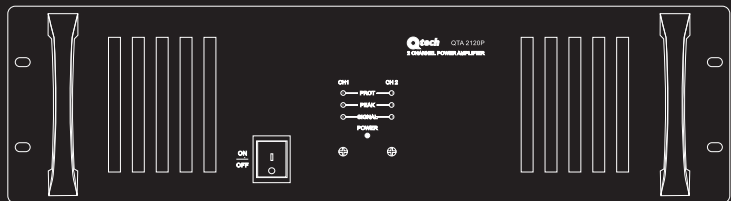


# Q-Tech

## Q-Tech Commercial Series QTA 2120P/2240P 2-Channel Power Amplifiers

User Manual



# WARNING

**THIS APPLIANCE MUST BE EARTHED**



## 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.

## Description

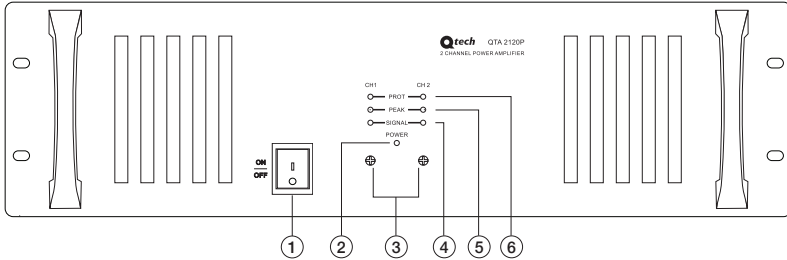
The QTA 2120P and QTA 2240P are 2 channel power amplifiers designed for 2 zone applications.

Each channel has XLR and phone jack input and outputs, each with its own gain control

- 2 channels Power Amplifier
- Signal, Peak and Protection Indicators
- Individual gain control of each input
- 8 ohm, 70V and 100V speaker output
- Choice of XLR and phone jack inputs
- Overload, over temperature, and speaker short protection.
- 115v-240v AC and 24v DC power in
- 2U height
- 19" rack or table mounted rack ears supplied.
- 3 year replacement warranty

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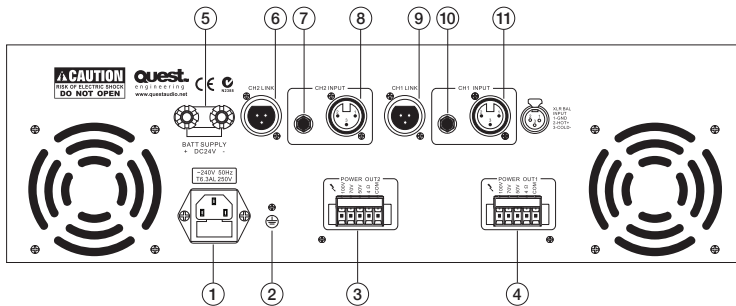
## Front Panel Layout



1	Power On/Off Switch	4	Signal Indicators
2	Power On Indicator LED	5	Peak Indicators
3	Channel Volume Controls	6	Protection Indicators

## Rear Panel Layout

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1	AC Power Input Socket	7	Channel 2 Phone Jack Input
2	Earth Terminal	8	Channel 2 XLR Input
3	Channel 2 Speaker Terminal	9	Channel 1 Link Output
4	Channel 1 Speaker Terminal	10	Channel 1 Phone Jack Input
5	24v DC Power Input	11	Channel 1 XLR Input
6	Channel 2 Link Output		

## Power Source

### AC Power Source

The supply transformer has been designed for use AC 240V(±10%) 50 Hz.

### DC Power Source

#### Battery Connection (24Vdc)

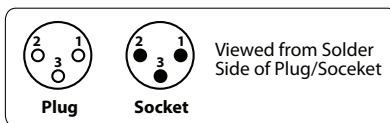
When using external batteries, please ensure the amplifier is grounded via the screw terminal. (Electrical stability of the system will be improved by providing a good earth ground.) When connecting batteries, please ensure correct polarity.

## Main Connections

Each input has XLR and Phone jack input. Use the one you want

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

## Speaker Output Connection

The speaker output screw terminal is on the rear panel. It can connect low impedance 8 ohm, or high-level 70V or 100V speaker. Use only one of these output connections for corresponding speaker.

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

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

## 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 + (strip) 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 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.

## Operation

After all connections are completed, turn on the power. If necessary, turn the gain control on the rear panel to what you desire. We suggest turning the gain level to maximum always.

## Trouble Shooting

If the amplifier fails to work as required, please check the following:

### No Power, No Lights

- 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.

### Distorted Output

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

### Very Low Output Volume

- Make sure that the speaker line is not shorted.
- Check speaker types and ratings.

### 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 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.



## Specifications

Type		Booster Amplifier	
Model		QTA 2120P	QTA 2240P
Output Power (RMS):		120W x 2	240W x 2
Power Supply	Mains Voltage	AC 115V or 230V 50/60Hz	
	Battery Voltage	DC 24V	
Total Harmonic Distortion		<= 1% @ 1KHz, rated power	
Sensitivity		XLR, Phone Jack (balanced) 1v @ 10K ohm	
Outputs		8Ω, 70V, 100V	
Signal to Noise Ratio <sup>4</sup>		86 dB	
Indicator		Power On, Level	
AC Power Consumption		440W	880W
DC Power Consumption		8A	15A
Dimensions (mm)		450 (W) x 184 (D) x 132 (H)	
Weight		14.3 Kgs	18.8Kgs
Mounting options		Table top or 19" rack mountable	

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## Technical Notes

### Constant Voltage Distributed Speaker Systems Demystified

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

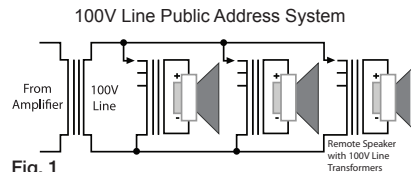


Fig. 1

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.

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 is concerned.

**A system that does not distort will give much clearer voice reproduction than a louder system that is distorting or losing 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:

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

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	100K $\Omega$	10W	1K $\Omega$	40W	250 $\Omega$
0.5W	20K $\Omega$	15W	667 $\Omega$	50W	200 $\Omega$
1W	10K $\Omega$	20W	500 $\Omega$	75W	133 $\Omega$
2W	5K $\Omega$	25W	400 $\Omega$	100W	100 $\Omega$
3W	3.33K $\Omega$	30W	333 $\Omega$	150W	66.7 $\Omega$
5W	2K $\Omega$	35W	286 $\Omega$	200W	50 $\Omega$

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

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







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