SM 20

USER GUIDE



CE This equipment complies with the EMC Directive 89/336/EEC

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Issue 1

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SM20

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SM20

1 Introduction

Introduction

Congratulations on purchasing a Soundcraft console.

The SM20 is a dedicated stage monitor console, designed to take account of the trend towards the use of in-ear monitoring systems, and draws on elements from the respected range of Soundcraft SM consoles.

System Overview

- 32, 40, 48 and 56-module frames
- Mono input with wide-range, low-noise input pre-amp
- Mic split output on each channel
- Combination of mono and stereo sends giving from 20 mono sends to 7 stereo and 6 mono sends, with individual pre/post fader switching
- 8 Mute groups
- Optional VU Meterbridge
- Balanced audio inputs and outputs throughout, on XLRs
- MIDI control of BSS Varicurve™ Equaliser

Power Supply

- The SM20 uses the CPS800 Power Supply.

Warranty

1 **Soundcraft** is a trading division of Harman International Industries 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.

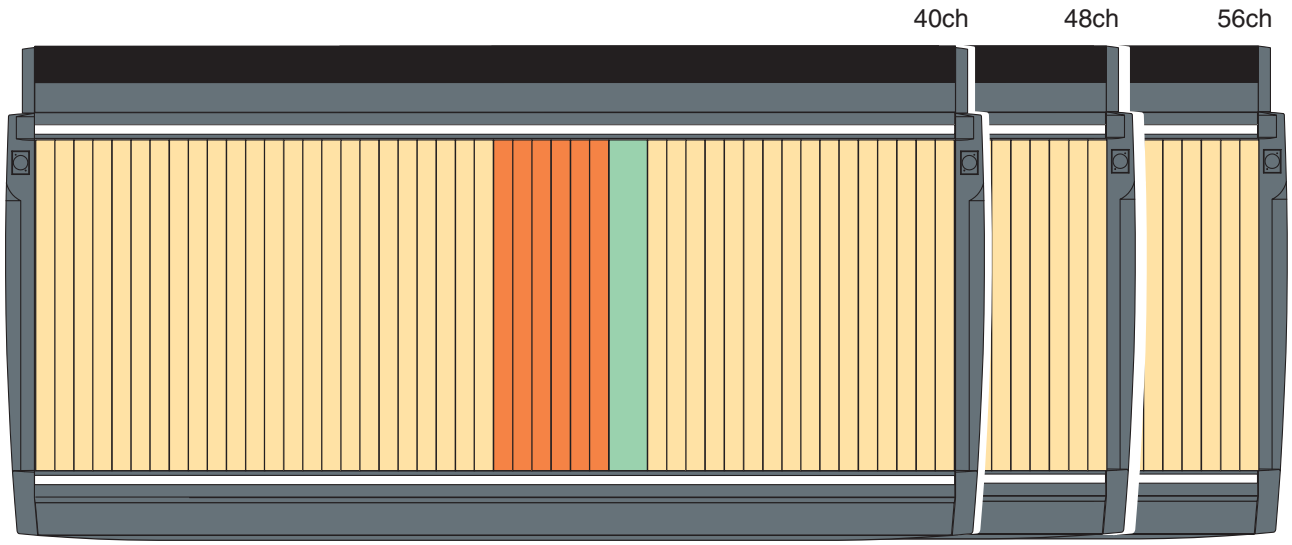
5 Defects arising as a result of the following are not covered by this Warranty: faulty or negligent handling, chemical or electro-chemical or electrical influences, accidental damage, Acts of God, neglect, deficiency in electrical power, air-conditioning or humidity control.

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.

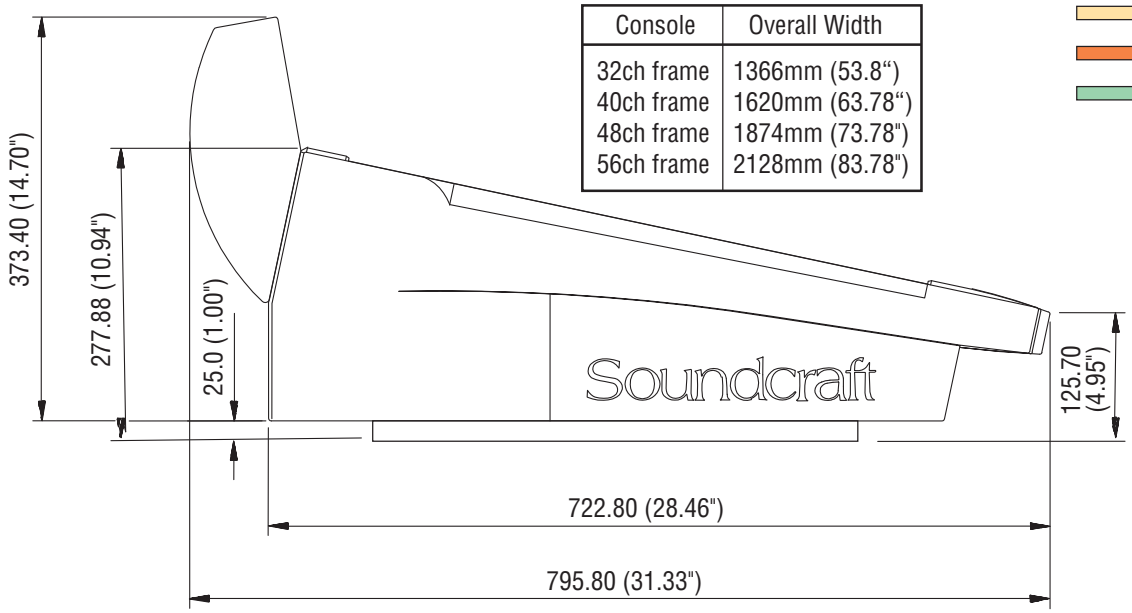
SM20

2 Installation



Console	Overall Width
32ch frame	1366mm (53.8“)
40ch frame	1620mm (63.78“)
48ch frame	1874mm (73.78")
56ch frame	2128mm (83.78")

Mono Input
Output
Master



Precautions and Safety Instructions

General Precautions

Avoid storing or using the mixing console in conditions of excessive heat or cold, or in positions where it is likely to be subject to vibration, dust or moisture. Do not use any liquids to clean the fascia of the unit: a soft dry brush is ideal. Use only water or ethyl alcohol to clean the trim and scribble strips. Other solvents may cause damage to paint or plastic parts.

Avoid using the console close to strong sources of electromagnetic radiation (e.g. video monitors, high-power electric cabling): this may cause degradation of the audio quality due to induced voltages in connecting leads and chassis. For the same reason, always site the power supply away from the unit.

Caution!
In all cases, refer servicing to qualified personnel.

Handling and Transport

The console is supplied in a strong carton or crate. If it is necessary to move it any distance after installation it is recommended that this packing is used to protect it. Be sure to disconnect all cabling before moving. If the console is to be regularly moved we recommend that it is installed in a foamlined flightcase. At all times avoid applying excessive force to any knobs, switches or connectors.

Power Supplies & cables

Always use the power supply and cable supplied with the mixer: the use of alternative supplies may cause damage and voids the warranty; the extension of power cables may result in malfunction of the mixing console.

Warning!
Always switch the power supply off before connecting or disconnecting the mixer power cable, removing or installing modules, and servicing. In the event of an electrical storm, or large mains voltage fluctuations, immediately switch off the PSU and unplug from the mains.

Warning!
Use only the Soundcraft CPS800 or CPS2000 power supply with your SM20 console.

Signal Levels

It is important to supply the correct input levels to the console, otherwise signal to noise ratio or distortion performance may be degraded; and in extreme cases, damage to the internal circuitry may result. Likewise, on all balanced inputs avoid sources with large commonmode DC, AC or RF voltages, as these will reduce the available signal range on the inputs. Note that 0dBu = 0.775V RMS.

Mains Installation

General Wiring Procedures

To take full advantage of the excellent signal to noise ratio and low distortion of Soundcraft consoles care must be taken to ensure that incorrect installation and wiring does not degrade the performance of the desk. Hum, buzz, instability and Radio Frequency interference can usually be traced to earth loops and inferior earthing systems. In some areas, especially heavily industrial areas, the incoming mains earth will not be adequate and a separate technical earth for all the audio equipment must be supplied. However, check with your local electricity supply company to ensure that safety regulations are not infringed or negated.

The successful, hum free, installation of a system requires forethought, and the establishment of a set of ground rules, which must be consistently adhered to at all stages of installation.

Initial Wiring Considerations

For optimum performance, it is essential for the earthing system to be clean and noise free, as all signals are referenced to this earth. A central point should be decided on for the main earth point system, and all earths should be `star fed' from this point. It is common electrical practice to 'daisy chain' the earths to all electrical outlets but this method is unsuitable for audio installations. The preferred method is to run an individual earth wire from each outlet, back to the system star point to provide a safety earth screen reference for each piece of equipment.

A separate earth wire should also be run from each equipment rack and area, to the star point. This may or may not be used depending on circumstances, but it is easier to install in the first place, than later when problems arise.

The location of the star point should be a convenient, easily accessible place, preferably at the rear of the console or in the main equipment rack.

Install separate 'clean' and 'dirty' mains outlets, wired individually back to the incoming mains distribution box. Use the 'clean' supply for all audio equipment and the 'dirty' supply for all lighting, etc. Never mix the two systems.

If necessary, to provide sufficient isolation from mains borne interference, install an isolating transformer. This should be provided with a Faraday Shield which must be connected with earth.

Never locate the incoming mains distribution box near audio equipment, especially tape recorders, which are very sensitive to electro-magnetic fields.

Ensure that all equipment racks are connected to earth, via a separate wire back to the star point.

Equipment which has unbalanced inputs and outputs may need to be isolated from the rack to prevent earth loops.

Audio Wiring

Having provided all equipment with power and earthing connections, consideration must be given to the method of providing audio interconnection and adequate screening of those interconnections. This must be done in a logical sequence to avoid problems and assist in the localisation of problem equipment.

- Connect the Monitor system to the console and check for any hum, buzz, or RFI. Only when you are satisfied with the quietness of the console and the monitor system should you proceed with the next step.
- Connect stereo tape recorders, echo and foldback sends one at a time, checking and isolating any connection which degrades performance.
- Connect all other peripheral devices.

- Connect all microphone lines.

By following this sequence much time and future trouble will be saved, and the result will be a quiet, stable system.

Shielding

Audio equipment is supplied with a variety of input and output configurations, which must be taken into consideration when deciding where the screen connections should be made. There are three sources of unwanted signal being impressed on the screen, which are as follows:

- Extraneous electrostatic or electromagnetic fields.
- Noise and interference on the earth line.
- Capacitive coupling between the screen and signal wires.

To minimise the adverse affects of the unwanted coupling to the signal wires, it is important that the screen is connected at one end only, i.e. the screen must not carry any signal current. Any signal on the wires within the screen will be capacitively coupled to the screen. This current will ultimately be returned to the source of the signal, either directly, if the screen is connected at the signal source end, or indirectly via the earthing system, if the signal is connected at the signal destination end. The indirect connection will cause an increase in high frequency cross-talk, and should be avoided wherever possible.

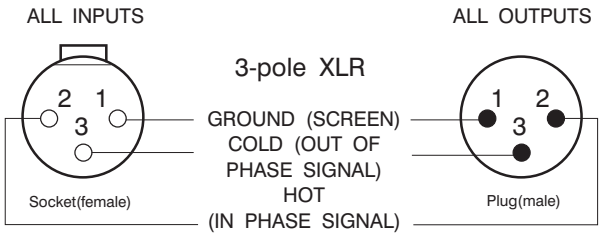
Therefore, in general, always connect the shield only at the signal source end. In high RF areas, the screen can also be connected to earth via a 0.01μF capacitor. This will present a short circuit at RF frequencies, thus lowering the effective shield impedance to ground. However, at low audio frequencies the reactance of the capacitor will be sufficiently high not to cause an earth loop problem.

Points to Remember

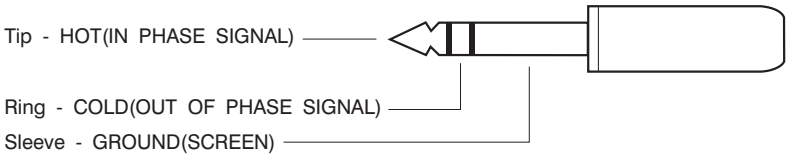
- In all cases, use good quality twin screened audio cable. Check for instability at the output.
- Always connect both conductors at both ends, and ensure that the screen is only connected at one end.
- Do not disconnect the mains earth from each piece of equipment. This is needed to provide both safety and screen returns to the system star point.
- Equipment which has balanced inputs and outputs may need to be electrically isolated from the equipment rack and/or other equipment, to avoid earth loops.

It is important to remember that all equipment which is connected to the mains is a potential source of hum and interference and may radiate both electrostatic or electromagnetic radiation. In addition, the mains will also act as a carrier for many forms of RF interference generated by electric motors, air–conditioning units, thyristor light dimmers etc. Unless the earth system is clean, all attempts to improve hum noise levels will be futile. In extreme cases there will be no alternative but to provide a completely separate and independant 'technical earth' to replace the incoming 'noisy earth'. However, always consult your local electricity supply authority to ensure that safety regulations are not being infringed.

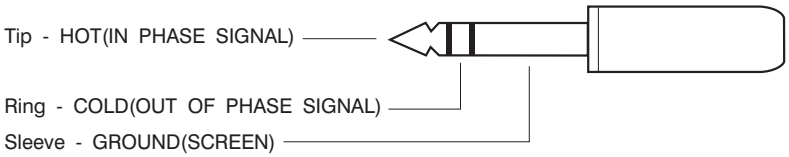
Audio Connectors



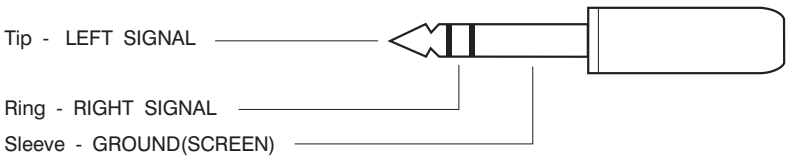
1/4" Stereo Jack Plug used as balanced Input/Output:



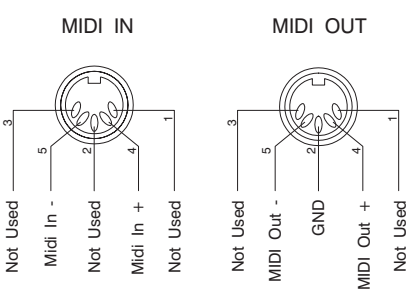
1/4" Stereo Jack Plug used for Inserts



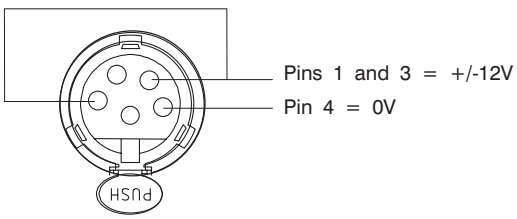
1/4" Stereo Jack Plug used for Headphones



MIDI Connectors



Lamp Connectors



Jumper Options

Input Module RH Board

J1	Insert Send/Return	Fitted = Pre EQ (default)
J2	Insert Send/Return	Fitted = Pre EQ (default)
J3	Insert Send/Return	Fitted = Pre EQ (default)
J4	Insert Send/Return	Fitted = Post EQ
J5	Insert Send/Return	Fitted = Post EQ
J6	Insert Send/Return	Fitted = Post EQ
J7	Direct Out	Fitted = Pre EQ (default)
J8	Direct Out	Fitted = Pre Mute
J9	Direct Out	Fitted = Post Mute
J10	Direct Out	Fitted = Pre EQ, Post Mute
J11	Groups 1-4 Pre Source	Fitted = Pre EQ
J12	Groups 1-4 Pre Source	Fitted = Pre Mute
J13	Groups 1-4 Pre Source	Fitted = Post Mute (default)
J14	Groups 1-4 Pre Source	Fitted = Pre EQ/Post Mute
J15	Groups 5-8 Pre Source	Fitted = Pre EQ
J16	Groups 5-8 Pre Source	Fitted = Pre Mute
J17	Groups 5-8 Pre Source	Fitted = Post Mute (default)
J18	Groups 5-8 Pre Source	Fitted = Pre EQ/Post Mute
J19	Groups 9-12 Pre Source	Fitted = Pre EQ
J20	Groups 9-12 Pre Source	Fitted = Pre Mute
J21	Groups 9-12 Pre Source	Fitted = Post Mute (default)
J22	Groups 9-12 Pre Source	Fitted = Pre EQ/Post Mute
J23	Groups L/R Pre Source	Fitted = Pre EQ
J24	Groups L/R Pre Source	Fitted = Pre Mute
J25	Groups L/R Pre Source	Fitted = Post Mute (default)
J26	Groups L/R Pre Source	Fitted = Pre EQ/Post Mute
J27	Direct Out	Fitted = Postfade

Output Module

No jumper-selectable options.

Master Module Centre Board

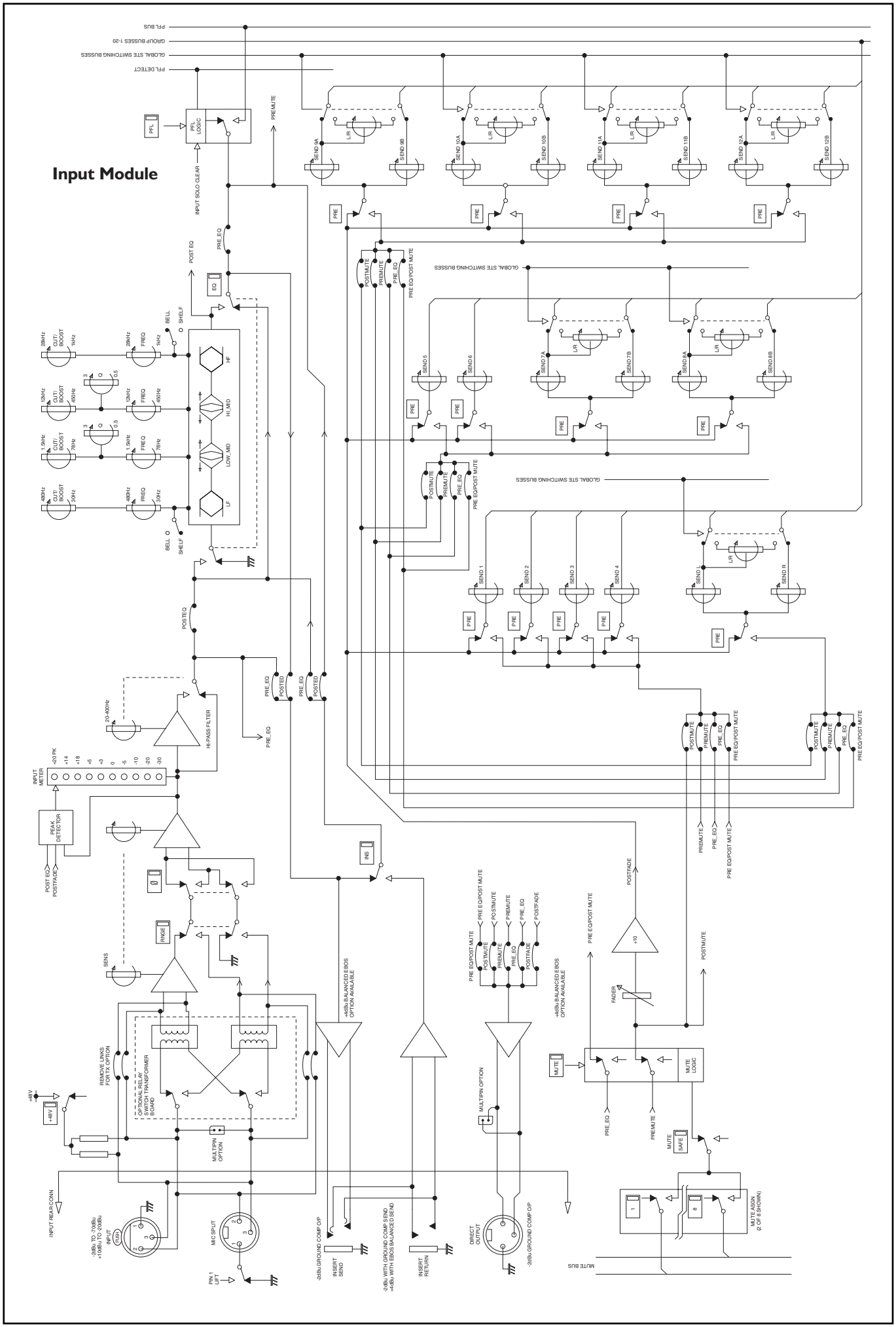
No jumper-selectable options

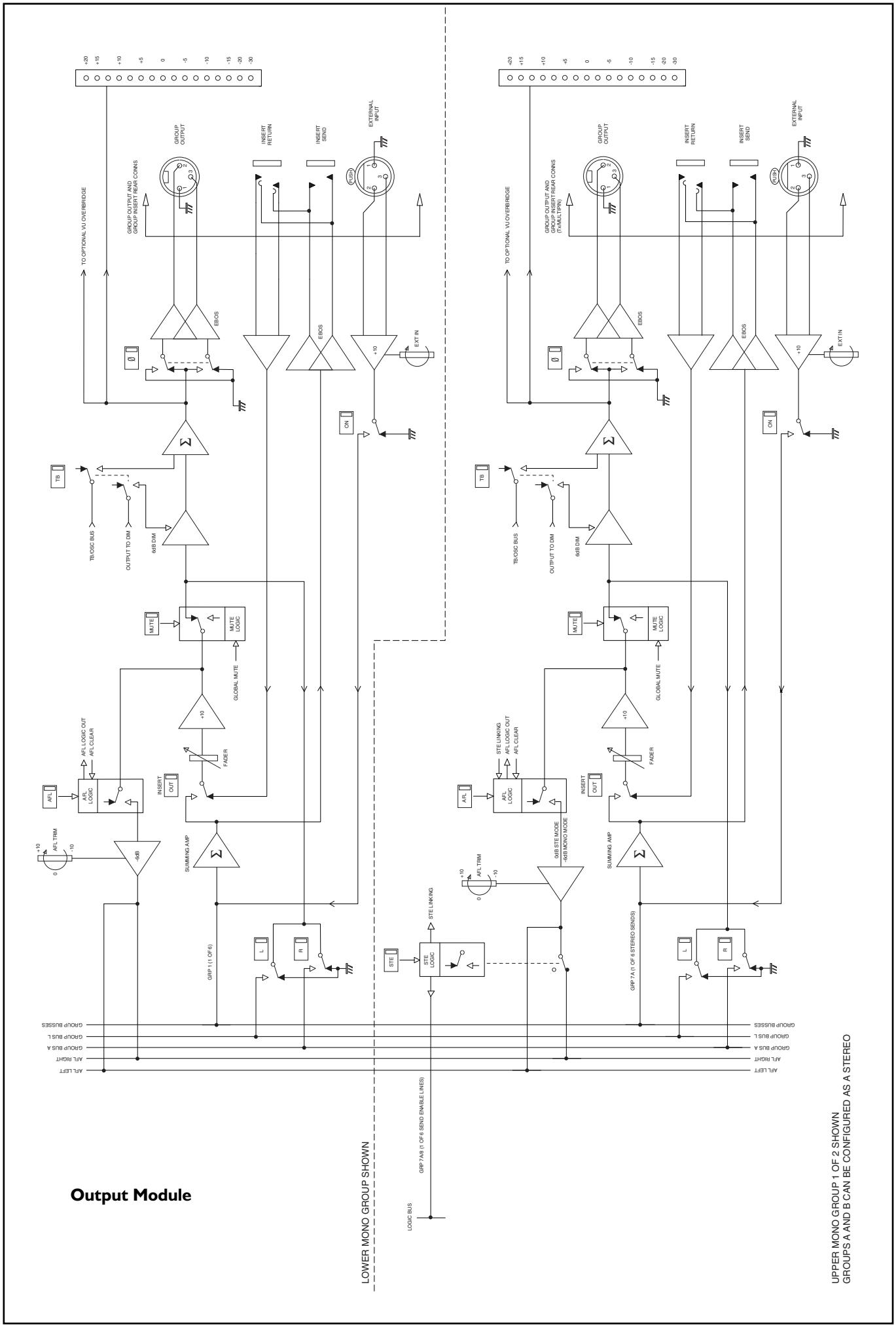
Master Module RH Board

J1	Talk to FOH dc signalling	1-2 = disabled
		2-3 = enabled (default)
J2	FOH TB In dc signalling	1-2 = enabled (default)
		2-3 = disabled

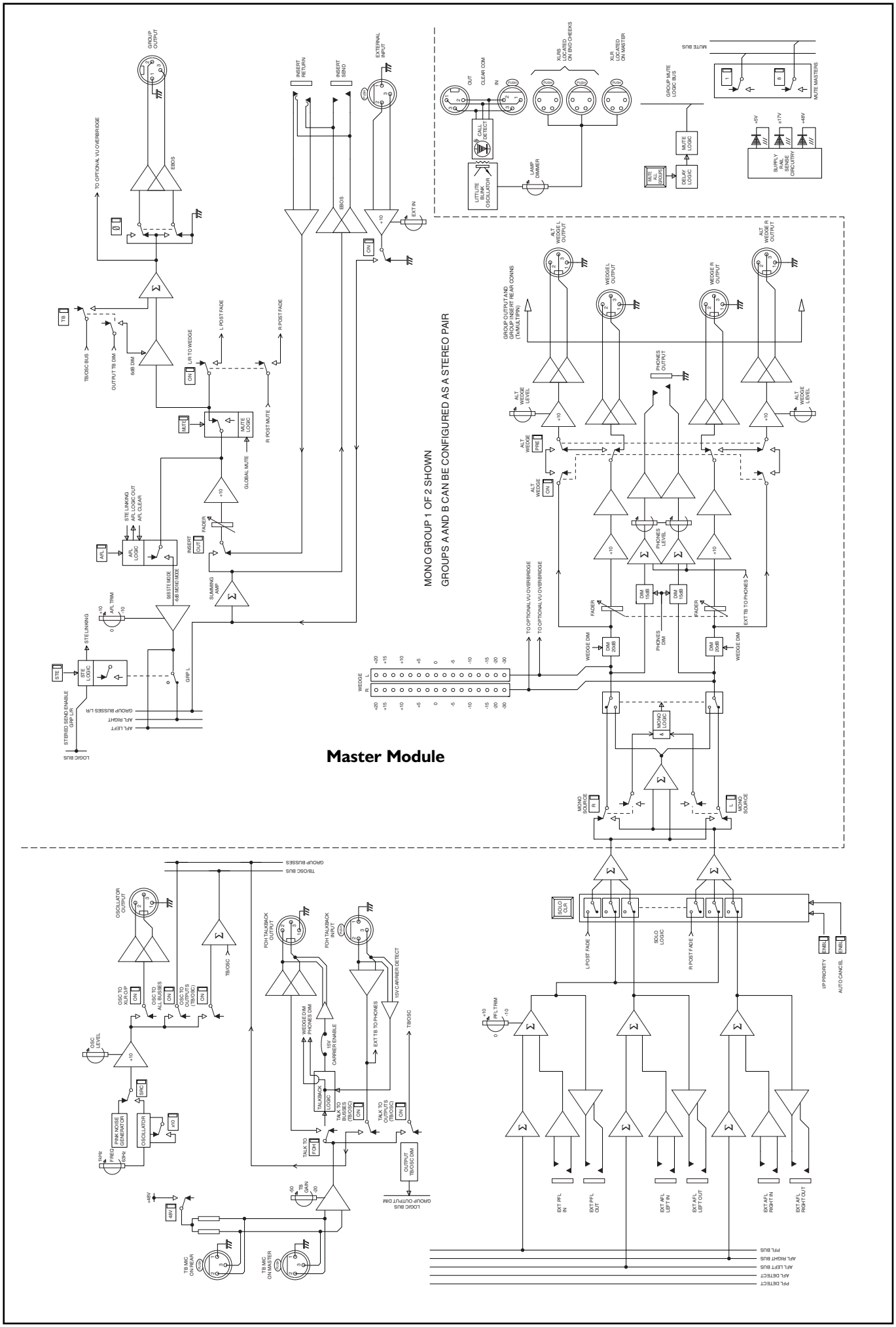
SM20

3 Block Diagrams


Input Module
PFL BUS
GROUP BUSSES 1-20
GLOBAL STE SWITCHING BUSSES
PFL DETECT
PFL
PFL LOGIC
PRE/MUTE
INPUT SOLO CLEAR
PRE EQ
POST EQ
EQ
BELL
SHELF
HF
HI_MID
LOW_MID
LF
FREQ
CUT/ BOOST
POST EQ
PRE EQ
HI-PASS FILTER
20-400Hz
INPUT METER
PEAK DETECTOR
POST EQ/ POSTFADE
RNGE
SENS
REMOVE LINKS FOR TX OPTION
OPTIONAL REAR SWITCH TRANSFORMER BOARD
+48V
MULTIPIN OPTION
INPUT REAR CONN
-20dBu TO -70dBu
+10dBu TO -20dBu
INPUT
MIC SPLIT
PIN 1 LIFT
INS
+4dBu BALANCED E80S OPTION AVAILABLE
-3dBu GROUND COMP O/P
INSERT SEND
-2dBu WITH GROUND COMP SEND
+4dBu WITH E80S BALANCED SEND
INSERT RETURN
DIRECT OUTPUT
-3dBu GROUND COMP O/P
SEND 1
SEND 2
SEND 3
SEND 4
SEND L
SEND R
SEND 5
SEND 6
SEND 7A
SEND 7B
SEND 8A
SEND 8B
SEND 9A
SEND 9B
SEND 10A
SEND 10B
SEND 11A
SEND 11B
SEND 12A
SEND 12B
L/R
PRE
POSTMUTE
PREMUTE
PRE_EQ
PRE EQ/POST MUTE
GLOBAL STE SWITCHING BUSSES
POSTFADE
+10
FADER
MUTE
MUTE LOGIC
PRE_EQ
PREMUTE
MUTE SAFE
MUTE BUS
MUTE ASGN (2 OF 8 SHOWN)

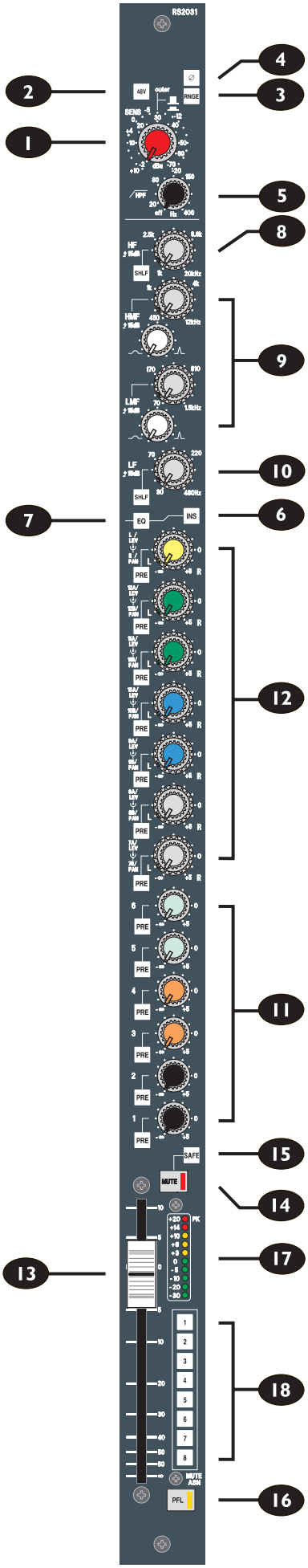


Output Module


Master Module
MONO GROUP 1 OF 2 SHOWN
GROUPS A AND B CAN BE CONFIGURED AS A STEREO PAIR

SM20

4 Functional Description



Input Module

1 SENS (Sensitivity)

The SENSitivity Control adjusts the level of the signal which is present on the Input XLR. The input can handle mic or line level signals up to +30dBu, with the RANGE switch (see below) selecting high or low sensitivity.

2 48V

The 48V switch, when it is depressed, places 48V phantom power on pins 2 & 3 of the input XLR. An integral LED glows when the phantom power is on.

3 RNGE (Range)

The RNGE (Range) switch selects between an input range of -2dBu to -70dBu (switch released), and +10dBu to -20dBu (switch pressed and lit), enabling both mic and line level signals to be handled by a common input stage.

CAUTION: Phantom power should not be switched on when unbalanced sources are connected to the XLR input.

4 Ø (Phase)

The PHASE switch reverses the phase of the input signal, to compensate for incorrect wiring or mic placement. The switch is internally illuminated when phase is reversed.

5 HPF (Highpass Filter)

The HPF Filter control sets the cutoff (-3dB) frequency of the high-pass filter: it is adjustable between 20Hz and 400Hz, to help reduce stage rumble or 'popping' from microphones. The control also has a built-in switch to switch the filter out of circuit when rotated fully anticlockwise.

6 INS (Insert Point)

The Insert Point may be switched in circuit by the INS switch. The insert uses separate balanced jacks for send and return. It is normally positioned after the filter and before the equaliser, but can be repositioned using internal jumpers to be post-EQ if required. The insert is in-circuit when the switch is illuminated.

7 EQ

The EQ section comprises four sweepable bands, and the two mid bands are fully parametric, with adjustable Q. The EQ is enabled when the EQ switch is pressed, and bypassed when the switch is released. The EQ is active when the EQ switch is illuminated.

8 HF

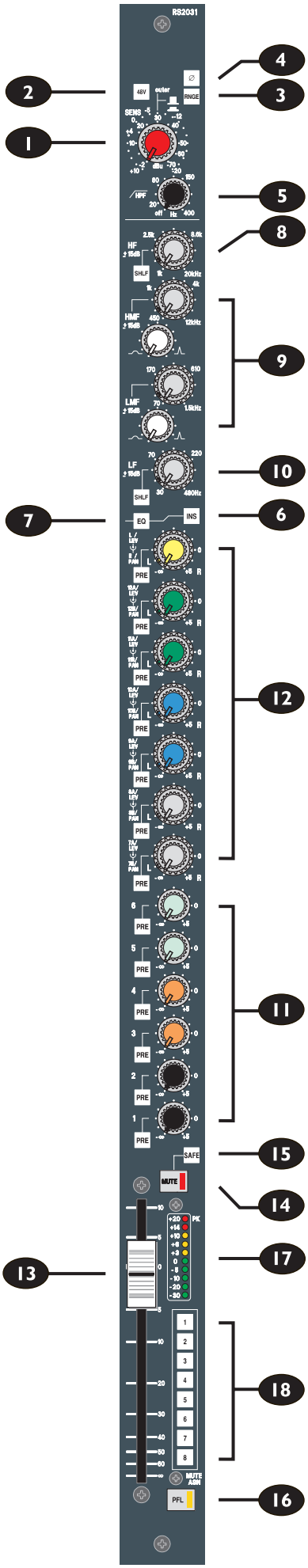
The HF section is fully sweepable, providing 15dB boost or cut at 1kHz to 20kHz. The section can be switched to work as either a Shelving control (SHLF switch pressed) or Bell control (switch released).

9 HMF/LMF

The high and low MID sections comprise a dual concentric control to set the centre frequency (outer ring) and 15dB of boost or cut (upper knob). The HMF spans the range 450Hz to 12kHz and the LMF spans the range 70Hz to 1.5kHz. Each section has an associated Q control, variable from 0.5 to 3.0.

10 LF

The LF section is fully sweepable, providing 15dB boost or cut at 30Hz to 480Hz. The section can be switched to work as either a Shelving control (SHLF switch pressed) or Bell control (switch released).



11 Monitor Sends 1-6

Sends are provided to the 20 output busses, and are designed to allow a mixture of mono and stereo sends that will suit typical operational scenarios. The lower 6 sends are configured as full-time mono sends, using single pots. Pressing the PRE button adjacent to each Send switches the source to pre-fade. The outputs of these mixes are controlled by the lower bank of 6 output faders in the output section. The pre-fade source for the sends may be reconfigured to suit individual requirements - see "Jumper options" in Chapter 2.

12 Monitor Sends 7-12, L/R

The sends to outputs 7-20 are on dual concentric pots, and each row can be configured at the touch of a button as either a stereo send with level on the top knob and pan on the lower, or a pair of mono sends. These mixes are controlled by the upper bank of 12 faders in the output section, and are labelled 7A and B to 12A and B. Stereo mode is selected by pressing the Global Mode STE button on the respective output module.

The last pair of sends although marked L and R, is functionally identical to the other stereo sends and can either be used as a stereo sidefill output, or two mono sends. The output faders for these sends are located on the master module.

The pre-fade feed for all sends is jumper selectable in four groups, pre or post-EQ and pre or post-mute, allowing the module to be configured with any combination of between 20 mono and 6 mono plus 7 stereo sends. The pre-fade source for the sends may be reconfigured to suit individual requirements - see "Jumper options" in Chapter 2.

13 Fader

A high-quality 100mm channel fader controls the level to all busses, and has 10dB of gain when full up as well as an expanded scale around the critical unity gain area, for maximum resolution.

14 MUTE

The Channel MUTE switch mutes all feeds from the input channel, and can be remotely controlled by the console's Mute Master section, allowing creation of up to 8 mute groups. The integral LED illuminates when the Mute is active.

15 SAFE

A semi-recessed Mute SAFE switch allows the channel to be prevented from remote muting by mute groups, but still allows it to be locally muted. Safe mode is selected when the switch is pressed and internally illuminated.

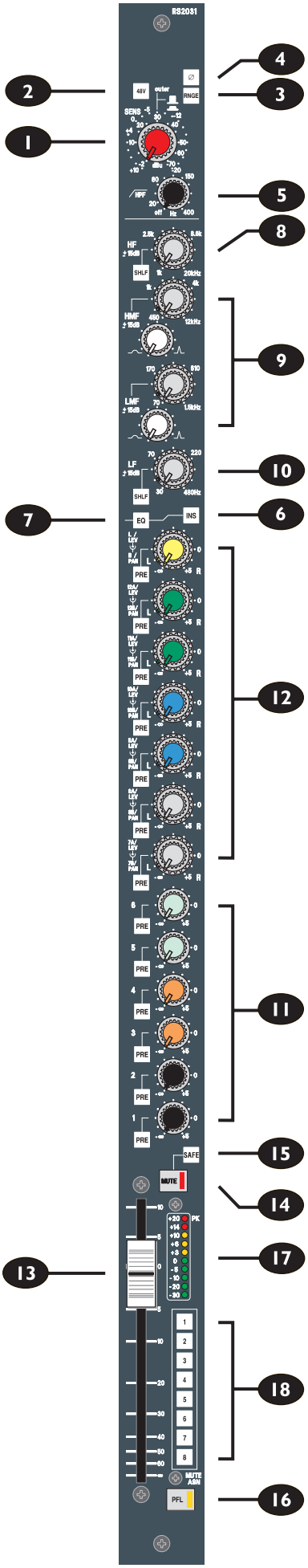
16 PFL

The PFL button is conveniently located below the fader, and provides a mono PFL or stereo AFL feed to the engineer's wedge output and headphones. Intercancel or additive soloing is possible, with or without Input Priority, and solos can be cleared with a single button press (SOLO CLEAR) at the master section.

The integral LED illuminates to indicate that a PFL is active.

17 LED input metering

The channel is fitted with a 10-segment peak-reading bargraph meter, positioned next to each fader for maximum visibility and giving immediate and graphic indication of incoming (pre-EQ) signals. The top (red) LED in the bar is configured as a Peak LED, and monitors the signal path in three places, (pre-EQ, post-EQ and post-fader) giving warning that the signal is within 3dB of clipping.



18 Mute Group Assignment

Each input channel can be assigned to any combination of 8 mute groups, using the recessed switch bank next to the fader. The corresponding mute master buttons are located on the master module.

Direct Output

A balanced direct output is available on a male XLR on the rear panel. This is fed from a pre-fade signal which can be jumper selectable to be pre or post-EQ, and pre or post-mute, or may be jumper-selected as post-fade.

Mic Split

A passive mic split output is available on a male XLR on the rear panel, for feeding input signals to the FHO console in applications where a separate stage splitter is not available. A pin 1 lift switch allows the pin 1 of this XLR to be disconnected console chassis ground.

Rearcon Panel

The connections on the rearcon panel are as follows:

INPUT XLR & MIC SPLIT

Pin 1	Gnd (Screen)
Pin 2	Hot (In-phase signal)
Pin 3	Cold(Out-of-phase signal)

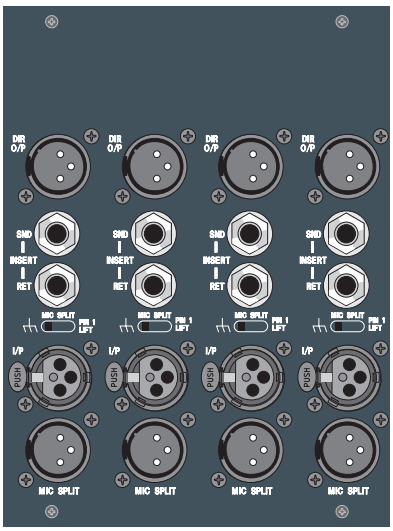
DIRECT OUT (Ground Compensated)		**(Balanced option)**
Pin 1	Gnd (Screen)	Gnd (Screen)
Pin 2	Signal	Hot (In-phase signal)
Pin 3	Ground Sense	Cold(Out-of-phase signal)

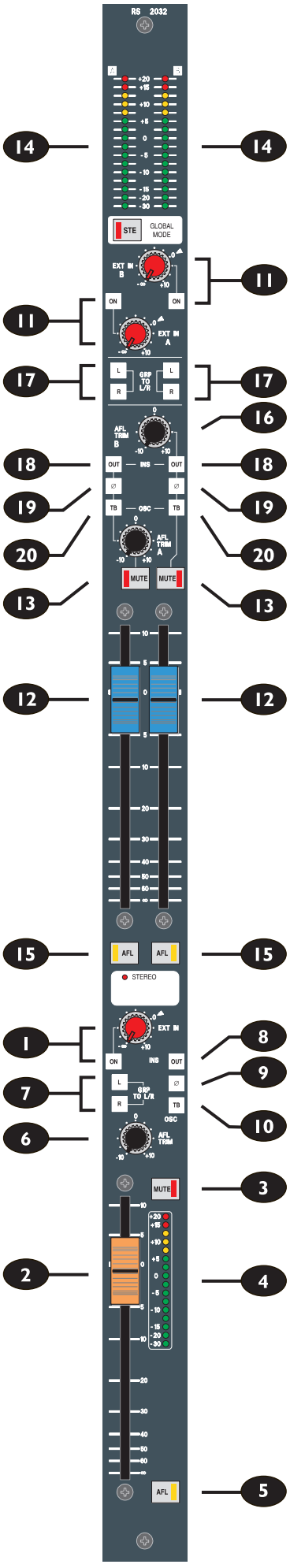
INSERT SEND (Ground Compensated)		**(Balanced option)**
Tip	Signal	Hot (In-phase signal)
Ring	Ground Sense	Cold (Out-of-phase signal)
Sleeve	Gnd (Screen)	Gnd(screen)

INSERT RETURN

Tip	Hot (In-phase signal)
Ring	Cold (Out-of-phase signal)
Sleeve	Gnd(screen)

Output Module





Each of the six Output Modules has two sections: The lower sections are dedicated mono outputs, and the top sections are arranged as 6 pairs of controls with a Global Mode switch which allows each pair to be configured as two monos or one stereo output.

Mono Outputs 1-6

1 EXT IN

The EXT IN level control adjusts the level of an external input which can be brought in via the balanced XLR for summing to the Output bus. The input is enabled when the associated ON switch is pressed.

2 FADER

The 100mm fader controls the final level to the electronically balanced output.

3 MUTE

The output is muted when the switch is pressed, and the integral LED illuminates to show that the MUTE is active.

4 METER

A peak-reading 16-segment LED Bargraph Meter displays the level of the output after the Talkback/Oscillator injection point. An optional VU meterbridge may also be fitted.

5 AFL

The AFL (After-Fade Listen) source is after the insert point. The AFL signal is switched through to both AFL L and AFL R buses by the AFL switch. An integral LED glows when AFL is active. The AFL may be switched off by pressing the AFL switch again, or by the Solo Logic system which is controlled from the Master Module.

6 AFL TRIM

AFL TRIM adjusts the level of the AFL signal by +/-10dB.

7 GRP TO L/R

The internally illuminated L and R switches route the post-mute, post-fade output signal to the last pair of output busses (designated L and R) for subgrouping, allowing the SM20 to be used as a Front-of-House mixer if necessary.

8 INS (OUT)

The Insert Point consists of separate Send and Return jacks on the rear panel. The Send is normalled to the Return.

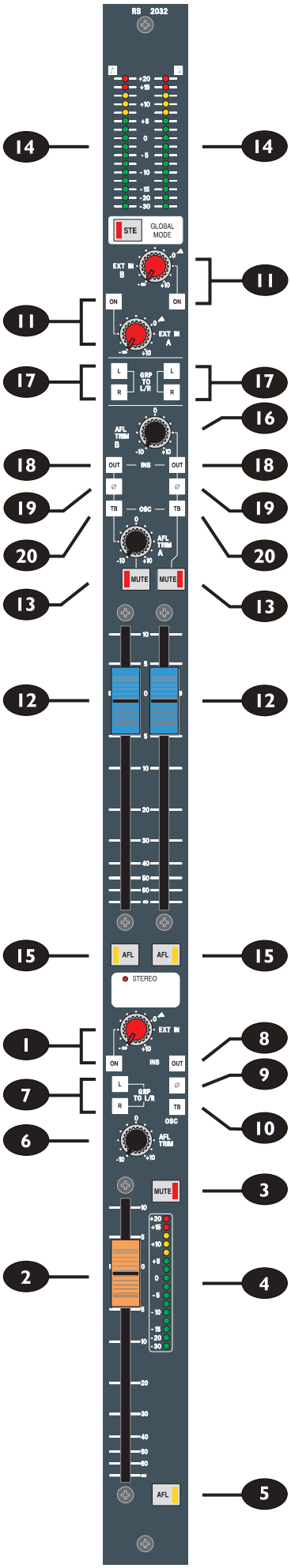
The OUT switch bypasses the Insert Point when pressed, but leaves the pre-fade output signal on the Send jack to feed external equipment if required. The switch is illuminated when the insert is bypassed.

9 Ø (Phase)

Pressing the Ø (Phase) switch reverses the phase of the output, to allow experimentation for best feedback immunity with a multiple-mic setup. The switch is illuminated when the phase is reversed.

10 OSC/TB

Pressing this latching switch arms the output to receive talkback, tone or pink



noise from the central talkback/oscillator section on the Master, when either the master TALK TO OUTPUTS or OSC TO OUTPUTS switches are active. The switch illuminates to warn the the OSC/TB is armed. The output is dimmed by 6dB when talkback is active. Alternatively, if the Master Talkback or Oscillator signal is already active, pressing OSC/TB switch routes the Talkback or Oscillator signal to the output, until the switch is released.

Mono/Stereo Outputs 7-12

These outputs may either be configured as mono sends or as stereo pairs by pressing the Global Mode (STE) switch (see 21 below).

11 EXT IN

The EXT IN level control adjusts the level of an external input which can be brought in via the balanced XLR for summing to the Output bus. The input is enabled when the associated ON switch is pressed.

12 FADER

The 100mm fader controls the final level to the electronically balanced output.

13 MUTE

The output is muted when the switch is pressed, and the integral LED illuminates to show that the MUTE is active.

14 METER

A peak-reading 16-segment LED Bargraph Meter displays the level of the output after the Talkback/Oscillator injection point. An optional VU meterbridge may also be fitted.

15 AFL

The AFL (After-Fade Listen) source is after the insert point. The AFL signal is switched through to both AFL L and AFL R buses by the AFL switch. An integral LED glows when AFL is active. The AFL may be switched off by pressing the AFL switch again, or by the Solo Logic system which is controlled from the Master Module. In stereo mode the Solo switches are logic linked to give automatic stereo AFL.

16 AFL TRIM

AFL TRIM adjusts the level of the AFL signal by +/-10dB.

17 GRP TO L/R

The L and R switches route the post-mute, post-fade output signal to the last pair of output busses (designated L and R) for subgrouping, allowing the SM20 to be used as a Front-of-House mixer if necessary.

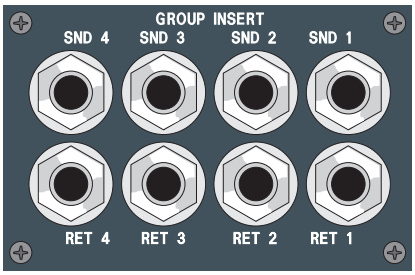
18 INS (OUT)

The Insert Point consists of separate Send and Return jacks on the rear panel. The Send is normalled to the Return.

The OUT switch bypasses the Insert Point when pressed, but leaves the pre-fade output signal on the Send jack to feed external equipment if required. The switch is illuminated when the insert is bypassed.

19 Ø (Phase)

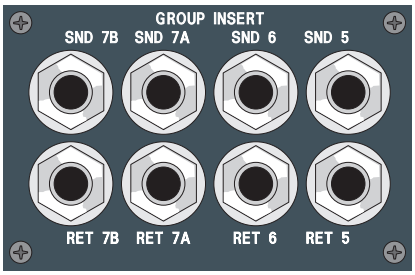
Pressing the Ø (Phase) switch reverses the phase of the output, to allow experimentation for best feedback immunity with a multiple-mic setup. The



switch is illuminated when the phase is reversed.

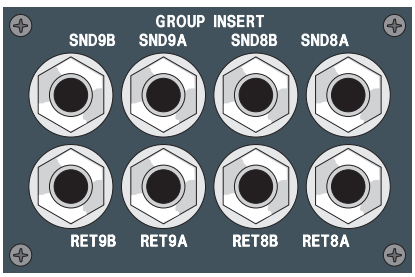
20 OSC/TB

Momentarily pressing this switch arms the output to receive talkback, tone or pink noise from the central talkback/oscillator section on the Master, when either the master TALK TO OUTPUTS or OSC TO OUTPUTS switches are pressed. The switch illuminates to warn that OSC/TB is armed. The output is dimmed by 6dB when talkback is active. Alternatively, if the Master Talkback or Oscillator signal is already active, pressing and holding the switch for more than about one second routes the Talkback or Oscillator signal momentarily to the output, until the switch is released.



21 GLOBAL MODE (STE)

When STE is pressed the two upper outputs become a stereo pair. In this mode the dual concentric sends on the input channels are automatically configured as a stereo Level on top and Pan on the bottom, instead of two separate mono sends, and the AFL buttons are linked. The integral LED illuminates to show when Stereo mode is active.

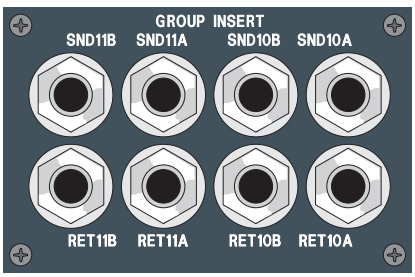


Rearcon Panels

The connections on the rearcon panes are as follows:

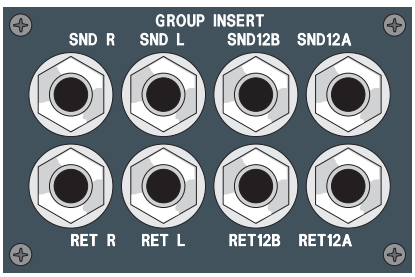
OUTPUT XLR , EXT I/P (on Master Rearcon Panel - see Master Section)

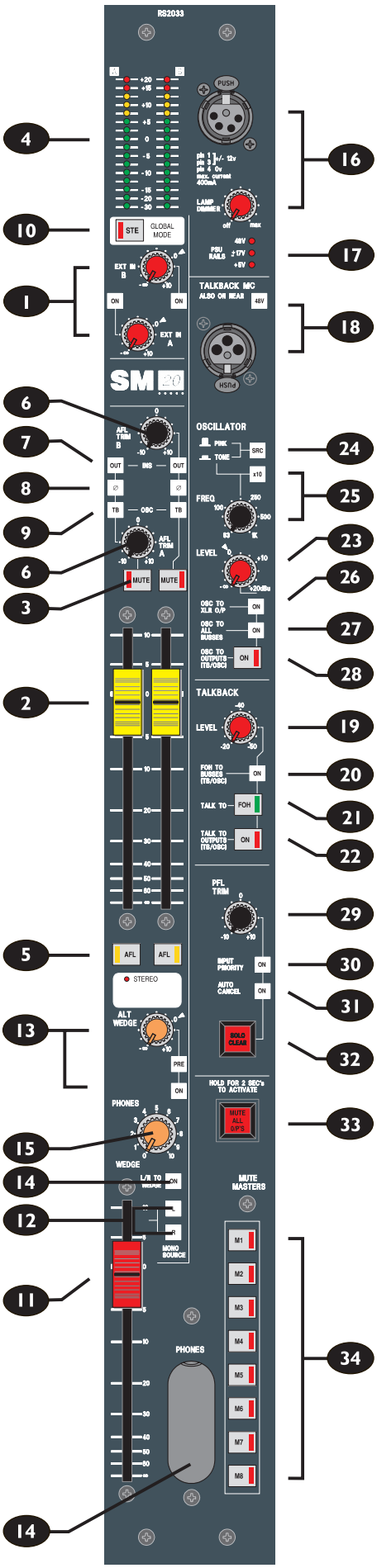
Pin 1	Gnd (Screen)
Pin 2	Hot (In-phase signal)
Pin 3	Cold(Out-of-phase signal)



INSERT SEND & RETURN

Tip	Hot (In-phase signal)
Ring	Cold (Out-of-phase signal)
Sleeve	Gnd(screen)





Master Module

L & R Outputs

1 EXT IN

The EXT IN level control adjusts the level of an external input which can be brought in via the balanced XLR for summing to the Output bus. The input is enabled when the associated ON switch is pressed.

2 FADER

The 100mm fader controls the level to the electronically balanced output.

3 MUTE

The output is muted when the switch is pressed, and the integral LED illuminates to show that the MUTE is active.

4 METERS

Peak-reading 16-segment LED Bargraph Meters display the level of the Wedge output signal, which is normally PFL/AFL. However, when the L/R TO WEDGE switch is ON, the Wedge output receives the L/R output signal, and this will be displayed on these meters, although this selection is always overridden by an active AFL/PFL. Note that if the optional VU meterbridge is fitted, separate L/R.output meters are included.

5 AFL

The AFL (After-Fade Listen) source is after the insert point. The AFL signal is switched through to both AFL L and AFL R buses by the AFL switch. An integral LED glows when AFL is active. The AFL may be switched off by pressing the AFL switch again, or by the Solo Logic system which is controlled from the Master Module. In stereo mode the Solo switches are logic linked to give automatic stereo AFL.

6 AFL TRIM

AFL TRIM adjusts the level of the AFL signal by +/-10dB.

7 INS (OUT)

The Insert Point consists of separate Send and Return jacks on the rear panel. The Send is normalled to the Return.

The OUT switch bypasses the Insert Point when pressed, but leaves the pre-fade output signal on the Send jack to feed external equipment if required. The switch is illuminated when the insert is bypassed.

8 Ø (Phase)

Pressing the Ø (Phase) switch reverses the phase of the output, to allow experimentation for best feedback immunity with a multiple-mic setup. The switch is illuminated when the phase is reversed.

9 OSC/TB

Pressing this latching switch arms the output to receive talkback, tone or pink noise from the central talkback/oscillator section on the Master, when either the master TALK TO OUTPUTS or OSC TO OUTPUTS switches are active. The switch illuminates to warn the the OSC/TB is armed. The output is dimmed by 6dB when talkback is active. Alternatively, if the Master Talkback or Oscillator signal is already active, pressing OSC/TB switch routes the Talkback or Oscillator signal to the output, until the switch is released.

10 GLOBAL MODE (STE)

When STE is pressed the two upper outputs become a stereo pair. In this mode the dual concentric sends on the input channels are automatically configured as a stereo level on top and pan on the bottom, instead of two separate mono sends. The integral LED illuminates to show when Stereo mode is active.

Wedge Monitor Section

11 WEDGE FADER

A stereo 100mm fader is provided for engineer's Wedge speakers, and this normally receives any PFL or AFL signals when an input or output SOLO button is pressed. When no solos are selected, the Wedge output is normally silent, unless the L/R to Wedge switch is pressed (see 14 below), in which case the L/R outputs are heard, or an external AFL/PFL is present.

12 MONO SOURCE L & R

Mono source buttons L and R allow either the Left or Right monitor/solo signals to be fed to both left and right wedge outputs, or if both are pressed, a mono sum of left and right monitor/solo signals is fed to both left and right wedge outputs. The switches illuminate when active.

13 ALT WEDGE

An Alternate Wedge stereo output is provided, with its own level control.

Pressing the internally illuminated ON switch enables the Alternate Wedge output and mutes the main wedge, allowing monitoring on either one or another type of speaker. (for example a standard wedge or an in-ear radio system).

The Alt Wedge is normally sourced post the main wedge fader, but may be switched to pre-fade by pressing the associated PRE switch.

14 L/R TO WEDGE

The Wedge speakers normally receive any PFL or AFL signals when an input or output SOLO button is pressed. When no solos are selected, the Wedge output is normally silent, unless the L/R TO WEDGE switch is pressed (in which case the L/R outputs are heard) or an external AFL/PFL is present. The switch illuminates when ON.

15 PHONES

The operator's phones are fed by the same signal as the Wedge, but have a separate phones volume control.

The headphone socket is recessed into the front of the master fascia, and is driven by a high-power (350mW into 8ohms) headphone amp.

Return talkback from another Soundcraft console is automatically switched onto the headphones, dimming the programme signal.

16 LAMP DIMMER

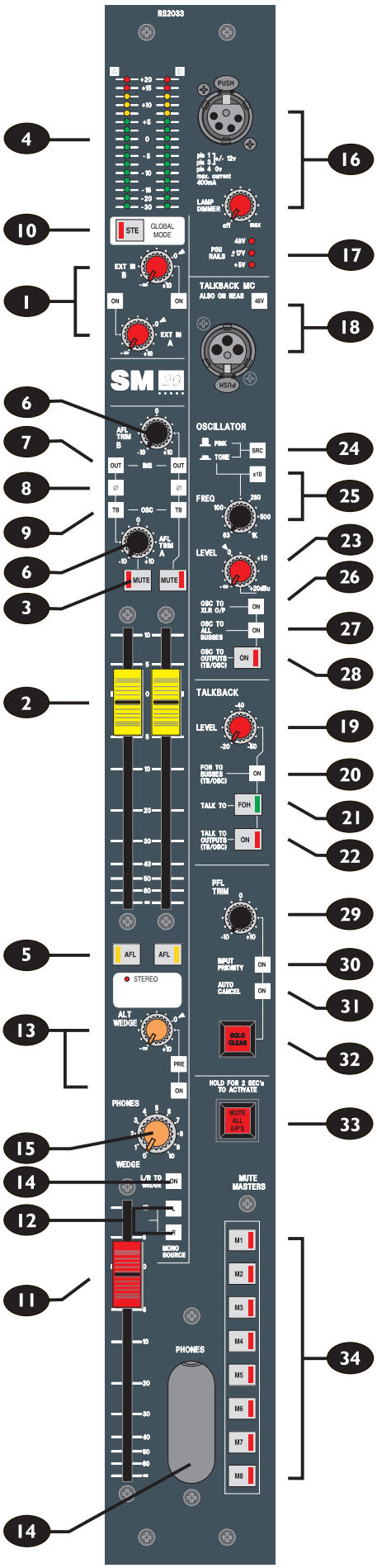
The Lamp Dimmer controls the voltage to the 4-pin XLR socket which is provided for the connection of Littlites™.

The pinout is as follows:

Pin 1 & 3	+/-12V
Pin 4	0v
max. current	400mA

17 PSU RAILS

Three LEDs monitor the status of the power supply rails.



Talkback and Oscillator Section

The talkback and oscillator sections have similar routing systems, allowing them to access any of the console busses. The talkback section has front and rear panel mic input XLRs, with phantom power capability. The mic signal can be routed either to selected internal busses, or sent to a Soundcraft proprietary intercom output (compatible with Series FIVE or another SM monitor console).

18 TALKBACK MIC

Talkback Mic input XLRs are provided on the front and rear panel, with 48V phantom power capability when the 48V switch is pressed.

19 LEVEL

This control adjusts the gain of the Talkback Mic preamp over a 30dB range.

20 FOH TO BUSSES

The FOH TO BUSSES (ON) switch allows any return talkback from the FOH console to be routed directly to the monitor outputs via the TB/Osc buttons, for use when the monitor engineer has to leave the console unattended during setup or soundcheck. The FOH talkback is enabled when the switch is illuminated.

21 TALK TO FOH

TALK TO FOH routes the talkback signal to the proprietary Soundcraft intercom output (compatible with Series FIVE or another SM monitor console) on the rear panel. When TALK TO FOH is active (LED illuminated) the FOH TB OUT XLR on the rear panel carries the talkback signal plus a nominal 15V DC superimposed on it to page the FOH console. The DC voltage may be disabled by internal jumpers if required.

22 TALK TO OUTPUTS (TB/OSC)

TALK TO OUTPUTS (TB/OSC) routes the talkback signal to any outputs which have been previously armed for talkback (local TB switch ON). If the switch is pressed momentarily, the switch latches. Alternatively, pressing and holding the switch for more than about one second produces a momentary action until the switch is released. The switch illuminates to warn that TB/OSC is active.

OSCILLATOR

The oscillator generates either tone or pink noise, and has its own independent balanced XLR output on the rear panel. The oscillator can be routed either individually to outputs, or to all busses simultaneously.

23 LEVEL

This control adjusts the oscillator level to both the XLR output and the internal busses.

24 SRC (Source)

The oscillator generates either TONE (switch pressed and illuminated) from 63Hz to 10kHz, or pink noise (switch released).

25 x10

The normal frequency range of the oscillator is 63Hz to 1kHz. Pressing the x10 switch (internal LED lit)provides a higher range of 630Hz to 10kHz.

26 OSC TO XLR O/P

The rear panel OSC OUT XLR is enabled when this switch is pressed. The internal illumination indicates when the output is active.

27 OSC TO ALL BUSSES

The Oscillator may be routed directly to all busses simultaneously by pressing the OSC TO ALL BUSSES switch ON (switch illuminated) where it mixes with any existing signal.

28 OSC TO OUTPUTS (TB/OSC)

OSC TO OUTPUTS (TB/OSC) routes the oscillator signal to any outputs which have been previously armed for talkback or oscillator (local TB switch ON). If the switch is pressed momentarily, the switch latches. Alternatively, pressing and holding the switch for more than about one second produces a momentary action until the switch is released. The switch illuminates to warn that TB/OSC is active..

29 PFL TRIM

The PFL trim control gives +/-10dB of level adjustment to the input solo level heard in the Wedge and Phones outputs. The output AFL solos have their own individual trim controls on their respective output modules.

30 INPUT PRIORITY

The INPUT PRIORITY (ON) switch, when selected, allows an input solo (PFL) to temporarily override any output solo (AFL) which may be present. When the input solo is released, the original output solo will reappear on the monitors. If AUTOCANCEL (see below) is also ON, input PFLs still have priority, but PFLs will only cancel other PFLs, and AFLs will only cancel other AFLs.

31 AUTO CANCEL

The AUTOCANCEL (ON) button, when selected, allows any solo button selected to cancel the previous solo. When this mode is not selected, solos can be selected additively.

32 SOLO CLEAR

Pressing SOLO CLEAR cancels any solos on the console.

Mute Masters

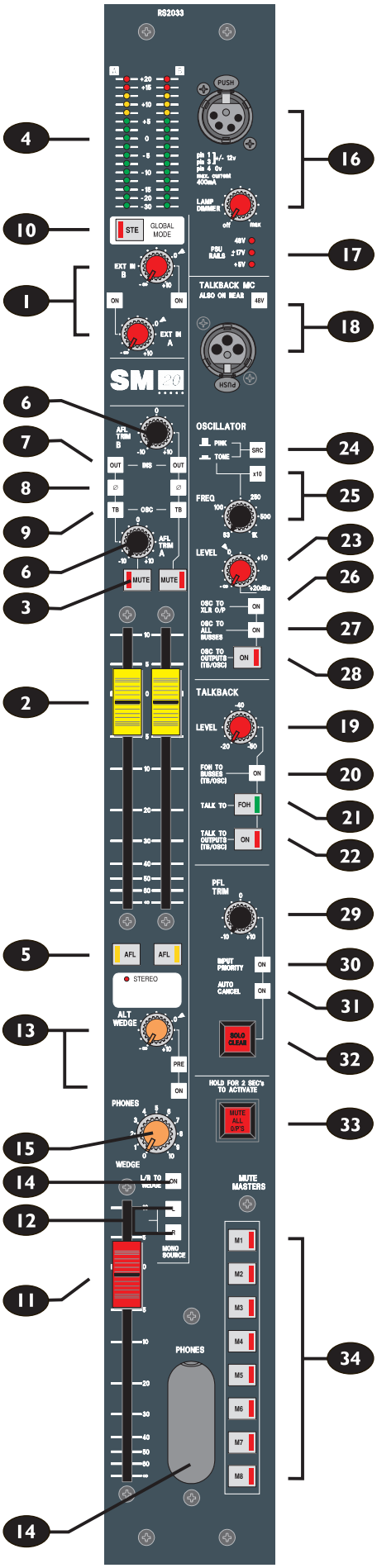
33 MUTE ALL O/P'S

The MUTE ALL O/Ps button allows total muting of all stage feeds. As protection against accidental operation, this button has to be held down for 2 seconds before it will activate. Inputs are not muted (Direct Outs will still be active), and soloing to the wedge outputs can still take place. The outputs are restored when the switch is released.

34 MUTE MASTERS

8 recessed latching buttons control the mute status of any channels assigned to the appropriate mute group.

Inputs may be assigned to any combination of the eight master mute busses. When an input channel is assigned to a mute bus, it is muted when the corresponding MUTE MASTER is pressed. The MUTE MASTER illuminates and the input channel MUTE switch also illuminates to indicate that a non-local mute is active.



Comms Link

The Comms Link is designed to pick up the call signal from a Clear-Com™ intercom and use this to flash the console's Littlites in order to attract the engineer's attention. There is no connection to the Clear-Com™ audio, which passes through unaffected.

The Comms Link will only operate if both the +30V Intercom supply and the DC Call signal (+4Vdc to +11Vdc) are present on the Comms Link XLRs. The Comms Link will also operate with the 'TW' option on the Clear-Com™ system where a second audio channel is superimposed on the +30Vdc.

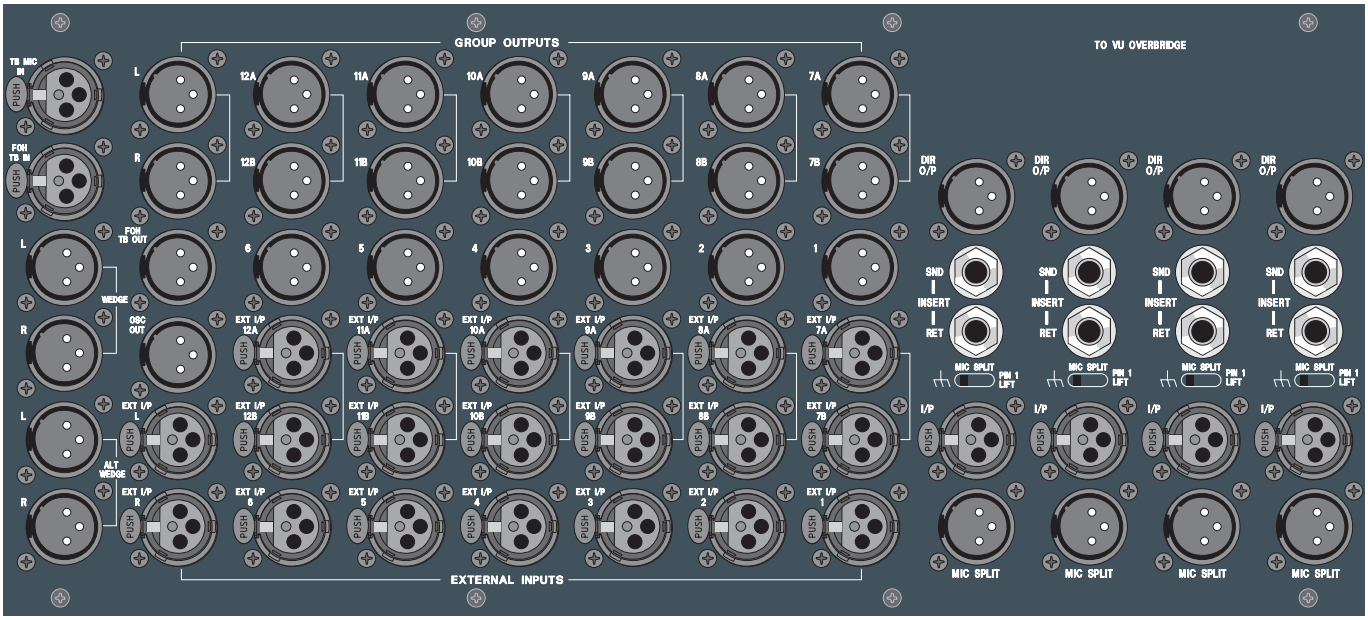
Optional VU Meterbridge

An optional VU meterbridge can be installed and contains 22 VU meters for metering of the 20 main outputs plus an additional pair of meters dedicated to the Wedge output, which will meter any soloed signal on the console. All VU meters are illuminated using LED backlighting, and each meter incorporates a large peak LED which illuminates when the output is within 6dB of clipping.

BSS Varicurve™ Remote Control

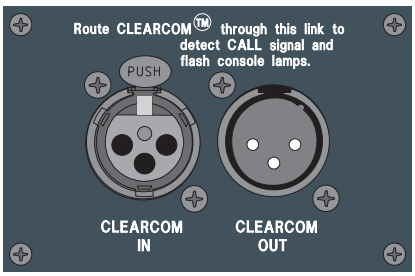
A unique feature on the SM20 allows the output solo buttons (in Autocancel mode) on the console to automatically select the correct EQ page on the FPC-900 Varicurve™ Remote Unit, using proprietary MIDI control. This saves the engineer vital seconds as it avoids the need to solo the output and then press the appropriate page button on the remote unit.

Note that this function requires the Varicurve™ remote to be fitted with operating system EPROM V1.16 or above; contact BSS for further information.



Rearcon Panel

The connections on the Master rear connector panel are as follows:

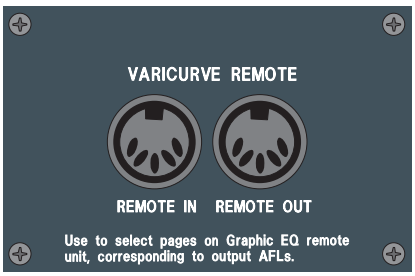


All Audio XLRs

Pin 1	Gnd (Screen)
Pin 2	Hot (In-phase signal)
Pin 3	Cold(Out-of-phase signal)

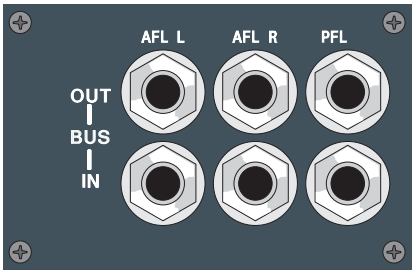
Clear-Com™ Connection (XLR)

Pin 1	Common (DC ground & Intercom Low)
Pin 2	+30Vdc from Intercom System
Pin 3	Intercom Line (Audio & DC Call Signal)



AFL/PFL Out

Tip	Signal
Ring	Ground Sense
Sleeve	Gnd (Screen)



AFL/PFL Bus In

Tip	Hot (In-phase signal)
Ring	Cold (Out-of-phase signal)
Sleeve	Gnd(screen)

SM20

5 Specifications

SM20 Provisional Specifications

Frequency Response

Any Input to any output	20Hz - 20kHz, +0/-0.5dB

Total Harmonic Distortion

All measurements at 20dBu	
Line In to Group or Mix Out	Less than 0.005% @1kHz
	Less than 0.025% @10kHz

Noise

22Hz - 22kHz bandwidth, unweighted

Mic input Equivalent Input Noise	Less than -127.5dBu (200Ω source)
Group Output Noise	Less than -80dBu (40 ch routed)
Mix Output Noise	Less than -80dBu (40 ch routed)

Crosstalk

All measurements at 1kHz

Input Channel Muting	Greater than 100dB
Input Channel Send Pot Isolation	Greater than 75dB
Group Fader Isolation	Greater than 95dB
Group to Group Crosstalk	Less than -75dB
Group to Mix Crosstalk	Less than -75dB
Mix to Group Crosstalk	Less than -75dB

Input and Output Impedances

Input	2kΩ balanced
All Insert Sends	Less than 75Ω balanced
All Insert Returns	Greater than 10kΩ balanced
Outputs	Less than 75Ω balanced

Input/Output Capability

Maximum Input Level	+30dBu
Input Insert Sends	+20dBu into 2kΩ (Bal. +26dBu into 1kΩ)
Output Insert Sends	+26dBu into 1kΩ
All Insert Returns	+26dBu
All Balanced Outputs	+26dBu into 1kΩ
Headphone Output	+20dBu into 600Ω
	+350mW into 8Ω

Input and Output Levels

Input Sensitivity (XLR)	-2dBu to -70dBu, +10dBu to -20dBu
Input Insert Send/Return	-2dBu nominal
Output Insert Send/Return	+4dBu nominal
Outputs	+4dBu for 0VU
PFL/AFL	-2dBu nominal
Oscillator	+4dBu nominal