

MH2 User Guide



IMPORTANT
**Please read this manual carefully before using
your mixer for the first time.**



This equipment complies
with the EMC directive
89/336/EEC
Modified by
92/31/EEC
93/68/EEC
91/263/EEC
and LVD 73/23/EEC
modified by 93/68/EEC

This product is approved to
safety standards:

IEC 60065: 2001
EN60065:2002
UL6500 7th Edition: 2003
CAN/CSA-E60065-03

And EMC standards
EN55103-1: 1996 (E2)
EN55103-2: 1996 (E2)

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Part No. ZM0324-01

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IMPORTANT SAFETY INSTRUCTIONS

Read these instructions.

Keep these instructions.

Heed all warnings.

Follow all instructions.

Do not use this apparatus near water.

Clean only with a dry cloth.

Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.

Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.

Do not defeat the safety purpose of a polarised or grounding type plug. A polarised plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet

Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.

Only use attachments/accessories specified by the manufacturer.



Use only with the cart, stand, tripod, bracket or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.

Unplug this apparatus during lightning storms or when unused for long periods of time.

Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

Note: It is recommended that all maintenance and service on the product should be carried out by Soundcraft or its authorised agents. Soundcraft cannot accept any liability whatsoever for any loss or damage caused by service, maintenance or repair by unauthorised personnel.

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

Do not expose the apparatus to dripping or splashing and do not place objects filled with liquids, such as vases, on the apparatus.

No naked flame sources, such as lighted candles, should be placed on the apparatus.

Ventilation should not be impeded by covering the ventilation openings with items such as newspapers, table cloths, curtains etc.

THIS APPARATUS MUST BE EARTHED. Under no circumstances should the safety earth be disconnected from the mains lead.

The mains supply disconnect device is the mains plug. It must remain accessible so as to be readily operable when the apparatus is in use.

If any part of the mains cord set is damaged, the complete cord set should be replaced. The following information is for reference only.

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

Earth (Ground):	Green and Yellow (US - Green/Yellow)
Neutral:	Blue (US - White)
Live (Hot):	Brown (US - Black)

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

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

The wire which is coloured Blue must be connected to the terminal in the plug which is marked with the letter N

The wire which is coloured Brown must be connected to the terminal in the plug which is marked with the letter L

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

This unit is capable of operating over a range of mains voltages as marked on the rear panel.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This Class A digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

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

SAFETY SYMBOL GUIDE

For your own safety and to avoid invalidation of the warranty all text marked with these symbols should be read carefully.



WARNINGS

The lightning flash with arrowhead symbol, is intended to alert the user to the presence of un-insulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



CAUTIONS

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



NOTES

Contain important information and useful tips on the operation of your equipment.



HEADPHONES SAFETY WARNING

Contain important information and useful tips on headphone outputs and monitoring levels.

Recommended Headphone Impedance \geq 200 Ohms.

Introduction

The key features of the MH2 are:

- 24+4, 32+4, 40+4 and 48+4 Ch frames.
- Mic amp with 50dB range plus -20dB level shift and separate 1/4" Line input.
- Sweep high-pass filter and EQ (4 band sweep EQ).
- 10 Auxes, of which 2 can be switched to create 1x stereo send.
- Pre/post fader switching in pairs (except 5-8 as one block of 4).
- 8 full-time group busses with paired routing.
- LCR Panning on inputs-mix.
- 8 VCAs and 6 Mute Groups.
- 4 Stereo Input channels with Mic/line Capability.
- 4 stereo line returns with 3-band fixed EQ, returns can route to output channels and mix busses.
- 11x4 Matrix built-in.
- 10x linear 60mm output faders, plus 8 rotary output faders with SWAP facility to allow linear faders to control either all 10 Auxes or 8 Grps and 2 Auxes.
- Inserts on Groups and Mix outputs (Group insert moves between Grp & Aux).
- 12-segment Input and Output metering on LED bargraphs.
- Central assignment of VCA Groups, with individual LED displays per channel.

Installation

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

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 cloth is ideal.

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.



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

Handling and Transport

The console is supplied in a strong carton. 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 foam lined flightcase. At all times avoid applying excessive force to any knobs, switches or connectors. You will have to remove the Meter Bridge to get it back into its carton.

Power Cable

Always use the power supply cable supplied with the mixer: the use of alternative cables may cause damage and voids the warranty.

W a r n i n g ! In the event of an electrical storm, or large mains voltage fluctuations, immediately switch off the mixer and unplug from the mains.

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 common mode DC, AC or RF voltages, as these will reduce the available signal range on the inputs. Note that $0\text{dBu} = 0.775\text{V RMS}$.

Refer to the Specifications section for details of input and output levels.

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 FOH or 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 PA system should you proceed with the next step.

Connect stereo or Multitrack Tape recorders, FX 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 screen 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 0.01 mF 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 independent '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.

Connecting an optional DPS-4 Power Supply Unit



Read the instructions which are supplied with the DPS-4.

Using the cable supplied with the DPS-4 connect the "console" connector of the DPS-4 to the "DPS-4" connector (marked "ONLY connect to DPS-4 PSU") of the MH2.

WARNING: DO NOT ATTEMPT TO CONNECT ANY OTHER TYPE OF POWER SUPPLY TO THE MH2



WORKING SAFELY WITH SOUND

Although your new console will not make any noise until you feed it signals, it has the capability to produce sounds which when monitored through an amplifier or headphones can damage hearing over time.

The table below is taken from the Occupational Safety & Health Administration directive on Occupational noise exposure (1926.52):

PERMISSIBLE NOISE EXPOSURE

DURATION PER DAY, HOURS	SOUND LEVEL dBA SLOW RESPONSE
8	90
6	92
4	95
3	97
2	100
1.5	102
1	105
0.5	110
<0.25	115

Conforming to this directive will minimise the risk of hearing damage caused by long listening periods. A simple rule to follow is the longer you listen the lower the average volume should be.

Please take care when working with your audio - if you are manipulating controls which you don't understand (which we all do when we are learning), make sure your monitors are turned down. Remember that your ears are the most important tool of your trade, look after them, and they will look after you.

Most importantly - don't be afraid to experiment to find out how each parameter affects the sound - this will extend your creativity and help you to get the best results.

Recommended Headphone Impedance 200-600 ohms.

Removing and Refitting the internal Power Supply Module

Power Supply Module

The MH2 is powered by a removable Power Supply Module that allows mains power to be connected directly to the console.

The Power Supply Module uses the latest switched-mode technology to provide very high efficiency, minimising unwanted heat generation inside the console. Another advantage of this technology is automatic input voltage switching, meaning the console can be used anywhere in the world without having to worry about setting the correct mains voltage.

Servicing

The Mains fuse is accessible from the outside, on the rear panel of the Power Supply Module. Always replace with the correct value and type of fuse (see text on rear panel adjacent to fuseholder).

Although there are no user-serviceable parts inside the Power Supply Module, it may be necessary to remove it from the console in order for it to be repaired or replaced, in the unlikely event of a failure. The module is mounted in the console on slide-out rails and has an integral connector that is automatically disconnected/reconnected when the module is removed /refitted.

The module has been designed to be easily removable from outside the console, but if you are mounting the console in a flightcase that includes a cablebox, take care to allow enough space behind the console to allow the unit to be removed without having to take the console out of the case. (Allow 280mm clearance behind the PSU Module).

Removal

Ensure that the mains supply is disconnected from the Power Supply Module.

Remove the six screws from the rear panel of the Power Supply Module (3 on top edge, 3 on bottom edge).

Do NOT remove the two large silver knurled knobs, one on each side of the unit.

Grasp the two knurled knobs and pull the unit away from the console. A certain amount of force will be necessary initially to disconnect the internal connector, the unit will then slide out with very little force.



Danger! Never connect a mains supply cable to the Power Supply Module when it is outside the console. Extremely high voltages are present and there is risk of electric shock.

Refitting



Before refitting the module, examine the pins on the beige-coloured 64-pin connector at one end of the module, and check that none are bent or damaged. Bent pins on this connector will make it impossible to plug the module back into the console correctly.

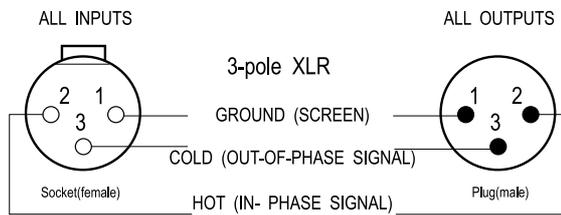
Refitting is the reverse of removal. Take care when handling the Power Supply Module not to apply any undue force which might damage any of the components that are fitted to the PCB.

Carefully locate the module's pcb into the guide rails in the console, and slide the unit back into the console. When you feel pressure, indicating that the module is nearly fully home, carefully push on the knurled knobs on each side of the rear panel to apply even pressure and re-seat the internal connector.

Re-fit the six screws retaining the rear panel. Connect the mains supply, switch on, and check correct operation.

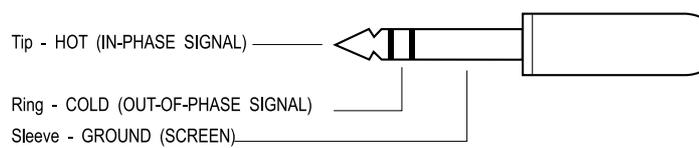
Note, there is a slight delay of about 1 sec between operating the power switch and seeing the PSU LEDs on the console illuminate – this is normal.

Audio Connector Pinouts

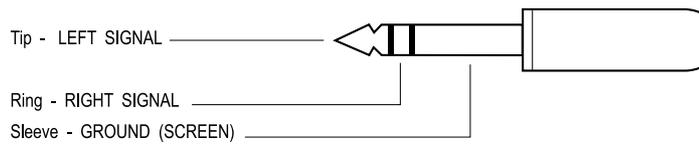


1/4" Stereo Jack Plug used as balanced Input/Output:

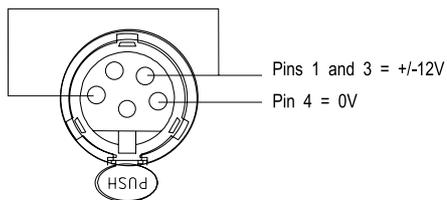
All Jacks Except Headphones



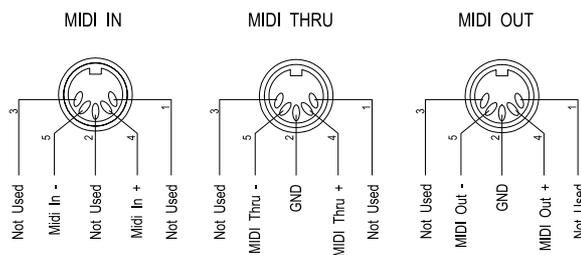
1/4" Stereo Jack Plug used For Headphones



Lamp Connectors

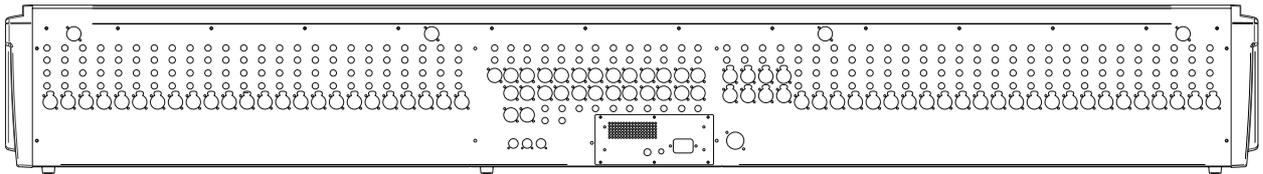
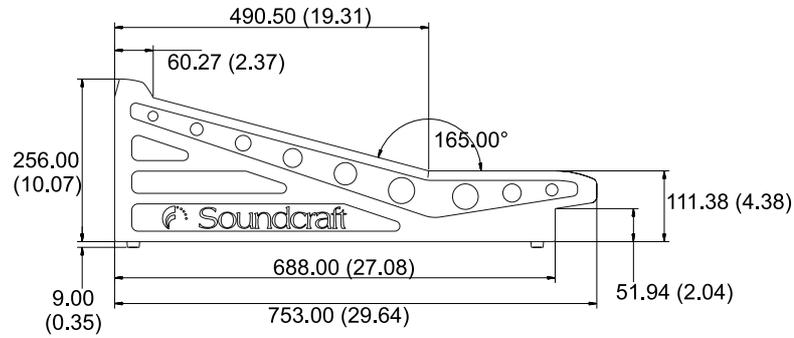


MIDI Connectors

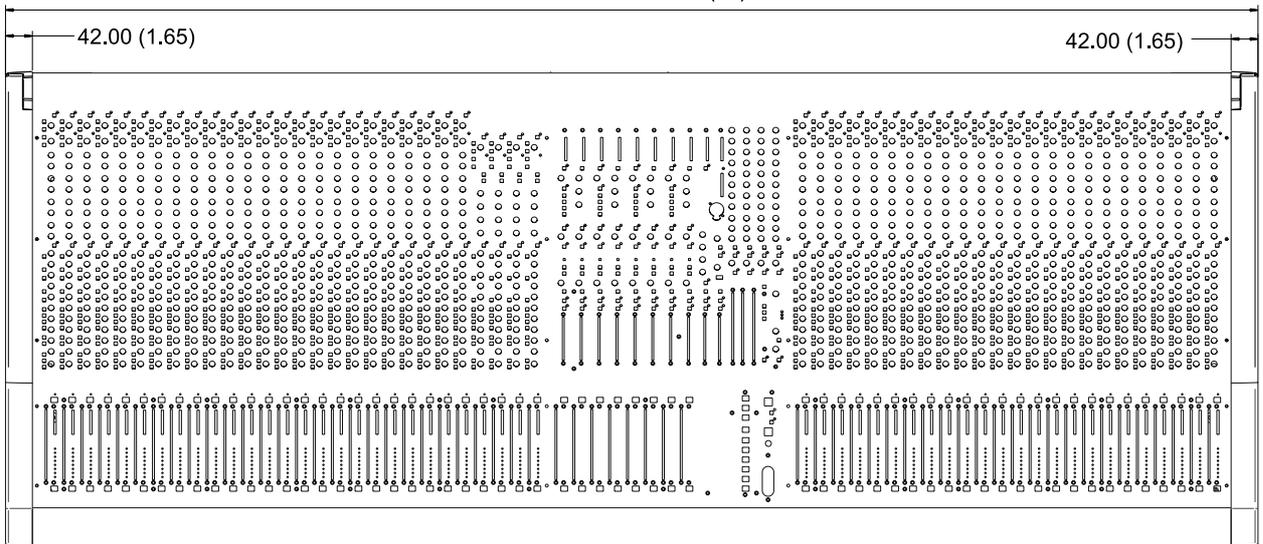


The MIDI IN signal is buffered by an opto-isolator.

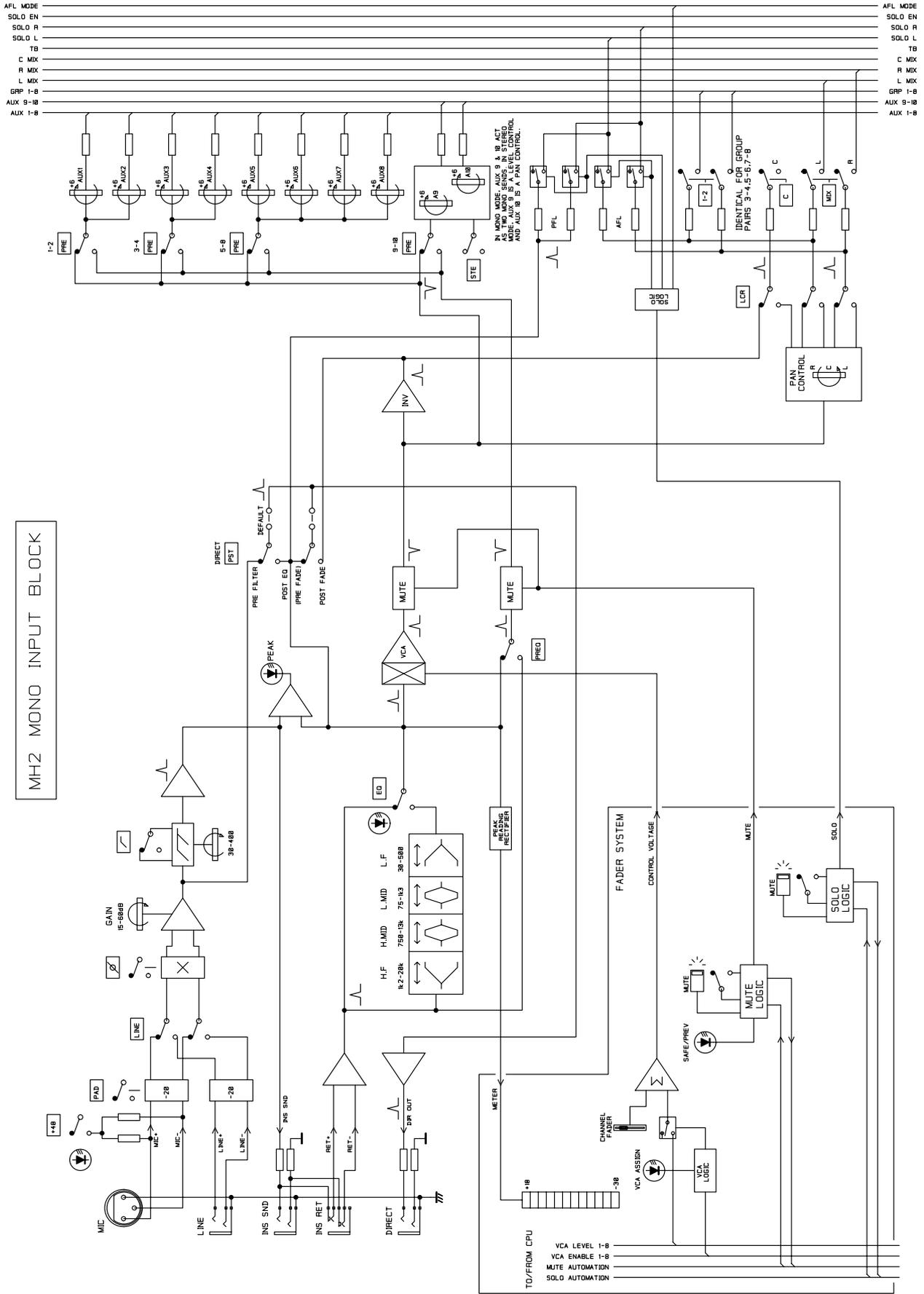
Dimensions

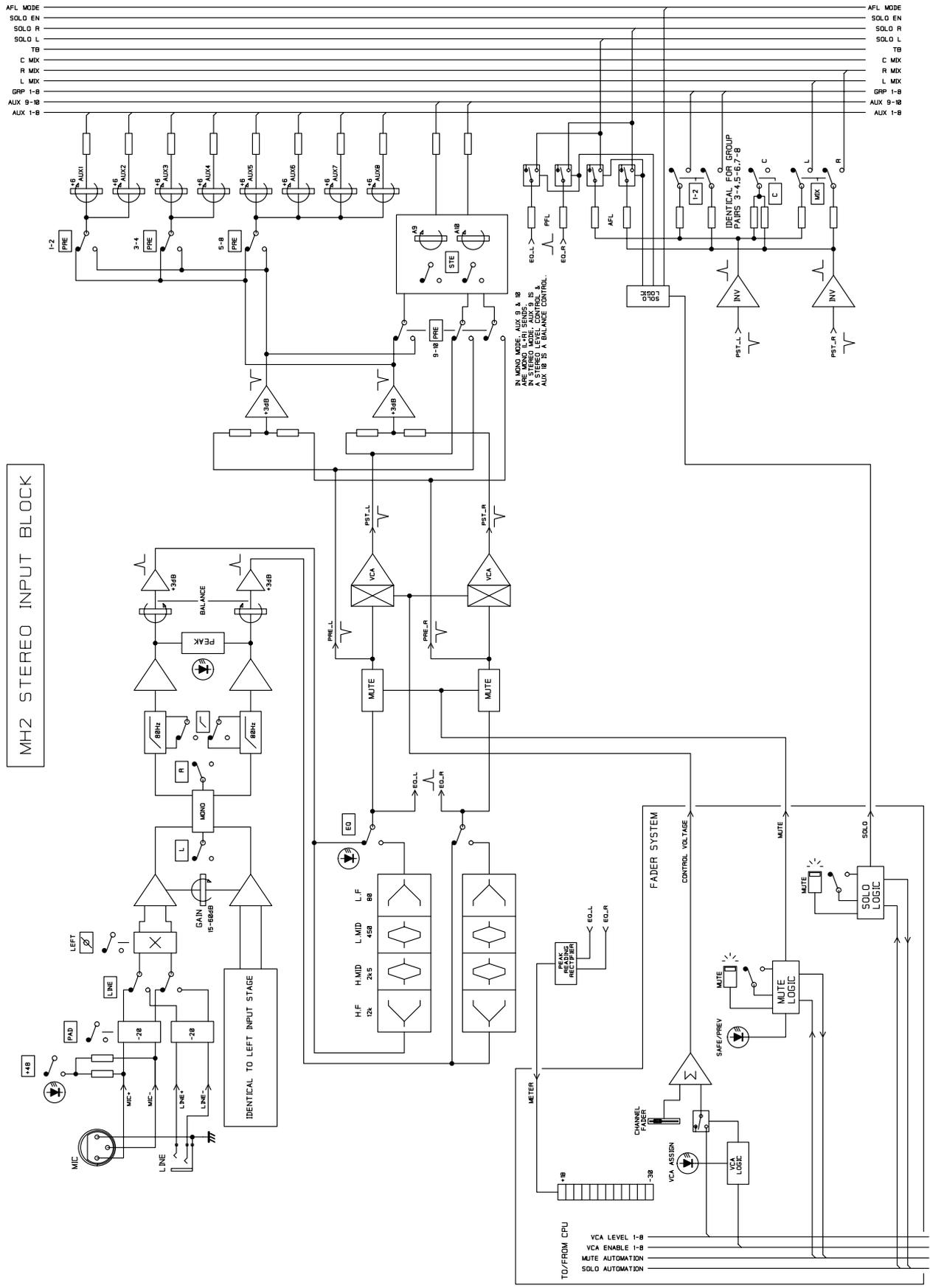


CONSOLE	OVERALL WIDTH mm (inches)
24CH	1271.45 (50.1)
32CH	1508.94 (59.4)
40CH	1732.46 (68.2)
48CH	1955.98 (77)



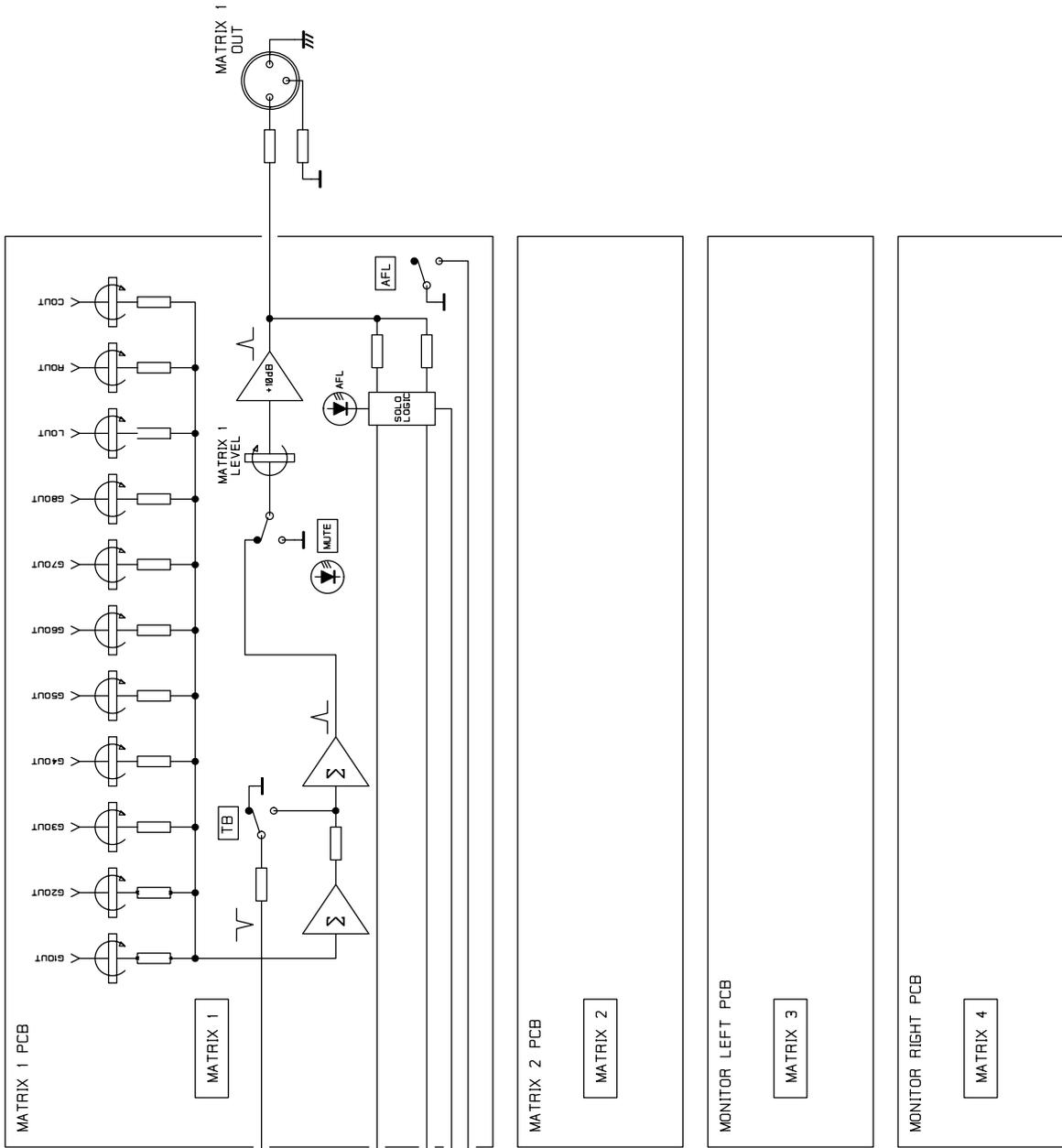
Block Diagrams





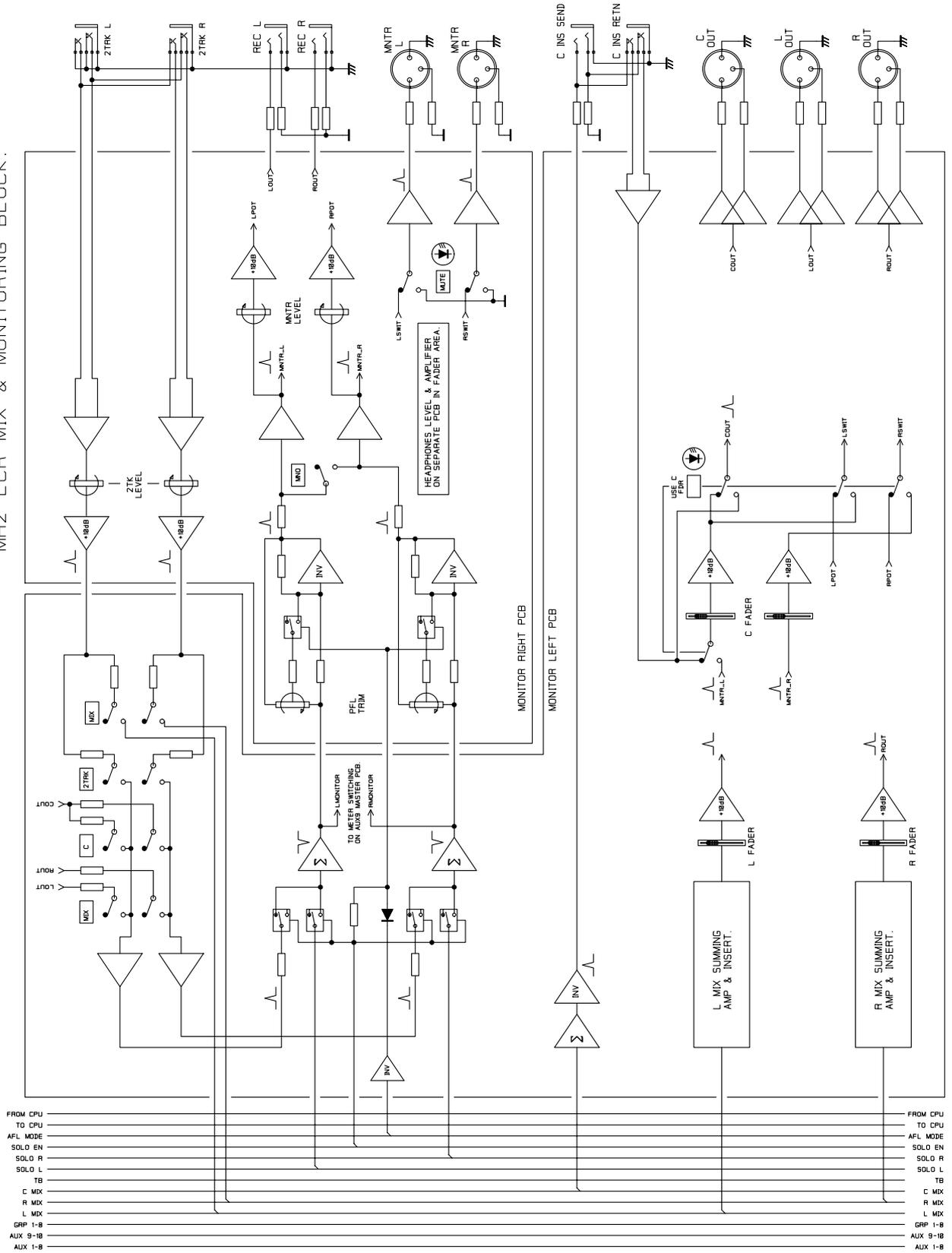
MH2 MATRIX BLOCK

FROM CPU
TO CPU
AFL MODE
SOLO EN
SOLO R
SOLO L
TB
C MIX
R MIX
L MIX
GRP 1-8
AUX 9-10
AUX 1-8

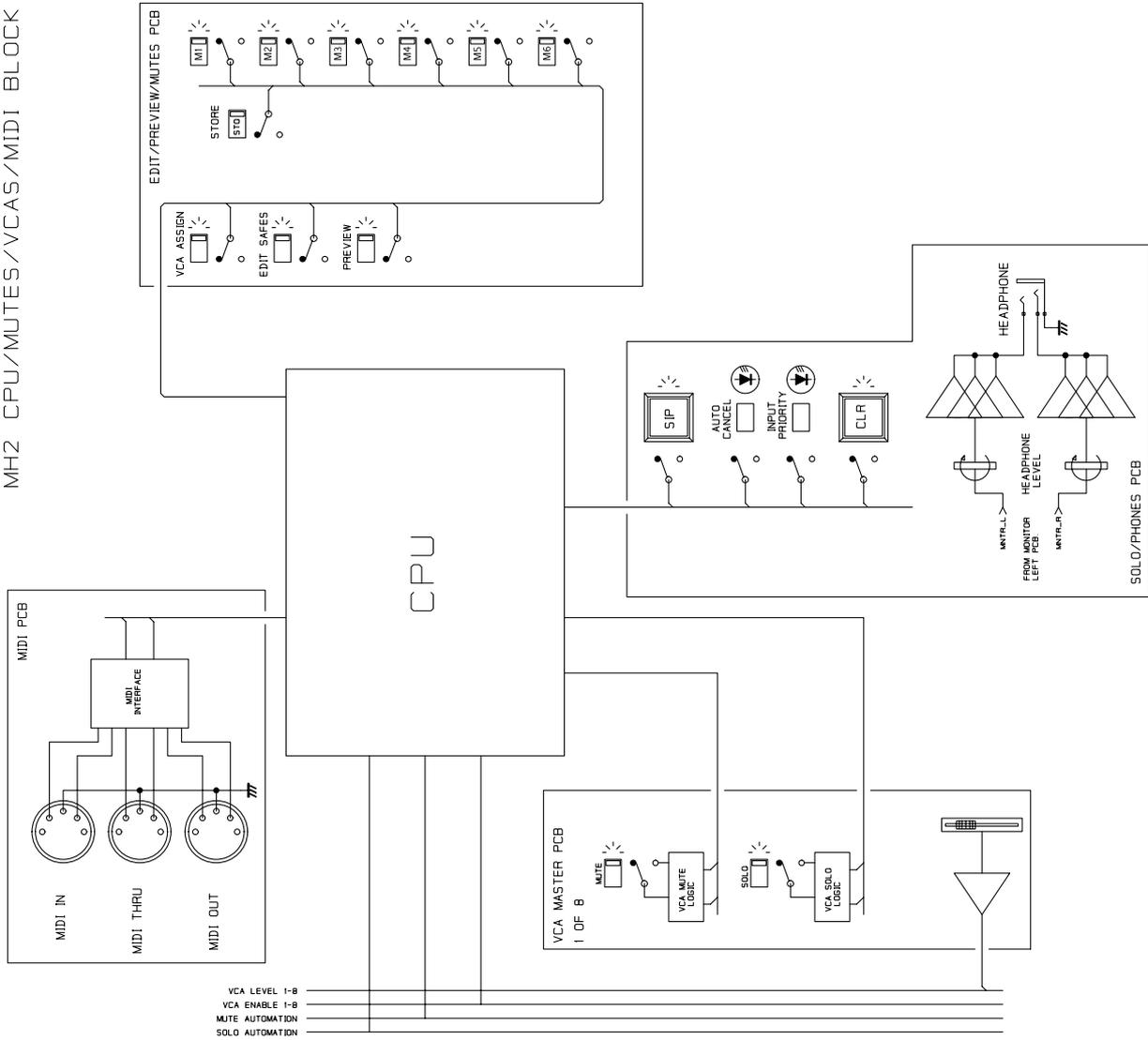


FROM CPU
TO CPU
AFL MODE
SOLO EN
SOLO R
SOLO L
TB
C MIX
R MIX
L MIX
GRP 1-8
AUX 9-10
AUX 1-8

MH2 LCR MIX & MONITORING BLOCK.



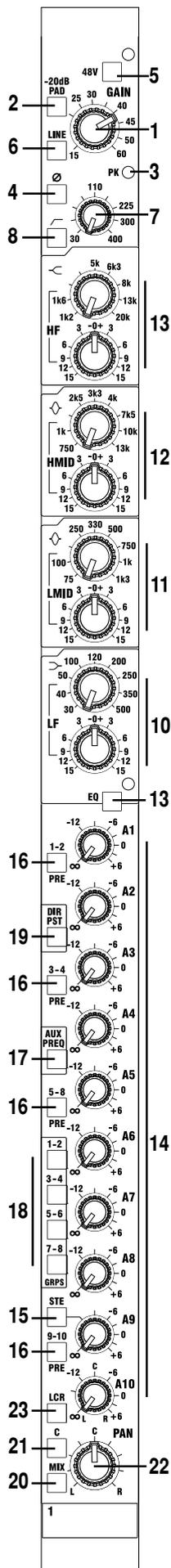
MH2 CPU/MUTES/VCAS/MIDI BLOCK



VCA LEVEL 1-8
 VCA ENABLE 1-8
 MUTE AUTOMATION
 SOLO AUTOMATION

FROM CPU	TO CPU	FROM CPU	TO CPU
AFL MIDE	AFL MIDE	AFL MIDE	AFL MIDE
SOLO EN	SOLO EN	SOLO EN	SOLO EN
SOLO R	SOLO R	SOLO R	SOLO R
SOLO L	SOLO L	SOLO L	SOLO L
TB	TB	TB	TB
C MDX	C MDX	C MDX	C MDX
R MDX	R MDX	R MDX	R MDX
L MDX	L MDX	L MDX	L MDX
GRP 1-8	GRP 1-8	GRP 1-8	GRP 1-8
AUX 9-18	AUX 9-18	AUX 9-18	AUX 9-18
AUX 1-8	AUX 1-8	AUX 1-8	AUX 1-8

Using The Console



Mono Input Channels

Pre-Amp

The module's pre-amp features a high headroom and outstanding CMRR performance. The XLR input can handle signals up to +26dBu, with a gain range of +15dBu to +60dBu (1) and a 20dB pad switch (2). A Peak LED (3) indicates internal signal levels in excess of +18dBu. This monitors both the pre-amp output and the EQ section output. Polarity Reverse (4) and Phantom Power switching (5) is provided. The Line Input switch (6) allows the XLR input signal to be replaced by a different high-level input signal, connected via the balanced 1/4" Line Input jack on the rear panel. The sensitivity of the line input is the same as the XLR input when the Pad is switched in (the Pad does not affect the Line Input).

Balanced Insert Point

Separate jacks provide a pre-EQ balanced send and return, at a nominal level of 0dBu. See the rear panel connectors.

EQ and HI-PASS Filter

This new design retains the traditional Soundcraft response, but incorporates steeper slopes on the HF stage focussing the control where you want it, and some carefully tailored overshoot on the LF band, which automatically controls the muddy lower-mid frequencies when boosting lows.

The high-pass filter (7) is variable from 30Hz - 400Hz with bypass (8) if required. The EQ section may be bypassed by releasing the EQ switch (9).

The EQ section is four band, with shelving sweep high and low frequency sections, and sweepable high-mid and low-mid bands. The frequency ranges are 30Hz-500Hz (LF)(10), 75Hz-1.3kHz (Low Mid)(11), 750Hz-13kHz (High Mid)(12), and 1.2kHz-20kHz (HF)(13), with +/-15dB of cut or boost available at any frequency. The Q on the two mid bands is fixed at 1.5.

Aux Sends

There are 10 Aux sends (14), which can be used either as FX sends in FOH use, or monitor mixes for monitoring. Aux 9 & 10 can be switched to a stereo pair for an in-ear send, using the adjacent STE switch (15). Each send has 5dB of gain at maximum.

The Auxes can be switched Pre- or Post-fader by the adjacent PRE switches (16), which are in pairs for the first 4 sends and Aux 9 & 10, and as one group for Aux 5-8. The default Pre-fade signal for all Auxes is post-EQ but can be changed to pre-EQ by pressing the AUX PREQ switch (17) (both feeds follow the channel mute).

Subgroup Routing

In addition to the 10 Aux sends, 8 busses are provided for conventional subgrouping. Routing to these is via 4 paired routing switches (18). The balance between odd and even group busses is controlled by the channel PAN control.

Direct Output

A direct output on balanced 1/4" jack is available from the channel, see the rear connector panel. The source is controlled by the DIR PST switch (19), which switches the direct output from pre-EQ to post-EQ when the switch is pressed in. In addition, there are internal solder links to alter the signal feeds in both of the switch positions, as follows:

- Either: UP= non-muted pre-fade, DOWN= Post fade,
- Or: UP= non-muted Pre-filter, DOWN= Post-EQ. (default setting).

Mix Bus Routing and Pan controls

The signal is sent to the stereo mix bus and the mono (C) bus using the MIX (20) and C (21) switches. The PAN control (22), which gives 3dB centre drop, operates on the stereo mix bus signal, unless LCR panning is engaged.

When routed, the Mono (C) bus is always fed directly with the post-fader signal, unless LCR panning is engaged.

LCR Panning

The LCR switch (23) changes the mode of the Pan pot from normal left - right panning with a 3dB centre drop, to 3-way LCR panning, requiring both the mono (C) bus and stereo mix bus to be routed, and the pan pot panning from left to C, and C to right. When the pot is physically centred, there is no output from the left and right mix bus outputs.

Fader

A high-quality long-throw 100mm fader (24) controls the level to all busses, and has 10dB of gain when fully up as well as an expanded scale around the critical unity gain area for maximum resolution.

MUTE

The MUTE switch (25) mutes the signal to all busses, including pre-fade Aux sends. The mute circuit can also be activated by the mute group system, a SIP mute signal, a VCA mute signal or an external MIDI note message on MIDI channel 16. A Preview mode allows editing and checking of mute groups without disturbing the audio passing through the desk, and Mutes can be set 'Safe', preventing them from being muted by Mute Groups, a Solo-In-Place mute or a VCA Master mute.

SAFE/PREV LED

The SAFE/PREV LED (26) is used to indicate the Mute Safe status of the channel or Preview mute status, if the console is in Preview mode. The channel is toggled in or out of SAFE mode using the MUTE switch, after first engaging EDIT SAFES mode on the mute group master panel. Steady illumination of the LED indicates a mute safe condition. Preview status is indicated by flashing illumination, upon entering Preview mode from the mute group master panel, if the Mute is present in the previewed mute group.

LED Input Metering

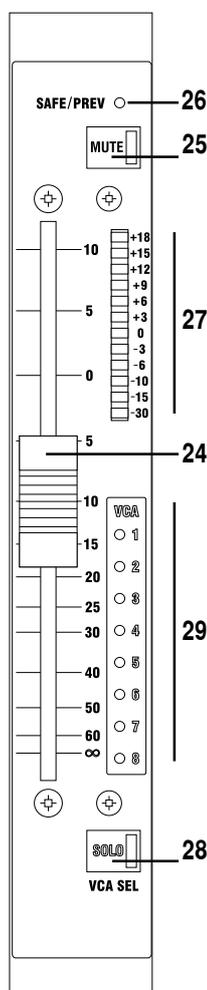
Every channel is fitted with a 12-segment LED bargraph meter (27), positioned next to each fader for maximum visibility and giving immediate graphic indication of incoming signals at the output of the EQ.

VCA Assign LEDs

The module is assigned to the 8 VCA Groups using the SOLO button (28) on each channel, in conjunction with the VCA Master SOLO switches. The whole console has to be switched into the VCA Assign Mode (press the "VCA Assign Mode" switch located at the top of the mute group master panel) in order for the SOLO switch functions to be changed in this way. The current VCA assignments are indicated on the 8 VCA Assign LEDs (29) adjacent to the fader.

SOLO

The Solo button provides a PFL feed to the engineer's headphones or monitors, or triggers a destructive solo in place, depending on mode selection at the master section. The solo button can also be activated remotely from a VCA solo when assigned to a VCA group, giving Stereo AFL. Intercancel or additive soloing is possible, with or without input priority, and solos can be



cleared with a single button press at the master section. The solo buttons also feature automatic momentary operation, by pressing and holding for more than 0.5 sec.

Jumper Options

Function	Options	Default
Direct switch operation	UP = Pre-fade DOWN = Post fade UP = Pre-filter, DOWN= Post-EQ.	<<<<<<

Input and Output Levels

MIC INPUT (electronically balanced)

Gain range +15dB to +60dB (-5dB to +40dB with -20 switch)
 maximum input level +26dBu
 input impedance 2kohms

LINE INPUT (electronically balanced)

Gain range -5dB to +40dB
 maximum input level +26dBu
 input impedance 10kohm

INSERT SEND (impedance balanced)

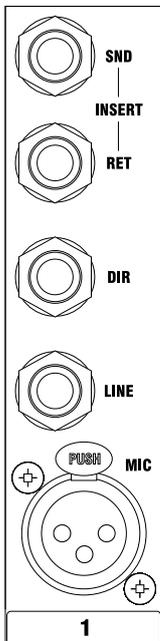
nominal level 0dBu
 maximum output level +21dBu into 2kohms
 output impedance <75ohms

INSERT RETURN (electronically balanced)

sensitivity 0dBu
 maximum input level +26dBu
 input impedance >10kohms

DIR OUTPUT (impedance balanced)

nominal level 0dBu
 maximum output level +21dBu into 2kohms
 output impedance <75ohms



Rear Connectors

MIC INPUT (3 pin female XLR)

Pin 1 Ground
 Pin 2 Signal Hot
 Pin 3 Signal Cold

LINE INPUT (1/4" TSR Jack)

Tip Signal Hot
 Ring Signal Cold
 Sleeve Ground

INSERT RETURN (1/4" TSR Jack)

Tip Signal Hot
 Ring Signal Cold
 Sleeve Ground

INSERT SEND & DIRECT OUTPUT (1/4" TSR Jack)

Tip Signal Hot
 Ring Cold (75ohm to ground)
 Sleeve Ground

Stereo Input Channels

Four stereo input channels are fitted as standard to all MH2 frame sizes.

Input stage

A stereo version of the Mono input's high performance pre-amp offers the same gain range of +15dBu to +60dBu (1) and a 20dB PAD switch (2). It also has Phantom Power switching (3), and polarity reverse on the left channel (4). The peak LED (5) indicates signals in excess of +18dBu on either left or right channels, while two MONO switches (6) cut either Left or Right channel, feeding the alternate channel to both module paths, or if both are pressed, a mono sum of L and R to the module paths. A separate Line Input signal can be connected to the 1/4" Line Input jacks on the rear panel, and switched in to replace the XLR signals, by pressing the LINE switch (7).

Balanced Insert Points with INS switch

Separate jacks provide a pre-EQ balanced send and return, for Left and Right channels, at a nominal level of 0dBu. See the rear connector panel.

EQ and HI-PASS Filter

The EQ section is stereo four band, with fixed frequencies on all bands and is enabled by pressing the EQ switch (8). The HF and LF bands have a shelving response, whilst the Mid bands have a peak/dip response.

The frequencies are 80Hz (LF)(9), 450Hz (Low Mid)(10), 2.5kHz (High Mid)(11), and 12kHz (HF)(12), with +/-15dB of cut or boost available. The Q is fixed on the mid bands at 1.3.

The stereo High-pass filter is fixed at 80Hz, and is switched in with the High-pass switch (13).

Aux Sends

As on the mono input there are 10 sends (14), for FX or Monitor use.

Aux 9 & 10 can be switched to a stereo pair for an in-ear send, using the adjacent STE switch (15). In this case, the A9 knob becomes a stereo Level control, and the A10 knob becomes the PAN between Aux 9 and Aux 10.

Each send has 5dB of gain at maximum, and is always fed from a mono sum of the left and right signals. (If Aux 9 & 10 are switched to stereo, these sends are fed with a stereo signal, left to Aux 9 and right to Aux 10.)

The Auxes can be switched Pre- or Post-fader by the adjacent PRE switches (16), which are in pairs for the first 4 sends and Aux 9 & 10, and as one group for Aux 5-8. The Pre-fade signal for all Auxes is always post-EQ.

Subgroup Routing

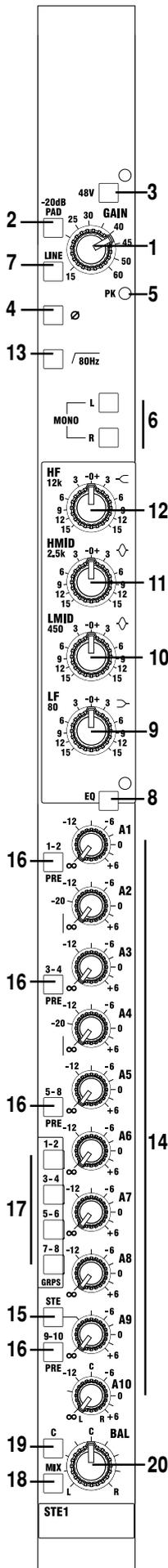
In addition to the 10 Aux sends, 8 busses are provided for conventional subgrouping.

Routing to these is via 4 paired routing switches (17). Odd numbered busses are fed by the left channel, even from the right.

Mix Bus Routing and Balance controls

The signal is sent to the stereo mix bus and the mono bus using the MIX (18) and C (19) switches.

The BAL (20) control allows the left signal to be faded down to zero level when turned fully clockwise, and vice-versa for the right signal. In the centre position, both channels are fed at unity gain to the Mix bus. The balance control also affects the L-R balance within the mono sum sent to the Aux sends (pre or post fade) and the L-R balance between odd and even group



busses.

The C (mono) bus is always fed directly with a mono sum of the stereo post-fader signal.

Fader

A high-quality long-throw 100mm fader (21) controls the level to all busses, and has 10dB of gain when fully up as well as an expanded scale around the critical unity gain area for maximum resolution.

MUTE

The MUTE switch (22) mutes the signal to all busses, including pre-fade Aux sends. The mute circuit can also be activated by the mute group system, an SIP mute signal or a VCA mute signal. A Preview mode allows editing and checking of mute groups and snapshots without disturbing the audio passing through the desk, and Mutes can be set 'Safe'.

SAFE/PREV LED

The SAFE/PREV LED (23) is used to indicate the Mute Safe status of the channel or Preview mute status, if the console is in Preview mode. The channel is toggled in or out of SAFE mode using the MUTE switch, after first engaging EDIT SAFES mode on the mute group master panel. Steady illumination of the LED indicates a mute safe condition. Preview status is indicated by flashing illumination, upon entering Preview mode from the mute group master panel, if the Mute is present in the previewed mute group.

LED Input Metering

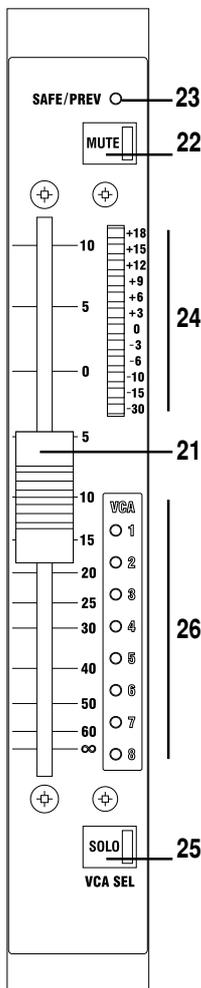
The Stereo channel channel is fitted with a 12-segment LED bargraph meter (24), positioned next to each fader for maximum visibility and giving immediate graphic indication of incoming signals at the output of the equaliser.

VCA Assign LEDs

The module is assigned to the 8 VCA Groups using the SOLO button (25) on each channel, in conjunction with the VCA Master SOLO switches. The whole console has to be switched into the VCA Assign Mode (press the "VCA Assign Mode" switch located at the top of the Mute Group master panel) in order for the SOLO switch functions to be changed in this way. The current VCA assignments are indicated on the 8 VCA Assign LEDs (26) adjacent to the fader.

SOLO

The Solo button (25) provides a stereo PFL feed to the engineer's headphones or monitors, or triggers a destructive solo in place, depending on mode selection at the master section. The solo button can also be activated remotely from a VCA solo when assigned to a VCA group, giving Stereo AFL. Intercancel or additive soloing is possible, with or without input priority, and solos can be cleared with a single button press at the master section. The solo buttons also feature automatic momentary operation, by pressing and holding for more than 0.5 sec.



Jumper Options

None

Input and Output Levels

L, R MIC INPUTS (electronically balanced)

Gain range +15dB to +60dB (-5dB to +40dB with -20 switch)
maximum input level +26dBu
input impedance 2kohms

L, R LINE INPUTS (electronically balanced)

Gain range -5dB to +40dB
maximum input level +26dBu
input impedance >10kohms

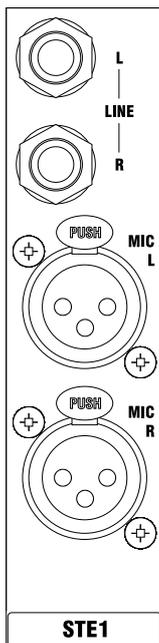
Rear Connectors

LEFT, RIGHT MIC INPUTS (3-pin female XLR)

Pin 1 Ground
Pin 2 Signal Hot
Pin 3 Signal Cold

LEFT, RIGHT LINE INPUTS (1/4" TSR Jack)

Tip Signal Hot
Ring Signal Cold
Sleeve Ground

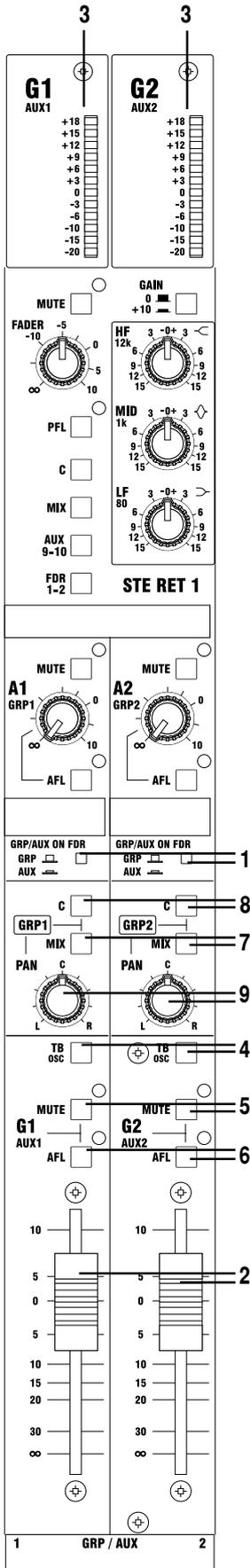


Output & Master Section - Overview

The Output & Master Section is made up of 3 distinct areas of control:

- Group/Aux 1-8 & FX returns
- Aux 9-10 & Matrix 1-4
- Master Outputs & Monitors & TB/Osc

Grp/Aux 1-8 & FX Returns



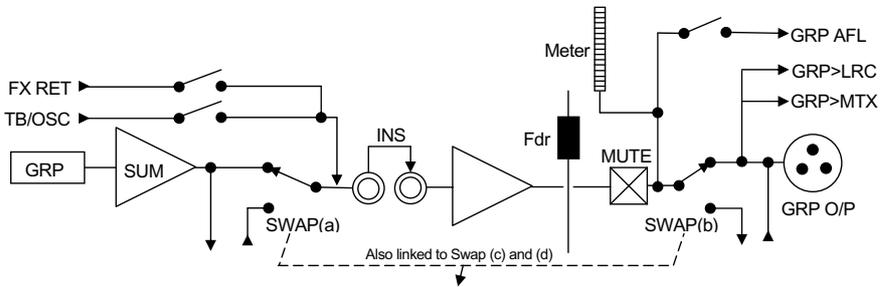
The key to the dual-purpose capability of the MH2 is the reversible signal path which allows either the Group or the Aux Output signal to be controlled by a linear fader, and have access to an insert point.

For FOH applications, the groups are required on faders for subgrouping duties, and the insert point allows external EQ or dynamics to be used on the group. The Aux sends in this application will be used for FX sends, so rotary master controls are appropriate.

By pressing the recessed GRP/AUX ON FDR button (1), thereby changing it to AUX mode, the console is set up for Stage Monitor use, where the Aux Output is controlled by the fader, and has use of the insert point for EQ insertion. Meanwhile the group output is swapped to the rotary fader.

It is possible to swap the fader mode for each of the 8 outputs individually, allowing a combination of subgroups and monitor sends on faders. This flexibility is essential when doing monitor mixes from FOH.

Group Path –SWAP not pressed



Fader Output Section

Each of the 8 Fader master sections comprises a 60mm fader (2) which feeds either the Group or Aux signals to their respective balanced XLRs on the rear panel. A pre-fade balanced insert point, via separate 1/4" jacks, allows insertion of EQ or dynamics. Each fader knob is colour co-ordinated with its Aux bus send control for easy identification when controlling Monitor mixes, and the 12-segment bargraph meter (3) at the top of the module provides line-of-sight metering of any fader-controlled output.

The TB (osc) button (4) routes talkback or tone from the central talkback/oscillator section to whichever output is being controlled by the fader.

Illuminated Mute (5) and AFL solo (6) buttons are provided for each fader.

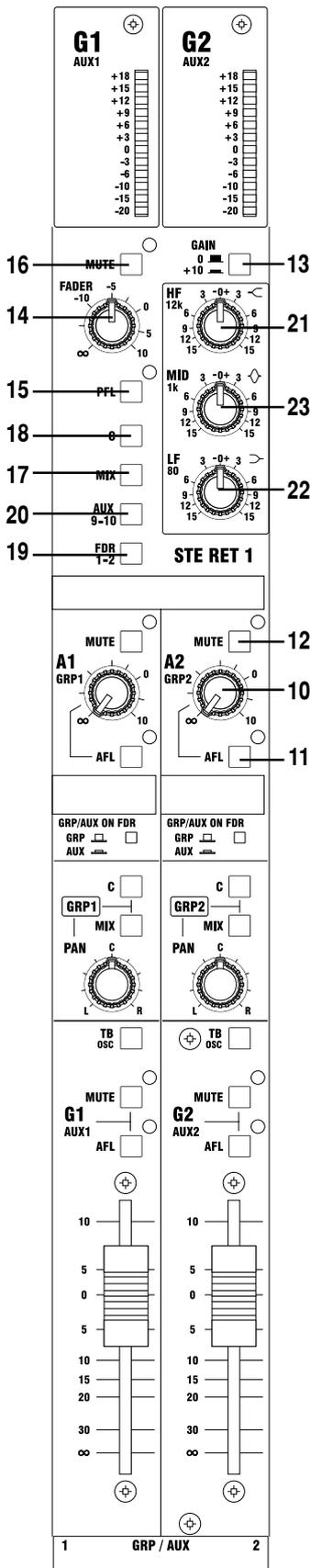
If stereo subgroups or In-Ear sends are in use, the AFLs can be linked as a stereo pair by pressing both adjacent buttons at the same time; when linked, the AFL appears as a stereo AFL in the stereo wedge & phones outputs. Once a pair of AFLs are linked they stay linked until the two AFL buttons are pressed simultaneously again. Linked pairs remain linked even if the console is powered down and then powered up again.

Group to Mix Section

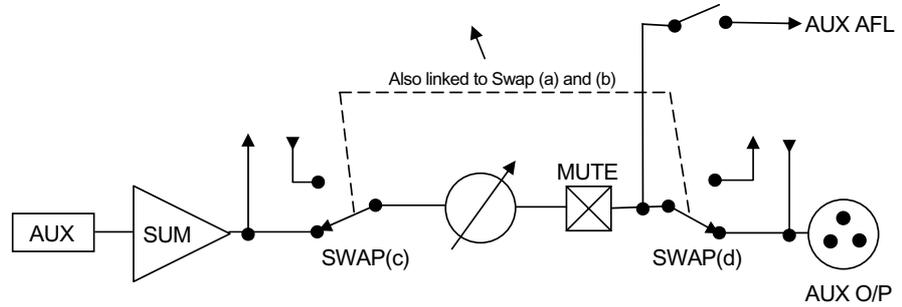
The Group signal path, regardless of whether it is controlled by the fader or not, can always be routed to the main mix busses using the MIX (7) and C (8) switches and the PAN (9) control.

Rotary Output Section

Each of the 8 Rotary master sections is equipped with a colour-coded rotary fader (10), AFL solo (11) and MUTE (12) controls. (AFL stereo linking is not available on the rotary output section.)



Aux Path –SWAP not pressed



Stereo FX Return with 3-band EQ

Located above each pair of Group/Aux Output sections is a stereo FX return section. A stereo line input from balanced rear panel jacks is fed via a 0-10dB gain switch (13), via a stereo 3-band EQ section (see below) to a rotary level fader (14).

Illuminated Stereo PFL (15) and Mute (16) switches are provided.

The stereo return signal can be routed to the main MIX (17) and C (18) busses, or directly to the nearest pair of Output faders directly below the return, using the FDR1-2 switch (19), or, for the Aux 9-10 outputs, using the AUX 9-10 switch (20). This gives the following benefits to the return in addition to standard FX return to the main mix:

In FOH applications when a pair of Output Faders will be controlling a stereo subgroup, the return can provide an individual FX return for that mix, the level of which will be controlled by the subgroup fader.

In Monitor applications, if Aux 9-10 is being used as a stereo in-ear feed, an individual reverb return can be routed to the in-ear output.

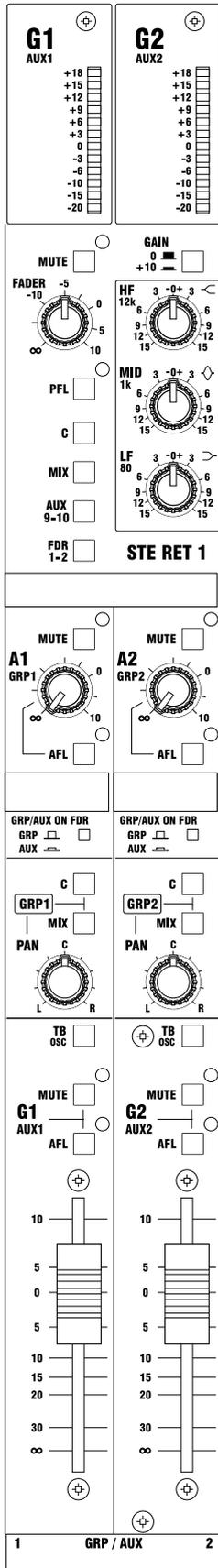
Alternatively, if all 8 subgroups are not being used in a FOH application, the return can be routed to the output Faders and then to Mix, allowing control of the return level by linear faders.

EQ

The stereo EQ section comprises fixed shelving HF (21) and LF (22) bands, at 12kHz and 80Hz respectively, with a peak/dip mid band (23) with a centre frequency of 1kHz. The mid band Q is fixed at 1.1. 15dB of cut or boost is available on all bands.

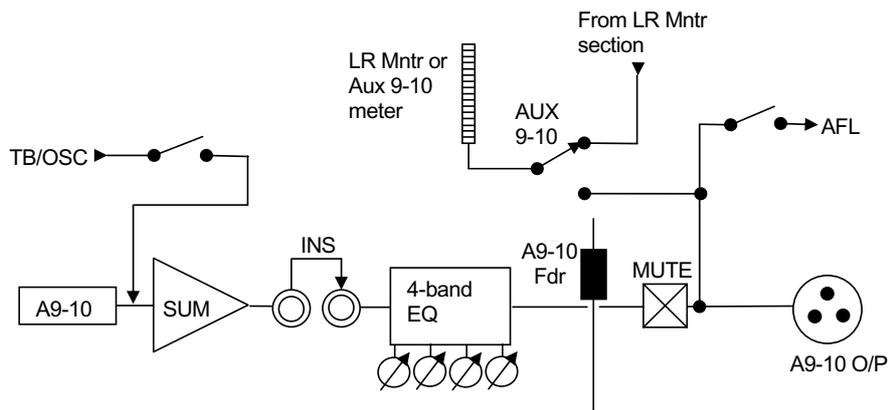
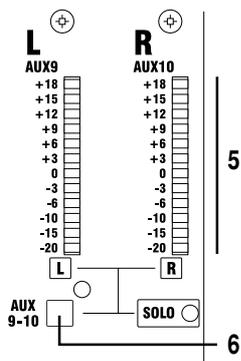
Notes on Output Solo logic

Both Group and Aux AFL switches behave as follows with regard to input priority, autocancel and solo clear:



- If INPUT PRIORITY mode is enabled on its own, then any active input SOLOs will replace the output AFL signal, and the output will not be heard until the inputs are un-SOLOed.
- If solo AUTO CANCEL mode is selected on its own, then the output AFL will cancel any other active SOLOs or AFLs.
- If AUTO CANCEL and INPUT PRIORITY are both selected, the output AFL will only cancel another output AFL. The output AFL may also be cleared with the master SOLO CLEAR function.
- If two adjacent (odd+even) Output AFL switches are pressed together, the software detects this and links both switches together, allowing single button soloing of both outputs by pressing either of the linked switches. At the same time, the audio feed to the AFL bus is changed from being a centre-image 'mono' solo (unlinked) to stereo (odd-left, even-right) in linked mode. The switches can be unlinked again by pressing both again.

Aux 9-10 Output Section

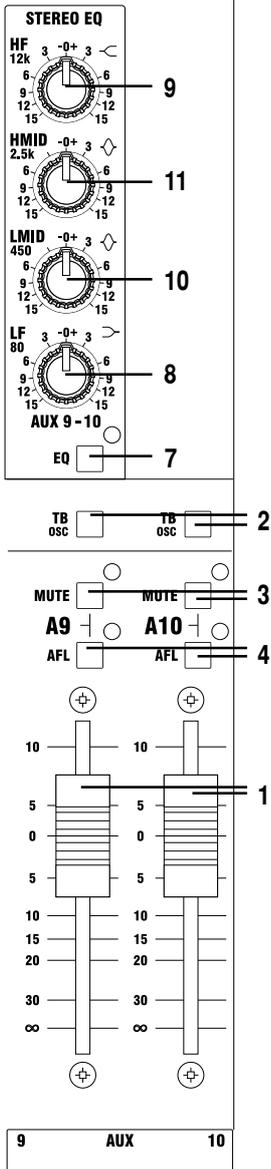


Aux 9-10 Outputs have their own dedicated output section and are always controlled by linear faders.

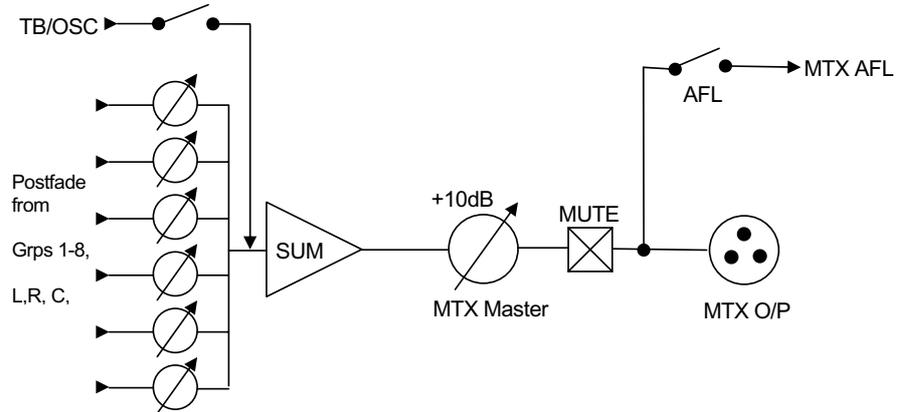
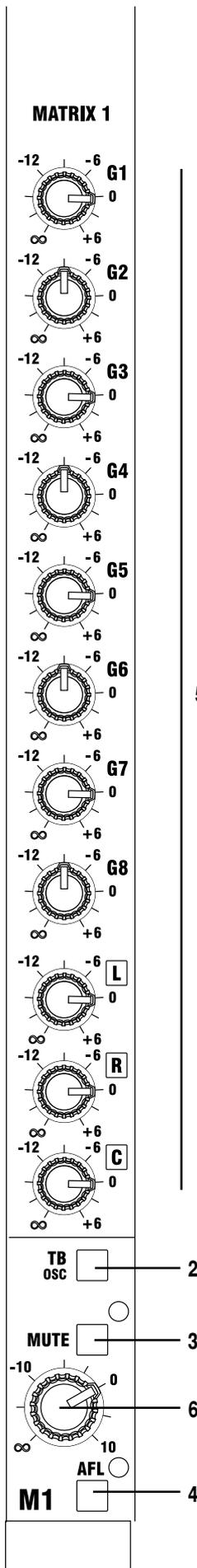
Each fader (1) feeds the Aux signal to balanced rear-panel XLR outputs. There is a pre-fade insert point with separate jacks, and TB (osc)(2), Mute (3) and AFL (4) buttons are provided.

The 12-segment LED bargraph meters (5) at the top of the section normally meter the Monitor LR Outputs, but can be switched to meter the Aux 9-10 Outputs by pressing the AUX 9-10 button (6) below the meters.

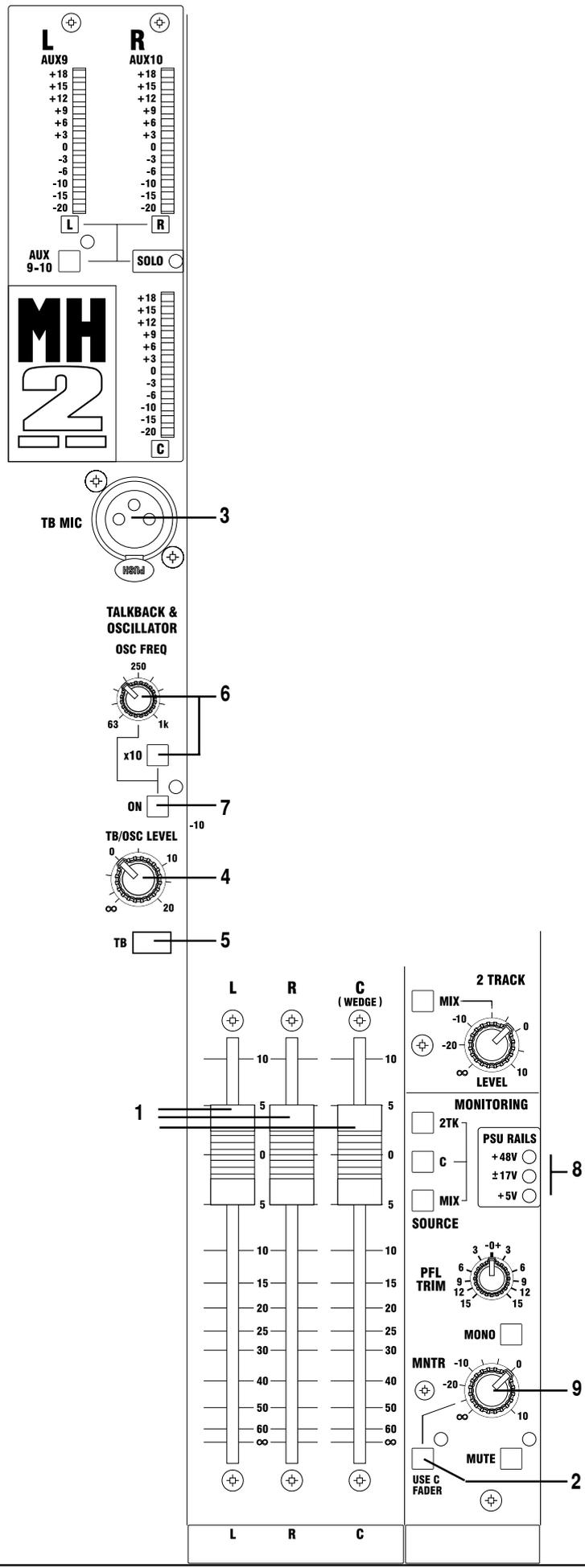
The Aux 9-10 Outputs are intended for use as a stereo in-ear monitor send, and for this reason a 4-band equaliser section is provided, allowing a degree of sweetening of the in-ear mix. The EQ section is stereo, and when it is switched in by the EQ switch (7) affects both Aux 9 and Aux 10 output signals. Four fixed-frequency bands are provided with shelving LF (8) and HF (9) sections and two peak/dip mid sections (10)(11).



Matrix 1-4 Output Section



An 11x4 Matrix section is located above and to the right of the Aux 9-10 Outputs. Each of the 4 Outputs has a rotary master fader **(1)**, with TB (osc)**(2)**, Mute **(3)**, and AFL **(4)** buttons, and 11 receive knobs **(5)** which control the mix levels fed to that Matrix Output from each of the 8 Groups and the L,R and C main outputs. The Matrix Output signal itself appears on a balanced XLR on the rear panel.



Master Section

The Master section contains the main L, R and C output faders, a sine wave test oscillator, and internal talkback functions. This section also contains the monitor outputs, 2-Track return and monitor source controls.

Main Output Faders

Three 100mm high quality faders **(1)** control the Stereo Mix Left and Right and Centre (Mono) Mix output levels. These are fed to balanced XLRs on the rear panel. The Centre fader can be used to control the 'Monitors' level for feeding wedges in a stage monitor application by pressing the 'Use C Fader' button **(2)**. The Centre output level will then be controlled by the rotary MNTR control.

Record Output

The Record output is an additional buffered feed from the post-fade Mix L and R outputs, available on 1/4" jacks on the rear panel

Insert Points

Pre-fade MIX L, R and C (mono) insert points use balanced sends and returns on separate 1/4" jacks on the rear panel.

Talkback and Oscillator section

The talkback and oscillator sections share a common set of TB OSC routing buttons, allowing them to access any of the Fader-controlled outputs and the Matrix outputs.

The talkback section has a front panel XLR **(3)** for mic input, with adjustable gain from 20-50dB **(4)**. The level control is shared with the oscillator. The talkback section cannot be used whilst the oscillator is switched on.

The mic signal can be routed to selected internal busses, by pressing the TB button **(5)** together with the appropriate TB OSC button(s).

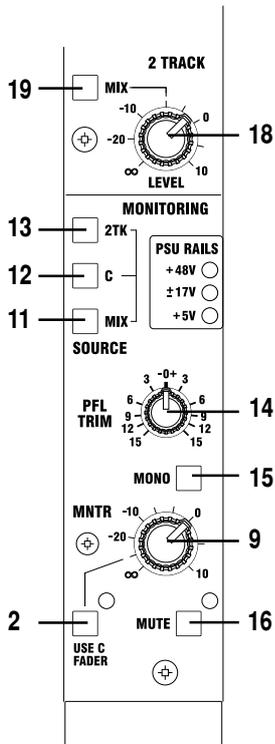
The Oscillator generates a sine wave tone, from 63Hz to 10kHz **(6)**. It shares its level control **(4)** with the talkback section, but the oscillator overrides the talkback section if both are activated together. It is routed to internal console busses by pressing the ON switch **(7)** and the local TB OSC switches on the desired output.

PSU Status Indicators

Three red PSU Status LEDs **(8)** indicate normal PSU rail operation.

Monitor and Headphones Outputs

Separate level controls (**9 & 10**) are provided for engineer's monitor speakers and headphones. The signal source for these outputs is common and can be selected from the post-fade MIX signal (**11**), the Centre (mono) MIX signal (to both L and R outputs)(**12**), or the 2TK replay inputs (**13**), and may be summed by simultaneous selection if required. These sources are automatically overridden by an input or output solo signal. The level of the PFL signal can be adjusted by +/-15dB using the PFL TRIM control (**14**).



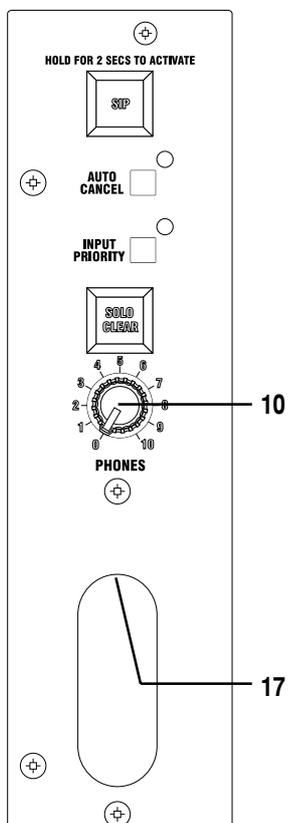
The Monitor level can be controlled by the Centre Output master fader, for stage monitor applications, by pressing the 'Use C Fader' button (**2**) adjacent to the rotary control. In this case the Centre Output is fixed at unity gain (it is assumed that the C output will not be used in the monitor application).

The stereo Monitor/phones signal can be summed to mono if required by pressing the MNO button (**15**), and can be muted by pressing the MUTE switch (**16**).

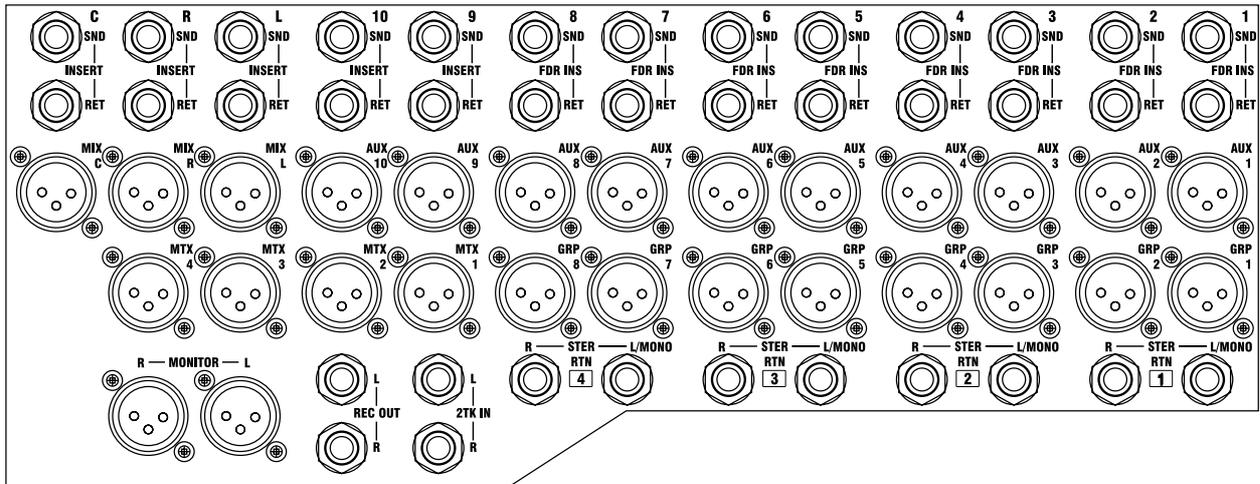
The headphones output socket is a stereo 1/4" jack (**17**), discretely mounted in a recessed socket in the fader panel fascia; the phones Volume control (**10**) is located adjacent to the socket. The headphone amplifier has a high power capability: use caution when connecting headphones to avoid damage to your hearing.

2-Track Replay Input

For replay of stereo tape, CD or Minidisc sources, a rotary level control (**18**) adjusts the signal level from the balanced 1/4" jack stereo inputs. These can either be routed to the MIX bus with the MIX switch (**19**), or monitored on the monitor/phones outputs as described above.



Master Section Rear Connector Panel



Input and Output Levels –Output and Master Section

INSERT SENDS (Impedance Balanced)

nominal level 0dBu
 maximum output level +21dBu into 2Kohms
 output impedance <75ohms

GROUP/AUX, MNTR L/R Outputs (Impedance balanced)

nominal level 0dBu
 maximum output level +21dBu into 2Kohms
 output impedance <75ohms

MIX L/R, CENTRE Outputs (Electronically balanced)

nominal level 0dBu
 maximum output level +21dBu into 2Kohms
 output impedance <75ohms

INSERT RETURNS, FX RETURN INPUTS, (electronically balanced)

sensitivity 0dBu
 maximum i/p level +26dBu
 input impedance >10K balanced

2TK L,R Input

sensitivity 0dBu
 maximum i/p level +21dBu
 input impedance >10K balanced

TB Mic Input (Electronically Balanced Inputs)

Nominal level: -50 to 0dBu
 Maximum Input level +6dBu
 Input impedance 900R

Headphones Output (Unbalanced)

Nominal level: 0dBu
 Maximum output level: +21dBu into 50 ohms
 Output Impedance: <50 ohms

Rear Connectors

INSERT SENDS, INSERT RETURNS (1/4" TSR Jack)

Tip Signal Hot
Ring Signal Cold
Sleeve Ground

GROUP/AUX, MIX L/R, CENTRE, OSC, MNTR L/R Outputs (3 pin male XLR)

Pin 1 Ground
Pin 2 Signal Hot
Pin 3 Signal Cold

TB Mic Input (3 pin female XLR)

Pin 1 Ground
Pin 2 Signal Hot
Pin 3 Signal Cold

Phones Output (1/4" TSR jack) (located on mute group master panel in fader section)

Tip Left
Ring Right
Sleeve Ground

VCA Master Faders

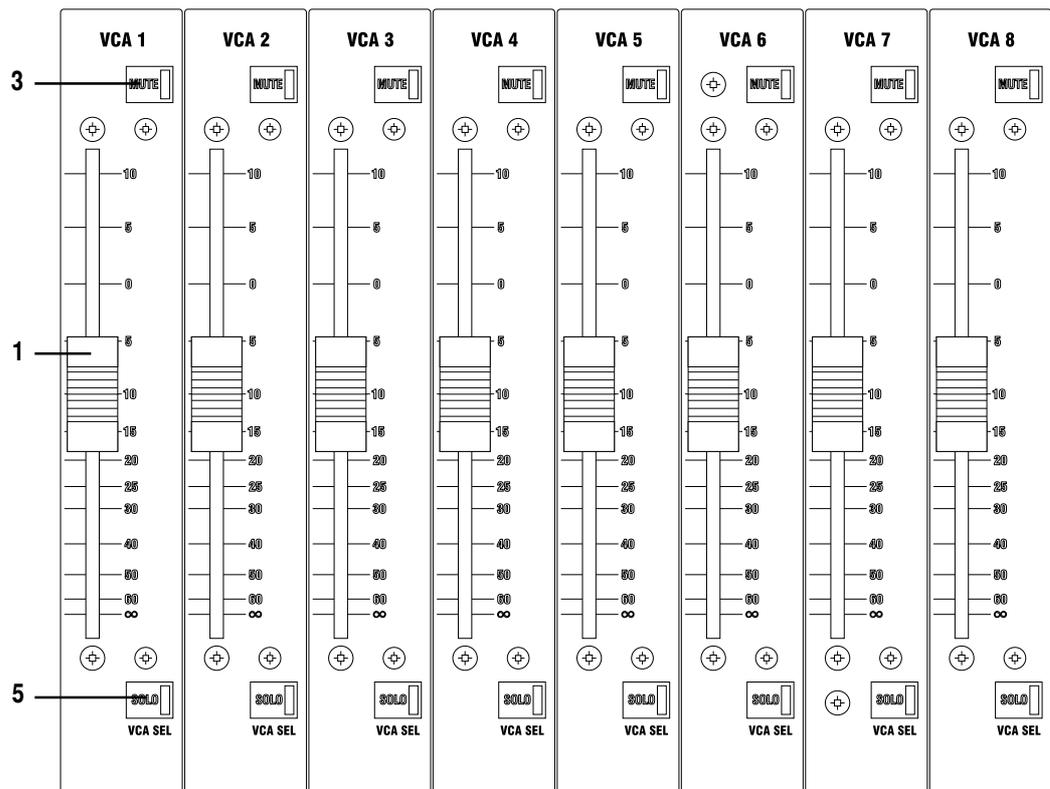
The fader area below the output and master modules contains the master faders and Mute and SOLO switches for the 8 VCA groups. The SOLO switches are also used for programming VCA assignments, when the console is in VCA Assign mode.

The **VCA master fader (1)** controls the levels of any channel VCAs assigned to that group.

The **VCA MUTE** switch (2) triggers a Mute condition on any input channels assigned to that VCA group. The Mute switch LED on the inputs flashes at approx 2Hz to differentiate VCA mute from Mute Group or Scene mutes.

The **VCA SOLO** switch (3) acts as a remote control for the SOLO switches on any input channels that are assigned to the VCA. However, whereas the normal solo mode for inputs is PFL, soloing from a VCA master will automatically change this to a stereo AFL solo. If SIP is activated via the master, soloing the VCA master generates a normal SIP solo from the inputs assigned to that group (ie: all other inputs are muted). Note that SIP is a destructive solo, and should not be used during a performance.

The VCA SOLO switch is also used to assign inputs to VCA groups. The VCA ASSIGN mode switch is first pressed (located to the right of the VCA master faders). The VCA SOLO switch is then pressed on the one or more VCA masters to which it is necessary to assign inputs. When the AFL switches on input channels are now pressed, those inputs will be assigned to the chosen VCA master(s), and their VCA Assign LEDs will display this assignment. To clear assignments, all VCA master SOLO buttons are turned off, and when the input AFL buttons are pressed, the assignments are cleared.



Assignment controls

VCA ASSIGN

The VCA ASSIGN switch selects VCA Assign mode. To assign channels to VCAs, first press the VCA Assign Mode switch, then the SOLO buttons on one or more VCA master faders -these SOLO buttons start flashing. Then press the SOLO buttons of any channels required to be part of those groups. The VCA Assign LEDs on the channels illuminate to indicate the assignment. The assignments can be deselected by a second press on the channel SOLO button -this then acts like a toggle for assigning and de-assigning. When finished, press the VCA Assign mode switch again to turn off the flashing and lock the assignments. (This will happen automatically if no solo buttons are pressed for a period of 20 seconds.)

To deselect any individual assignment, repeat the procedure for assigning to the VCA is question: pressing the channel SOLO switch on a channel which already is assigned to the selected VCA, will de-assign it.

To clear all assignments from a particular channel, enter VCA ASSN mode, but do not select any VCA master solos. Pressing input Solos in this condition will clear all the assignments from those inputs.

VCA ASSIGN & MUTE GROUP CONTROL

TO ASSIGN VCA
PRESS 'VCA ASSIGN'
PRESS SOLO BELOW REQ'D VCA MASTER FADER(S)
PRESS SOLOS ON REQ'D INPUTS
Deselect 'VCA ASSIGN' MODE

TO SET MUTE SAFES
PRESS 'EDIT SAFES'
PRESS MUTES TO CHANGE STATUS
Deselect 'EDIT SAFES' MODE

TO PREVIEW/ EDIT MUTES
PRESS 'PREVIEW MUTES'
PRESS REQ'D MUTE GROUP
PRESS MUTES TO CHANGE STATUS
STORE CHANGES (SEE BELOW)
Deselect 'PREVIEW MUTES'

TO STORE A MUTE GROUP
SET INPUT CHANNEL MUTES
PRESS AND HOLD 'STORE'
PRESS AND RELEASE MUTE GROUP
RELEASE 'STORE'
THE CURRENT MUTE STATUS IS IN THE SELECTED MUTE GROUP

TO CLEAR A MUTE GROUP
ENSURE NO INPUT MUTES ARE ACTIVE
PRESS AND HOLD 'STORE'
PRESS AND RELEASE MUTE GROUP
RELEASE 'STORE'

MUTE GROUPS

MH 2

EDIT SAFES

EDIT SAFES mode allows the MUTE buttons on inputs and outputs to be used to set those channels into SAFE mode. This means that their mutes will not be affected by any mute group, VCA mute or solo in place mute, but can still be manually muted. The SAFE/PREVIEW LED adjacent to the MUTE switches will illuminate steadily to show that the mute is in SAFE mode. Putting a channel into Mute Safe will also unmute the channel, if it is muted as a result of anything except a manual press.

MUTE PREVIEW

MUTE PREVIEW mode allows checking of the mute contents of a mute group, in the following way. When Preview mode is active, recalling a mute group will display the muted status of that mute group by flashing the SAFE/PREVIEW LED, instead of actually muting the channel. In addition, pressing the MUTE switches can be used to edit the recalled mute group, and it can then be re-stored or overwritten to the current mute group, or another one. Pressing the Mute Preview switch will toggle in and out of preview mode.

Note that the mute safe status of channels cannot be seen whilst Mute Preview mode is active because the same LED is used.

No MIDI control to or from the console is possible when Preview Mode is active.

Mute Groups

Mute Group Master switches

Up to 6 Mute Groups can be created and controlled from the 6 Mute Master switches.

To store a Mute Group, first switch on the Channel Mutes required, then hold down the STORE switch immediately above the Mute Master switches and press the desired Mute Master switch.

Mute Groups can be set up, edited and tested in Preview mode, the procedure is the same, the only difference is that pressing the Mute switches will not actually mute the channels, and the Mute status will be shown on the flashing preview LEDs, rather than the switches themselves.

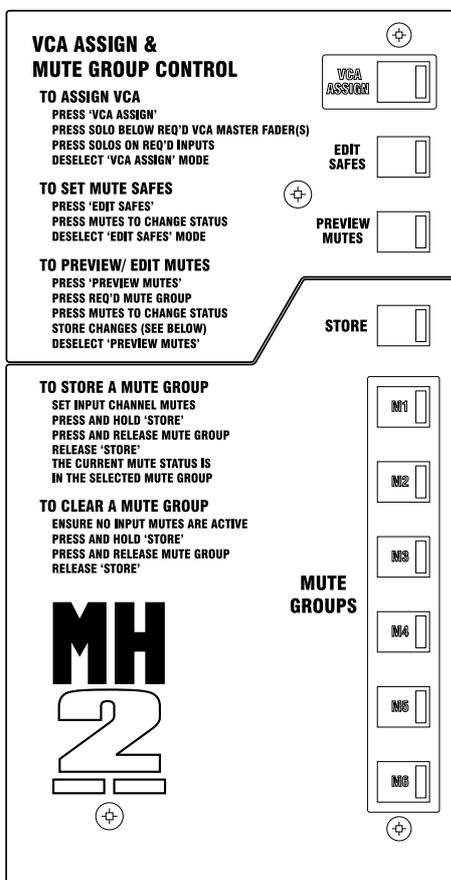
The following notes apply to Mute Groups:

Channels will not mute if they are Safe.

They will not unmute if they are also Muted as the result of another active Mute Group or VCA Group, or if they have been manually muted.

A Mute Group Master will not activate if no channels have been assigned to it or all its members are safed.

An active Mute Group will be automatically deactivated if at any point all its members are made safe, if all its members are unmuted, or if it is made to have no members.



Power Down Settings

The following settings are saved to EPROM on power down and will be restored when the console is powered back up:

- Active mutes
- Manual mute status
- Active Mute Groups
- Active VCA Groups
- VCA Assign Membership
- Active safes
- Output AFL 'pairing'

Clearing The Internal Memory

This procedure clears out all data from the internal memory and restores factory default settings. It is useful for quickly clearing down all VCA and Mute Group assignments, in readiness for a new job. The following settings will be cleared:

- All VCA assignments
- All Mute Group assignments
- Mute Safe settings
- Output Solo pairings.

Press and hold down VCA ASSIGN + EDIT SAFES + PREVIEW MUTES then switch the console power supply off and then on again. Continue holding the three switches for 10 seconds after switching on.

MH2 Typical Specifications

MH2 Specification

	Module	Signal	Conn.	Pin	Nom Level	Max Level	Impedance
Inputs	Mono Input	Input	Female XLR	Pin 1 - Ground Pin 2 - Signal Hot Pin 3 - Signal Cold	-60 to -15dBu -40 to +5dBu (switched range)	+26dBu	>2k Ω
	Stereo Input	STE IN (Left & Right)	Female XLR		-60 to -15dBu -40 to +5dBu (switched range)	+26dBu	>2k Ω
	Master	TB Mic I/P	Female XLR	Pin 1 - Ground Pin 2 - Signal Hot Pin 3 - Signal Cold	-50 to 0dBu	0dBu	900 Ω
		2-TK Returns (L & R)	TRS (1/4" Jack)	Tip - Signal Hot Ring - Signal Cold Sleeve - Ground	0dBu	+21dBu	>10k Ω
Insert points	Mono Input	Channel Snd & Ret	TRS (1/4" Jack)	Tip - Signal Hot Ring - Signal Cold Sleeve - Ground	Send 0dBu	+21dBu (into 2k Ω)	Send <75 Ω Return >15k Ω
	Group/Aux Master	Group/Aux Snd & Ret			Return 0dBu	+21dBu	Send <75 Ω Return >15k Ω
	Output Master	Main L, R & C Snd & Ret					
Outputs	Mono Input	Direct Output	TRS (1/4" Jack)	Tip - Signal Hot Ring - Signal Cold Sleeve - Ground	0dBu	+21dBu (into 2k Ω)	<75 Ω
	Main Mix	L/R/C Outputs	Male XLR	Pin 1 - Ground Pin 2 - Signal Hot Pin 3 - Signal Cold	0dBu	+21dBu (into 2k Ω)	<75 Ω
	Group/Aux Master	Group/Aux Output	Male XLR		0dBu	+21dBu (into 2k Ω)	<75 Ω
	Matrix	Matrix Output	Male XLR		0dBu	+21dBu (into 2k Ω)	<75 Ω
	Other	Headphones Output	TRS (1/4" Jack)		Tip - Left Ring - Right Sleeve - Ground	0dBu	+20dBu (into 600 Ω) 0dBu (into 8 Ω)
		Monitor Outputs L & R	Male XLR	Pin 1 - Ground Pin 2 - Signal Hot Pin 3 - Signal Cold	0dBu	+21dBu (into 2k Ω)	<75 Ω
		Record Outputs L & R	TRS (1/4" Jack)	Tip - Signal Hot Ring - Signal Cold Sleeve - Ground	0dBu	+21dBu (into 2k Ω)	<75 Ω

MH2 Typical Specifications

Frequency Response

XLR input to any output +0/-1dB, 20Hz-20kHz

T.H.D. & Noise

All measurements at 0dBu

XLR in to Mix Out <0.03% @1kHz

<0.03% @10kHz

Mic Input E.I.N.

<-128dBu (150 Ohm source)

22Hz-22kHz bandwidth, unweighted

Residual Noise

-90dBu

Mix Output; no inputs routed, Mix fader @0dB

Bus Noise

Mix Output, input faders @ -∞, Mix fader 0dB

48 channels routed <-83dBu

Grp Output, input faders @ -∞, Grp fader 0dB

48 channels routed <-82dBu

Aux Output, input sends @ -∞, Aux fader 0dB

48 channels routed <-84dBu

Crosstalk

1kHz, +20dBu input signals

Input Channel Muting >95dB

Input fader cutoff >90dB

Input pan pot isolation >75dB

Mix routing isolation >90dB

Group routing isolation >90dB

Aux send off >80dB

CMRR

>84dB @ 1kHz

Mono input

Input & Output Levels

Mic Input +26dBu max

Balanced Inputs +21dBu max

Balanced Outputs +21dBu max

Nominal Operating Level 0dBu

Input & Output Impedances

Mic Input >2kΩ

All other inputs >10kΩ

Headphone Output 25Ω

Recommended headphone impedance 50-600Ω

All other Outputs <75Ω

Oscillator

63Hz to 10kHz, variable level

HP Filter (Mono Input)

30-400Hz, 12dB per octave

EQ (Mono Input)

HF: 1.2kHz-20kHz, +/-15dB, shelving

Hi-Mid: 750Hz-13kHz, +/-15dB, Q=1.5

Lo-Mid: 75Hz-1.3kHz, +/-15dB, Q=1.5

LF: 30Hz-500Hz, +/-15dB, shelving

Metering

12-segment LED bargraphs for all inputs.

12-segment LED bargraphs for 8 Fader-controlled Outputs, plus LR & C. Aux 9/10 metered via the LR meters.

Power Consumption

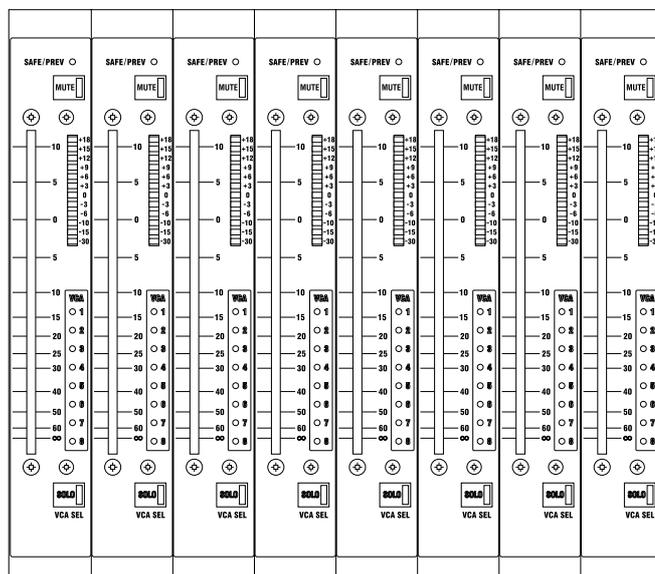
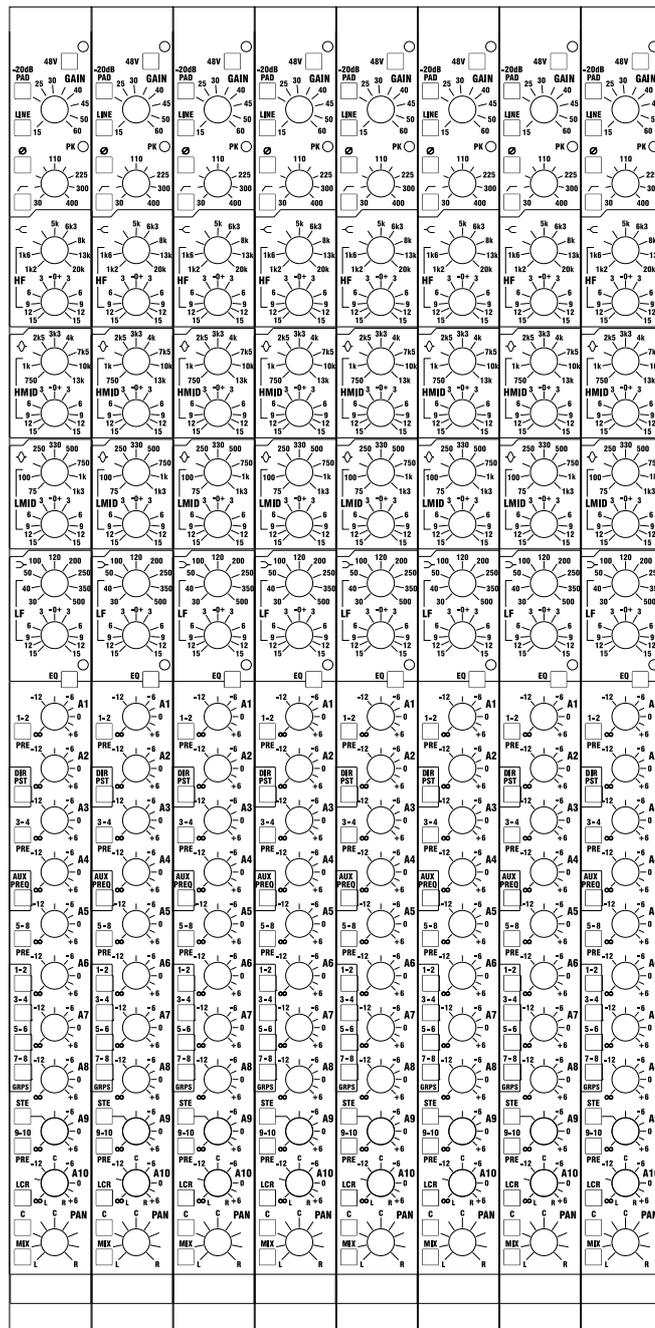
Mains Power: 48ch: 300W max

Operating Conditions

Temperature Range -10°C to +30°C

Relative Humidity 0% to 80%

Mark-up Sheets



STE1	STE2	STE3	STE4

G1 AUX1	G2 AUX2	G3 AUX3	G4 AUX4	G5 AUX5	G6 AUX6	G7 AUX7	G8 AUX8
MUTE							
FADER							
PFL							
C	C	C	C	C	C	C	C
MIX							
AUX 9-10							
FDR 1-2	FDR 3-4	FDR 5-6	FDR 7-8				
STE RET 1		STE RET 2		STE RET 3		STE RET 4	
A1 GRP1	A2 GRP2	A3 GRP3	A4 GRP4	A5 GRP5	A6 GRP6	A7 GRP7	A8 GRP8
MUTE							
AFL							
GRP/AUX ON FDR							
C	C	C	C	C	C	C	C
MIX							
PAN							
L	L	L	L	L	L	L	L
R	R	R	R	R	R	R	R
TB OSC							
MUTE							
AFL							
10	10	10	10	10	10	10	10
5	5	5	5	5	5	5	5
0	0	0	0	0	0	0	0
5	5	5	5	5	5	5	5
10	10	10	10	10	10	10	10
15	15	15	15	15	15	15	15
20	20	20	20	20	20	20	20
30	30	30	30	30	30	30	30
40	40	40	40	40	40	40	40
50	50	50	50	50	50	50	50
60	60	60	60	60	60	60	60
70	70	70	70	70	70	70	70
80	80	80	80	80	80	80	80
90	90	90	90	90	90	90	90
100	100	100	100	100	100	100	100
1	2	3	4	5	6	7	8
GRP / AUX							

L AUX9	R AUX10	MATRIX 1	MATRIX 2	MATRIX 3	MATRIX 4
MUTE	MUTE	M1	M2	M3	M4
AFL	AFL	AFL	AFL	AFL	AFL
10	10	10	10	10	10
5	5	5	5	5	5
0	0	0	0	0	0
5	5	5	5	5	5
10	10	10	10	10	10
15	15	15	15	15	15
20	20	20	20	20	20
30	30	30	30	30	30
40	40	40	40	40	40
50	50	50	50	50	50
60	60	60	60	60	60
70	70	70	70	70	70
80	80	80	80	80	80
90	90	90	90	90	90
100	100	100	100	100	100
9	10	L	R	C	MIX
AUX	AUX	L	R	C	MIX

STEREO EQ
HF 12k, HMID 2.5k, LMID 450, LF 60

TALKBACK & OSCILLATOR
OSC FREQ, TB OSC, TB OSC LEVEL

MONITORING
PSU RAILS (+48V, +17V, +5V), SOURCE, PFL TRAIN, MONO, MIXTR, MUTE, USE C FADER

VCA 1	VCA 2	VCA 3	VCA 4	VCA 5	VCA 6	VCA 7	VCA 8
MUTE							
10	10	10	10	10	10	10	10
5	5	5	5	5	5	5	5
0	0	0	0	0	0	0	0
5	5	5	5	5	5	5	5
10	10	10	10	10	10	10	10
15	15	15	15	15	15	15	15
20	20	20	20	20	20	20	20
30	30	30	30	30	30	30	30
40	40	40	40	40	40	40	40
50	50	50	50	50	50	50	50
60	60	60	60	60	60	60	60
70	70	70	70	70	70	70	70
80	80	80	80	80	80	80	80
90	90	90	90	90	90	90	90
100	100	100	100	100	100	100	100
VCA SEL							

VCA ASSIGN & MUTE GROUP CONTROL

TO ASSIGN VCA
PRESS 'VCA ASSIGN'
PRESS 'VCA ASSIGN' (PRESS SOLO BELOW REQ'D VCA MASTER FADER(S))
PRESS SOLO ON REQ'D INPUTS
DISELECT 'VCA ASSIGN' MODE

TO SET MUTE SAFES
PRESS 'MUTE SAFES'
PRESS MUTES TO CHANGE STATUS
DISELECT 'MUTE SAFES' MODE

TO PREVIEW / EDIT MUTES
PRESS 'PREVIEW MUTES'
PRESS REQ'D MUTE GROUP
PRESS MUTES TO CHANGE STATUS
STORE CHANGES (SEE BELOW)
DISELECT 'PREVIEW MUTES'

TO STORE A MUTE GROUP
SET INPUT CHANNEL MUTES
PRESS AND HOLD 'STORE'
PRESS AND RELEASE MUTE GROUP
RELEASE 'STORE'
THE CURRENT MUTE STATUS IS IN THE SELECTED MUTE GROUP

TO CLEAR A MUTE GROUP
ENSURE NO INPUT MUTES ARE ACTIVE
PRESS AND HOLD 'STORE'
PRESS AND RELEASE MUTE GROUP
RELEASE 'STORE'

MUTE GROUPS
M1, M2, M3, M4

PHONES

MIDI Implementation

Mutes

The MH2 does not have built-in mute scene automation, but incorporates direct MIDI control of channel mutes using MIDI note messages. This can be used with some types of external Show Control software to generate externally-stored mute scenes. When mutes are manually pressed, note data is transmitted on MIDI channel 16, and this data can be recorded into the external PC running Show Control software. The software can then recall scenes by transmitting all the stored mute data back to the console in a compressed “packet” of MIDI note information.

It is possible to transmit and receive the note data in two different formats, depending on the requirements of the external software. The two formats are essentially the inverse of one another. In “Sampler Mode” (the factory default), a Note On message is transmitted when a mute is switched off (un-muted) and a Note Off message is transmitted when a mute is switched on (muted).

In “Sequencer Mode” the inverse is the case.

In both modes the note data is always transmitted and received on MIDI channel 16.

The mode can be changed by holding down the M2 Mute Group Master button during power up for 10 seconds. Repeating the procedure toggles the mode again. Once set, the mode will be memorised on future power cycles, unless changed again.

The mute control messages cannot be transmitted or received if the console is part of a BSS Varicurve MIDI Loop: see the next section.

MIDI Mute Tx

A MIDI mute On message will be transmitted on manually muting any channel. A MIDI Mute Off message will be transmitted on manually unmuting a channel.

MIDI Mute Rx

A received MIDI mute On message will mute a channel IF the channel was previously unmuted AND the channel is not safed. A received MIDI mute Off message will unmute a channel IF the channel was previously muted due to a MIDI mute only.

Sampler Mode

This is called sampler mode because the Note format allows Samplers to play samples triggered by the Mute going Off. These events are NOT easily viewed recorded into a sequencer. The transmit & Receive message format is:

Pressing Mute switches transmit Note On (for Mute Off) or Note Off (for Mute On) messages, whose velocity determines the Mute state.

The message format is:

<<Note On or Off>><<Console Channel>><<Velocity>>

where

<<Note On>>	= 9FH (i.e. Mute Off, MIDI Chan 16)
<<Note Off>>	= 8FH (i.e. Mute On, MIDI Chan 16)
<<Console Channel>>	= 00H-07H Mono Input 1 - 8
	= 08H-0FH Mono Input 9 - 16
	= 10H-17H Mono Input 17 - 24
	= 18H-1FH Mono Input 25 - 32
	= 20H-27H Mono Input 33 - 40
	= 28H-2FH Mono Input 41 - 48
	= 40H-43H Stereo Input 1-4
<<Velocity>>	= 7F

The velocity is ignored on Rx i.e. any velocity will trigger the mute.

Sequencer Mode

This is called sequencer mode because the Note format allows the events to be viewed more easily when recorded into a sequencer. Pressing Mute switches transmits Note On messages whose velocity determines the Mute state. MIDI messages always transmitted when a mute is pressed.

The transmit & Receive message format is:

<<Note On>><<Console Channel>><<Velocity>>

where

<<Note On>> = 9FH (i.e. Note On, MIDI Channel 16)
<<Console Channel>> = (see above)
<<Velocity>> = 3F if Mute is OFF
= 7F if Mute is ON

For Rx, any velocity less than 3F is interpreted as a Mute OFF. Any velocity higher than 3F is interpreted as a Mute ON.<W1IVO>

Mute Groups

Activating/deactivating a Mute Group transmits no MIDI mute data for any associated changes in mute status.

VCA Master Mutes

Activating/deactivating a VCA Master Mute transmits no MIDI mute data for any associated changes in mute status.

Safe On/Off

Activating/deactivating Safe On/Off transmits no MIDI mute data for any associated changes in mute status.

SIP Associated Mutes

Activating/deactivating a SIP Mute transmits no MIDI mute data.

Solos

Because of special MIDI merge functionality required for interfacing to a BSS Varicurve, on booting up, the console will check if it is installed as part of a BSS Varicurve MIDI loop. It will determine this by checking for the BSS Varicurve sysex request message, which is transmitted every 200ms from the BSS Varicurve unit:

F0 00 20 18 7F 1F F7

If it detects this message on boot up, it will enter BSS Varicurve MIDI loop mode. If it does not detect this message on boot up, it will enter Normal MIDI mode. Normal MIDI mode is usually therefore the default mode.

BSS Varicurve MIDI Loop Mode

If a BSS Varicurve is detected, the console switches to this mode. The object is to enable the console AFL switches on output modules to remotely change the EQ page on the Varicurve remote, so as to ensure the correct EQ is always being viewed/adjusted and listened to.

When in this mode, no MIDI messages associated with channel mutes are transmitted/responded to. ALL data that is received by the console will be throughput straight to the MIDI output port, EXCEPT the BSS sysex request:

F0 00 20 18 7F 1F F7

which will be REPLACED with the message

F0 00 20 18 7F 20 AFL F7

where AFL = last output AFL soloed (0x000x1C for output solos 128) or = 0x7F if no output has been soloed since the last BSS sysex request was serviced.

This allows the BSS Varicurve unit to update its display to show the last soloed AFL. Attempting to install the console into a BSS Varicurve MIDI loop after the console has booted will not work the console must detect the presence of a BSS Varicurve MIDI loop

on boot up.

Normal MIDI Mode

If a BSS Varicurve MIDI loop is not detected on boot up, it will process/transmit MIDI automation data as normal.

The MIDI Channel for Transmit & Receive is fixed at channel 16. Running status is also supported for Rx. There are two modes: Sampler (default) & Sequencer Mode. This can be set by pressing and holding Mute Group Master 2 on Boot-up.

MIDI Solo Rx

On reception of the message (from a dbx Driverack 480 unit)

F0 39 04 7F 20 AFL F7

where

AFL = output AFL (0x000x1C for output solos 128)

or

= 0x7F (Solo Clear)

the relevant AFL solo/Solo Clear will be activated.

MIDI Solo Tx

When an output solo is pressed, a sysex message directed to a dbx Driverack 480 unit is transmitted. This is transmitted in the form:

F0 00 01 1E 7F 7F 20 AFL F7

where

AFL=output AFL soloed (00-09 for Output Fader AFLs 1-10),

or

= 7F if last remaining soloed output solo is unsoloed

No message is transmitted on pressing an input solo/VCA solo. A message will not be transmitted if the solo was activated via an incoming Driverack message.

Channel Number / MIDI Note Number Listing

It is possible to transmit and receive the note data in two different formats, depending on the requirements of the external software. The two formats are essentially the inverse of one another. In "Sampler Mode" (the factory default), a Note On message is transmitted when a mute is switched off (un-muted) and a Note Off message is transmitted when a mute is switched on (muted).

In "Sequencer Mode" the inverse is the case.

In both modes the note data is always transmitted and received on MIDI channel 16.

The mode can be changed by holding down the M2 Mute Group Master button during power up for 10 seconds. Repeating the procedure toggles the mode again. Once set, the mode will be memorised on future power cycles, unless changed again.

Mono Input Chan	MIDI Notenumber	MIDI Notename	Stereo Input Chan	MIDI Notenumber	MIDI Notename
1	00	C -1	1	40	E 4
2	01	C# -1	2	41	F 4
3	02	D -1	3	42	F# 4
4	03	Eb -1	4	43	G 4
5	04	E -1			
6	05	F -1			
7	06	F# -1			
8	07	G -1			
9	08	G# -1			
10	09	A -1			
11	0A	Bb -1			
12	0B	B -1			
13	0C	C 0			
14	0D	C# 0			
15	0E	D 0			
16	0F	Eb 0			
17	10	E 0			
18	11	F 0			
19	12	F# 0			
20	13	G 0			
21	14	G# 0			
22	15	A 0			
23	16	Bb 0			
24	17	B 0			
25	18	C 1			
26	19	C# 1			
27	1A	D 1			
28	1B	Eb 1			
29	1C	E 1			
30	1D	F 1			
31	1E	F# 1			
32	1F	G 1			
33	20	G# 1			
34	21	A 1			
35	22	Bb 1			
36	23	B 1			
37	24	C 2			
38	25	C# 2			
39	26	D 2			
40	27	Eb 2			
41	28	E 2			
42	29	F 2			
43	2A	F# 2			
44	2B	G 2			
45	2C	G# 2			
46	2D	A 2			
47	2E	Bb 2			
48	2F	B 2			

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.