How To Plug Stuff In

A QUICK GUIDE TO AMPS, MICS AND LEADS

There are very many different types of amplifiers & microphones, it's impossible to cover all the possibilities. In fact, it takes a lifetime to learn half of them! But this document will introduce you to the few varieties that you'll meet in the classroom, and give you an idea of how to connect them all up.

AMPLIFIERS (or 'AMPS')

TYPES

The two main types of amps that you'll encounter are Guitar Amps and Keyboard Amps. They look basically the same, but keyboard amps are often labelled as Keyboard Amps, whereas guitar amps usually don't mention 'guitars'. And as you'll see below, they tend to have different controls.

Guitar amps are designed to colour and change the sound of the guitar that you plug into it, while keyboard amps assume that you've created exactly the sound you want in the keyboard and the job of the amp is simply to make it louder.

Bass amps are broadly the same as guitar amps, but are designed for lower pitch of a bass guitar.

Although technically you can play any instrument through any amp, it's best not to - at best it will sound a bit odd and at worst it will damage the amp. In particular, never play a bass through anything other than a bass amp.

Guitar amp

Keyboard amp

POWER & VOLUME

Both types of amp come with different power ratings. The ratings are given in Watts (often abbreviated to 'W') and give a measure of how loud they are. USB computer speakers are often around 2-3W, loud guitar amps to fill a concert hall might be 100-150W.

You are unlikely to need more than 10-15W in a classroom, maybe slightly more to sound good in a school hall.

It's not a good idea to have really loud amps in schools, because amps that are designed to be loud sound best when they are loud – you don't get a full sound when you turn them down. Also, loud amps provide temptation for players to crank the volume ever up!

CONTROLS ON A GUITAR AMP

Every amp, and every manufacturer, has its own unique controls, but there are a few common features.

One of the distinctive controls on guitar amps is 'gain' (or occasionally 'input volume'). Turning this up will start to distort the sound. This will make it sound bigger, louder, & fuzzier – without actually making it louder.

As well as the gain, there will be a volume control – this is what actually makes the sound louder and quieter.

They will also both have some kind of tone control or EQ. It could be a single 'tone' control, 'treble' and 'bass' like on a home Hi Fi system, or even a multi-band 'graphic equalizer'.

Guitar amps sometimes have two sets of controls for just the one guitar input, with some sort of switch (often a foot pedal) to change between them. That way, a guitarist can set up 2 distinct tones (usually one clean and one distorted) and change between them quickly. On amps with 2 channels, you'll see only one input, but two sets of gain and tone controls.

And some guitar amps have built-in effects like reverb (similar to echo) or chorus, which will have their own controls.

Above is a close-up of the controls on the Marshall guitar amp shown on the previous page. Going from left to right, you can see the: guitar input; gain, volume & tone for the clean channel; gain, volume & tone for the OD (OverDrive ie distorted) channel; a reverb control; an input for a CD player or phone; a headphone socket; and the all-important on/off switch.

CONTROLS ON A KEYBOARD AMP

In theory, keyboard amps are rather simpler than guitar amps, with just a volume & EQ controls. But increasingly, keyboard amps have multiple inputs and can be used to amplify many devices at once: keyboards, microphones, phones/CD players etc. These amps are sometimes referred to as PA Systems or PA Amps. In that case, there will be lots of inputs with their own individual controls, as well as Master controls which affect all the inputs.

This is a close-up of the controls on the Peavey keyboard amp pictured above. You'll see that there are three channels, each with their own controls. Channels 1 & 2 are labelled 'Inst/Line' and have controls knobs for 'level' and for 'High' and 'Low'. Channel 3 is labelled 'Mic/Line' and has an additional 'mid' knob.

This allows you to plug three separate things in at the same time, and control their tone and their relative volume. Channels 1 & 2 can only take keyboards or laptops/phone etc, but channel 3 has a mic pre-amp (see below)

On the far right, you can see the main amp controls. As well as the all-important on/off switch, there are three different volume controls – 'Master' (for the overall volume) 'Monitor' (so you can plug in and set the level for an external speaker) and 'Headphones' (so you can plug in and set the level for headphones).

MICROPHONES

There are way too many types of microphone to document here – large condensers, small condensers, ribbons, . This section gives some useful information about what to look for in mics, and things you might need to know. But if you want a very condensed version:

There are 2 main types of mic that are useful in the classroom: omni-directional electret mics for recording whole rooms, and cardioid dynamic mics for amplifying specific singers & instruments. 'Cardioid' essentially means it picks up sound from in front of it, 'omni-directional' picks up everything.

ELECTRET MICROPHONES

Electret mics are small and portable, need a battery (or USB power) to operate, and are the sort used in mobile phones, laptops, and USB mics. They are usually small & light, and can be pretty durable. They can generally pick up sound from quite far away, so are good for recording a whole band or ensemble from the front of a stage.

DYNAMIC MICROPHONES

Dynamic microphones don't need power, tend to be chunkier than electrets, and only pick up sounds from quite close. This makes them ideal for picking up voices and instruments close up – in general they should be 5-10 cm from the singer or instrument. They also look like 'typical' singers microphones, which may help some young people stay focussed on singing when they use them. While you can use them to pick up a whole band at once, they won't sound as good in that context as an electret.

PRE-AMPS

Microphones produce very low sound levels, and need to be plugged into pre-amps ('Pre-amplifiers') before they go to the main amplifier. PA systems and many keyboard amps have dedicated Mic inputs, which have pre-amps built in. If you plug a mic in without going through a pre-amp, you probably won't damage anything – but you won't hear anything either.

Many keyboard amps have inputs which allow you to switch between 'mic' and 'line'. Essentially, this switches a pre-amp on or off. You should choose 'Line' if you're going to plug in a keyboard, phone, CD player etc. and – as you'll guess – choose 'Mic' if you plug in a microphone.

MOULDED CABLES & INTERNAL BATTERIES

Some mics have cables fixed in place – the base of the mic becomes a lead, with some kind of connector on the end. These can be quite convenient, as the lead is always on hand. There are, though, some disadvantages – mainly that you can't replace the lead if it gets damaged or starts to wear, and that the lead is a fixed length and you can't change the lead to fit your circumstance. They also generally made for convenience, rather than for good sound quality.

You won't find mics with fixed leads in professional studios, but you may find them helpful in the classroom – it's all down on what you find works best for you.

LEADS AND PLUGS

If you're going to connect a guitar, keyboard, mic – or anything else – to an amp, you'll need some kind of lead.

In essence, all leads are the same whether they're thin, fat, straight, curly, plastic, fabric covered etc. The big difference is what kind of connectors (or 'plugs') they have on the ends. The main types are:

1/4 inch jack plug aka - Jack

1/8 inch jack (plug) aka 3.5mm jack aka Mini-jack

Male XLR plug
(i.e. the pins stick out)

'Female' XLR plug (i.e. there are holes for the pins to go in)

JACK LEADS *(ie a lead with a 1/4 inch jack plug at each end)*
Are the most common leads in music making. All guitars and guitar amps have 1/4 inch jack sockets, and most keyboards do too. If ever someone mentions a jack lead without specifying a size, it will be one of these.

MINI-JACKS LEADS (ie a lead with an 1/8 inch jack plug at each end)
Are mostly used for phones, CD players and the like.

MIC LEADS OR **XLR LEADS**
Are leads that have an XLR connector at each end, and are generally used to plug microphones into mic inputs. There are two varieties of XLR socket, known as 'male' and 'female' (depending on whether the pins stick out or not!), and a mic lead will have a female at one end to plug into the mic and a female at the other to plug into the input.

It's worth having a good stock of 1/4 inch jack leads of varying lengths. 5 metres is a good basic length, to allow a bit of flexibility of movement and of setting up, 10 metres will reach across the room, and 2 metres is OK if you're right next to the amp.

It's also worth having a few mini-jack leads, but you probably won't need any 10 metre leads.

And you should have enough XLR leads to plug in all your microphones. You'll probably want 5 and 10 metre leads but may not need 2 metre leads.

With any type of lead, it's worth avoiding the cheapest ones. The build quality and the electrical connectors are likely to be poor, they'll start to wear out quickly and you'll get crackling, popping and outright failure soon enough. You really will notice the difference in longevity.

And a final, important note - as far as I can tell, leads come alive and wriggle around at night. That means, if you don't coil and store them carefully when you finish with them (preferably with a velcro tag or cable tie to keep them coiled) , they'll be horribly tangled the next time you go to use them. As the saying goes, 'a tidy lead is a happy lead'.

ADAPTORS

You can get adaptors to change mini-jack plugs to jack plugs, and vice versa (and plenty of other, more esoteric adaptors).

These can be lifesavers when you can't find the right lead, but they tend to come loose, crackle and then get lost between sessions. It's worth having a few of each type ready for emergencies, but even better to make sure you have enough of the right kind of leads handy.

A QUICK NOTE ON BLUETOOTH

Bluetooth provides a way of connecting sound-sources without using wires, but is designed for listening to music at home rather than playing and recording music. I would generally avoid it at all costs in the classroom/band room. It tends to be glitchy, and can cut out unexpectedly, leaving you with no option but to switch off & on again – and hope.

SUMMING UP

Recording and amplifying musicians in a studio is a complicated and skilled business, but getting a decent sound in a classroom doesn't have to be hard. This document should give you enough of an insight into mics, amps and leads that – in combination with your ears and a bit of trial and error – you'll be able to get the most from your equipment and help your musicians to sound their best!