IN THE STUDIO

A. Essentials & Ergonomics

Think about room layout and equipment. No, we're not going to plan your studio for you, but here are a few pointers:

- If you play keyboards, set them up so that you can reach the mixer.
- Position your effects and synth modules within arms length.
- If you use a computer, position the screen so as to avoid reflections. Do not position speakers near the screen unless they are magnetically compensated or shielded.
- If the room is too 'live', deaden it with drapes or soft furnishings.
- For best results, use dedicated nearfield monitors.
- Don't use large speakers in a small room - they'll sound wrong at low frequencies.
- Do use a well specified power amp (minimum 50 watts per channel).
- Don't compromise on a weedy amp: it will distort at high levels and may damage the speakers.

B. Tape Machines & Recording Media

Basically, you'll need two types of tape machine: a **multitrack recorder** for recording the individual parts of the performance in readiness for mixdown onto a **2-track recorder** for mastering. There are both analogue and digital models available. The final choice must be based on individual requirements.

C. The Console

Studio work presents additional problems for a mixing console in that it has to deal with a two stage process requiring very different skills.

1 Recording - Sound sources have to be captured on multitrack tape. This process will include ensuring that the cleanest strongest signal is being recorded to tape, without overload and distortion, optimising the sound of the recorded signal with EQ, signal processing and effects, monitoring the recorded sources, and creating a headphone mix for the musicians to ensure the best possible performance from them.

2 Mixdown - All the recorded sound sources as well as any "live" media coming from sequencers, drum machines or samplers must then be blended together using EQ, level, pan and effects and mastered down to a two-track device to create a "final mix". This process bears some similarities to mixing a band - minus the audience, the live performance and poor venue acoustics!

If you have seen any T.V. shows including footage of commercial recording studios you may be forgiven for thinking that good multitrack recordings are only possible using a mammoth console. This does not have to be the case! Professional sounding results can be achieved, albeit with some repatching between recording and mixdown stages, using a relatively small multipurpose mixer. However, to achieve professional results the mixer must be equipped with either (and preferably both):

- **Direct outs**
- **Groups/Subs**

When purchasing a console for both live and recording work, ensuring these facilities are available will save you having to buy a dedicated recording console until your requirements become more sophisticted.

D. Simple Multitrack Recording

The diagram below shows a simple recording set-up using a multipurpose console equipped with direct outs and a pair of subgroups. The sound from instruments or voices is taken straight out to be recorded by the multitrack, with recorded signals being returned from the multitrack's channels into spare inputs of the mixer so they can be monitored. Alternatively, backing vocals or grouped instruments such as drumkits may be recorded to single or pairs of tracks by subgrouping them and connecting the mixer's group outputs to the multitrack device.

The engineer monitors both performances and previously recorded material through a monitor amp and speakers, with the performers getting their own separate foldback mix through the auxiliary sends .

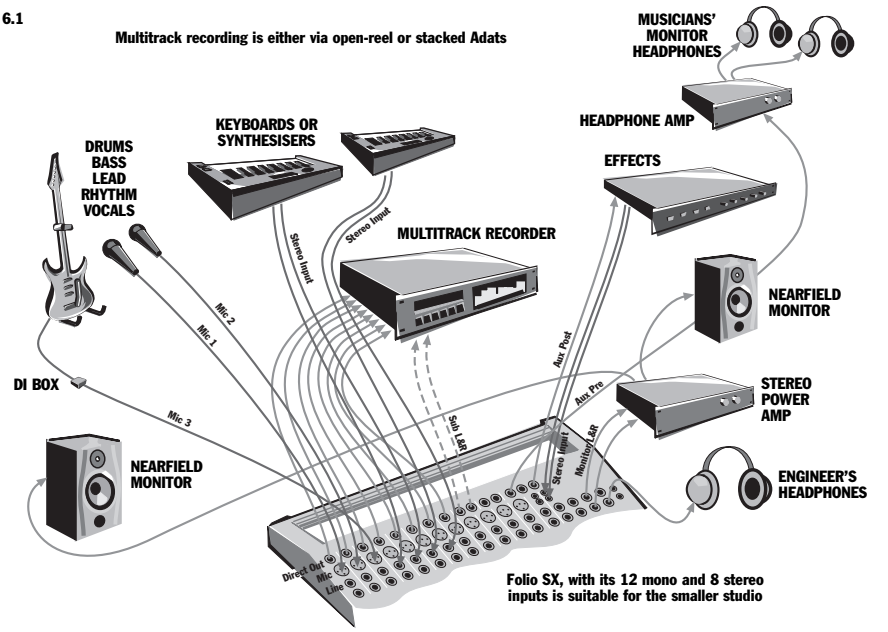
Hints and Tips when Recording:

- If you are recording as a solo performer on a budget, you can avoid the expense of buying a separate amp to create a headphone mix. Plug your headphones into the console's headphone connector and use its monitor mix for your foldback. Alter channel fader levels as you wish to achieve optimum headphone levels for your performance.
- If your console is not large enough to cope with every multitrack send and return, connect only as many Direct Outs as you need per take. For example, if you are recording solo you will only be recording one instrument at a time anyway, so a maximum of only two direct outs will be required for stereo instruments, and one for mono ones. The same channel direct outs may then be repatched to adjacent multitrack tape ins to record new tracks. This should leave enough channels free to monitor all your recorded tracks.
- If you run out of tape tracks, group instruments together. For example a fully mic'd up drumkit can be recorded in stereo to two tape tracks via a pair of groups, or if you are really stretched you could do this with the entire rhythm section, including bass and rhythm guitar. However, it is then essential to mix the balance between the instruments accurately as, once recorded, they can never be individually altered again.
- If you have only one effects unit and you need it to create a variety of different sounds, it may be neccessary to record the instrument with effects included. Again, remember that once you have done this there is no going back, so wherever possible it is best to record "dry" and buy a second effects unit if you can. If you must record "wet", look at you mixer's block diagram and use outputs coming after the effects return for this purpose.
- Do not record in the same room in which you are playing unless

MULTITRACK RECORDING

FIG. 6.1

Multitrack recording is either via open-reel or stacked Adats



your monitor speakers are muted. At the very least, your recorded track will pick up the mix from the monitor speakers, but more likely howl-round and feedback will occur which will damage your equipment. If you a recording a band, it is best to put them in an entirely different room altogether.

- Setting recording levels - for the best results, as it is important to set the highest record levels you can on your multitrack without getting overload or distortion. If you set levels too low, you will end up with a weak signal and background hiss. All multitrack recorders allow you to set record levels before a take. Consult the recorder's manual as to how best to achieve this.

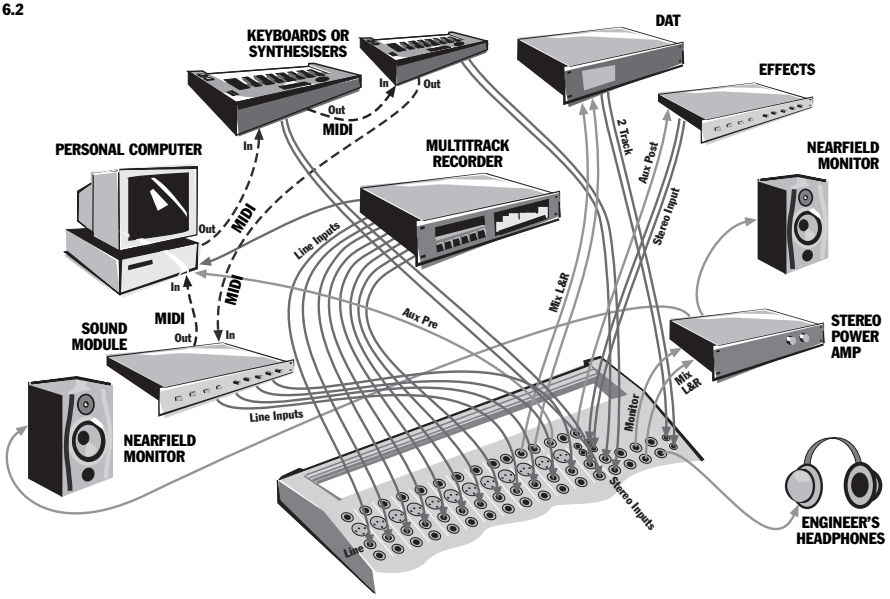
E. Simple Multitrack Mixdown

The diagram below shows how a simple set-up will look for the mixdown process. Some repatching has occured to free up the input channels which were used as mutitrack tape sends. Tape returns can then be plugged into the mixer in sequence from channel 1 upwards, leaving any spare inputs for sequenced MIDI instruments. Effects, amps and speakers may be left as before.

NB: Mixdown hints and tips may be found in "Creating a Mix" at the end of this section.

SIMPLE MULTITRACK MIXDOWN

FIG. 6.2



F. Using a Dedicated "In-Line" Mixing Console

For recording projects beyond 8 track, a multipurpose console is usually inadequate, being unable to cope with the additional multitrack sends and returns and with all the repatching that is required between recording and mixdown. In such cases, a dedicated "in-line" recording console is necessary. An example of the input strip of such a console is shown here.

Virtually all of the features and facilities are identical to a standard mixer - except one: As well as including full channel input facilities and a direct out (here called a tape send), the strip also includes an extra input for a multitrack tape return as well as some basic rotary level control and pan facilities for that input. This second input is known as the **Monitor Input** or **Monitor Return**. Using this technique allows a signal to and from a multitrack to be handled by one input strip, saving space and avoiding the confusion of having to find corresponding send and return signals in different areas of the console.

The major advantage of using an "in-line" recording console is that repatching is unnecessary. This is because both channel and tape return inputs can be swapped (using the switch marked "Chan/Mntr Input Rev"), giving the signal coming from multitrack all the EQ, Auxiliaries and the linear fader of the channel input for the mixdown process. This also leaves the monitor input free for sequenced MIDI gear such as keyboards. If more facilities are required for these sound sources, then EQ and auxiliaries may be shared between the two inputs.

With two inputs per channel, a 16 channel "in-line"console actually has 32 inputs available. This high input count and compactness has made "in -line" consoles extremely popular with project studios, programming and remixing suites and commercially successful bands' home studios. With prices tumbling all the time, "in-line" consoles are now barely more expensive than standard designs.

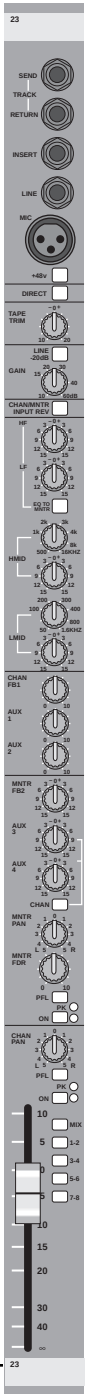


FIG. 6.3

Multitrack Recording and Mixing with an "In-Line" Console

A more complex recording set up with an "in-line" console is shown opposite in Fig 6.4. Both multitrack ins and outs are plugged into the same channel strip, avoiding the need for repatching, whilst for sound proofing purposes, musicians are recorded in a separate room. Effects and signal processors are connected in an identical way to any other console via auxiliary sends and returns and insert points.

G. Recording Instruments and Voices

VOCALS

- Use a cardioid condenser mic positioned 9 inches (225mm) from the singer.
- A pop shield will reduce explosive 'p' and 't' sounds.
- If sibilance is a problem, change to a dynamic mic or move the singer back from the mic.

Recommended effects/processor settings:

EQ: Not normally required. But, if necessary, use the HPF (High Pass Filter) to reduce rumble.

Compressor: Attack as fast as possible;
Release around 0.5S, ratio between 4:1 and 8:1.

Reverb: Try a decay time of around 3 seconds and a pre-delay of 50mS.

DRUMS

- Place mics 2 inches (50mm) from the heads of snare and kick drum.
- For the kick drum, place the mic inside - pointing directly at where the beater strikes the drumhead.
- To fully mic a kit, use separate mics on all toms and hats.
- Use condenser mics 5ft (1.5m) overhead, spaced around 5ft (1.5m) apart, to pick up the entire drum sound, cymbals and "ambience".

Recommended effects/processor settings:

EQ: Boost at: 80Hz to add weight to kick drums, 6kHz to add sizzle to cymbals or edge to a snare. Cut at 250-300Hz to reduce boxiness on a kick drum or low toms.

Gate: Fast attack setting to allow percussive transients to pass through. Precise settings will depend on microphone type and placement.

Reverb: Keep kick drum 'dry'. Try a percussion plate setting with a 2.5S decay time on other drums.

ELECTRIC GUITAR

- Some players prefer the sound of a valve amplifier, so be prepared to mic up the speaker cabinet using a cardioid dynamic mic.
- Experiment with mic positioning to achieve the desired sound.
- If preferred, the guitar can be DI'd via a recording preamp which incorporates an amp simulator.

Recommended effects/processor settings:

EQ: Boost at: 120Hz to add 'thump' to rock guitars, 2-3kHz to add bite, 5-7 kHz to add zing to clean rhythm sound. Cut at: 200-300Hz to reduce boxiness, 4kHz and above to reduce buzziness.

Compressor: Attack between 10 and 50mS; Release, around 0.3S, Ratio, between 4:1 and 12:1. Because of the noise generated by a typical electric guitar, use in conjunction with a gate or expander is advised.

Reverb: Plate or room, 1.5 to 4S; 30 to 60mS pre-delay.

ACOUSTIC GUITAR

- Use the best mic that you can, preferably a condenser type.
- For a natural tone, position the mic between 12-18ins from the guitar, aiming at where the neck joins the body.
- If recording in stereo, point a second mic towards the centre of the neck, about 12-18ins from the instrument.
- Acoustic guitars sound best in slightly live rooms, if necessary place a piece of acoustically reflective board beneath the player.

Recommended effects/processor settings:

EQ: Boost: between 5kHz and 10kHz to add sparkle. Cut between: 1kHz and 3kHz to reduce harshness, 100 and 200Hz to reduce boom. In busy pop mixes you can cut the low end to produce a more cutting rhythm sound.

Compressor: Attack 20 mS; Release, around 0.5S, Ratio, between 4:1 and 12:1.

Reverb: Bright setting such as Plate to add vitality. Decay time of between 2 to 3S.

BASS GUITAR

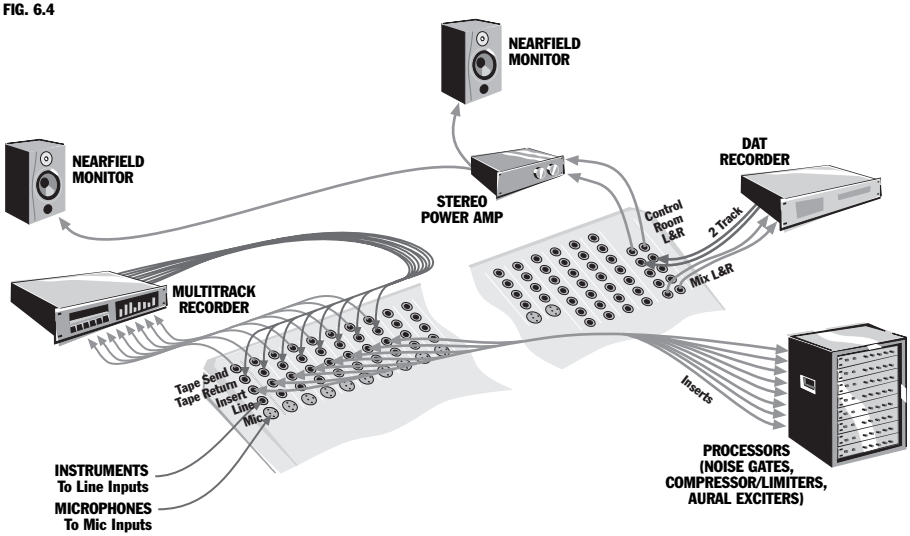
- Most engineers DI the bass via an active DI box and a compressor. This provides a clearer sound.
- Use the compressor to keep signal peaks under control.
- Check the player's technique; the harder the instrument is played, the brighter the tone.
- Consider the use of a budget graphic EQ.

Recommended effects/processor settings:

EQ: Boost: at 80-100Hz to add more weight and punch, between 2 and 4kHz to add edge. Cut: below 50Hz to reduce unwanted rumble, between 180 and 250Hz to reduce boxiness.

Compressor: Attack around 50mS; Release, around 0.4S, Ratio, between 4:1 and 12:1.

FIG. 6.4



KEYBOARDS

- Most electronic keyboards can be plugged directly into the line inputs of the mixing console.
- Bear in mind that the majority of contemporary synthesizers etc, have stereo outputs and will require two mixer channels.
- Most synthesizer sounds can be used without compression, though they do benefit from effects such as reverb or chorus.
- Overdriven keyboard sound may be created by feeding the signal via guitar recording preamp.

H. Planning a Session

- You have a lot to remember during a session, so create a track sheet to keep a log of what instrument is recorded onto what tape track, plus other relevant information.
- Record rhythm sections first; drums, bass, and rhythm guitar.
- Add vocals, solos, and additional instrumentation as overdubs.
- Decide whether you want to add effects at the mixing stage or while recording. If you can, try to keep a copy of the original "dry signal" on tape. You may wish to remix at a later date!
- When recording vocals, ask the singer what instruments they most need to hear in the headphone mix.

I. Creating a Mix

Go into 'neutral' before you start off -

- Set all the Aux Sends to zero.
- Set all EQ controls to their central positions.
- Pull all the faders down.
- All routing buttons 'up'.

Organize your Subgroups

- Put logical groups of sounds together.
- Route drums to a stereo sub-group.
- Consider grouping backing vocals.
- Group multiple keyboards.

Metering

- Use the PFL metering system for each channel in turn to optimize the gain setting.
- The PFL should just go into yellow band of the meter section, although peaking into the red area is acceptable.
- Check all the effects units for correct input levels.
- If fitted, use the Solo In Place function to check individual channels in isolation while retaining their original pan and level settings.

J. Balancing the Mix

If you don't have a lot of mixing experience, it can help to set up the drums and bass balance first, then move onto the vocals and the other instruments. Don't worry about fine tuning the EQ or effects until your dry mix is somewhere near right.

- Satisfy yourself that the mix is working in mono. Check for Phase problems.
- Pan bass drums, bass guitar and lead vocals to centre - this will stabilize the mix.
- Spread other instruments across the stereo stage as required, including backing singers.
- EQ the mix as required.
- Now add stereo effects as necessary to add to the illusion of space and width.
- Check the balance of your final mix by listening to it from the next room through the adjoining door: for some reason, this often shows up whether the vocals are too loud or quiet.

Hints & Tips

- Clean the heads of analogue tape machines before every session. Use cotton buds dipped in Isopropyl Alcohol.
- Check all instrument tunings before each take, because they have a tendency to change as the room warms up.
- Make a pop shield from stocking material stretched across a wire frame. This will minimise vocal "popping".
- Don't skimp on cables and connectors; these can be a source of noise.