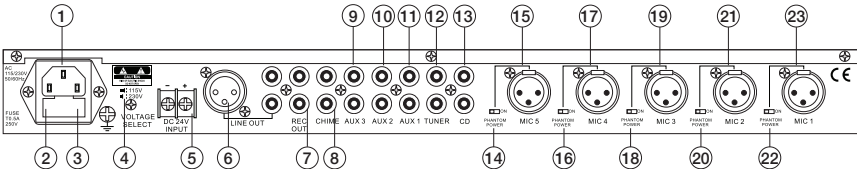
Front Panel Layout



1	MIC 1 Input Level Control	10	AUX 3 Input Level Control
2	MIC 2 Input Level Control	11	Chime Tone Input Level Control
3	MIC 3 Input Level Control	12	BASS Control
4	MIC 4 Input Level Control	13	TREBLE Control
5	MIC 5 Input Level Control	14	Master Level Control
6	CD Input Level Control	15	Power On/Off Switch
7	Tuner Input Level Control		
8	AUX 1 Input Level Control		
9	AUX 2 Input Level Control		

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Rear Panel Layout



1	Mains Input Socket	13	CD Input
2	Power Fuse	14	MIC 5 Phantom Power
3	Earth Connection Screw	15	MIC 5 Input
4	110 - 240v Power Select	16	MIC 4 Phantom Power
5	24v DC Power Supply	17	MIC 4 Input
6	Line Output	18	MIC 3 Phantom Power
7	Record Out	19	MIC 3 Input
8	Chime Input	20	MIC 2 Phantom Power
9	Aux 3 Input	21	MIC 2 Input
10	Aux 2 Input	22	MIC 1 Phantom Power
11	AUX 1 Input	23	MIC 1 Input
12	Tuner Input		

Power Source

The supply transformer has been designed for use on either 115Vac or 240Vac, selected by a slide switch on the rear panel. The amplifier is factory set at 240Vac mains voltage.

Battery Connection (24Vdc)

When using external batteries, earth the amplifier via the screw terminals on the rear of the amplifier because of the high voltages present. Electrical stability of the system will be improved by providing a good earth ground. **NOTE:** the connection cable must be fitted with an in-line fuse.

Main Connections

Muting

On a signal from Mic 1, 2, Chime, the Mixer automatically activates the muting circuit which temporarily mutes the signals from other input channels. A chime module is not included in this unit.

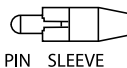
Line level input Connections

The equipment provides additional inputs which may be used for connecting other signal sources such as a CD, TUNER, AUX, CHIME. The line level Controls on the front panel operates on each of the input sources.

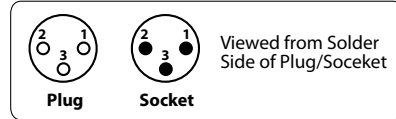
RCA Phono plug Connections

Sleeve - Screen

Pin - Signal



XLR Connections



Balanced Audio (3 pole XLR):

Pin 1: Ground / Screen

Pin 2: In phase / +ve / Hot

Pin 3: Out of phase / -ve / Cold

Unbalanced Audio (3 pole XLR):

Pin 1: Ground / Screen

Pin 2: Signal

Pin 3: Ground / Screen (connect to pin 1)

For best performance when using long lines between microphones/mixer and or amplifier use balanced lines. These have the effect of canceling out any noise or hum that may be induced into the cables.

Note that a balanced line uses three wires (two signal wires and one earth wire or shield) where an unbalanced cable uses only one signal wire and an earth. See the connection details previously.

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Operation

For the best noise performance turn the input level control to a high setting and use the Master as the volume control. Use the other input level controls to set the required mixing ratios. If you are using the auxiliary inputs, adjust the bass and treble controls to get the desired sound.

The QTM-60P has 11 bi-color indicators for Signal Present/Overload (green/red). Green indication occurs when there is a signal present above -30 dBu. This lamp should be glowing green when signal is present. If this lamp is off, the reason maybe:

- A. The Input may not be connected.
- B. There is little or no signal present at the moment.
- C. There is a Mic connected to a channel switched to LINE.
- D. The Mic needs Phantom Power (See Rear Panel Layout).
- E. The LEVEL control needs to be increased (clockwise).
- F. The cable is not wired properly

A red glowing LED indicates that the levels are so high that distortion due to clipping is occurring or imminent.

Check these conditions:

- A. The LEVEL control may be turned too high.
- B. The Output of the preceding device may need to be reduced.

Mixer input and chime input do not have overload indicators. Because 12 dB of gain is added after the LINE INPUT LEVEL controls, it is possible to overload a line input without an overload indication. The indicators can SHOW overload from the Line Inputs. Although a single Input may be at unity gain, multiple active Inputs mixed together can cause an

overload. If the OL indicators illuminate, just turn down the OUTPUT LEVELS until the overload stops—mix ratios will not change.

Stereo Line Level Inputs 6-11

The STEREO LINE INPUT LEVEL controls adjust both left and right channels equally. Use the OUTPUT LEVEL controls together for overall output adjustment, or separately to control balance.



Trouble Shooting

Common problems with ceiling speaker installations

System is distorting. Check for the following causes:

1. Too many speakers set to too high a power tapping for the power of the amplifier
Solution: Calculate the total power draw and re connect the speakers to a lower the wattage tapping. (See below)

Some cheap ceiling speakers have incorrect taping labels. A 10 watt speaker may really be drawing 15 or 20 watts. The only way to test this is with an impedance meter on a single speaker. A 15% discrepancy can mean that a 100 watt system will only be able to power 7 or 8 x10 watt speakers safely. Be aware of this booby trap. Always plan to have 20% more power than you think you will need.

2. Incorrect output connection: If you accidentally connect your terminal strip on the amplifier to the 8 ohm output instead of the 100/70V line, you will have distortion and risk damaging the amplifier..
3. Short circuits and no circuits: Check that your wiring has not been accidentally cut, miss-connected or generally damaged in the course of installation. This can be common with building sites with multiple trades people installing equipment into the same ceiling cavities as the audio system.

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Specifications

Input Sensitivity/Impedance	
MIC 1-5	0.4mV @600Ω, Balanced
CD	300mV @47KΩ, Unbalanced
TUNER	100mV @50KΩ, Unbalanced
AUX	100mV @50KΩ, Unbalanced
CHIME	700mV @10KΩ, Unbalanced
Output Level/Impedance	
Line Out	1.2V @600Ω, Balanced
Recording Out	1V @600Ω, Unbalanced
Freq. Response	50HZ~20KHZ
T.H.D.(at 1kHz, rated output)	1% @ 1KHZ
Signal to Noise ratio	65 dB
Tone Control	Bass 100HZ +/- 12 db Treble 10KHZ +/- 12 dB
Power Source	AC 115V/240V 50/60HZ, DC24V
Power Consumption	AC 9.5W @ Rated Power DC 1A @ Rated Power
Weight	4kgs
Dimensions (mm)	44(H) x 483 (W) x 290(D)
Mounting	19"RACK

Technical Notes

Constant Voltage Distributed Speaker Systems Demystified

In a typical paging and background music speaker installation, a quantity loudspeakers are placed across a single amplifier in a parallel wiring configuration (see Fig. 1).

Each ceiling speaker will contain a small transformer and you will notice that the connection block near the transformer will have a common terminal (C or earth), and a number of wattage terminals.

Connect the wattage setting terminal for the desired acoustic output (volume) level you need from each individual speaker.

This will be a 100V setting in Europe and most of Asia and 70V in the USA. (See Fig. 1)

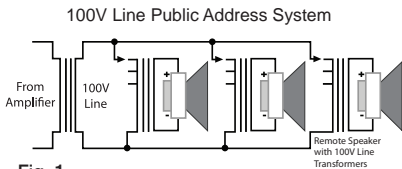


Fig. 1

Often some speakers need to be set at different volume output levels, and the calculations involved in determining the actual load impedance at the amplifier's output can be quite involved but there is a simple technique for not overloading the amplifier.

As for the amplifiers, there are two common standards, 100 Volt line in Europe and Asia and 70 Volt line on the American continent.

For the purpose of simple calculations, we will use the European standard for this exercise.

On the rear of a 70/100V amplifier you will find an output terminal strip. This terminal strip will contain a number of + voltage outputs (70V 100V) and a terminal at one end for the negative return wire (COM).

A low impedance terminal will be for 8-ohm speaker installations and is under no circumstances to be connected to a transformer type speaker system.

How to calculate the correct number of speakers and what wattage connection for a given amplifier power.

If you connect too many speakers to an amplifier you will have distortion, overheating of the amplifier and generally poor performance. The problem is not really "too many speakers", it is more a problem of "too much wattage draw exceeding the output capability of an amplifier. A similar problem would be trying to draw 2,000 watts from a 1,000 watt generator. Sooner or later.... Expect a system failure.

Let us take a 100 watt amplifier. If you have 20 speakers and you set them at the 5 watt tapping, you will have a total 100 watt draw which is the maximum output of the amplifier. This is correct in theory but in practice you will be safer connecting 18 speakers, not 20. The reason is that most ceiling speakers draw more than their claimed wattage.

The alternative would be to connect the speakers to the 4 watt transformer terminal giving you a theoretical total draw of 80 watts and thus, plenty of "headroom". One watt difference is not very noticeable as far as output sound pressure level in concerned.

A system that does not distort will give much clearer voice reproduction than a louder system that is distorting or loosing the sibilant frequencies.

There is a formula for testing the potential power of the system by measuring the impedance of each speaker and then adding all the figures to a total impedance, which is then compared to the amplifier's expected impedance/power figures. The quick way is to just add up all the wattages and then give yourself 10-20% headroom by reducing the number of speakers per amplifier or lowering the wattages slightly.



For the benefit of those who want to calculate the power of the system with a formula. See below:

Determining power by calculating total impedance

The alternative to counting the speaker taping watts is to calculate the total impedance of the line, which will also indicate the wattage necessary to drive the system correctly.

The computational formula is voltage squared divided by impedance:

$$\text{Power} = \text{Voltage}^2 / \text{Impedance.}$$

When the speaker line reaches its top voltage of 70 Volts, the formula is:

$$\text{Power} = 5000 / \text{Impedance (because 70 squared equals 5000).}$$

To measure impedance a dedicated meter is required. These use a 1k frequency to send an alternating current through the transformer(s). The resulting figure indicated by the meter's dial can be cross referenced with the meter's impedance chart to see what value should be expected and the power that will be required.

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High impedance of speakers and output calculation table for 100Volt systems

Output	Impedance	Output	Impedance	Output	Impedance
0.1W	100KΩ	10W	1KΩ	40W	250Ω
0.5W	20KΩ	15W	667Ω	50W	200Ω
1W	10KΩ	20W	500Ω	75W	133Ω
2W	5KΩ	25W	400Ω	100W	100Ω
3W	3.33KΩ	30W	333Ω	150W	66.7Ω
5W	2KΩ	35W	286Ω	200W	50Ω

$$(100V \text{ plan}) P = E \times E / Z = 100 \times 100 / Z = 10,000 / Z$$

P: Power(W), Z: Impedance (Ω), E: 100V(Designed voltage of a general-use amplifier)



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