DIGITAL MATRIX MIXER

M-9000

DESCRIPTION

The TOA M-9000 Series Digital Matrix Mixer features a compact design that fits in a two rack space package. The versatile new Mixer is ideal for multi-zone paging, music distribution and room-combining applications.

The M-9000 includes eight module ports allowing designers to easily configure custom systems with up to eight mic/line inputs and eight outputs. The M-9000 chassis has two channels of built-in digital signal processing (DSP) with ten band parametric EQ, compressor, eight level ducking and more. Input and output modules provide additional DSP.

Two discrete operation modes, "Mixer" and "Matrix", allow the M-9000 to be used in both simple mixing and complex multi-zone paging applications. Versatile features include telephone zone paging, automatic microphone mixing and ambient noise control.

Modules include the D-001T dual channel mic/line input module, T-001T dual channel line output module, ZP-001T telephone access zone paging module, C-001T control expansion module, and AN-001T Ambient Noise Control module. Accessories include the AN-9001 ceiling/wall-mount microphone, ZM-9001 and ZM-9002 remote panels, and SS-9001 4-zone speaker selector.

SYSTEM FEATURES

■ **Modular Digital Matrix Mixer** for a multitude of applications including audio-visual, zone paging, room combining and many more.

■ **Dual Modes (MIXER and MATRIX)** — two separate feature sets to suit both simple mixing and complex multi-zone distribution applications.

■ **Easy to Configure and Operate**

■ **Exceptional Audio Quality**
  • 24-bit, 48 kHz sampling
  • Low Distortion - 0.008%

■ **Modular System**— up to 8 mic/line inputs and 8 outputs.

■ **Dual Channel Digital Signal Processor (DSP):**
  • 10-Band Parametric EQ
  • High and Low Pass Filters
  • Compressor
  • Loudness Contour
  • Bass and Treble
  • Delay (MIXER mode)
  • TOA Speaker EQ Presets
  • Additional DSP included on D-001T and T-001T modules

■ **Telephone Zone Paging**— access up to eight zones with optional ZP-001T module

■ **Ambient Noise Control**— automatically increase or reduce output levels in response to changes in ambient noise.

■ **Multi-function Display** allows programming and operation without a PC.

■ **Rack-mount Kit Included (2RU)**

Flexible Remote Control

■ **Two Remote Volume Control Terminals**
  • Assignable to any input or output channel
  • Control with 10k ohm linear potentiometer, 0-10 VDC or optional ZM-9001/ZM-9002 remote panels
  • Assign remote volume control to background music (Priority 8) inputs without affecting paging input volume

■ **Four Control Inputs** (expandable to twelve with C-001T module)– programmable to activate Memory, Volume Up/Down, Mute, Power On/Off, Emergency Mute
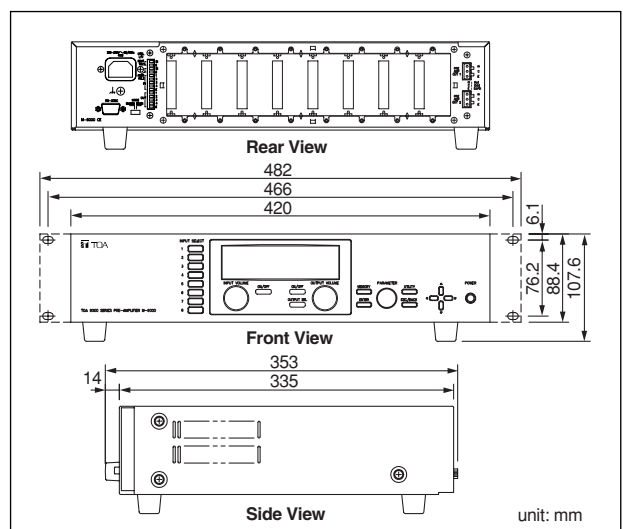
■ **Four Control Outputs** (expandable to twelve with C-001T module) – programmable to activate external relays synchronized with Memory, Channel On/Off and Power On/Off

■ **RS-232 Port**
  • Control protocol available for external devices (see protocol for controllable parameters)
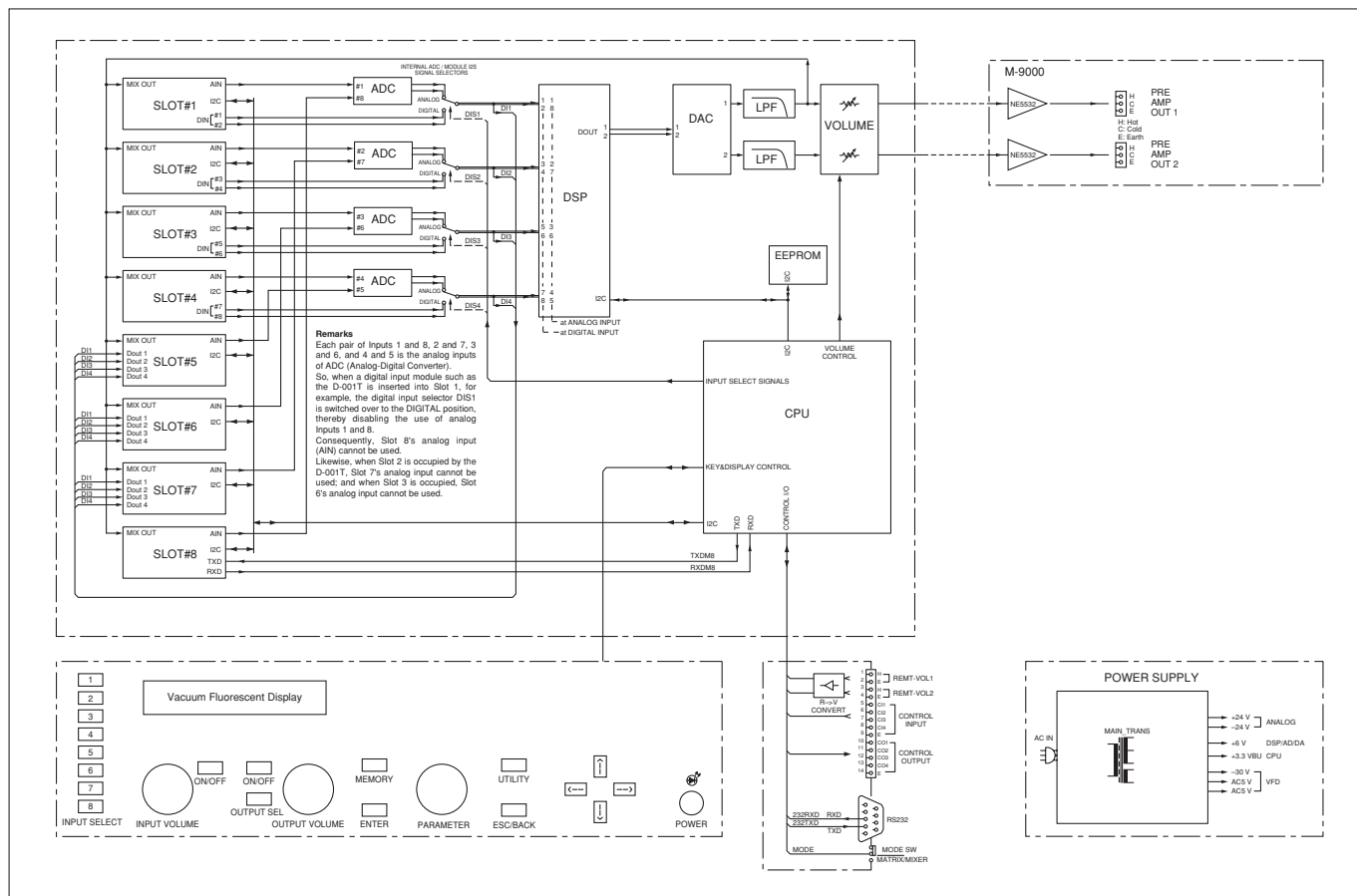 • AMX and Crestron control modules available

Additional Features

■ **Software Utility** for saving unit parameters to PC, updating unit firmware, virtual control activation and status indication

■ **MS Excel Programming Templates** – use Microsoft(R) Excel for off-site programming

■ **Keylock Security** sets password-protected access to Input, Output, Utility & Power functions

■ **Input and Output Metering** (D-001T module(s) required for input metering)

■ **Alphanumeric Channel and Memory Naming**

■ **Power On Memory** sets the Event/Scene selected when unit powers up

■ **Detachable AC Cable**

Rear View

Front View

Side View

unit: mm

M-9000 Digital Matrix Mixer

BLOCK DIAGRAM

SPECIFICATIONS

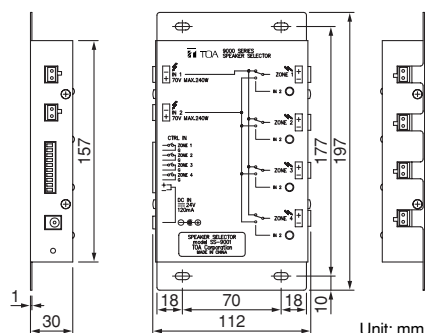|	
Power Source	AC mains, 50/60 Hz
Power Consumption	40W
Audio Input	Max. 8 channels, modular construction (modules optional)
Audio Output	Preamplifier output 1 2: 0 dBV, 600Ω, balanced, removable terminal block (3 pins)
Module Slot	Analog input (slot 1 – 8): –10dB*, unbalanced Digital input (slot 1– 4): 24 bit/48kHz MIX output (slot 1 – 8): -14dB*, 330 Ω (CH 1 prefader output), unbalanced Digital output (slot 5 – 7): 24 bit/48kHz Power supply (slot 1 – 8): 24V, -24V, :6V DC
Digital Audio Dignal Reference Level	–20dBFS
Frequency Response	20 – 20,000 Hz +1, –3 dB
Total Harmonic Distortion	0.008% (at 22 kHz LPF, 1 kHz, +10 dBV output)
S/N Ratio	At Input short, 20 – 20,000 Hz, ALL FLAT or OFF setting 　Output volume min.: 90 dB 　Output volume max.: 61 dB (input 1 vol.: 0 dB, other inputs: OFF)
Crosstalk	Over 64 dB (at 20 kHz)
Tone Control	Bass: +/–12 dB (at 100 Hz), Treble: +/–12 dB (at 10 kHz)
Parametric Equalizer	10 bands, Freq: 20 – 20,000Hz, 31 steps, Various range: +/–12 dB, Q: 0.3 – 5
Speaker Equalizer	15 (presets for TOA speakers)
High-pass Filter	–12 dB/oct, Variable frequency range: 20 – 400 Hz, 14 steps
Low-pass Filter	–12 dB/oct, Variable frequency range: 4,000 – 20,000 Hz, 8 steps
Compressor	Depth: 1 – 5
Delay	0 – 40 ms (1 ms steps), maximum 40 ms (CH1 + CH2) (Mixer mode only)
Scene/Event Memory	32
Operation Mode	Matrix mode/Mixer mode (selector switch)
Auxiliary Function	Key lock function
Control Input/Output	RS-232C*[2], D-sub connector (9P, female) Control input: 4 inputs, no-voltage make contact input, open voltage: 3.3 V DC, short-circuit current: under 1 mA, removable terminal block (14 pins) Control output: 4 outputs, open collector output, withstand voltage: 27 V DC, control current: 50 mA, removable terminal block (14 pins) Remote volume: 2 channels, connect a 10kΩ/linear taper variable resister or input the DC voltage of 0 to +10V, removable terminal block (14 pins)
Operating Temperature	–10°C to 40°C
Operating Humidity	35% to 80% RH (no condensation)
Finish	Panel: Aluminum, hair-line, black, Case: Surface-treated steel plate, black paint
Dimensions (W × H × D)	420 × 107.6 × 353 mm
Weight	6 kg (without modules)
Accessory	Power cord (2m) × 1, Rack Mounting bracket × 2, Bracket mounting screw × 4, Blank panel × 7, Blank panel mounting screw × 14, Removable terminal plug (3 pins) × 2, Removable terminal plug (14 pins) × 1, CD-ROM × 1, Start guide × 1

* 0dB = 1V
*[2] Allowing it to be controlled by a control system such as AMX and Crestron through RS-232C port.
Notes: AMX is a tradmark of AMX Corporation.　Crestron is a tradmark of Crestron Electronics. Inc.

SS-9001 Speaker Selector

The SS-9001 is a speaker selector used with the ZP-001T zone paging module. It outputs 2 input signals to 4 different zones.

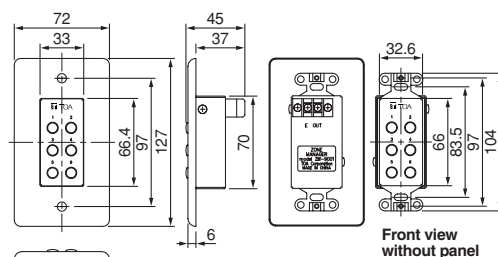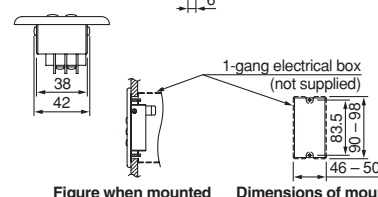|	
Power Source	Supplied from the optional AD-246 AC adapter or an external 24 V DC/200 mA power supply.
Current Consumption	120 mA
Control Signal	No-voltage make contact nput (polarized), open voltage: 24 V DC, short-circuit current: 3 mA
Control Power	Under 240 W (70 V line)
Speaker Terminal	Removable terminal block (2 pins)
Control Terminal	Removable terminal block (10 pins)
Operating Temperature	-10°C to +40°C
Finish	Case: Surface-treated steel plate
Dimensions	112 (W) × 197 (H) × 30 (D) mm
Weight	530 g
Accessory	Removable terminal plug (2 pins) × 6, Removable terminal plug (10 pins) × 1, Cord clamp × 1, Mounting screw × 4
Option	AC adapter: AD-246

Unit: mm

ZM-9001 Remote Panel

The ZM-9001 is a remote control switch panel used with the M-9000. It provides an additional 6 control inputs of amplifier expansion, and can be mounted in an American standard 1-gang electrical box in the wall.

Applicable Cable	Single conductor shielded cable
Line Resistance	Under 50 Ω (per line)
Terminal	M3 screw terminal, distance between barriers: 7.62 mm
Operating Temperature	-10°C to +40°C
Finish	Surface-treated steel plate, white, paint
Dimensions	72 (W) × 127 (H) × 45 (D) mm
Weight	170 g
Accessory	Box mounting screw × 2, Panel mounting screw × 2

Note: Since no electrical box is supplied with the unit, prepare it separately.

Unit: mm

Front view without panel
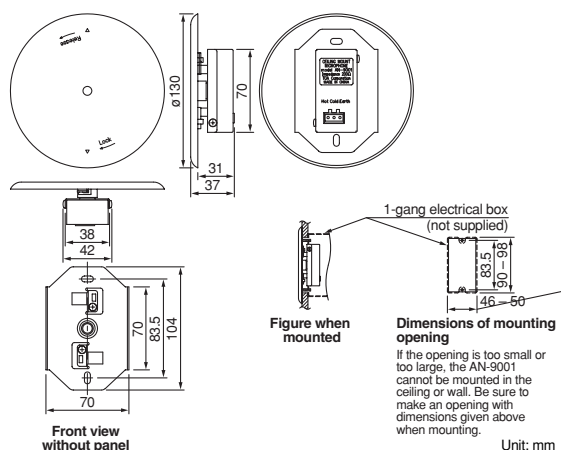
Figure when mounted

Dimensions of mounting opening
If the opening is too small or too large, the ZM-9001 cannot be mounted in the wall. Be sure to make an opening with dimensions given above when mounting.

AN-9001 Ambient Noise Sensing Microphone

The AN-9001 is an electret condenser microphone designed for ambient noise sensing. It is used in conjunction with the AN-001T Ambient Noise control module in the M-9000. It can be mounted in an American Standard 1-gang electrical box in the ceiling or wall.

Type	Electret condenser microphone
Phantom Power	14-26 V DC
Current Consumption	7 mA (at 24 V DC)
Directivity	Omnidirectional (hemispherical)
Impedance	200 Ω
Rated Sensitivity	-5 dB (1 kHz, 0 dB = 1 V/Pa)
Frequency Response	100-10,000 Hz
Output Terminal	Removable terminal block (3 pins)
Operating Temperature	-10°C to +40°C
Finish	Panel: ABS resin, white Frame, Case: Surface-treated steel plate
Dimensions	ø130 × 37 (D) mm
Weight	170 g
Accessory	Removable terminal plug (3 pins) × 1, Box mounting screw (No.6-32UNC x 30) × 2, Box mounting screw (M4 x 30) × 2
Option	9000 series plug-in module: AN-001T

Note: Since no electrical box is supplied with the unit, prepare it separately.

Figure when mounted

Dimensions of mounting opening
If the opening is too small or too large, the AN-9001 cannot be mounted in the ceiling or wall. Be sure to make an opening with dimensions given above when mounting.
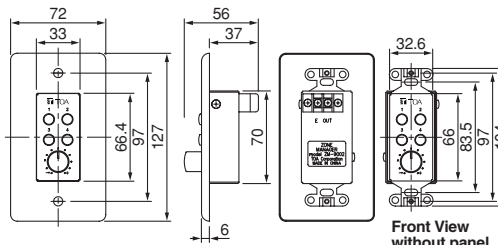
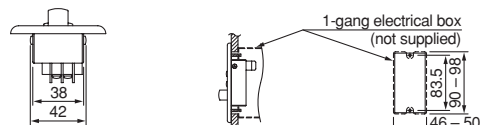**Front view without panel**

Unit: mm

ZM-9002 Remote Panel

The ZM-9002 is a remote control switch/volume panel used with the M-9000. It adds 4 amplifier control inputs and 1 remote volume control, and can be mounted in an American Standard 1-gang electrical box in the wall.

Applicable Cable	Single conductor shielded cable
Line Resistance	Under 50 Ω (per line)
Terminal	M3 screw terminal, distance between barriers: 7.62 mm
Operating Temperature	-10°C to +40°C
Finish	Surface-treated steel plate, white, paint
Dimensions	72 (W) × 127 (H) × 56 (D) mm
Weight	170 g
Accessory	Box mounting screw × 2, Panel mounting screw × 2

Note: Since no electrical box is supplied with the unit, prepare it separately.

Front View without panel

Unit: mm

Figure when mounted

Dimensions of mounting opening
If the opening is too small or too large, the ZM-9002 cannot be mounted in the wall. Be sure to make an opening with dimensions given above when mounting.

T-001T Dual Line Output Expansion Module with DSP

The T-001T is a plug-in module designed for use with the M-9000 and provide two independent balanced outputs. It can drive load of 600Ω up to +16dB. It can process effect for TONE/EQ/COMPRESSOR to two inputs independently.

Power Source	+24 V DC, -24 V DC, +6 V DC
Current Consumption	35 mA (at +24 V DC), 35 mA (at -24 V DC), 60 mA (at +6 V DC)
Output	2 channels, max. +20 dB* (at 10 kΩ load), 600 Ω, electronically-balanced, removable terminal block (3 pins)
Frequency Response	20-20,000 Hz, +1, -3 dB
Total Harmonic Distortion + N	0.005% (at 1 kHz, 20 – 20,000 Hz BPF, 5 V output, 10 kΩ load)
S/N Ratio	Over 73 dB (at 20 – 20,000 Hz BPF)
Residual Noise	Under -91 dB (at 20 – 20,000 Hz BPF, VOL: -70 dB)
Crosstalk	Over 87 dB (at 20 kHz)
D/A Converter	24 bit ΔΣDAC
Sampling Frequency	48 kHz
Tone Control	Bass: ±12 dB (at 100 Hz), Treble: ±12 dB (at 10 kHz)
Parametric Equalizer	10 bands, Frequency: 20-20,000 Hz, 31 steps, Variable range: ±12 dB, Q: 0.3-5
Speaker Equalizer	15 (compatible with TOA speakers only)
High-pass Filter	-12 dB/oct, Variable frequency range: 20 – 400 Hz, 14 steps
Low-pass Filter	-12 dB/oct, Variable frequency range: 4,000 – 20,000 Hz, 8 steps
Compressor	Depth: 1-5
Delay	0-40 ms (1 ms step), maximum 40 ms (CH 1 + CH2), mixer mode only
Operating Temperature	-10°C to +40°C
Finish	Panel: Aluminum, hair-line
Dimensions	35 (W) × 78 (H) × 91.5 (D) mm
Weight	82 g
Accessory	Removable terminal plug (3 pins) × 2, Module mounting screw × 2

*0 dB = 1 V

C-001T Input/Output Control Module

The C-001T is Control I/O expansion module designed for use with the M-9000 and can provide up to 8 channels each of input and output expansion. Since the main unit has 4 preinstalled inputs and outputs each, the control input and output can be expanded to up to 12 channels each when the C-001T is used.

Power Source	6 V DC
Current Consumption	15 mA
Control Input	8 channels, open voltage: 3.3 V DC, short-circuit current: under 1 mA, removable terminal block (9 pins)
Control Output	8 channels, open collector output, withstand voltage: 27 V DC, control current: max. 50 mA, removable terminal block (9 pins)
Operating Temperature	-10°C to +40°C
Finish	Panal: Aluminum, hair-line
Dimensions	35 (W) × 78 (H) × 91.5 (D) mm
Weight	62 g
Accessory	Removable terminal plug (9 pins) × 2, Module mounting screw × 2

ZP-001T Telephone Zone Paging Module

The ZP-001T is a zone paging module designed for use with the M-9000 and functions as interface to connect the M-9000 to an analog PABX, allowing zone paging to be initiated from the PABX. There are two operation modes: ring signal and paging port modes.
Broadcast can be initiated regardless of operation mode.

Power Source	+24 V DC, +6 V DC
Current Consumption	38 mA (at +24 V DC), 18 mA (at +6 V DC)
Number of Line	1 line
Type of Selectable Signal	DTMF signal
Signaling System	Loop-Start (or Ground-Start, selectable)
TEL Line	0 dB, 600 Ω, balanced, transformer-isolated, loop voltage: 24 V DC or more which should be supplied from the PABX, RJ11 connector
Paging Input	0 dB, 600Ω, balanced, transformer-isolated audio input, removable terminal block (4 pins)
Control Input	1 channel, no-voltage make contact, open voltage: 5 V DC, short-circuit current: 0.5 mA, removable terminal block (4 pins)
Control Output	4 channels, open collector output (isolated), withstand voltage: 35 V DC, control current: max. 50 mA, removable terminal block (4 pins)
Operating Temperature	-10°C to +40°C
Finish	Pael: Aluminum, hair-line
Dimensions	35 (W) × 78 (H) × 91.5 (D) mm
Weight	153 g
Accessory	Removable terminal plug (4 pins) × 3, Module mounting screw × 2

D-001T Dual Mic/Line Input Module with DSP

The D-001T is a plug-in module designed for use with the M-9000 and can provide two independent balanced inputs. The D-001T can handle signals ranging from microphone level to line level by controlling their input sensitivity in 9 increments from -60dB to -10dB.
Phantom power (+24V) can be supplied for condenser microphone use. The D-001T can process effect for TONE/EQ/COMPRESSOR to two inputs independently.

Power Source	+24 V DC, -24 V DC, +6 V DC
Current Consumption	20 mA (at +24 V DC), 20 mA (at -24 V DC), 60 mA (at +6 V DC)
Input	2 channels, 3 kΩ (when the phantom power is ON)/ 10 kΩ (when the phantom power is OFF), electronically-balanced, removable terminal block (3 pins)
Input Sensitivity	-60, -54, -48, -42, -36, -30, -24, -18, -10 dB* (selectable)
Frequency Response	20 – 20,000 Hz, +1, -3 dB
Total Harmonic Distortion + N	0.008% (at 1 kHz, 20-20,000 Hz BPF, Input sensitivity: -10 dB)
Input Equivalent Noise	Under -112 dB (at 20 – 20,000 Hz BPF, Input short, Input sensitivity: -60 dB)
S/N Ratio	Over 73 dB (at 20 – 20,000 Hz BPF, Input short, Input sensitivity: -10 dB)
Crosstalk	Over 75 dB (at 20 kHz, Input sensitivity: -10 dB)
CMRR	Over 62 dB (at 1 kHz, Input sensitivity: -60 dB)
A/D Converter	24 bit ΔΣADC
Sampling Frequency	48 kHz
Tone Control	Bass: ±12 dB (at 100 Hz), Treble: ±12 dB (at 10 kHz)
Parametric Equalizer	10 bands, Frequency: 20 – 20,000 Hz, 31 steps, Variable range: ±12 dB, Q: 0.3-5
High-pass Filter	-12 dB/oct, Variable frequency range: 20 – 400 Hz, 14 steps
Low-pass Filter	-12 dB/oct, Variable frequency range: 4,000 – 20,000 Hz, 8 steps
Compressor	Depth: 1 – 5
Phantom Power	+24 V DC
Operating Temperature	-10°C to +40°C
Finish	Panel: Aluminum, hair-line
Dimensions	35 (W) × 78 (H) × 91.5 (D) mm
Weight	82 g
Accessory	Removable terminal plug (3 pins) × 2, Module mounting screw × 2

*0 dB = 1 V

AN-001T Ambient Noise Controller Module

The AN-001T is a plug-in module of 2-channel ambient noise detector designed for use with the M-9000.
It automatically adjusts the output volume in response to the change of ambient noise level. The AN-001T can handle input signals from microphone level (-60dB) to line level (-10dB) by controlling the gain in 9 steps.
Phantom power (+24V) can be supplied for condenser microphone use.

Power Source	+24 V DC, -24 V DC, +6 V DC
Current Consumption	20 mA (at +24 V DC), 20 mA (at -24 V DC), 60 mA (at +6 V DC)
Input	Sensor input (Ambient noise sensor microphone input): 2 channels, 3 kΩ (when the phantom power is ON)/10 kΩ (when the phantom power is OFF), electronically-balanced, removable terminal block (3 pins)
Input Sensitivity	-60, -54, -48, -42, -36, -30, -24, -18, -10 dB* (selectable)
Phantom Power	+24 V DC
A/D Converter	24 bit ΔΣADC
Sampling Frequency	48 kHz
Ambient Noise Control Function	Sensor input reference level adjustment function Maximum output signal level control: -15 to 0 dB Minimum output signal level control: -18 to -3 dB Sample time setting: 10 s, 15 s, 20 s, 30 s, 1 min, 2 min, 3 min, 5 min Gain ratio setting (Ambient noise: Output signal level): 6:3, 5:3, 4:3, 3:3, 3:4, 3:5, 3:6, 6:-3, 5:-3, 4:-3, 3:-3, 3:-4, 3:-5, 3:-6,
Operating Temperature	-10°C to +40°C
Finish	Panel: Aluminum, hair-line
Dimensions	35 (W) × 78 (H) × 91.5 (D) mm
Weight	82 g
Accessory	Removable terminal plug (3 pins) × 2, Module mounting screw × 2
Option	Ceiling mount microphone: AN-9001

*0 dB = 1 V

TOA Corporation

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