



# MARK 1 SERIES MONAURAL MIXERS

## OPERATOR'S GUIDE

For 6, 9 & 12 Channel Versions



### SPECS

#### Frequency Response:

20 Hz - 20 kHz + 2 dB @ 2v RMS output (+8 dBm)

#### Total Harmonic Distortion:

0.1% THD 20 Hz - 10 kHz @ 2v RMS output (+8 dBm)

#### Equivalent Input Noise:

Low Z input, -123 dBv @ 150 Ohms (0.7 uV)

High Z input, -80 dB below 2V RMS @ 20 dB gain

#### Inputs:

Low impedance unbalanced microphone 600 Ohm (cannon plug)

High impedance unbalanced line 50 K Ohm (phono plug)

#### Input Attenuator:

Continuously variable from 0 dB to -40 dB operational on mic or line inputs

Total gain of mixer @ 0 dB attenuation = 60 dB

#### Outputs:

Main & Monitor

Unbalanced, 5v RMS into 10 K Ohms, 2v RMS into 600 Ohms (+8 dBm)

**Effects High:** Unbalanced, 2v RMS into 10 K Ohms

**Effects Low:** Unbalanced, 0.4v RMS into 10 K Ohms

#### Equalization:

Infinitely variable boost & cut, 15 dB @ 100 Hz & 5 kHz ea. channel

15 dB @ 50 Hz & 10 kHz Master

#### Effects:

Built-in reverb unit with contour control, effects out & return capability for external effects units

**WARNING:** To prevent electrical shock or fire hazard, do not expose this appliance to rain or moisture.

# Mark 1 Series

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**INPUT CIRCUITRY** - In order for a mixer to be flexible in different applications, it must have the capability to control the sensitivity of the input circuitry of each channel. This requires a gain control, sometimes called a pad. Some mics and signal sources can be at such a level as to overdrive or clip the input circuitry of a mixer. The gain control allows the operator to reduce the input gain when input clipping occurs.

In use, the operator must adjust the input gain in such a manner that clipping is avoided. This can easily be done by setting up the channel with the highest expected input signal level and adjusting the input gain so that no clipping or distortion is heard from the speaker system. After the mixer has been used several times, the operator will have a very good idea of the signal levels encountered and will be able to set up accordingly. The different types of microphones will have different output levels and different performers will get widely varying levels from mics depending on the strength of their voices and/or their basic "mic techniques".

The input gain should be operated in the position yielding the least attenuation required to avoid clipping. Operation in this mode allows maximum gain to be utilized in the input preamp where it is most efficiently obtained. Excessive input padding sometimes makes necessary higher settings of the channel level controls and/or master control thus yielding a less than optimum signal-to-noise ratio for any given situation.

It is important to realize that not all "breakup" is caused by the mic signal overloading the input stage of the mixer. If the performer's mic technique includes very close and/or very loud situations, the internal elements of the mic can "bottom out" or distort just as a loudspeaker can when it is overdriven. Quite a few of the mics now used by performers lack the dynamic range required to adequately handle the tremendous sound pressure levels encountered in a very loud rock and roll concert situation. It is vital for the professional soundman and the musicians to be aware of the limitations of the various links in the audio system in order to correctly diagnose and solve the various problems encountered in a sound reinforcement situation.

Overall, the input gain is the first control in the circuit and must be set up properly in order for the remaining circuits to function properly. "Common sense" and experience on several jobs will allow the operator to achieve superb results in virtually any mixing situation.

The **MONITOR SEND CONTROL** is the channel mixing element for determining the all-important monitor mix. The signal for the monitor send is obtained right after the input preamp and before the channel EQ. This is referred to as a Monitor Pre-send Control, i.e., it is before or pre to the channel equalization and slider level control. This makes it independent of these controls, meaning that any changes made to the EQ or channel level will not affect the monitor system. Having the monitor send with the pre capability is absolutely vital to avoid feedback of the monitor system when EQ and normal incremental output variations are made in the channel fader during the course of the performance.

**EQUALIZATION** - The equalization circuitry is the latest active type utilizing negative feedback technology. We selected circuitry that produces a "shelving" type of action because the conventional type circuitry used by some manufacturers tends to create erratic, or sometimes harsh sounding results when in the near-maximum boost positions. These two equalization controls will produce extremely smooth action as well as giving effective tone control. Experience will show their utility in achieving professional channel equalization on the job.

It should be remembered that these active equalization circuits are a form of "electronic crossover" in which the equalization controls are similar to level controls for their respective frequency bands.

Generally, it is poor operating practice to use both equalizer controls in the deep cut (counter-clockwise) positions since this results in substantially lower gain from the channel. It should be remembered that the balance of highs and lows is a relative situation, cutting overall channel gain should properly be done by the output slide attenuator for input attenuator.

The **LOW FREQUENCY EQUALIZER** is capable of better than 15 dB boost or cut @ 100 Hz with a sloping characteristic exhibited up to the crossover point. The shelving action of this control has proven to yield a much more satisfying and effective equalization characteristic than some of the "wide open" equalization circuits claiming 20-25 dB boost and cut. The action of this equalization control is conventional and should present no problem in operation. Boost is obtained in the righthand (clockwise) position while cut is obtained in the lefthand (counter-clockwise) position. The vertical (12 o'clock) position yields a flat (no boost or cut) response and is the position from which all tonal balancing should be started.

The **HIGH FREQUENCY EQUALIZER** is capable of 15 dB boost or cut @ 5 kHz with a shelving characteristic sloping down to the crossover point. The boost or cut action of this control is very similar to that of the low equalizer with the exception of its high frequency effect. Boost is obtained to the right of the center position. Flat response is obtained in the center (12 o'clock) position.

Caution should be exercised in using extreme low-frequency boost to avoid emphasizing objectionable wind noises or rumble from the microphone as well as any hum that might enter the mixer from external sources. Excessive treble boost should be avoided to keep residual noise from the amplification circuitry to a reasonable level as well as to avoid a strident or screeching tonality in the output program material.

In sound reinforcement, there is nothing holy about an entirely flat equalization setting. If it is necessary to use moderate amounts of equalization, then you should be willing to do so, considering that the "ideal" flat settings are almost never used, even in the recording studio, and even less often in most sound reinforcement applications.

The **EFFECTS SEND CONTROL** is the channel level for determining the amount of signal from each respective channel to be sent to the effects output or to be mixed into the reverb summing buss. The effects send circuit has been designed to provide multiple functions which will be explained further in the master control section.

The CHANNEL LEVEL SLIDER is the output control that determines the mix into the main summing buss. Its calibration is in decibels of attenuation and this is why the numbering sequences goes from off (infinity) or maximum attenuation to zero (0), or no attenuation. Remember that attenuation is the cutting or reduction of the signal level i.e., the more attenuation, the more you have cut down the signal level. The output fader is calibrated in accordance with standard practice for professional audio equipment.

Proper setting of the input gain (pad) should produce adequate gain within the input preamp to allow slider settings approximately in the center (approximately -20 dB). You should also remember that the input gain will most definitely influence the settings for the output slider with any given input signal. The input gain should be adjusted for the maximum gain that will allow distortion free performance, then the output slider level should be adjusted for proper mix.

It is very poor operating practice to use the input pads in the extreme cut positions and then have to set the output sliders in their close to maximum positions to obtain adequate channel output. This type of operation results in less than optimum signal-to-noise ratios as well as contributing to headroom problems. As with any system, "common sense" must be combined with operating knowledge to produce satisfactory results. Overall, the channel controls should be set to provide a reasonable amount of "adjustment" i.e., none of the gain controlling elements should be operated near their extreme up or down positions. After several hours usage, the operator will have acquired a good "feel" for the characteristics of the controls and should be able to suitably handle any mixdown situation encountered in the field with satisfactory results.

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MASTER AREA - The master area of the Mark 1 Series contains all the master or final output controls for the mixing busses. The main mixing buss equalization features shelving type high and low EQ. The Effects level is the master control for the effects mixing buss.

The master level controls should be set in such a manner that they are close to the center of their travel to take advantage of maximum control action. It is poor practice to run the channel levels up near maximum and then run the main levels near the low end to achieve the desired output. Operation in this manner will cause the operator to lose his "range" in control action with all the gain located in one element while the other is near its stop position. Best practice calls for most controls to be operated in the middle of their operating range to allow maximum mixing control margins (travel). Remember, that while mixing, it is important to allow yourself adequate margins within which to operate and by using any of the controls in their extreme (close to the stop) positions, you have effectively reduced your range. This manner of operation also tends to create "headroom" problems.

These master controls allow the operator complete flexibility for functions and should allow almost any mixing situation to be handled. As with any reasonably complex system, experience and operator knowledge of the equipment are essential for satisfactory performance. The mixer, like the musician's instrument, should be practiced on and learned. To properly operate a mixer during a performance requires thorough knowledge and trained reflexes to allow proper responses under the stress of demanding and sometimes sudden situations.

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The MASTER OUTPUT LEVEL is the control that determines the main output level for the output connectors located on the rear panel. The main summing amp, as well as the other two summing busses, are of the very latest "zero null" type using negative feedback to achieve maximum dynamic range, lowest noise, and crosstalk. The master fader should be operated in accord with the proper operating practices as outlined above.

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The MASTER LOW FREQUENCY EQUALIZER is capable of 15 dB boost or cut @ 50 Hz. This equalizer is similar to those used in the individual channels and is designed to exhibit a "Shelving" characteristic which has proven to yield the best results in this type application. The controls are "flat" with no boost or cut in the straight up (12 o'clock) position with boost being obtained in the righthand (clockwise) position.

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The MASTER HIGH FREQUENCY EQUALIZER is capable of 15 dB boost or cut @ 10 kHz and is designed to exhibit a "shelving" characteristic. The operation of this EQ control is similar to the low EQ with the exception of the fact that it controls the high frequency portion of the audio spectrum.

The important thing to keep in mind about the equalization on the Mark 1 mixers is that each channel is provided with its own set of EQ controls to correct problems in that particular channel, while Master EQ is provided to allow for overall tonal balance and feedback control. We have not included this equalization system to allow tremendous boost or cut but rather to allow incremental EQ where it is needed. You must use common sense in the use of these controls in order to achieve satisfactory tonal balance and intelligibility.

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The EFFECTS LEVEL is the control that determines the overall signal output level for the effects send buss. This effects buss has two output connectors associated with it, one is a high level output that can be used to drive a power amplifier for an additional monitor system and the other is a low level output designed to drive the input of an effects device such as an echo unit, phasor, digital delay line, etc. In addition to driving the high and low level effects outputs, the effects level control also determines the drive to the internal reverb delay line. This effects level control must be adjusted so that the output level from the jack on the rear panel does not overload the input circuitry of the effects unit you are driving, thus causing clipping or other forms of distortion. This is especially critical on some of the special effects units that are designed to work with guitars or other instruments with relatively low output levels.

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The REVERB RETURN is the gain control element for the reverb system. The signal coming from the reverb delay lines is amplified and the gain or amount of signal sent to the main summing buss is controlled by the reverb return.

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The REVERB CONTOUR is the control used to vary the tonality of the reverb signal and is a low cut type equalizer. This contour control is very useful in tailoring the reverb sound and in controlling reverb induced feedback. Balancing these reverb controls will yield many combinations of reverb delay, tonality, and sustain.

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The EFFECTS RETURN LEVEL control is provided for varying the input levels mixed into the main mixing buss from the effects return input jack provided on the rear panel. The effects return input jack allows signals from mics or effects units to be patched directly into the main mixing buss. This control may be considered a separate channel whose output is blended into the main mix just as the individual channels are.



The MONITOR MASTER FADER is the output level control for the main monitor system. The same operating practices should be observed when using this control as when using the main channel controls. The individual channel monitor send controls should be set in such a manner that will allow the monitor master slider (fader) to be operated somewhere in the middle of its travel to allow yourself adequate control margins, up or down, as might be required on the job. The monitor output signal is flat, that is, we did not include equalization for the monitor since this equalization is usually external to the mixer and is best performed on the stage itself, which is generally at some considerable distance from the mixer. It is because the mixer is usually located remotely from the performing area that it is sometimes difficult for the monitor equalization to be performed at the mixer.

The METER SET CONTROL enables the VU meter to be adjusted for proper indication with any power amplifier, tape recorder, or other equipment driven by the mixer. If your power amp, tape recorder, etc... has VU meters, the level set control can be adjusted to track the VU meter with a constant input signal, i.e., set the meter to read "0" VU at the same level as the external equipment's VU does. With equipment that has LED overload indicators, the meter should be set to zero VU at the point where the LED peak overload indicator initially lights up.

If the equipment being fed by the mixer has no maximum level indicator you should refer any adjustment of VU meters to a properly equipped sound technician to avoid problems in matching VU readings with maximum output and/or modulation.

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**REAR PANEL** - The rear panel features a complete patching panel for various output and input functions, as well as the microphone input connectors for each channel.

Each channel's input connectors are labeled with its identification number, as well as an indication of whether the input is for high or low impedance. The high impedance connectors are standard phone jacks. The low impedance connectors are of the cannon type, three conductor connectors to be used for low impedance microphones only, and will accept 150 to 600 ohm mics.

**CAUTION SHOULD BE USED NEVER TO USE THE LOW IMPEDANCE INPUT AND THE HIGH IMPEDANCE INPUTS OF ANY ONE CHANNEL SIMULTANEOUSLY.**

The MAIN AUXILIARY INPUT is the input to the main mixing buss. This input mixes a signal with the main buss at the same point as the individual channels and may be used when patching two mixers together, or whenever an additional signal is added to the main mix. The main auxiliary input can also be thought of as an additional channel and can even be used with a high impedance microphone as a signal source.

The MONITOR AUXILIARY INPUT is the input to the monitor mixing buss. This input mixes a signal with the monitor buss at the same point as the individual channels and is to be used when patching two mixers together or any time access is needed to the monitor buss in order to place a particular signal in the monitor system.

The EFFECTS AUXILIARY INPUT is the input to the effects mixing buss. This input mixes a signal with the effects buss at the same point as the individual channels and is to be used when patching two mixers together or any time access is needed to the effects mixing buss.

The EFFECTS RETURN is the input jack for patching in external signals of various kinds. This input is high impedance with adequate gain to handle low level signal sources such as certain echo units and high impedance mics. Actually, this input is an additional channel without equalization or sends that feeds into the main mixing buss as do the other channels. The level control for this input is the Effects Return located in the front panel master section.

A line output is provided for each channel which derives its signal after the input attenuator and prior to the equalization circuitry. This output is of the unbalanced, low impedance (less than 1000 Ohms) configuration.

The MAIN OUTPUTS are located on the rear panel and are standard ¼ phone jacks. The outputs are unbalanced and are capable of 5 volts RMS into 10K ohms load impedance. These levels are capable of driving most commercial power amplifiers or other auxiliary equipment to full performance by a wide margin and should allow a more than adequate amount of headroom in nearly any application.

The MONITOR OUTPUTS are unbalanced and are capable of 5 volts RMS into 10K ohms load impedance.

The EFFECTS HIGH OUTPUT is capable of 2 volts RMS into 10K ohms load and can be used to drive an additional power amplifier and speaker system from the effects buss to obtain an additional monitor.

The EFFECTS LOW OUTPUT is a lower level signal than the effects high and is intended to drive the input of an effects device such as an echo unit, phasor, etc. It is capable of 0.4 volts RMS into 10K ohms.

Both the effects high and effects low outputs are controlled by the effects level control and both jacks can be used simultaneously.

The REVERB FOOTSWITCH JACK is used with an auxiliary footswitch to enable the operator to defeat the reverb function of the mixer remotely.

The POWER SWITCH is the type that enables the operator to easily reverse the polarity of the line (mains) cable, thus yielding the ability to minimize hum by proper polarization of the power supply (mains) connection. One of the ON positions will result in the lowest hum level and/or the least noise when unbalanced high impedance microphones are used, and this position should be used.

You must polarize the power (mains) supply to achieve maximum performance in each location the mixer is used in.

