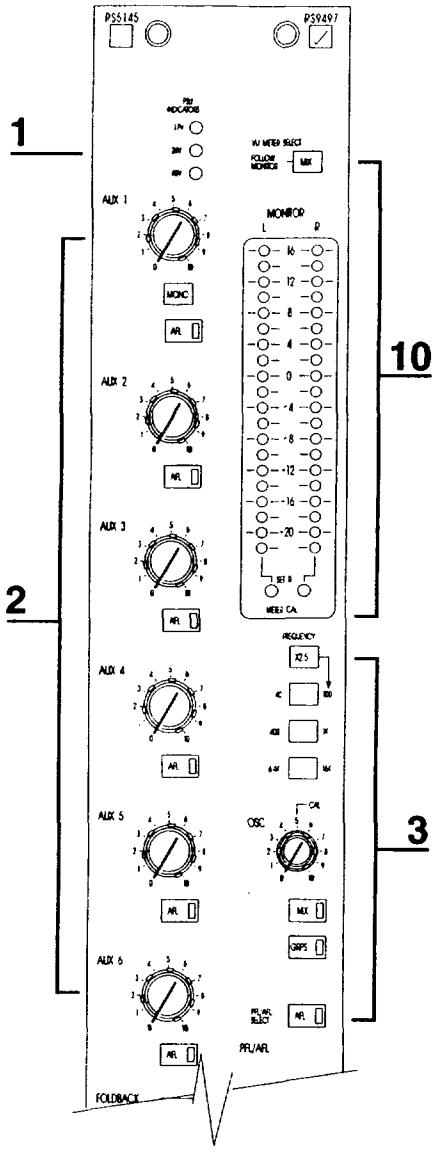
Master Module RS9497/RS5145

Description

and Operation

The Master module contains the summing amps and level controls for the Mix and Aux outputs, plus monitoring selection, metering, Solo functions and a multi-frequency oscillator.



Module Identification

At the top of the module there are two boxes which indicate the module number: RS9498 for non-patchbay consoles and RS5146 for the patchbay version. The two modules have indentical functions and differ only in the rear connections.

1 Power supply monitoring is provided by three **LEDs** which show the presence of +/-17V, +24V and +48V supplies.

Auxiliary Masters

2 Each **AUX** Send bus has its own master level control with +10dB gain at full clockwise rotation and an associated **AFL** switch to allow monitoring of the output signal. The balanced output buffers give a nominal output level of +4dBu. Aux Master 1 also has a **MONO** switch which sums the stereo output signal in mono.

Oscillator

3 The test Oscillator has six switch-selectable frequencies. Three switches select the basic frequencies at **40Hz, 400 Hz and 6.4kHz** and pressing **x2.5** provides a second set of frequencies at **100Hz, 1kHz & 16kHz**. The oscillator signal can be routed to **MIX** or **GRPS**, and these switches DIM (or CUT if internally selected) the control room monitors. The **OSC** level control varies the output level and the detented CAL position gives a reference +4dBu at the Mix output XLRs or -10dBV at the mix output jack sockets.

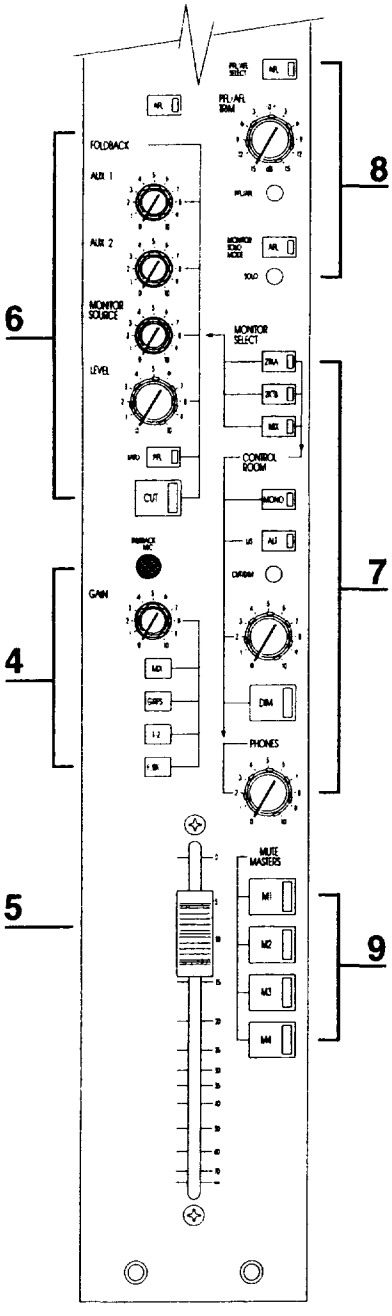
Talkback

4 The built-in talkback mic has an associated **GAIN** control and can be routed with momentary switches to MIX, GRPS, Aux 1 & 2 or F/BK (Foldback). When any of these switches is pressed the Dim/Cut function is activated on the control room monitor output. and the **DIM** LED illuminates. Normally this causes the monitors to DIM by approx 20dB, but may be optionally changed to CUT by changing an internal link. See the Sapphyre Technical Manual for details.

Mix Masters

5 A long throw stereo **FADER** provides overall level control of the Mix L & R signals which are available either as +4dBu level on XLR connectors or -10dBV level on jack sockets and both pairs of outputs have individual balanced output amplifiers.

The Mix outputs have a pre-fade **INSERT** point with a ground compensated Send and a balanced Return on separate jack sockets, operating at a nominal -2dBu.



Foldback Masters

6 The Foldback output is a stereo submix of Aux 1, Aux 2 and the monitor select signals, allowing studio speaker or headphone mixes to be set up very rapidly. The three sources each have a level control, and a master **LEVEL** knob and associated **CUT** switch provide overall control of the balanced output signal.

The output signal can be monitored by the (AFL)**PFL** switch

Monitoring

7 Control Room Monitors can be sourced from **MIX**, **2T-A** or **2T-B** as selected on the intercancelling MONITOR SELECT switches. 2T-A is fed from XLR connectors and is a nominal +4dBu input, while 2T-B is a nominal -10dBV input on jack sockets. A master control sets the overall level to either the main output (+4dBu) or alternative output (+4dBu) with **ALT** pressed. This allows quick access to two separate pairs of monitor speakers from individual balanced outputs. The stereo monitor signal can be switched to **MONO** to check for correct phasing of the stereo image.

Headphones have a separate level control (**PHONES**) feeding a socket under the armrest. This output follows the control room monitor signal and is similarly affected by the DIM/CUT system.

PFL/AFL & Solo-in-Place

8 The monitor selection is overridden by any PFL/AFL selected, indicated by the **PFL/AFL** LED. The PFL/AFL level may be varied by +/-15dB using the **PFL/AFL TRIM** control. The PFL/AFL/SIP mode for the whole console is set by the two switches above and below the TRIM control. **PFL/AFL SELECT** chooses between PFL (UP) and AFL (DOWN) while **MONITOR SOLO MODE** selects any SOLO switches to SOLO (UP) or AFL/PFL (DOWN) depending on the setting of the PFL/AFL SELECT switch. The modes available in each switch position are shown in the diagram below:

The **PFL/AFL** and **SOLO** LED indicators show when either a PFL, AFL or SOLO is active.

Note that the MONITOR SOLO MODE switch is effectively a solo-safe switch, since while SIP is destructive and interrupts the bus feeds, PFL and AFL do not.

Master Module Mode Switches - corresponding module functions

Master Module Switches		I/O Monitor path SOLO Switch	I/O Channel path AFL/PFL Switch	Dual Line Input SOLO Switch	Dual Stereo Input AFL/PFL Switch	Aux Master AFL Switch	Foldback Master PFL Switch
PFL/AFL Select	Monitor Solo Mode						
■	■	SOLO	PFL	SOLO	PFL	AFL	PFL
■	▬	PFL	PFL	PFL	PFL	AFL	PFL
▬	■	SOLO	AFL	SOLO	AFL	AFL	AFL
▬	▬	AFL	AFL	AFL	AFL	AFL	AFL

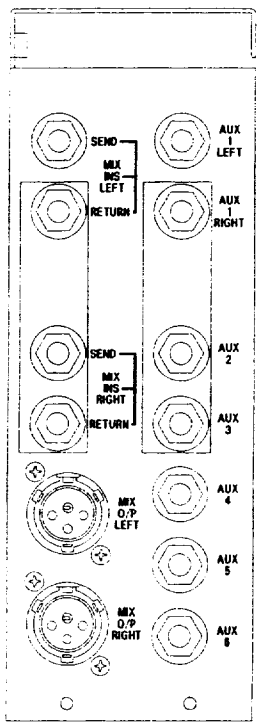
Mute Masters

9 The four **MUTE MASTER** switches (M1-M4) mute, when pressed, any channel which has the corresponding Mute bus selected, enabling four separate and overlapping mute groups to be created.

Metering

10 The two 20-segment LED **METERS** on the master module follow the monitor selection. The twin **VU METERS** with peak LEDs in the overbridge normally also follow the monitor but can be sourced from the stereo Mix by pressing **MIX**.

Rear Connector Panels



Connector Pinouts

Mix Outputs - Male XLR

Pin 1	Screen
Pin 2	Hot(in phase signal)
Pin 3	Cold(out of phase signal)

Mix Insert Send L & R - 3 Pole Jack

Tip	Hot(signal)
Ring	Ground Sense
Sleeve	Ground(screen)

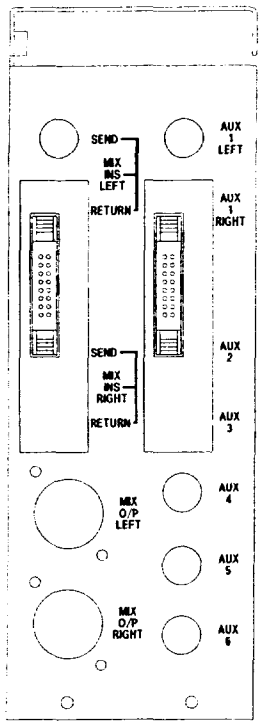
Mix Insert Return L & R - 3 Pole Jack

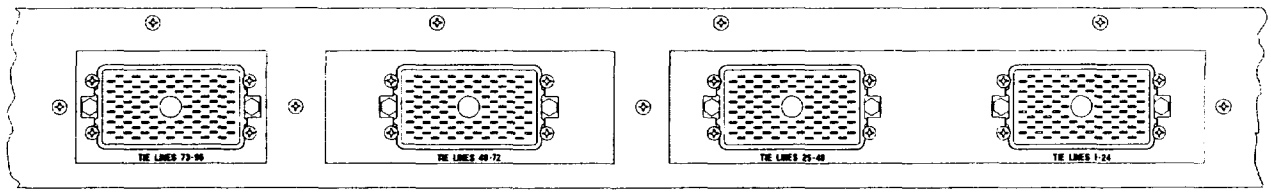
Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

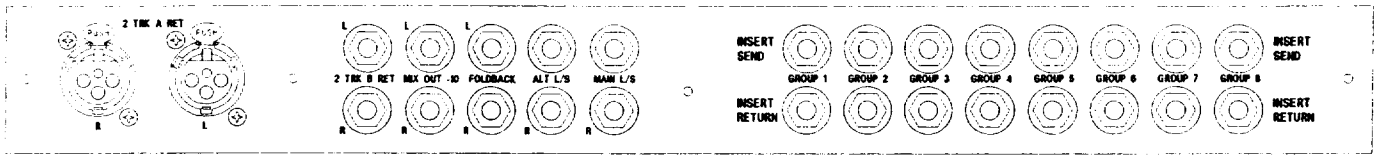
Auxiliary Outputs - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

Rear Connector Panels







Connector Pinouts

2 TRK A Return - Female XLR

Pin 1	Screen
Pin 2	Hot(in phase signal)
Pin 3	Cold(out of phase signal)

2 TRK B Return - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

Mix Output (-10) - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

Foldback Output - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

Alt LS Output - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

Main C/Room Output - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

Group Insert Send - 3 Pole Jack

Tip	Hot(signal)
Ring	Ground Sense(cold)
Sleeve	Ground(screen)

Group Insert Return - 3 Pole Jack

Tip	Hot(in phase signal)
Ring	Cold(out of phase signal)
Sleeve	Ground(screen)

The Sapphyre / Sapphyre LC Patchbay

The Sapphyre / Sapphyre LC Patchbay

Introduction

The Patchbay version of Sapphyre / Sapphyre LC is an 8-module wide panel that provides patching for up to 52 I/O modules (48 tape tracks), Master functions and a maximum of 144 tie lines (96 are fitted as standard). The majority of the external connections are via EDAC 516 connectors.

The panel has 3 functionally seperate areas:

- I/O patching is done in the left-hand area.
- Master patching in the upper right-hand area.
- Tie-line patching in the lower right-hand area.

The patchbay also accommodates Stereo Input and Dual Line Input (optional) module patching.

Pin-out details are given later in this chapter.

Patch Jacks.

These are PCB mount ADC Bantam.

Master Interface.

This is via three 38-way EDAC516 connectors, mounted on a panel at the rear of the Patchbay.

Tape Interface.

This is via 56-way EDAC516 connectors, mounted on a panel at the rear of the Patchbay, configured to carry 8 tape sends and 8 tape returns per connector.

Tie Line Interface.

This is via 90-way EDAC516 connectors, mounted in slots at the lower rear of the console.

Patchcards.

The left side of the Patchbay contains the I/O section. Each patchcard has 14 Bantam jack sockets and caters for 2 I/O modules and 2 associated tape tracks. Optional patchcards may be used for 2 Dual Line or 2 Dual Stereo Input modules.

On the right side of the Patchbay, the 7 upper patchcards are for Master function patching. Each patchcard has 12 Bantam jack sockets.

Below the Master patchcards is a patchcard (12 jack sockets) for the 3 Stereo Input modules provided in the standard console configuration.

The 12 lower right cards are for tie-lines (12 jacks sockets each). 8 tie-line cards are fitted as standard, giving 96 tie-lines with the option of up to 144.

I/O Module

An IDC connector is installed instead of 3 jack sockets. Only the Mic XLR and -10dB switch are accessible by the user. All line level connections are via the Patchbay or optional ¼" jacks mounted in 8- way rear panel cut-outs.

Dual Line Input (Optional)

An IDC connector is installed instead of the Input and Insert jack sockets. All connections are via the Patchbay or optional ¼" jacks mounted in 8-way rear panel cut-outs.

Dual Stereo Input

An IDC connector is installed instead of the Input jack sockets. All connections are via the Patchbay or optional ¼" jacks mounted in 8- way rear panel cut-outs.

Master Module

IDC connectors are installed instead of the jack sockets and XLRs. All connections are via the Patchbay to the EDACs.

Patchbay

The Multitrack and Master EDACs (9 in total) are housed in the panel at the rear of the Patchbay.

Lower Rear Panel Cut-outs

These house the 90-way tie line EDACs and optional 1/4" Jack (8 jacks each) / EDAC panels. The number of cut-outs increase with frame size; See table below.

Note that there is a maximum number of 1/4" jacks which can be fitted. For each frame size there is enough space for all line inputs on the I/O modules to be catered for, but NOT enough space to accommodate the jacks required for a console which was, for example, fully fitted with Dual Line Input modules.

FRAME SIZE	STD CUT OUTS	OPTIONAL CUT OUTS
20 P/B	4 (tie lines)	4
28 P/B	4 (tie lines)	6
36 P/B	4 (tie lines)	8
44 P/B	4 (tie lines)	10
52 P/B	4 (tie lines)	12

Module Removal/Replacement

Removal of the console modules in the Sapphyre / Sapphyre LC Patch version of the console requires a different procedure to that of the standard console. Module replacement is carried out in the reverse order to module removal.

Standard Console:

- Unplug external interface cables (jack/XLR) on selected module.
- Remove top and bottom plastic trims from console front facia.
- Remove module fixing screws. (Top & bottom of module, as well as module rear panel).
- Lift module in the vertical plane so that bus and ground connectors can be unlatched, thereby freeing the module.

Patchbay Console:

- Unplug external interface cable(s) (jack/XLR) on selected module.
- At the rear of the console, remove cable cover plate behind selected module, exposing module's IDC patchbay connectors.
- Unlatch selected module connector(s).
- Remove top and bottom plastic trims from console front facia.
- Remove module fixing screws. (Top & bottom of module, as well as module rear panel).
- Lift module in the vertical plane so that bus and ground connectors can be unlatched, thereby freeing the module.

I/O Patchcard Facilities

The patchcards in the I/O section have 14 Bantam jack sockets per card and cater for 2 I/O modules and 2 associated tape tracks. Unused positions are blanked off.

The I/O patchcard has the following facilities for each module.

SIGNAL NAME	TYPE	LEVEL	CONNECTED TO
Line Input	Bal	+4dBu	I/O Module
Insert Send	Unbal	-2dBu	I/O Module
Insert Return	Bal	-2dBu	I/O Module
Channel Out	Bal	+4dBu/-10dBV	I/O Module
Tape Send	Bal	+4dBu/-10dBV	Tape EDAC
Tape Return	Bal	+4dBu/-10dBV	Tape EDAC
Monitor In	Bal	+4dBu/-10dBV	I/O Module

There is an option to take line input break contacts to 1/4" jacks on rear panel cut-outs.

Master Patch Facilities

There are 7 Master Patchcards each with 12 Bantam jack sockets.

Send and Return pairs of jacks connect to and from the same Module/PCB and not to external connectors.

Output jacks are connect as half-normalled pairs. The source jack connects to the module/PCB providing the ouput signal, and the destination jack connects to external equipment via EDACs.

2 Track Return jacks connect as half-normalled pairs. The source jacks connect to the 2-Track machine providing the ouput signal (via EDACs), and the destination jacks connect to the module/PCB receiving the signal in the console.

SIGNAL NAME	TYPE	LEVEL	SIGNAL FROM	SIGNAL TO
Grp Ins Send 1-8	GC	-2dBu	Group PCB	
Grp Ins Ret 1-8	Bal	-2dBu	Group PCB	
Aux Out 1L, 1R	Bal	+4dBu	Master LH PCB	Aux EDAC
Aux Out 2 - 6	Bal	+4dBu	Master LH PCB	Aux EDAC
Mix Ins Send L/R	GC	-2dBu	Master RH PCB	
Mix Ins Ret L/R	Bal	-2dBu	Master RH PCB	
Mix Out +4 L/R	Bal	+4dBu	Master RH PCB	2-Tk & Mix Jacks
Mix Out -10 L/R	Bal	-10dBV	Group PCB	2-Tk & Mix Jacks
2 Tk A Send L/R	Bal	+4dBu	Mix Out Jacks	2-Tk EDAC
2 Tk A Ret L/R	Bal	+4dBu	2-Tk EDAC	Master RH PCB
2 Tk B Send L/R	Bal	-10dBV	Mix Out Jacks	2-Tk EDAC
2 Tk A Ret L/R	Bal	-10dBV	2-Tk EDAC	Group PCB
Main Mon Out L/R	Bal	+4dBu	Group PCB	O/P EDAC
Alt Mon Out L/R	Bal	+4dBu	Group PCB	O/P EDAC
Foldback Out L/R	Bal	+4dB	Group PCB	O/P EDAC
Oscillator Out	Unbal	+4dBu	Master RH	

Stereo Input Patch Facilities

Standard Stereo Patchcard

One Stereo Input Patchcard serves the three Stereo Inputs, fitted as standard. The jacks are not normalled to any external connections and signals must be patched to the Stereo Input Modules.

However, the normalling contacts of the jacks are brought out onto IDC connectors on the patch cards so that normalling from tie lines or some other external connection may be made.

SIGNAL NAME	TYPE	LEVEL	CONNECTED TO
Ste I/P 1A Left	Bal	+4dBu5	Stereo Input Module 1
Ste I/P 1A Right	Bal	+4dBu	Stereo Input Module 1
Ste I/P 1B Left	Bal	+4dBu	Stereo Input Module 1
Ste I/P 1B Right	Bal	+4dBu	Stereo Input Module 1
Ste I/P 2A Left	Bal	+4dBu	Stereo Input Module 2
Ste I/P 2A Right	Bal	+4dBu	Stereo Input Module 2
Ste I/P 2B Left	Bal	+4dBu	Stereo Input Module 2
Ste I/P 2B Right	Bal	+4dBu	Stereo Input Module 2
Ste I/P 3A Left	Bal	+4dBu	Stereo Input Module 3
Ste I/P 3A Right	Bal	+4dBu	Stereo Input Module 3
Ste I/P 3B Left	Bal	+4dBu	Stereo Input Module 3
Ste I/P 3B Right	Bal	+4dBu	Stereo Input Module 3

Optional Stereo Modules

Extra Stereo Inputs may be installed in groups of 4 by swapping out I/O modules. Like the I/O module patchcard, the Stereo patchcard serves 2 modules. Only 8 of the 14 jacks are used, the remaining 6 are arranged as a phase reverse pair and 4 parallels. The jacks are not normalled to any external connections and signals must be patched to the Stereo Input Modules.

However, the normalling contacts of the jacks are brought out onto IDC connectors on the patch cards so that normalling from tie lines or some other external connection may be made.

SIGNAL NAME	TYPE	LEVEL	CONNECTED TO
Ste I/P 1A Left	Bal	+4dBu	Stereo Input Module 1
Ste I/P 1A Right	Bal	+4dBu	Stereo Input Module 1
Ste I/P 1B Left	Bal	+4dBu	Stereo Input Module 1
Ste I/P 1B Right	Bal	+4dBu	Stereo Input Module 1
Ste I/P 2A Left	Bal	+4dBu	Stereo Input Module 2
Ste I/P 2A Right	Bal	+4dBu	Stereo Input Module 2
Ste I/P 2B Left	Bal	+4dBu	Stereo Input Module 2
Ste I/P 2B Right	Bal	4dBu	Stereo Input Module 2
Jacks 9-12	Parallel		
Jacks 13 & 14	Phase reverse		

Dual Line Input Patch Facilities

Dual Line Inputs may be installed in groups of 4 by swapping out I/O modules. Like the I/O module patchcard, the Dual Line patchcard serves 2 modules. Only 6 of the 14 jacks are used, the remaining 8 are arranged as 2 sets of 4 parallels. The jacks are not normalled to any external connections and signals must be patched to the Dual Line Input Modules.

However, the normalling contacts of the jacks are brought out onto IDC connectors on the patch cards so that normalling from tie lines or some other external connection may be made.

SIGNAL NAME	TYPE	LEVEL	SIGNAL FROM	SIGNAL TO
1 DL 1 Input	Bal	+4dBu	No Conn/Ext	DL module
1 DL 1 Ins Snd	Unbal	-2dBu	DL module	
1 DL 1 Ins Ret	Bal	-2dBu	DL module	
1 DL 2 Input	Bal	+4dBu	No Conn/Ext	DL module
1 DL 2 Ins Snd	Unbal	-2dBu	DL module	
1 DL 2 Ins Ret	Bal	-2dBu	DL module	
2 DL 1 Input	Bal	+4dBu	No Conn/Ext	DL module
2 DL 1 Ins Snd	Unbal	-2dBu	DL module	
2 DL 1 Ins Ret	Bal	-2dBu	DL module	
2 DL 2 Input	Bal	+4dBu	No Conn/Ext	DL module
2 DL 2 Ins Snd	Unbal	-2dBu	DL module	
2 DL 2 Ins Ret	Bal	-2dBu	DL module	
Jacks 13-14	Phase Rev			

Tie Line Patch Facilities

96 tie-lines are fitted as standard with external interface via 4 x 90 way EDAC 516 connectors. The tie-lines consist of 8 Patchcards, each with 12 Bantam jacks. A further 4 Patchcards (48 tie-lines) may be fitted as an option. Each connects Tip, Ring and Sleeve to 3 pins of an EDAC connector. There is no normalling to other parts of the patchbay. The 90-way EDAC connectors are configured to carry 24 tie lines each.

EDAC Pin-Outs

Master: Auxes (EDAC516 38-way)

PAIR	PIN	FUNCTION	SIGNAL NAME
1	R	+	AUX 2
1	S	-	AUX 2
1	L	GND	AUX 2
2	E	+	AUX 1 R
2	F	-	AUX 1 R
2	A	GND	AUX 1 R
3	B	+	AUX 1 L
3	C	-	AUX 1 L
3	H	GND	AUX 1 L
4	J	+	SPARE
4	K	-	SPARE
4	D	GND	SPARE
5	T	+	SPARE
5	U	-	SPARE
5	P	GND	SPARE
6	BB	+	SPARE
6	CC	-	SPARE
6	HH	GND	SPARE
7	MM	+	AUX 6
7	NN	-	AUX 6
7	TT	GND	AUX 6
8	RR	+	AUX 5
8	SS	-	AUX 5
8	LL	GND	AUX 5
9	JJ	+	AUX 4
9	KK	-	AUX 4
9	PP	GND	AUX 4
10	Z	+	AUX 3
10	AA	-	AUX 3
10	DD	GND	AUX 3

M, N, V, W, X, Y, EE, FF

Commoned for grounding, but usually not connected.

Master: Outputs(EDAC516 38-way)

PAIR	PIN	FUNCTION	SIGNAL NAME
1	R	+	MIX +4dBu OUT R
1	S	-	MIX +4dBu OUT R
1	L	GND	MIX +4dBu OUT R
2	E	+	MIX +4dBu OUT L
2	F	-	MIX +4dBu OUT L
2	A	GND	MIX +4dBu OUT L
3	B	+	MAIN MONITORS OUT L
3	C	-	MAIN MONITORS OUT L
3	H	GND	MAIN MONITORS OUT L
4	J	+	MAIN MONITORS OUT R
4	K	-	MAIN MONITORS OUT R
4	D	GND	MAIN MONITORS OUT R
5	T	+	ALT MONITORS OUT L
5	U	-	ALT MONITORS OUT L
5	P	GND	ALT MONITORS OUT L
6	BB	+	ALT MONITORS OUT R
6	CC	-	ALT MONITORS OUT R
6	HH	GND	ALT MONITORS OUT R
7	MM	+	FOLDBACK OUT L
7	NN	-	FOLDBACK OUT L
7	TT	GND	FOLDBACK OUT L
8	RR	+	FOLDBACK OUT R
8	SS	-	FOLDBACK OUT R
8	LL	GND	FOLDBACK OUT R
9	JJ	+	MIX -10dBV OUT R
9	KK	-	MIX -10dBV OUT R
9	PP	GND	MIX -10dBV OUT R
10	Z	+	MIX -10dBV OUT L
10	AA	-	MIX -10dBV OUT L
10	DD	GND	MIX -10dBV OUT L

M, N, V, W, X, Y, EE, FF

Commoned for grounding, but usually not connected.

Master: 2 Tracks (EDAC516 38-way)

PAIR	PIN	FUNCTION	SIGNAL NAME
1	R	+	2-TRACK A SEND R +4dBu
1	S	-	2-TRACK A SEND R +4dBu
1	L	GND	2-TRACK A SEND R +4dBu
2	E	+	2-TRACK A SEND L +4dBu
2	F	-	2-TRACK A SEND L +4dBu
2	A	GND	2-TRACK A SEND L +4dBu
3	B	+	SPARE
3	C	-	SPARE
3	H	GND	SPARE
4	J	+	2-TRACK A RETURN L +4dBu
4	K	-	2-TRACK A RETURN L +4dBu
4	D	GND	2-TRACK A RETURN L +4dBu
5	T	+	2-TRACK A RETURN R +4dBu
5	U	-	2-TRACK A RETURN R +4dBu
5	P	GND	2-TRACK A RETURN R +4dBu
6	BB	+	2-TRACK B RETURN L -10dBV
6	CC	-	2-TRACK B RETURN L -10dBV
6	HH	GND	2-TRACK B RETURN L -10dBV
7	MM	+	2-TRACK B RETURN R -10dBV
7	NN	-	2-TRACK B RETURN R -10dBV
7	TT	GND	2-TRACK B RETURN R -10dBV
8	RR	+	SPARE
8	SS	-	SPARE
8	LL	GND	SPARE
9	JJ	+	2-TRACK B SEND R -10dBV
9	KK	-	2-TRACK B SEND R -10dBV
9	PP	GND	2-TRACK B SEND R -10dBV
10	Z	+	2-TRACK B SEND L -10dBV
10	AA	-	2-TRACK B SEND L -10dBV
10	DD	GND	2-TRACK B SEND L -10dBV

M, N, V, W, X, Y, EE, FF

Commoned for grounding, but usually not connected.

Tape Interface(EDAC516 56-way)

PAIR	PIN	FUNCTION	TRACK
1	n	TAPE SEND +	1, 9, 17, 25, 33, 41
1	t	TAPE SEND -	1, 9, 17, 25, 33, 41
1	m	TAPE SEND GND	1, 9, 17, 25, 33, 41
2	y	TAPE RETURN +	1, 9, 17, 25, 33, 41
2	x	TAPE RETURN -	1, 9, 17, 25, 33, 41
2	w	TAPE RETURN GND	1, 9, 17, 25, 33, 41
3	CC	TAPE SEND +	2, 10, 18, 26, 34, 42
3	JJ	TAPE SEND -	2, 10, 18, 26, 34, 42
3	HH	TAPE SEND GND	2, 10, 18, 26, 34, 42
4	NN	TAPE RETURN +	2, 10, 18, 26, 34, 42
4	MM	TAPE RETURN -	2, 10, 18, 26, 34, 42
4	LL	TAPE RETURN GND	2, 10, 18, 26, 34, 42
5	KK	TAPE SEND +	3, 11, 19, 27, 35, 43
5	DD	TAPE SEND -	3, 11, 19, 27, 35, 43
5	EE	TAPE SEND GND	3, 11, 19, 27, 35, 43
6	z	TAPE RETURN +	3, 11, 19, 27, 35, 43
6	AA	TAPE RETURN -	3, 11, 19, 27, 35, 43
6	BB	TAPE RETURN GND	3, 11, 19, 27, 35, 43
7	u	TAPE SEND +	4, 12, 20, 28, 36, 44
7	p	TAPE SEND -	4, 12, 20, 28, 36, 44
7	v	TAPE SEND GND	4, 12, 20, 28, 36, 44
8	k	TAPE RETURN +	4, 12, 20, 28, 36, 44
8	l	TAPE RETURN -	4, 12, 20, 28, 36, 44
8	r	TAPE RETURN GND	4, 12, 20, 28, 36, 44

EDAC516 56-way Pin Out (Tape Interface)

PAIR	PIN	FUNCTION	TRACK
9	a	TAPE SEND +	5, 13, 21, 29, 37, 45
9	W	TAPE SEND -	5, 13, 21, 29, 37, 45
9	b	TAPE SEND GND	5, 13, 21, 29, 37, 45
10	R	TAPE RETURN +	5, 13, 21, 29, 37, 45
10	S	TAPE RETURN -	5, 13, 21, 29, 37, 45
10	T	TAPE RETURN GND	5, 13, 21, 29, 37, 45
11	L	TAPE SEND +	6, 14, 22, 30, 38, 46
11	E	TAPE SEND -	6, 14, 22, 30, 38, 46
11	F	TAPE SEND GND	6, 14, 22, 30, 38, 46
12	A	TAPE RETURN +	6, 14, 22, 30, 38, 46
12	B	TAPE RETURN -	6, 14, 22, 30, 38, 46
12	C	TAPE RETURN GND	6, 14, 22, 30, 38, 46
13	D	TAPE SEND +	7, 15, 23, 31, 39, 47
13	K	TAPE SEND -	7, 15, 23, 31, 39, 47
13	J	TAPE SEND GND	7, 15, 23, 31, 39, 47
14	P	TAPE RETURN +	7, 15, 23, 31, 39, 47
14	N	TAPE RETURN -	7, 15, 23, 31, 39, 47
14	M	TAPE RETURN GND	7, 15, 23, 31, 39, 47
15	V	TAPE SEND +	8, 16, 24, 32, 40, 48
15	Z	TAPE SEND -	8, 16, 24, 32, 40, 48
15	U	TAPE SEND GND	8, 16, 24, 32, 40, 48
16	d	TAPE RETURN +	8, 16, 24, 32, 40, 48
16	c	TAPE RETURN -	8, 16, 24, 32, 40, 48
16	Y	TAPE RETURN GND	8, 16, 24, 32, 40, 48

X, e, f, h, j, s.
Commoned for grounding, but usually not connected.

Tie Line Interface (EDAC516 90-way)

PAIR	PIN	FUNCTION
1	A	+
	B	-
	C	GND
2	H	+
	J	-
	K	GND
3	R	+
	S	-
	T	GND
4	X	+
	Y	-
	Z	GND
5	AE	+
	AF	-
	AH	GND
6	AM	+
	AN	-
	AP	GND
7	BJ	+
	BK	-
	BL	GND
8	BS	+
	BT	-
	BU	GND
9	BY	+
	BZ	-
	CA	GND
10	CF	+
	CH	-
	CJ	GND
11	CN	+
	CP	-
	CR	GND
12	CW	+
	CX	-
	CY	GND

Tie Line Interface (EDAC516 90-way)

PAIR	PIN	FUNCTION
13	F	+
	E	-
	D	GND
14	P	+
	N	-
	M	GND
15	W	+
	V	-
	U	GND
16	AD	+
	AC	-
	AB	GND
17	AL	+
	AK	-
	AJ	GND
18	AU	+
	AT	-
	AS	GND
19	BR	+
	BP	-
	BN	GND
20	BX	+
	BW	-
	BV	GND
21	CE	+
	CD	-
	CC	GND
22	CM	+
	CL	-
	CK	GND
23	CV	+
	CU	-
	CT	GND
24	DB	+
	DA	-
	CZ	GND

AV, AW, AZ, BA, BD, BE GROUP 1

Commoned for grounding, but usually not connected.

AX, AY, BB, BC, BF, BH GROUP 2

Commoned for grounding, but usually not connected.

Specifications

Specifications

Input/Output Levels

Mic Input Sensitivity	-2 to -70dBu variable
Line Input Sensitivity	-20 to +10dBu variable
Tape Send/Return	-10dBV/+4dBu switched
Insert Send/Return	-2dBu

Input/Output Capability

All balanced Line O/Ps	+27dBu into 600Ω
Insert Sends	+21dBu into 2kΩ
Headphone Output	+20dBu into 600Ω (150mW into 8Ω)

Input & Output Impedances

Microphone Input	2kΩ
Line Input	>15kΩ
Tape Send	75Ω
Tape Return	>40kΩ
Insert Send	75Ω
Insert Return	>15kΩ

Frequency Response

Mic or Line Input to any Output (20Hz to 20kHz)	+0,-0.5dB

Crosstalk (all at 10kHz)

Channel Muting	>110dB
Channel Panpot Isolation	>85dB
Monitor Muting	>100dB
Monitor Fader Attenuation	>80dB
Monitor Panpot Isolation	>85dB
Monitor to Channel Crosstalk	-80dB
Group Routing Isolation	>85dB

Noise

Measured 20Hz to 20kHz bandwidth, Average Reading, Unweighted

Mic Input E.I.N. (200Ω source)	<-127.5dBu
Group O/P Noise (16 Ch. routed)	-90dBu
Mix O/P Noise (16 Ch. routed)	-90dBu

Distortion

Line Input to Tape Send at +20dBu	< 0.005% (1kHz) < 0.025% (10kHz)

Using the Sapphyre / Sapphyre LC

Introduction to Multitrack Recording

Recording

Mixing

Using the Sapphyre / Sapphyre LC

The Sapphyre is a highly flexible system, with features normally associated only with the largest studio recording consoles. Many of these advanced features will be familiar to more experienced engineers, but require a detailed understanding if the new user is to get the best from the console. This chapter will lead the user through the basic concepts of the system, and demonstrate how to use Sapphyre for each stage of the recording process.

Refer also to the Sapphyre Quick Reference Guide for examples of the basic operating modes.

Introduction to Multitrack Recording

Multitrack recording involves recording the sounds that will comprise the final stereo master (which will be used in the production of CD's, cassettes etc.) *individually* onto a multitrack intermediate master tape, and then later transferring that material, suitably balanced and processed onto the stereo master tape.

This method gives several advantages over a 'straight-to-stereo' recording, where all the sounds are mixed 'live' and recorded directly as a finished stereo master tape. These advantages are:

a) If there is an error or flaw in one part of the recording, only the affected track needs to be re-done, rather than the whole piece.

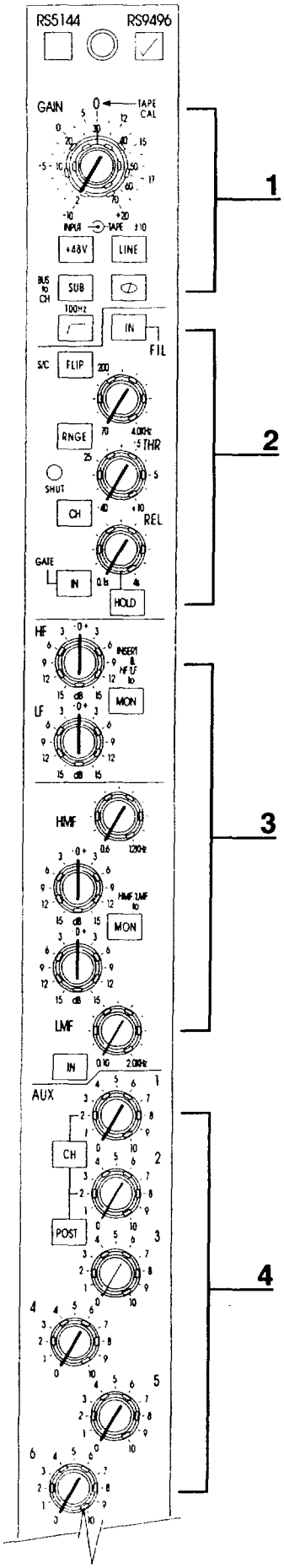
b) It allows the processing, correction or enhancement of individual sounds (tracks) after the actual recording has taken place, providing much greater creative freedom without the constraints of 'straight-to-stereo' recording. Highly complex and polished recording can be created without the time pressures imposed by a live session or concert.

c) A small number of artistes are able to create a full recording by means of repeated overdubbing.

Recording

The aim of the multitrack recording is to put the best possible reproduction of the source material down on the tape, so that this can be used to derive a final master of the highest artistic and technical quality. The source signals need to be:

- *Amplified and Controlled* - the source signal level is usually too small to drive the input of the tape machine directly. Since achieving the optimum signal level on tape is vital for a good recording, the mixer provides the means of raising and adjusting the level of sources with precise control.
- *Processed* - it is generally not necessary or desirable to process the original sound excessively, since this can be very difficult to remove later if the processing is not wanted. It is far better to add processing or effects during mixing, with the opportunity for greater control. However, where the source material is poor it may be useful to use an equaliser to emphasise wanted frequencies or remove others, or to use a compressor to limit the dynamic range of the input signal. This may be particularly true during recordings of live performances.



- *Routed* - the mixer provides the means of sending the input to any tape track, singly or in combination.
- *Monitored* - it is vital that the artiste and engineer are able to hear what is going to the tape machine, and to listen to previously recorded tracks off the tape.

Basic Concepts

Sapphyre is an **In-line** recording console. Each I/O module comprises two individual paths of audio processing:

The **CHANNEL** (Input) path is used for the material going to the tape.

The **MONITOR** (Mix) path is used to monitor the sound during recording and to mix the recorded tracks to the stereo master.

This contrasts with the alternative **Split** format of console, which houses these two signal paths in physically separate modules.

Sapphyre provides three processing blocks - **Noise Gate, HF/LF** and **MF Equalisers** which can be switched into either signal path to enhance and control the sound.

For normal operation, Sapphyre would be connected as follows:

- I/O Tape Send connected to the correspondingly numbered input on the multitrack tape machine.
- Output from the tape machine connected back to the corresponding Tape Return on the I/O module.
- Mix Left and Right Outputs connected to a 2-track Mastering recorder.
- Control Room Monitor Outputs connected to an amplifier and monitor loudspeakers.

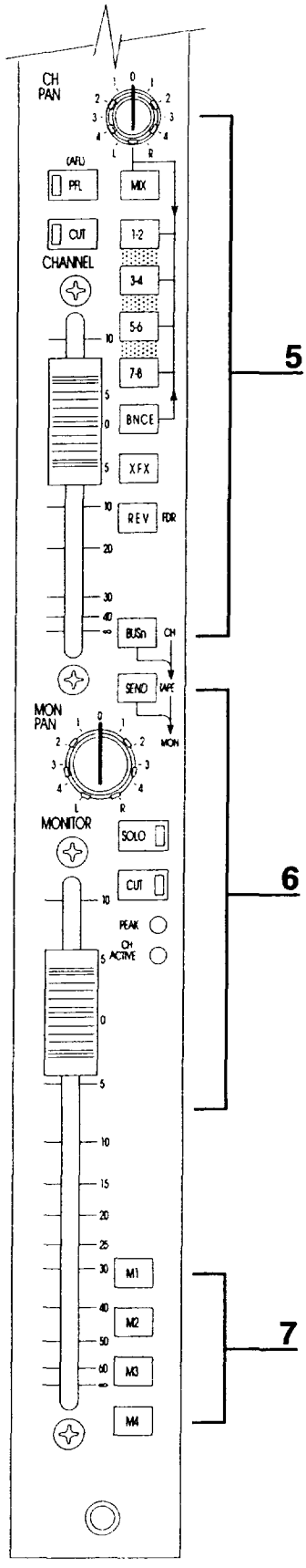
Sapphyre is designed so that with all switches on the modules released and rotary controls in their detented or '0' positions the console is set for recording a microphone to the corresponding tape track, with the signal sent to the tape through the Channel path under the control of the small fader, and monitoring through the Monitor path, controlled by the large fader.

Tracklaying

Let us suppose that we want to put a single instrument down onto tape. Purely acoustic sources will be picked up by a microphone feeding the **MICROPHONE** input (using +48V phantom power if the mic needs it), whereas electronic sources (synths, drum machines etc.) would be plugged into the **LINE** input, or in the case of high impedance sources (e.g. passive electric guitars) into the MIC input via a D.I. Box. The MIC input is the default selection, so to select the Line input you must press the LINE switch.

The Mic/Line preamplifier, controlled by the **GAIN** control raises the signal level to the internal operating level of the console. The output level **from** the console to the tape machine is set by the small (channel) fader. Between the two, the **EQUALISER** may be used to modify or enhance the signal.

The GAIN control should be adjusted so that with the fader at unity (0dB) gain, the highest expected input signal gives maximum modulation at the tape machine.



The Sapphyre console contains a routing matrix that allows you to send the signal from an input channel to any tape send output, the simplest (default) case being when an input channel is fed to the *same* numbered tape track. This is known as 'going direct', and is the best method when putting a single source down to one track.

Alternatively, if you want to send an input channel to a *different* numbered tape track, there are two ways of doing it:

- Firstly, you can go direct as before, and patch the tape send output of the channel into the required input on the multitrack. This has the advantage of going though the shortest signal path, but involves inconvenient patching.
- Secondly you can send the signal to one of eight **Group** , and pick it up by pressing the BUS switch on the I/O module corresponding to the desired tape track. This works as follows:
- Choose the tape track that you wish to record to and locate the correspondingly numbered I/O module.
- Press the BUS switch on this module and note the number on it (the Bus numbers run sequentially in blocks of eight along the console).
- Press the corresponding routing switch on the **source** I/O module.
- Rotate the PAN control on this I/O module fully left if the bus is an odd number, or fully right if the bus is an even number.

You may if you wish select a number of *source* I/O modules to the same bus to record multiple sources to a single tape track.

N.B. It is advisable to check that EQ sections are left in the Channel path during tracklaying and that the gate is switched out, since these may colour your judgement about the true signal going to tape. They are however useful tools once a few tracks have been built up, and you wish to achieve a mix which is more representative of the final sound.

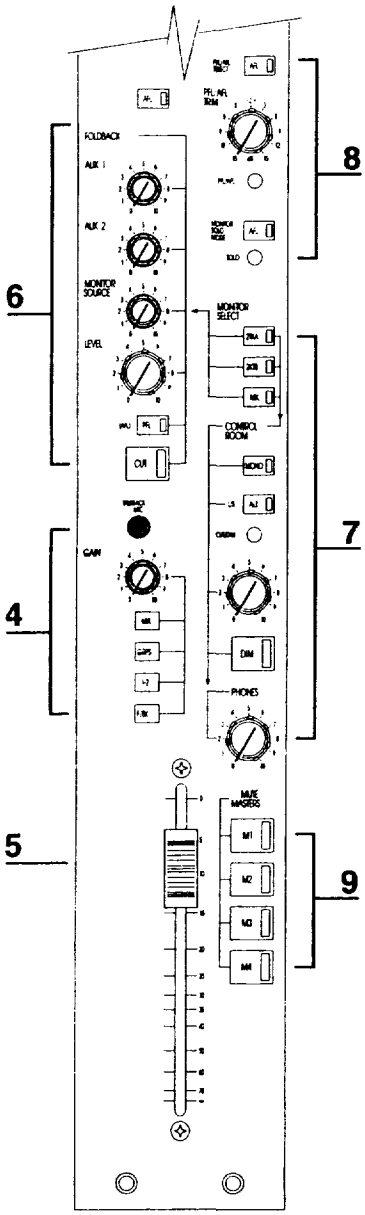
Monitoring from Tape

You will need to know if what you are recording is any good, and the **Monitor** path in the I/O module lets you hear the signal going to and returning from the tape machine. The monitor path uses the large fader, with most essential controls placed just above it.

The input to the monitor path is normally the *return from* the multitrack, as most modern tape machines now have the 'Auto Input' facility, i.e. when you place a tape track in 'Ready' the output of the tape machine monitors the input. If you wish to monitor the signal *going to* the tape, press the **SEND** switch.

- Check that the control room monitors are set up as follows:
- Push the Stereo Master fader up.
- Choose MIX on the Control Room Monitor Select.
- Set Control Room Level to a comfortable setting.

The Monitor fader now controls the level of the sound going to the monitor speakers, and you may vary its position within the stereo image using the **PAN** control, and mute the signal with the **CUT** switch.



The Solo System

As you build up a monitor mix of more than one or two tracks it becomes difficult to hear individual sounds. You could of course isolate one track by dropping down all the other monitor faders, but the Sapphyre's **Solo** system provides a much more convenient method, allowing instant monitoring of single channels or groups of channels. The channel path and monitor path use the solo system in different ways as follows:

- *Channel Path* - the solo facility is an AFL (**A**fter **F**ade **L**isten) mode, which is non-destructive (i.e. it doesn't cut non-soloed channels which would be potentially dangerous when tracklaying) but switches the control room monitoring to listen to only the channels which have AFL switches pressed. A **PFL/AFL TRIM** control on the Master module allows you to adjust the level of the AFL signal for about the same loudness as the mix.
- *Monitor Path* - The monitor path can also work in AFL mode (if the Monitor Solo Mode AFL switch is pressed on the Master module), but normally it acts in **SOLO-IN-PLACE** mode, whereby pressing the monitor **SOLO** switch on a module destructively cuts all the other monitor paths. This has the advantage of allowing a source to be heard with all it's effects etc. exactly as it appears in the mix, but unmasked by other sources.

Auxiliary Sends

Live performers providing vocals or playing acoustic instruments will usually need foldback through headphones, and Sapphyre makes provision for this through the configuration of Auxiliary Sends 1 & 2 or the dedicated Foldback output from the Master module.

Aux 1 and **Aux 2** are specifically intended for foldback, since they are normally sourced from a pre fade monitor signal, which does not therefore alter with the engineers monitor mix.

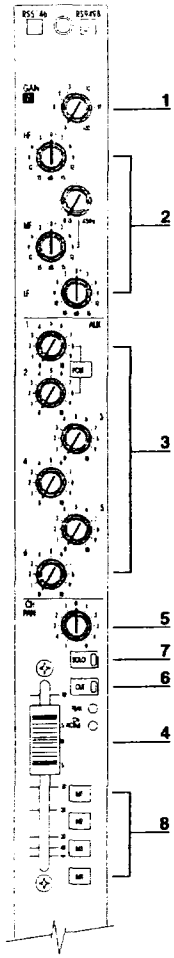
Aux 1 is a stereo send that follows the source panpot and will therefore normally follow the monitor pan setting at a level set by the Aux 1 send control. Pressing **POST** moves the source to post fade, and the send will now follow the main fader level.

Aux 1 & 2 may also be sourced from the Channel path by pressing the **CH** switch, and this is sometimes useful for drop-ins because the send does not then follow the auto-input switching on the tape machine.

Aux 2 is a mono send which can be used in a similar way to Aux 1 if a second foldback mix is required.

There is also a dedicated **Foldback** output on the Master module, which is essentially a three input stereo mixer that allows the combining of outputs from Aux 1, Aux 2 and the main stereo mix. When only one foldback send is required this provides a very rapid means of creating a basic foldback feed, with Aux 1 & 2 used to boost individual sources as the performer requires.

The other important function of the Auxiliary Sends is to feed effects processors, and **Aux 3 to 6** are sourced from the post fade monitor signal for this purpose. These are all mono sends, but of course Aux 1, which is stereo, can also be switched to POST if a stereo send following the source panpot is required. In case this stereo send is needed to feed a single channel effects processor, Aux 1 can be switched to a **MONO** sum on the Master module.



Stereo Inputs as Effects Returns

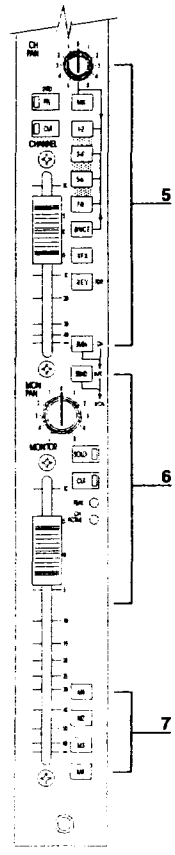
The standard configuration of Sapphyre includes three Dual Stereo modules which are ideal for handling the return signals from effects processors, adding perhaps some equalisation and then routing the stereo signals to the main mix bus or a pair of Group .

The inputs to the two sections of the Stereo Input provide sufficient **GAIN** adjustment to cope with either professional equipment with inputs and outputs operating at +4dBu, or other units operating at -10dBV. If there is a choice of output levels it is advisable to always choose +4dBu. Effects are normally used sparingly, and the most suitable way of setting the input GAIN is to route the module to the stereo mix by pressing MIX, place the fader between 0 and -5 and adjust the GAIN for the correct amount of the effect.

The **WIDTH** control allows the spread of the stereo image to be varied from MONO (single sound source in the middle) through STEREO (as the original signal) to HUGE STEREO (very little mono information in the middle, with a widened image). Sends are provided to AUX 1 & 2, principally for foldback with a pre fade source or Aux 1 may be switched to post fade by pressing POST. Aux 2 is normally a pre fade mono sum of the input signal and is routed to Aux Bus 2. Pressing POST 3 routes this to Aux Bus 3 and makes it post-fade instead, providing access to one of the Aux normally used for effects.

Track Bouncing

Occasionally, where you are running out of tracks on tape, or have a large number of tracks that you think could be better handled as a group (e.g. a number of string parts grouped as a stereo pair), it may be useful to 'bounce' them down onto another tape track. This is achieved as follows:



- Set up the required mix of tracks using the large fader and monitor PAN, with EQ and GATE switched to the monitor path if necessary, and then press the **BNCE** (bounce) switches on these modules. You will no longer be able to hear them on the stereo bus.
- Select the tracks that you wish to use to record the mixed signal (If this is to be a stereo pair you should use an adjacent pair of tracks) and press the BUS switches on these modules.
- Select these tracks on the multitrack to Record Ready.
- Note the number of the BUS switches which you pressed and route the bounced modules to this pair of . You should now be able to hear the composite signal through the monitor path of the track which you are sending to.
- Place the multitrack to record to effect the bounce.

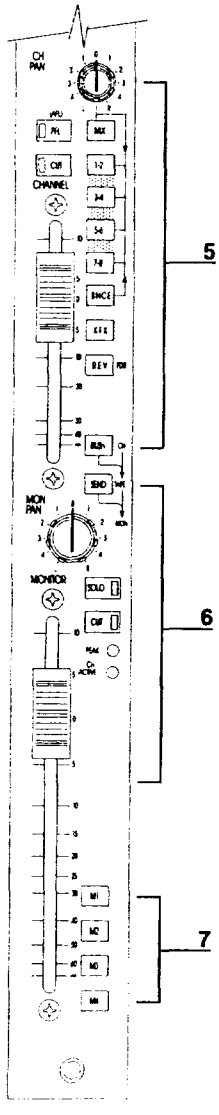
Don't forget to check the new tracks before erasing the old, and to reset all the BNCE and BUS switches for normal operation.

Mixing - Introduction

Tracklaying created a series of 'raw' tracks on tape, but with optimum signal to noise ratio as the priority. **MIXING** manipulates these tracks, adds other signals as required, and combines them to produce the final stereo master. The mixing process produces the correct balance of levels, tonal quality and stereo imaging and adds effects (e.g. artificial reverberation) and other sources (e.g. sequenced keyboards).

Sapphyre is designed to make the transition from tracklaying to mixing so simple that it is almost imperceptible, since the Monitor (mix) path is always used to mix to the stereo bus. Only the function of the Channel path changes - during mixdown this is either used as an extra input to the stereo bus, an extra effects send by the use of XFX or a sub Group Master by the use of BUS and SUB. The similarity between mixing and tracklaying also means that it is very easy to go back and do an overdub whilst mixing if necessary.

When mixing it is the monitor path which is primarily in use, and it may therefore be appropriate to switch the EQ sections into the monitor path by pressing the **MON** switches. The NOISE GATE is in the monitor path by default and is switched into circuit by pressing **IN**.



Auxiliaries

During mixing the auxiliary sends will mainly be used as effects sends, and should therefore usually be post fade. Remember that Aux 1 & 2 can be switched to post fade by pressing the POST switch.

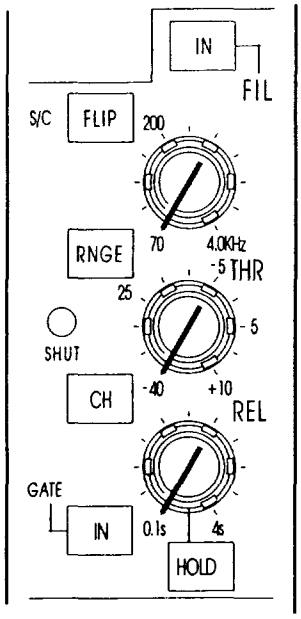
It is a good idea to start using Aux sends 3-6 first, and keep Aux 1 & 2 free, especially if you think you will need to return many extra inputs during the mix (using the channel paths) or will need to do last minute overdubs.

If you run out of effects sends, or want to send just one or two inputs to one device (and don't want to tie up a whole Aux bus in doing so), you can use the small fader as an extra send if the channel path is free. The is achieved as follows:

Derive the source for the small fader from the post fade monitor path (the source for the other Aux sends) by pressing the Fader **XFX** switch. The desired send signal is now fed to the Tape Send jack (assuming that BUS is not pressed), and this can be patched to the effects device as required.

If you want to send from several inputs to a single device, press the XFX switches on all the inputs, then route the small fader outputs to a group bus (see Tracklaying above) using the routing switches and the PAN control. The group signal may then be patched from the group insert jack to the input of the effects device.

Noise Gate



Sapphyre has a highly versatile noise gate in every I/O module and this is normally in the monitor path for use during mixing. Gating a signal going to tape during tracklaying is not recommended, since you can't ungate it afterwards. If you do want to use it in the channel path you can do so by pressing the **CH** switch. The gate is switched into the chosen path by pressing **IN**.

The action of the Gate is as follows:

The gate opens and starts to pass the audio signal at a point set by the **THR**(Threshold) control. This might be set quite low (-40) if you only want to clean tape noise off the signal, or should be much higher (typically -10 to +10) to radically gate drum sounds so that it opens only on peaks of the signal. The opening point of the gate can be made frequency-sensitive by switching **FIL**ter **IN**. This places a bandpass filter tuneable between 70Hz and 4kHz into the trigger path (sidechain), allowing you to select which frequency components of the signal will trigger the gate, for instance to prevent it opening on spill from a bass drum.

Normally the gate has a fairly gentle attenuation of 15dB which is ideal for cleaning off noise or for applications where severe attenuation would be very noticeable, e.g. vocals. Pressing the **RNGE**(Range) switch increases the attenuation to 60dB giving a much more severe effect which is more appropriate for drums etc.

The opening (**attack**) of the gate is very fast to avoid chopping off the start of the sound, whereas the closing (**release**) is slower and variable by the **REL** control to suit the particular signal. In general, sound with a fast decay need short release times, and those with a long decay need slower release times to preserve the character of the sound. With some sounds it is impossible to avoid undesirable modulation of the natural decay without using very long release times, and as a result the gate may never actually close on a repetitious signal. Sapphyre provides a solution to this problem with a HOLD facility. Pressing the **HOLD** switch fixes the release time at 0.1 seconds and the **REL** control now varies the HOLD time (the time delay between the trigger signal ending and the gate starting to close. This allows the gate to be kept open until the signal has decayed naturally, after which it shuts rapidly to attenuate the unwanted noise.

The trigger signal (sidechain) is normally sourced from the input to the gate, through the filter if selected. Sometimes it is useful to trigger the gate from an external signal, and pressing **S/C FLIP** switches the sidechain source to the **other** path in the module which can then be used to derive the trigger signal.

Creating Extra Inputs

If you are not using the channel path on any I/O module it can be used as another input on mixdown as follows:

Press **MIX** to route the channel to the stereo mix.

Switch the EQ sections into the channel or monitor paths as appropriate, using the **MON** switches (if MON is not pressed, the EQ is in the Channel path).

Grouping

There are many ways of creating Sub-Groups on the Sapphyre, however in the the following examples the **MONITOR** fader is used for monitoring the 'Mix' and the **CHANNEL** fader is used for the 'Group' master, the meter on the corresponding I/O module showing the 'Group' signal. This provides a consistent approach to 'button- pushing' and operation in all three cases. Some alternatives give more facilities, shorter signal paths or even allow the Channel faders to be used as Sub-group masters on modules which already have the monitor path in use.

Example 1 Sub-Grouping & Recording

In this example, Mic Inputs 1 to 10 are being used for the drum kit. We want to record the drums as a stereo pair onto tracks 17 & 18.

Preparing the Input Channels

- Set the input level, check this with the Channel PFL button (the signal is monitored on the main MIX meters).
- Press the **SEND** button.
- Bring up the **CHANNEL** fader. The signal is shown on the channel meter.
- Bring up the **MONITOR** fader. The monitoring signal is shown on the main MIX meters.
- Repeat steps 1 to 4 for the other inputs adjusting the **MONITOR** fader and **PAN** pot positions to build the desired 'drum mix'.

Preparing the Outputs

Tracks 17 & 18 of the tape machine would normally be connected to the **TAPE SEND & TAPE RETURN** of I/O modules 17 & 18. The on the console are repeated every 8 channels, the bus numbers being shown on the upper scribble strip and the bus button. Channels 17 & 18 correspond to 1 & 2. The following procedure is for preparing the outputs and there should be no change in signal at this time.

On channels 17 & 18:

- Press the **SUB** button.
- Press the **SEND** button.
- Bring up the **MONITOR** faders to about the '0' point.
- Bring up the **CHANNEL** faders to about the '0' point.
- Set the **PAN** pots (17 left and 18 right).

Routing the Inputs to the Outputs

- On the inputs press the **BNCE** button (the monitor signal should disappear).
- Press routing button 1-2 (the signal should now reappear on the meters for I/O modules 17 & 18).

- As the group builds up, the level to tape is adjusted with the **CHANNEL** faders on 17 & 18. The monitoring signal is adjusted with the **MONITOR** faders on 17 & 18.

The group is now complete and ready to record. To monitor the signal from tracks 17 & 18 of the tape machine de-select the **SEND** buttons on I/O modules 17 & 18.

The use of each fader and Pan control is as follows:

INPUTS

Channel Fader Sets the level of the channel signal. This should be high enough for good signal-to-noise, but low enough to allow for unexpected transients.

Monitor Fader Sets the relative level of the signal in the overall 'group mix'.

Monitor Pan Sets the position of the signal in the overall 'group mix'.

OUTPUTS

Channel Fader Sets the group signal level sent to the tape machine.

Monitor Fader Sets the relative level of the signal from the tape machine in the overall mix.

Monitor Pan Sets the width of the stereo image in the mix.

Example 2 Track Bouncing

In this example. tape tracks 1 to 10 are being used for strings as a stereo pair onto tracks 17 & 18.

Preparing the Input Channels

The I/O channel meter will show the tape return signal.

- Bring up the **MONITOR** fader. The monitoring signal is shown on the main MIX meters.
- Adjust the **MONITOR** fader and **PAN** pot positions to build the desired 'strings mix'.

Preparing the Outputs

Tracks 17 & 18 of the tape machine would normally be connected to the **TAPE SEND & TAPE RETURN** of I/O modules 17 & 18. The on the console are repeated every 8 channels, the bus numbers being shown on the upper scribble strip and the bus button. Channels 17 & 18 correspond to 1 & 2. The following procedure is for preparing the outputs and there should be no change in signal at this time.

On channels 17 & 18:

- Press the **SUB** button.
- Press the **SEND** button.

- Bring up the **MONITOR** faders to about the '0' point.
- Bring up the **CHANNEL** faders to about the '0' point.
- Set the **PAN** pots (17 left and 18 right).

Routing the Inputs to the Outputs

- On the inputs press the **BNCE** button (the monitor signal should disappear).
- Press routing button 1-2 (the signal should now reappear on the meters for I/O modules 17 & 18).
- As the group builds up, the level to tape is adjusted with the **CHANNEL** faders on 17 & 18. The monitoring signal is adjusted with the **MONITOR** faders on 17 & 18.

The group is now complete and ready to record. To monitor the signal from tracks 17 & 18 of the tape machine de-select the **SEND** buttons on I/O modules 17 & 18.

The use of each fader and Pan control is as follows:

INPUTS

Monitor Fader Sets the relative level of the signal in the overall 'group mix'.

Monitor Pan Sets the position of the signal in the overall 'group mix'.

OUTPUTS

Channel Fader Sets the group signal level sent to the tape machine.

Monitor Fader Sets the relative level of the signal from the tape machine in the overall mix.

Monitor Pan Sets the width of the stereo image in the mix.

Example 3 Sub-Grouping and Mixing

In this example, a 24 Track machine is connected to I/O channels 1 to 24. We want to make a number of Sub-groups and route the signals from the sub-groups to the main mix using channels 25 and upwards as the Sub-group Masters.

Up to eight sub-groups may be created (eight mono or four stereo). Although the following example describes a stereo sub-group it could be treated as two mono sub-groups.

Use the following procedure to create each sub-group in turn.

Sub-Group 1
Preparing the Input Channel

The I/O channel meters will show the tape return signals.

- Bring up the **MONITOR** faders. The monitoring signals are shown on the main MIX meters.
- Adjust the **MONITOR** faders and **PAN** pot positions to build the desired sub-group mix.

Preparing the Outputs

The on the console are repeated for every 8 channels, the bus numbers being shown on the upper scribble strip and the bus button. Channels 25 & 26 correspond to 1 & 2.

The following procedure is for preparing the sub-group and there should be no change in signal at this time.

On channels 25 & 26:

- Press the **SUB** button.
- Press the **SEND** button.
- Bring up the **MONITOR** faders to about the '0' point.
- Bring up the **CHANNEL** faders to about the '0' point.
- Set the **PAN** pots (25 left and 26 right).

Sending the Inputs to the Sub-Group

- On the inputs press the **BNCE** button (the monitor signal should disappear).
- Press routing button 1-2 (the signal should now reappear on the meters for I/O modules 25 & 26).
- As the sub-group builds up, the overall level is adjusted with the **CHANNEL** faders on 25 & 26. The 'Sub-Group to Mix' signal is adjusted with the **MONITOR** faders on 25 & 26.

The sub-Group is now complete.

The use of each fader and pan control is as follow:

INPUTS

Monitor Fader Sets the relative level of the signal in the overall 'sub-group mix'.

Monitor Pan Sets the position of the signal in the overall 'sub-group mix'.

OUTPUTS

Channel Fader Sets the overall sub-group signal level.

Monitor Fader Sets the overall level of the sub-group signal in the main Mix.

Monitor Pan Sets the stereo image width of the sub-group in the main Mix.

Appendices

Specification Notes

SPECIFICATION NOTES AND CONDITIONS

A The console has a nominal output level of +4dBu: all input sensitivities are relative to this: i.e. with line input gain set to '0', an input of 0dBu, will give an output of +4dBu at any group or mix output and, a sensitivity of +4dBu gives unity gain from input to output.

B Noise measurements are taken with 22Hz-22kHz bandwidth, average reading response.

C Distortion measurements are made with an input of +20dBu (line inputs at unity gain) giving an output of +20dBu. The analyser reads THD+N with an average response, over a 10Hz-30kHz bandwidth.

D Frequency response and E.Q. measurements are made with an input of 0dBu to line inputs at unity gain, outputs are quoted relative to 0dBu.

E Crosstalk and rejection measurements are made with an input level of +20dBu (line inputs at unity gain) giving an output of +20dBu on the active signal path. The ratio quoted is relative to +20dBu output.

F Gain tolerance +/-1.5dB or 10% of indicated value, which ever is the greater.

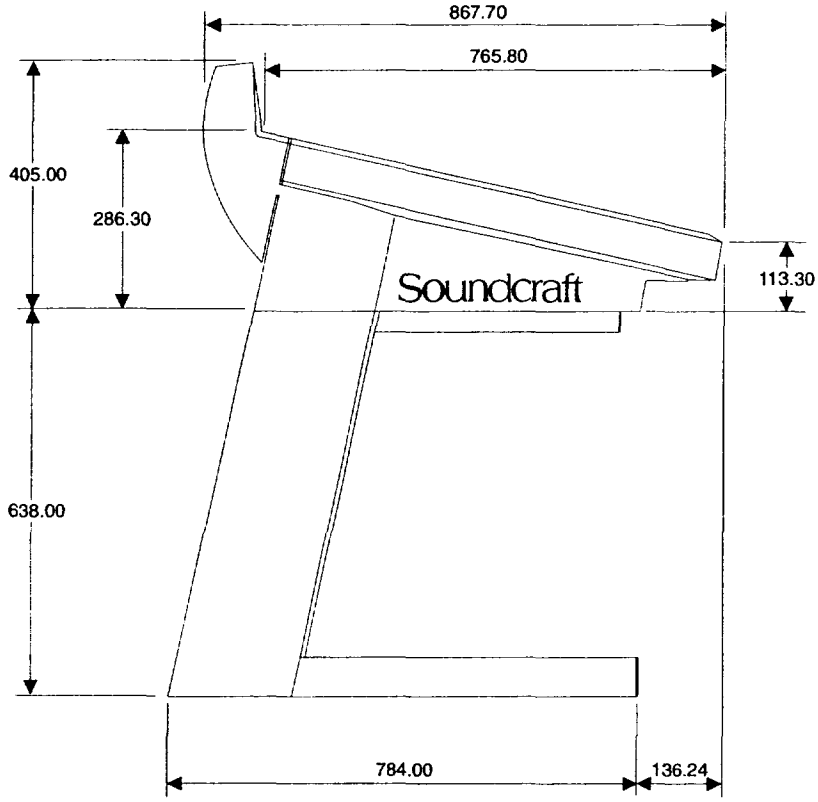
G All crosstalk and rejection figures stated with 16 channels routed to the measured output, where applicable.

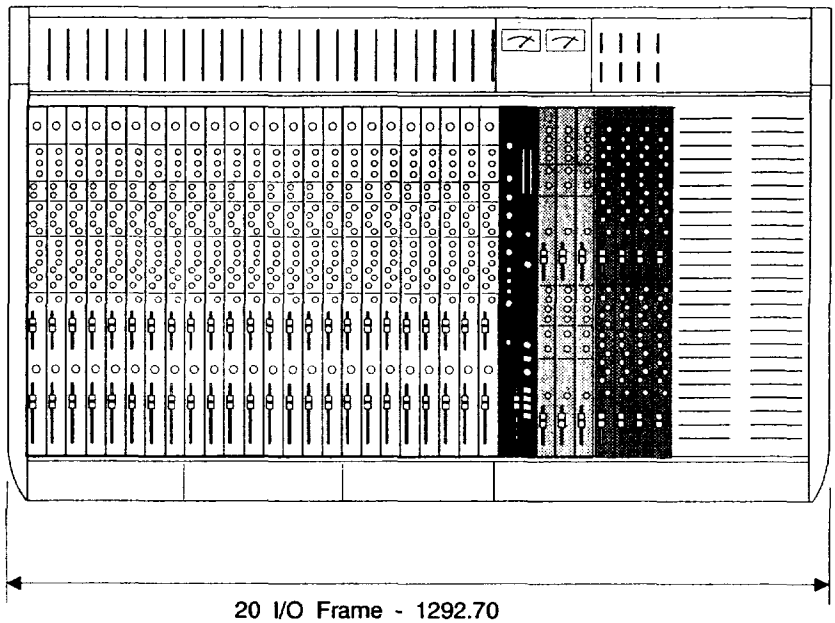
H Mix noise figures are stated in two ways:

- Bus residual noise: Noise measured at the output with faders at unity and no channels routed.
- Mix bus noise: Noise measured at the output with 36 channels routed, faders down.

Dimensions

Sapphyre / Sapphyre LC Outline Dimensions



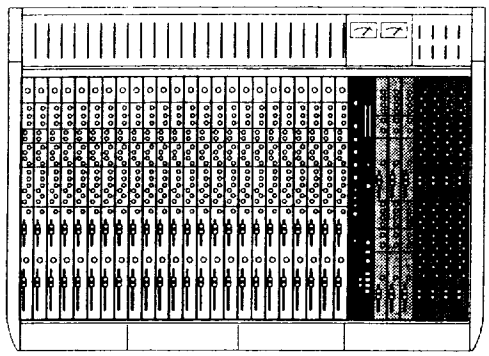


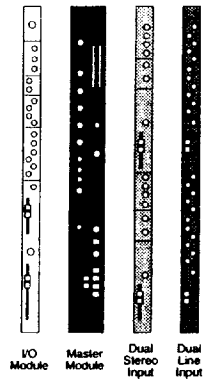
20 I/O Frame - 1292.70
28 I/O Frame - 1575.90 * (illustrated)
36 I/O Frame - 1859.10
44 I/O Frame - 2213.10
52 I/O Frame - 2496.30

* shown with 4 x I/O replaced with Dual Line Inputs

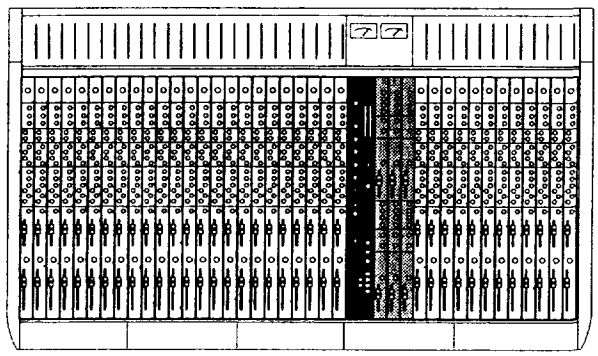
Sample Configurations

28 I/O Console + 3 Dual Stereo Module
(4 x I/O replaced with Dual Line Input)

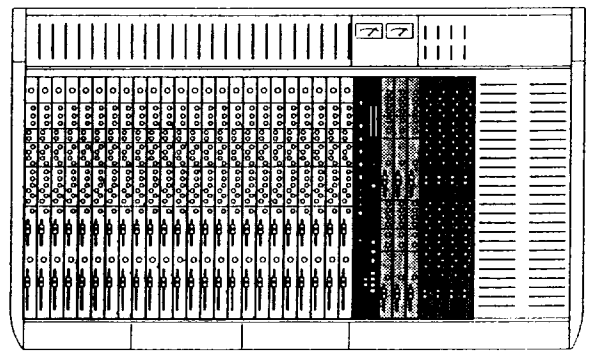




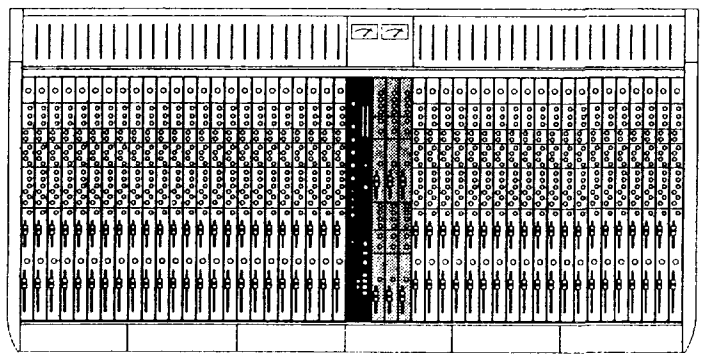
36 I/O Console + 3 Dual Stereo Module



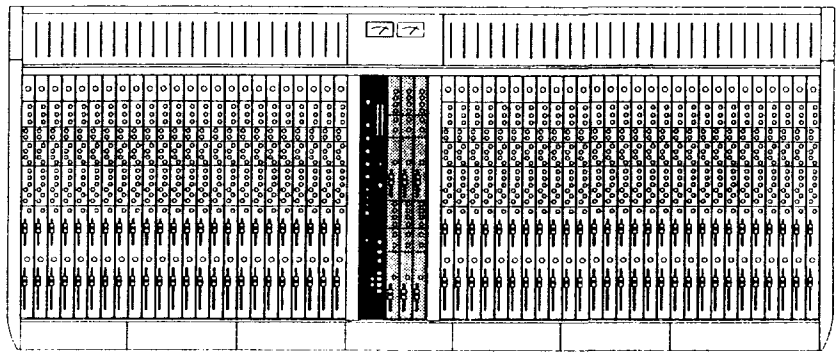
28 I/O Console with 4 Dual Line Inputs & Patchbay



44 I/O Console + 3 Dual Stereo Module



52 I/O Console + 3 Dual Stereo Module



Warranty

1 **Soundcraft** means Soundcraft Electronics Ltd.

End User means the person who first puts the equipment into regular operation.

Dealer means the person other than Soundcraft (if any) from whom the End User purchased the Equipment, provided such a person is authorised for this purpose by Soundcraft or its accredited Distributor.

Equipment means the equipment supplied with this manual.

2 If within the period of twelve months from the date of delivery of the Equipment to the End User it shall prove defective by reason only of faulty materials and/or workmanship to such an extent that the effectiveness and/or usability thereof is materially affected the Equipment or the defective component should be returned to the Dealer or to Soundcraft and subject to the following conditions the Dealer or Soundcraft will repair or replace the defective components. Any components replaced will become the property of Soundcraft.

3 Any Equipment or component returned will be at the risk of the End User whilst in transit (both to and from the Dealer or Soundcraft) and postage must be prepaid.

4 This warranty shall only be available if:

a) the Equipment has been properly installed in accordance with instructions contained in Soundcraft's manual; and

b) the End User has notified Soundcraft or the Dealer within 14 days of the defect appearing; and

c) no persons other than authorised representatives of Soundcraft or the Dealer have effected any replacement of parts maintenance adjustments or repairs to the Equipment; and

d) the End User has used the Equipment only for such purposes as Soundcraft recommends, with only such operating supplies as meet Soundcraft's specifications and otherwise in all respects in accordance Soundcraft's recommendations.

5 Defects arising as a result of the following are not covered by this Warranty: faulty or negligent handling, chemical or electro-chemical or electrical influences, accidental damage, Acts of God, neglect, deficiency in electrical power, air-conditioning or humidity control.

6. The benefit of this Warranty may not be assigned by the End User.

7. End Users who are consumers should note their rights under this Warranty are in addition to and do not affect any other rights to which they may be entitled against the seller of the Equipment.

Glossary

Auxiliary Send	an output from the console comprising a mix of signals from channels and groups derived independently of the main stereo group mixes. Typically the feeds to the mix are implemented on rotary level controls.
Balance	the relative levels of the left and right channels of a stereo 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.
CR (Control Room) Monitors	loudspeakers used by the operator (engineer) in the control room to listen to the mix.
dB (decibel)	a ratio of two voltages or signal levels, expressed by the equation $dB=20Log_{10}(V1/V2)$. Adding the suffix 'u' denotes the ratio is relative to 0.775V RMS.
DI(Direct Injection)	the practice of connecting an electronic 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.
Equaliser	a device that allows the boosting or cutting of selected bands of frequencies in the signal path.
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.
(sub) Group	an output into which a group of signals can be mixed.
Headroom	the available signal range above the nominal level before clipping occurs.
Highpass Filter	a filter that rejects low frequencies.
Line Level Signals	at a nominal level of -10dBV to +6dBu, coming from a low impedance source.
Noise Gate	an electronic switch which only passes signals exceeding a set threshold level.
Pan (pot)	abbreviation of 'panorama': controls levels sent to left and right outputs.
Patchbay	a connection panel providing access to most input/output signals on the console, allowing the operator to redirect or rearrange internal and external connections using flexible patch cords.
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.
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.
Spill	acoustic interference from other sources.
Talkback	the operator speaking to the artistes or to tape via the auxiliary or group outputs.
Transient	a momentary rise in the signal level.
VCA	(Voltage Controlled Amplifier) a device which acts as a variable audio attenuator controlled by an external d.c. voltage.

Issue 4
Part No. ZZ2715

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