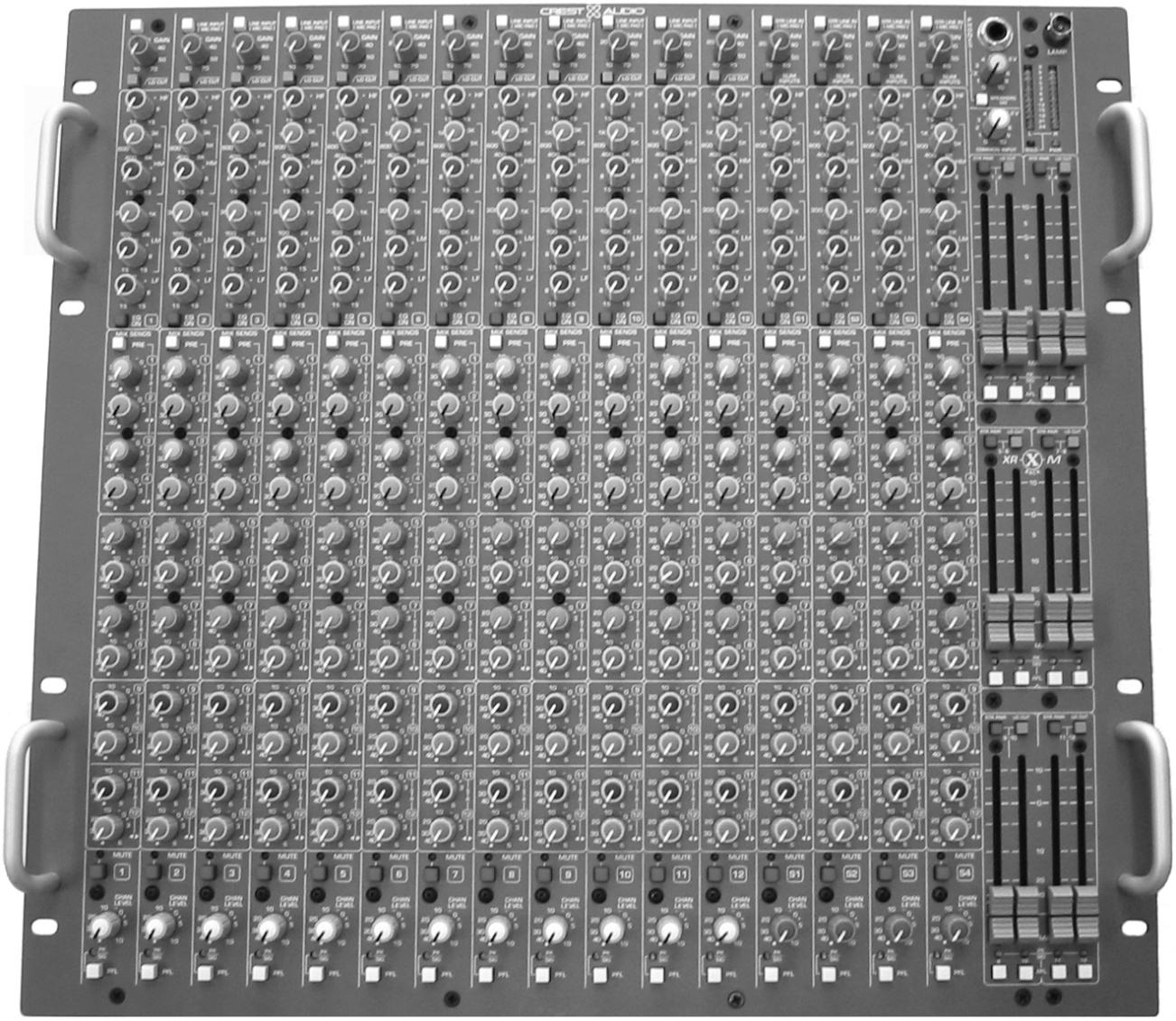
owner's manual

X-Rack rack mount mixers

XRM - 12 Output Monitor Mixer



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Important precautions

1 **Save the carton and packing materials!** Should you ever need to ship the unit, use only the original factory packing.

For replacement packaging, call Crest Audio's Customer Service Department directly.

2 **Read all documentation before operating your equipment.** Retain all documentation for future reference.

3 **Follow all instructions printed on unit chassis for proper operation.**

---

4 **Do not use the unit if the electrical power cord is frayed or broken.** The power supply cord should be routed so that it is not likely to be walked on or pinched by items placed upon or against it.

5 **Always operate the unit with the AC ground wire connected to the electrical system ground.** Precautions should be taken so that the means of grounding of a piece of equipment is not defeated.

6 **Damage caused by connection to improper AC voltage is not covered by any warranty.**

7 **Do not spill water or other liquids into or on the unit, or operate the unit while standing in liquid.**

8 **The power cord of equipment should be unplugged from the outlet when left unused for a long period of time.**

Service Information

Do not open unit!
Opening the unit will expose you to potentially dangerous voltages. There are no user serviceable parts inside.

Equipment should be serviced by qualified service personnel when:

A. The equipment has been exposed to rain.

B. The equipment does not appear to operate normally, or exhibits a marked change in performance.

C. The equipment has been dropped, or the enclosure damaged.

To obtain service:
contact your nearest Crest Audio Service Center, Distributor, Dealer, or Crest Audio at 201.475.4600 USA or visit www.crestaudio.com for additional information.

email techserve@crestaudio.com



This symbol is used to alert the operator to follow important procedures and precautions detailed in documentation.



This symbol is used to warn operators that uninsulated "dangerous voltages" are present within the equipment enclosure that may pose a risk of electrical shock.

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table of contents

Introduction

Thank you and congratulations on your purchase of your new Crest Audio X-Rack mixer. We're confident that you will enjoy many years of trouble-free service from it. You will quickly find that it fits into a wide variety of mixing applications with ease. Due to well thought out sets of features, coupled with intelligent circuit design and the highest standards in construction & workmanship, all Crest Audio console products excel above and beyond the competitor's products, in every area.

This owner's manual covers the XRM X-Rack mixer. The XRM has 12 Mono inputs and 4 Stereo inputs, adding up to a total of 20 microphone inputs. Each input can feed any of 12 outputs.

Please read this manual thoroughly and keep it handy for future reference. If you have any operating concerns that are not covered in this manual, or have application questions of any type, don't hesitate to contact Crest Audio directly either by phone, fax, or email. Here is our technical support contact information:
Phone: (201) 475-4600
Fax: (201) 475-4677
Email: techserve@crestaudio.com

Mono Input channels p. 7 — 1
Front panel controls and rear panel connections

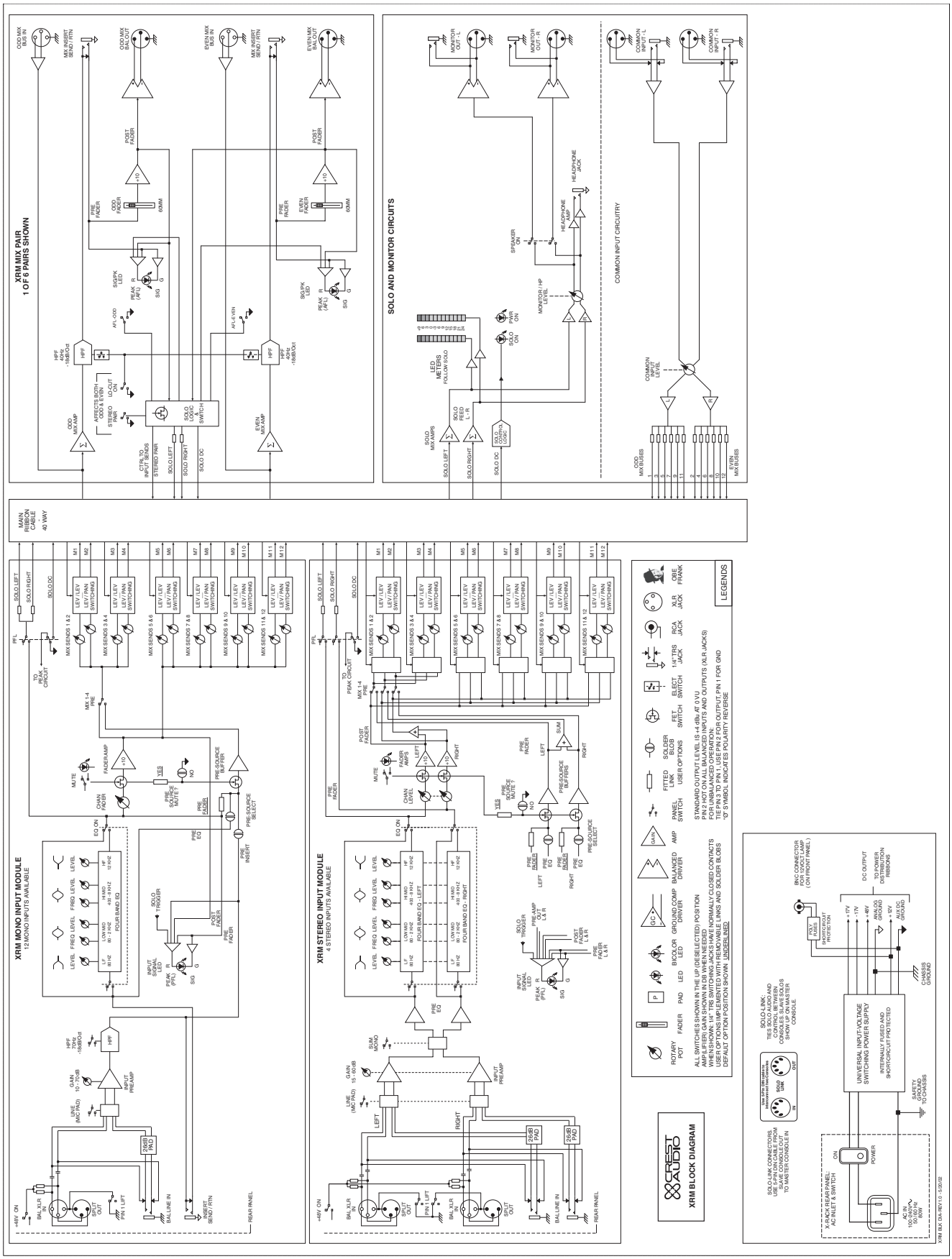
Stereo Input channels p.19 — 2
Front panel controls and rear panel connections

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Solo and Monitoring System, Output Masters.
Front panel controls and rear panel connectors.

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XRM block diagram



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format

This manual uses a format that is intended to be easy to read, yet technical for those who need to know all the details. For feature descriptions, this is done by devoting the left side of each page to 1) an overall module picture, 2) a block diagram, and 3) a control closeup. These images all pertain to the features and control descriptions on the right side of the page. The intention is to make the manual easy to read while including all the technical details needed for getting the most out of the X-Rack - a compact, flexible, feature-rich addition to Crest Audio's growing line of audio mixing console products.

conventions

Control Icons

This manual uses symbols to illustrate what the control descriptions are referring to. This makes it possible to avoid redundant wording and makes the control descriptions clear.


Switch in the UP, non-activated position

Switch in DOWN, activated position

Switch that illuminates when in the DOWN position


Momentary switch that illuminates when activated



LED that is on, indicating that it's associated feature is activated


Potentiometer



Standard 1/4" TRS jack (used for line level inputs)



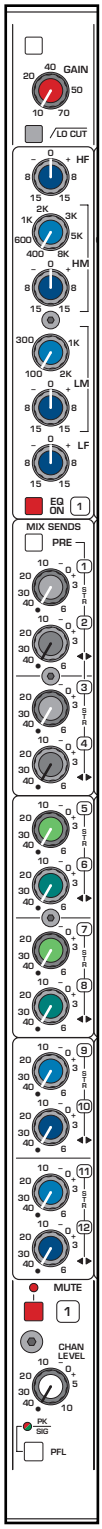
1/4" TRS jack with normal switching (used on inserts)


Female XLR input jack

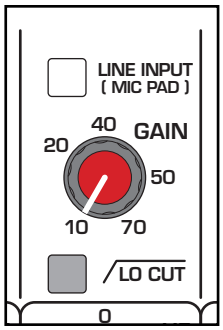

Male XLR output jack

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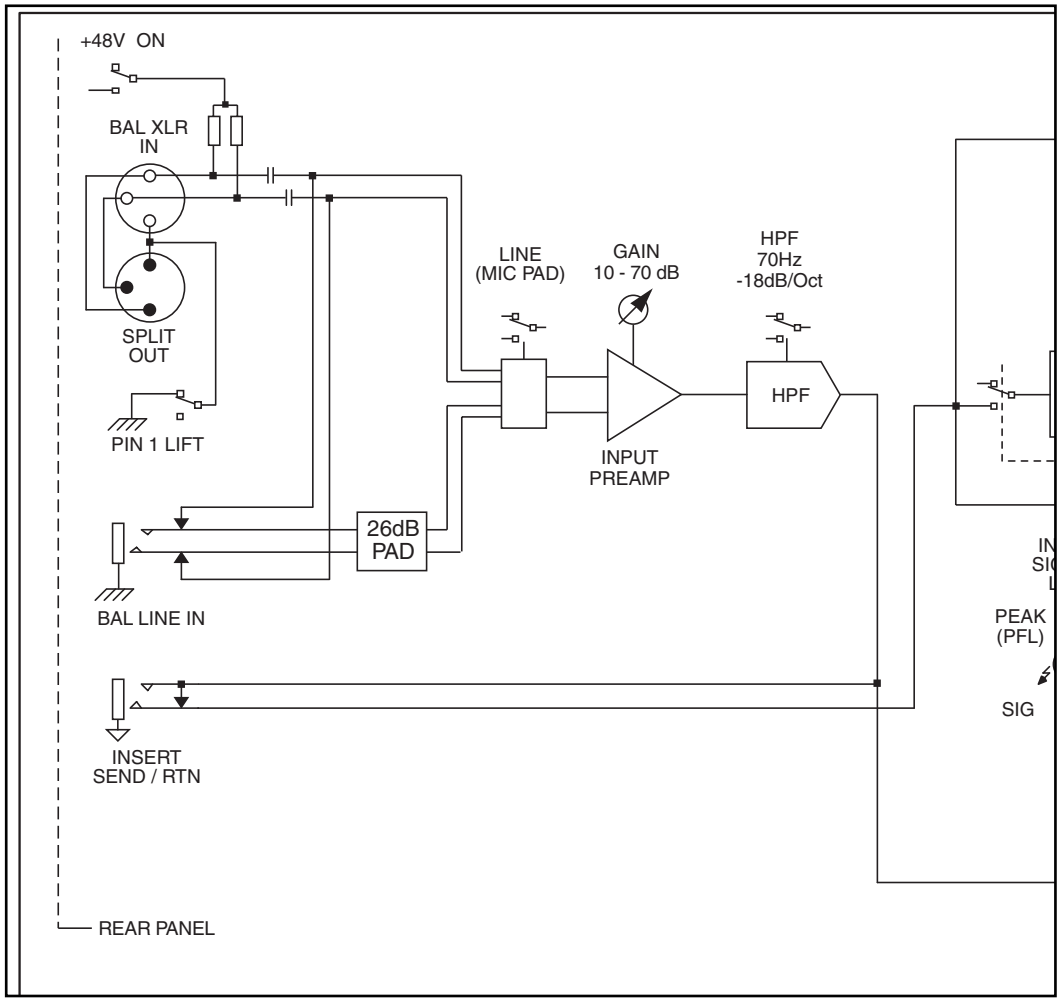
Module



Controls



Block diagram



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Front panel features

Line Input (Mic Pad)

With this switch in the UP position, the input preamp circuit is set up to accept a mic-level signal. This signal is brought in via the XLR mic-input connector located on the rear panel. The 1/4" TRS input jack is ignored.

When the switch is depressed, a Pad is inserted into the signal path and the input preamp circuit is set up to accept a line-level signal from either the XLR mic-input connector or the 1/4" TRS input jack, both located on the rear panel. The XLR signal is normal'd to the 1/4" TRS jack. If nothing is plugged into the TRS jack, the XLR signal is fed to the preamp when the LINE switch is pressed. Since the TRS signal is always padded down by 26dB, this feature allows the LINE switch to act as a PAD switch for bringing a very hot microphone signals down to a controllable level, avoiding overload. When a plug is inserted into the 1/4" TRS input jack, the XLR mic-input signal is disconnected and the signal present on the 1/4" plug is fed to the preamp. If plugs are inserted into both the XLR and TRS jacks, this switch acts as an input selector switch between the two jacks.

Gain

The Input gain control is used to establish proper gain structure in the channel. For best results, use the Solo system to monitor the channel while you set the gain. The goal is maximum gain without distortion. Both the main LED meters (during Solo) and the channel's Level/Peak indicator can be used for adjusting gain.

70 Hz Lo-Cut filter

This filter reduces or eliminates unwanted low frequencies without substantially affecting the program material. Quite often, such unwanted low frequencies are included with mic- or line-input signals. For example, stage rumble or wind can be picked up through vocal mics. The cut-off frequency of the filter is 70 Hz and the slope is -18dB per octave. This type of filter is also referred to as a Hi-pass filter (HPF). It allows the hi-frequencies to pass, but stops the lo-frequencies.

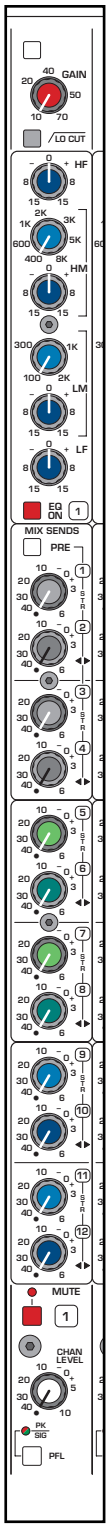
Lo Cut Switch

Lo-Cut filter is bypassed.

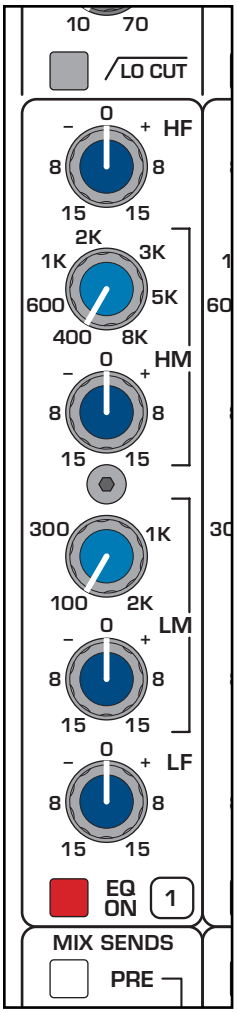
Lo-Cut filter is on.

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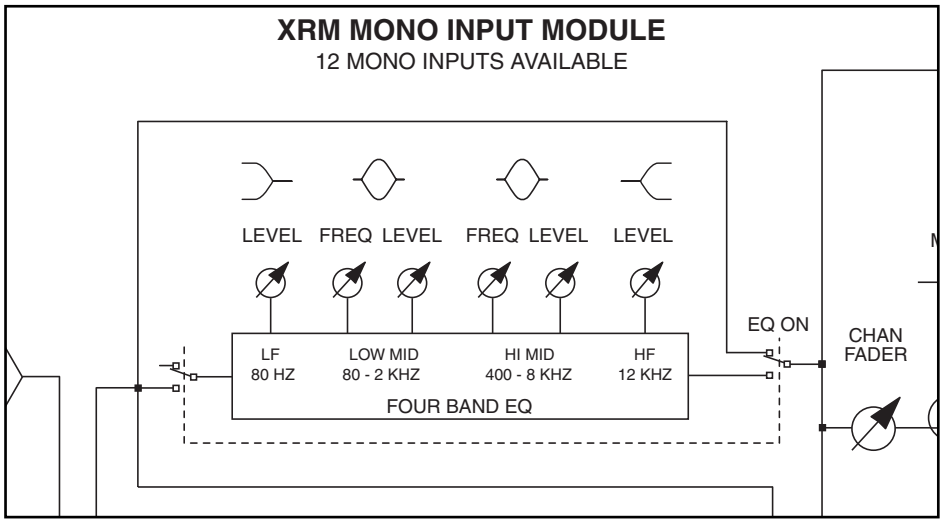
Module



Controls



Block diagram



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Front panel features

Equalizer (EQ)

Many audio signals coming into the console require some degree of corrective eq in order to be part of a good sounding mix. XRM offers a 4-Band EQ on each channel. The input EQ consists of the bands: High, High-Mid, Low-Mid and Low. The High and Low frequency bands are shelving equalizers, each have a boost/cut control and their frequencies are fixed. The High-Mid and Low-Mid bands have a bell-shaped response, each band features variable boost/cut and adjustable frequency.

high frequency—HF

Boost / Cut 15dB boost and cut. Shelving @ 12 kHz

high mid—HM

Frequency Continuously variable between 400 Hz and 8 kHz.

Boost / Cut 15dB boost and cut. Bell curve with a BW of approx 1.5 octaves

Low mid—LM

Frequency Continuously variable between 100 Hz and 2 kHz.

Boost / Cut 15dB boost and cut. Bell curve with a BW of approx 1.5 octaves

Low frequency—LF

Boost / Cut 15dB boost and cut. Shelving @ 80 Hz.

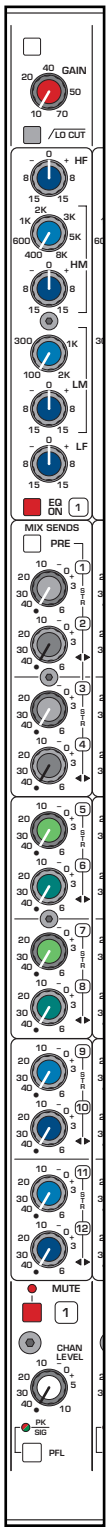
EQ on

Equalizer is OFF. The equalizer circuitry is bypassed.

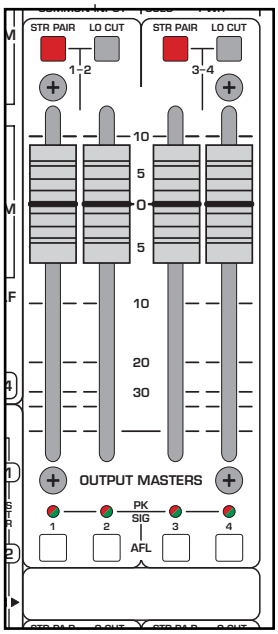
Equalizer is ON. This switch is used to activate the EQ section and can be used to make A/B comparisons between "flat" and eq'd signals.

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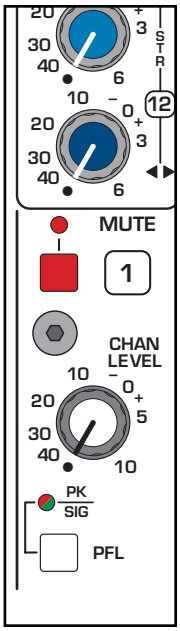
Module



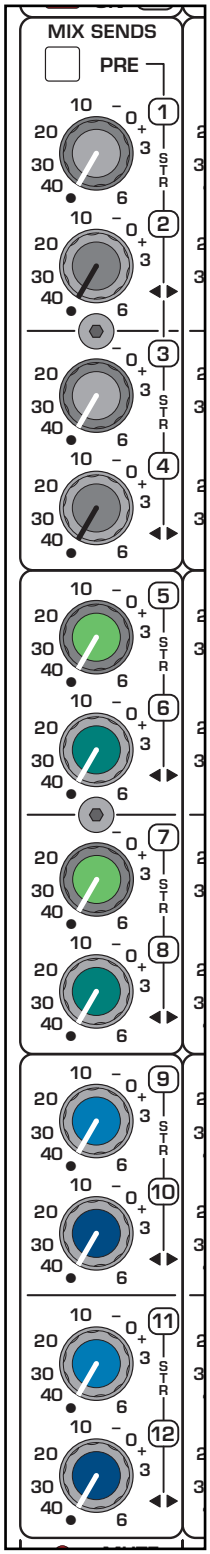
Master Faders



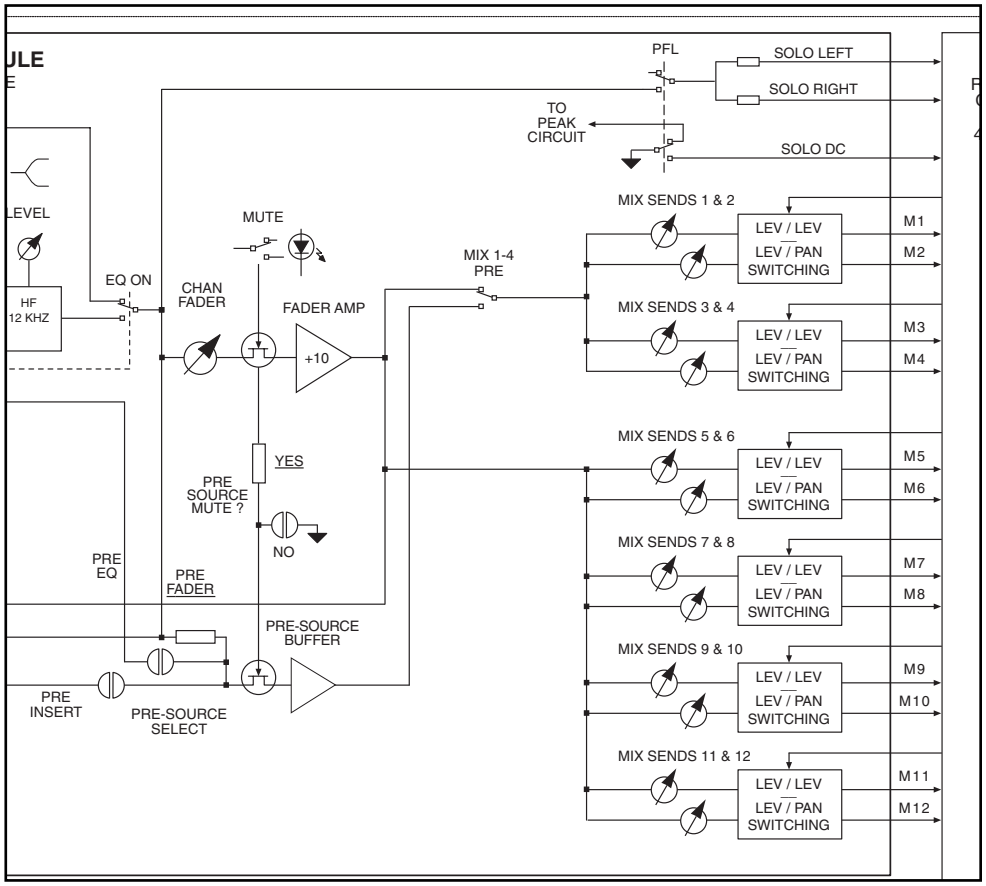
Chan Fader



Chan Sends



Block diagram



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Front panel features

Mix Send features

The XRM is capable of generating 12 mono mixes, 6 stereo mixes, or a combination of both mono and stereo mixes. Each of the six Odd/Even pairs of sends can be configured as a stereo pair- the Odd pot becomes the level control, the Even pot becomes the pan pot. The changeover to stereo operation is controlled by the STR PAIR switches located above the master faders. A LO CUT switch is also present for activating the hi-pass filter (40Hz, -18dB/oct) for each pair of mixes.

Mix 1 - 4 PRE

MIX Sends 1-4 are Post-Fader

MIX Sends 1-4 are Pre-Fader

Normally, the signal feeding the Mix Sends is derived after the main Chan Level Pot (Post-Fader). This Chan Level pot controls the level of the chan signal feeding the individual Mix Send pots. Each Mix Send pot is then used to generate a sub-mix of this channel signal. This Post-fader signal is also affected by the Mute switch; if the channel is muted, the Mix Send no longer receives a signal. There are some cases where an independent mix is desired, the operator doesn't want the Chan Level to affect the signal. On the XRM, Mixes 1 thru 4 can be switched to receive their signal PRE the Chan Level pot (Pre-fader). The default PRE setting for Mixes 1-4 is pre-fader, but it is still post-insert/post-EQ/post Mute. An internal jumper (per channel) can be changed so that the PRE setting becomes either pre-insert or pre-EQ. Another jumper allows this PRE setting to additionally be independent of the channel mute.

Mix Sends 1 & 2
Levels for Mixes 1 and 2 are controlled by this pair of knobs. In MONO mode, each knob controls the amount of chan signal that is sent to its corresponding mix bus. In Stereo Mode, the top knob controls the level to both buses and the bottom knob acts as a PAN control between the two buses- full CCW for Odd, full CW for Even.

STR PAIR sw in the UP position(located above Master Fader 1)

Knob 1: Send level for Mix 1

Knob 2: Send level for Mix 2

STR PAIR sw in the DOWN position

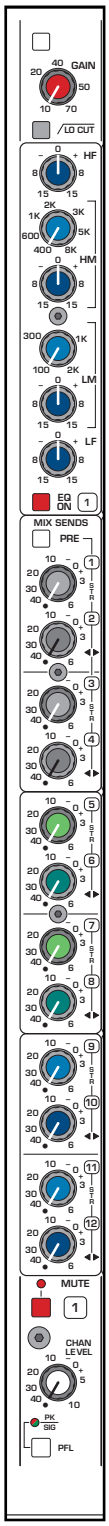
Knob 1: Send level for both Mix 1 and Mix 2

Knob 2: Pan control between Mix 1 and Mix 2

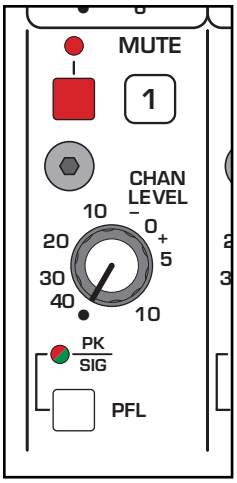
This Send arrangement is repeated for the remainder of the Mix Send pairs on the channel. Each pair's operation is controlled by its own STR PAIR switch located above the corresponding odd-numbered Master Fader.

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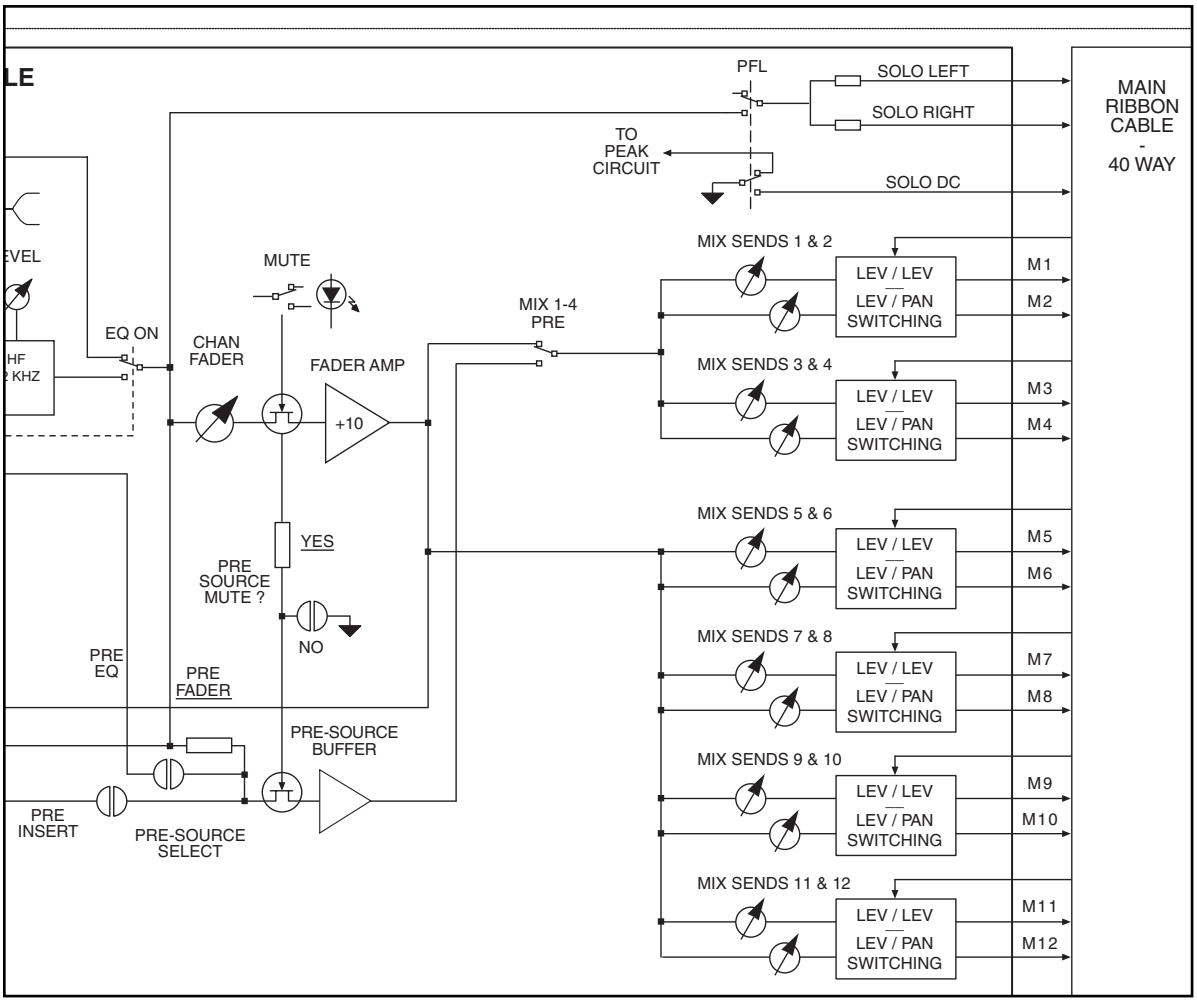
Module



Controls



Block diagram



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Front panel features

Channel Level and Control

This next set of controls allows the operator to control and monitor the overall level of the channel signal.

Mute Sw and LED
The Mute switch kills the channel signal and prevents it from feeding any Mix Send pots. The mute-element itself is a FET transistor, allowing for timed, ramped on-off control of the channel signal. This avoids any "pops and clicks" when muting a channel. Normally, the Mute will also affect the PRE signals of the channel (see Mix Send details). PRE can be selected for Mix Sends 1 thru 4, and is normally the Pre-fader channel signal. There are internal jumpers that allow the user to change the definition of this PRE signal on a channel by channel basis, or it can be specified at the time of order and reconfigured during the product build at the factory. The PRE signal can be changed from its normal Pre-Fader setting and redefined as either Pre-Insert or Pre-EQ. Additionally, the mute operation of the PRE signal can be changed from its default of "Follow Chan Mute" to "Ignore Chan Mute". Again, this chan by chan option can be done either by the user or by the factory at the time of order.

Mute Switch UP, LED OFF

 Channel is un-muted. Signal is allowed to pass (pre or post fader)to the Mix Send pots.

Mute Switch DOWN, LED ON

 Channel is muted. The Post-Fader signal is prevented from reaching the Mix Send pots. The PRE signal (available for Mix Sends 1-4) is also muted unless the option has been changed to "Ignore Chan  Mute".

Channel Level Pot
This rotary pot controls the level of Post-Fader signal sent to the individual Mix Sends. Mix Sends 5 thru 12 always receive this Post-Fader signal. Mix Sends 1 thru 4 have the option of selecting a Pre-fader signal by the use of the PRE button.

 Continuously variable from OFF (full CCW) to +10dB gain (full CW). The panel is marked with the dB level of the channel, 0dB (unity channel gain) is at approx the 2-o'clock position.

PeaK / SIGnal LED

 This bi-color LED performs three functions:
1) Chan level; 2) Channel overload; 3) PFL status.

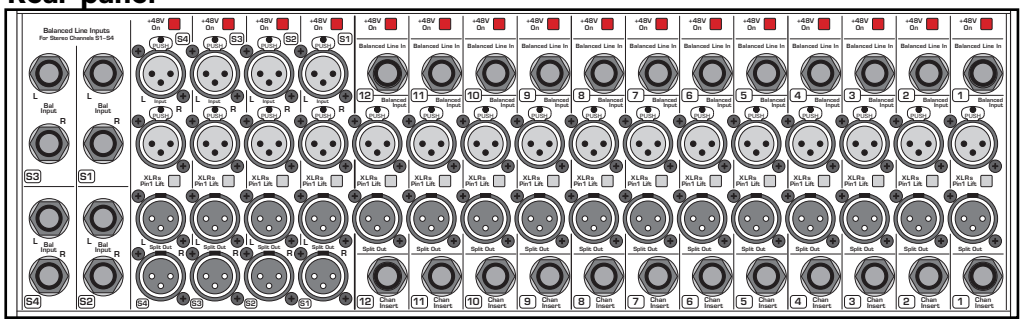
1) Varying intensity Green shows the pre-fader signal level
2) Red warns of channel clipping anywhere within the signal path. 3 points are monitored by the Peak circuitry: Input preamp, EQ circuit, and Fader amp. If any of these points come within 3dB of clipping, the LED will illuminate Red.
3) If the Chan PFL button is depressed, the LED will illuminate Red.

PFL Sw (and LED)
The XRM is equipped with a Stereo Solo system. Input Channels are monitored Pre-Fader (PFL), and outputs are monitored After-Fader (AFL). When a Mono channel is Solo'd, it appears in the Solo meters and headphone/monitor system as a mono signal (equal level to both sides). The Solo'd signal is Pre-fader, so the level feeding the Solo system is not affected by the setting of the Chan Lev pot.

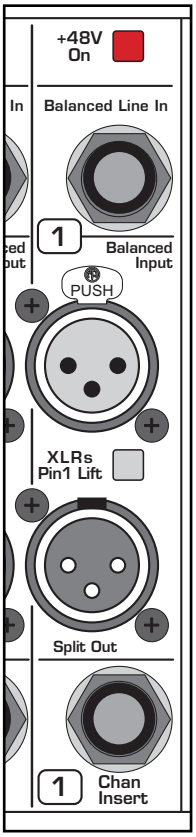
 Channel Pre-fader signal is sent to the Solo bus and displayed on the Solo meters and can be heard on the Headphone and Monitor outputs. The chan PK/SIG LED will illuminate RED, indicating that the PFL button is depressed. The Solo system is additive, so any and all channels that have their PFL switches depressed will be mixed together and monitored by the Solo system.

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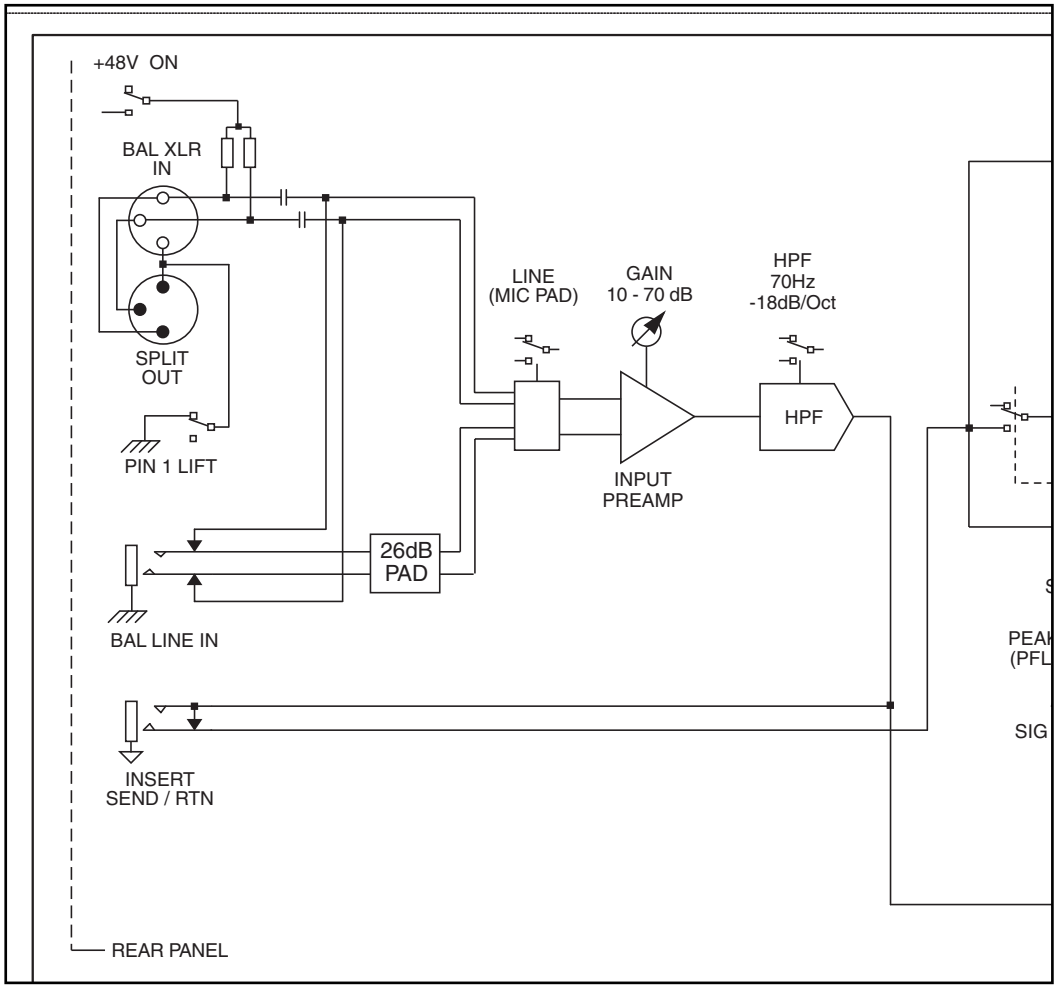
Rear panel



Connectors



Block diagram



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Rear panel features

+48 V On

+48 volts DC is applied equally (thru current-limiting resistors) to both pins 2 and 3 on the mic-input XLR connector. This feature is used with condenser microphones and active direct boxes that require an external DC voltage (phantom power) in order to operate. For dynamic or ribbon mics, phantom voltage is not required and should be switched OFF.
NOTE 1: Operating this switch (On or Off) causes large voltage swings to occur at the input of the mic preamp. Care should be taken to insure that the channel is muted or the main faders are pulled down to prevent this POP from getting to someone's ears.
NOTE 2: Pin-1 of the XLR is used as the DC return path for the phantom voltage. If the Pin-1 Lift switch is depressed (see below), this path is broken and the microphone will no longer receive operating power from the XRM. If the Pin-1 Lift switch must be used (to prevent a ground-loop hum or other unpleasant sounds when connecting to another mixer), then phantom power must be derived from a different source; either the other connected mixer (usually FOH) or an external phantom supply.

Line Input jack

Line-level signals, balanced or unbalanced, may be brought into the input channel through this 1/4" TRS jack. The LINE switch (front panel) must be pressed for this jack to be active. On the XRM, the XLR jack is normal'd to the switching contacts of this jack. If nothing is plugged into the jack, a padded XLR signal is available to the channel when the LINE switch is depressed. This allows the LINE switch to perform a dual function: XLR pad if nothing is plugged into the Line jack, or XLR(Mic)/Line input selection if the jack is being used.
Tip is Positive Input, Ring is Negative Input, Sleeve is Chassis Ground
Input impedance is 20KΩ balanced.

XLR(Mic) Input jack

This balanced, latching, female XLR accepts a low-impedance microphone signal, or a line-level signal, depending on the position of the LINE INPUT switch on the front panel.
Pin-2 is Positive Input, Pin-3 is Negative Input, Pin-1 is Chassis Ground
Input impedance is 4KΩ balanced

Pin-1 Lift Switch
Pin-1 of both of the XLR jacks is connected to the XRM chassis thru this switch.
This Pin-1 connection serves two main functions:
1) A shield connection point that allows any interference signals (picked up by the cable shield) to be effectively shunted to ground, thus avoiding signal degradation.
2) A DC return path for the +48 volt phantom power voltage.

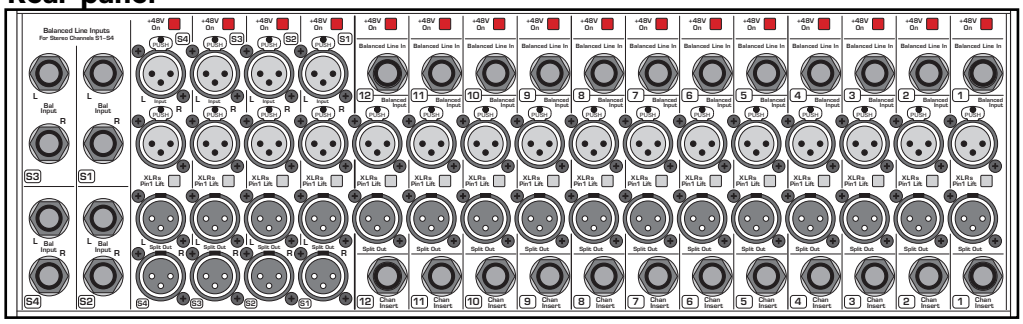
Normally, this switch is left in the UP position; Pin-1 is tied to the XRM chassis, and the shielding and phantom power are both maintained. When the XRM is used by itself, there is usually no reason to press this switch. When the XRM is used in conjunction with another mixer, either by using the built-in passive splitter, or when fed from an external splitter, there may be situations where ground differences between mixers can cause a "ground-loop". This usually manifests itself as a low-freq hum (usually at the AC mains freq), a hi-freq buzz, or a combination of both. In most cases, lifting the ground connection between mixers can clean up this interference.

Pin-1 of BOTH XLR jacks is connected to Chassis ground.

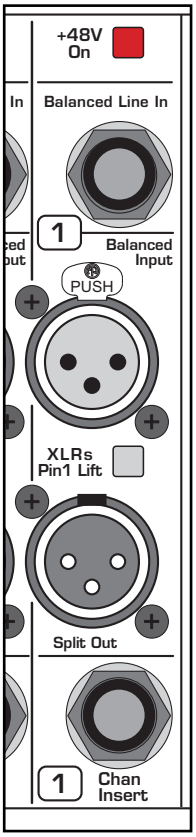
Pin-1 of BOTH XLR jacks is disconnected from Chassis ground.
NOTE 1: The pin-to-pin wiring between the paired XLR connectors is never changed by this switch, it only disconnects the common, Pin-1 of the XLRs from the mixer chassis, never from one another.
NOTE 2: Remember- if this switch is depressed, it prevents the XRM phantom power from reaching the attached microphone. Phantom power (if needed) must be supplied from an alternate source.

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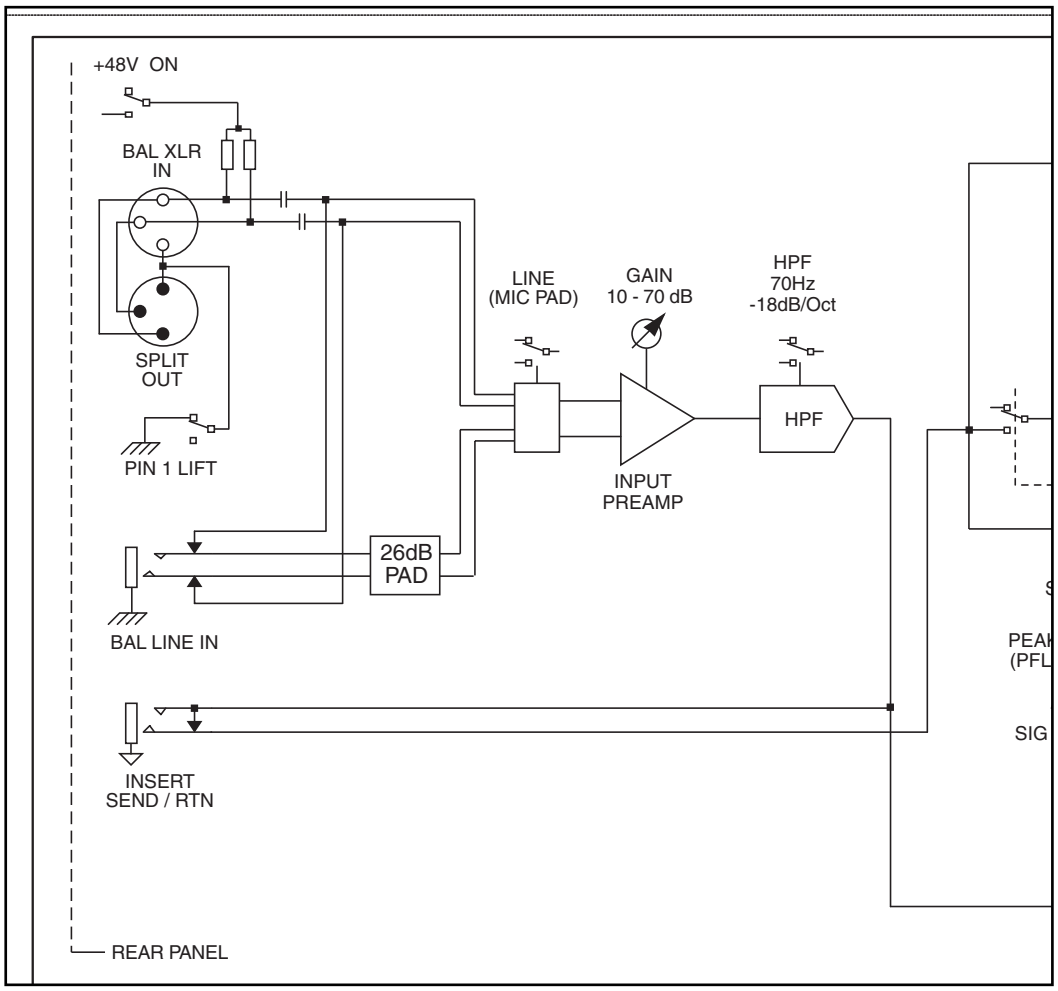
Rear panel



Connectors



Block diagram



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Rear panel features (continued):

Split-Out XLR jack



This male XLR jack is wired pin-to-pin to the female XLR input jack. In combination with the female XLR, it forms a passive, Y-Split of the input signal. This split-signal can be used to feed the mic input to another mixer (usually the FOH mixer), or to "mult" the input to another channel on the XRM.
NOTE: This pin-to-pin connection between XLR jacks is NOT affected by the Pin-1 lift switch.

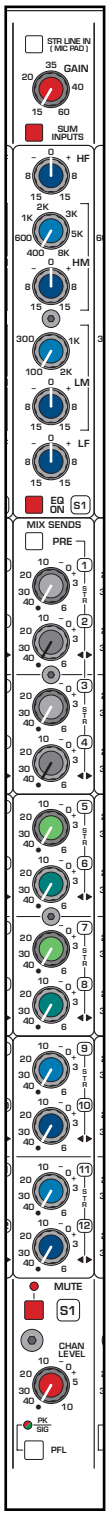
Chan Insert jack



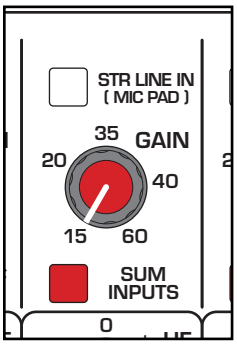
This switching 1/4" TRS jack allows an external signal processor to be inserted into the signal path of the channel. The tip carries the SEND signal from the channel, and the ring carries the RETURN signal back to the channel. The insert-send point is located directly after the Lo-Cut filter on the channel, the return comes back into the channel at the top of the EQ section.
Tip is Send, Ring is Return, Sleeve is Audio Ground.
Send (output) impedance is 50Ω
Return (input) impedance is 5KΩ
Nominal Operating Level= +4dBu
NOTE: To avoid any degradation of the XRM's channel signal, any processing gear patched into the channel insert should have a low impedance output (<100Ω) and must be capable of cleanly driving a 2KΩ load to +21dBu.

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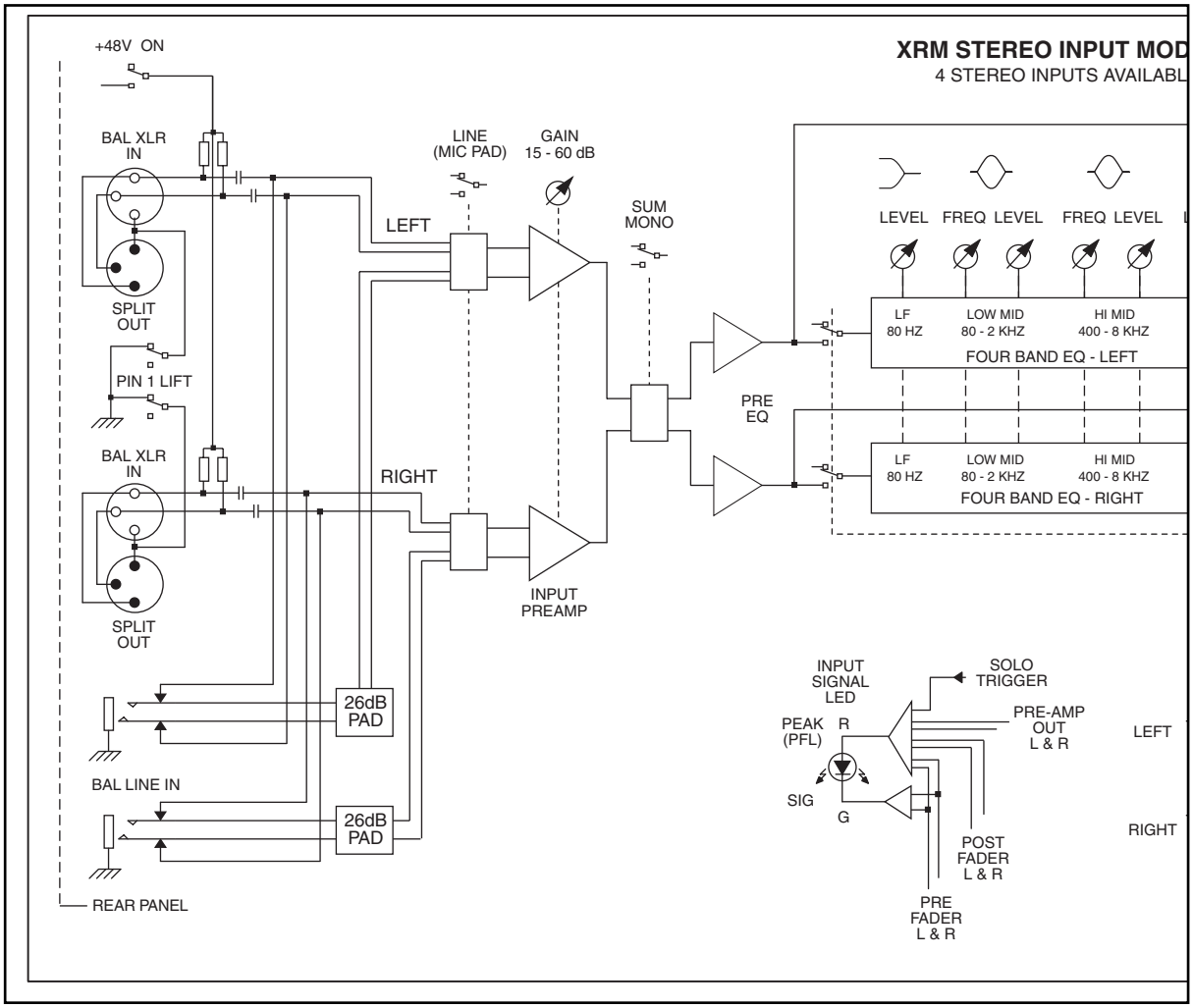
Module



Controls



Block diagram



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Front panel features

The XRM features four, full-function Stereo Input channels. These inputs are labeled S1 thru S4 and are located directly left of the master section. Each stereo channel features two mic preamps, so mic-level stereo sources can be processed on one common channel. In cases where just a mono source is present, the SUM INPUTS switch allows a mono source (plugged into either left or right input) to feed both sides of the stereo channel, effectively turning the stereo channel into an additional mono channel for the mixer. This SUM INPUTS switch also permits the operator to collapse a stereo signal to mono if necessary.
The Stereo channels are very similar, front-panel wise, to the Mono channels. In most cases, the controls will be identical and the descriptions are repeated here. Any Stereo-specific or Stereo-different controls will be identified as such and further described. The rear panel differs in the amount of jacks offered per channel. Because of space limitations, there is no Channel Insert jack available on the Stereo Channels.

Str Line In (Mic Pad)

With this switch in the UP position, the input preamp circuits are set up to accept mic-level signals. These signals are brought in via the XLR mic-input connectors located on the rear panel. The 1/4" TRS input jacks are ignored.

When the switch is depressed, a Pad is inserted into each of the signal paths and the input preamp circuits are capable of accepting line-level signals from either the XLR mic-input connectors or the 1/4" TRS input jacks, located on the rear panel. The XLR signal is normal'd to the 1/4" TRS jack. If nothing is plugged into the TRS jack, the XLR signal is fed to the preamp when the LINE switch is pressed. Since the TRS signal is always padded down by 26dB, this feature allows the LINE switch to act as a PAD switch for bringing a very hot microphone signals down to a controllable level, avoiding overload. When a plug is inserted into a 1/4" TRS input jack, the XLR mic-input signal is disconnected and the signal present on the 1/4" plug is fed to the preamp. If plugs are inserted into both the XLR and TRS jacks, this switch acts as an input selector switch between the two jacks.

Gain

The Input gain control is used to establish proper gain structure in the channel. For best results, use the Solo system to monitor the channel while you set the gain. The goal is maximum gain without distortion. Both the main LED meters (during Solo) and the channel's Level/Peak indicator can be used for adjusting gain.

SUM INPUTS (Stereo-specific)

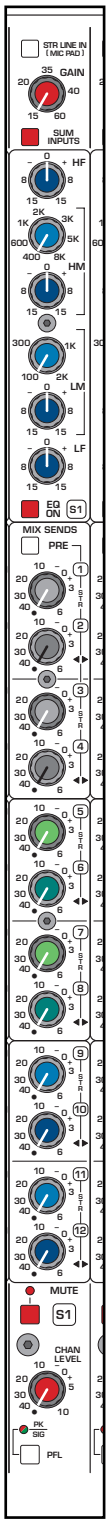
By summing the inputs, a stereo input channel can be used as a mono input channel.

The channel functions as a stereo input; left input signals feed the left side of the Stereo channel, right inputs feed the right side.

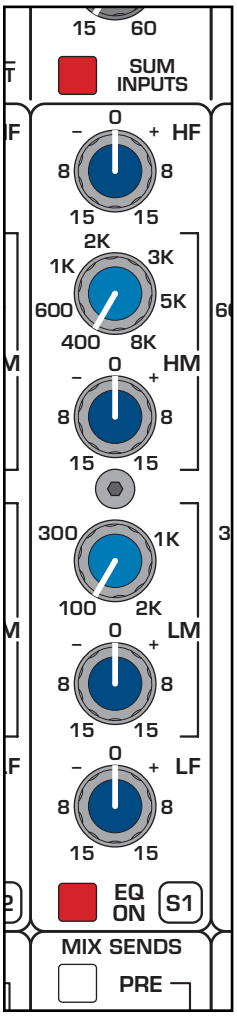
If signals are applied to both the Left and Right input jacks, they will be summed together as a mono signal and fed to both sides of the Stereo channel. This sum-point is directly after the input preamps. If a signal is applied to just one of the input jacks and this switch is pressed, that lone signal will feed both sides of the channel and it will be treated as a mono signal throughout the mixer.

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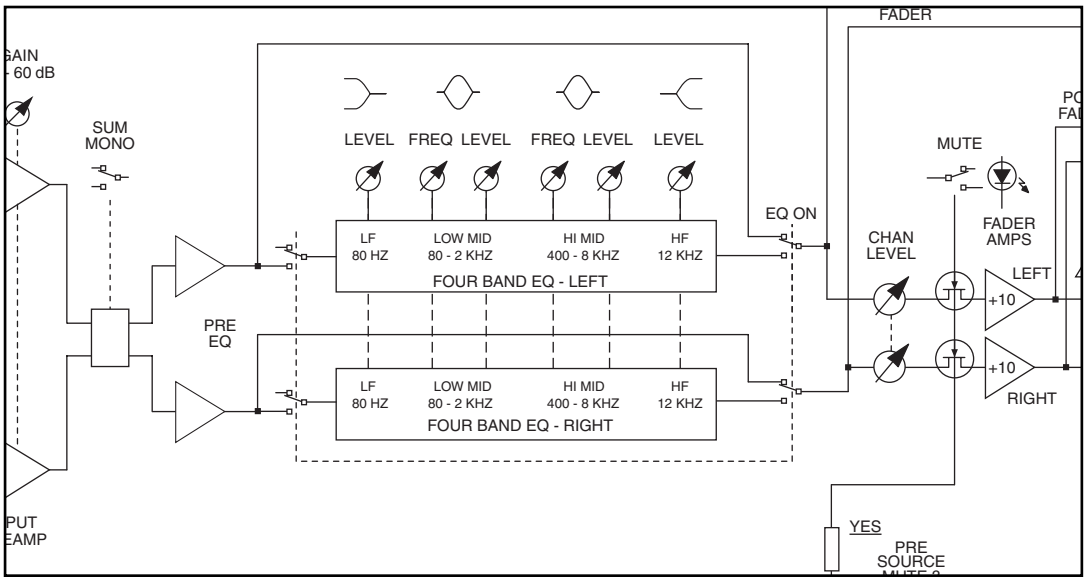
Module



Controls



Block diagram



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Front panel features

Stereo EQ

The Stereo Input channel has two parallel EQ circuits that are controlled by the same set of knobs. It is functionally identical to the Mono Input EQ.

Many audio signals coming into the console require some degree of corrective eq in order to be part of a good sounding mix. XRM offers a 4-Band EQ on each channel. The input EQ consists of the bands: High, High-Mid, Low-Mid and Low. The High and Low frequency bands are shelving equalizers, each have a boost/cut control and their frequencies are fixed. The High-Mid and Low-Mid bands have a bell-shaped response, each band features variable boost/cut and adjustable frequency.

high frequency—HF

Boost / Cut 15dB boost and cut. Shelving @ 12 kHz

high mid—HM

Frequency Continuously variable between 400 Hz and 8 kHz.

Boost / Cut 15dB boost and cut. Bell curve with a BW of approx 1.5 octaves

Low mid—LM

Frequency Continuously variable between 100 Hz and 2 kHz.

Boost / Cut 15dB boost and cut. Bell curve with a BW of approx 1.5 octaves

Low frequency—LF

Boost / Cut 15dB boost and cut. Shelving @ 80 Hz.

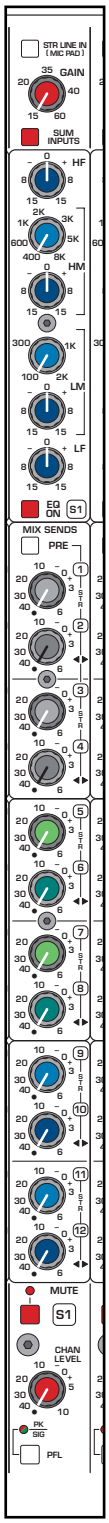
EQ on

Equalizer is OFF. The equalizer circuitry is bypassed.

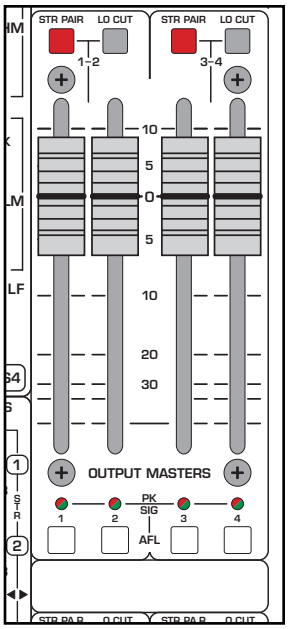
Equalizer is ON. This switch is used to activate the EQ section and can be used to make A/B comparisons between "flat" and eq'd signals.

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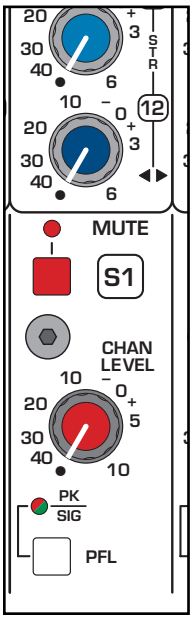
Module



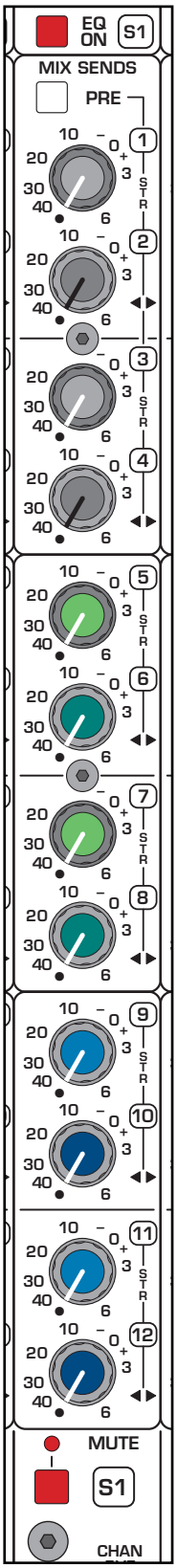
Master Faders



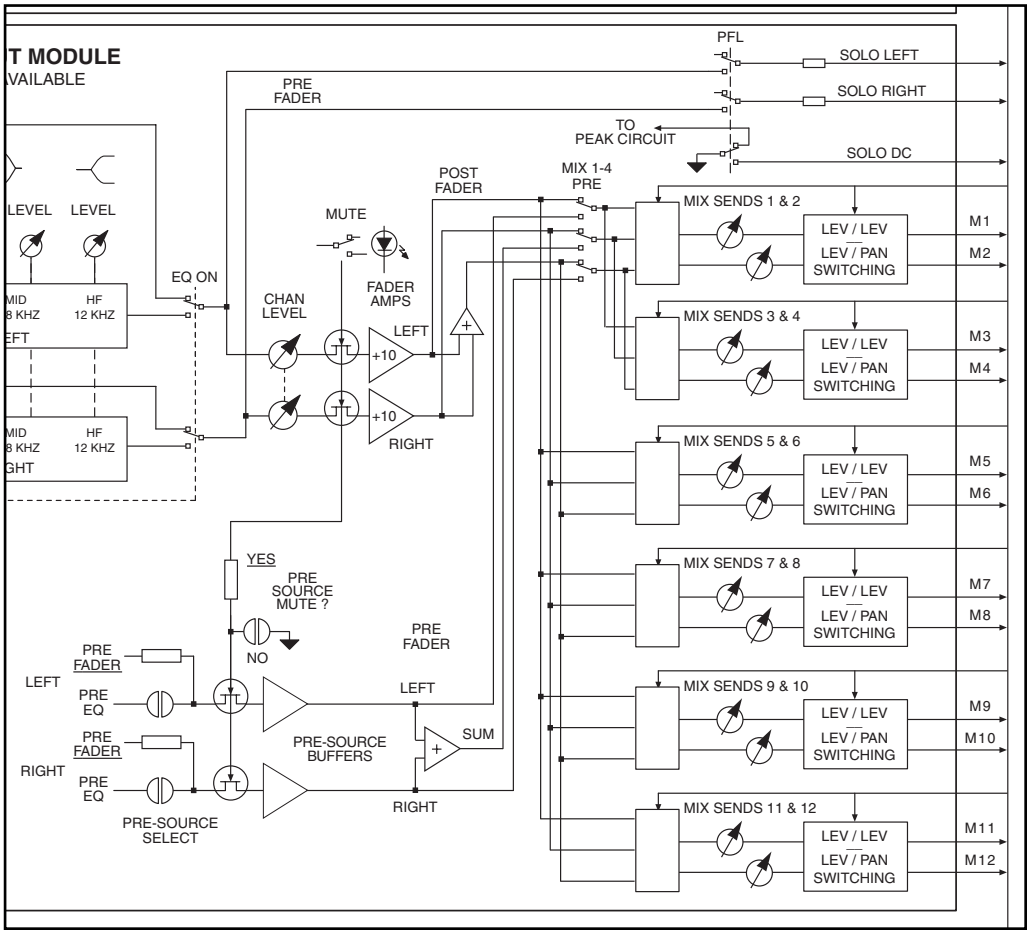
Chan Level



Chan Sends



Block diagram



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Mix Send features

The XRM is capable of generating 12 mono mixes, 6 stereo mixes, or a combination of both mono and stereo mixes. Each of the six Odd/Even pairs of sends can be configured as a stereo pair- the Odd pot becomes the level control, the Even pot becomes the pan pot. The changeover to stereo operation is controlled by the STR PAIR switches located above the master faders. A LO CUT switch is also present for activating the hi-pass filter (40Hz, -18dB/oct) for each pair of mixes.

NOTE: The Stereo Channels differ in how they feed the Mix Sends. With the Mono Channels, there was only one source within the channel, so the feed to any Mix Send pot is always the mono source. Switching to Stereo-Pair operation simply took this mono source and allowed it to be panned across the odd and even buses. In the Stereo Channels, there are two signal sources, the left and right channel signals. Normally, a sum of these two signals is fed to the Mix Send pots; a pre-fader sum is also generated for use with the Mix 1-4 PRE switch. When the corresponding STR PAIR switch is depressed, the operation AND THE SOURCE of the Mix Sends change. The odd pot still becomes the level control for both buses, but the even pot is now a BALance pot. The feed to the buses changes from a summed mono feed to both sides, to a left-to-odd and right-to-even feed. The stereo signal within the channel is maintained as it is fed to the stereo-paired mix buses. If the SUM INPUTS switch is depressed, the stereo signals within the channel effectively become mono and the Mix sends behave the same as on a Mono channel.

Mix 1 - 4 PRE

MIX Sends 1-4 are Post-Fader

MIX Sends 1-4 are Pre-Fader

Normally, the signal feeding the Mix Sends is derived after the main Chan Level Pot (Post-Fader). This Chan Level pot controls the level of the chan signal feeding the individual Mix Send pots. Each Mix Send pot is then used to generate a sub-mix of this channel signal. This Post-fader signal is also affected by the Mute switch; if the channel is muted, the Mix Send no longer receives a signal. There are some cases where an independent mix is desired, the operator doesn't want the Chan Level to affect the signal. On the XRM, Mixes 1 thru 4 can be switched to receive their signal PRE the Chan Level pot (Pre-fader). The default PRE setting for Mixes 1-4 is pre-fader, but it is still post-insert/post-EQ/post Mute. An internal jumper (per channel) can be changed so that the PRE setting becomes either pre-insert or pre-EQ. Another jumper allows this PRE setting to additionally be independent of the channel mute.

Mix Sends 1 & 2

Levels for Mixes 1 and 2 are controlled by this pair of knobs. In MONO mode, each knob controls the amount of chan signal that is sent to its corresponding mix bus. In Stereo Mode, the top knob controls the level to both buses and the bottom knob acts as a Balance control between the two buses- full CCW for Odd, full CW for Even.

STR PAIR sw in the UP position(located above Master Fader 1)

Knob 1: Send level for Mix 1

Knob 2: Send level for Mix 2

STR PAIR sw in the DOWN position

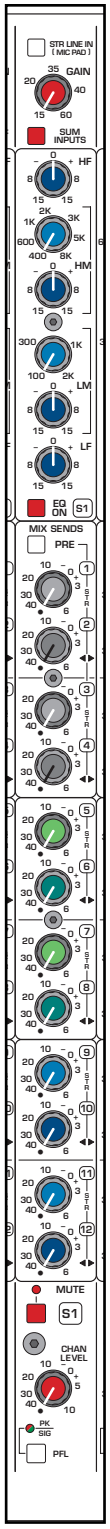
Knob 1: Send level for both Mix 1 and Mix 2

Knob 2: Balance control between Mix 1 and Mix 2

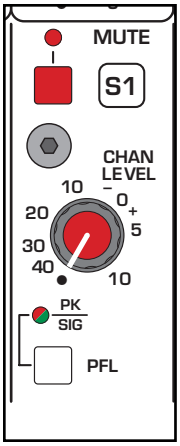
This Send arrangement is repeated for the remainder of the Mix Send pairs on the channel. Each pair's operation is controlled by its own STR PAIR switch located above the corresponding odd-numbered Master Fader.

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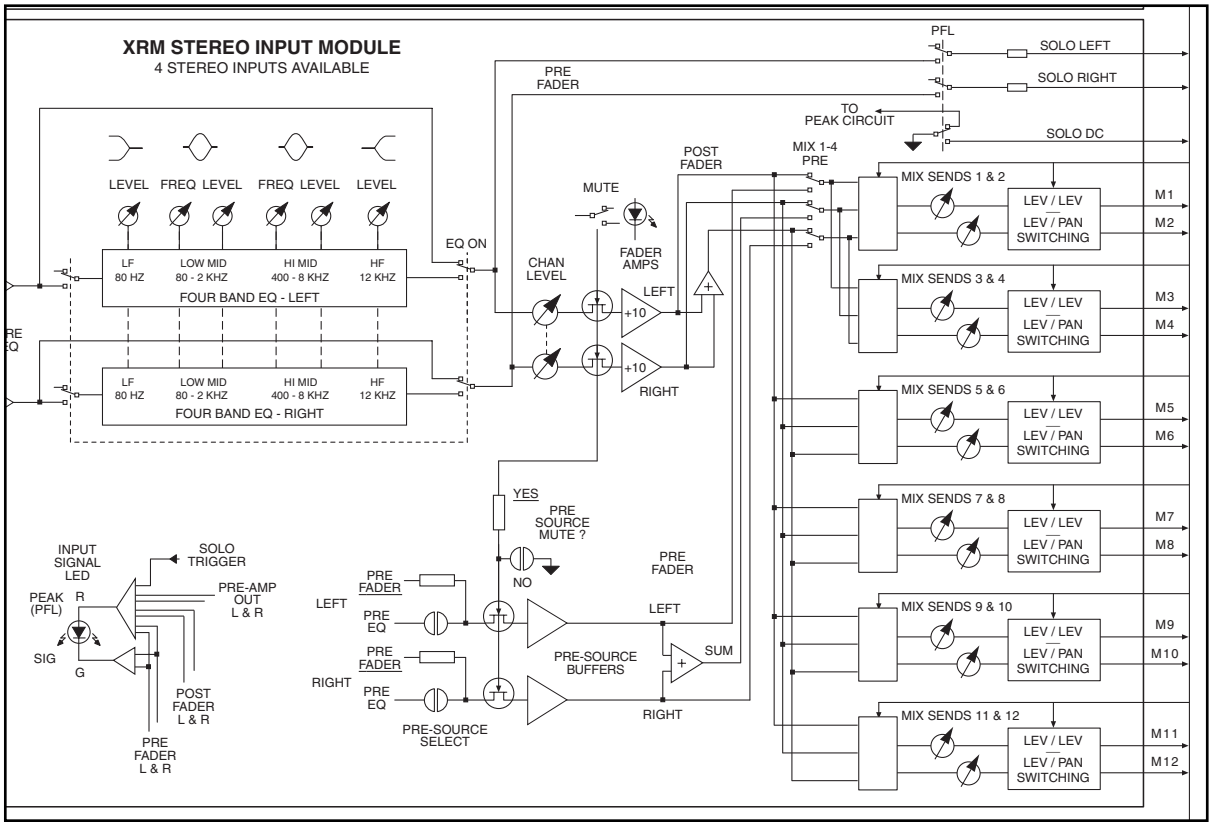
Module



Controls



Block diagram



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Front panel features

Channel Level and Control

This next set of controls allows the operator to control and monitor the overall level of the channel signal. Both sides of the Stereo channel (left & right) are simultaneously controlled.

Mute Sw and LED
The Mute switch kills the channel signals and prevents it from feeding any Mix Send pots. The mute-element itself is a FET transistor, allowing for timed, ramped on-off control of the channel signal. This avoids any "pops and clicks" when muting a channel. Normally, the Mute will also affect the PRE signals of the channel (see Mix Send details). PRE can be selected for Mix Sends 1 thru 4, and is normally the Pre-fader channel signal. There are internal jumpers that allow the user to change the definition of this PRE signal on a channel by channel basis, or it can be specified at the time of order and reconfigured during the product build at the factory. The PRE signal can be changed from its normal Pre-Fader setting and redefined as either Pre-Insert or Pre-EQ. Additionally, the mute operation of the PRE signal can be changed from its default of "Follow Chan Mute" to "Ignore Chan Mute". Again, this chan by chan option can be done either by the user or by the factory at the time of order.

Mute Switch UP, LED OFF

 Channel is un-muted. Signal is allowed to pass (pre or post fader)to the Mix Send pots.

Mute Switch DOWN, LED ON

 Channel is muted. The Post-Fader signals are prevented from reaching the Mix Send pots. The PRE signals (available for Mix Sends 1-4) are also muted unless the option has been changed to "Ignore Chan Mute".

Channel Level Pot
This rotary pot controls the level of the Post-Fader signals sent to the individual Mix Sends. Mix Sends 5 thru 12 always receive this Post-Fader signal. Mix Sends 1 thru 4 have the option of selecting a Pre-fader signal by the use of the PRE button.

 Continuously variable from OFF (full CCW) to +10dB gain (full CW). The panel is marked with the dB level of the channel, 0dB (unity channel gain) is at approx the 2-o'clock position.

PeaK / SIGnal LED

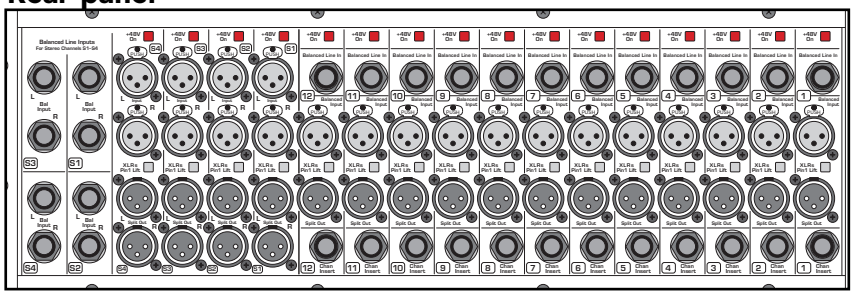
 This bi-color LED performs three functions:
1) Chan level; 2) Channel overload; 3) PFL status.
1) Varying intensity Green shows the L&R summed, pre-fader signal level
2) Red warns of channel clipping anywhere within the signal path. 6 points are monitored by the Peak circuitry: Input preamps, EQ circuits, and Fader amps. If any of these points come within 3dB of clipping, the LED will illuminate Red.
3) If the Chan PFL button is depressed, the LED will illuminate Red.

PFL Sw (and LED)
The XRM is equipped with a Stereo Solo system. Input Channels are monitored Pre-Fader (PFL), and outputs are monitored After-Fader (AFL). When a Stereo channel is Solo'd, it appears in the Solo meters and headphone/monitor system as a stereo signal. If the SUM INPUTS sw is depressed, a mono sum will be fed to the Solo system. The Solo'd signal is Pre-fader, the level feeding the Solo system is not affected by the setting of the Chan Lev pot.

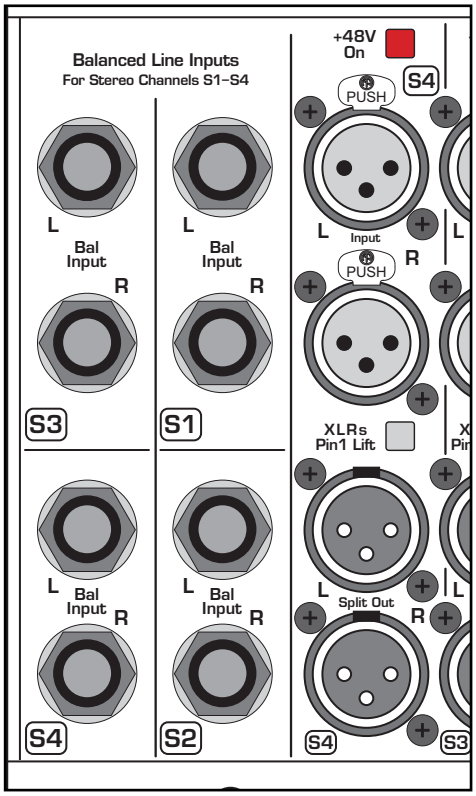
 Channel Pre-fader signal is sent to the Solo bus and displayed on the Solo meters and can be heard on the Headphone and Monitor outputs. The chan PK/SIG LED will illuminate RED, indicating that the PFL button is depressed. The Solo system is additive, so any and all channels that have their PFL switches depressed will be mixed together and monitored by the Solo system.

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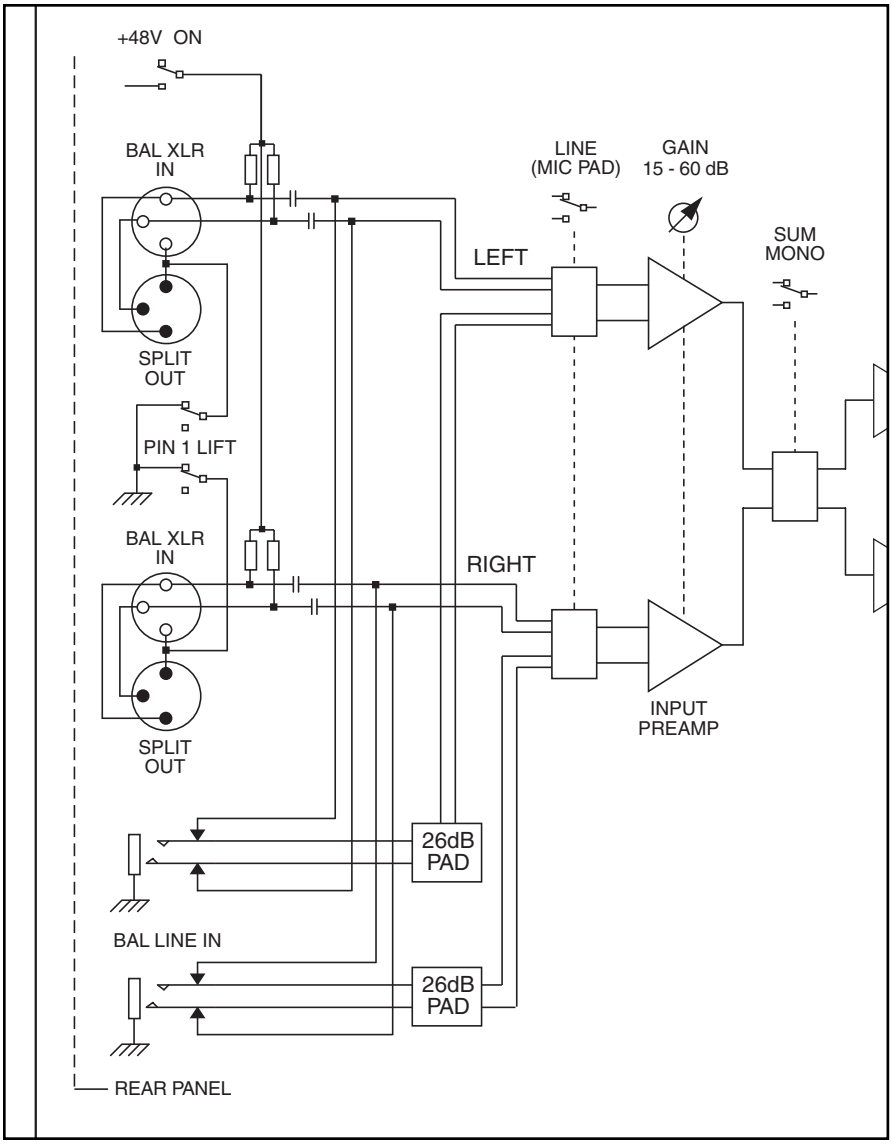
Rear panel



Connectors



Block diagram



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Rear panel features

+48 V On

+48 volts DC is applied equally (thru current-limiting resistors) to both pins 2 and 3 on both the L & R mic-input XLR connectors. This feature is used with condenser microphones and active direct boxes that require an external DC voltage (phantom power) in order to operate. For dynamic or ribbon mics, phantom voltage is not required and should be switched OFF.
NOTE: See the Mono Channel Rear Panel description for warnings and limitations when operating the phantom power switch.

Line Input jack


Line-level signals, balanced or unbalanced, may be brought into the input channel through these 1/4" TRS jacks. The LINE switch (front panel) must be pressed for this jack to be active. On the XRM, the XLR jacks are normal'd to the switching contacts of these jacks. If nothing is plugged into the jack, a padded XLR signal is available to the channel when the LINE switch is depressed. This allows the LINE switch to perform a dual function: XLR pad if nothing is plugged into the Line jack, or XLR(Mic)/Line input selection if the jack is being used.
Tip is Positive Input, Ring is Negative Input, Sleeve is Chassis Ground
Input impedance is 20KΩ balanced.

XLR(Mic) Input jack


This balanced, latching, female XLR accepts a low-impedance microphone signal, or a line-level signal, depending on the position of the LINE INPUT switch on the front panel.
Pin-2 is Positive Input, Pin-3 is Negative Input, Pin-1 is Chassis Ground
Input impedance is 4KΩ balanced

Pin-1 Lift Switch
Pin-1 of all four of the XLR jacks is connected to the XRM chassis thru this switch.
This Pin-1 connection serves two main functions:
1) A shield connection point that allows interference signals (picked up by the cable shield) to be effectively shunted to ground, thus avoiding signal degradation.
2) A DC return path for the +48 volt phantom power voltage.
Normally, this switch is left in the UP position; Pin-1 is tied to the XRM chassis, and the shielding and phantom power functions are both maintained. When the XRM is used by itself, there is usually no reason to press this switch. When the XRM is used in conjunction with another mixer, either by using the built-in passive splitter, or when fed from an external splitter, there may be situations where ground differences between mixers can cause a "ground-loop". This usually manifests itself as a low-freq hum (usually at the AC mains freq), a hi-freq buzz, or a combination of both. In most cases, lifting the ground connection between mixers can clean up this interference.

Pin-1 of ALL XLR jacks is connected to Chassis ground.

Pin-1 of ALL XLR jacks is disconnected from Chassis ground.

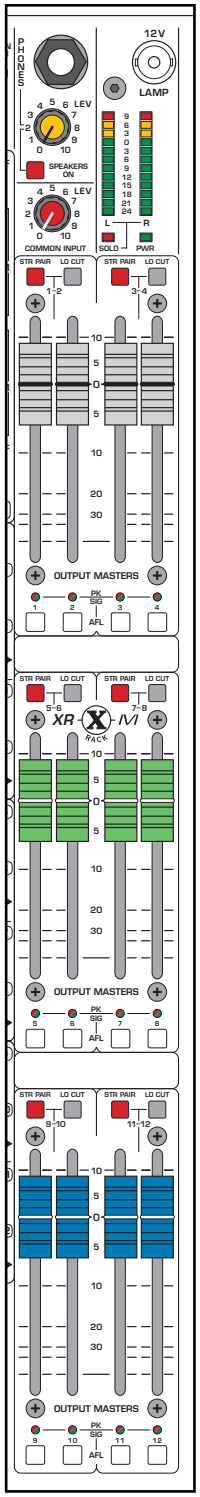
NOTE 1: The pin-to-pin wiring between the paired XLR connectors is never changed by this switch, it only disconnects the common, Pin-1 of the XLRs from the mixer chassis, never from one another.
NOTE 2: Remember- if this switch is depressed, it prevents the XRM phantom power from reaching the attached microphones. Phantom power (if needed) must be supplied from an alternate source. an alternate source.

Split-Out XLR jack

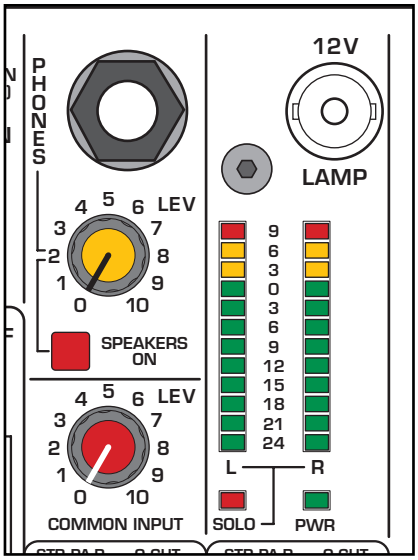

This male XLR jack is wired pin-to-pin to its corresponding female XLR input jack. In combination with the female XLR, it forms a passive, Y-Split of the input signal. This split-signal can be used to feed the mic input to another mixer (usually the FOH mixer), or to "mult" the input to another channel on the XRM.
NOTE: This pin-to-pin connection between paired XLR jacks is NOT affected by the Pin-1 lift switch.

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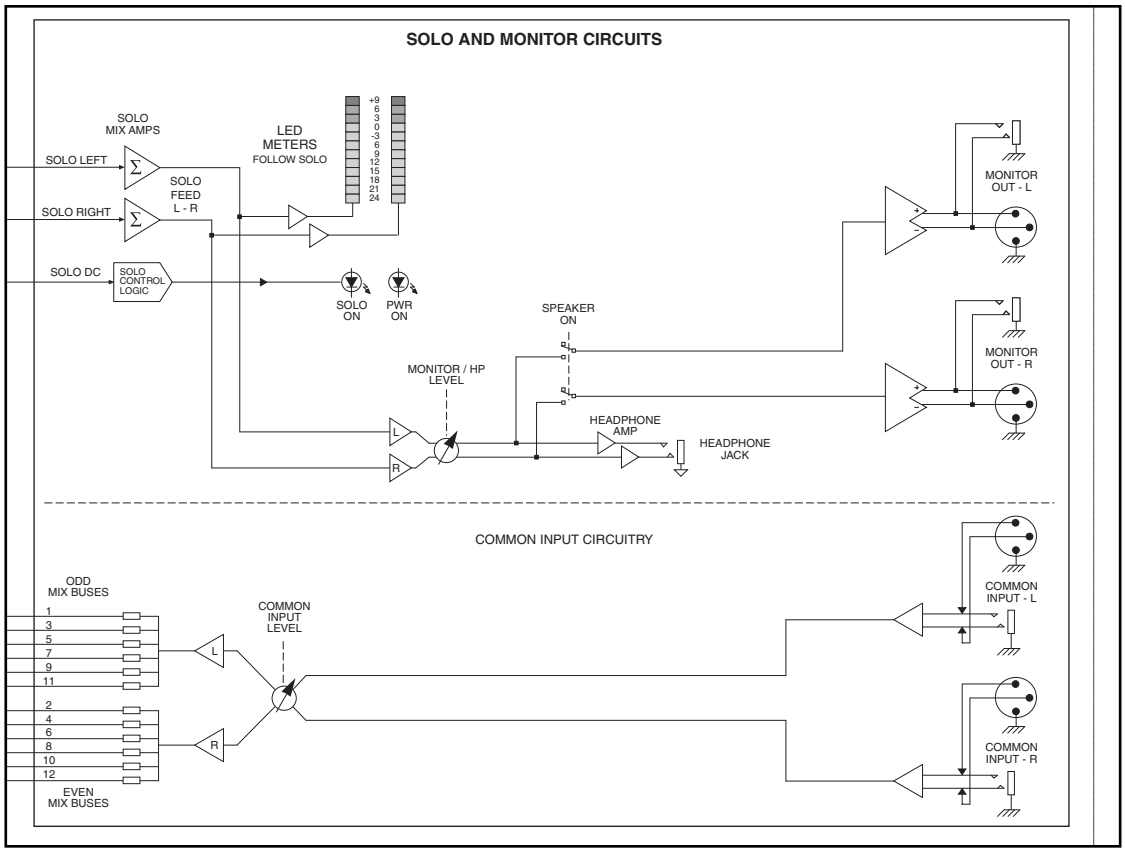
Module



Controls



Block diagram



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Front panel features

The XRM master section contains the controls and indicators for the Solo system, headphone and Monitor system, and Mix Master outputs. This section allows the operator to control the overall operation of the mixer. A BNC lamp connector, supplied with +12 volts, is also located within this section. Each individual sub-system will be described in detail.

Solo System

The XRM is equipped with a Stereo Solo System. Input channels (Mono or Stereo) are monitored Pre-Fader (PFL), and Outputs are monitored After-Fader (AFL). Even though the Solo System itself is stereo, not all monitored points are stereo sources. In those cases, the source appears in the Solo System as a mono signal and appears equally on both meters and is present on both sides (L & R) of the headphone and Monitor outputs.
Mono sources include:
A) Mono Input channels 1 thru 12,
B) Mix Outputs 1 thru 12 : IF the corresponding STR PAIR switch is NOT depressed.

Stereo sources include:
A) Stereo Input channels S1 thru S4 (NOTE: The PFL monitoring point is after the SUM INPUTS switch, so a Stereo channel will solo as mono (it really is) if the switch is depressed.
B) Mix Output Pairs 1-2 thru 11-12 : IF the corresponding STR PAIR switch IS depressed. Either AFL switch (odd or even) will trigger the Solo system, and both LED indicators will show Red.

The Solo System is additive. ANY and ALL sources that have their corresponding solo switches pressed (PFL or AFL) will be mixed together. The resulting mixed signal will be displayed on the meters and heard in the phones and monitor system.

Headphone jack (PHONES)

 This 1/4" TRS jack is intended for use with stereo headphones. Any signals that are present in the Solo System can be monitored here. When nothing is solo'd, the output is off. Although capable of driving low impedance headphones (8Ω), best results (maximum output) are obtained with medium impedance phones (30Ω to 75Ω types).

Headphone/Monitor Level Control

 This knob controls the amount of Solo audio fed to the Headphones and also to the rear-panel Monitor Out jacks. If no Solo is active, both outputs are OFF (no signal). In most cases, the operator will use headphones to monitor the signals within the XRM, however, there are certain situations where additional monitoring is needed. A cue wedge may need to be set up, or the solo audio may need to be fed to a remote monitoring location; the Monitor Out jacks are available for this purpose.

SPEAKERS ON

This switch activates the rear-panel Monitor Out jacks..

 Monitor Out jacks are muted (OFF).

 Solo audio (controlled by the above Level control) can feed the Monitor Out jacks.

SOLO Meters (L & R)

These 12-segment LED ladders show the audio level of the Solo system. When nothing is being solo'd, the meters are off. The meters have a "VU Type" response, they smooth-out the signal and display an average of the audio level.

SOLO (ON)

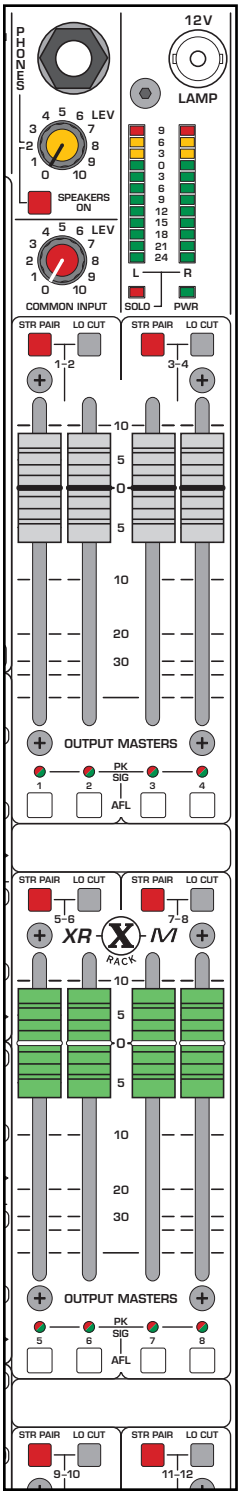
This Red LED will illuminate when any solo switch is depressed.

PWR

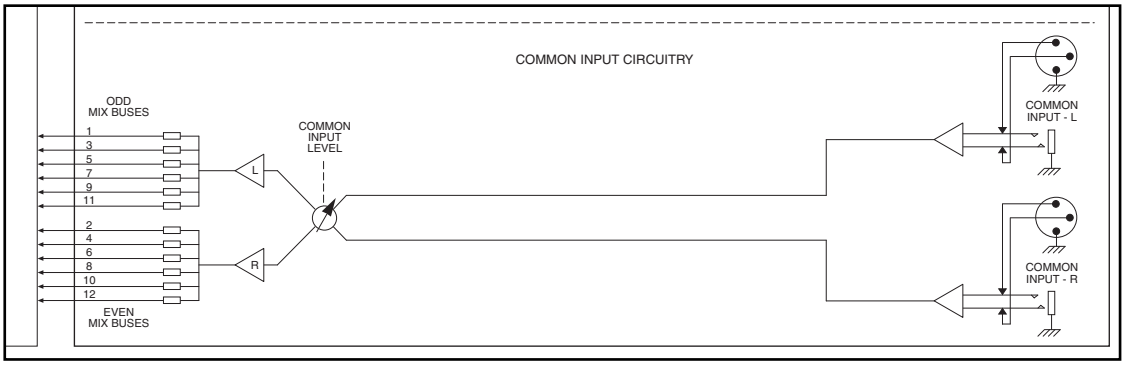
This Green LED illuminates when the XRM is powered on.

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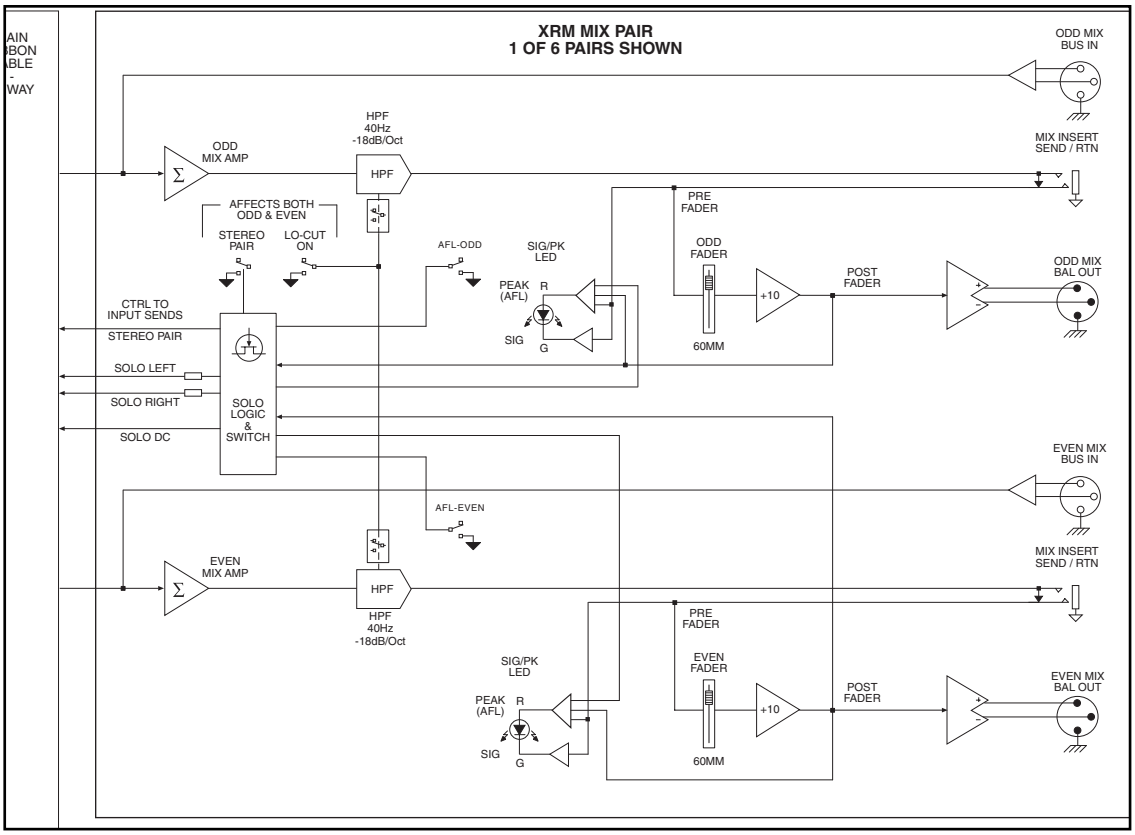
Module



Block diagram- Common Input



Block diagram- Mix Outputs



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Front panel features (continued)

Common Input
Often, a click track, tape playback or ref track, needs to be heard by all the performers. An input channel can be used for this, with all mix sends turned up to the same level. If an input channel is not available, the Common Input section can be used for that purpose. Input jacks, both TRS and XLR, are provided on the rear panel for bringing a line-level, stereo feed into the mixer. This signal is fed to the level pot and then to the Mix buses, left-side signal to odd buses, right-side signal to even buses.

Common Input Level
This pot controls the amount of Common Input signal fed to the Mix buses. Left input feeds the odd buses, right input feeds the even buses.

12V Lamp jack
A BNC jack is available for attaching a goose-neck lamp. The center connection is 12 Volts DC and the outer connection is ground. A medium or high-intensity 12V DC Littlite can be used. The output voltage is current limited to prevent faulty bulbs or mis-connection from harming the internal workings of the mixer.

Mix Master Outputs
Each of the 12 Mix Outputs has its own 60mm master fader, AFL switch, and Peak/Sig LED. Additionally, each odd-even pair of outputs has an associated STR PAIR switch and LO CUT switch. Both of these switches affect both of the outputs of the pair: The STR PAIR switch changes the pair of outputs from independent mono to linked-stereo. The LO CUT switch activates the hi-pass filters on both outputs (40Hz, -18dB/Oct)
When operating the mixes as separate Mono outputs, each fader sets the overall output level and the associated AFL switch below the fader allows the operator to monitor the output level of the mix.
When it is desired to operate in Stereo-Pair Mode, the STR PAIR switch located above the odd-numbered fader is pressed. This sends a control signal to the input channels which reconfigures the associated pair of send pots from Level/Level operation to Level/Pan operation. Additionally, the AFL switches for the pair of outputs are linked and the Solo feed is changed from mono to stereo. Now, if either AFL switch of the pair is pressed, both AFL indicators will illuminate Red and both outputs will appear in the Solo system, odd to left, even to right.

STR PAIR switch
The pair of outputs associated with this switch are un-linked and operate as independent mono mixes. The AFL switch for the fader will produce a mono feed to the Solo system.

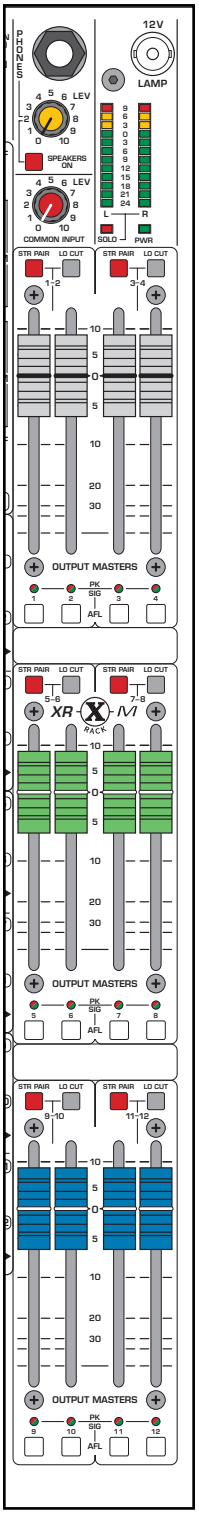
The pair of outputs are linked: The associated mix sends on the input channels are changed to Lev/Pan operation, and the AFL switches for the two outputs are linked, producing a stereo Solo feed of the outputs if either AFL is pressed.

LO CUT switch
Both outputs operate at full bandwidth, low frequencies are not attenuated.

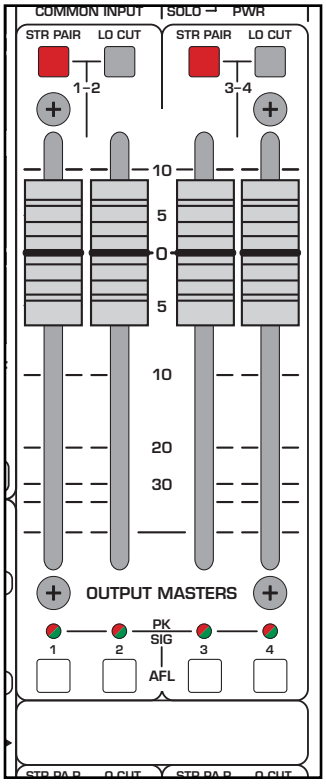
Hi-pass filters are inserted into the signal paths of both outputs, reducing low frequency rumble.

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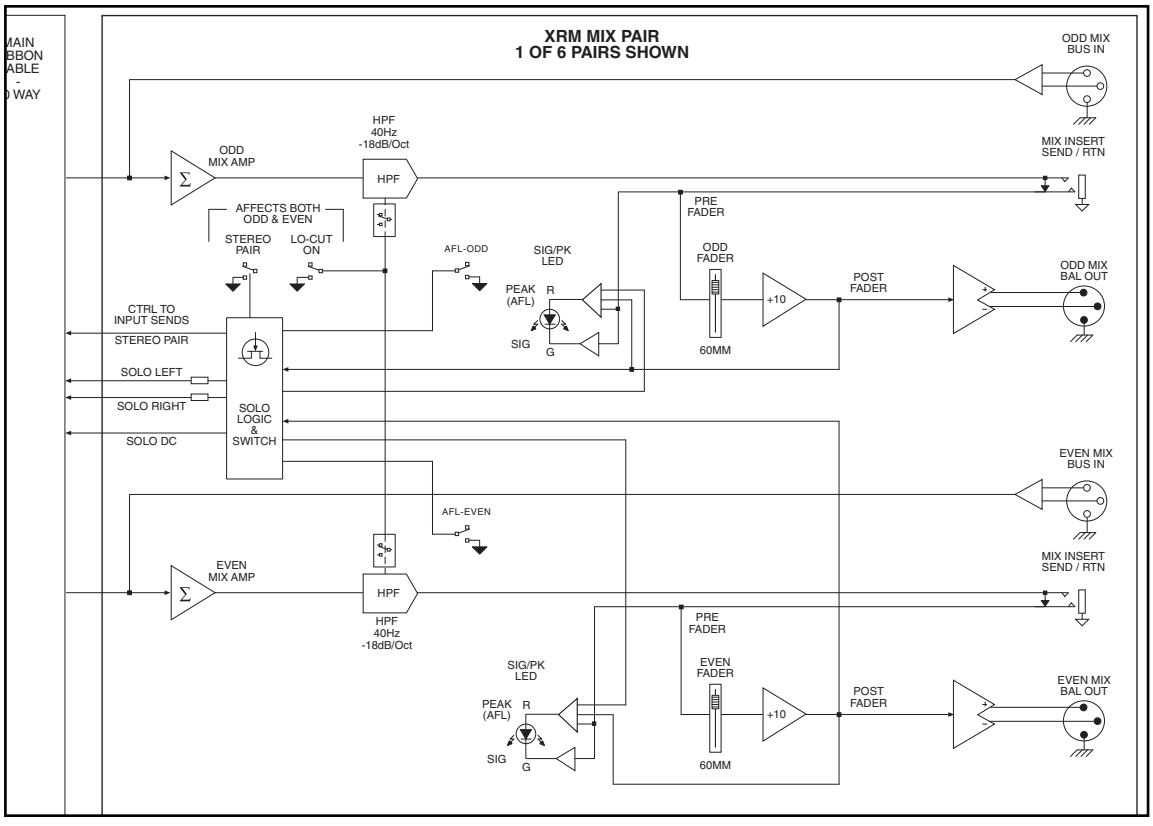
Module



Controls



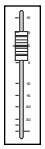
Block diagram



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Front panel features (continued)

Master Fader - Mix Output Level



Each of the twelve mixes has its own 60mm master fader. This fader controls the main output of the mix and allows the operator to easily adjust the level sent to the performers. Up to 10dB additional gain is available. The faders are arranged in odd/even pairs for ease of use when operating in Stereo mode. Nominal setting is at the 0 (unity) point.

Peak/Signal LED + AFL Switch & indicator

PK/SIG This bi-color LED indicates the pre-fader mix level with varying intensity Green illumination. If critical internal signals get to within 3dB of clipping, the LED will turn Red. This LED will also indicate AFL activation by turning Red.

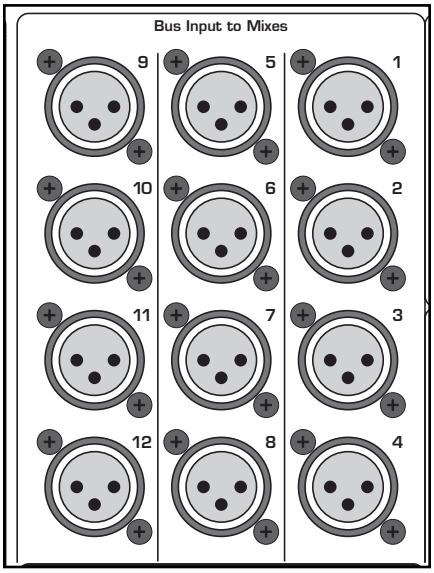
AFL This switch allows the engineer to monitor the post-fader level of the mix. Pressing the switch will turn the PK/SIG LED Red and feed the mix to the Solo system where it can be viewed (Solo meters) and monitored (HP and Monitor Out) by the operator. In Mono mode, only the associated mix is fed to the Solo system. It appears as a mono signal in the Solo system (equal level in both left & right). If the associated STR PAIR switch is depressed (located above the odd-numbered faders), then pressing EITHER the odd or even AFL switch will cause BOTH LEDs to illuminate and both mixes will be fed to the Solo system as a stereo pair, odd mix to left, even mix to right.

Repeat as necessary:

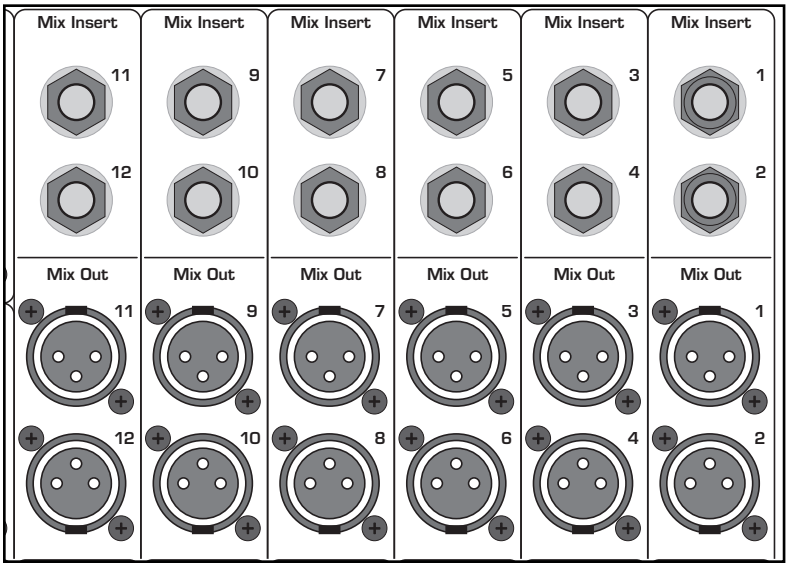
The previous descriptions of the functions associated with each of the Master faders are repeated for the remaining Master faders. The stereo pairing, when activated by a STR PAIR switch, always operates between the associated mixes 1-2, 3-4, 5-6, 7-8, 9-10 and 11-12. Not only are the output faders and their controls affected by this switch, the associated mix sends on all the input channels are also affected. The Sends are reconfigured from their normal Lev/Lev operation (odd-pots feed odd buses, even-pots feed even buses) to the Lev/Pan stereo configuration (odd-pots feed BOTH odd and even buses, even-pots pan between the buses).

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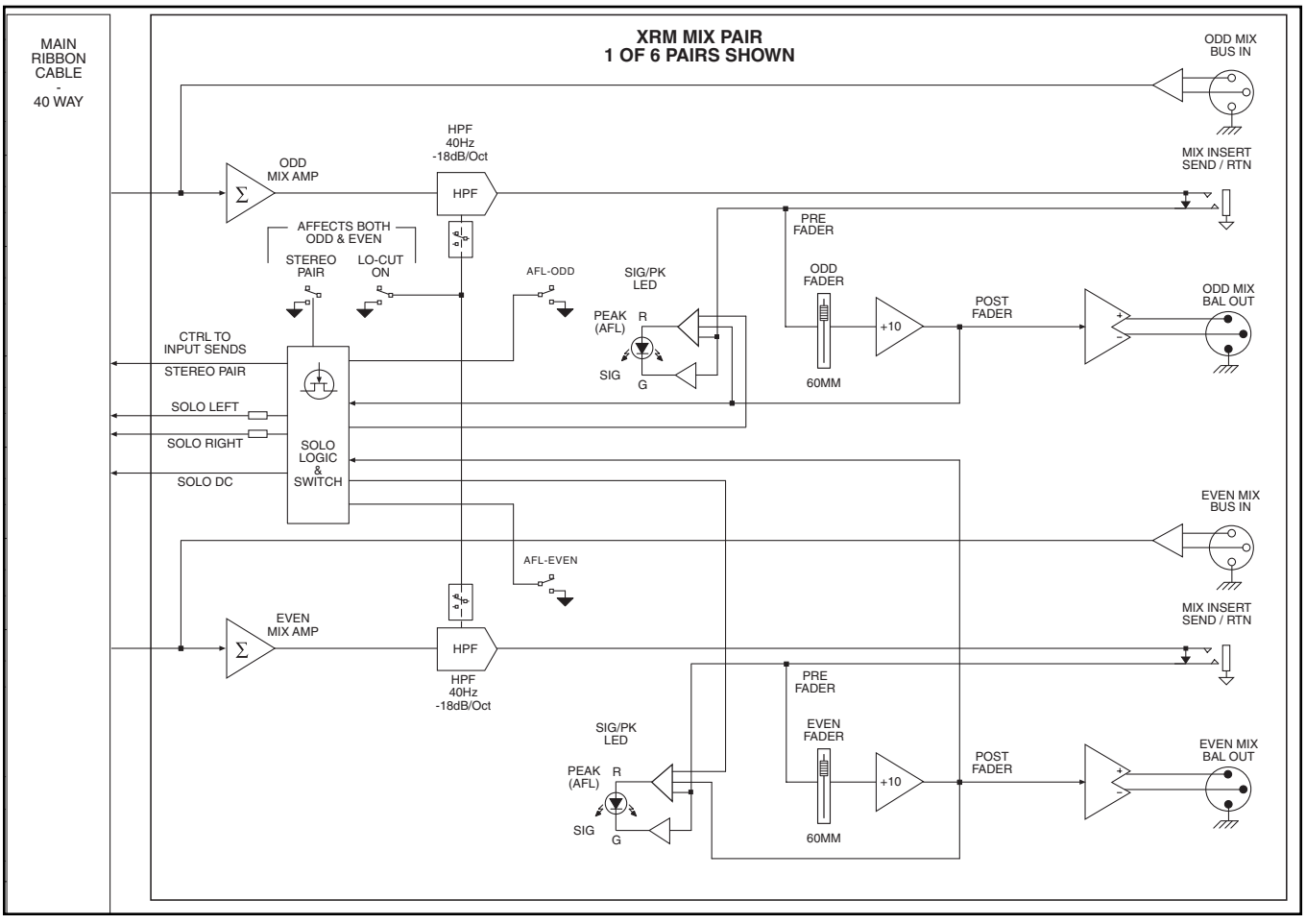
Bus Inputs



Mix Inserts and Outputs



Block diagram



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Rear panel features

Main Outputs 1 thru 12

The XRM has 12 Mix outputs. Each output features the following connectors:

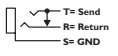
Bus Input
Mix Insert
Main Out

Bus Input

 Each of the 12 mixes has an associated Bus Input jack. This female XLR allows external signals to be mixed into the XRM, either from another X-Rack mixer, or any other audio source.

Electronically balanced input: 20KΩ impedance
Pin-2 Hot, Pin-3 Cold, Pin-1 Chassis
Nominal input level is +4dBu

Mix Insert



This switching 1/4" TRS jack allows an external processor to be inserted into the signal path of the mix bus. The tip carries the SEND signal from the XRM, and the ring carries the RETURN signal back to the XRM. The insert-send point is located directly after the Lo-Cut filter on the output, the return comes back at the top of the master fader.
Tip is Send, Ring is Return, Sleeve is Audio Ground.
Send (output) impedance is 100Ω unbalanced
Return (input) impedance is 5KΩ unbalanced
Nominal Operating Level= -2dBu
NOTE: To avoid any degradation of the XRM's output signal, any processing gear patched into the mix insert should have a low impedance output (<100Ω) and must be capable of cleanly driving a 2KΩ load to +21dBu.

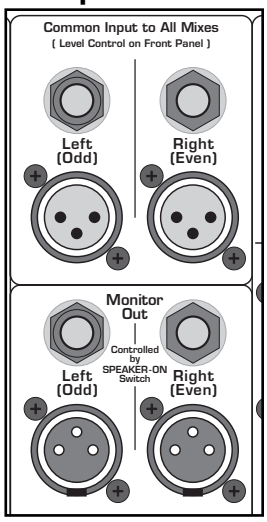
Mix Output

 This male XLR is the main output feed for each of the 12 mixes. The jacks are physically arranged for ease of identification when wiring stereo pairs. The output can be used either balanced or unbalanced. For unbalanced operation, connect Pin-3 to Pin-1 and take the output from Pin-2.

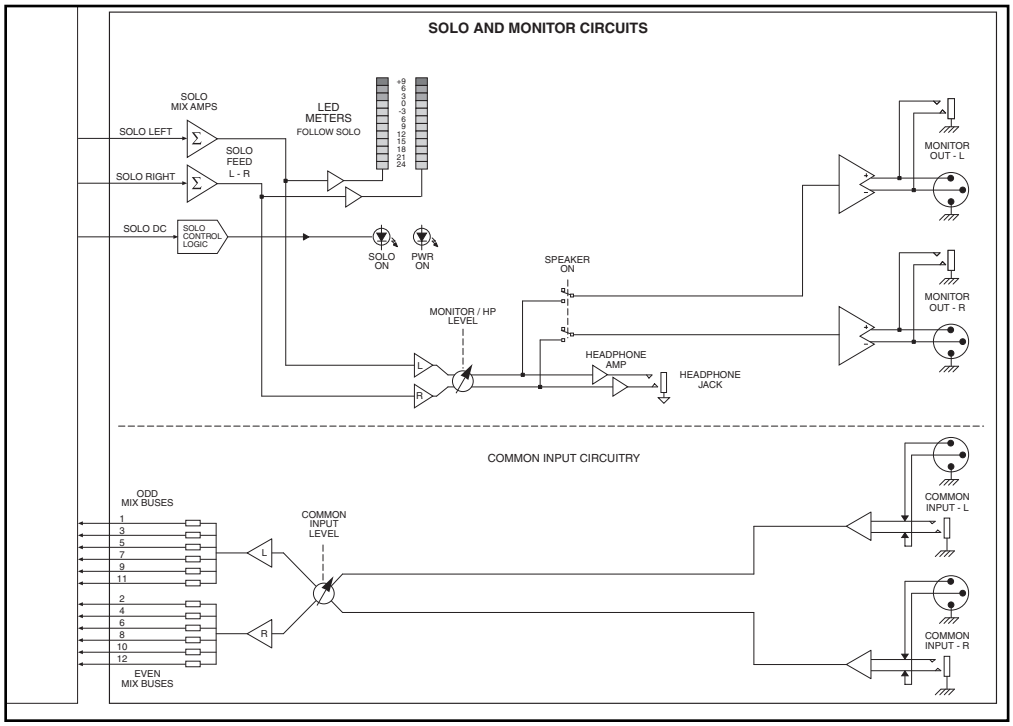
Electronic balanced cross-coupled output: 100Ω impedance (50Ω per leg)
Pin-2= Hot, Pin-3= Cold, Pin-1= Chassis
Nominal output level is +4dBu.

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Rear panel



Block diagram



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Rear panel features (continued)

Other Inputs and Outputs

Common Input



A stereo input is provided for feeding a common signal to all of the 12 mix buses simultaneously. From the stereo source, the left signal will feed all of the odd mixes, the right signal will feed all of the even mixes. Both XLR and 1/4" TRS jacks are provided, the XLR jack is normal'd thru the TRS jack, so if a plug is inserted into the TRS jack, the XLR is disconnected.

Electronically balanced input: 20KΩ impedance
XLR: Pin-2= Hot, Pin-3= Cold, Pin-1= Chassis
XLR is normal'd to TRS jack (see diagram):
TRS: Tip= Hot, Ring= Cold, Sleeve= Chassis
Nominal input level is +4dBu

Monitor Output

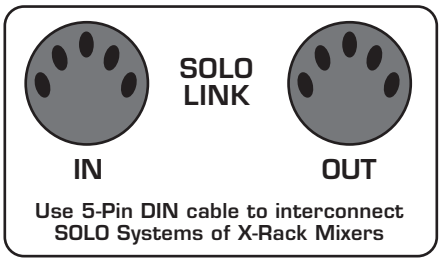


This output follows the Solo system and is controlled by both the HP/Mntr pot and SPEAKER ON switch on the front panel. The pot controls the audio level of both the front panel PHONES jack, and also these rear panel Monitor Out jacks. The SPEAKER ON switch enables these rear jacks while leaving the PHONES unaffected. These jacks normally would feed the engineer's monitor system if something more than headphone listening was desired. Both TRS and XLR jacks are provided, they are wired in parallel, and both sets may be used

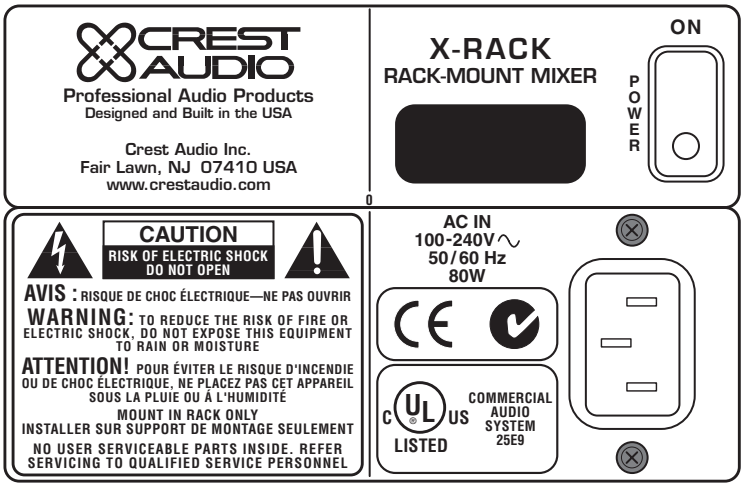
Electronic balanced cross-coupled output: 100Ω impedance (50Ω per leg)
XLR: Pin-2= Hot, Pin-3= Cold, Pin-1= Chassis
TRS: Tip= Hot, Ring= Cold, Sleeve= Chassis
Nominal output level is +4dBu.

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Solo Link Connectors
Tie Mixers together



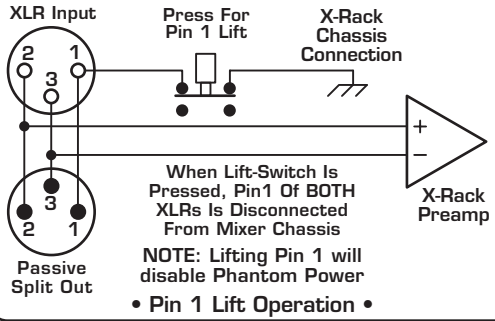
AC Inlet
Information and warnings



Connector Pinouts,
Levels & Impedance

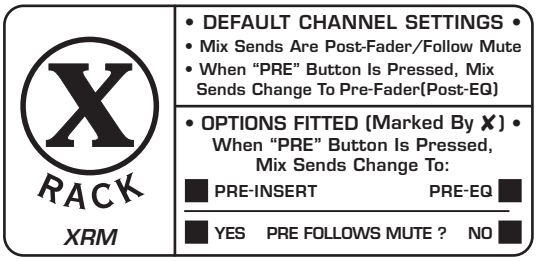
I/O Connections • Operating Levels • Impedance (Ω)

1= CHS 2= IN + 3= IN –	Bal In (Mic) Bal In (Line) Bus In Common In	–60dBu +4dBu +4dBu +4dBu	4K 20K 20K 20K
• XLR Female •			
1= CHS 2= OUT + 3= OUT –	Split Out Mix Out Monitor Out	Passive +4dBu +4dBu	4K 100 100
• XLR Male •			
T= IN + R= IN – S= CHS	Line Input Common In	+4dBu +4dBu	20K 20K
• 1/4" TRS Input •			
T= OUT + R= OUT – S= CHS	Monitor Out	+4dBu	100
• 1/4" TRS Output •			
T= Send R= Rtn S= GND	Chan Insert Mix Insert	+4dBu -2dBu	Send= 100 Rtn= 10K
• 1/4" TRS Insert •			



• Pin 1 Lift Operation •

User Options



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Rear panel features (continued)

Solo Link

When using multiple X-Rack mixers together, the solo systems can be linked. This Solo Link is compatible with the XR-20 and XR-24 Rack mixers. A 5-pin, shielded DIN cable, wired pin-to-pin, can be used to link the Solo Audio and control signals between mixers. The "Slave" mixer has its own solo'd signals appear in its own solo system, but these signals are also passed to the "Master" mixer where they also show up in the Master mixer solo system, added to any existing solo'd signals, or triggering the Master solo if nothing else was present. The Master and Slave consoles are designated by the IN-to-OUT relationship between the Solo Link connectors. The Master mixer should have the DIN cable plugged into the IN jack, the other end of the cable should plug into the Slave's OUT jack.
This linking can extend to additional mixers (no practical limit). Just keep plugging additional DIN cables between the added mixers. The daisy-chain continues, the ultimate Master will be the mixer with only one DIN cable plugged into the Link-IN jack.
NOTE 1: You should not plug the ends of the link-cable into both Link-IN jacks or both Link-OUT jacks across two mixers. No permanent damage will result, but there may be erratic solo behavior (besides, it's not a nice thing to do to the XRM).
NOTE 2: Even though the DIN connector is the same type as used in MIDI systems, the Link connection is not MIDI and should not be connected to a MIDI device.

Audio Linking

The XRM is equipped with bus-in jacks on all the main mix buses (see earlier Rear-Panel detail) allowing the user to create a larger console out of multiple XRM, XR-20/24 or combinations of all types. Similar to the Solo-Link description, "Slave" mixers can be fed to "Master" mixers by using standard, shielded XLR cables to tie the Slave balanced outputs to the Master mixer's bus inputs. The Slave outputs (still controlled by their our master faders) are fed to the Master mixer as a sub-mix. No additional inputs are taken up, the bus inputs allow for easy expansion.

AC Input

The XRM uses an internal switching power supply which is capable of accepting a wide range of line voltages. This industry-standard IEC connector will mate up with any of the common IEC line cords. The incoming voltage can be anywhere between 100 and 240 volts, +/- 10%. The AC mains frequency can be 50 Hz or 60 Hz.

Connector Pinout detail

The rear panel of the XRM is screened with the pinout and electrical details of the I/O connectors. It is reprinted here for your reference.

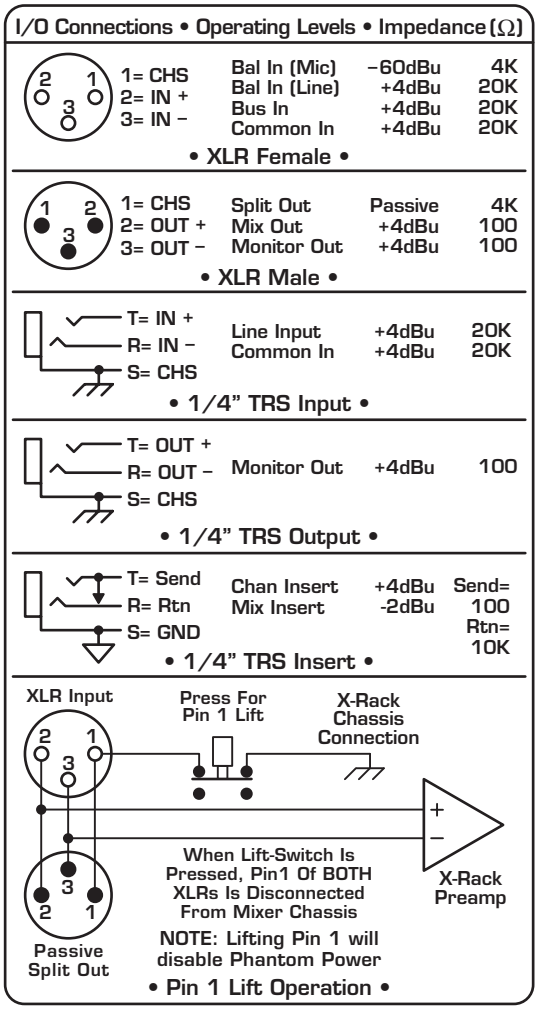
XRM Internal Options

The Input Channels have various options that can be selected. If specified at time of order, the factory will set-up the XRM with the user's desired settings. If configured from the factory, the appropriate check-box will be marked, showing which option was changed, and what it was changed to.

Mix 1-4 PRE: This PRE source is normally Pre-fader. It can be changed to Pre-Insert or Pre-EQ

PRE-Follow Mute: Normally, the PRE signal (no matter what the source) will be muted when the main channel is muted (MUTE sw depressed). An option allows the PRE source to ignore the channel mute and be active (ON) at all times.

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Specifications

Frequency response	+0/-0.5dB 20Hz-20kHz ref 1kHz (any input to any output)
THD+noise	any output <0.01% THD 20Hz-20kHz@ +15dBu out
Noise	mic ein: better than –128dBu 20Hz to 20kHz 150 ohm source, 60dB gain Bus Noise: better than -85dBu
Crosstalk/Shutoff	All Crosstalk measurements: 20Hz to 20kHz BW Channel Mute >90dB Channel Fader attenuation >90dB Mix Send attenuation >85dB
Phase Shift	< +/- 30 degrees, 20Hz to 20kHz – mic-in to mix out
XLR In	F-XLR 4k ohm balanced max voltage gain to mix outs = 92dB
Split Out	M-XLR 4k ohm balanced Passive "Y-Split" of XLR In
Line-in TRS	>10k Ohms balanced
XLR/TRS Com Input	>10k Ohms balanced
Bus inputs	>10k Ohms balanced
Mix outputs	XLR 100 ohms balanced
Mntr outputs	XLR & TRS 100 ohms balanced
Headphones	Stereo, Intended to drive > eight-ohms
Dimensions	17.5" in height (10u) x 19" in width x 4.5" in depth behind panel
Weight	30 pounds
Internal Power Supply	100 -240 VAC, 50/60 Hz
Warranty	Five Years

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XRM owner's manual
Version 1.01 May 28, 2002

Crest P/N D7000028

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