

# 7510A

## AUTOMATIC MICROPHONE MIXER



### FEATURES:

- Program-actuated inputs
- Automatic control of output level
- Automatic background noise discrimination
- Expandable to 24 input channels
- +24 dBm output at less than 0.02% THD

The JBL 7510A is a compact microphone mixer that provides up to 24 program-actuated input channels. Output level is automatically adjusted to provide a constant margin of gain before feedback, regardless of how many microphones are active. Each input channel can be switched to a continuously actuated mode, an automatic program-actuated mode, or an automatic override mode.

In the automatic mode, the level-sensing circuitry of the 7510A utilizes a zero-crossing detector and an

ultra-fast rise time to produce completely inaudible turn-on; there are no clicks or pops, and the beginning of words or musical notes are not chopped off. The combination of program-actuated microphones and output level correction offers a constant margin against feedback, difficult to accomplish with a conventional mixer or a compressor/limiter. Manual gain riding is never necessary.

The 7510A is a modular, rack-mountable unit with space for 6 plug-in modules, each containing full electronics, controls, and connections for 4 balanced microphone inputs. The 7510A is supplied with 4 inputs installed. The front panel is fully labeled for the maximum of 24 input channels; unused input positions are covered by blank panels. The mainframe is fully wired, making it easy to install additional modules at any time. The monophonic

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output section includes a large VU meter, a Master Gain control, and a balanced +4 dBm (ref. 600 ohm) output with a male XL-type connector. Each input channel has a multi-function direct output ¼ inch phone jack, providing a normal through connection between the booster amplifier output and the summing buses. Insertion of a ¼ inch ring, tip, and sleeve phone plug into the phone jack breaks the normal through connection, and provides both a nominal +4 dBv unbalanced direct output and a nominal +4 dBv unbalanced input to the summing buses, suitable for feeding a signal to and receiving a signal from, an external signal processor.

Each plug-in module has a 15-pin remote control connector for providing external gain adjustment of 49 dB for the preamplifier stage of each of four balanced inputs. When the gain is properly adjusted, it provides the best combination of headroom versus noise between the low output of a dynamic microphone to the high output of a tape recorder. The remote control connector has provisions for providing TTL level on/off logic for each of the four channels. This on/off logic provides a suitable means for switching speakers on and off, starting and stopping a tape recorder, or switching other external equipment—all by activating an associated input channel.

Other features of the 7510A include built-in 48 volt phantom power with on/off switch for condenser microphones, an auxiliary input which can be used for line level signals such as tape recorders or a return for the direct outputs sent to a signal processor. The gain for each input is set manually, and the 7510A has a Master Gain control for the output level.

Two or more 7510A automatic mixers may be connected together with the JBL interface system. Connection to the JBL interface system is via the interface connector on the output module and provides interface such that all functions of the 7510A are connected together and all operate as one unit.

The JBL Model 7510A is an ideal choice as the main mixer in private or public meeting rooms, courtrooms, houses of worship, restaurants, small clubs, and other similar installations. In addition, it is also an excellent tool for the sophisticated recording studio, theater, concert sound reinforcement, and broadcaster.

## TECHNICAL INFORMATION

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Each input of the 7510A can be set for any of three operating modes: ON, in which the input functions as a conventional mixer; AUTOMATIC, in which the input is actuated by the presence of a program source; and PRIORITY, in which the input is also program-actuated, but will override inputs in the Auto-

matic mode.

The 7510A achieves its performance through a unique combination of digital and analog circuitry. In the program-actuated modes, digital logic circuits compare those sounds present at all microphones (background noise) with those originating from a specific microphone (program). The threshold for discrimination between background noise and program is adjustable by means of a front-panel control. This threshold is relative, varying with the ambient sound level. The attack time is dependent on how soon a zero crossing occurs after the signal first exceeds the threshold level; it corresponds to a half-cycle from 20 Hz-20 kHz. Because rise time is just 30 to 60 ns and occurs within the half-cycle of detection, and turn-on is effected while zero output voltage is present, input actuation is totally inaudible. Even the sharpest musical transient is accommodated. Release time is continuously adjustable from 100 ms to 5s.

When an input channel is actuated, it not only feeds an audio (analog) signal to the audio mixing bus and summing amp, it also feeds a digital signal to the digital mixing bus and summing amp. The digital summing amp keeps track of how many input channels are live from moment to moment; it feeds this information to an 8 bit digital attenuator, which is programmed to reduce the gain by 3 dB for each doubling of the number of live input channels. The actual gain reduction is logarithmically scaled and is incremented for each additional live input channel to provide a constant system level, reducing the possibility of feedback as the number of live microphones increases.

The 7510A offers significant advantages over a compressor/limiter. When set to prevent system feedback, such components reduce output gain in response to input level increases, whether those increases result from the activation of additional microphones or increased level from one microphone. Compressor/limiters thus affect program dynamics to an unnatural degree. Compressors also increase output gain when input level is reduced, resulting in audible "breathing" as the background noise level increases. The 7510A turns off unused microphones, so there is no increase in background noise.

## SPECIALIZED APPLICATIONS

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The 7510A is an ideal mixer for any situation requiring multiple microphones with differing demands on each. For instance, in a meeting room, the chairperson's microphone can be set on PRIORITY mode, allowing him or her to override any other

speaker. In a house of worship, it will prevent excess ambient noise (which causes the sound to have a "hollow" quality) from getting into the sound system.

The 7510A can also be used as a very fast, high-quality noise gate. This has particular application in the recording studio, where it can improve the clarity from closely placed, multi-mic set-ups, and in concert

sound reinforcement, where it can increase the overall system gain before feedback.

All of the 7510A's functions are automatic. It requires no attention, no manual gain riding, once it has been adjusted, freeing the sound technician for other concerns.

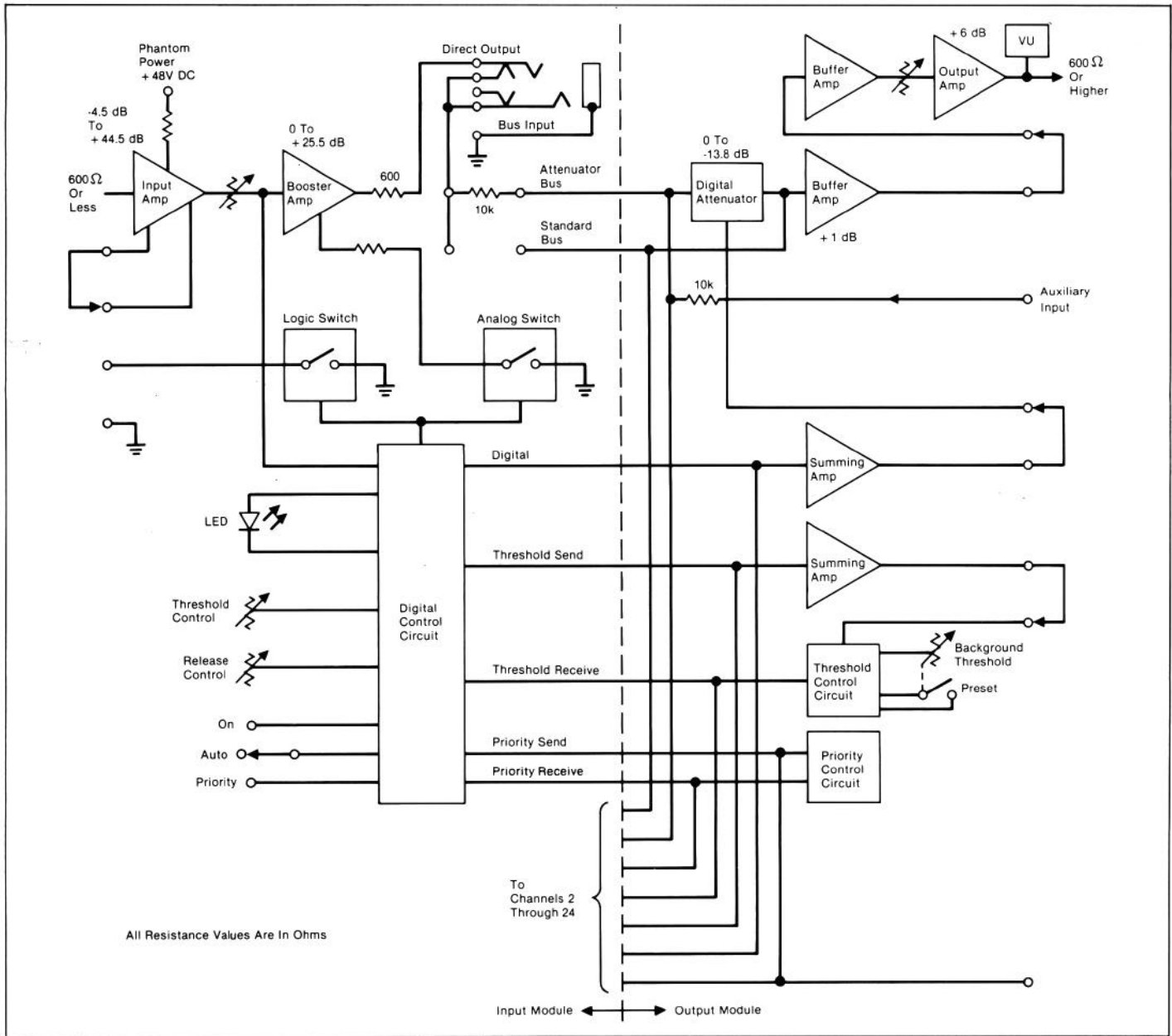
## SPECIFICATIONS:

Maximum Gain:	
Input Module:	Adjustable, 15 dB to 64 dB (600 ohm load) Adjustable, 21 dB to 70 dB (10 kilohm load)
Output Module:	7 dB (600 ohm or higher load)
Overall System:	77 dB (600 ohm or higher load)
Main Output Characteristics:	
Actual Impedance:	Less than 0.5 ohm 20 Hz to 20 kHz
Load Impedance:	For 600 ohm or higher loads
Maximum Output Level:	+24 dBm
Common Mode Output Impedance:	10 kilohm
Direct Output Characteristics:	
Actual Impedance:	600 ohm unbalanced
Load Impedance:	For 600 ohm or higher loads
Maximum Output Level:	+14 dBm (600 ohm load) +20 dBv (10 kilohm load)
Input Characteristics:	
Actual Impedance:	Greater than 10 kilohm (20 Hz to 20 kHz unbalanced)
Source Impedance:	0 ohm to 600 ohm
Nominal Input Level:	Adjustable, 2.5 mV RMS (-50 dBv) to 0.7 V RMS (-1 dBv)
Input Overload:	Adjustable, 45 mV RMS (-25 dBv) to 6.13 V RMS (+18 dBv)
Aux Input Characteristics:	
Actual Impedance:	10 kilohm ( $\pm 5\%$ ) unbalanced
Source Impedance:	0 ohm to 10 kilohm
Nominal Input Level:	+4 dBv typical
Input Overload:	7.75 V RMS (+20 dBv)
Frequency Response:	
Input Module:	+0, -0.5 dB 20 Hz to 20 kHz
Output Module:	+0, -0.5 dB 20 Hz to 20 kHz
Overall System:	+0, -0.5 dB 20 Hz to 20 kHz
Total Harmonic Distortion:	
Input to Direct Output:	0.02% maximum 20 Hz to 20 kHz at +20 dBv
Input to Main Output:	0.02% maximum 20 Hz to 20 kHz at +24 dBm
Equivalent Input Noise:	-130 dBv (0 dBv RE, 0.775 V RMS, 50 ohm source)
Automatic Mix Function:	
Input Attack Time:	10 ms to 10 $\mu$ s ( $\frac{1}{2}$ waveform from 20 Hz to 20 kHz after signal exceeds set threshold)
Input Rise Time:	30-60 ns (tolerance for turn-on once attack occurs)
Input Release Time:	100 ms to 5 seconds, adjustable
Channel Attenuation:	25.5 dB
Feedback Prevention:	3 dB for each doubling of inputs

Controls:	
Channel Gain:	Audio taper potentiometer
Master Gain:	Audio taper potentiometer
Channel Threshold:	Screw-adjustable linear taper potentiometer
Background Threshold:	Audio taper potentiometer with CCW switch
Release Time:	Screw-adjustable linear taper potentiometer
Mode Switch:	3 position toggle switch
Power Switch:	Push ON/ Push OFF
Phantom Power Switch:	Slide Switch
Voltage Selector Switch:	Slide Switch
Indicators:	
Channel ON:	Red LED
Power ON:	Green LED
Output Level:	VU meter: 0 VU = +4 dBm output
Power Supply:	115 volts AC switchable to 230 volts AC, $\pm 10\%$ , 50/60 Hz—Internal fuse protection
Connectors:	
Input:	Neutrik NC3FD-V (Female 3 pin panel socket), mating connector—Neutrik NC3MC or switchcraft A3M
Direct Output:	Switchcraft 113BPC ( $\frac{1}{4}$ inch phone jack), mating connector—Switchcraft 267 (3 conductor, ring-tip-sleeve)
Main Output:	Neutrik NC3MD-V (male 3 pin panel socket), mating connector—Neutrik NC3FC or Switchcraft A3F
Remote Control:	AMP HD-20 (15 pin female panel socket), mating connector—AMP 205735-6 or TRW DA-15 P
Interface:	AMP HD-20 (15 pin female panel socket), mating connector—AMP 205735-6 or TRW DA-15 P
AC Power:	Panel components 8843.ZP.30.60; Mating AC line cord—Switchcraft P-2392
Dimensions:	133 mm high x 483 mm wide x 283 mm deep. ( $\frac{5}{16}$ in. high x 19 in. wide x 11 $\frac{1}{8}$ in. deep)
Weight:	
Mainframe with 1 input Module (4 channels) and Output Module:	Net 6.4 kg (14 lb, 3 oz) Shipping 8.2 kg (18 lb, 1 oz)
1 input Module (4 channels):	Net 0.8 kg (1 lb, 11 oz) Shipping 1.3 kg (2 lb, 14 oz)
1 output Module:	Net 2 kg (4 lb, 7 oz) Shipping 2.7 kg (5 lb, 14 oz)
Mounting:	Occupies 3 EIA standard rack spaces
Panel Finish:	Textured semi-gloss baked enamel, dark grey; white nomenclature

# 7510A

7510A Automatic Microphone Mixer Signal Flow/Block Diagram.



Rear panel view

