



# STARTING OUT

## A. What does a Mixer do?

No matter how sophisticated or expensive, all mixers carry out the same basic function - to blend and control the volume of a number of input signals, add effects and processing where required and route the resulting mix to the appropriate destination, which could be power amplifiers, the tracks of a recording device - or both. A mixer is the nerve centre of these sources, and therefore the most vital part of your audio system.

## B. Guidelines in Choosing a Mixer

Audio mixers come in many different sizes and at all price levels, so it's little wonder that people are confused as to what type is actually needed for the job in hand. However there are several questions you can ask yourself that will help you narrow your search to the most appropriate models.

- What am I going to be using the mixer for - i.e. multitrack recording, live PA work or both?
- What is my budget?
- How many sound sources do I have? As a guideline your mixer needs to have at least as many inputs as sound sources. If you are likely to be buying more equipment in the future you should budget for extra inputs.
- What particular mixer facilities **must I have** for my application? i.e. plenty of EQ, auxiliaries, or Direct Outs for recording.
- How portable does the mixer need to be?
- Will I be doing any location work where there won't be any mains power available?
- Have I read the Spirit Guide to Mixing from cover to cover?

Once you can answer these questions satisfactorily you should have a fairly accurate specification for the mixer you need.

## C. The Controls - A Description

This is where we get into the nitty-gritty of what controls and inputs/outputs you'll find on a typical mixer. For this example, we've used a Spirit Folio SX. **If you are already familiar with what the controls on a standard mixer do, then it's OK to skip to section 2.** If you find a term particularly difficult, further explanation can be found in the Glossary (Section 8).

### MONO INPUTS

#### A Mic In

Use this "XLR" input to connect your microphones or DI boxes.

*For Mic Input Wiring Explanations see section 7.*

#### B Line In

Use this connector for plugging in "Line Level" instruments such as keyboards, samplers or drum machines. It can also be used to accept the returns from multitrack tape machines and other recording media. The Line Input is not designed for microphones and although it may be used, will not provide optimum performance with them.

*For Line Input wiring explanations see section 7.*

#### C Insert Point

This is used to connect external signal processors such as compressors or limiters within the input module. The Insert Point allows external devices to be placed within the Input Path - see Fig. 1.1.

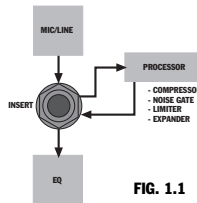
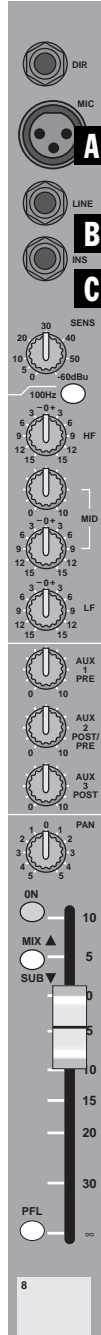


FIG. 1.1

*See Section 2 and 3 for more detail on how to use processors, and Section 7 for information on wiring.*



**D Direct Out**

This allows you to send audio direct from your channel out to a multitrack tape recorder, or to an effects unit when the channel requires its own special effect.

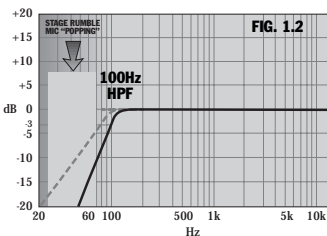
See sections 2 and 6 for more details on connections and studio techniques.

**E Gain Control (Input Sensitivity)**

Sets how much of the signal from the mic or line inputs is fed to the channel.

**F HPF (High Pass Filter)**

As the name suggests this switch cuts out the very lowest frequencies of a sound whilst allowing the higher frequencies to "Pass Through". It's particularly useful in live situations to reduce stage rumble or microphone 'popping', which can produce a muddy mix, or to 'clean-up' male vocals and filter out low frequency hum. Some manufacturers may also use the term "low-cut" filter to describe the HPF. See Fig. 1.2.

**G EQ Section**

Usually the most closely scrutinised part of any mixer, the equaliser section allows you to change the tone of the sound on each input. An EQ is normally split into "bands", which control a range of frequencies, in a similar fashion to the treble and bass tone controls on your Hi-Fi. Indeed a simple "2 band" EQ is little more than an input treble and bass control. The more bands an EQ has the more sophisticated it is. SX has a 3 band EQ, with a separate control for the middle audio frequencies. This control is also "swept" which provides even more sophistication. Simply described, a sweep EQ allows you to choose the exact frequency to cut and boost, rather than having it chosen for you, as on normal "fixed" controls.

We will talk in more detail about EQ in section 3.

**H Auxiliary Section**

Typically, these controls have two functions: First, to control the levels of *effects* such as reverb from external effects units that have been added to the input signal, and second to create separate musician's "foldback" mixes in the studio or on stage.

How to use auxiliaries, connecting them to external equipment and other applications are described in section 3.

**I Pan (Panoramic Control)**

This determines the position of the signal within the stereo mix image or may be used to route (send) the signal to particular GROUP outputs as selected by the ROUTING SWITCHES (see below).

**J Solo (PFL and Solo in Place)**

The PFL solo switch allows you to monitor an input signal independently of any other instruments that have been connected, which is useful for troubleshooting, or setting an instrument's Input Preamp Gain and EQ setting.

Pre-Fade Listen (PFL) is a type of solo that allows you to monitor your sound BEFORE THE FADER. In other words when you move the input fader in PFL mode the level will not change, nor will you hear any effects. Because effects and volume are not a distraction, PFL solo is very useful for setting proper input preamp levels.

Some Spirit mixers use SOLO IN PLACE, which allows you to monitor signals after the fader in their true stereo image, and with any effects that have been added. This type of Solo is less good for level setting, but more useful in mixdown situations for auditioning sounds.

See section 3 - Setting Gain, for more information on using PFL.

**K Mute/Channel On-Off Switch**

This turns the channel on or off and is useful for isolating the channel when not in use or pre-setting channel levels which may not be needed until later, ie: theatre scene-setting or support acts/performers.

**L Fader**

This determines the level of the input signal within the mix and provides a visible indication of channel level.

**M Routing**

By selecting the routing switches the input signal is sent to a choice of the mixer's outputs - typically the main mix outs or the group outputs. The switches are used in conjunction with the PAN control to route the signal proportionately to the left or the right side of the mix or to odd/even groups/subs if PAN is turned fully left or right.

**STEREO INPUTS**

Guitar amps and mic'd sound sources only provide you with

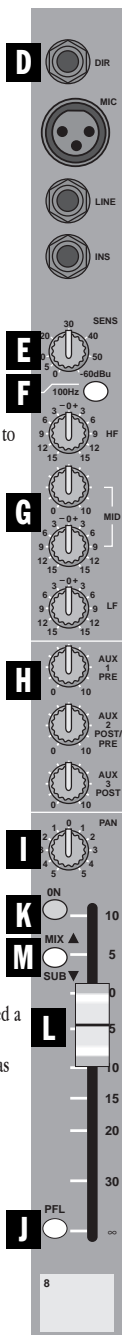


FIG. 1.3

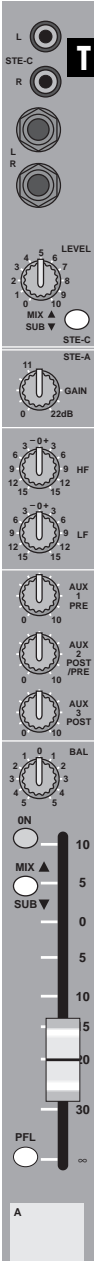


FIG. 1.4

mono signals. However keyboards, samplers, drum machines and other electronic media often provide true stereo outputs with separate left and right signals. Stereo Inputs on mixers simply allow you to connect both of these signals individually and control them from a single fader. Stereo inputs tend to incorporate fewer facilities than mono inputs as most keyboards are already equipped with plenty of internal effects and tone control options.

*NB: Spirit jack stereo inputs default to Mono when the left input is used. RCA phono connectors do NOT have this option.*

### SUBGROUPS

These allow the logical assignment of groups of instruments or vocalists so that they may be controlled by just one pair of faders, or even a single fader, once individual instruments' relative levels have been balanced. They also act as additional outputs with separate volume/level controls – ideal for speaker fills or recording a number of instruments to one tape track.

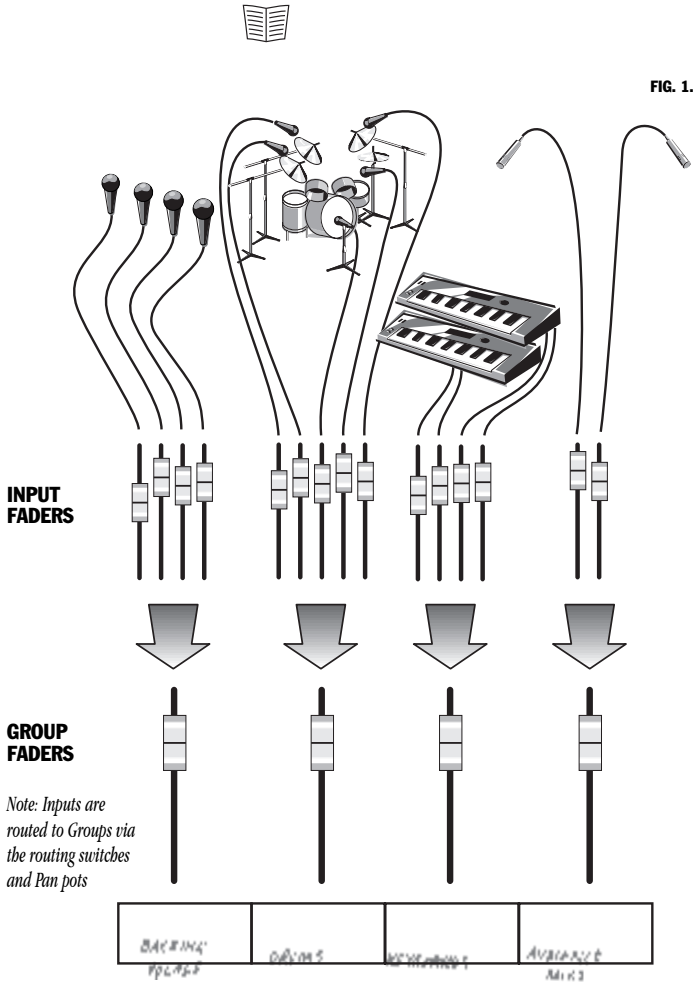


FIG. 1.5

## THE MASTER SECTION

### N Mix Outputs

Mix outputs provide left and right level control of the final stereo mix. Many consoles feature mix insert points too, allowing the connection of signal processors across the whole mix.

### O Monitor “Engineer’s” / Control Room Outputs

These let you listen to any solo, mix, submix from a group, or the 2 Track tape return via an external amplifier and speakers, or the headphone socket.

### P 2 Track Tape Returns

Allow you to connect the outputs of your cassette or DAT player and listen back to your completed masterwork. They may also be used for playing pre-show music at a gig using 2-Track to Mix switch (not shown in illustration).

### Q Aux Masters

These govern the overall output levels from the auxiliary outputs and therefore the amount of signal going to an effects unit or a musician’s foldback mix.

### R AFL

Allows monitoring of the actual signal leaving the Aux Masters.

### S Meters

Normally they show mix output levels. When any Solo button is pressed, the meters automatically switch to show the solo level. They provide visual indication of what’s going on in your mixer.

### T Stereo Returns (see *Stereo Inputs* earlier in this section)

These allow signals from external equipment, such as effects units, to be returned to the mixer and routed to the stereo Mix or Groups, without using up valuable input channels.

### U +48v or Phantom Power

Some microphones, known as condenser mics, require battery power to operate. Alternatively the power may be provided by the console. This is known as ‘phantom power’ and runs at 48vDC. Simply press “Phantom Power” and any condenser mic connected will operate without the need for batteries.

*More Information on Condenser Mics can be found in Section 3 - Mixing Techniques.*

*Further detail on mic wiring may be found in Section 7 - wiring.*

## V Headphones

Allow you to listen to your mix without annoying your neighbours or being distracted by ambient sounds.

*That’s it, the basic features of your average mixing console. If you found it a little heavy going, don’t despair: it does get easier!*

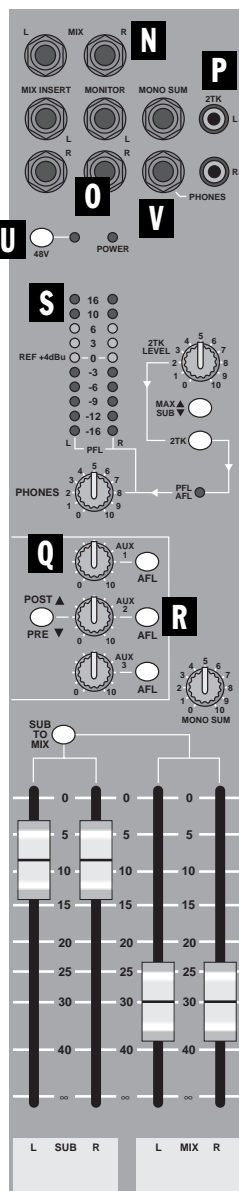


FIG. 1.5

**Caution: DO NOT ACTIVATE A GLOBAL PHANTOM POWER SWITCH IF AN UNBALANCED SIGNAL SOURCE IS CONNECTED TO ANY MIC INPUT.**

*Because of the voltage present on pins 2 and 3 of the XLR connector, you will damage your microphone/signal source.*

*Always refer to your Mixer’s User Guide.*



## D. Signal Flow

Now the typical mixer features have been explained in detail it is important to understand how they form together. The route which a signal source takes through a mixer is normally shown using one of two devices:

a **block diagram** or a **signal flow diagram**.

Both diagrams provide a 'visual' description of the key elements of the mixing console. They allow you to identify which components are used in the audio path and help the engineer to "troubleshoot" when signal sources don't appear to be doing what they should! In simple terms, they are electronic maps.

An example of a signal flow diagram is shown here. This is the most basic representation of console layout, showing a how a single sound source may pass through an input strip to the various other parts of the mixer.

Block diagrams are slightly more complex, showing more detail, electronic information, including the location of resistors and capacitors, and the structure of the entire console including bussing: **an example is shown on page 37**. Block diagrams also use a number of symbols to represent electronic elements. A few minutes spent understanding them some time during your journey through this booklet will most definitely pay-off in future mixing projects.

**FIG. 1.6**  
**A Typical Signal Flow Path**

