



INTRODUCTION

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1:1 GENERAL INTRODUCTION TO POWERHOUSE CONSOLES

Please read this manual thoroughly from front to back and keep it close at hand during operation. The Studiomaster POWERHOUSE consoles have, in one compact box, a comprehensive mixing console, built-in 127 program Stereo Digital Reverb, dual graphic equalisers, and a 2x300W power amplifier.

It will come as no surprise that the POWERHOUSE is extremely versatile; it can be used as a complete P.A. system for small bands, or as a self-contained sub-system in larger applications. All of the features of the POWERHOUSE can be used in a variety of ways, for ultimate flexibility. This manual will introduce you to the many and varied ways of using it.

DO NOT switch on the console before reading the following sections.

1:2 IMPORTANT! AC POWER INFORMATION

PLUG WIRING INFORMATION

As the colours of the wires in the AC Power Lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The GREEN & YELLOW wire must be connected to the terminal in the plug which is either:

- marked by the letter "E"
- or by the safety earth symbol " \perp "
- or coloured GREEN
- or coloured GREEN & YELLOW.

The BLUE wire must be connected to the terminal which is marked with the letter "N", or coloured BLACK.

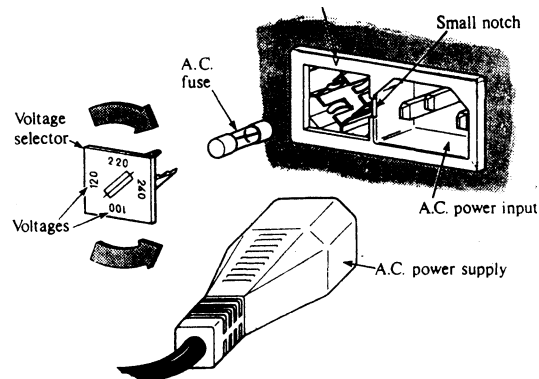
The BROWN wire must be connected to the terminal which is marked with the letter "L" or coloured RED.

WARNING: THIS APPARATUS MUST BE EARTHED

BEFORE PROCEEDING: DO NOT CONNECT THE AC SUPPLY LEAD TO THE CONSOLE

The following section relating to the power input assembly fitted to the rear panel of console MUST be read before switching on.

The consoles are fitted with this voltage selector/AC input/AC fuse assembly: pointer
(indicates voltage selected)



The voltage selector (the square shaped part which can be levered out) contains the AC fuse.

This is the voltage selection procedure. Check that the pointer (see diagram above) is pointing at the local AC supply voltage (100, 120, 220 and 240V are stamped on the voltage selector). If it is, then go ahead and connect AC power to the console.

If the voltage indicated is wrong, then lever out the voltage selector (there is a small notch for this purpose between the selector and the AC power input). Turn the selector round until the pointer is pointing to the correct voltage, then press it back in.

You will have noticed a fuse while the selector was out. This is the console's AC fuse. It is a 20x5mm T2A 250V in all units. The console is now ready to have the power lead connected and be switched on.

1:3 IMPORTANT! COOLING INFORMATION

There is a cooling vent in the base of the POWERHOUSE consoles. This MUST NOT be obstructed in any circumstance, as overheating of the unit will occur.

If the POWERHOUSE is transported in a flightcase, it should be lifted completely from the flightcase before use.

1:4 IMPORTANT! TO PROTECT YOUR LOUDSPEAKERS

Always turn the TO AMP control to 0 before turning the console on or off.

2:1 INPUT CHANNEL

NOTE: Use either the MIC or LINE input and NOT both together as this could damage the MIC input circuitry or the equipment connected to it.

- 1 MIC INPUT Female XLR wired Pin 1 = Ground, Pin 2 = +ve phase. Pin 3 = -ve phase. The channel may be driven with a low impedance balanced microphone. Input impedance 2kohm, gain range 15 to 60dB.
 - 2 LINE INPUT Stereo 0.25" jack wired Tip = +ve phase, Ring = -ve phase, sleeve = ground. For unbalanced use, connect a mono jack wired Tip = Signal, Sleeve = Ground.
 - 3 GAIN control with 45dB range. Operates both LINE and MIC level inputs to ensure that the input signal is at a suitable level to drive the channel. It determines the nominal channel signal level by varying the pre-amp gain, preserving maximum headroom and minimum noise without loading the input signal.
 - 4 EQUALISATION A 3-band design comprising of:
4a High Frequency control is a shelving type with 16dB of boost/cut at 12kHz.
4b MID Frequency control is a peak/dip type with 16dB of boost/cut at 2kHz.
4c Low Frequency control is a shelving type with 16dB of boost/cut at 60Hz.
 - 5 REV Turning this control clockwise sends the input channel signal to the 127 program DIGITAL REVERB built in to the POWERHOUSE. The REV control is post-fade.
 - 6 AUX This control is post-fade, like the REV control, but sends the input channel signal to the AUX SEND jack. The AUX SEND would normally be connected to an effect.
 - 7 MON The MON control is pre-fade, and turning it clockwise sends the input channel signal to the MON SEND jack. The MON SEND would normally be connected to an amplifier for foldback purposes.
 - 8 PAN control allows a left-right stereo balance of the channel between the left and right busses.
 - 9 CLIP indicator. This LED illuminates whenever the signal approaches the maximum running level. It monitors all stages within the input channel, and illuminates at 3dB prior to clipping.
 - 10 L-R/GRAPHIC button. When released, (L-R selected), the channel will be connected to the left and right busses directly. To mix the input channel signal onto the left and right busses via the GRAPHIC EQUALISER, depress this button.
 - 11 FADER 60mm channel fader with 10dB of gain.
-

2:2 OUTPUT SECTION

- 1 **DIGITAL REVERB** The POWERHOUSE consoles have a built in reverb with a total of 127 programs. The various programs are clearly labelled, on the front panel, for rapid accessing of the desired effect.

The reverb is stereo, and its outputs are connected to the left and right busses. The ON/OFF button switches the DIGITAL REVERB on or off. When it is not required, it should be switched off. Depress for ON, and the adjacent LED will light.

There are six reverb "types" (each of which can be DARK or BRIGHT and have any of eight reverb times), three reverb effects (which can also have any of eight preset reverb times) plus seven SPECIAL EFFECTS.

The reverb types are selected by the TYPE button. Each time this button is depressed, the lit LED above it "moves" down the row to indicate the type selected. The bank SELECT button selects whether the reverb type is BRIGHT or DARK. The DARK/BRIGHT selection is shown by the two LEDs adjacent to the BANK SELECT button.

The TYPE and BANK SELECT buttons also select the three reverb effects and gain access to the 7 SPECIAL EFFECTS (GATED, DELAY, REVERSE & SPECIAL) by moving the LED down with the TYPE button, and using the BVMK SELECT button to toggle between GATED and DELAY, or REVERSE and SPECIAL.

The eight different times available for each of the reverb types and effects are preset and vary for each type/effect selected. The time is selected by using the SPECIAL/TIME button in the same way as the TYPE button.

When SPECIAL has been selected, the SPECIAL/TIME button is used to select any of the 7 SPECIAL EFFECTS. These have all their parameters pre-programmed to create the effect.

The O/LOAD LED will light when the level of the mix of signals sent to the reverb (controlled by the REVERB fader reaches a level 3dB below overload occurs to warn of clipping distortion.
 - 2 **POWER ON** This LED lights when AC power has been switched on at the rear panel of the console.
 - 3 **LED METERS** These display the LEFT & RIGHT OUTPUT levels. The meters are 12-segment, 2-colour with typical VU meter ballistics.
 - 4 **GRAPHIC EQUALISER**

The graphic equalisers are assigned to the left and right busses. They control the equalisation of the mix of signals routed to them by the L-R/GRAPHIC buttons on each of the input channels. If, when adjusting the graphic equaliser, the overall mix level becomes too low or too high, the TRIM fader on each graphic equaliser can be used to compensate for this. To remove the graphic equalisers from the signal path, simply release all L-R/GRAPHIC buttons on input channels.
 - 5 **REV TO MON** Depress this button to route the REVERB to the MON buss (normally used for foldback).
 - 6 **MON FADER** The MON controls on each of the input channels have their overall, mixed level determined by the MON FADER. This fader controls the output level of the MON SEND jack.
 - 7 **REVERB FADER** The REV controls on each of the input channels have their overall, mixed level
-

determined by the REVERB FADER. This fader controls the level INTO the reverb, and when adjusting it, the O/LOAD LED should be checked to make sure that the too high a signal level is not being fed to the reverb.

8 LEFT & RIGHT/MASTERS FADERS

These are dB calibrated for accurate signal level settings to be made. These control the overall mix level on the left and right busses. The signals which can make up this mix are input channels (with or without GRAPHIC EQUALISATION), the DIGITAL REVERB, and the STEREO RETURN.

9 +48V

When this switch is depressed, it applies +48V Phantom Power, to all MIC INPUT XLR Pins 2 and 3, to power condenser microphones.

10 STEREO RETURN

0.25" mono jacks wired Sleeve = Ground, Tip = Signal. Input impedance 10kohm. These are connected to the left and right busses. If a signal is connected to the LEFT jack only, then it will be routed, as MONO, to both the left and right busses.

11 F/S

0.25" mono jack wired Sleeve = Ground, Tip = Signal. This jack socket is wired in series with the REVERB ON/OFF button. When a footswitch is connected to it, it allows the REVERB to be switched on or off remotely. The REVERB ON/OFF button on the console must be released (OFF) for the footswitch to operate.

12 LEFT & RIGHT LINE OUT

0.25" mono jacks wired Sleeve = Ground, Tip = Signal. These are the main outputs from the POWERHOUSE mixing console for connecting to an external amplifier/P.A system. They allow a signal to leave the POWERHOUSE before the built-in power amplifier, but they do not break the signal path. This allows a second amplifier system to reinforce the output of the built-in amplifier, or drive speakers in another part of a venue, the foyer perhaps.

The LINE OUTS are, however, most useful when the built-in amplifier is being used to drive the on-stage monitor system; MON selected by the AMP L-R/MON button. The LINE OUTS would then drive the Front-of-House amplifier/P.A. system.

13 MON SEND

0.25" mono jack wired Sleeve = Ground, Tip = Signal.

14 AUX SEND

0.25" mono jack wired Sleeve = Ground, Tip = Signal.

15 RECORD

Phono sockets for connection to the inputs of a 2-track recorder. They are wired parallel with the LINE OUTS and allow the stereo mix (from the left and right busses) to be recorded conveniently during a performance. Nominal level -10dBV. Minimum load 5kohm.

16 PLAYBACK

Phono sockets for connection to the outputs of a 2-track recorder. When the PLAYBACK button is depressed, they are routed to both the left and right busses (remaining stereo) and also to the MON buss (as mono). Input impedance 5kohm.

17 LEVEL

This controls the level of the stereo PLAYBACK signal onto the left and right busses.

18 TO MON

This controls the level of the mono sum of the stereo PLAYBACK signal onto the MON buss.

-
- 19 AUX SEND This controls the overall output level at the AUX SEND jack, of the mix of signals derived from the AUX controls on the input channels.
- 20 TO AMP This is the master volume control for the built-in stereo 2x300W power amplifier. The LEFT & RIGHT FADERS, or the MON FADER (depending on the selection made on the L-R/MON switch below) must be raised to allow this control to work.
- 21 L-R/MON This button is for selecting whether the left and right busses or the MON buss are routed to the built-in amplifier.
- 22 L-R/MON This button is for selecting whether the left and right busses or the MON buss are routed to the PHONES socket.
- 23 PHONES This is the output volume control for the headphones.
- 24 PHONES socket. For stereo headphones. 0.25" stereo jack wired Sleeve = Ground, Ring = Right, Tip = Left. The headphone amplifier is designed to cater for headphones with a minimum impedance of 400 ohms.

NOTE : The LED bargraphs are connected to the main (left/right) outputs of the mixer section and are calibrated to indicate an output level of 0dBu (.775V) when the first red LED is illuminated.
The amplifier section gives maximum output with an input signal of 0dBu (.775V), so when the "To Amp" control is turned fully clockwise, red LEDs are accompanied by distortion at the speaker outputs.
When the "To Amp" control is set below 10, there is no direct relationship between the bargraphs and the amplifier output.

2:3 THE REAR PANEL

- 1 AC POWER ON SWITCH.
- 2 AC POWER INPUT.
- 3 LEFT & RIGHT INSERTS. The position of these insert points in the signal path is just before the power amplifiers. Their main purpose is for the patching in the pre-amp/crossovers which are supplied with some compact speaker systems. Effects can also be connected here if required.
- 4 OUTPUTS. These XLRs are the amplifier outputs and connect directly to loudspeakers (min impedance 4ohms).
- 5 COOLING FAN. This vent MUST NOT be obstructed while the POWERHOUSE is in use.

NOTE : High voltages are present at the speaker outputs. Avoid touching exposed XLR pins and/or jack plug tips.
Use only heavy duty speaker cables. Screened signal leads (guitar lead etc) are unsuitable since they cannot safely withstand the high current.

USING THE POWERHOUSE

3:1 FIRST THINGS FIRST

Set all console controls to their minimum, or zero position: all levels fully anticlockwise, pans to centre, faders to oo. Make sure all switches are set OUT. Switch OFF +48V Phantom Power. Connect either loudspeakers (min. impedance 4ohms) to the OUTPUTS, or stereo headphones (min. impedance 400ohms) to the PHONES jack.

Switch on the console.

3:2 THE INPUT CHANNEL CONNECTORS

For each input channel there are two connectors: a female XLR labelled MIC and a standard 0.25" stereo jack labelled LINE. The MIC socket is designed for low level signals, typically generated by microphones. The LINE socket is for higher level (or "line level") signals produced by drum machines, keyboards, some electric guitars, tape machines etc.

NOTE: Use only the MIC or LINE socket on an input channel, NEVER both together.

For the purpose of setting up the console, connect a keyboard or tape machine to the LINE input of a channel so that a continuous signal is fed to the channel).

At this stage, a signal has entered the console but nothing can be heard.

3:3 HOW TO GET THE INPUT SOUND THROUGH TO THE HEADPHONES

- 1 The GAIN control. Adjust this control until it reads about 20 on its scale. The signal within the input channel has its level determined by this control.
 - 2 The CLIP indicator. Check that this LED is not lit. This LED will only light when the signal level within the channel (pre- or post-fader) is too high. It illuminates just before "clipping" occurs, to warn that the channel is near its limit. If a signal clips, then it will be distorting. If it does light, then take one of the following steps:
 - a Reduce the GAIN control level until the light goes off.
 - B Reduce the output level of the input source (keyboard etc.).
 - 3 The PAN control. All inputs are routed to the left and right busses (see L-R/GRAPHIC button below). The PAN control determines how much of the signal goes to left or right. In the centre position, the input signal level is equal on both left and right busses.
 - 4 The L-R/GRAPHIC button. Depressing this button will send the input channel signal to the left and right busses via the graphic equalisers. To bypass the graphic equalisers, leave the button released.
 - 5 The input channel FADER. The output level of the channel is set by this control, and for the time being, it is best set at 0dB on its scale. At this point, raising the channel fader presents the incoming signal to the left and right busses and the level of this signal is now passed directly to the LEFT/RIGHT faders.
-

Raising these faders will show the signal level on the LEFT/RIGHT bargraphs and it can be heard in the headphones (the headphones also have their own level control).

If loudspeakers are connected, then the TO AMP control should be turned clockwise, then the sound will also go to the loudspeakers. DO NOT allow the signal to go beyond the first red LED on the bargraph.

3:4 THE EQUALISATION SECTION ON THE INPUT CHANNELS

The function of equalisation is to increase or decrease selected frequencies to either achieve a particular sound, or eliminate an unpleasant characteristic.

To set the EQ flat (no frequencies cut or boosted), set to zero (centre) the three knobs calibrated in dB. Turn clockwise the HF (treble) control, then turn it back to zero and compare the sounds. Notice the difference? What you have done is BOOST high, or treble, frequencies. The EQ network covers the whole range of audible frequencies from treble to bass.

The electronic characteristics and frequencies of STUDIOMASTER EQ are unique and are developed to SOUND good. The main purpose of EQ is to correct deficiencies in a sound source's frequency response, but used creatively it can also enhance sounds. POWERHOUSE has an EQ network that when mastered can make mediocre sounds good, and good sounds excellent. Practise is recommended.

3:5 REV, AUX & MON

The POWERHOUSE consoles have three controls on each input channel which can be used to send the input channel signal to be processed, or used elsewhere; the REV, AUX and MON controls.

THE REV CONTROL

Turning this control clockwise sends the input channel signal to the built-in DIGITAL REVERB. By using several REV controls on the input channels a mix is created at the REVERB FADER. The setting of this fader controls the level of signal fed to the REVERB. When adjusting it, check that the REVERB O/LOAD LED does not light.

THE AUX CONTROL

The AUX control is just like the REV control, but allows an external effect processor to be used. Adjusting several AUX controls creates a signal mix at the AUX SEND control which sets the level of the output from the AUX SEND jack. This would be connected to the input of an effect processor such as delay, enhancer, compressor etc.

Like the REVERB FADER, the AUX SEND control alters the signal level fed IN to the effect, so check the overload indicator of the external effect to avoid clipping or distortion.

REV & AUX, POST-FADE

The REV and AUX controls are "post-fade". Post-fade means that their level is affected by the position of the channel fader. They are effects sends. The reason for this is that a mix is set, say from inputs 1 to 5,

with "dry" input signals using the channel faders. Turning REV on each of the inputs 1 to 5 by the same amount means that the same mix levels that were sent to the left and right busses by the channel faders are now at the REVERB FADER. The AUX controls work in exactly the same way, but allow a different external effect to be used.

MIXING EFFECTS

Both the REVERB and the effect connected to the AUX SEND need to be returned to the left and right busses to be added to the mix.

The outputs of the built-in REVERB are connected directly to the left and right busses, so simply raise the REVERB FADER to mix the "wet" (reverb added) signal to the rest of the mix. The REVERB FADER actually controls the signal level being fed IN to the REVERB. This allows the REVERB to be removed from the mix (with the fader setting preserved) by switching the REVERB OFF, either at the console, or via the optional remote footswitch.

The outputs of an effect processor connected to the AUX SEND jack can be returned for mixing at either of two places. The first is the STEREO RETURN, which is ideal for, perhaps, an autopanner or other effect which operates in stereo. The STEREO RETURN jacks are connected directly to the left and right busses, and the level of signal added to the mix is set by the AUX SEND control. For a mono effect, use only the LEFT jack of the STEREO RETURN.

The other place the effect can be returned is a LINE input. The effect return would then be treated like any other input signal and routed to the left and right busses, with the option of mixing it via the GRAPHIC EQUALISERS (by depressing the L-R/GRAPHIC BUTTON). For a stereo effect, two LINE inputs will be required. Using one or more LINE inputs for returning an effect should be considered very carefully, and usually only when input channels are spare.

WARNING: DO NOT return the effect connected to the AUX SEND into an input channel and turn the AUX control on that input channel - the console will start to oscillate.

THE MON CONTROL

While the REV and AUX controls are used for adding effects to the mix, the function of the MON controls is to allow the performers to hear themselves playing. Adjusting MON controls on the input channels creates a mix at the MON FADER, which sets the output level of the MON SEND. This would normally be connected to an amplifier and monitor speaker, or headphone system, for the performers to listen to themselves.

MON, PRE-FADE

Pre-fade sends are used for foldbacks (on-stage monitoring) because a relative mix of signals different to that used for front-of-house can be sent to the stage (performers generally do not want the same signal mix as front-of-house). This is possible with the MON controls as they are pro-fade and therefore independent of the input fader levels that have been set for the main mix.

MORE ABOUT THE MON SYSTEM

The MON system on POWERHOUSE consoles has a number of useful additional features. The REVERB can be routed directly to MON by depressing the REV TO MON button. If the built-in stereo 2x300W amplifier is not being used for the main mix, then it can be used to power the foldback system if the L-R/MON button below the TO AMP control is depressed. Also, MON can be sent to the operators headphones by depressing the L-R/MON button above the headphone level control.

CONNECTIONS

The AUX SEND should be connected to the input of an effect processor. The MON SEND should be connected to the input of the on-stage monitoring system (unless the built-in amplifier is to be used instead, as described above). The output from the effect processor connected to the AUX SEND can be connected to either the STEREO RETURN or a spare LINE input. The benefit of using an input channel is that EQ is available for the signal, but on the other hand, using the STEREO RETURN leaves all inputs free for instruments.

3:6 THE GRAPHIC EQUALISERS

Each of the 7-band GRAPHIC EQUALISERS are assigned to the left and right busses. For maximum flexibility, input channels can be individually sent via the GRAPHIC EQUALISERS to the left and right busses.

The TRIM FADER on each equaliser allows the signal level into the equaliser to be adjusted. This is only required when excessive EQ adjustments either cause clipping, or severe reduction of the mix level (seen on the LEFT & RIGHT LED meters).

3:7 TAPE RECORD & PLAYBACK SOCKETS

These are used for making tape recordings of live sessions, playing backing tapes or for playing pre-recorded background music during intervals etc.

On playback the signal is routed to the left and right busses, its level on these busses set by the LEVEL control. It can also be sent to the MON system by turning clockwise the TO MON control. Using both these controls means that a backing track can be sent to both the main mix, and also to the performers.

3:8 PHANTOM POWERING

The POWERHOUSE has a +48V phantom powering facility. When the phantom power switch is ON, 48V is applied to pins 2 & 3 of all the MIC INPUT XLRs. This is used for remote powering of condenser/ capacitor microphones which eliminates the need for external microphone power supplies.

A balanced microphone which does not need phantom power will not usually be damaged by being used while the 48V power is on (there are a few exceptions to this though, and if in doubt contact the microphone manufacturer).

An unbalanced microphone **MUST NOT** be used with phantom power ON.

3:9 THE OUTPUTS

There is a choice of two outputs for the main stereo mix on POWERHOUSE consoles; the LINE OUTS, and the amplifier OUTPUTS.

The amplifier OUTPUTS in most cases would be used to drive the main P.A. loudspeakers (the L-R/MON button below the TO AMP level control must be released). However, more power may be required for the P.A. system in which case amplifiers may be connected to the LINE OUTS. The built-in power amplifier may then be used to drive the MON (foldback) system (the L-R/MON button below the TO AMP level control must be depressed).

NOTE: When the amplifier is assigned to MON both channels are driven by the same signal (because the MON system is mono).

4:1 DIGITAL REVERBERATION

When live music is played in a concert hall, the sounds of the instruments and vocalists become sustained and blend into one another. This is due to the sounds being reflected from the walls, ceiling and floor of the hall and bouncing between these surfaces many times until the "echoes" die away. This effect is called REVERBERATION.

Many performance venues have poor acoustics; often caused by their internal surfaces not being reflective to sound. The performance may sound- unnatural and synthetic. Devices for creating artificial "concert hall" reverberation have been used for many years in the forms of electro-mechanical spring or metal plate based systems. Apart from being bulky and prone to external noise and vibration, these devices were invariably noisy, had a poor frequency response, a very limited range of reverb sounds, and in particular an unconvincing and unnatural sound.

High-speed computer technology has changed all that, allowing acoustic environments to be simulated with breathtaking accuracy by digital signal processing techniques. In a DIGITAL REVERB, the sound signals are represented as strings of digital numbers, just like in a compact disc player. A very fast arithmetic processor continuously performs the millions of calculations every second necessary to synthesise the many echoes found in natural reverberation. The results of these calculations are then converted back to analogue sound.

The versatile digital reverberator built in to POWERHOUSE consoles not only provides facilities for recreating various acoustic environments, but also has some special effects in its 127 program memory.

4:2 THE CONTROLS

- 1 The TYPE button, and the 8 LEDs above it, are used to select the type of acoustic environment (top 6 LEDs), or various effects (bottom 2 LEDs).
 - 2 The BANK SELECT button. This button is used to toggle between two "banks", indicated by the two LEDs next to it. When the right LED is lit DARK is selected for the first 6 reverb TYPES. The selection of "DARK" brings a digital filter into operation, resulting in a more mellow sound. Selecting DARK also selects the DELAY and SPECIAL EFFECT modes when one of the bottom two TYPE LEDs is lit.
Selecting the left LED for BRIGHT reproduces the first 6 reverb types without the filter, and is used to select GATED and REVERSE reverb types.
 - 3 The TIME button, and the 8 LEDs above it, are used to select the decay time of the reverb sound, the delay time in DELAY mode, or the type of effect in SPECIAL EFFECT mode.
 - 4 The O/LOAD LED indicator gives an impression of the input level and warns of any possible overload condition.
 - 5 The ON/OFF button allows the reverb to be in-circuit or bypassed. When depressed, the reverb is in-circuit (ON), and the adjacent LED will light.
-

4:3 TECHNICAL DATA

TABLE 1 - TIME SETTINGS

DECAY/GATE/DELAY TIME (Seconds):

TIME SETTING	TYPE								
	SMALL HALL	LARGE HALL	SMALL ROOM	LARGE ROOM	PLATE 1	PLATE 2	GATED	REVERSE	DELAY
1	0.5	1.2	0.3	1.5	0.2	1.0	0.2	0.1	0.05
2	0.8	2.0	0.5	2.5	0.3	1.5	0.3	0.2	0.1
3	1.0	3.5	0.8	3.0	0.5	2.0	0.4	0.25	0.18
4	1.2	5.0	1.0	4.0	0.8	2.5	0.6	0.3	0.2
5	1.5	6.0	1.2	4.5	1.0	3.0	0.15	0.35	0.35
6	1.8	7.0	1.5	5.0	1.2	5.0	0.25	0.4	0.4
7	2.5	8.0	1.8	7.0	1.5	5.5	0.35	0.45	0.5
8	3.0	15.0	2.0	8.5	1.8	7.5	0.45	0.5	0.65

TABLE 2 - SPECIAL EFFECT PROGRAMS

TIME SETTING	EFFECT
1	Regenerative Reverb
2	Room Ambience
3	Echo and Reverb
4	Stereo Crossing Echo
5	2-Tap Stereo
6	3-Tap Panning
7	Multitap
8	Reverb Bypass

4:4 IN USE

The HALL TYPES tend to be useful for general purpose overall reverberation, and in particular for strings and brass instruments. The ROOM TYPES are slightly less smooth, and are useful for a more intimate sound on vocals and guitar. The PLATE TYPES are very smooth and slightly shrill; ideal for vocals or percussion.

Selecting DARK simulates the more mellow effect of a room filled with a sound-deadening audience or carpets, curtains, soft furnishings etc. This can be useful for making the reverberation sound less "cutting", allowing more of it to be used.

On these normal reverb settings, the SPECIAL/TIME button selects the decay time as shown in TABLE 1.

The GATED TYPE simulates the effect of a plate reverberator treated with a noise gate so that the reverberation tail ends abruptly rather than decaying gradually. This is very effective on percussion such as snare or bass drum.

The REVERSE TYPE simulates the effect of playing a tape backwards, which can be useful as a special effect on vocals or guitar for instance. The build-up time is varied using the SPECIAL/TIME button (see TABLE 1).

The GATED and REVERSE reverb TYPES (or algorithms) have no corresponding "dark" setting.

When the right BANK is selected, the GATED position becomes DELAY, with a range of normal digital delays as shown in TABLE 1. The REVERSE position becomes SPECIAL.

When SPECIAL is selected, the various effects listed in TABLE 2 become available on the various positions of the TIME control.

4:5 SPECIFICATIONS

Frequency Response	20Hz to 10kHz +4-1dB * (Effect) , 11Hz to 25kHz +/-1dB (Dry)
T.H.D.	0.1% (1kHz 0dBm, effect)
Output Noise	-71dBm (DIN Audio) +4dBm mode, -82dBm (DIN Audio) -10dBV mode, -98dBm (DIN Audio) Dry
Maximum Output Level	+14dBm (1kHz, 600ohm) +4dBm mode, +2dBm (1kHz, 600ohm) -10dBV mode
Stereo Separation	100dB (1kHz), 92dB (10kHz)
Input Impedance	100kohm
Reverberation Time	0.2 to 15.0 seconds
Maximum Delay Time	650ms
Headroom Indication	6dB below clipping

* - Includes a small "presence" peak

5:1 MIXING CONSOLE SPECIFICATIONS**TOTAL EQUIVALENT INPUT NOISE (DIN Audio)**

150ohm source MIC Input : -129dB
10kohm source LINE Input : -99dB

COMMON MODE REJECTION RATIO

MIC Maximum Gain @ 1kHz : 87dB
MIC Maximum Gain @ 100Hz : 77dB

TOTAL HARMONIC DISTORTION & NOISE

MIC Gain 50dB Master Output 0dBm into 600ohms : Less than 0.05%

FREQUENCY RESPONSE (+0-1dB)

MIC Gain 50dB Master Output 0dBm into 600ohms : 35Hz - 20kHz

INPUT IMPEDANCE

MIC Input Impedance : approx 2kohms
LINE Input Impedance : greater than 20kohms

GAIN RANGE

MIC Gain Range : +15 to +60dB
LINE Gain Range : -5 to +40dB

SIGNAL TO NOISE RATIO

MIC Input to Master Output : 77dB (ref. to 0dBm output)
(MIC Gain 50dB, Output Faders at "0")

CROSSTALK

Input to Adjacent Input : Below Noise
Left Master to Right Master : -68dB @ 1kHz
Input Pan Attenuation : -65dB @ 1kHz

NOMINAL NOISE (DIN Audio)

Master Output Faders at "0" : -87dBm (8 or 12 inputs)

MAXIMUM GAIN

MIC Input to Master Output : 80dB
LINE Input to Master Output : 60dB

NOMINAL OUTPUT LEVEL

Master Outputs : 0dBm/0.775Vrms

MAXIMUM OUTPUT

Master Outputs into 600ohms: +20dBm/8Vrms

HEADPHONES OUTPUT

Into 400ohms : 8Vrms (160mW)
Into 600ohms : 8.4Vrms (115mW)

TAPE RECORD/PLAYBACK

Line In Sensitivity : -10dBV 300mVrms
Line Out Level (Min. load 5kohms) : -10dBV 300mVrms

INPUT EQUALISATION

Treble (HF) +/-16dB :	12kHz shelving
Midrange (MID) +/-16dB :	2kHz peak response
Bass (LF) +/-16dB :	60Hz shelving

PEAK/CLIP

Dynamic Operation :	Indicates 4dB prior to clip
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METERS

VU response 12 segment, 2 colour LED meters with "0" reference :	0dBm
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FADERS

Sealed Carbon Track :	60mm
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5:2 AMPLIFIER SPECIFICATION**POWER OUTPUT**

Both Channels Driven:	4 ohm - 300Wrms
	8 ohm - 160Wrms

FREQUENCY RESPONSE

+0-1dB	8Hz to 80kHz
+0-3dB	4Hz to 100kHz

TOTAL HARMONIC DISTORTION

At rated power output (1kHz test signal):	0.02%
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INPUT IMPEDANCE:

10kohm

INPUT SENSITIVITY:

0dBm

RESIDUAL HUM NOISE:

-70dB

SIGNAL TO NOISE RATIO:

Greater than 100dBm

PROTECTION:

Dual slope protection against short circuit, open circuit and load mismatch conditions. D.C. and thermal protection via relay circuit.

POWER REQUIREMENTS:

600 VA

COOLING:

Thermostatically controlled fan

5:3 GRAPHIC EQUALISATION SPECIFICATION

+/-12dB at 60Hz, 150Hz, 400Hz, 1kHz, 2.5kHz, 5kHz, 10kHz

5:4 DIMENSIONS (WxHxD) AND WEIGHTS

8-2 - 530mm wide x 180mm high x 440mm deep, 25kg
 12-2 - 650mm wide x 180mm high x 440mm deep, 27kg

6:1 GLOSSARY OF TERMS

AC POWER INPUT	Local electrical supply.
ATTENUATE	To reduce a signal, or reduce gain.
AUTO-PANNER	A device which automatically moves an instrument between left and right. Can be triggered manually, or by another instrument connected to its sidechain.
AUXILIARY SEND	Extra output from the console, normally used for sending a mix of various instruments to effects or foldback systems.
BUSS	This carries a signal, or sum of signals through the console eg "left" buss.
COLD	The negative phase of a signal. With 2 signal wires, one is positive (hot), and the other is negative (cold).
COMPRESSOR	A device which literally compresses a signal so that its level can fit onto media which have a narrow dynamic range. Compression is often needed before recording onto cassette tape, and is very useful for vocals.
CONDENSER MICROPHONES	High quality microphones, generally best suited to recording work. To use with POWERHOUSE, switch on the +48V Phantom Power.
dB (DECIBEL)	A logarithmic ratio used to represent voltage or power gain. The reference to which the ratio is being made is usually stated.
DIGITAL DELAY	A device which samples a piece of sound, stores it digitally, then converts it back into sound a short time later.
DRY	A signal which has not been sent to an effect (see also WET).
EFFECT	A general term used to refer to an external piece of equipment which can be used to "fix" signals which sound wrong (noise gating for example), or used creatively to produce an "effect" (reverb for example).
EFFECTS SEND	See AUXILIARY SEND
EFFECTS RETURN	Any place where effects may be returned to the console for mixing; on the POWERHOUSE consoles there are LINE inputs and STEREO RETURN which are suitable for this purpose.
EQ (EQUALISATION)	Refined tone controls. Each "band" of EQ can adjust a particular frequency to make it more or less prominent.
FADER	A slider, rather than rotary, volume control.
FEEDBACK	This is normally caused by a microphone being too close to a speaker. Feedback is an "endless loop" in which an "output" (from a speaker) gets accidentally fed back into an "input" (microphone). This can be a deafening howl, or sometimes in headphones a whining noise will be added to the sound.
FLAT EQ	Equalisation has been set so that no frequencies have been boosted or cut - every frequency is at the same level.
FOLDBACK	A separate mix for the performers to hear consisting of live instruments, pre-recorded backing tracks and sometimes effects returns. The MON system of the POWERHOUSE consoles is designed for this purpose.
FREQUENCY SPECTRUM	The entire range of frequencies from very low (sub-bass and bass) to very high (treble).

GAIN	The amount of amplification or increase in a signal's level.
GROUND	Earth or screen of a cable when referring to connecting leads.
GRAPHIC EQUALISER	A device which, due to its many faders, can adjust many specific frequencies in the FREQUENCY SPECTRUM. The term graphic arises from the fact that when adjusted, the fader settings "graphically" represent the adjustments to the frequency spectrum.
HOT	The positive phase of a signal. With 2 signal wires, one is positive (hot), and the other is negative (cold).
Hz	Measurement of frequency (Hertz). 1Hz = 1 cycle per second.
kHz	Measurement of frequency expressed to the power of 1000. 1kHz = 1000 cycles per second.
kohm	Measurement of electrical resistance expressed to the power of 1000. 1kohm = 1000ohms.
LINE LEVEL	A high level signal suitable for feeding LINE inputs, STEREO RETURNS, and the RETURN of INSERT POINTS. The standard level is -10dBV.
LOW LEVEL	A signal which requires considerable amplification to feed a channel. MIC INPUT XLRs on POWERHOUSE are designed for low-level signals, typically generated by microphones and D.I. boxes.
MONITOR	This term often also refers to the FOLDBACK speakers on stage - as well as "THE MONITORS".
NOISE GATE	A device which can remove the noise content from a signal, or be used to remove low level noise present when an instrument is not being played.
Ohm	Measurement of electrical resistance.
PAN	A PAN control places a signal across two stereo busses (left and right). Turning it to the left will send all the signal to the left buss, and by turning it to the right, all the signal will be sent to the right buss. If the PAN is at its centre (0) position, an equal amount of signal is sent to both sides, and the signal's "image" in the stereo picture will appear to be central.
POST	Post means AFTER a part of the console - Post-fader, post-EQ etc. Post on its own generally refers to post-fader.
PRE	Pre means BEFORE a part of the console - pre-fader, pre- EQ etc. Pre on its own generally refers to pre-fader.
DIGITAL REVERB	An essential effect for adding "ambience" to a sound. Reverberation gives the impression that the instruments are being played in an enclosed space. The built-in stereo DIGITAL REVERB in the POWERHOUSE console provides 127 different reverb programs, which can emulate room sizes and create special effects.
SIGNAL TO NOISE RATIO	The ratio between the level of signal and the level of unwanted noise.
WET	A signal which has been processed by an EFFECT (see also DRY).
