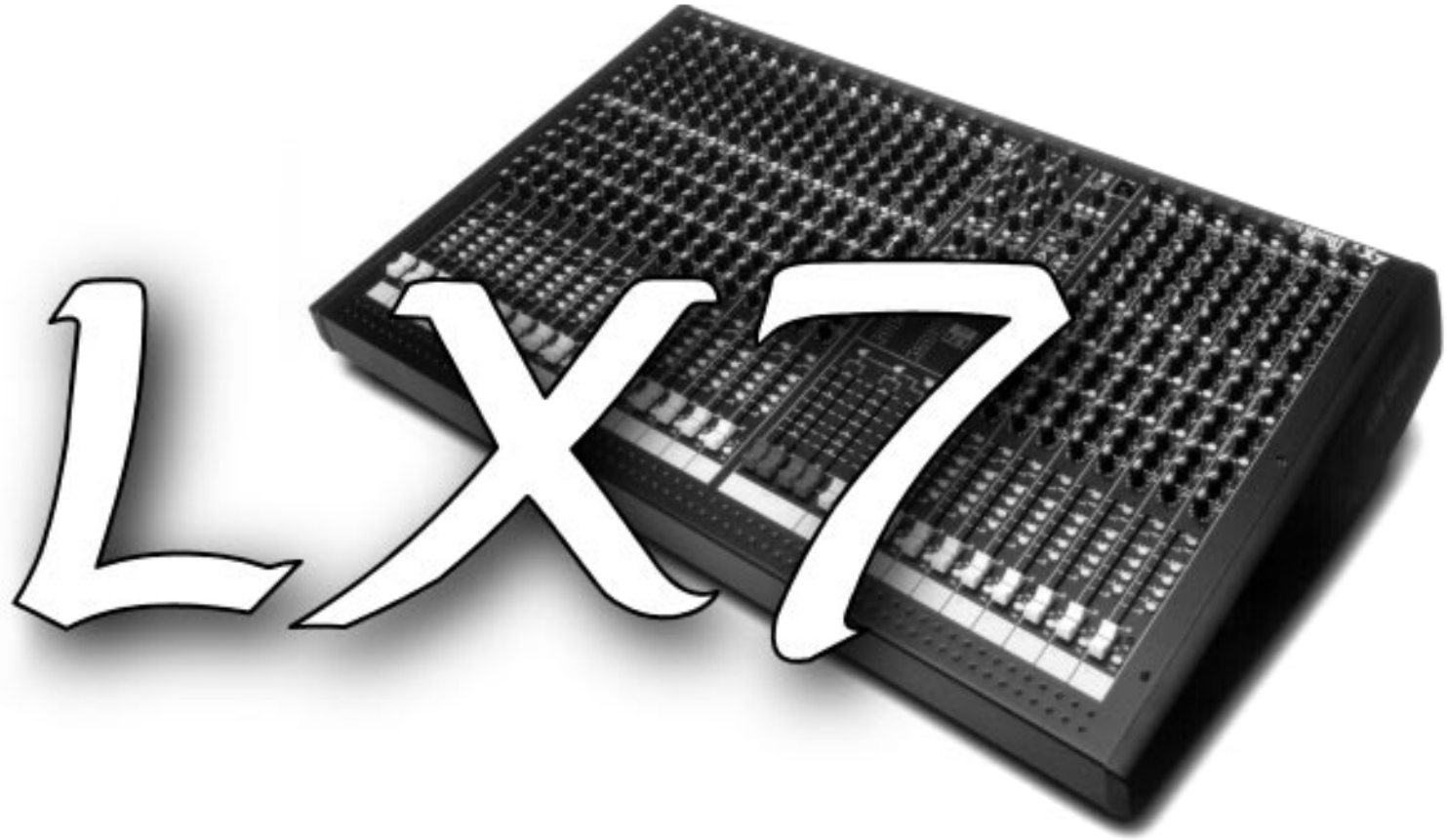
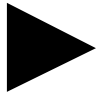
SPIRIT
By Soundcraft



USERS GUIDE

Featuring ™ ULTRA MIC

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



INTRODUCTION

Thank you for purchasing an LX7 mixer, brought to you with pride by the SPIRIT team of Andy, Colin, Chris, James, Simon, Mukesh, Graham, Martin, Paul, Tony and Peter, with the support of many others - we hope you will have as much fun using it as we did building it!

SAFETY PRECAUTIONS

WARNING: THIS UNIT MUST BE EARTHED
Under no circumstances should the mains earth be disconnected from the mains lead.

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

Earth: Green and Yellow (Green/Yellow - US)

Neutral: Blue (White - US)

Live: Brown (Black - US)

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:

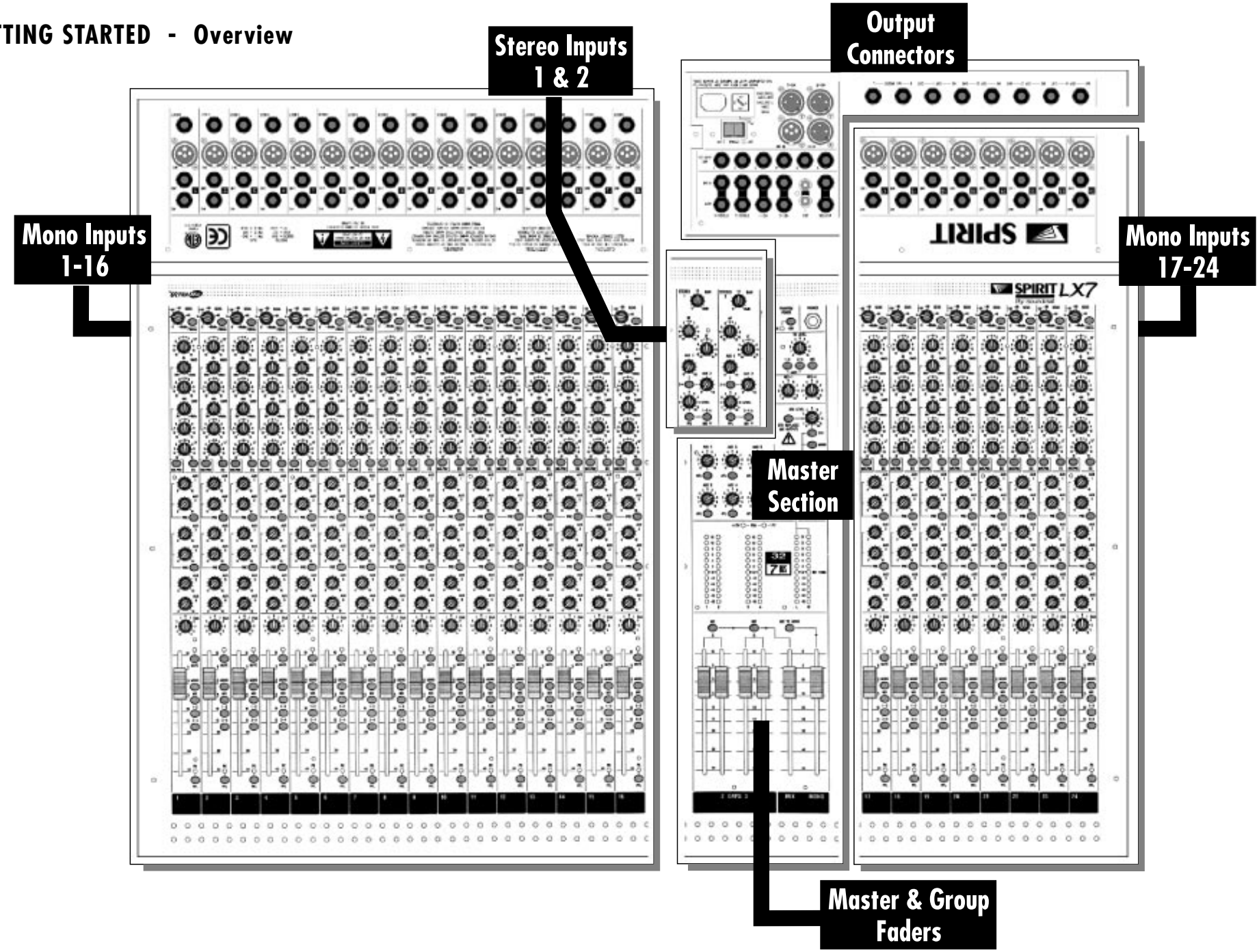
- The wire which is coloured Green and Yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol.
- The wire which is coloured Blue must be connected to the terminal in the plug which is marked with the letter N.
- The wire which is coloured Brown must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

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

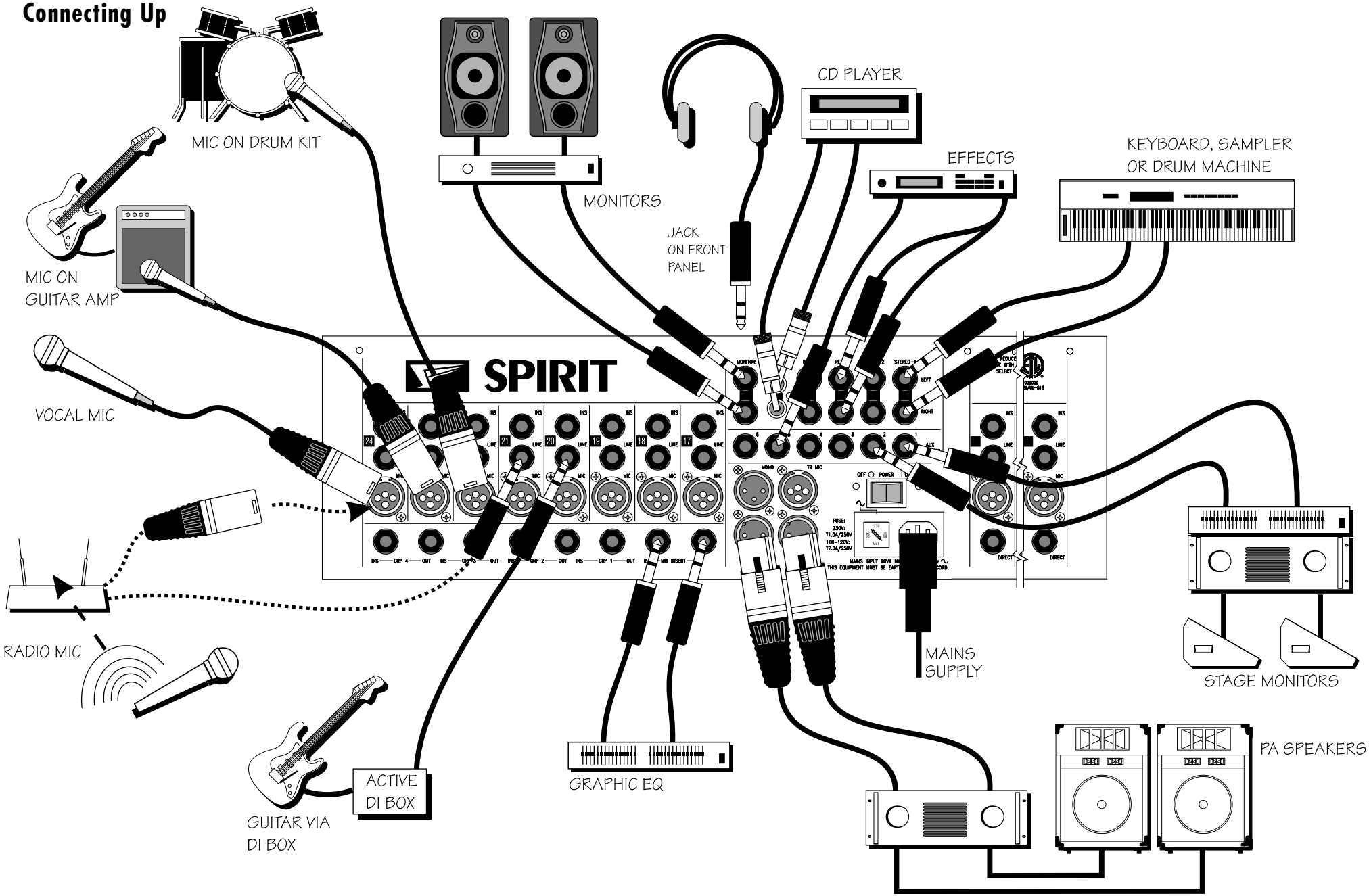
This unit is capable of operating over a range of mains voltages by means of a 4-position mains input fuse carrier. It is important to ensure that the correct voltage setting is selected for the level of local mains voltage supply, for safe, uninterrupted operation. Use a small screwdriver to prise the fuse carrier from its location in the connector.

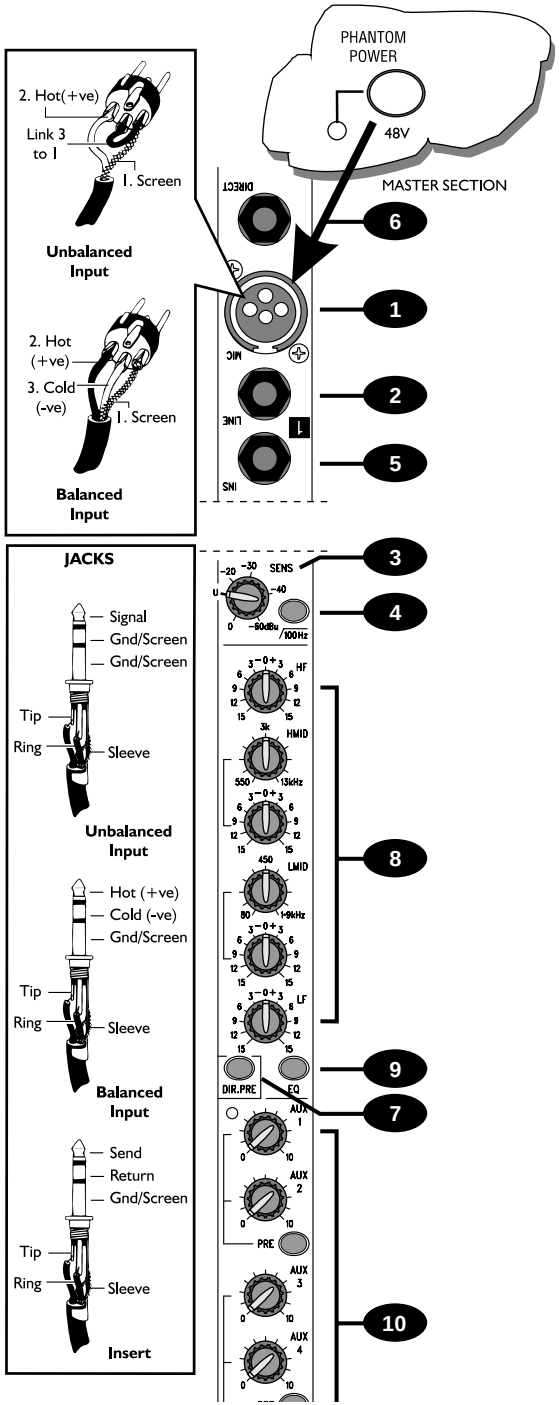
To avoid the risk of fire, replace the mains fuse only with the correct value fuse, as marked on the rear panel.

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


Stereo Inputs
1 & 2
Output
Connectors
Mono Inputs
1-16
Mono Inputs
17-24
Master
Section
Master & Group
Faders

Connecting Up





USING LX7

Mono Input Channel

1 Mic Input ™ULTRA MIC

The mic input accepts XLR-type connectors and is designed to suit a wide range of BALANCED or UNBALANCED signals. Professional dynamic, condenser or ribbon mics are best because these will be LOW IMPEDANCE. You can use low-cost HIGH IMPEDANCE mics, but the level of background noise will be higher. If you press the 48V switch down (beside the phones jack) the socket provides a suitable powering voltage for professional condenser mics (this is also known as Phantom Power).

ONLY connect condenser microphones with the 48V powering OFF (switch UP), and ONLY turn the 48V powering on or off with all output faders DOWN, to prevent damage to the mixer or external devices.

TAKE CARE when using unbalanced sources, which may be damaged by the phantom power voltage on pins 2 & 3 of the XLR connector.

Unplug any mics if you want to use the LINE Input. The input level is set using the SENS knob.

2 LINE INPUT

Accepts 3-pole `A' gauge (TRS) jacks. Use this high impedance input for sources other than mics, such as keyboards, drum machines, synths, tape machines or guitars. The input is BALANCED for low noise and top quality from professional equipment, but you can use UNBALANCED sources by wiring up the jacks as shown, although you should then keep cable lengths as short as possible. Unplug anything in the MIC input if you want to use this socket. Set the input level using the SENS knob.

3 SENS (Sensitivity)

This 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. 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.
Setting the knob to the `U' mark gives unity gain for the LINE input. 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.
See `Setting Up & Troubleshooting' on page 9 to learn how to set SENS correctly.

4 100Hz HI-PASS FILTER

Pressing this switch activates a steep 18dB per octave filter which reduces the level of bass frequencies only. Use this in live PA situations to clean up the mix, reducing stage rumble or 'popping' from microphones.

5 INSERT POINT

The unbalanced, **pre-EQ** insert point is a break in the channel signal path, allowing limiters, compressors, special EQ or other signal processing units to be added in the signal path. The Insert is a 3-pole 'A' gauge jack socket which is normally bypassed. When a jack is inserted, the signal path is broken, just before the EQ section. The Send may be tapped off as an alternative pre-fade, pre-EQ direct output if required, using a lead with tip and ring shorted together so that the signal path is not interrupted.

6 DIRECT OUTPUT

Channels 1-16 have a dedicated Direct Output which allows direct connection to external devices, for example to feed Tape Machines or effects units. The pre-fade direct output level may be monitored by pressing the PFL switch on the appropriate channel to feed the pre-fade signal to the monitors and the bargraph meters.

7 DIR. PRE

The Direct Outputs on channels 1-16 are normally set POST-FADER for use as effects sends or to provide fader control of recording levels in a studio recording application. For live recording the outputs can be individually changed to PRE-FADER by pressing this switch, so that the direct output level remains unaffected by fader settings for the main PA mix.

8 EQUALISER

The Equaliser (EQ) allows fine manipulation of the frequency bands, and is particularly useful for improving the sound in live PA applications where the original signal is often far from ideal and where slight boosting or cutting of particular voice frequencies can really make a difference to clarity.

HF EQ

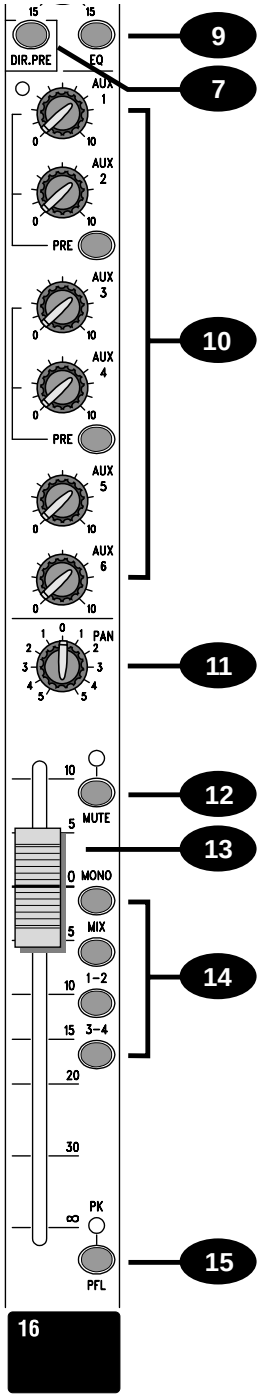
Turn clockwise to boost high (treble) frequencies (12kHz and above) by up to 15dB, adding crispness to cymbals, vocals and electronic instruments. Turn anticlockwise to cut by up to 15dB, reducing hiss or excessive sibilance which can occur with certain types of microphone. Set the knob in the centre-detented position when not required.

MID EQ (HMID & LMID)

There are two pairs of knobs which work together to form HI and LO MID frequency EQ sections. The lower knob in each pair 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 550Hz to 13kHz (HMID) or 80Hz to 1.9kHz (LMID). This allows some truly creative improvement of the signal in live situations, because the mid bands cover the range of most vocals. Listen carefully as you use these controls together to find how particular characteristics of, for instance, a vocal signal can be enhanced or reduced. Set the gain (lower) knob to the centre-detented position when not required. Note: Q is set at 1.5.

LF EQ

Turn clockwise to boost low (bass) frequencies (60Hz and below) by up to 15dB, adding warmth to vocals or extra punch to synths, guitars and drums. Turn anticlockwise to cut low frequencies by up to 15dB for reducing hum, stage rumble or to improve a mushy sound. Set the knob to the centre-detented position when not required.



9 EQ SWITCH

The EQ switch bypasses the Equalisation section when released. Alternately pressing and releasing the switch provides an easy way of comparing the equalised and unequalised signals.

10 AUX SENDS

These are used to set up separate mixes for FOLDBACK, EFFECTS or recording, and the combination of each Aux Send is mixed to the respective Aux Output at the rear of the mixer. For Effects it is useful for the signal to fade up and down with the fader (this is called POST-FADE), but for Foldback or Monitor feeds it is important for the send to be independent of the fader (this is called PRE-FADE). All Aux Sends are muted with the other channel outputs when the MUTE switch is pressed.

All six Aux Sends are POST-EQ, unless the EQ is bypassed using the EQ switch (see above) and are normally POST-FADE for use as effects sends or additional submixes. Aux's 1 & 2 and 3 & 4 may if required be switched in pairs to PRE-FADE by pressing the respective PRE switch, for use as foldback or monitor feeds. Aux's 5 & 6 always remain POST-FADE.

11 PAN

This control sets the amount of the channel signal feeding the Left and Right MIX buses, allowing you to move the source smoothly across the stereo image. When the control is turned fully right or left you are able to route the signal at unity gain to either left or right outputs individually.

12 MUTE

All outputs from the channel except inserts are active when the MUTE switch is released and muted when the switch is down, allowing levels to be pre-set before the signal is required.

13 FADER

The 100mm FADER allows precise balancing of the various source signals being mixed to the Master Section. You get most control when the input Sensitivity is set up correctly, giving full travel on the fader. See the `Setting Up & Troubleshooting' section on page 9 for help in setting a suitable signal level.

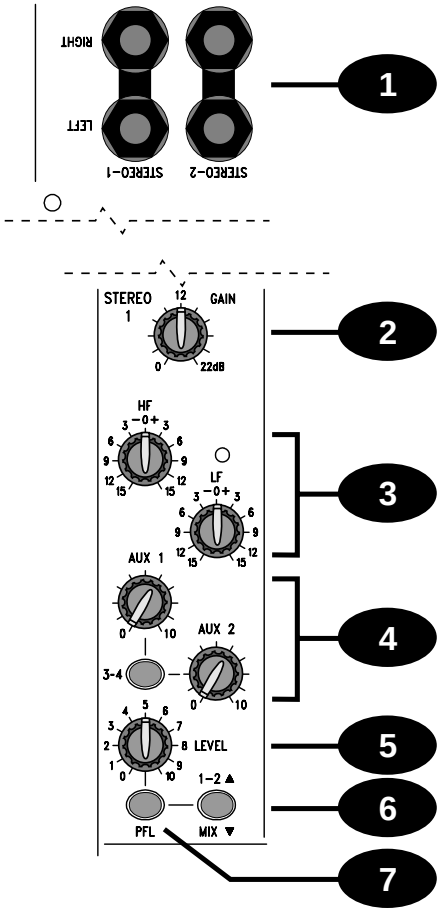
14 ROUTING

The channel signal may be routed to the main stereo MIX or pairs of group busses (1-2, 3-4) by pressing the respective switches, with the channel signal fed proportionately to left (1, 3) or right (2, 4) depending on the position of the PAN control (11). The channel signal may also be routed to the separate mono bus by pressing the MONO switch, unaffected by the position of the PAN control.

15 PFL/PEAK

When the latching PFL switch is pressed, the pre-fade, post-EQ signal is fed to the headphones, control room output and meters, where it replaces the selected monitor source. The adjacent LED lights to identify the selected channel and the PFL/AFL LED on the Master section illuminates to warn that a PFL is active. This is a useful way of listening to any required input signal without interrupting the main mix, for making adjustments or tracing problems.

When the PFL switch is released the LED serves as a PEAK indicator which illuminates approximately 4dB before clipping to give warning of a possible overload. The signal is sampled both after the HF EQ and also POST EQ.



STEREO INPUT CHANNEL

1 INPUT JACKS

These high impedance inputs accept 3-pole `A' gauge (TRS) jacks. Use these inputs for sources such as keyboards, drum machines, synths, tape machines or returns from processing units. The inputs are BALANCED for low noise and top quality from professional equipment, but you can use UNBALANCED sources by wiring up the jacks as shown in the "Connecting Leads" section on page 16 in this manual, although you should then keep cable lengths as short as possible to prevent 'hum' being induced into the sound system. Mono sources may be used by plugging into the left jack only.

2 GAIN

The GAIN control sets the input level to the channel, allowing matching to a wide range of line level sources.

3 EQUALISER

HF EQ

Turn clockwise to boost high (treble) frequencies, adding crispness to percussion from drum machines, synths and electronic instruments. Turn anticlockwise to cut these frequencies, reducing hiss or excessive brilliance. Set the knob in the centre-detented position when not required. The control has a shelving response giving 15dB of boost or cut at 12kHz and above.

LF EQ

Turn clockwise to boost low (bass) frequencies, adding extra punch to synths, guitars and drums. Turn anticlockwise to reduce hum, boominess or improve a mushy sound. Set the knob to the centre-detented position when not required. The control has a shelving response giving 15dB of boost or cut at 60Hz and below.

4 AUX SENDS

These are used to set up separate mixes for FOLDBACK, EFFECTS or recording, and the combination of each Aux Send is mixed to the respective Aux Output at the rear of the mixer. The sends are always PRE-FADE which is most appropriate for Foldback or Monitor feeds, but note that the Line Inputs on pairs of Mono channels may be used as alternative stereo inputs if post-fade sends are essential for effects.

5 LEVEL

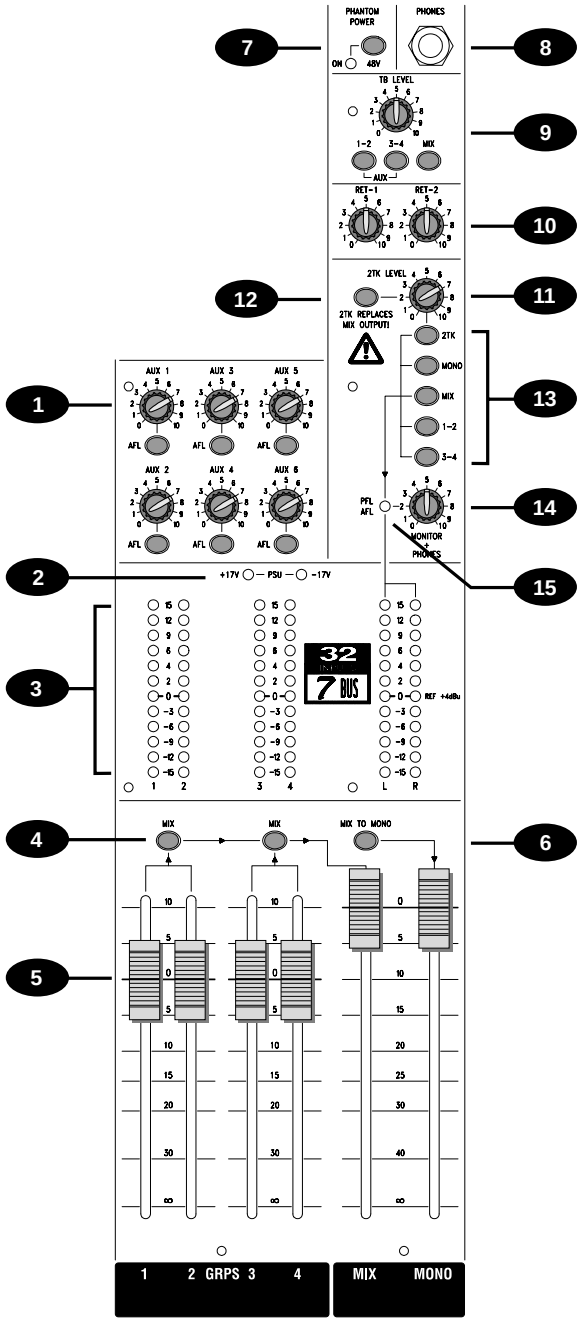
The rotary level control adjusts the overall level of the signal which is fed to the Mix or selected pair of Groups.

6 ROUTING

The Stereo channel signal is fed either to a pair of Subgroups (switch UP) or the stereo Mix (switch DOWN), at a level set by the LEVEL control. Stereo 1 feeds to Subgroups 1 & 2, Stereo 2 feeds to Subgroups 3 & 4.

7 PFL

When the latching PFL switch is pressed, the pre-fade, post-EQ signal is fed in mono to the headphones, control room output and meters, where it replaces the selected monitor source. The PFL/AFL LED on the Master section illuminates to warn that a PFL is active. The Left and Right meters display the PFL signal in mono.



Master Section

1 AUX MASTERS

Each of the six AUX outputs has a master output level control and associated AFL switch.

AUX AFLs

Just as the Channel PFL switches allow *pre-fade listening*, so you can monitor each AUX output *after the level control* by pressing the AFL switch. This routes the AUX output signal to the MONITOR or PHONES, replacing any existing signal which is selected. The METERS also switch from the selected source to display the PFL/AFL signal and the PFL/AFL LED lights to warn that a PFL or AFL switch is pressed. When you release the switch the Monitor swaps back to the previous source.

2 POWER INDICATORS

These LEDs light to show that power is connected to the console and that the internal power supply is operating correctly.

3 BARGRAPH METERS

3-colour peak reading BARGRAPH METERS are provided to monitor the four Subgroup outputs and the selected Monitor + Phones source (2TK, Mono, Mix or Groups), giving you a constant warning of excessive peaks in the signal which might cause overloading. Aim to keep the signal within the amber segments at peak levels for best performance.

Similarly, if the output level is too low and hardly registering at all on the meters, the level of background noise may become significant. Take care to set up the input levels for best performance.

When any PFL or AFL switch is pressed, the L & R meters automatically switch to show the selected PFL/AFL signal on both meters, in mono.

4 MIX

Pressing the Mix switch routes the post-fade Subgroup signals in pairs to the main Mix. Groups 1 & 3 are routed to Mix L, Groups 2 & 4 are routed to Mix R.

5 MASTER FADERS

The MASTER FADERS set the final level of the Subgroup and Mix L & R outputs. These should normally be set close to the `0' mark if the input GAIN settings have been correctly set, to give maximum travel on the faders for smoothest control.

6 MIX TO MONO

Pressing this switch routes the post-fade Mix L/R outputs to the Mono bus to create a separate mono mix to feed, for example, an induction loop or centre cluster. Note: If there are input channels which are routed both to Mix and Mono, pressing this switch will have an additive effect which may lead to feedback.

7 48V (Phantom Power)

Many professional condenser mics need an external powering voltage, normally 48V, also known as PHANTOM POWER. This is a method of sending a powering voltage down the same wires as the mic signal. Press the switch to supply the 48V power to all of the MIC inputs. The adjacent LED illuminates when the power is active.

DO NOT USE unbalanced mics with 48V switched on as they may be damaged by the phantom power voltage. Balanced dynamic mics and leads can normally be used with 48V switched on (contact your microphone manufacturer for guidance)

Mics should always be plugged in, and all output faders set to minimum before switching 48V ON to avoid damage to external equipment

8 PHONES

The PHONES output appears on a 3-pole 1/4" jack, suitable for headphones with an impedance of 200Ω or higher.

9 TB LEVEL

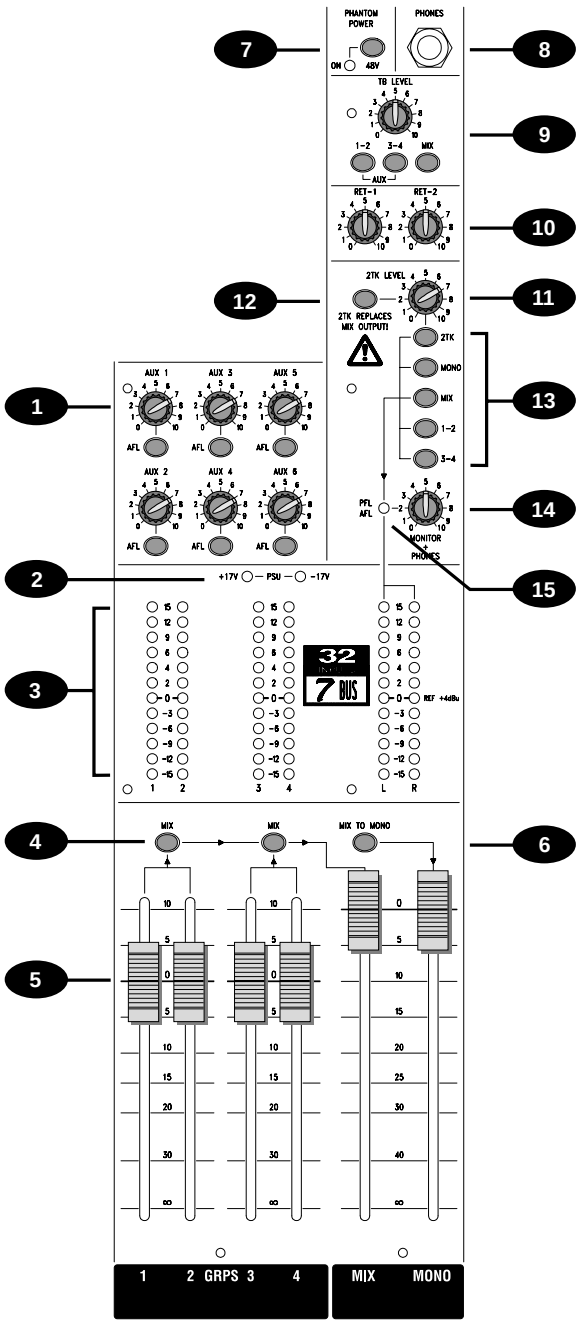
A balanced input is provided for a Talkback microphone. The signal may be routed selectively to Aux 1/2 or 3/4 (which might typically be used for performers' foldback) or Mix L/R by pressing the appropriate switches. The signal level is adjusted by the TB LEVEL control.

10 STEREO RETURNS

Two balanced Stereo Returns are available for the outputs of effects units and are mixed directly to the Mix L/R busses at a level set by the RET-1 or RET-2 controls. If a mono source is used, plugging into the Left jack only automatically feeds the signal to both Left and Right.

11 2TK LEVEL

The rotary control sets the level of the 2 Track Tape input, which is routed to the headphones, monitor outputs and meters, or directly to the Mix outputs by pressing the adjacent switch (12). These unbalanced inputs, on RCA phono connectors, are ideal to connect the playback of a tape machine for monitoring.



12 2TK REPLACES MIX OUTPUT!

This switch does what it says! When pressed the Mix output is switched to the 2 Track input and is an ideal way of feeding pre-show music to the main outputs in live applications without using up valuable input channels. For example, with the switch pressed and a CD connected and playing pre-show music, the engineer can be setting up channel levels, adjusting EQ, talking back to performers and monitoring any part of the mix (including final Mix) without affecting the sound to the audience. Releasing the switch instantly swaps the Mix Outputs back to the mixer and cuts off the CD.

CAUTION: Pressing this switch cuts off the normal Mix L/R signal and it should therefore NOT be used during live performance or recording

13 MONITOR SOURCE SELECT

These switches allow a choice of 2TK, Mono, Mix or Groups as the source for the Phones, Monitor outputs and meters, and may be selected individually or as a combination. **NOTE:** If NO switches are pressed, there will be NO signal on the meters or monitors!

14 MONITOR + PHONES

This control sets the output level to the MONITOR LEFT & RIGHT outputs. If Headphones are plugged into the PHONES jack the Monitor outputs are cut off, and the knob then sets the headphone listening level. When the PHONES are unplugged the Monitor output is restored. The source for the Monitor and Phones is selected by the five switches (13) above the control.

When any PFL or AFL switch is pressed the source for the Monitor outputs and Headphones is switched to the mono PFL/AFL signal without interrupting the other outputs from the mixer, to allow individual signals to be monitored. The original monitor source is restored when the PFL/AFL switches are released.

15 PFL/AFL

The PFL/AFL LED illuminates to show that a PFL/AFL is active and is the source for the monitors and meters. The LED will normally be OFF

Setting Up & Troubleshooting

Initial Set Up

Once you have connected up your system (see the sections on connection and wiring earlier in this manual for guidance) you are ready to set initial positions for the controls on your mixer.

The front panel drawing on page 18 shows typical initial control positions which may serve as a useful guide to setting up the mixer for the first time.

Set up individual input channel as follows:

- Connect your sources (microphone, keyboard etc.) to the required inputs and release the MUTE switches. Note: Phantom powered mics should be connected before the 48V is switched on.
- Set Master faders at 0, input faders at 0, route the channels to MIX and set power amplifier level to suit the application.
- Provide a typical performance level signal and press the PFL button on the first channel, monitoring the level on the bar-graph meters.
- Adjust the input gain until the meter display is in the amber section, with occasional peaks to the first red LED at a typical maximum source level. This allows sufficient headroom to accommodate peaks and establishes the maximum level for normal operation (but see note below).
- Repeat this procedure on other channels as required.
- Listen carefully for the characteristic sound of `feedback'. If you cannot achieve satisfactory input level setting without feedback, check microphone and speaker placement and repeat the exercise. If feedback persists, it may be necessary to use a Graphic Equaliser to reduce the system response at particular resonant frequencies.

Note: The initial settings should only be regarded as a starting point for your mix. It is important to remember that many factors affect the sound during a live performance, for instance the channel EQ settings or even the size of the audience!

You are now ready to start building the mix and this should be done progressively, listening carefully for each component in the mix and watching the meters for any hint of overload. If this occurs, back off the appropriate Channel Fader slightly until the level is out of the red segments, or adjust the Mix Master Faders. This procedure will ensure that the mixer is set up correctly, with adequate headroom. If more amplification is needed, adjust the power amplifier level controls.

Troubleshooting

No Power

- Is the mains supply present? Check that mains voltage selection is correct for your country.
- Is the mains lead firmly connected?
- Check the mains fusing
- If only one of the power indicators is illuminated, consult your Spirit dealer

Condenser Mic Not Working

- Is the 48V turned on?
- Is the mic plugged into the Mic input?
- Is the mic cable a balanced 3-wire type?

Meters not showing any signal

- Has the input gain been set correctly? (see above.)
- Is the source connected to the appropriate input socket for the level of signal?
- Do you have something connecetd on the Inserts, and is that external device switched on?
- Are the Master faders set at max., are input faders set high enough and is the channel routed to the output being monitored?
- Is the MUTE switch released on the relevant channels?
- Is the appropriate monitor select switch pressed?
- Is there a PFL/AFL pressed on another channel?

No Mix output

- Check that the Mix Master Fader is up?
- Check that the 2TK REPLACES MIX switch is released?

No Monitor output

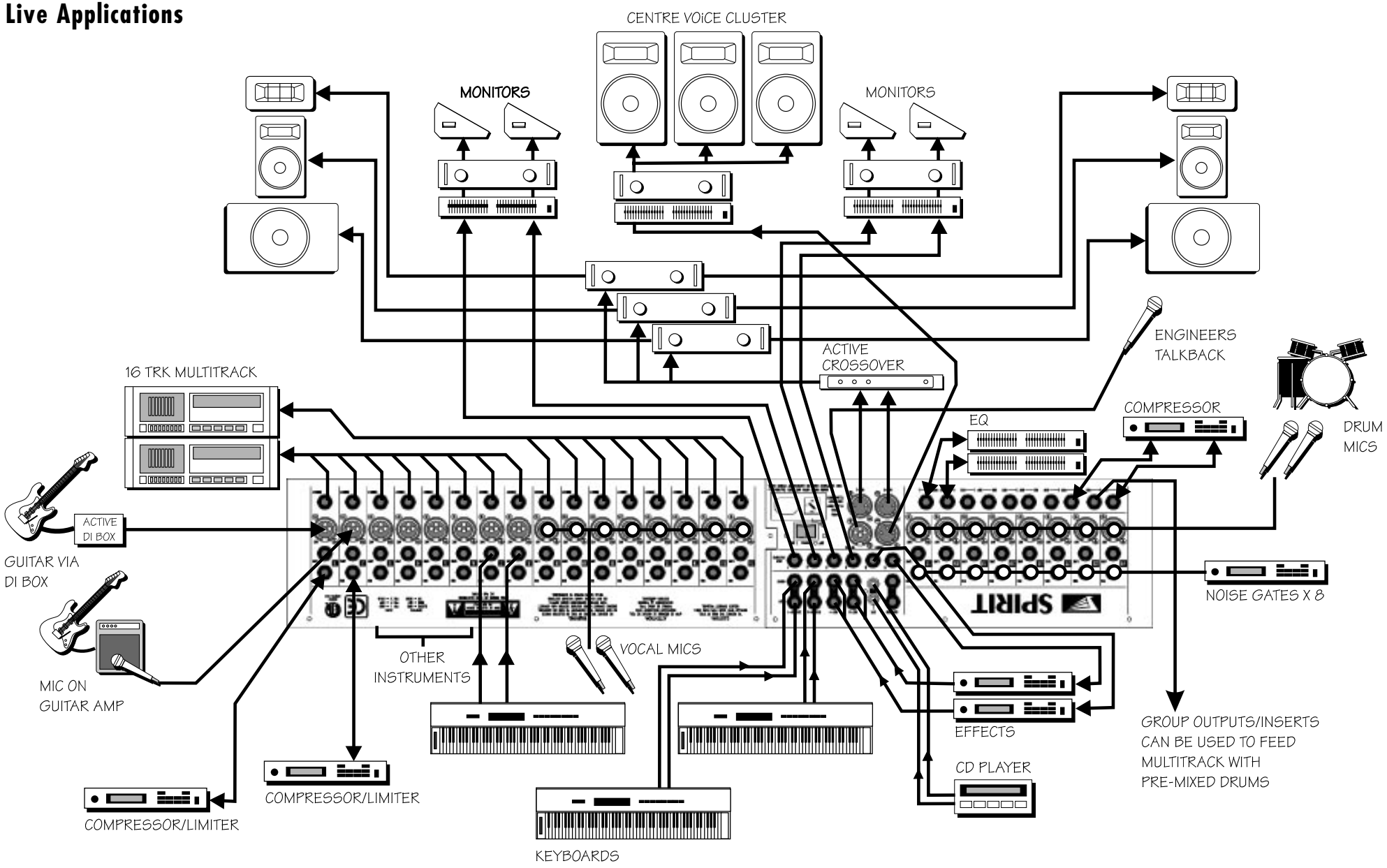
- Is a headphone jack plugged in?
- Is the Monitor + Phones control set high enough?
- Is the appropriate monitor select switch pressed?

Headphones Distorting

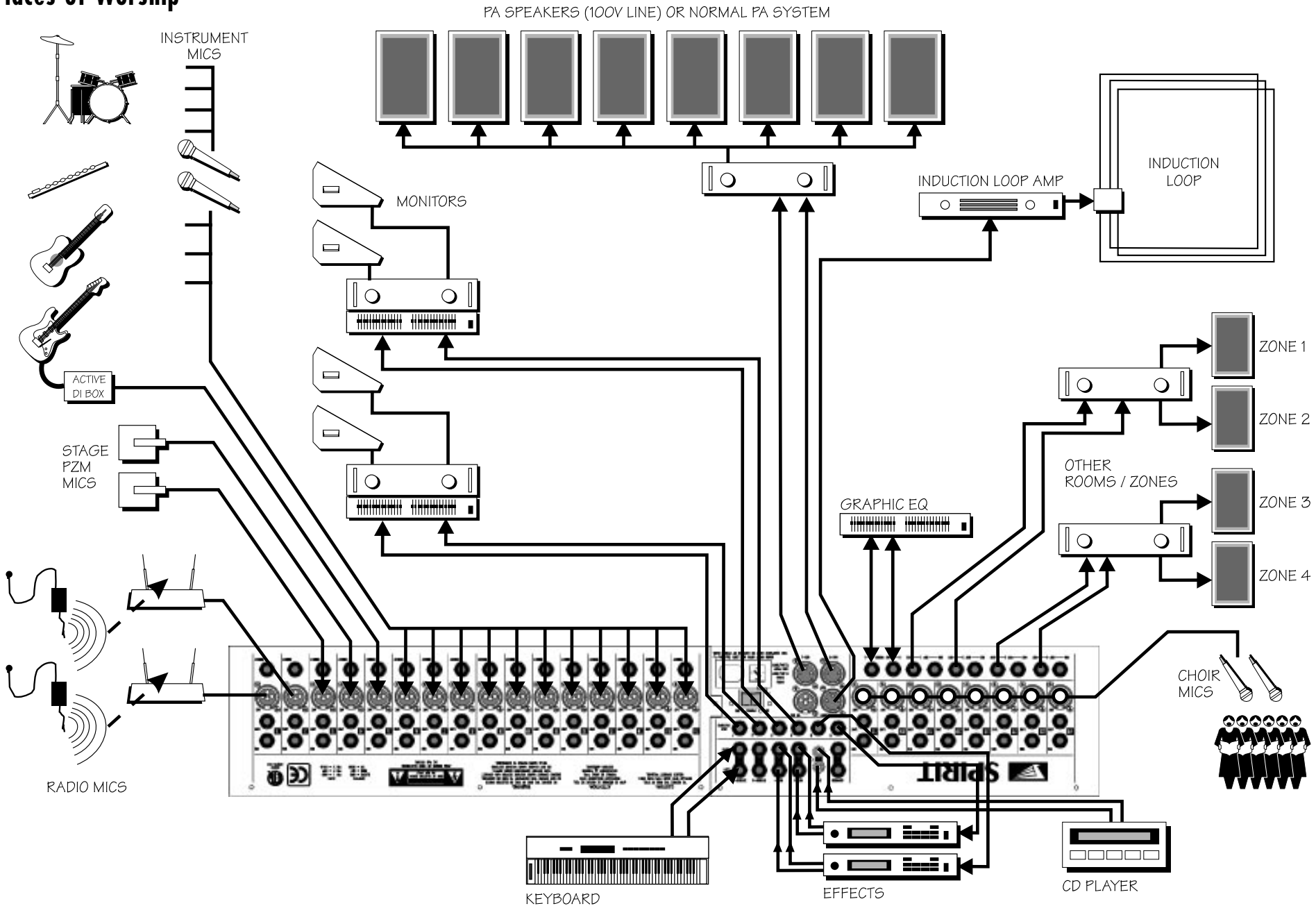
- Are the headphones less than 200Ω impedance?
- Is the Monitor + Phones level set too high?

APPLICATIONS

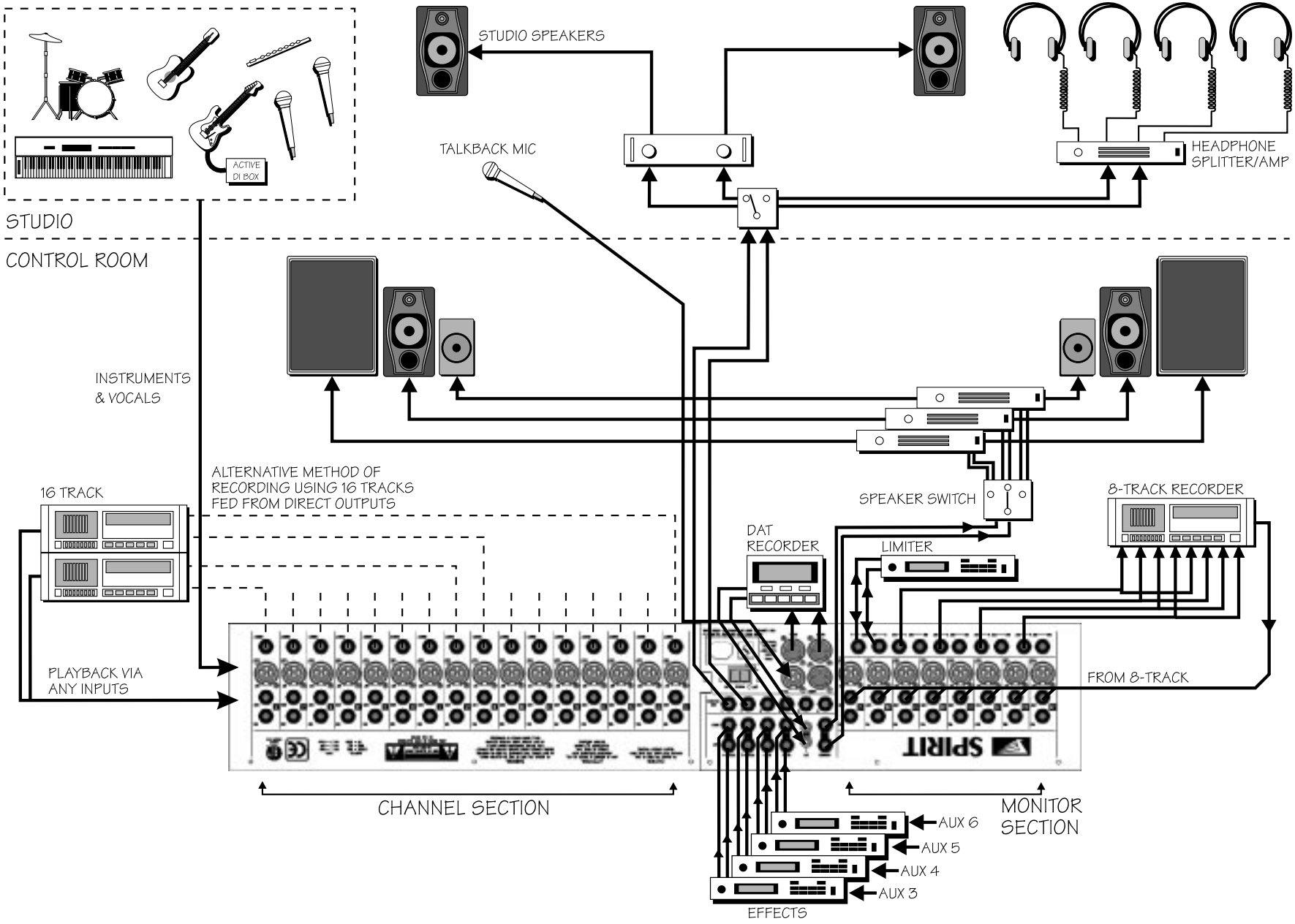
Live Applications



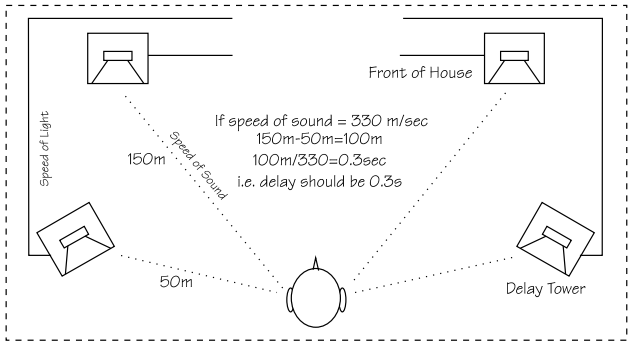
Places of Worship



Recording Studio



Theatre



MAIN
FOH PA

SIDE FILL

OVERHEAD STAGE MONITORS

BACK FILL

AMP +
GRAPHIC EQ

REAR FILL

SIDE STAGE MONITORS

AMP +
GRAPHIC EQ

GRAPHIC EQ

DELAY
DELAY
DELAY
DELAY

VOCAL MICS, WIRELESS MICS, PZM STAGE MICS ETC.

STAGE BAND
INPUTS 17-24

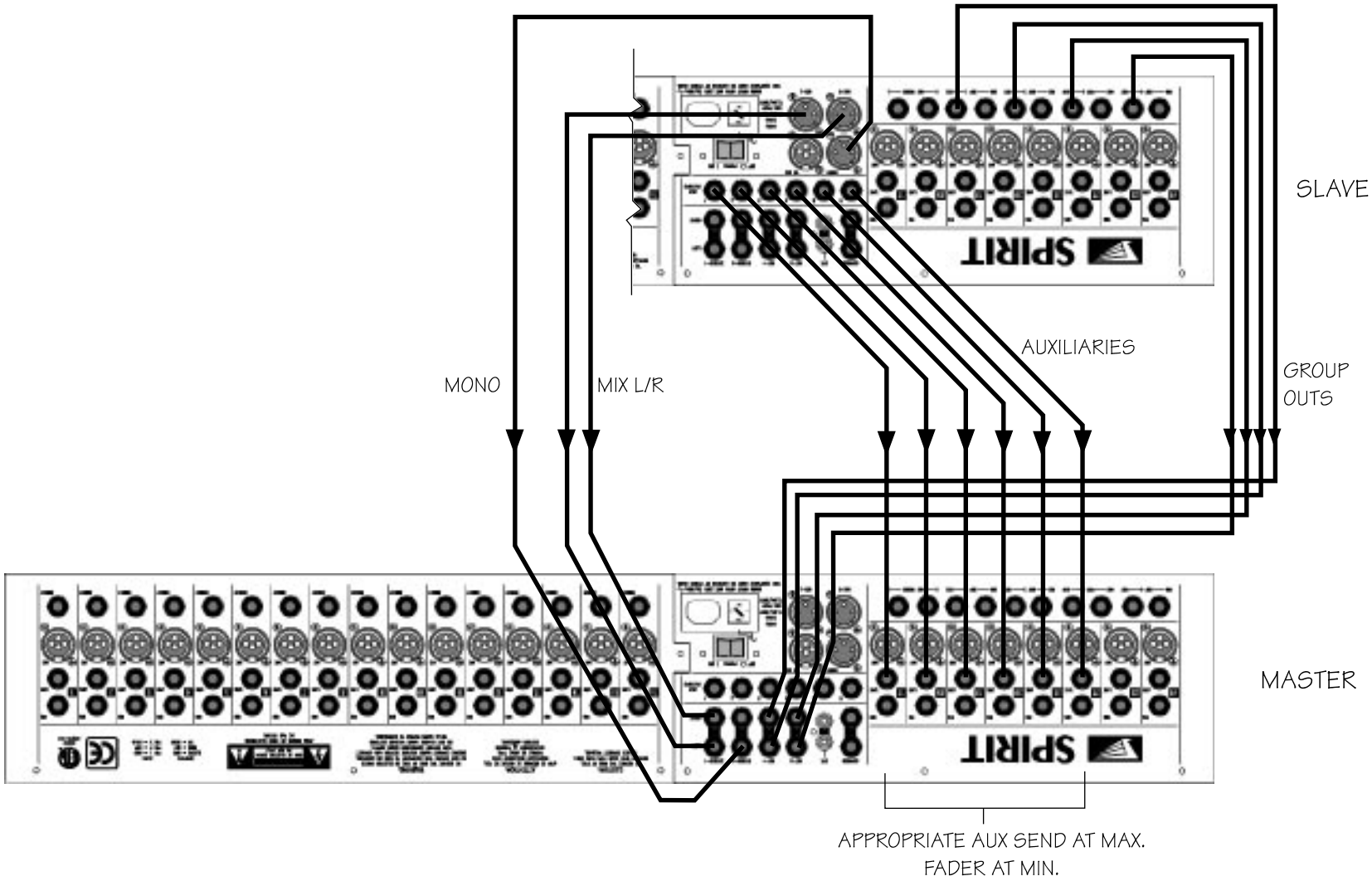
SPECIAL EFFECTS

CD PLAYER

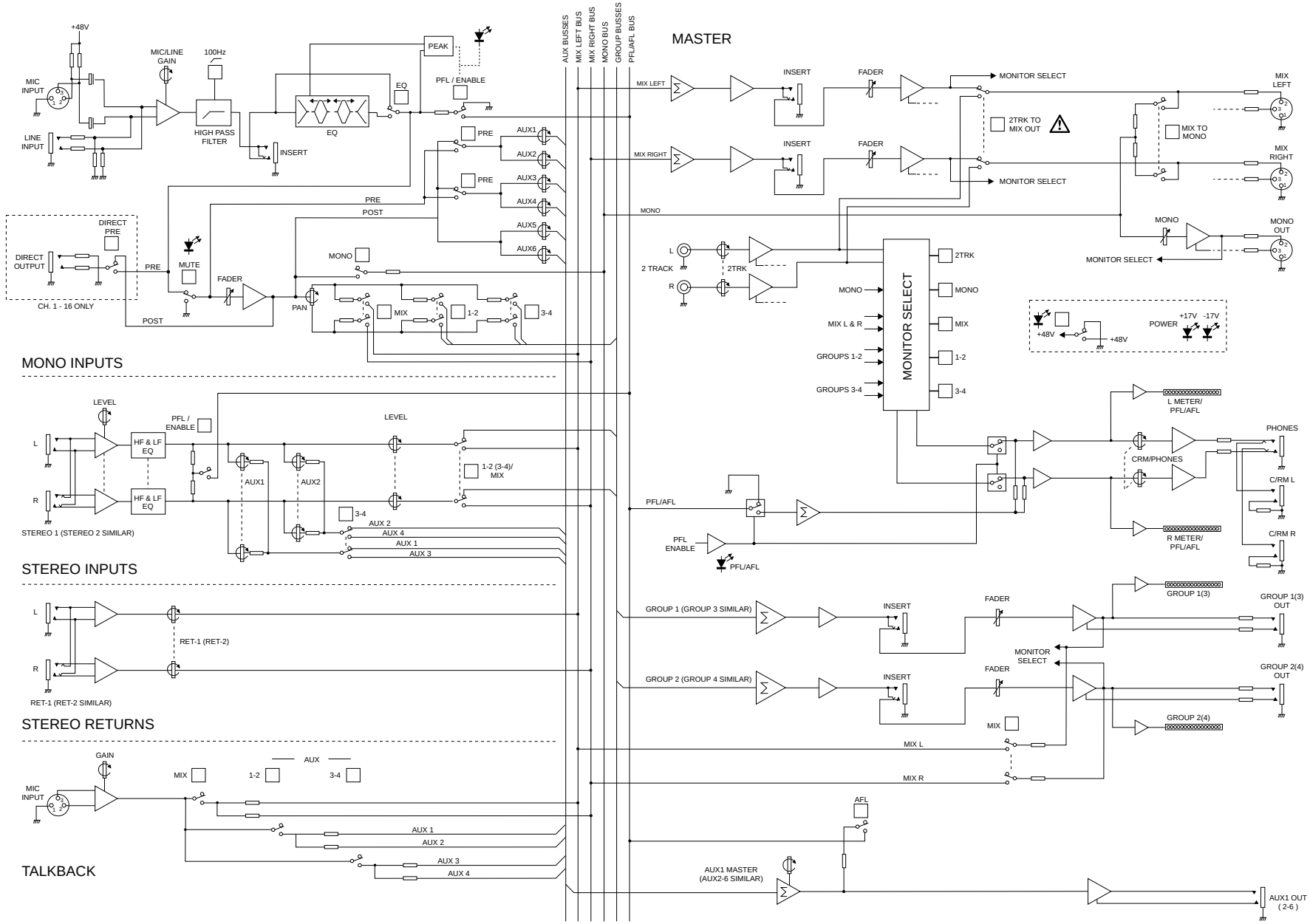
KEYBOARDS

EFFECTS

Linking two LX7s

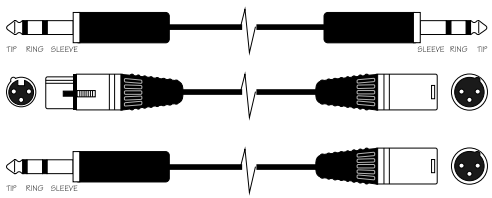


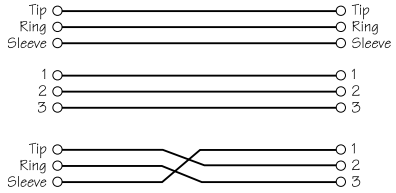
System Block Diagram



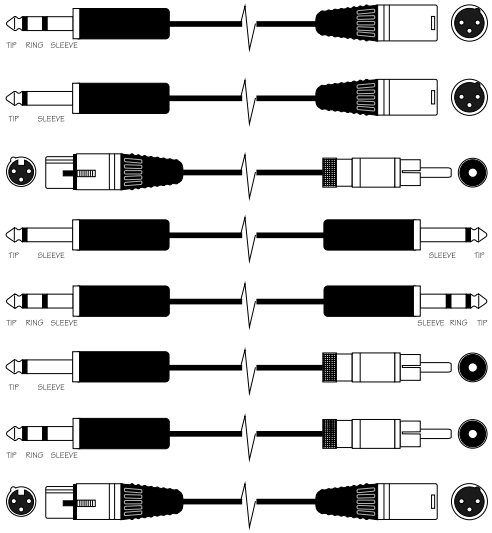
Connecting Leads

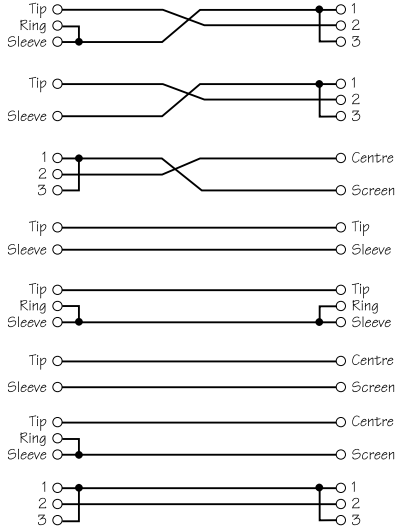
Balanced



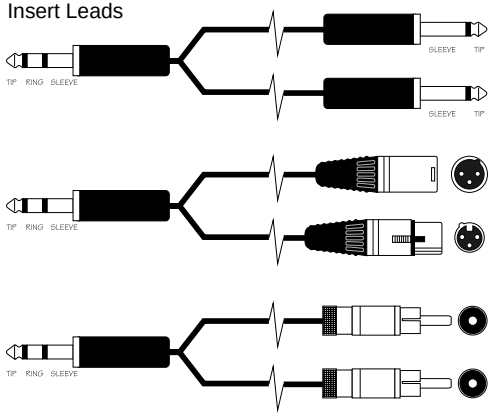


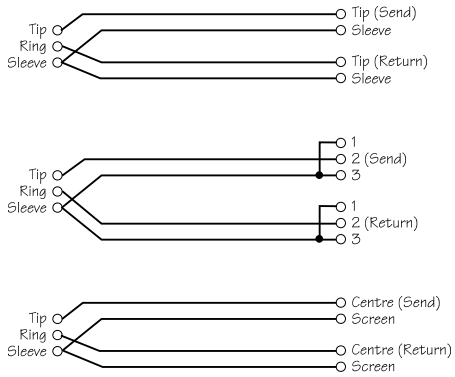
Unbalanced





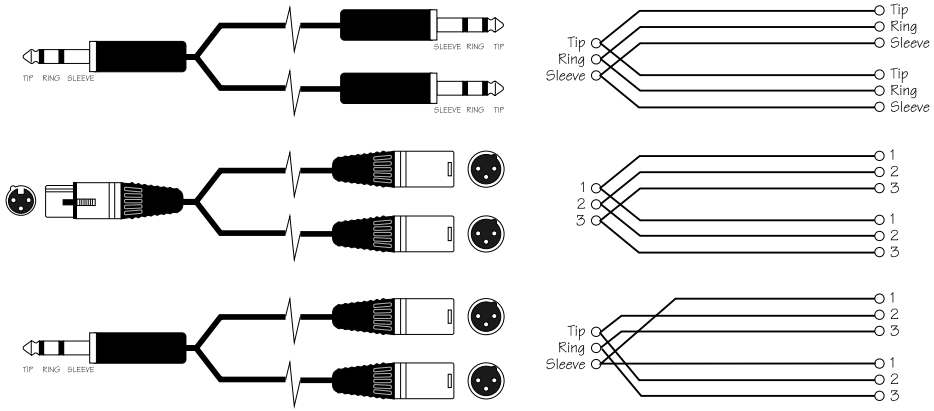
Insert Leads





'Y' Leads (Balanced)

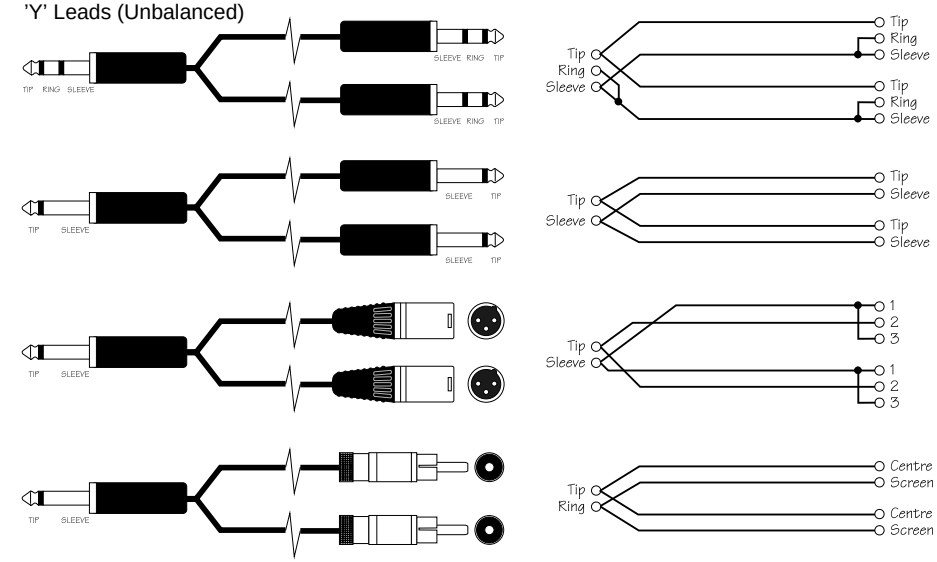
Where used....Aux, Mix outputs



Headphone Splitter

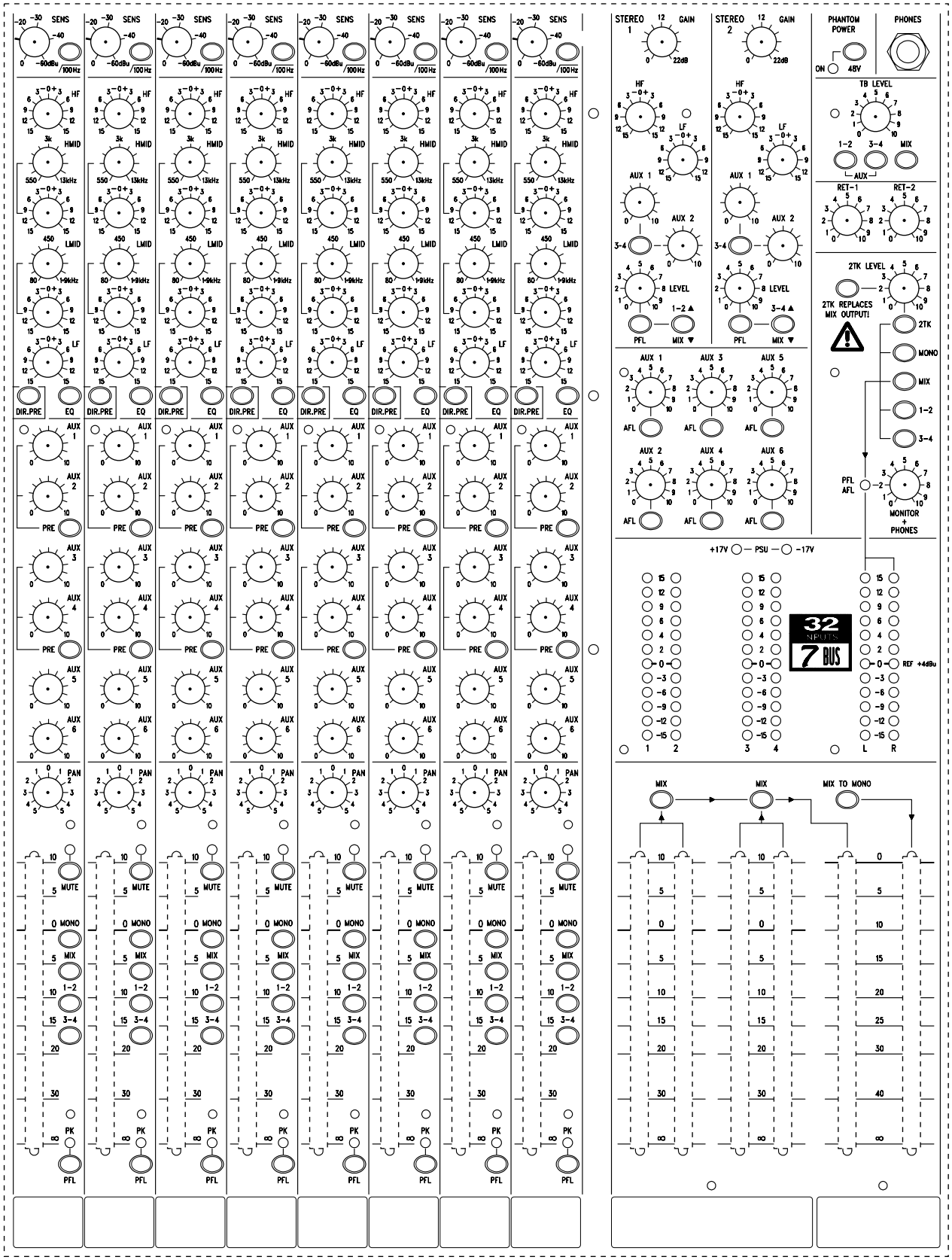


'Y' Leads (Unbalanced)



Gig : ..... **Date :** .....

Engineer : .....



Control Position Sheet

You may freely copy this page to mark control positions to assist in resetting the desk between performances.

Sheet Title:

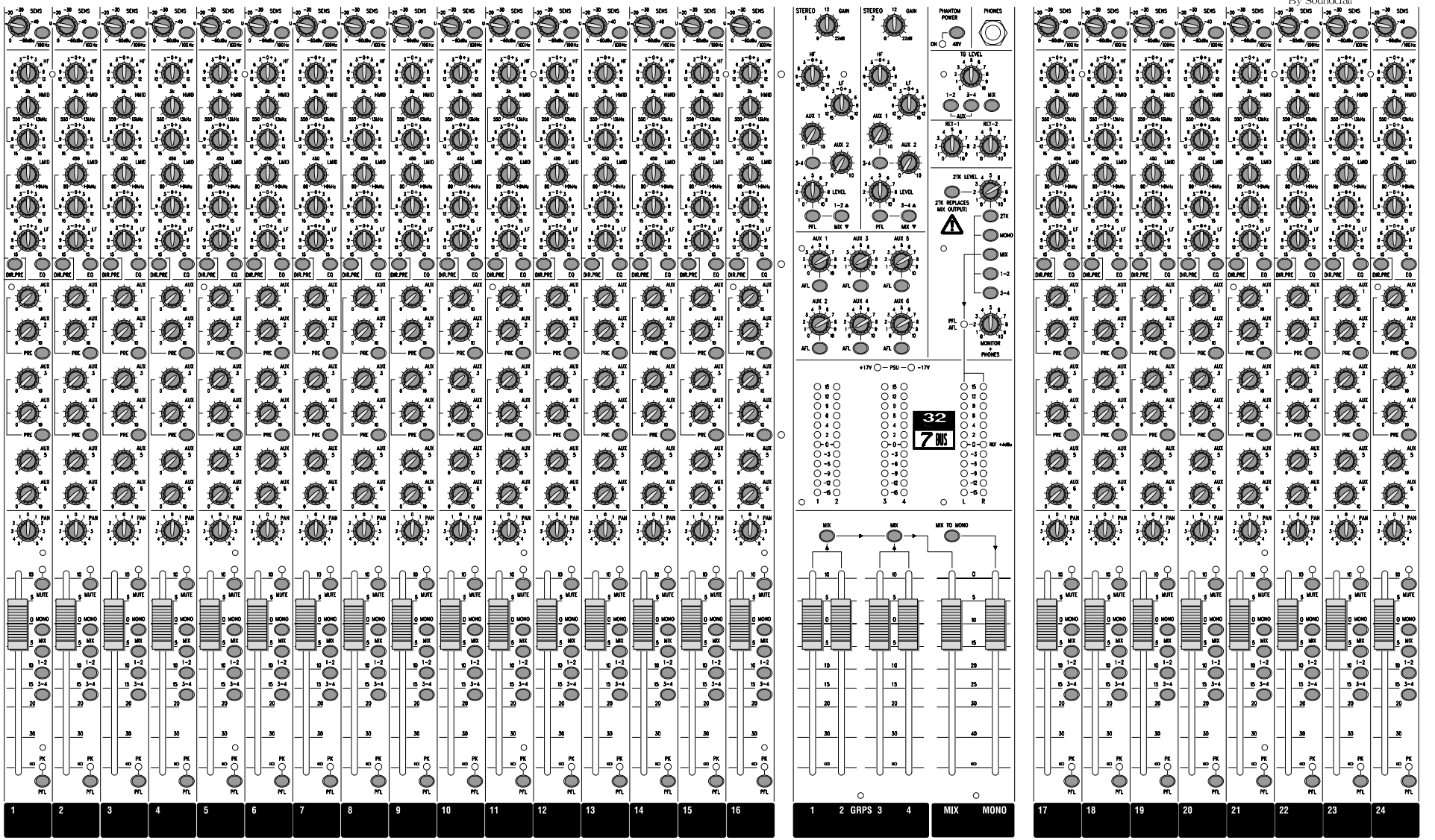
Sheet Title:

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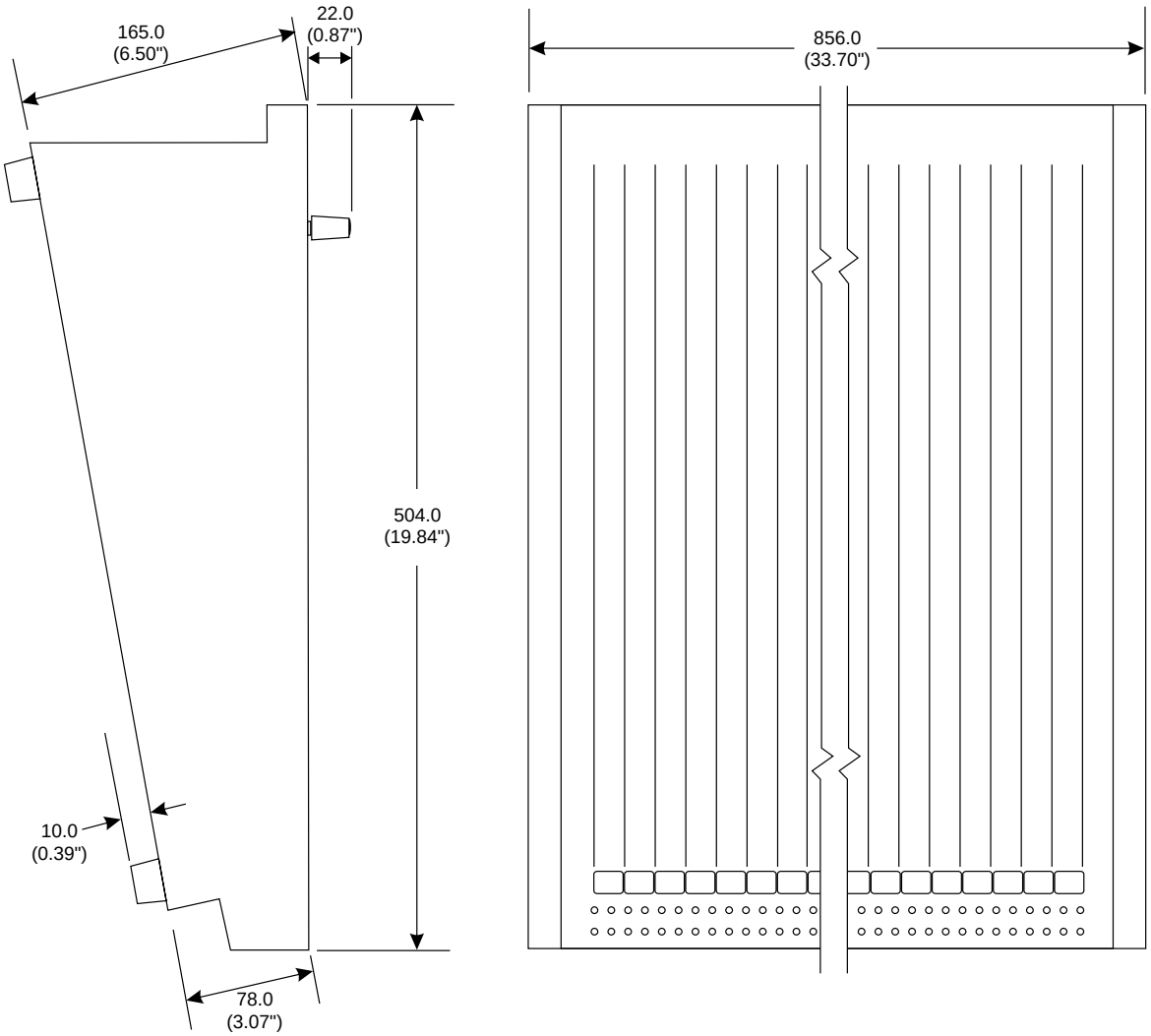
Sheet Title:

Sheet Title:



LX7 Console - Typical Starting Out Control Positions

Dimensions



Specifications

Noise

Measured RMS, 22Hz to 22kHz Bandwidth	
Mic E.I.N. @ unity gain, 150Ω source impedance	-129dBu
Mix Output, 24 inputs routed to mix, faders at unity, muted	<-80dBu
Mix Output, 24 inputs routed to mix, faders down	<-100dBu
Input to Direct output at unity gain	<-90dBu
Input to Direct output at 40dB gain	<-80dBu

Crosstalk (@1kHz, typical)

Fader attenuation	>95dB
Aux attenuation	>80dB
Pan isolation	>75dB
Adjacent channel crosstalk	>-80dB
Channel Mute	>90dB
Fader cut-off (rel. 0 mark)	>90dB
Aux Send pots offness	>80dB

Frequency Response

Mic/Line Input to any output, 20Hz - 20kHz	<1dB

THD + N

Mic sens. -30dBu, +20dBu at all outputs @1kHz	<0.006%

CMRR

Typical @ max gain @ 1kHz	>80dB
Typical @ any gain @ 50Hz	>60dB

Input & Output Impedance

Mic Input	1.8kΩ
Line Input	10kΩ
Stereo Input	8.6kΩ
2TK Return	12kΩ
Mix, Aux, Direct Outputs, and Insert Sends	75Ω

Input & Output Levels

Mic Input max. level	+22dBu
Line Input max. level	+22dBu
Stereo Input max. level	+22dBu
2TK Return	>30dBu
Headphones (@ 200Ω)	150mW

Weight

Excluding packing	17.5kg/38.57 lb

SPIRIT
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CE
This equipment complies
with the EMC Directive
89/336/EEC
and LVD 73/23/EEC
and 93/68/EEC

For further details contact the address on the left