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SPIRIT STUDIO *Lc*

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Introduction

Thank you for buying a **SPiRiT STUDIO *Le*** mixer, brought to you with pride by the **SPiRiT** team of Peter, Graham, Martin, Peter, George, Colin, Joe, Colin, Roland, James, Chris, Mukesh, Andy, Candy and Simon. We hope you have as much fun as we did!

Owning a **SPiRiT** console brings you the expertise and support of one of the industry's leading manufacturers and the results of over 20 years experience supporting some of the biggest names in the business.

Built to the highest standards using quality components, **SPiRiT STUDIO *Le*** is designed to be as easy to use as possible, but some time spent NOW, looking through this manual and getting to know your new mixer will give you lots of helpful tips and confidence, away from the pressures of a recording session. **STUDIO *Le*** is an extremely versatile and powerful console, with flexibility provided by the innovative use of the minimum of front panel controls. The console introduces some concepts which may be unfamiliar to many users, and this makes it even more important that the new user should seek a good understanding of all controls as quickly as possible. Don't be afraid to experiment to find out how each control affects the sound - this will only extend your creativity and help you to get the best from your mixer.

Safety Precautions

For your own safety and to avoid invalidation of the warranty please read this section carefully.

The STUDIO *Le* desk must only be connected through the Power Supply Unit supplied.

The wires in the mains lead are coloured in accordance with the following code:

Green and Yellow:	Earth
Blue:	Neutral
Brown:	Live

As the colours of the wires in the mains lead may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol.
- The wire which is coloured Blue must be connected to the terminal in the plug which is marked with the letter N or coloured Black.
- The wire which is coloured Brown must be connected to the terminal in the plug which is marked with the letter L or coloured Red.

Ensure that these colour codings are followed carefully in the event of the plug being changed.

To avoid the risk of fire replace the fuse only with the correct value fuse, as indicated on the power supply.

The power supply contains no user-serviceable parts. Refer all servicing to a qualified service engineer, through the appropriate Soundcraft dealer.

Principles of Operation

SPiRiT STUDIO *Le* is an *In-Line* console design, and this may be a new concept to some users. A brief explanation of the of the basic principles behind the console will help those users to understand why the **STUDIO *Le*** can be so compact, while offering power and flexibility typical of large studio recording consoles. Once the basic principles are understood the operation of the console will be mastered much more quickly.

In-Line consoles differ from the more straightforward Input + Output (Split) configuration by effectively placing these two signal paths on the same physical operating strip. In its simplest form the first path (CHANNEL) receives a variety of sources, and when required can feed this signal direct to a tape track for recording. The second path (MONITOR) normally receives the outputs of the tape machine, to create a monitor mix. By placing these two paths on the same strip the size of the console is substantially reduced, bringing more controls within the comfortable reach of the engineer and providing the opportunity for some powerful features unique to this type of console.

The main sections of the console and their functions are summarised below:

CHANNEL PATH

The *channel path* normally takes input sources to the console, provides an insert point for external processing, EQ, foldback and effects sends, and feeds the resulting signal to a stereo mix or direct to a tape track for recording. In this mode it is essentially identical to the *input* of a traditional *split* console.

MONITOR PATH

The secondary signal path is normally called the *monitor path*, and this is provided by the Input B section. This normally receives the return from the tape machine and can be mixed down to a stereo monitor mix. No EQ or insert is provided in this path in the normal mode.

FLIP

The power and flexibility of the *in-line* design is provided by the FLIP button which interchanges the channel and monitor paths. With FLIP pressed the tape return is routed through the full facilities of the channel path (EQ, insert, Solo-in-Place etc.) without any repatching, and the Mic/Line input can be used as an additional input to the mix (sequenced keyboards perhaps) via the original Input B controls.

SUBMIX INPUT

A separate *submix input* strip provides a simple method of expanding the **STUDIO *Le*** by connecting an external submixer (**SPiRiT FOLIO** or **FOLIO *Si*** are ideal) directly to the Phones, Mix or Mix B signals. This can alternatively be used as an additional general purpose stereo input.

GROUP

The *channel path* can be routed to one or more of eight *audio subgroups* which then allow a number of sources to be fed as a balanced group to the mix under the control of a single fader.

STEREO INPUTS

Four *stereo inputs* provide direct access to the main Mix, Mix B or Phones Mix for stereo effects returns or additional sources such as keyboards or samplers.

MASTER

The *master section* provides overall level control of the Mix, Mix B and Auxiliary Sends, plus headphone monitoring, talkback and test oscillator.

To help you find you way around the mixer the section 'Controls in more detail' explains the function of each front panel control.

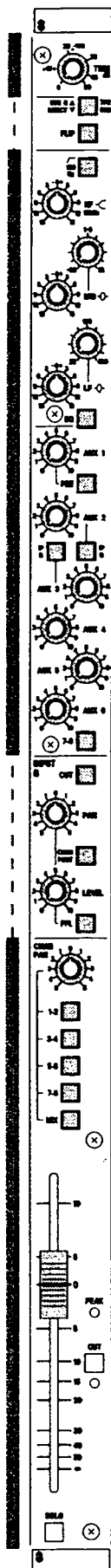
Tips and guidance on how the controls can be used in practice are given throughout this manual. Look out for the boxes in this style.

FINDING YOUR WAY AROUND

The Channel Path

Accepts a variety of SOURCES, provides gain and tone control and the resulting signal can be selectively fed to AUX SENDS for Foldback or Effects or fed directly to tape tracks for recording. Alternatively the channel may route the signal to a stereo mix or GROUPS.

See
Page 6
for Further
detail



The Monitor Path (Input B)

This path normally receives the playback output from the recording machine, and is used to create a dedicated monitor mix (MIX B). FLIP swaps the monitor and channel paths to make the comprehensive channel path facilities available to the relevant tape track at playback.

The Sub Mix Input

This provides a dedicated input for connecting the outputs of a submixer, for instance for handling a large number of keyboards or other instruments. It can also be used as an additional Stereo Return if required.

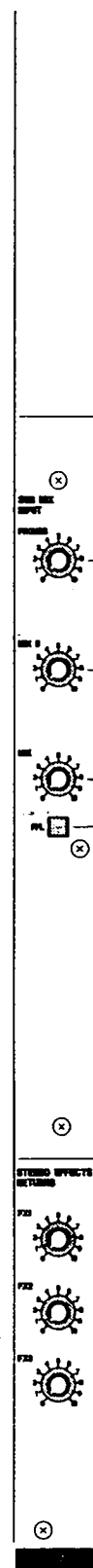
The signal can be mixed directly to phones, Mix B or main Mix.

See
Page 10
for Further
detail

Effects Returns

Three dedicated stereo Effects Returns to Mix.

See
Page 10
for Further
detail



Auxiliary Masters

Masters for the eight Auxiliary Sends

See
Page 12
for Further
detail

Stereo Inputs

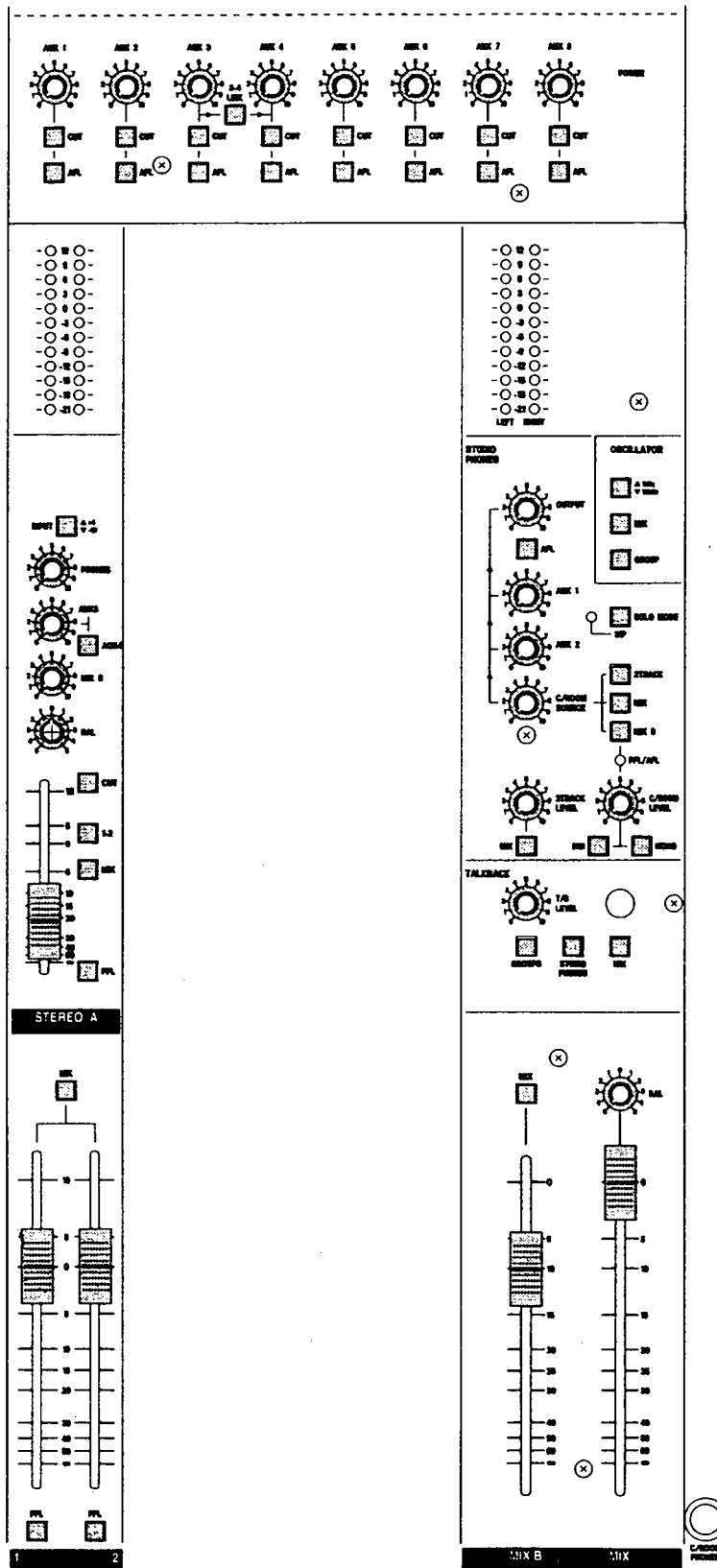
Four Stereo Inputs are included for Effects Returns, Tape Returns or other stereo outboard equipment.

See
Page 11
for Further
detail

Groups

Selected channels can be mixed to one of 8 groups, to be controlled together, or sent as a group to a tape track for recording.

See
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for Further
detail



Master Section

This section comprises central control of headphones and control room monitoring, oscillator, talkback and the PFL & Solo-in-Place systems.

See
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for Further
detail

INITIAL SETTING UP

You will probably use your **SPIRIT STUDIO Le** with a wide range of different types of sound source, and these will be at varying signal levels. It is important to set the TRIM of the inputs correctly to give the best performance.

Set up the individual channel inputs as follows:

- Ensure that all FLP buttons are released and that the master section SOLO MODE button is released.
- Plug in the chosen source (usually the MIC socket for mics and the LINE jack for anything else). Plug in phantom powered mics before switching the phantom power on using the rear panel switch.
- Set the Mix Master Fader fully down and press the MIX button to route the channel signal to the Mix..
- Provide the chosen source with a typical signal level and press the latching SOLO button by the fader. The level of signal will be shown on the right-hand Bargraph Meter (the Left meter will be switched off when the PFL button is down).
- Adjust the input GAIN until the meter is just reaching the amber LED (0dB) at a typical maximum source level with a steady signal. If the source signal is rich in high-level transients (e.g. drums) a rather higher meter reading of +6/+9 will be needed to achieve an equivalent average level. This leaves enough headroom to cope with peaks in the signal without distortion for live work or analogue recording.
If you are using the mixer to record to a DAT machine, remember that, unlike analogue tape machines, they will not tolerate any overload whatsoever before distortion occurs. It is therefore advisable to set a working level of -6 or -12 dB to allow a margin of safety.
- Adjust each input channel in the same way.
- If you find that you cannot set a reasonable level within the range of the GAIN control when using a MIC input, try the LINE input instead.

Stereo inputs A-D do not have a TRIM control, since the typical source for these inputs will be external keyboards or effects units which have a much more predictable signal level. Set the +4/-10 switch to +4 (released) initially, and check the input level with the PFL switch as described above. If the level is too low, switch to the -10 input setting.

SETTING UP FOR MULTITRACK RECORDING

Following the procedure above will ensure that the input channels are correctly adjusted for particular source signals. Multitrack Recording makes additional demands because the mixer is not only required to mix down input signals but also to provide a monitor mix for artists to hear previously recorded tracks when overdubbing new parts. A typical set-up is as follows:

- Connect input sources and set gain as described above. Connect channel Tape Sends to as many tape inputs as required. Press the channel TPE SND (Tape Send) switches on these inputs. This allows an individual source to be sent to an individual tape track. With the switch released the Tape Send will otherwise be fed from the output of one of the eight Groups.
A switch on each channel, accessible from beneath the mixer allows the Tape Send and Return to be matched to either -10dBV signal levels (switch IN) or +4dBu (switch OUT). This enables the mixer to be used with both professional and semi-professional machines.
- If a compressor is to be used, connect this to the Channel insert points.

While it is often useful to add a little compression to vocals to keep the level as even as possible, it should only be used sparingly during recording, because it cannot be undone later. You can always add more during mixing if necessary.

- Connect the tape outputs to the Tape Returns. This makes the tape outputs available on Input B to create a monitor mix if required.
- Connect a monitor amplifier for foldback headphones to STUDIO PHONES or a control room monitor system to the C/RM MONITORS output. Set the amplifier volume to a normal listening level.
- Use the INPUT B LEVEL controls to set up a monitor mix. Select MIX B as the C/ROOM SOURCE
- Connect any effects required using Auxs 3 to 8, and return them to the mixer on one of the four STEREO inputs to allow the effect to be balanced with the original source. Auxs 1 & 2 are best reserved for foldback.

THE CONTROLS IN DETAIL

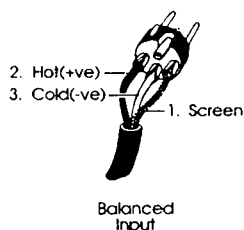
CHANNEL PATH

The channel strip comprises two separate signal paths. The *channel* path provides comprehensive signal control with EQ, auxiliary sends and insert point, and would normally receive the input sources to the console. The alternative *Input B (monitor)* path normally receives the returns from the tape machines. During mixdown the two paths may be *flipped* to make the full facilities of the channel strip available to the return signals and allowing the channel inputs to be used as further input sources to the mix.

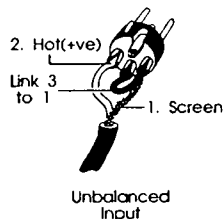
1 TRIM

TRIM adjusts the gain of the signal from either a MIC or LINE input. The MIC input accepts XLR-type connectors and is designed to suit a wide range of BALANCED or UNBALANCED low-level signals, whether from delicate vocals requiring the best low-noise performance or close-miked drum kits needing maximum headroom. Professional dynamic, condenser or ribbon mics are best because these will be LOW IMPEDANCE. While you can use low-cost HIGH IMPEDANCE mics, you do not get the same degree of immunity to interference on the microphone cable and as a result the level of background noise may be higher. If you turn the PHANTOM POWER on (on the rear panel above the XLR) the socket provides a suitable powering voltage for professional condenser mics.

Balanced Mic Input - XLR



Unbalanced Mic Input - XLR

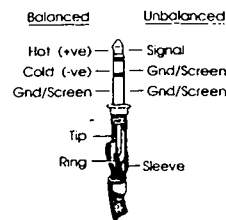


DO NOT use unbalanced sources with the phantom power switched on. The voltage on pins 2 & 3 of the XLR connector may cause serious damage.

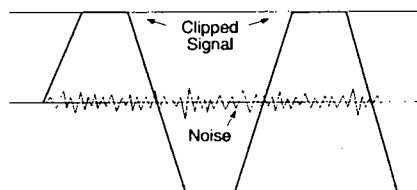
Unplug any mics if you want to use the corresponding LINE Input to avoid the load presented by the mic from affecting the Line Input gain.

The LINE input accepts 3-pole 'A' gauge (TRS) jacks. Use this input for sources other than mics, such as keyboards, drum machines, synths, tape machines or guitars. The input is BALANCED for low noise and immunity from interference, but you can use UNBALANCED sources by wiring up the jacks as shown below, although you should then keep cable lengths as short as possible to minimise interference pick-up on the cable. Unplug anything in the MIC input if you want to use this socket.

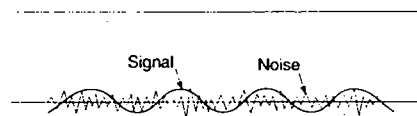
3-Pole Jack



The TRIM knob sets how much of the source signal is sent to the rest of the mixer. Too high, and the signal will distort as it overloads the channel and causes clipping. Too low, and the level of any background hiss will be more noticeable and you may not be able to get enough signal level to the output of the mixer. This is shown in the diagram below:



If the signal level is too high, clipping distortion may occur.



If the signal level is too low it may be masked by the noise.

A mark at the 9 o'clock position indicates unity gain for the LINE input with a +4dBu source. Note that some sound equipment, particularly that intended for domestic use, operates at a lower level (-10dBV) than professional equipment and will therefore need a higher gain setting to give the same output level, indicated by a second mark at approx. 12 o'clock.

2 100Hz HI-PASS FILTER

Pressing this switch reduces the level of bass frequencies only by inserting a 12dB/octave filter.

Use this to reduce 'popping' from microphones, mains hum or stage rumble in live situations.

3 EQUALISER

The Equaliser (EQ) allows precise manipulation of the sound, particularly to improve the sound in live PA applications where the original signal is often far from ideal due to poor acoustics or restrictions on where to place microphones and where slight boosting or cutting of particular voice frequencies can really make a difference to clarity. The EQ allows enough control to improve, for instance, bad recordings or the precision to gently enhance vocal or live instrument tracks. There are three sections: a fixed-frequency HF and swept frequency MID and LF sections, giving the sort of control usually only found on much larger mixers.

The EQ knobs can have a dramatic effect, so use them sparingly and listen carefully as you change any settings so that you get to know how they affect the sound.

HF EQ

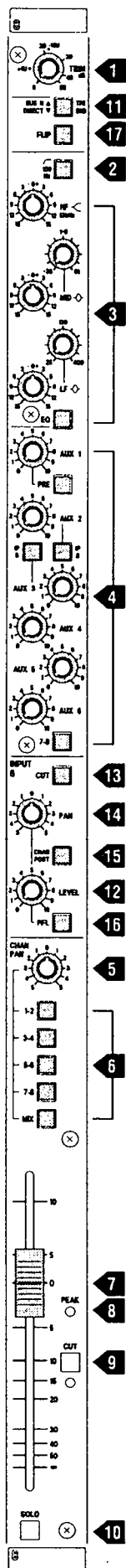
Turn to the right to boost high (treble) frequencies by up to 15dB at 12kHz, adding crispness to cymbals, vocals and electronic instruments. Turn to the left to cut these frequencies by up to 15dB, reducing hiss or other high-frequency components in the signal, which can be emphasised with certain types of microphone. Set the knob in the centre-detented position when a flat response is required.

MID EQ

There are two knobs which work together to form a SWEPT MID EQ. The lower knob provides 15dB of boost and cut, just like the HF EQ knob, but the frequency at which this occurs can be set by the upper knob over a range of 250Hz to 8kHz. This allows some truly creative improvement of the signal in live situations, because this mid band covers the range of most vocals. Listen carefully as you use these controls together to find how particular characteristics of a vocal signal can be enhanced or reduced. Set the lower knob to the centre-detented position when not required.

LF EQ

There are two knobs which work together to form a SWEPT LF EQ. The lower knob provides 15dB of boost and cut, just like the HF EQ knob, but the frequency at which this occurs can be set by the upper knob over a range of 25Hz to 400Hz.



Boosting at a chosen frequencies can add warmth to vocals or extra punch to synths, guitars and drums. Cutting low frequencies can reduce hum, stage rumble or to improve a mushy sound. Set the knob to the centre-detented position when not required.

EQ IN/OUT

When the EQ switch is released the complete EQ section is bypassed. Pressing the switch places the EQ in the channel signal path.

Pressing and releasing the EQ switch gives instant comparison of the treated and untreated signals, to show the effect that the EQ controls are having on the signal.

4 Auxiliary Sends

The channel signal can be routed to any one or more of eight AUXILIARY busses. These combine the sends from each channel, mixing them to separate outputs on the rear of the mixer. Since they are independent of the Mix or Group busses they can provide sources for artists foldback, effects processors or extra loudspeakers in live sound applications. This section is designed to be extremely flexible, and the options for each of the eight channels are shown below. Turn the knobs anticlockwise when not in use.

If you run out of Aux sends, you can use INPUT B as an additional stereo send (Aux 9 & 10) - see the INPUT B section below)

The following table shows the options available with the eight Auxiliary Sends.

AUX	PATH	PRE/POST
1	CHANNEL always	POST or PRE when AUX1-2 PRE pressed
2	CHANNEL or INPUT B if AUX2 IPB pressed	POST or PRE when AUX1-2 PRE pressed
3	CHANNEL or INPUT B if AUX3 IPB pressed	POST always
4	CHANNEL always	POST always
5 & 6 OR 7 & 8 (if 7-8 pressed)	CHANNEL always	POST always

NOTES 1. Pre-fade sends are never CUT and are POST-EQ
2. Post-fade sends are POST-EQ

Using the Auxiliary Sends

PRE-FADE sends are unaffected by fader position or the CUT switch. They would typically be used for Foldback or Monitor feeds, where it is important that, for instance, the mix to artists' headphones is not affected by fader level.

POST-FADE sends would normally be used to feed external signal processing units which are fed back into the console and must fade out with the input channel.

AUX 1 is always in the Channel path, and is therefore ideal as a headphone or monitor feed when switched to PRE.

AUX 2 can be switched to Input B, providing a means of feeding headphones from a tape track.

AUX 3 & 4 may be summed by pressing the 3-4 LINK switch on the Aux Master section. Since Aux 3 may be placed in the INPUT B path, this allows an effects device to be fed from both the Channel and Input B at the same time, for instance for reverb.

5 CHANNEL PAN

The CHAN PAN control sets the amount of the channel signal feeding the Right and Left MIX or odd and even GROUP busses, allowing you to position the source within the stereo image. Rotation fully anticlockwise feeds the signal solely to the Mix Left or odd number Groups, while rotation clockwise sweeps the image to the Mix Right or even Groups.

6 ROUTING

The input channel may be routed to Mix or Groups as selected by the ROUTING switches. The Groups are selected in pairs which may be used as stereo groups or as individual mono groups by panning the channel signal fully left or right.

7 FADER

The long travel FADER gives you smooth level control of the channel signal, allowing precise balancing of the various source signals being fed to the Mix or Groups. Normal operating position should be at about 0dB, giving 10dB in hand above normal operating level. Careful setting up of the input TRIM will ensure that this optimum position is achieved.

8 PEAK LED

The PEAK LED indicator warns when an excessively high signal level is present in the channel. The signal is sampled just after the EQ section and the LED will light approximately 4dB before clipping. This point is post-insert, and will therefore take into account the effect of any equipment connected to the Insert jack.

9 CUT

The CUT switch mutes the channel signal, and an adjacent LED lights when CUT is active.

10 SOLO

Pressing the SOLO switch routes the channel signal to the Studio Phones and Right Meter for monitoring or level matching. It is normally a PFL (Pre Fade Listen) function, but becomes a Solo-in-Place when SOLO MODE on the Master section is pressed. This allows the channel to be monitored in its true stereo position, including any effects which may have been added.

11 TAPE SEND

The TAPE SEND on each channel is normally fed by one of the eight Group busses. For example Group 1 feeds the tape sends on channels 1, 9 & 17, Group 2 feeds the send on channels 2, 10 & 18 etc. This enables grouped signals to feed an individual tape track. When TPE SND is pressed the Group feed is replaced by the post-EQ output (DIRECT output) from the channel fader to enable the 'dry' channel signal to be sent direct to a tape track.

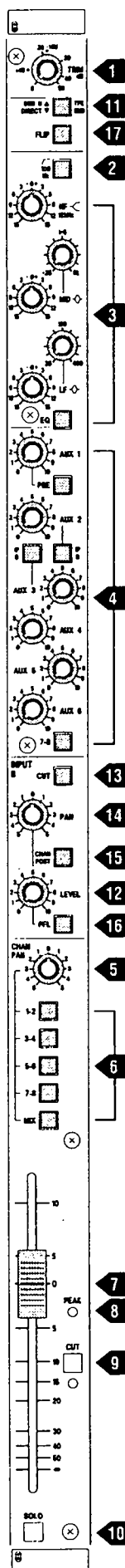
INPUT B

12 LEVEL

The second signal path in the channel strip is INPUT B, and this normally receives the TAPE RETURN. LEVEL acts as a fader on the return signal.

13 CUT

Pressing CUT mutes the input B signal.



14 PAN

The Input B signal is normally fed to stereo MIX B. The PAN control sets the amount of the channel signal feeding MIX B Left and Right, allowing you to position the signal within the stereo image. Rotation fully anticlockwise feeds the signal solely to Mix B Left, while rotation clockwise sweeps the image to Mix B Right.

15 CHANNEL POST

CHN PST (Channel Post) extends the versatility of the channel by swapping the Input B source from the Tape Return to the Channel Post-Fade signal, creating an additional stereo auxiliary send from the channel (Aux 9 & 10). The MIX B master then becomes an AUXILIARY 9 & 10 master, with the advantage of a pre-fade Insert point.

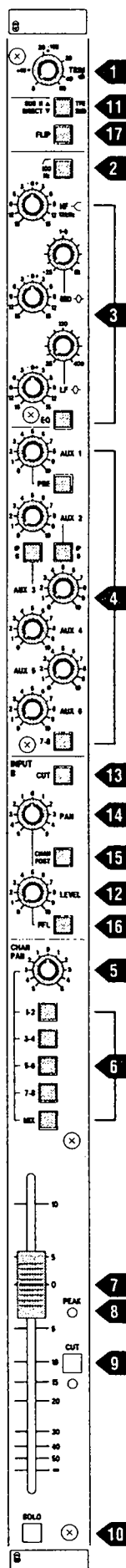
16 PFL

When the PFL switch is pressed the pre-fade signal is fed to the headphones or monitor outputs, replacing the selected source. The PFL/AFL LED on the Master section illuminates to warn that the headphones, monitor outputs and right bargraph meter are now responding to the PFL/AFL selection. This is a useful way of listening to one or more signals without interrupting the main mix, for adjusting signal quality, level matching or simply to check that it is there!

17 FLIP

Pressing FLIP swaps over the *channel* and *monitor* (Input B) signal paths, allowing the tape return to have access to the comprehensive EQ, auxiliary facilities and the long-throw fader. This saves a considerable amount of repatching at mixdown, and leaves the original channel inputs available as additional inputs to the mix.

Press FLIP at mixdown to give long travel faders on the tape returns.



SUB MIX INPUT

18 SUB MIX INPUT

The stereo SUB MIX INPUT enables another mixing console to be connected as a submixer without using up valuable channel inputs. The input is electronically balanced on 3-pole 'A' gauge (TRS) jacks. See opposite for connection details.

A mono source plugged into the left jack feeds both sides in mono.

19 PHONES

The PHONES control feeds the stereo submix signal from the submix input to the Studio Phones mix.

20 MIX B

The MIX B control feeds the stereo submix signal from the submix input to the MIX B busses.

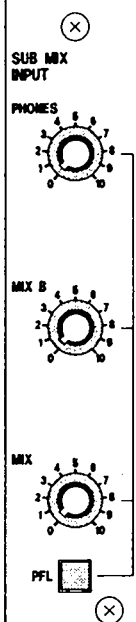
If MIX B is being used as Aux 9/10, this control becomes a stereo Aux Send.

21 MIX

The MIX control feeds the stereo submix signal from the submix input to the main Mix

22

When the PFL switch is pressed a mono sum of the submix signal is fed to the headphones or monitor outputs, replacing the selected source. The PFL/AFL LED on the Master section illuminates to warn that the headphones, monitor outputs and right bargraph meter are now responding to the PFL/AFL selection.



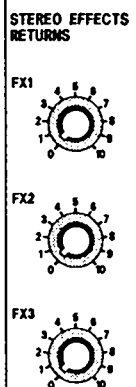
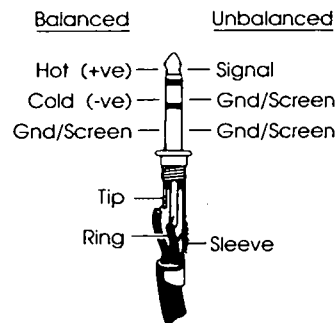
STEREO EFFECTS RETURNS 1-3

23 STEREO EFFECTS RETURNS

Three unbalanced stereo EFFECTS RETURNS are provided, with individual LEVEL controls, to bring external effects units back into the mix.

A mono source plugged into the left jack feeds both sides in mono.

3-Pole Jack

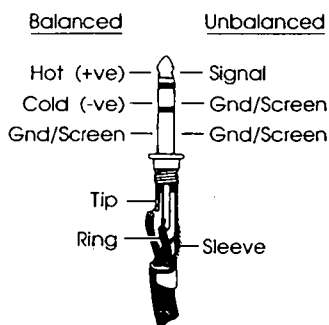


23

STEREO INPUTS A-D

Four STEREO INPUTS are provided on 3-pole 'A' gauge (TRS) jacks. A mono source plugged into the left jack feeds both sides in mono. Use these inputs for sources such as keyboards, drum machines, synths, tape machines or as returns from processing units. The inputs are **BALANCED** for low noise and immunity from interference, but you can use **UNBALANCED** sources by wiring up the jacks as shown, although you should then keep cable lengths as short as possible to minimise interference pick-up.

3-Pole Jack



24 INPUT +4/-10

Most professional equipment uses input and output levels of +4dBu, but semi-professional tape machines or hi-fi systems use a lower level of -10dBV. This switch allows you to match the sources connected to the Stereo input jacks to either standard, which is important to ensure the best possible sound quality. If you are not sure what input level is appropriate, start with the switch **UP** to select +4dBu. If you are unable to achieve an adequate signal level (even with the fader at maximum), press the switch in for -10dBV.

25 FADER

The linear **FADER** controls the overall signal level in the input strip. It is important that the input level is set correctly with the +4/-10 switch to give maximum travel on the fader which should normally be used at around the '0' mark.

26 BALANCE

This control sets the L/R balance of the channel signal feeding **MIX B** or the routing switches. When the control is turned fully right or left you feed only that side of the signal to the mix. Unity gain is provided by the control in the centre-detented position.

27 ROUTING

The stereo signal may be routed to either or both of the **MIX** or the **Group** immediately below by pressing the respective buttons. The proportion of the signal feeding Left or Right is set by the **BAL** control (see above).

If no other routing is set up the signal is fed only to the monitor, providing a 'wet' monitor signal when recording.

24

29

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28 CUT

31

The stereo signal is muted when the **CUT** switch is pressed.

26

29 PHONES

28

The stereo signal may be fed to the **Studio PHONES** mix using this control. A typical application would be to add reverb to the artists headphone mix. The **PHONES** control is pre-fade, pre-CUT and is therefore unaffected by the **CUT**, **Routing** or **Balance** controls.

27

25

30 AUXILIARY SENDS

32

The stereo input is provided with access to either **AUX 3**, or **AUX 4** if the **AUX 4** switch is pressed. The feed is always post-fade, with the level set by the rotary control.

34

Effects can be chained together by feeding one effect to **Aux 3** or **4** and bringing the respective **Aux** output back via a second effects unit into another **Stereo Input**.

31 MIX B

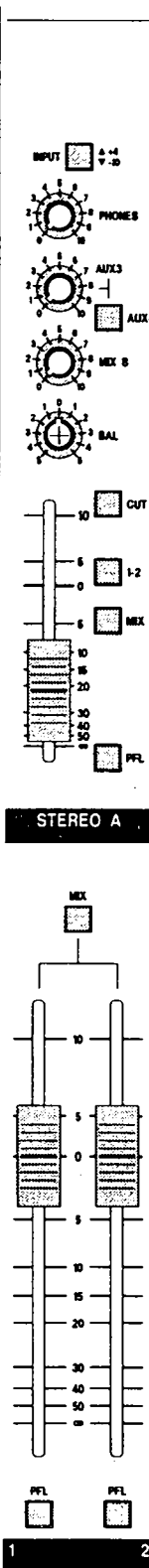
33

The post-fade stereo signal may be sent to the **MIX B** busses using this control, subject also to the position of the **Balance** control.

32 PFL

35

When the **PFL** (Pre-Fade-Listen) switch is pressed a mono sum of the pre-fade signal is fed to the monitor output or headphones, replacing the normal source. The **PFL/AFL** LED on the Master section illuminates to warn that the headphones, monitor outputs and right bargraph meter are now responding to the **PFL/AFL** selection.



GROUPS

33 GROUP FADERS

Eight audio GROUPS are provided, each with a long travel FADER controlling overall level. These allow the subgrouping of a number of instruments or voices under the control of a single fader.

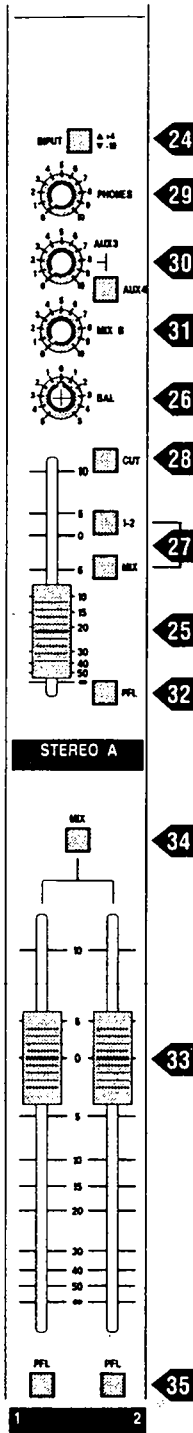
A 12 segment BARGRAPH METER above each section displays the Group output level. Each Group is provided with an unbalanced Insert point to patch in an external signal processing unit.

34 MIX

The MIX switch routes odd numbered Group signals to the Mix Left bus and even numbered Group signals to the Mix Right bus.

35 PFL

When the PFL (Pre-Fade-Listen) switch is pressed the pre-fade, post-insert signal is fed to the monitor output or headphones, replacing the normal source. The PFL/AFL LED on the Master section illuminates to warn that the headphones, monitor outputs and right bargraph meter are now responding to the PFL/AFL selection.



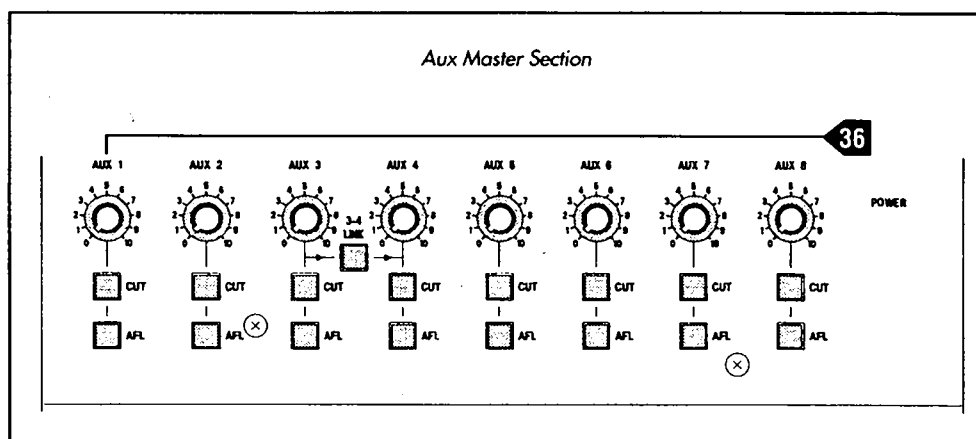
AUX MASTERS

36 AUXILIARY MASTERS

Eight AUXILIARY MASTERS provide overall level control for each auxiliary bus. An associated CUT switch mutes the Auxiliary output when pressed, and the Auxiliary signal may be monitored by pressing the AFL (After Fade Listen) switch.

Aux 3 may be summed into Aux 4 using the 3-4 LINK switch, to enable the use of an effect in both channel and monitor paths.

All Auxiliary outputs are ground compensated to minimise mains hum.

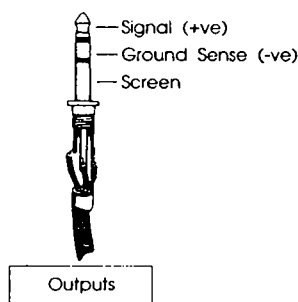


MASTER SECTION

The Master section comprises the master level controls for the Mix and Mix B outputs, Studio Phones and Monitor outputs, Oscillator, Talkback and Solo/PFL functions.

37 MIX B FADER

The long travel stereo FADER controls the output level of MIX B. The outputs are ground compensated on 3-pole 'A' gauge (TRS) jacks. MIX B would normally be used as the Monitor Mix, but can also be used as an additional Auxiliary Send (with CHAN POST pressed on each channel) or as separate submix outputs at mixdown, for instance for sequenced keyboards. An unbalanced insert point is provided to allow external processing units to be patched into the mix.



38 MIX

When MIX B is being used as a submix, the MIX switch may be used to add the MIX B outputs to the main Mix.

39 MIX FADER

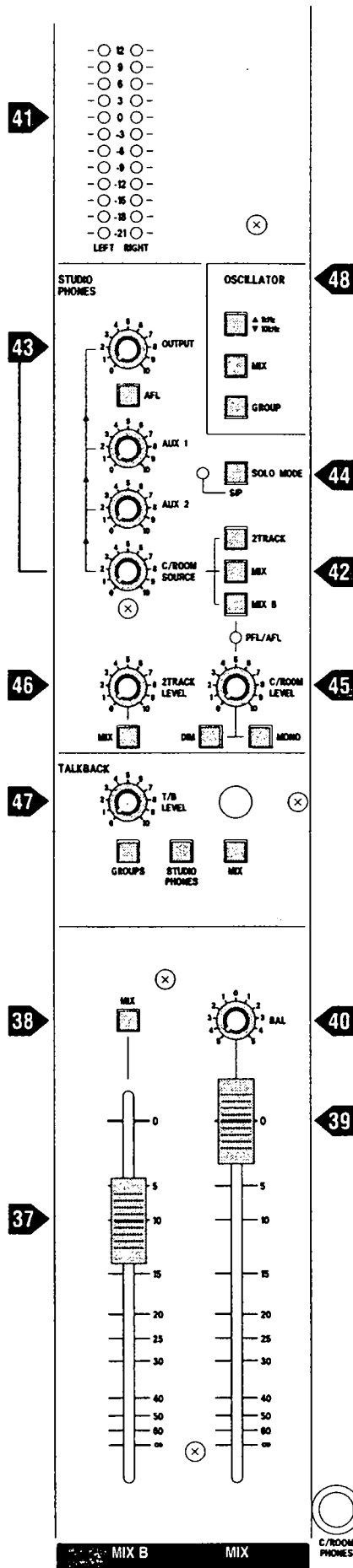
The long travel stereo FADER controls the output level of the main MIX. The outputs are ground compensated on 3-pole 'A' gauge (TRS) jacks (see connections above). Left and Right unbalanced Insert points are provided for external processing equipment.

40 BALANCE

The pre-insert BAL (Balance) control provides fine adjustment of the stereo image.

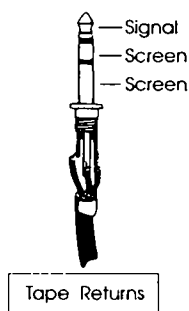
41 BARGRAPH METERS

Two 12-segment PPM METERS display any selection of the MIX, MIX B outputs or 2TRACK input. When any SOLO or AFL is pressed the left meter is muted and the right meter displays the selected solo level.



46 2 TRACK LEVEL

The stereo 2TRACK returns are balanced on 3-pole 'A' gauge (TRS) jacks. A mono source plugged into the left jack feeds both sides in mono. The signal is fed to the Studio Phones section, or to the main mix if MIX is pressed. This allows the input to be used as an additional stereo input if required.



47 TALKBACK

The signal from a built-in electret TALKBACK microphone may be fed to the GROUPS, STUDIO PHONES or MIX as selected by the three switches, allowing the engineer to communicate with artists during recording sessions. Talkback LEVEL is set by the rotary control. Pressing any of the destination switches dims the C/Room output.

48 OSCILLATOR

The built-in OSCILLATOR provides a test tone at 1kHz or 10kHz for system tests or aligning Tape Machines. The top switch selects the required frequency, while pressing the MIX or GROUP switches activates the oscillator and feeds the tone to the respective output.

BE CAREFUL NOT TO ACTIVATE THE OSCILLATOR BY MISTAKE, WITH THE AMPLIFIERS TURNED UP HIGH - a sudden, very loud burst of tone will not do your ears or your loudspeakers any good!

STUDIO PHONES

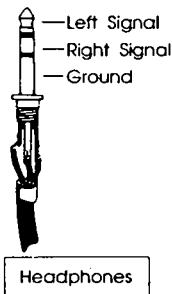
42 C/ROOM SOURCE

Two separate monitor and phones sections are provided - Studio and Control Room. The C/Room Source switches select a choice of Mix, Mix B or 2Track as one of the feeds to both sections.

43 STUDIO PHONES

The stereo STUDIO PHONES output provides a very flexible means of setting up a musicians' headphone mix from a variety of sources. Rotary controls allow a choice of any combination of Aux 1, Aux 2 and the Control Room source (see above). In addition the PHONES controls on the four Stereo Inputs and the Sub Mix input feed directly to the Studio Phones mix, to enable, for instance, reverb to be added to artists headphone mixes.

Use the C/ROOM SOURCE selection as a quick method of producing a rough headphone mix, selected to MIX or MIX B.

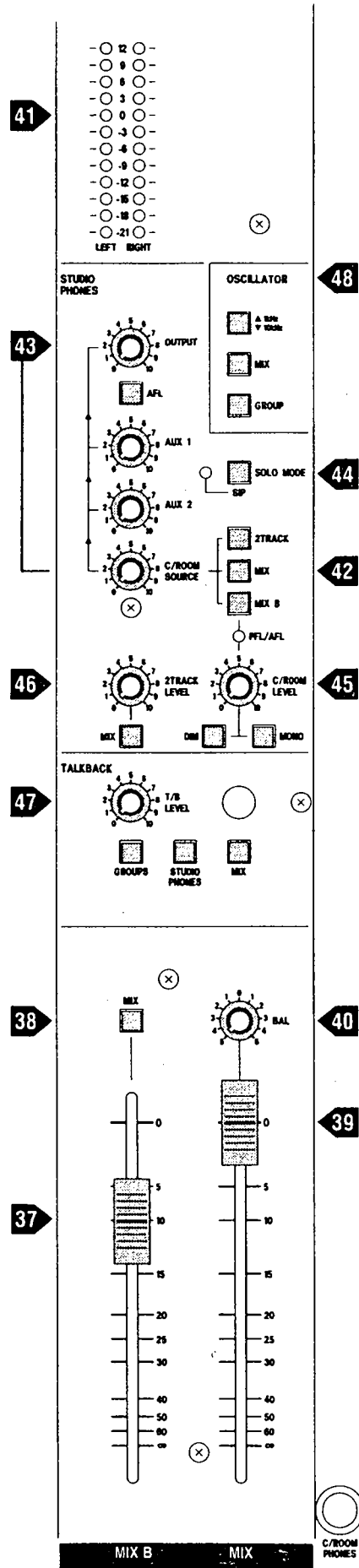


44 SOLO MODE

All channel SOLO switches are normally a non-destructive PFL (Pre-Fade-Listen). When SOLO MODE is pressed SOLO-IN-PLACE mode is activated, and the SIP LED will illuminate. If any channel SOLO switch is pressed all other channels are cut, leaving the selected channel, complete with effects in the mix. The SIP LED then flashes to indicate that a SOLO is active. Input B, 2TRACK and Returns are not affected.

45 CONTROL ROOM LEVEL

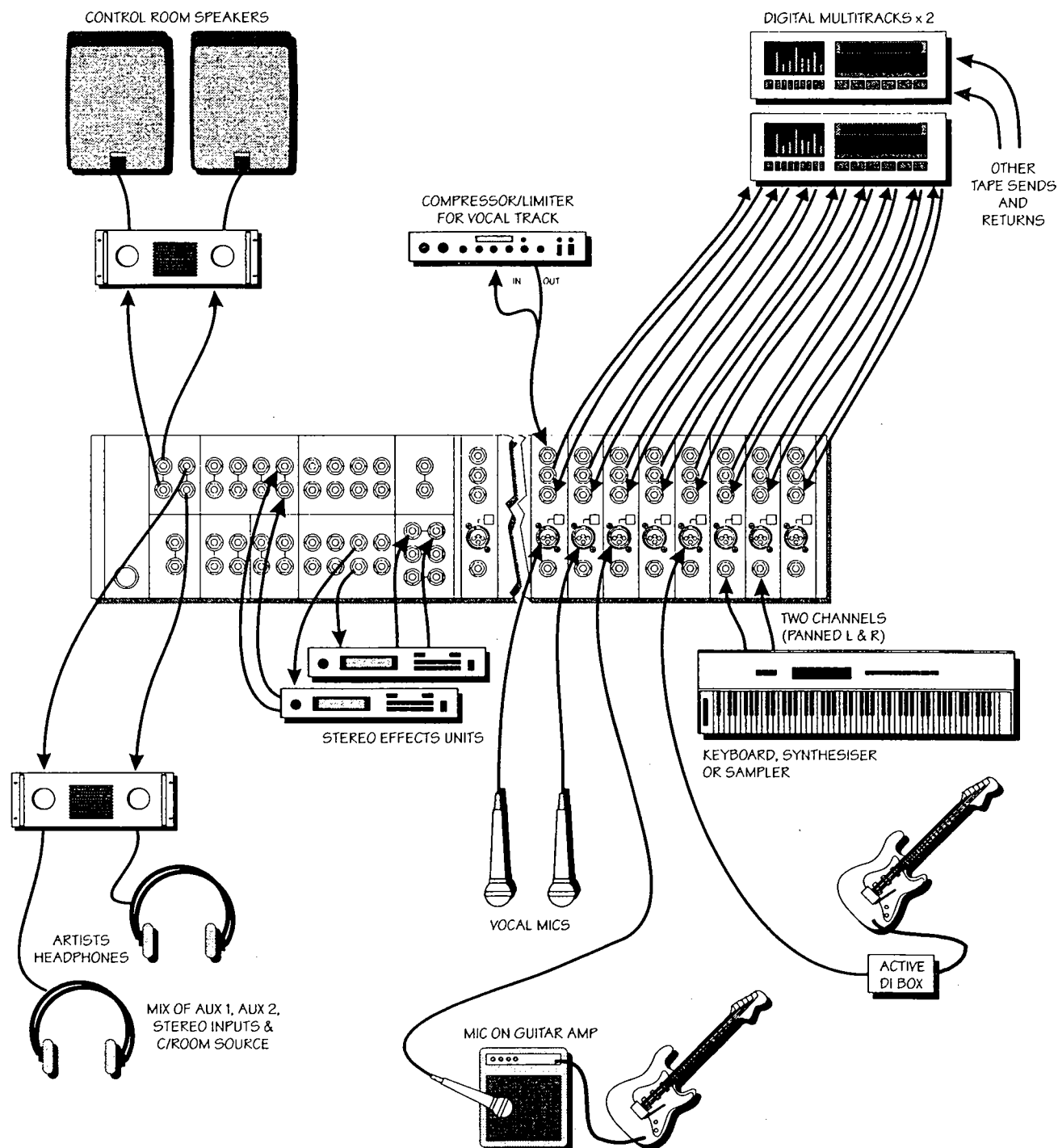
C/ROOM LEVEL controls the output level to the CRM L & R jacks and C/ROOM PHONES. It receives the output from the C/Room Source switches (see above) or, if PFL/AFL lit, the PFL signal. If headphones are inserted the Control Room outputs are muted.



Applications

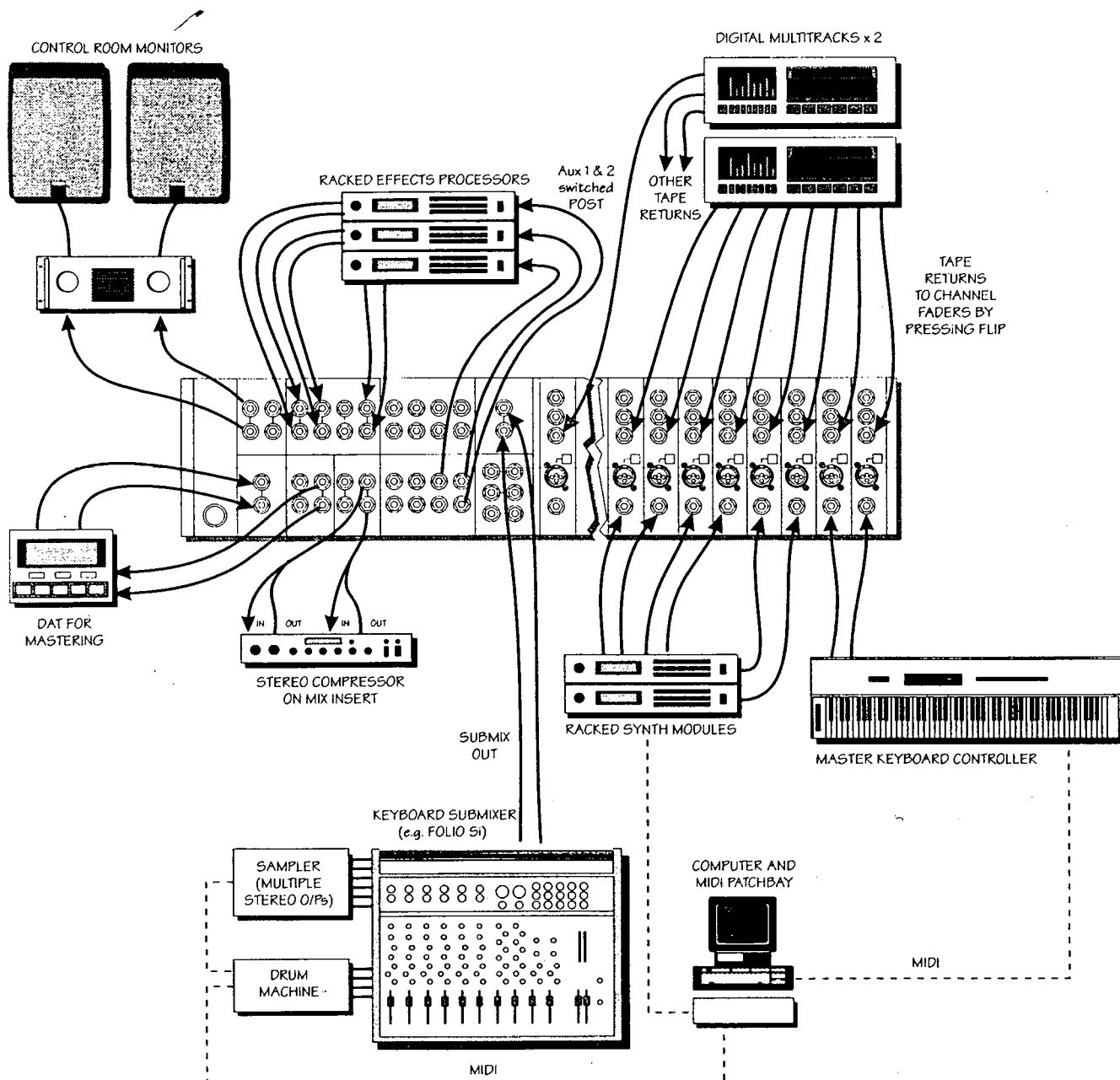
Recording

In this example individual instrument or vocal tracks are recorded on Digital Multitracks by pressing the Tape Send switch, thus selecting the channel post-fade signal as the source. The returns from the Multitracks are brought back for monitoring on the Tape Returns (Input B). If you are short of tape tracks, a number of sources can be routed to a Group and fed to a selected recording track by deselecting the Tape Send switch on the appropriate channel module. This might be particularly useful for a stereo group comprising vocals or an instrument section. A compressor is included on the insert of one of the vocal channels and Effects fed from Aux 3 to 8 (3 & 4 shown) and returned on Stereo A and FX1. An Artists Phones mix is derived from the Studio Phones output, fed from the channel Aux 1 & 2 sends and Control Room source, with the 'wet' signal added from the Stereo Return if required. Note that the Stereo Returns may also feed effects to Mix or Mix B to produce a wet monitor mix.



Mixdown

In this example the Digital Multitracks are connected in the same way as for recording, but the FLIP button gives the option to now bring the tape returns through the main channel path and long fader. The illustration shows how other MIDI sources can be mixed in through the channel inputs, or via an external submixer. The Sub Groups may be used to combine selected inputs under the control of a single Group fader, which may be routed to Mix. The Mix outputs are fed to a DAT machine for mastering, with the option of compression in the Mix Insert. Aux Sends are used to provide Effects if required, returned to the console via Stereo Inputs.

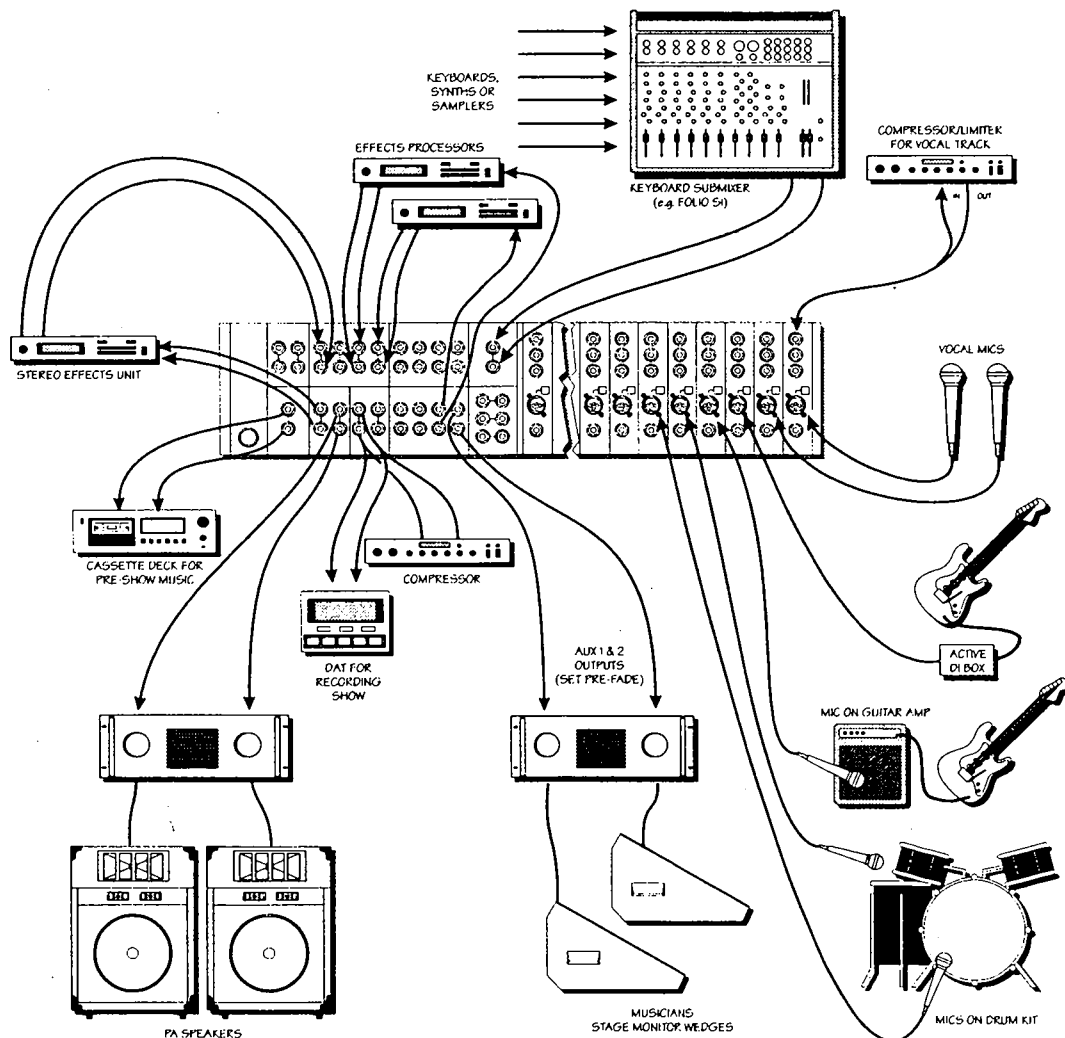


This example illustrates how the console may be configured for sound reinforcement applications. Sources are fed to channel Mic or Line inputs as required, mixed to a stereo PA feed on the main Mix outputs. Mix B is used to generate a separate send to an Effects Processor, returned on Stereo D. The source for this feed could also be Aux 2 (with INPUT B switch pressed, normally post-fade) or Aux 3 (with INPUT B switch pressed). Additional Effects can be provided on Aux 3 to 8, returned on Stereo A & B. A separate keyboard/instrument submix is included, connected to the submix inputs. Foldback mixes can be fed from the Aux 1 & 2 as shown (switched PRE and in the Channel path). Pre-show music is provided by a cassette machine, connected to the 2Track Returns. A compressor is included in the Mix insert point.

Recording a Live Show

The console offers a number of different options for connecting a tape machine to record a show. You could split the Mix output to feed the recording machine in parallel with the main PA, or take a pre-fade send from the mix insert point. The diagram shows a DAT machine sharing the Mix insert send with the compressor, connected via a 'Y' lead or, similarly, a post-compressor feed could be used by a 'Y' lead at the compressor output. Alternatively the Studio Phones could be used as a send to the DAT, fed from the C/Room source with MIX selected (in this case the source must not be changed during the show).

While the main mix is optimised for the live sound, this may not be ideal for a recording, and if Mix B is not being used, you may use this output to set up a completely separate mix for the show recording. In this case the channel CHN PST switches should be pressed, feeding Mix B with the channel post-fade signal. The Mix B output feeds the recording machine, with the option of the Mix B insert point for compression if required.



Technical Specifications

E.I.N.

Mic input, source 150Ω, max. gain -129dBu

OUTPUT NOISE

Any output, fader or master down < 95dBu

BUS NOISE @ 1kHz

24 channels routed, input faders down, masters up

Mix -80dBu

Mix B -83dBu

Any Aux output, master at max. -82dBu

CROSSTALK @ 1kHz

Typical fader cut-off > 95dB

Typical Aux Send cut-off > 90dB

Channel mute > 90dB

Routing switch isolation > 90dB

Pan control stereo isolation > 65dB

C.M.R.R @ 1kHz

Mic input at Max Gain -70dB

Line input at Unity Gain -51dB

DISTORTION

Line input to Mix or Group, via EQ (set flat) at unity gain,

+20dBu input and output, typical 0.008%

Stereo Returns to Mix at 20dBu 0.003%

Mic at 30dB sensitivity, -14dBu in, +20dBu at Mix output 0.006%

FREQUENCY RESPONSE

Any input to any output, 20Hz to 20kHz ± 0.5dB

MAXIMUM OUTPUT LEVELS

Any output max. level into 10kΩ +21dBu

MAXIMUM INPUT LEVELS

Mic input at minimum +14dBu

Line input at minimum +21dBu

Tape Return (set to +4dBu input) +25dBu

Stereo Return (set to +4dBu input) +25dBu

2Track Return +21dBu

Sub Mix input +21dBu

INPUT & OUTPUT IMPEDANCES

Any Output < 80Ω

Mic inputs 2kΩ

Line inputs 10kΩ

Stereo Returns 10kΩ

Insert Returns 3kΩ

Tape Returns 10kΩ

2Track Returns 10kΩ

Sub Mix input 10kΩ

WEIGHT

16 Channel 26kg

24 Channel 28kg

32 Channel 30kg

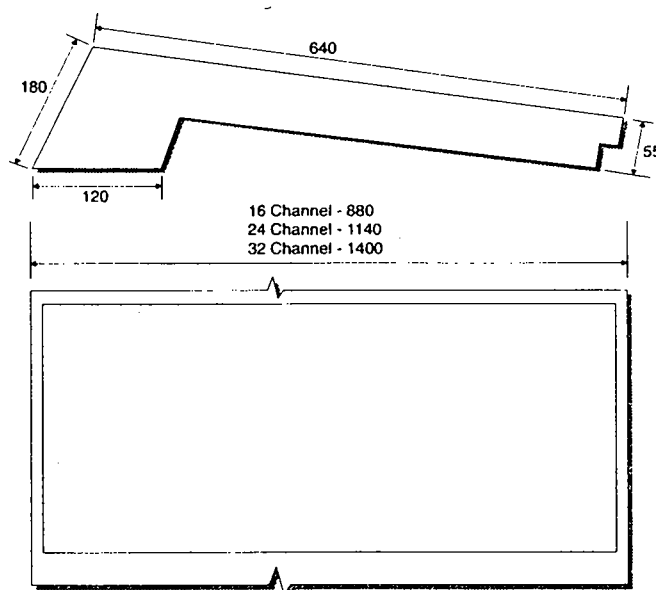
POWER SUPPLIES

16 & 24 Channel consoles CPS150

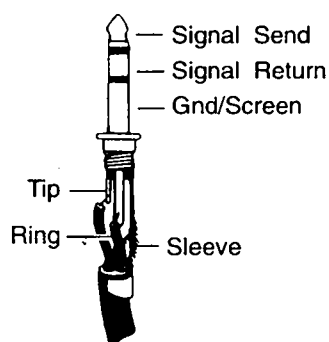
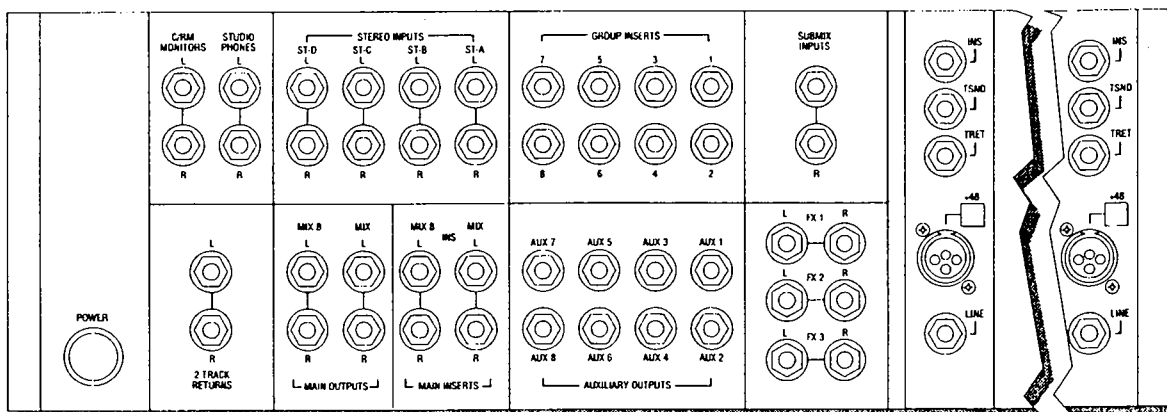
32 Channel CPS450

DIMENSIONS

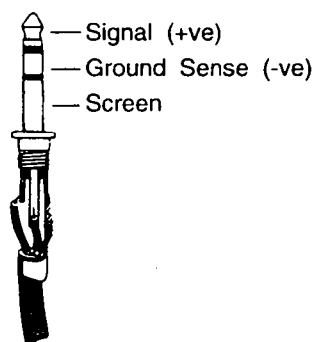
All dimensions are in millimetres



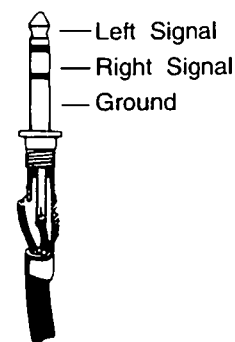
Connections



Inserts



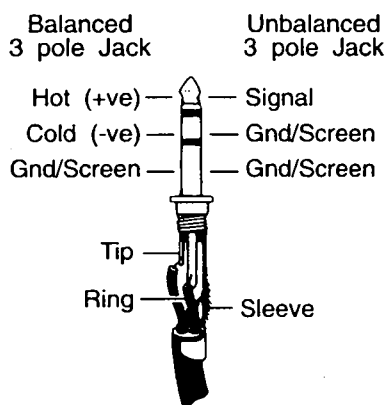
Mix Outputs
Aux Outputs
Monitor Outputs
Tape Sends



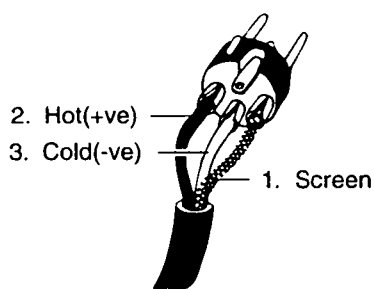
Headphones

INPUTS & TAPE RETURNS

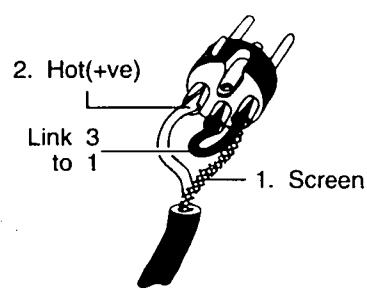
(Note: All inputs are balanced, but unbalanced sources may be used as shown)



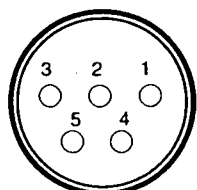
Balanced Mic XLR



Unbalanced Mic XLR



POWER CONNECTOR PINOUTS



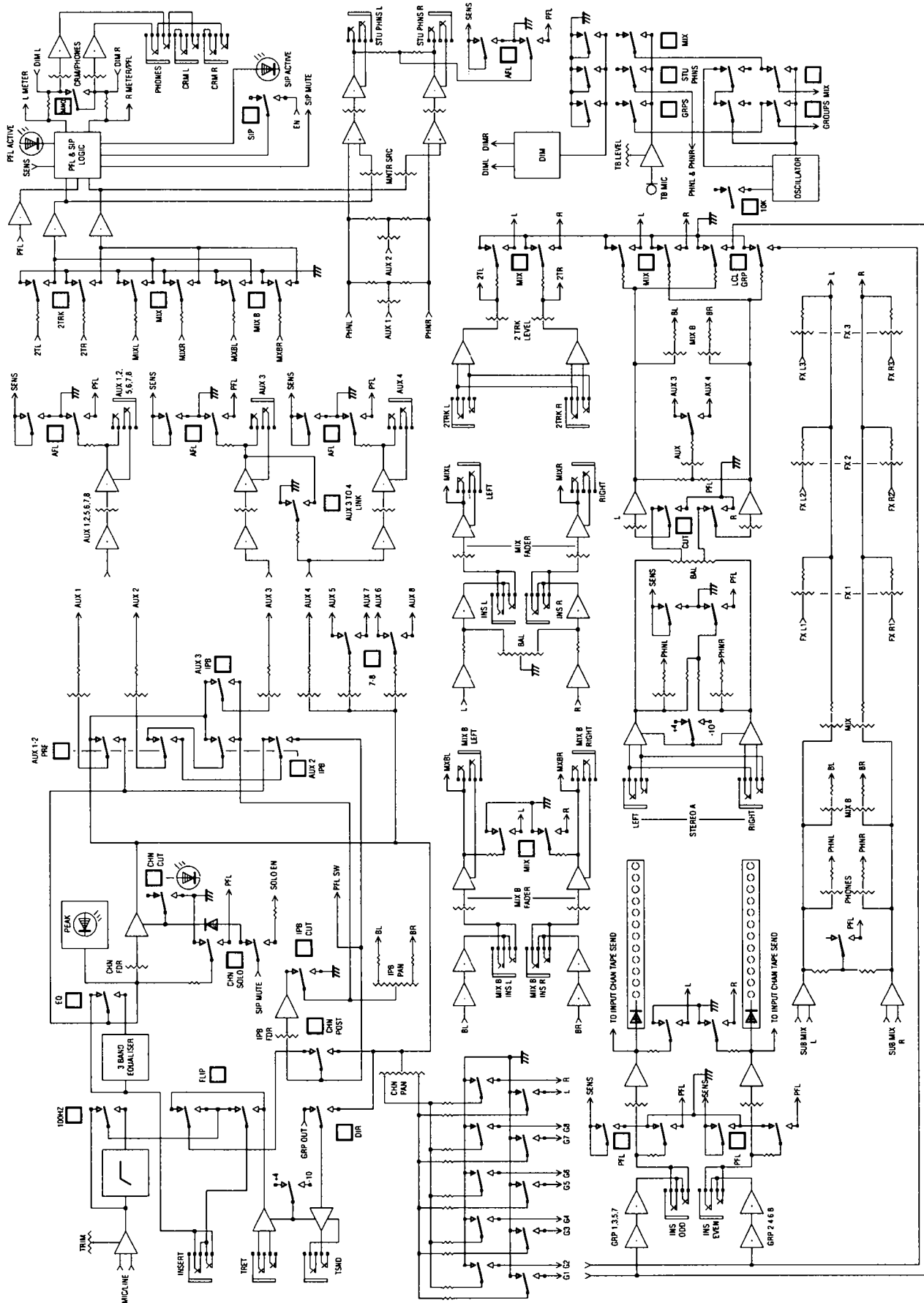
(viewed from cable end)

Pin 1	GND
Pin 2	GND
Pin 3	+48V
Pin 4	+17V
Pin 5	-17V

Glossary

AFL (After Fade Listen)	a function that allows the operator to monitor the post-fade signal in a channel independently of the main mix.
Balance	the relative levels of the left and right channels of a stereo signal.
Balanced	a method of audio connection which 'balances' the signal between two wires and a screen which carries no signal. Any interference is picked up equally by the two wires, but out of phase resulting in cancellation of the interference signal.
Clipping	the onset of severe distortion in the signal path, usually caused by the peak signal voltage being limited by the circuit's power supply voltage.
dB (decibel)	a ratio of two voltages or signal levels, expressed by the equation $dB=20\log_{10} (V1/V2)$. Adding the suffix 'u' denotes the ratio is relative to 0.775V RMS.
DI	(direct injection) the practice of connecting an electric musical instrument directly to the input of the mixing console, rather than to an amplifier and loudspeaker which is covered by a microphone feeding the console.
Effects	the use of devices to alter or process the sound to add special effects e.g. reverb, normally as a mix of the original ('dry') sound and the treated version.
Equaliser	a device that allows the boosting or cutting of selected bands of frequencies in the signal path.
Feedback	the 'howling' sound caused by bringing a microphone too close to a loudspeaker driven from its amplified signal.
Foldback	a feed sent back to the artistes via loudspeakers or headphones to enable them to monitor the sounds they are producing.
Frequency response	the variation in gain of a device with frequency.
Ground Compensation	a technique used on unbalanced outputs to cancel out the effect of ground loops caused by connections to external equipment.
Headroom	the available signal range above the nominal level before clipping occurs.
High Pass filter	a filter that rejects low frequencies.
Line level signals	at a nominal level of -10 to +6dBu, usually coming from a low impedance source.
Oscillator	a built-in tone generator for test and line-up purposes.
Peaking	an equaliser response curve affecting only a band of frequencies i.e. based on a bandpass response.
PFL (pre-fade listen)	a function that allows the operator to monitor the pre-fade signal in a channel independently of the main mix.
Phantom Power	the +48V d.c. voltage applied equally to the two signal pins of a balanced mic input to provide powering for condenser microphones.
Post-Fade	the point in the signal path <i>after</i> the channel or master fader and therefore affected by fader position.
Processor	a device which affects the whole of the signal passing through it, e.g. gate, compressor or equaliser
Rolloff	a fall in gain at the extremes of the frequency response.
Shelving	an equaliser response affecting all frequencies above or below the break frequency i.e. a highpass or lowpass derived response.
Signal to Noise Ratio	a expression of the difference in level between the audio signal and background system noise.
Spill	acoustic interference from other sources.
Sweep EQ	an Equaliser section (e.g. MID EQ) which operates at a variable rather than fixed frequency giving increased flexibility to the user.
Talkback	the operator speaking to the artistes or to tape via the auxiliary or group outputs.
Tape Return	a line level input provided specifically to receive the playback output of a tape machine
Transient	a momentary rise in the signal level.
TRS Jacks	a 3-pole jack with Tip, Ring and Sleeve connections
Unbalanced	a method of audio connection which uses a single signal wire and the cable screen as the signal return. This method does not provide the noise immunity of a <i>balanced input</i> (see above).

System Block Diagram



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Part No. ZM0052