

---

# TOA ENGINEERED SOUND SYSTEM

---

# AUTOMATIC MIXER

---

## AX-1000A

---



### DESCRIPTION

The TOA AX-1000A automatic microphone mixer is ideally suited for applications such as churches, board rooms, conference rooms or courtrooms, where multiple microphones are in use.

Conventional mixers require an increase in total level as the number of input connections increases. The room loop from speakers to microphones not currently in use causes the feedback margin to be lowered.

The US. patented Automatic Mixer Apparatus (U.S. Patent No. 5148491) on The TOA AX-1000A compensates for each input, thus doing away with unwanted noise and room loops. The increase in total level is proportional to the number of inputs, and attenuation takes place regardless of the input quantity. This makes it possible to maintain maximum feedback margin without having to rely on a specialist to operate the system.

The AX-1000A is a modular eight-channel automatic microphone mixer incorporating the technology required to gate on, configured to shut out unnecessary sound, or to gate off quietly, quickly and automatically.

The NOM (Number of Open Microphones) attenuation control circuitry automatically adjusts gain level according to the number of active inputs. This allows the system to deliver maximum acoustic gain while preventing feedback.

Each of the AX-1000A's eight input ports can accept any of TOA's 900 Series family of Microphone, Line Level, Auxiliary, Bridging, Input/Output (except T-01) or Sound Processing Modules. This allows the contractor or specifying engineer ultimate flexibility in system design. Ten (10) AX-1000A's may be linked together to create a system with a maximum of eighty (80) active input channels. When units are in link mode, any mixer in the chain can operate as the

master. This is accomplished by utilizing the Master/Slave switch on the rear panel. In addition to the main output, the AX-1000A provides direct and logic outputs for each channel. The Logic Out is an open collector circuit that can be utilized to trigger external devices.

The direct output can be used as an input for a logging recorder to provide an account of the proceedings in a courtroom communication system.

For flexibility and ease of set-up, each channel is provided with input volume, threshold and off-attenuation controls. The Threshold Level control adjusts the level at which the input gates on. The Off-Attenuation control allows attenuation of inactive inputs from 0 to -40dB. In addition, it allows the adjustment necessary to assure smooth turn on without any missed syllables.

The input remains on when the Off-Attenuation control is set at 0dB.

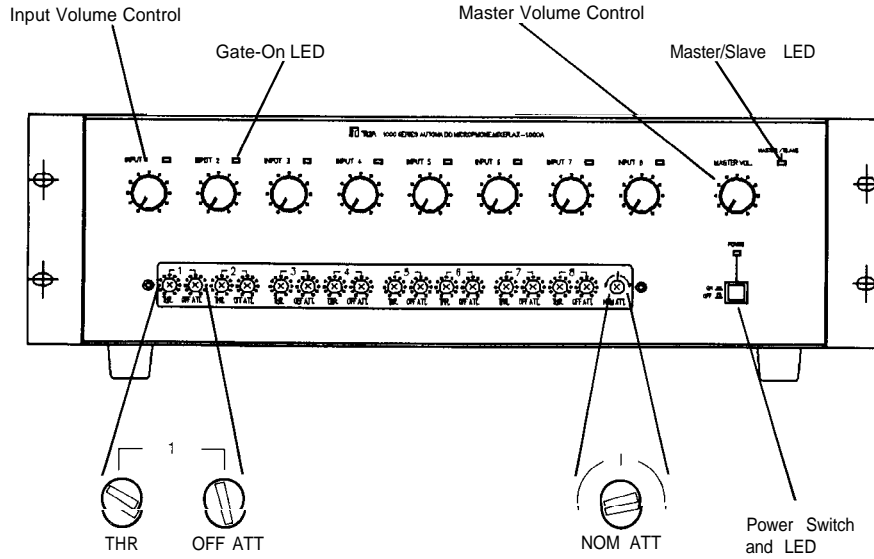
To match virtually any type of application, the NOM attenuation control permits adjustments between 0dB (functioning as a standard mixer) and 20logNOM (6dB attenuation for each additional active input). The center 10logNOM position (3dB attenuation for each additional input) is the standard automatic setting.

Other features include Muting, especially attractive in conference systems where the chairman must override other delegates, and a Master Remote Volume control circuit.

The Off-Attenuation, Threshold and NOM-Attenuation controls are protected by a security cover to prevent unauthorized or unnecessary adjustments.

The AX-1000A includes the hardware necessary for mounting in standard 19" equipment cabinets.

# Front View



## Channel Controls:

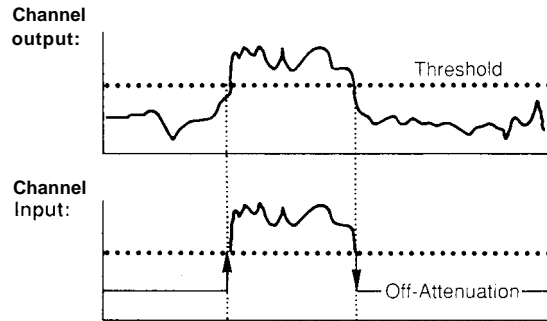
Variable Threshold

Each threshold control adjusts its channels detector, raising and lowering the baseline sensitivity to an incoming signal. It determines how easily the input will gate on. Threshold is independent of the Off-Attenuation setting.

Variable Off-Attenuation

This control, permitting continuous adjustment of a channels Off-Attenuation (depth), operates from 0dB (full CW) to -40dB (full CCW). In the 0dB position, the channel acts as a conventional mixer input. At that setting there is no attenuation of the input whether it is above or below threshold.

## Relation of Threshold and Off-Attenuation Controls (simplified):

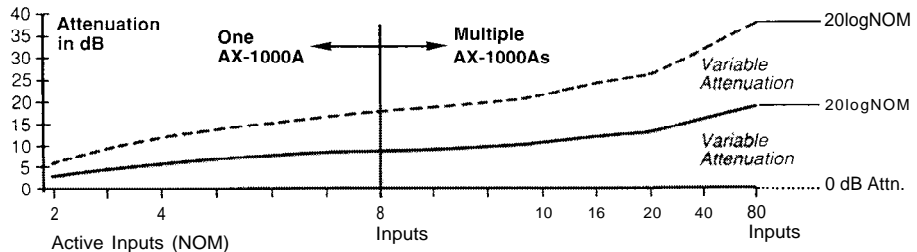


## System Output Gain:

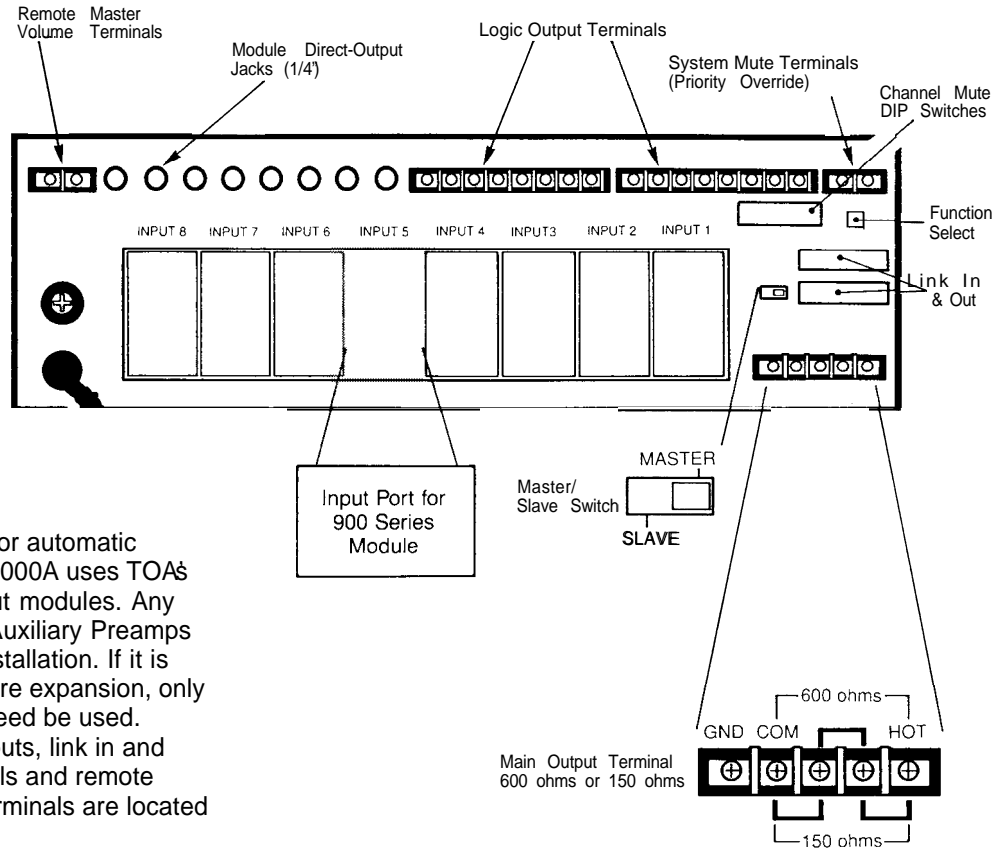
Adjustable NOM Attenuation

Automatic gain reduction is continuously variable from none to  $20\log\text{NOMdB}$ . (NOM=Number of Open Mics.) At the center detent, the attenuation of system output gain follows the standard formula " $10\log\text{NOM}$ ". When the control is moved clockwise, the attenuation is deeper, moving from  $10\log\text{NOM}$  to  $12\log\text{NOM}$ ,  $15\log\text{NOM}$ , etc.

Attenuation is at a maximum fully clockwise, following the formula  $20\log\text{NOM}$ . With the control set fully counterclockwise there is no system output gain attenuation and the AX-1000A functions as a normal mic/line mixer. Between no attenuation and the detent, output gain is attenuated more and more up to  $10\log\text{NOM}$ .



# Rear View



## Modular Inputs

In a significant advance for automatic mixing systems, the AX-1000A uses TOA's standard 900 Series input modules. Any combination of Mic and Auxiliary Preamps can be specified in an installation. If it is important to allow for future expansion, only a few of the input ports need be used. Logic outputs, direct outputs, link in and out, system mute terminals and remote master volume control terminals are located on the rear panel.

## System Mute (Priority Override)

A DIP switch determines which channels are muted when the two rear-panel mute terminals are shorted by a relay or switch closure. AX-1000A Internal Muting occurs within the mixer, after the signal has left the input module itself. Thus, any 900 Series input module will be muted when the contacts are closed. The module does not have to be a 900 Series muting module. In fact, by using 900 Series muting modules, two levels of muting are possible. The first level can be automated. It utilizes the Mute Send and Mute Receive features of certain 900 Modules. The second level utilizes the Internal Mute built into the AX-1000A.

## Direct Outputs

Each channel's Direct Output provides a signal from the corresponding module. It has been processed by the preamplifier and other circuitry in the module itself, including, for example, compression in the case of the U-61 module. However, the Direct Output signal is unaffected by the action of the AX-1000A's gating, muting, or gain-sharing circuits.

## Logic Outputs

Each channel's Logic Output is an open-collector circuit. The logic outputs may be connected to relays for automatic initiation of events in an automatic zonal switching system, triggering video camera controls, etc.

## Link In and Out

When AX-1000A mixers are run in multiple, one of the mixers operates as the Master and the rest operate as Slaves. The Master/Slave relationship is determined by the rear-panel slide switch. The Master is connected to the Slaves using the Link In and Out connectors. An optional Link cable is available.

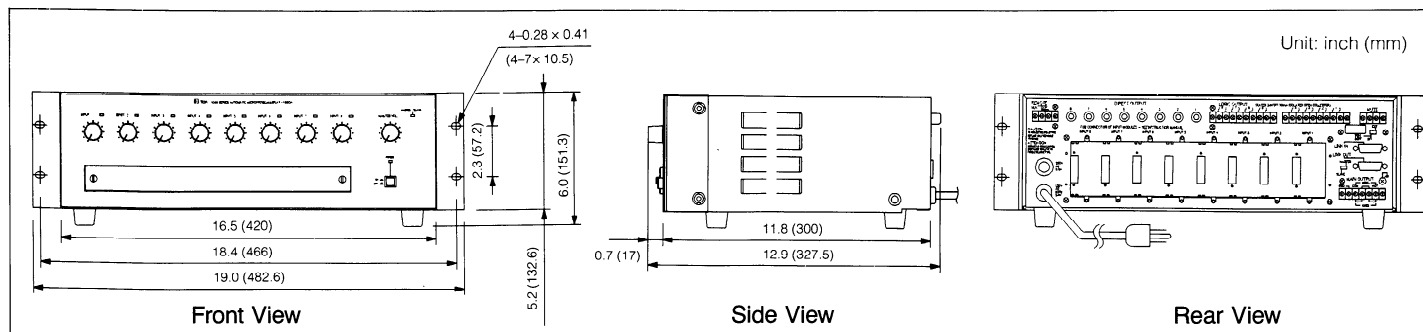
## Main Output

The Main Output barrier strip can be configured for 150 ohms or 600 ohms operation by moving the jumpers (provided).

# 900 Series Plug-In Modules Specifications & Selection Guide

Applications			Specifications													Connector						
			Module Types	Source Impedance	Input Sensitivity for Rated Output (-20dBV/100mV)	Gain	Max. Before Clip into 10k ohms load as less than 0.5% THD (1kHz)	Frequency Response ±1dB	Noise Level Equivalent Input Noise or S/N	Signal Muting Level	Remote Control Range	Compress. Range [Threshold]	Power Requirement [24V DC]	Controls [Pre-settable]	Weight (Max.)	XLR-3-13 (F)*	XLR-3-14 (M)*	Phone Jack (P)*	RCA Phono Jack (R)*	3P screw Terminal (S)	5P screw Terminal (S)	
Microphone Preamplifier	Low Z Gain Control (except M-61) Low-cut Filter High-cut Filter (except for M-51) Phantom Power	Mute or M-11	M-01 series	Balanced 200 ohms	Nominal - 60dBV (1.0mV) Adjustable - 72 ~ - 52dBV (0.25 ~ 25mV)	Nominal 40dB Adjustable 52 ~ 32dB	6.3V (+ 16dBV)	25 ~ 20,000Hz	- 126dBm, 200 ohms terminated	-	0 ~ -60dB	-	-	9mA	1-Low cut 1-High cut 1-Gain	3.88 oz.	M-01F	M-01M	M-01P	-	M-01S	-
		Remote Volume Control facilities	M-21											14mA	2.82 oz.	-	-	-	-	M-11S	-	
		Voice Gate	M-51 series											30mA	3.17 oz.	-	-	-	-	-	M-21S	-
		Compressor	M-61 series											27mA	3.88 oz.	M-51 F	-	-	-	M-51s	-	
	High Z, Gain Control, Low-cut and High-cut Filters	-	M-03	Unbalanced 50k ohms	Nominal - 50dBV (3.2mV) Adjustable - 62 ~ - 42dBV (0.8 - 8.0mV)	Nominal 30dB Adjustable 42 ~ 22dB	6.3V (+ 16dBV)	20 ~ 20,000Hz	SIN 70dB	-	-	-	20dB Threshold adjustable 0.5 ~ 5mV	33mA	1-Low cut 1-High cut 1-Threshold	3.88 oz.	M-61 F	-	-	-	M-61S	-
Mag. Phono Preamplifier	Gain Control	-	R-01	Unbalanced 50k ohms	Nominal - 54dBV (2.0mV) Adjustable - 54 ~ -46dBV (2.0 ~ 5.0mV)	Nominal 34dB Adjustable 34 ~ 26dB	6.3V (+ 16dBV)	RIAA Equalized	SIN 70dB	-	-	-	9mA	1-Gain	1.76 oz.	-	-	-	R-01R	-	-	
Auxiliary Preamplifier	Gain Control	Mute	U-01 series	Unbalanced 220k ohms	Nominal - 20dBV (100mV) Adjustable - 20 ~ + 10dBV (100 ~ 3,200mV)	Nominal 0dB Adjustable 0 ~ - 30dB	6.3V (+ 16dBV)	20 ~ 20,000Hz	S/N 90dB	60dB	Adjustable 0 ~ 60dB	-	-	4mA	1-Gain	2.65 oz.	U-01F	-	U-01P	U-01R	U-01S	-
		Variable Mute	U-12											14mA	1.76 oz.	-	-	-	U-11R	U-11S	-	
		Remote Volume or Remote Master Volume Control facilities	U-21											27mA	1.76 oz.	-	-	-	-	U-12S	-	
		Compressor	U-61											27mA	2.12 oz.	-	-	-	-	-	U-21s	-
	Auxiliary Input Line output	Output Gain Control Input Gain Control	-	T-02	AUX Unbalanced 220k ohms LINE OUT [Output Balanced 600 ohms]	Rated output 0dBV (1.0V) Nominal - 20dBV (100mV) Adjustable - 20 ~ 0dBV (100 ~ 1,000mV)	Nominal 0dB Adjustable 0 ~ - 20dB	6.3V (+ 16dBV)	20 ~ 20,000Hz	S/N 90dB	-	-	20dB Threshold 1.0V	38mA	1-input gain 1-Output gain	3.70 oz.	-	-	-	-	-	T-02S
Bridging Transformer	Mute	B-01 series	Balanced 10k ohms	- 18dBV (125mV)	- 1dB	-	20 ~ 20,000Hz	-	-	-	-	-	-	-	3.17 oz.	B-01 F	-	B-01P	-	B-01S	-	
	Gain Control	B-11 series	Balanced 600 ohms	- 18dBV (125mV)	- 2dB	-	20 ~ 20,000Hz	-	60dB	-	-	-	5mA	-	3.35 oz.	-	-	-	-	B-11S	-	
Line Matching Transformer	Mute	L-01 series	Balanced 600 ohms	- 18dBV (125mV)	-	-	20 ~ 20,000Hz	-	60dB	-	-	-	-	-	3.17 oz.	L-01 F	-	L-01P	-	L-01S	-	
	Sensitivity Control	Signal Activated Mute	L-41	- 18dBV (125mV) [Min. 15mV to activate mute function]	-	-	20 ~ 20,000Hz	-	60dB	-	-	-	8.5mA	1-Sensitivity	3.35 oz.	-	-	-	-	L-41S	-	
Paging Input	Gain Control Mute Delay Control	-	I-01	Balanced 600 ohms	Nominal 3.2V Adjustable 3.2 ~ 10V	Nominal - 30dB Adjustable - 30 ~ - 40dB	-	500 ~ 20,000Hz Low-cut 250Hz	-	-	-	-	15mA	1-Mute 1-Gain	3.53 oz.	-	-	-	-	-	I-01S	
Line Output	Gain Control	-	T-01	[Output Balanced 600 ohms]	-	Nominal 20dB (1.0V output) Adjustable 20 ~ 4dB (1.0V ~ 158mV)	6.3V (+ 16dBV) 4.7V (+ 13.4dBV) into 600 ohms load	30 ~ 20,000Hz	S/N 80dB	-	-	-	35mA	1-Gain	3.53 oz.	-	-	-	-	T-01S	-	
Tone Signal Generator	Gain Control	1 kHz Sine Wave	S-01	-	-	-	0.5V (- 6dBV) 0.5% THD	-	-	-	-	-	7mA	1-Output	1.94 oz.	-	-	-	-	S-01S	-	
		Buzzer/Yelp	S-02	-	-	-	1V peak to peak	S/N 80dB	-	-	-	11mA	2.12 oz.		-	-	-	-	S-02S	-		
		One Tone Chime/Continuous Chime	S-03	-	-	-	1V peak to peak	-	-	-	-	16mA	2.47 oz.		-	-	-	-	S-03S	-		
BBE Sound Processing Module	Definition, Low Contour, On-Off	Increased Intelligibility, Paging, BGM, FGM	F-01R	47k ohms	No Connection to Mix Buss	N/A	-	20 ~ 20,000Hz	S/N 80dB	-	-	-	11mA	1-Definition 1-Lo Contour	4 oz.	2-RCA Phono (Input/Output)						

## APPEARANCE AND DIMENSIONAL DIAGRAM



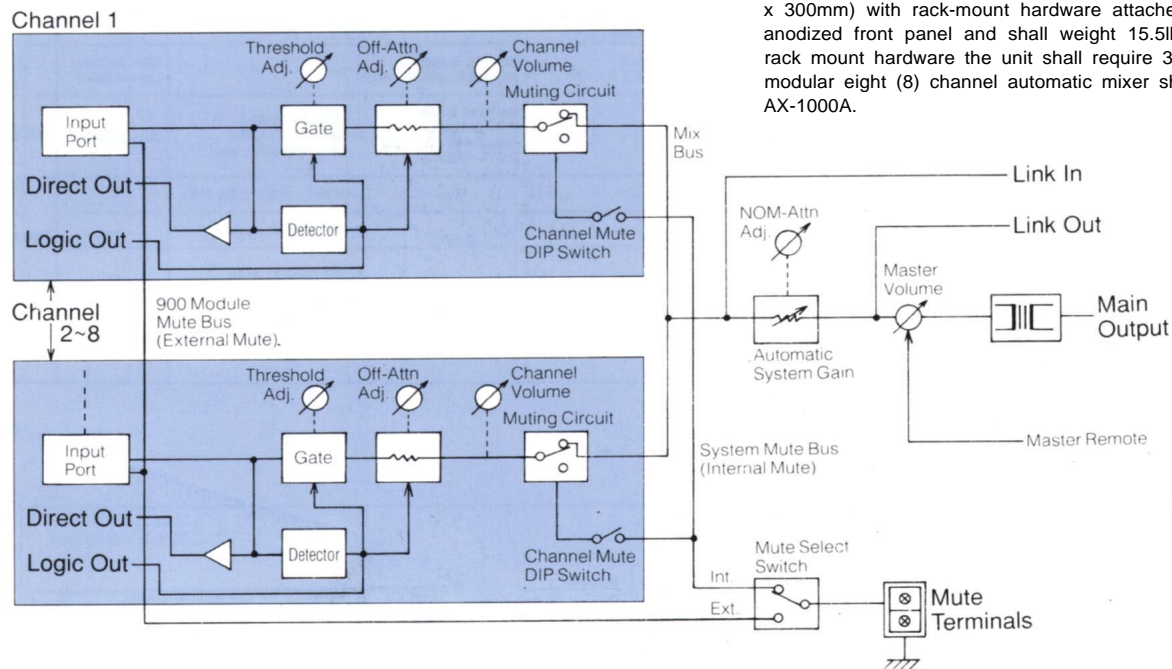
Module	Application Note
I-01S	Designed for interface with TOA EXES intercom systems.
L-41S	Must occupy port No. 2 when used in conjunction with A-901A.
M Series	Phantom power is defeatable by cutting jumper J-1 on the module.
T-01S	Will not function in the A-901A. Functions only in ports No.s 5 and 6 when used with the following models: M-900A, A-903A, A-906A, A-912A, W-906A and W-912A.
U-61S	Can function as a master compressor when used between the pre-amplifier and power amplifier sections.
With W-906A and W-912A in-wall amplifiers use screw terminal modules only.	

## SPECIFICATIONS

Frequency Response	20Hz to 20kHz $\pm$ 1 dB
Total Harmonic Distortion	Less than 0.1%, at 1 kHz signal input
Signal to Noise Ratio	Better than 90dB, with all Vol. Min. Better than 77dB, with Band Pass 20Hz to 20kHz, Input Vol. Min., Master Vol. Max.
Inputs	8 x Input port for TOA 900 Series modules 1 x Link In (stacking)
Input Sensitivity and Impedance	Input ports: 100mV, 10k ohms Link In: 100mV, 10k ohms Audio Signal
Outputs	1 x Main output: 600 ohms/150 ohms, balanced, transformer isolated 8 x Direct outputs: 680 ohms; Nominal -20dBV (100mV); Maximum +16dBV (6.3V) 1 x Link out: 100mV, 1k ohms 8 x Logic out: isolated open collector (30mA, 24V DC max.)
Controls	8 x Input volume 1 x Master volume 8 x Threshold controls 1 x NOM Attenuation control 8 x Off-Attenuation controls 1 x Master/Slave switch 1 x set of 8 Channel Mute DIP switches 1 x INT/EXT Mute Function Select switch
Number of Max. Stacking	10 units (80 channels)
Max. Attenuation Level	20dB per AX-1000A
-Attenuation System	10logNOM (Number of Open Mics) typical (Continuous adjustable from 0dB to 20logNOMdB)
Line Voltage	AC mains
Fuse	05A, 250V, fast blow Internal fuses not user accessible: see service manual
Dimensions	16.5 (W) x 6.0 (H) x 12.9 (D) inches 420 (W) x 151.3 (H) x 327.5 (D) mm 19" rack-mountable, 3 EIA rack units
Weight	15.5lbs. (7.0kg)

\*Specifications are subject to change without notice.

## BLOCK DIAGRAM



## Architect's and Engineer's Specifications

The automatic microphone mixer shall have eight input ports and shall be capable of accepting a full complement of TOA 900 Series Microphone, Line Level, Auxiliary, Bridging, Input/Output (except T-01) and Sound Processing Input Modules. The automatic mixer shall incorporate a continuously variable, adjustable NOM-Attenuation control (with a range from 0logNOM to 20logNOM with a center detent at 10logNOM) to allow precise adjustment of automatic mixing circuitry to the acoustical environment of the facility in which the device shall be utilized. For flexibility and ease of set-up, each channel shall be provided with Input Volume, Threshold Level and Off-Attenuation controls. The Threshold Level control shall adjust the level at which the input gates on. The Off-Attenuation control shall be continuously variable and shall allow attenuation of an inactive input from 0 to -40dB. The Off-Attenuation setting shall not affect the channel gating, ensuring smooth turn-on without any missed syllables. The Input Volume, Threshold Level, Off-Attenuation, and NOM-Attenuation controls shall be front-panel mounted for ease of set-up. A security cover shall be provided to protect the Off-Attenuation, Threshold and NOM-Attenuation controls from unauthorized use. Each input channel shall incorporate a front panel LED to visually indicate the gating function. A link Input/Output shall be provided allowing up to ten (10) devices together to create a system with a maximum of eighty (80) input channels.

A rear panel Master/Slave switch shall be provided to allow any unit to function as a Master or Slave unit when multiple units are incorporated into a sound reinforcement system. A front panel LED shall visually indicate the position of the Master/Slave switch.

The automatic mixer shall incorporate logic outputs for each channel. The Logic Out shall be an open collector circuit that can be utilized to trigger external devices. The automatic mixer shall provide direct outputs for each channel, providing a buffered audio signal from the corresponding input module.

The direct output shall only be affected by the circuitry within the input module; it shall not be affected by the mixer's gating, muting or gain-sharing circuits. The direct outputs shall be capable of being passively mixed. Dip switch selectable muting shall be provided to allow a "chairman override" function for any combination of channels. Muting shall be accomplished by shorting the rear panel mute terminals via a switch closure or relay contact.

By utilizing TOA 900 Series Muting Input Modules it shall be possible to provide two levels of muting. Rear panel Remote Master Volume terminals shall be provided, the maximum gain of which shall be limited by the front panel master volume control setting. Control shall be via a 10k $\Omega$  linear potentiometer.

The unit shall measure 19.0"(W) x 5.22"(H) x 11.8"(D) (483mm x 133mm x 300mm) with rack-mount hardware attached, shall have an aluminum anodized front panel and shall weight 15.5lbs (7.0kg). With standard rack mount hardware the unit shall require 3 EIA Rack Units. The modular eight (8) channel automatic mixer shall be a TOA Model AX-1000A.



TOA Corporation