

## Anatomy of a loudspeaker

Information kindly provided by Celestion International Ltd.

There are a number of important technical issues relating to the matching of speakers to amplifiers, and to the wiring of multiple speaker systems (eg 2 x 12", 4 x 12", etc.).

### Impedance/Cabinet Wiring

The impedance of a speaker is basically a measurement of how hard the amplifier will have to work to drive that speaker. The impedance is measured in Ohms and is clearly marked on the back of every Celestion speaker. The impedance of the speaker(s) installed in an amplifier or cabinet will be quoted in the Operating

Instructions. It is essential, particularly in the case of tube (valve) amplifiers that the impedance or 'load' presented to the amplifier is correct; otherwise this can damage the amplifier.

Many tube amplifiers are set up with multiple 'taps', eg. 8 and 16 Ohms. In such cases, it is important that the impedance of the speaker system matches the impedance value set on the amplifier.

Most transistor amplifiers are designed to drive 8 Ohm loads.

Although the impedance matching is not as critical as with tube amplifiers, the impedance of the speaker(s) should be at least equal to the minimum impedance of the amplifier.

The majority of Celestion guitar speakers are available in a choice of 8 and 16 Ohm impedances. However, the way in which multiple speakers are wired (in a 4 x 12" cabinet for instance) determines the overall impedance of the speaker system. Hence wiring is critical.

There are basically two ways of wiring

multiple speakers: Series and Parallel. Here are diagrams of the most typical wiring configurations.

### Power Rating

If multiples of identical speakers are used in a combo or cabinet, the overall power rating is calculated by multiplying the individual speaker rating by the number of speakers in the cab, eg: 4 x 25 watts = 100 watts. However, when speakers are mixed, the lower rating is used to make the calculation, as both speakers draw the same power from the amp. For example, in the case of one 60 watt speaker and one 25 watt speaker in the same cab, the effective power rating is calculated as follows:  
1 x 25 watts + 1 x 25 watts = 50 watts total.

It is not critical to match the power handling of a speaker system precisely with the power output of the amplifier. But as a general rule, the power rating of the speaker(s) should be at least equal to that of the amplifier.

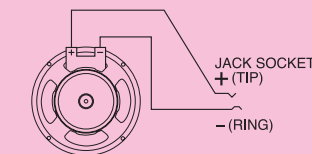
### Phase / Polarity

All guitar speakers have just two connectors, one marked positive (+) and the other negative (-). If one speaker is wired the wrong way around in a multiple speaker configuration, it will not damage the amplifier. However, it will be 'pushing' when the other speakers are 'pulling', resulting in the cancellation of some frequencies in the overall sound. It is therefore important that the correct wire goes to the correct terminal.

For further information, please consult an authorised Celestion dealer or service agent.

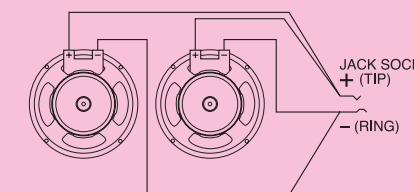
Replacing the loudspeakers in your cabinet or combo may affect the manufacturer's warranty. Celestion International Ltd and its associated distribution companies will accept no liability for any damage or injury caused as a direct or indirect result of improper handling, installation or use of its products.

1 X 12"



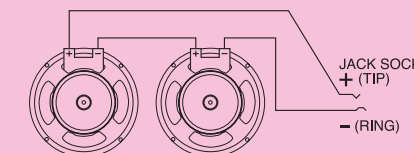
Example:  
1 X 8 Ohm Speaker = 8 Ohm Load

2 X 12"  
Parallel



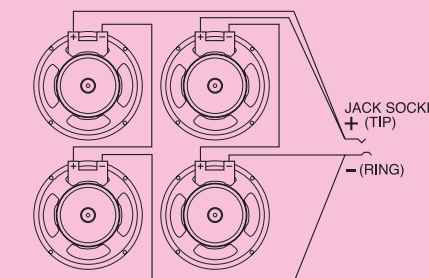
Example:  
2 X 4 Ohm Speaker = 2 Ohm Load  
2 X 8 Ohm Speaker = 4 Ohm Load  
2 X 16 Ohm Speaker = 8 Ohm Load

2 X 12"  
Series



Example:  
2 X 4 Ohm Speaker = 8 Ohm Load  
2 X 8 Ohm Speaker = 16 Ohm Load  
2 X 16 Ohm Speaker = 32 Ohm Load

4 X 12"  
Series/Parallel



Example:  
4 X 8 Ohm Speaker = 8 Ohm Load  
4 X 16 Ohm Speaker = 16 Ohm Load

