

Setting up and packing away music equipment

1. The PA System

Basically a PA system can be thought of as a chain of leads and equipment that takes the sound of an instrument or voice, turns it into an electrical signal, makes adjustments to it and amplifies it so that it can be heard.

The first stage of the chain will often have lots of inputs. These could include microphones, guitars, computers, keyboards, or CD players. It is also possible to connect the mixing desk to a reverb unit to add reverb to the sound (other additional devices could include effects units, noise gates and limiters). For workshops we usually work in mono-connecting the mixer to just one powered speaker. The small mixers need a special Jack to male XLR lead to connect to the SRM450 speakers. The bigger mixers use XLR to XLR leads. Make sure they are connected to the "IN" on the SRM450.

2. Setting Up Procedures

Cables should be coiled and uncoiled carefully, coiling up by holding in one hand, reaching out with the other and putting a half twist in the cable as it is placed into the other hand. This will keep the cables kink free, enabling them to lie flat and minimising the risk of people tripping. Cables should be laid with great care, never stretched tightly and away from where anyone would walk. If they have to cross a walkway they must be taped down or covered in a substantial rubber mat that does not itself cause a risk of tripping. Not only is this a health and safety and fire regulation requirement, but it also reduces the risk of faults or failures due to damaged cables. Cables are the most common cause of faults in PA systems. Any cable which looks suspect should immediately be removed, labelled and notified to the person in charge. Music Makers code for a broken cable is to tie a knot in it.

Powering up. As you connect things in check that their power switches are off. Mixer faders should be turned down (pan and tone controls centred) before turning on. Power amps and gain levels should not be set too high. Then turn on the mains and power switches, and gradually put up the gains until the right levels are reached. It is sometimes worth checking the level where you get feedback on microphones and then you can make sure you do not go near it.

Powering Down and Packing Up. Switch off the power amps first so that other things do not cause bumps through the system. Disconnect all cables ASAP so that nothing can get pulled or tripped over when people are milling about. Put microphone and guitars safe - preferably in cases, then coil cables as detailed above. Mic stands should be packed away with clips down and everything re-tightened so they do not slide around when being moved. If gaffer tape has been used on cables pull off the tape first, before you pull up the cable - this avoids the tape sticking to itself round the cable which is a real pain to remove.

3. Fault Finding

If the system doesn't work, don't panic - follow this procedure:

TURN THE VOLUME DOWN BEFORE MAKING EACH CHANGE OR TEST. THE SIGNAL MAY SUDDENLY COME THROUGH AT A MUCH HIGHER LEVEL THAN YOU WERE EXPECTING.

Step 1. Check the things that most commonly stop the system working. Examples would be: broken cables, mains lead with fuse blown, microphones or other parts of the chain not plugged in properly, power amplifier or mixer not turned on, gains turned down on the mixing desk or at the input to the speaker/amp, pan controls on the mixer turned to the channel that is not being used.

Step 2. Insert a sound source at the mid point of the chain, for example, you could put a microphone or guitar directly into the power amp. If this works the fault is before the mixing desk. If it doesn't work the fault is in the other bits of the system.

Step 3. Insert a sound source at the mid point of whatever section is not working.

Step 4. Keep systematically narrowing down the area of the fault until you find it. Jumping about and guessing is not often helpful. Occasionally faults occur in the most unlikely places. Stay cool and work step by step logically no matter what pressure you are under - it is almost always the quickest way of resolving problems.

There are two areas of safety:

a. Preventing bits of equipment falling, being dropped or damage from people tripping over cables. Apart from cables, which have already been discussed, one of the biggest risks are heavy loudspeakers on stands. PA operators should never lift weights that they have any doubt about handling. Back injury could finish your career as a PA operator. Lift carefully with a straight back. Once equipment is in place knock, pull or push it yourselves to check that it is stable and there is no risk. Bear in mind the kind of things children may do.

Make sure there are no buttons or switches accessible to children which could cause damage to the system. Most PA systems are fairly robust but it is usually best to turn the power amplifiers on last and off first to avoid the risk of damage to loudspeaker systems from the bumps and clicks of turning other pieces of equipment on and off.

The risk of electric shocks from the mains is fairly low with modern equipment. The two areas to watch are keeping your fingers clear of mains plugs when taking them in and out and immediately removing and reporting any broken plugs or dubious looking mains wiring.

b. Theft - the highest risk of theft when the equipment is in use is bits of equipment you have out but are not actually using - keep them in an accessible place. In high risk situations it is worth removing the microphones to a safe place as soon as the event is over. Security in storage - permanent marking with an etching system or engraving is one of the best deterrents; it needs to be highly visible. Police crime prevention officers can offer good advice. PA operators need to remember that the risk of theft can be reduced if people don't know where the equipment is.

7. For further reading:

1. White P- *Live Sound for the Performing Musician* - Sound on Sound ISBN 1-86074-210-6.
2. Buick P - *Live Sound PA for Performing Musicians* - PC Publishing ISBN 1-870775-44-9
Both clear practical and thorough guides to live PA with drawings and diagrams. I think the White book is slightly more comprehensive.
3. White P - *Basic Live Sound* - Sound on Sound ISBN 1-86074-271-8 *An edited down version of the first book - good if you don't need the detail of the construction of bass bins etc..*

8. Explanation of some technical terms:

PA - stands for Public Address system. The general name for all sound systems.

DI - stands for Direct Inject, which is when you take the signal from an electric instrument, such as a bass guitar, electric guitar or keyboard straight into a PA system. The kind of signal that these instruments send would lose a lot of its top end if it was sent down a long cable. The instruments usually use jack plugs which are plugged into a DI box with an XLR lead coming out to the mixing desk.

Reverb Unit - A bit of equipment to add reverberation to the sound, very important for voices, modern keyboards have reverb built in, many guitarists will have their own reverb unit. Churches often have more than enough reverb without adding any!

Noise gates - many reverb units and other such devices can be hissy, and noise gate shuts down when there is no signal coming through, thus getting rid of the hiss during quiet moments.

Limiters - These reduce the range of sound levels, that is the difference between the quiet and loud bits. They are always used in radio and television broadcasts and recordings, particularly with drums and often with bass guitar, where the first attack of a note can be so powerful that it causes equipment to distort.

Panning - the movement of a single sound source from the left to right hand side (or vice versa) of a stereo output.

Foldback - This is a separate amplification and loudspeaker system which sends sounds back to the performers.

Feedback - This occurs when the signal from the microphone is picked up, amplified through the system and then picked up again by the microphone in a continuous loop, which causes a shrieking sound, which if left will continue getting louder until something blows. Guitars and bass guitars which are left near their amplifier and turned up can produce the same effect.

Microphone pickup patterns - The most common is cardioid which means that the microphone picks up mostly in an inverted heart shape around the front of the microphone. These microphones can be placed to reduce the risk of feedback.

Acoustic instruments - These are ones that produce sound on their own such as acoustic guitars (with a hollow wooden body), violins, etc. They can sometimes be fitted with pickups. These vary in quality and can cause feedback.