

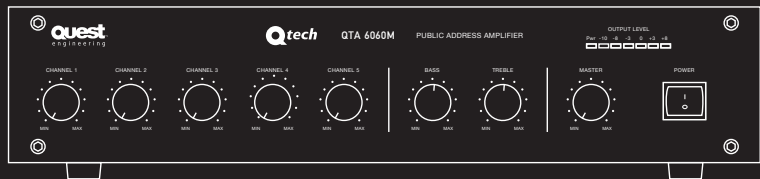
Q-Tech

Commercial Series

QTA6060M/6120M/6240M

Mixer Amplifiers

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 amplifier. Quest Engineering Q-Tech Series amplifiers 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 amplifier, please read all the safety instructions and familiarize yourself with the amplifiers functions and installation procedure section before installing and operating the amplifier. Quest has paid great attention to detail in order to maintain strict quality assurance standards of all Q-Tech Series amplifiers.

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

Unpacking: Please inspect the amplifier 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. Also check that the voltage is correct for your local power supply.

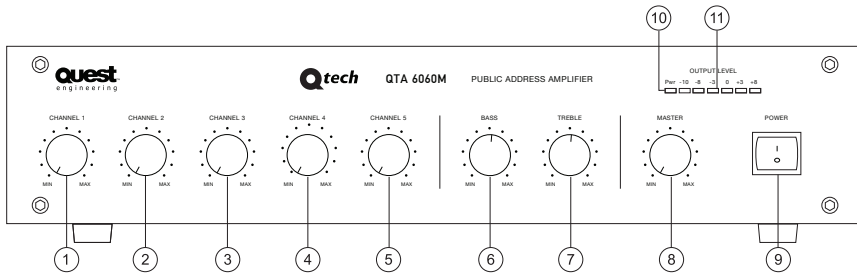
Description

The Q-Tech Range of Mixer amplifiers are of very high quality and come supplied full of features.

- In built chime tone module
- Phantom Power on all mic inputs
- Telepaging input with selectable priority
- 24v DC power inputs
- Built in Mic/Line Priority
- Low Signal to Noise ratio
- Complete with barrier strip, XLR or ¼ in jack Mic input connections
- Pre Out function
- Tape Output
- External Mixer input
- All Mic inputs selectable as Mic or Line
- The Mixer amps can also drive up to three external power amps

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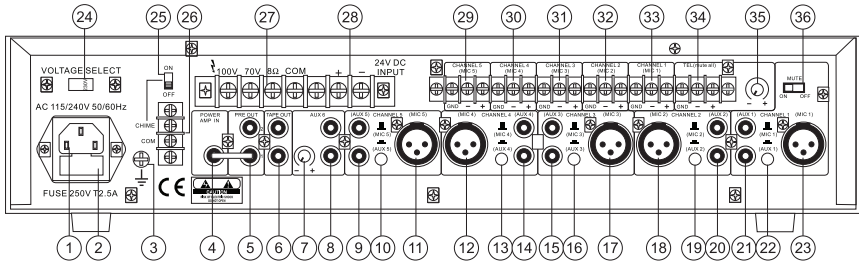
Front Panel Layout



1	Channel 1 Volume Control	7	Master Tone Control (Treble)
2	Channel 2 Volume Control	8	Master Volume Control
3	Channel 3 Volume Control	9	Power On / Off switch
4	Channel 4 Volume Control	10	Power On / Off indicator LED
5	Channel 5 Volume Control	11	Output Level indicator LED
6	Master Tone Control (Bass)		



Rear Panel Layout



1	Mains Input Socket	13	MIC 4/Aux 4 Selector Switch	25	Chime Selector Switch
2	Power Fuse	14	Aux 4 Input (RCA Jack)	26	Chime Screw Terminal
3	Earth Connection Screw	15	Aux 3 Input (RCA Jack)	27	Speaker Output Terminals
4	Power Amp in	16	MIC 3/Aux 3 Selector Switch	28	DC Power Supply Terminals
5	Pre out (RCA Jack)	17	MIC 3 Input (XLR Jack)	29	MIC 5 Screw Terminal input
6	Tape Output (RCA Jack)	18	MIC 2 Input (XLR Jack)	30	MIC 4 Screw Terminal input
7	Aux 6 Level Control	19	MIC 2/Aux 2 Selector Switch	31	MIC 3 Screw Terminal input
8	Aux 6 Input (RCA Jack)	20	Aux 2 Input (RCA Jack)	32	MIC 2 Screw Terminal input
9	Aux 5 Input (RCA Jack)	21	Aux 1 Input (RCA Jack)	33	MIC 1 Screw Terminal input
10	MIC 5/Aux 5 Selector Switch	22	MIC 1/Aux 1 Selector Switch	34	Tel Page Input (Screw Terminals)
11	MIC 5 Input (XLR Jack)	23	MIC 1 Input (XLR Jack)	35	Tel Input Level Control
12	MIC 4 Input (XLR Jack)	24	Mains Voltage (115V/240V) Selector Switch	36	MIC 1 Mute On/Off Switch

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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 (24V DC)

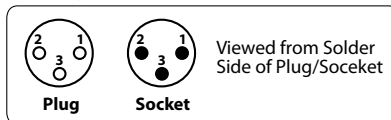
When using external batteries, earth the amplifier via the screw terminals on the rear of the amplifier because of the high voltages present. Electrical stability of the system will be improved by providing a good earth ground. **NOTE:** the connection cable must be fitted with an in-line fuse. Quick blow type 5A(60W) 8A(120W) 15A(240W). When connecting batteries, please ensure correct polarity.

Main Connections

Microphone Inputs

Five microphone inputs are provided, the microphone amplifiers are an electronically balanced, transformer-less design configured for optimum low noise performance. The input impedance is greater than 2k Ω and is suitable for microphones in the 200 Ω to 600 Ω range. For balanced microphones, connect the cable screen to pin 1, the in phase signal to pin 2 and the reverse phase to pin 3. To operate the channel in the unbalanced mode, connect pin 3 to pin 1 (ground) inside the XLR cable plug. Use pin 2 as hot and pin 1 as screen (ground), see diagram below: -

Pin Assignments:



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 cancelling out any noise or hum that may be induced into the cables.

Phantom power facilities are provided; either of the mic inputs can be configured to operate with 15V phantom power by setting the relevant jumper to the ON position. Care should be taken to ensure that phantom power is activated only when the microphone connected to the input requires external phantom power

In addition to the XLR microphone inputs, the option exists for installing Microphones via the barrier strip provided.

VOX Muting

The TEL input has voice activated (VOX priority) muting over CH1~CH5 and AUX 6. Priority Microphone, Mic1 input, has VOX priority over CH 3~6 and Line input signals but does NOT mute Channel 2 input.

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Line (Aux/CD) Connection

The equipment provides an auxiliary input which may be used for connecting other signal sources such as a Radio Tuner, CD or Cassette player. A push button switch is located on the rear panel for selection of, Mic1→Aux1, Mic2→Aux2, etc.

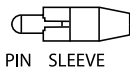
The line level Control on the front panel operates on each of the input sources.

To operate, select the desired music source using the slide switch and turn the "Channel" control clockwise to increase the volume, or anti-clockwise to reduce the volume.

The Aux / input sockets are standard stereo RCA phono. Single sockets are supplied and these are linked together internally. This allows stereo signal sources to be used without the need to obtain a special lead, however you may wish to check with the manufacturer of the signal source to ensure that no damage will result if the left and right output channels are put in parallel.

RCA Phono Plug Connections

Sleeve - Screen
Pin - Signal



Tape Output Connection

These are standard RCA stereo phono sockets, and provide a mixed output suitable for connection to a tape or digital recorder.

Pre Out / Aux Out

The horseshoe jumper “U” connects the mixer/preamplifier stage to the power amplifier stage. This Insert Point will allow for connection of signal processors such as equalisers, compressors or Feedback Exterminators. The Insert Point is located (electronically) between the mixer and power amplifier sections of the amplifier. It allows for the “mixed” output of the amplifier to be processed externally and then returned to the power amplifier section of the amplifier. The connecting link must be plugged in for normal operation as a mixer/amplifier. “PRE OUT” is after the tone controls and the master volume control.

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Chime Output

Chime is a two tone “DING DONG”. This is obtained by shorting screw terminals. Chime tones mute all channels. A slide switch located adjacent to the speaker output terminal strip allows the enable/disable Chime function.

Power Amp Output

Additional amplification can be achieved by connecting the “PRE OUT (2)” output to another power amplifier. Under normal conditions, up to three power amplifiers can be connected in this way.

Loudspeaker Connection

Note: Use only 100V or 70V (Selectable) Line Loudspeakers

Low Impedance 8Ω or (4Ω):

This output allows connection of standard low impedance loudspeakers. The minimum impedance must be 4Ω. When two or more loudspeakers are in use, ensure that they are wired in such a way that the impedance load is between 4Ω and 16Ω.

As a guide for the correct gauge of wire, we recommend the following:

100V	Up to 50m	AWG25-26 (0.15mm ²)
	50m - 200m	AWG20 (0.5mm ²)
	Over 200m	AWG18 (0.75mm ²)
70V	Up to 50m	AWG24 (0.20mm ²)
	50m - 200m	AWG17 (1.0mm ²)
	Over 200m	AWG16 (1.5mm ²)
Low Imped. (4)	Up to 10m	AWG18 (0.75mm ²)
	10m - 30m	AWG13 (2.50mm ²)

Installation Practice

Step 1. Take a piece of figure-8 cable, connect the stripe/coloured wire to the 100V terminal and the uncoloured wire to the COM on the amplifier terminal strip.

Step 2. Connect the other end of the wire (uncoloured) to the Com/EARTH connection on the ceiling speaker transformer and the other + (stripe) wire to the required voltage taping.

Step 3. Take a second piece of figure-8 cable and connect the plain wire to the parallel COM connection and the other + (stripe) wire to the parallel output from the transformer terminal block and connect it in the same way to the next ceiling speaker.

Step 4. Continue this process until all the ceiling speakers are connected in a parallel connection with all the COM connections and all the wattage connections following a parallel connection.

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 "Determining power by calculating total impedance." on page 10)

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.

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 Q-Tech range of amplifiers has a 7 stage LED ramp for Signal Present/Overload (green/red). Green indication occurs when there is a signal present. This LED display 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.
- C. The Input may be switched to MIC with a line-level source. Switch the Input to LINE.



Specifications

Type		Mixer Amplifier		
Model		QTA-6060M	QTA-6120M	QTA-6250M
Supply	Mains Voltage	AC 115V/ 240V, 50 / 60Hz ± 10% Switchable		
	Battery Voltage	DC 24V (MAX 10% deviation)		
Output Power:		60W	120W	240W
Outputs		Speaker outputs: 4Ω, 8Ω, 70V, 100V Tape output: 1V 4.7KΩ Pre output: 1V, 600Ω Aux Mains Power: 4A/115V		
Inputs		Mic 1~5: sensitivity. Adjustable (1mV), 600Ω balanced. Aux 4~6: 150mV, stereo 22K, TEL: 150mV, Adjustable 600Ω, balanced Power amplifier in: 1V		
Frequency response		Mic 1~Mic 5: 60Hz ~ 12KHz ± 3dB Aux 1~ 6: 50Hz ~ 15KHz ± 3dB TEL: 50Hz ~ 15KHz ± 3dB		
Total harmonic distortion		Less than 1% @ 1KHz, rated power		
Signal to noise ratio		All Volume Controls: 80dB below rated power Mic 1~ 5: 60dB below rated power Tel: 80dB below rated power Aux: 80dB below rated power		
Tone Controls		Bass : ± 10dB at 100Hz Treble : ± 10dB at 10KHz		
Controls		Channel 1~5 volume control Aux 6 volume control Master volume control Tone controls (Bass, Treble) TEL volume control Mute slide switch Mic 1/Aux 1 push switch Rear Mounted Mic 2/Aux 2 push switch Rear Mounted Mic 3/Aux 3 push switch Rear Mounted Mic 4/Aux 4 push switch Rear Mounted Mic 5/Aux 5 push switch Rear Mounted Chime Control AC 115V / 240V voltage Selector switch		
Indicators		Power indicator (LED), output level indicators (6 LEDs)		
AC power consumption		150W	300W	600W
DC power consumption		5A	8A	15A
Phantom power		Factory set "on" @ 16V, defeatable via internal jumpers		
Priority		TEL mutes all channels Channel 1 can mute Channel 3 ~5, Aux 3~6		
Dimensions (H x W x D) mm		88mm(H) x 426mm(W) x 13.5"D		
Weight		8.5	9.5	11.5
Colour		Black		
Mounting options		Table top or 19" rack mountable / Rack Mount Ears Included		

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Trouble Shooting

If the amplifier doesn't appear to be working normally, please check the following,

No Power, No indicator Lights working

- Make sure amplifier power switch is on.
- Make sure mains power switch is on at the wall.
- Check the mains and DC fuse.
- Replace with only the correct type and rating. Over rated fuses with invalidate warranty.

Distorted Output

- Check that the speaker type is correct for the output that you are using (ie.4-16Ω, 70V or 100V line).
- Check for any short circuits on the speaker line.

Very Low Output Volume

- Make sure that the input is the correct level (check for shorted connectors).
- Check for any short circuits on the speaker line.
- Check if signal LED on the front panel is lit to indicate there is signal.
- If it is not lit there is no signal present.

Continually Blows Fuses

- Make sure that the speaker line is not shorted.
- Check speaker types, ratings and if on correct output.

Amplifier Keeps on Cutting In & Out

- Make sure that there is adequate ventilation around the amplifier.
- Check the vent slots on the front, top and sides are not covered or blocked and the fan on the rear is functioning correctly.
- Check also speaker types, ratings and for any short circuits on the speaker line.

No Output Volume

- Check the Send/Return link is in place.

Technical Notes

Constant Voltage Distributed Speaker Systems Demystified

In a typical paging and background music speaker installation, a quantity of 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 the explanation below)

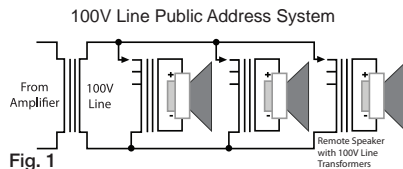


Fig. 1

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.

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Let us take a 100 watt amplifier. If you have 20 speakers and you set them at the 5 watt taping, 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:

Power = Voltage² / Impedance.

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

Power = 5000 / 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.

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 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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