Operating Instruction Manual

TOA POWERED MIXER

Model MX-106R

TOA ELECTRIC CO., LTD.
KOBE, JAPAN

● Contents

● Precautions

1. XLR Type Audio Connector

The connectors are wired as follows.
The pin 1 is ground (shield), the pin 2 cold (low, minus), the pin 3 hot (high, plus).

2. Description of components and functions on the MX-106R.

Various descriptions are applied, depending on each manufacturer. In our Operating and Instruction Manual explanation of components and functions is made according to our usage for them.

General Description

The MX-106R is a compact self-powered mixer with a wide array of sophisticated features — many of them unavailable on any competitive models. An examination of performance levels and specifications will reveal the truly professional nature of the MX-106R. The rugged construction and specialized packaging ensure optimum performance and reliability under even the most demanding "on the road" applications.

The MX-106R features 6 input channels; 1 program, 1 foldback, and 1 effects output. The internal power amplifier is rated at 120 watts into 8 ohms, 200 into 4, and 300 into a 2 ohm load.

Each input channel features an electronically balanced XLR connector, and a high impedance unbalanced 1/4" phone jack. An input trim control is provided to accommodate a wide range of input source levels. A peak indicator LED detects excessive input signal (either pre or post EQ), aiding in proper settings of the trim control to avoid input clipping.

Each channel also features 3-band equalization, a "pre" foldback send, a "post" reverb/effects send, and program level control.

The master control section features a one-octave (9-band) graphic equalizer, high and low equalizer control of an internal reverberation unit, auxiliary input controls, fluorescent high-intensity bargraph output meters, and a full patch bay with our exclusive Bus-Link capability. All master level controls, and effects return to program and foldback busses are also contained in this section.

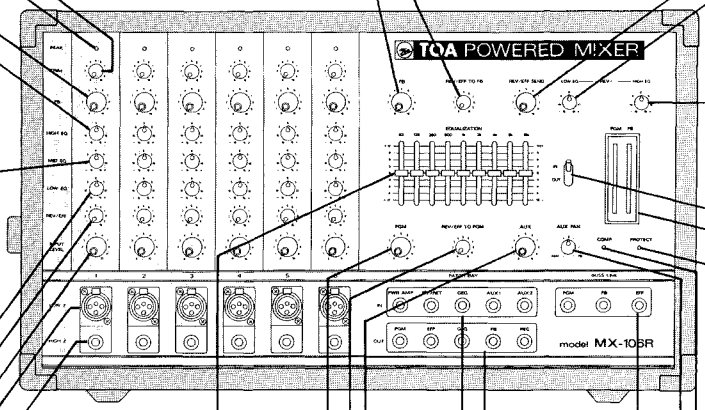
Features

1. Six input channels
2. 300 watts RMS (@ 2 ohms)
3. 9-band graphic equalizer w/bypass switch
4. Auto Comp compression circuitry w/indicator
5. Built-in spring reverberation unit
6. High intensity fluorescent bar graph metering
7. Power amp protection circuitry w/indicator
8. Complete patch bay w/buss link
9. Aux input w/pan and level controls
10. Reverb-effects return to PGM and FB
11. Independent foldback mix

Each Channel

1. Input trim control w/ LED peak indicator
2. Pre EQ foldback send
3. 3-band EQ
4. Post effects send
5. Lo-Z balanced XLR input
6. Hi-Z unbalanced 1/4" input

● Front Panel



Peak Indicator (PEAK)
The peak indicator lights when the pre or post EQ signal level reaches 3dB below clipping, giving a visual reference for optimum setting of the trim control.

Foldback Control (FB)
The Foldback control determines the level of signal assigned to the foldback mixing buss, thus setting the level of that channel in the on-stage monitor mix.

High Equalizer Control (HIGH EQ)
The high EQ control alters the high frequency response of the input channel, providing ±13dB at 10kHz, and ±15dB at 20kHz of continuously variable active shelving equalization. The "0" detented position provides flat audio response.

Middle Equalizer Control (MID EQ)
The mid EQ control provides ±15dB of continuously variable active peaking equalization at 2kHz. and has a flat audio response when set to the "0" detented position.

Low Equalizer Control (LOW EQ)
The low EQ control provides ±13dB at 100Hz and ±15dB at 50Hz of continuously variable active shelving equalization. The "0" detented position provides flat audio response.

Reverb/Effects Control (REV/EFF)
This control determines the level of signal assigned to the reverb effects buss. Rotating the control clockwise increases the amount of reverb effect in that channel.

Input Level Control (INPUT LEVEL)
The level control provides continuously variable adjustment of the channel output to the program mixing buss, thus determining the level of that channel in the main sound system mix. Since the reverb/effects signal is "post" this control, an increase in the level of the channel's output will also result in a corresponding increase in the reverb effect of that channel. The nominal level of the input level control is at the "10" position.

Low Impedance Connectors (LOW Z)
The XLR connectors are low impedance, electronically balanced inputs with an input impedance of 1k ohms.

Input Trim Control (TRIM)
The input trim adjusts the gain of the head-amp stage of the associated channel, providing 39dB of gain control. When the trim control is set to the "10" position, the nominal input levels of the low-Z and high-Z inputs are –55dB and –35dB respectively. At the "0" position the levels are –16dB and +4dB. The trim of each channel should be adjusted so that the peak LED just begins to light, or only flashes occasionally. This will ensure lowest distortion levels and optimum signal to noise ratio.

Graphic Equalizer (EQUALIZATION)
The graphic equalizer is 1/1 octave with 9 independent active bands (filters), providing 12dB of boost or cut at each center frequency. The "0" detented position provides flat audio response.

High Impedance Connectors (HIGH Z)
These connectors are unbalanced, standard 1/4" phone jacks with an input impedance of 50k ohms, and an input level of –35dB when the trim control is set to "10". When a plug is inserted into the high –Z input, the corresponding XLR connector is automatically switched out of the input circuitry.

Program Master Control (PGM)
The PGM control adjusts the overall combined signal level of the six independent channel level controls, and thus the level of the main sound system.

Reverb/Effects to Program Control (REV/EFF TO PGM)
This control adjusts the amount of reverb/effects signal that is returned to the program buss and thus the level of reverb/effects contained in the main sound system.

Aux Level Control (AUX)
This control sets the overall level of the Aux input signal.

Foldback Master Control (FB)
The FB master control adjusts the overall combined signal level of the six independent channel foldback sends, and thus the level of the entire on-stage monitor mix.

Reverb/Effects to Foldback Control (REV/EFF TO FB)
This control adjusts the amount of reverb/effects signal that is returned to the foldback buss and thus the level of reverb/effects contained in the on-stage monitor mix.

Buss Link Jack (BUSS LINK)

Patching Jack (PATCH BAY/IN)

Patching Jack (PATCH BAY/OUT)

Aux Panpot (AUX PAN)
This control assigns the auxiliary input signal (a tapedeck, etc., connected to the aux input jacks) to either the program or the foldback mixing busses. At the center position, the signal is routed equally to both busses. Panning from one side to the other gradually assigns the signal to either independently.

Power Amp Compression Indicator (COMP)
The Comp LED lights when the internal compressor is activated. The compressor is provided to protect speaker systems by compressing the input signal level of the power amplifier when clipping occurs in the output stage. Frequent flashing of the LED is not reason for alarm. However, a constant or steady light indicates that the MX-106R is being overdriven and that the internal power amplifier is possibly "under powered" for that application. The output level of the MX-106R should be decreased until the LED only flashes intermittently.

Reverb/Effects Send Control (REV/EFF SEND)
This control adjusts the overall signal level of the effects mix that is delivered to the internal reverberation unit, or to an external effects device through the effects output. The send control works in conjunction with the REV/EFF to PGM and the REV/EFF to FB controls to set the overall level of reverb/effects in the main and monitor sound systems.

Reverberation Low Equalizer Control (REV LOW EQ)
The low EQ control alters the low frequency response of the reverberation signal. The "0" detented position provides flat audio response.

Reverberation High Equalizer Control (REV HIGH EQ)
The high EQ control alters the high frequency response of the reverberation signal. The "0" detented position provides flat audio response.

Graphic Equalizer In/Out Switch (IN/OUT)
The in/out switch enables comparison between a flat response (out) and the equalized response (in). The "out" position completely removes the equalizer from the MX-106R circuitry.

Fluorescent Bargraph Peak Meters (PGM/FB)
The high intensity meters enable visual monitoring of the program and foldback output signal levels.

Power Amp Protection Indicator (PROTECT)
The indicator LED lights if the power amplifier output is shorted, if the temperature of the unit rises above acceptable levels, or if DC is drifted to the speaker outputs. If the LED should light, speaker wiring and ambient temperature of the MX-106R should be checked. If the LED remains lighted, the unit should be referred to qualified service personnel for repair.
Note:
The MX-106R protection circuitry will (1) detect 'faulty conditions' within the power amplifier, (2) give a visual indication, and (3) automatically shut down until the fault condition is alleviated. This special circuitry ensures maximum reliability and virtually eliminates equipment damage due to unsafe or fault conditions. Please refer to fault protection table on page 7 for full explanation of this important feature.

Front Panel, Patch Bay & Buss Link

Power Amplifier Input Jack (PWR AMP)
The PWR Amp input jack allows the internal power amplifier to be used with external equipment. When a plug is inserted, the power amp is automatically disconnected from the MX-106R mixer section. The nominal input level is +4dB with an input impedance of 10k ohms.

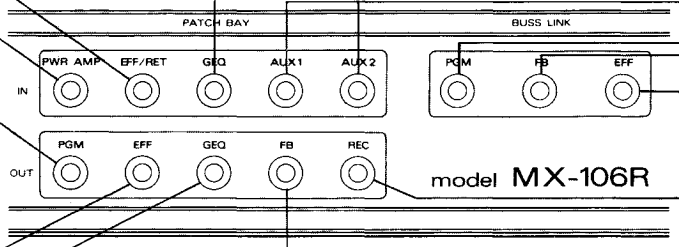
Program Output Jack (PGM OUT)
The PGM Out jack is provided for connection to external equalizers and/or power amps, deriving its signal prior to the internal GEQ and power amp. Nominal output level is +4dB with an impedance of 600 ohms.

Effects Output Jack (EFF OUT)
The EFF Out jack used in conjunction with the EFF/RET Jack allows use of an external effects device in place of the internal reverberation unit. The effects out jack should be connected to the input of the external effect unit. Nominal output level is –10dB with an impedance of 600 ohms.

Effects Return Jack (EFF/RET)
The EFF/RET jack is provided to connect an external effects device to the MX-106R. When a plug is inserted the internal reverberation unit is automatically switched out of the MX-106R circuitry, being replaced by the external unit. This jack should be connected to the output of the external effects unit. Nominal input level is –20dB with an impedance of 50k ohms.

Graphic Equalizer Output Jack (GEQ OUT)
This jack allows the MX-106R and the internal graphic equalizer to be used with an external power amplifier, or in conjunction with the GEQ in jack, to be used independently of all other MX-106R circuitry. Nominal output level is +4dB with an impedance of 600 ohms

Graphic Equalizer Input Jack (GEQ)
The GEQ input jack allows the graphic equalizer to be used independently of the MX-106R with other external equipment, or the internal power amplifier and the graphic equalizer with external equipment. When a plug is inserted, the main mix from the program buss is disconnected from the graphic equalizer and the power amplifier. The nominal input level is +4dB with an input impedance of 50k ohms.



Foldback Output Jack (FB OUT)
This jack is for connection to external power amplifiers and/or equalizers for the on-stage monitoring system. Nominal output level is +4dB with an impedance of 600 ohms. If the internal power amp and equalizer are to be used for the on-stage monitor system, the FB output should be connected to the GEQ input jack.

AUX 1, AUX 2 Input Jack (AUX 1, AUX 2) –20dB 10kΩ

Program Buss Link Jack (PGM) (+4dB 22kΩ)

Fold Back Buss Link (FB) (+4dB 22kΩ

Reverb/Effects Buss Link Jack (EFF) +4dB 22kΩ

Buss Link Jacks
The buss link provides direct access to the PGM, FB, and effects mixing busses, and is provided for easy input expansion with additional MX-106R units or other auxiliary equipment. All jacks have an input level of +4dB with an impedance of 22k ohms.

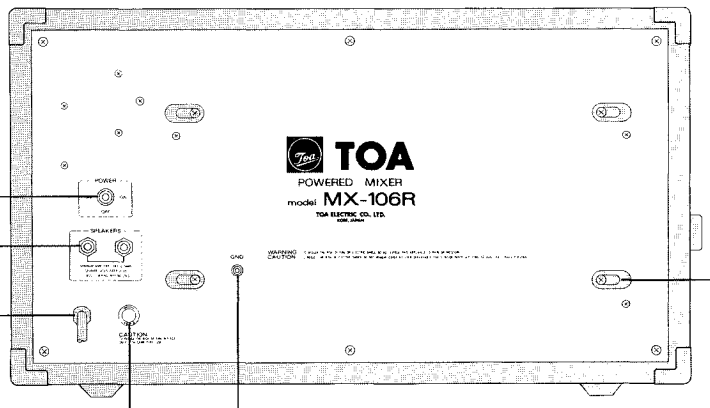
Recording Output Jack (REC OUT)
The Rec Out jack obtains its signal prior to the program master output, and is intended for connection to external recording equipment. Nominal output level is –10dB with an impedance of 1k ohms.

Rear Panel

Power Switch (POWER)
The power switch is a three-position type with the middle position being the "off" position. The MX-106R should be operated in the switch position which produces the lowest amount of system hum.

Speaker Jacks (SPEAKERS)
The speaker outputs are standard 1/4" phone jacks wired in parallel. Speaker cables (recommend at least #18 gauge wire) should be connected between the MX-106R and the speaker systems prior to applying power to the unit.
Caution - The MX-106R should never be operated into less than a 2 ohm speaker load.

AC Power Cord
The power cord is the three-wire type with proper grounding facilities.
Caution - The ground pin should not be removed under any circumstances. If the MX-106R must be used without proper grounding facilities, a suitable grounding adapter should be utilized. Operation of the MX-106R with proper grounding techniques will result in less system noise and greatly reduced shock hazard.



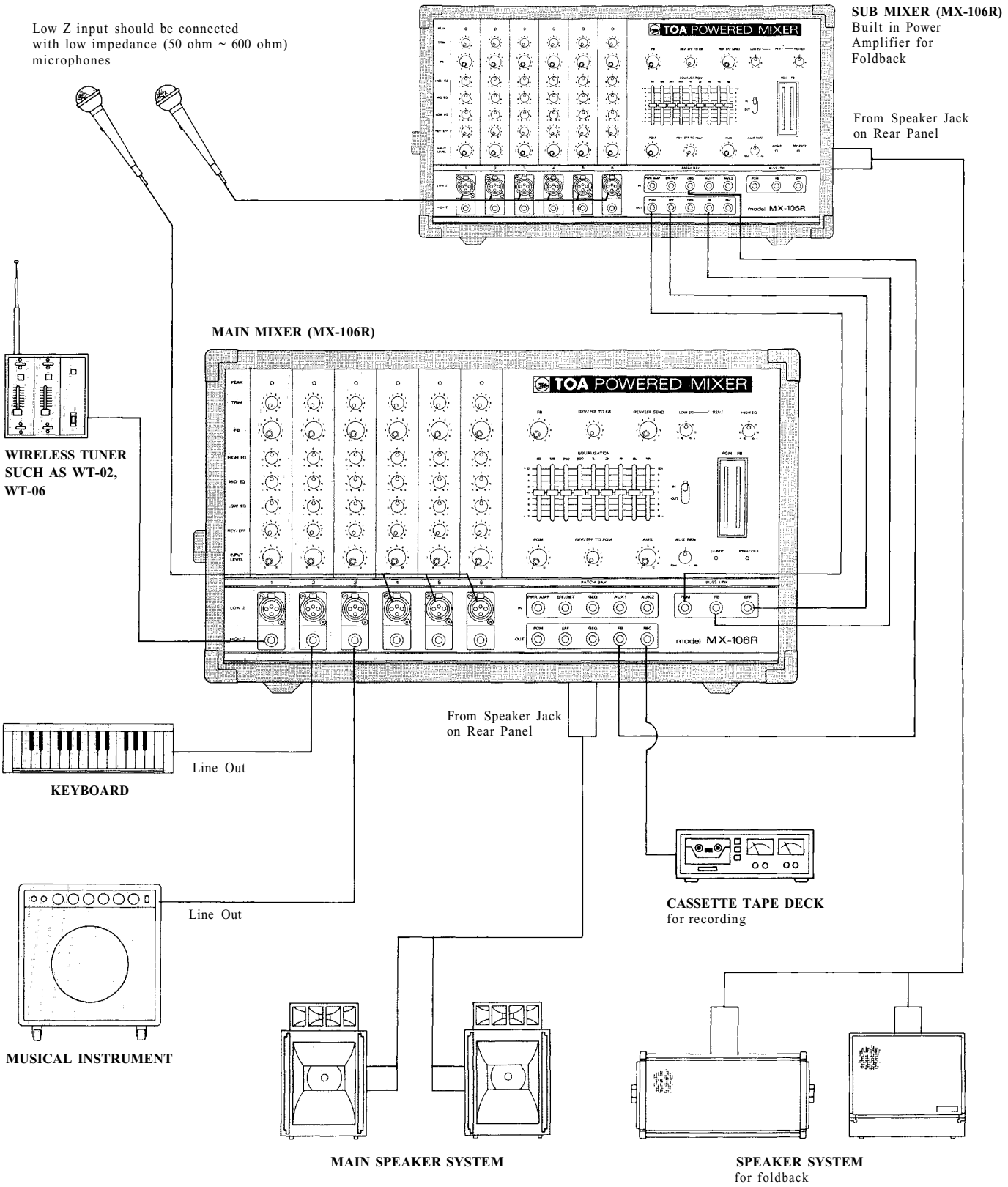
Earth Terminal (GND)

AC Fuse

Warning - To avoid possible equipment damage and/or personnel injury, the fuse should always be replaced with same type and rating. Using improper fuses will also void the warranty. The MX-106R should always be disconnected from AC outlet prior to changing fuses. If fuse repeatedly fails, the unit should be referred to qualified service personnel for repair.

Cord Wrap
The cord wrap is provided for convenient storage of the power cord when the MX-106R is not in use.
Caution - The power cord should always be completely removed from the cord wrap prior to operation of the unit. This will insure maximum cooling of the MX-106R. For the same reason, adequate clearance should be maintained between the rear panel and any other surface (4-6 inches should do). The vents on the bottom and top of the MX-106R are also provided for convection cooling. These vents should be kept clear and open. Failure to do so may cause thermal shut-down of the unit.

● Connection Examples



Input Connections

Generally speaking, there are two rules to follow when connecting equipment outputs to the inputs of other equipment.

1. Properly match the impedances of the outputs and inputs.

2. Connect low impedance outputs to high impedance inputs.

It goes without saying that not only input and output impedance matching but also level matching should be taken into consideration. Each input channel of the MX-106R is provided with an input TRIM control, so the usable signal level range is very wide. Input impedances and levels are shown in the following table.

INPUT SPECIFICATIONS

CONNECTION	INPUT	ACTUAL LOAD IMPEDANCE	FOR USE WITH NOMINAL	TRIM POSI-TION	SENSITIVITY (PGM OUTPUT LEVEL +4dB)	MAX BEFORE CLIP INPUT LEVEL	CONNECTOR
CH1 ~ CH6	LOW Z		50Ω TO 250Ω MICRO-PHONES	10	-55dBm (1.38mV)	-34dBm (15mV)	XLR TYPE NC3F
				0	-16dBm (123mV)	+1.7dB (0.94V)	
	HIGH Z	50kΩ	50kΩ OR LOWER IMP LINES	10	-35dBm (13.8mV)	-14dBm (150mV)	PHONE JACK
				0	-4dBm (1.23mV)	+20dB (7.75V)	
AUX (1~2)		10kΩ	10kΩ OR LOWER IMP, LINES		-20dBm (77.5mV)	-2dBm (0.61V)	PHONE JACK
EFF/RET		50kΩ	50kΩ OR LOWER IMP, LINES		+20dBm (77.5mV)	-2dBm (0.61V)	PHONE JACK
GEQ		50kΩ	50kΩ OR LOWER IMP, LINES		+4dBm (1.23V)		PHONE JACK
PWR/AMP		10kΩ	10kΩ OR LOWER IMP		+4dBm (1.23V)		PHONE JACK

*Sensitivity is the level required to produce a program out level of +4dBm.
*0dBm is referenced to 0.775V RMS.

All XLR Type connectors are electronic balanced. Phone jack is unbalanced.

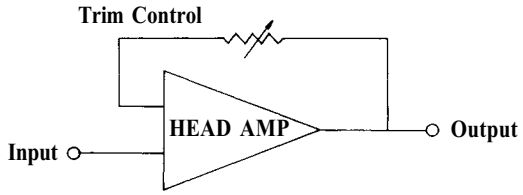
If the line going from one piece of equipment to another is long (more than 5m), we recommend that balanced outputs be connected to balanced inputs.

As is described in the beginning of the Operating Instructions Manual, the connectors of the MX-106R are wired as follows: Pin 1 is ground (shield). Pin 2 is cold (low, minus). Pin 3 is hot (high, plus).

● How to get a good mix

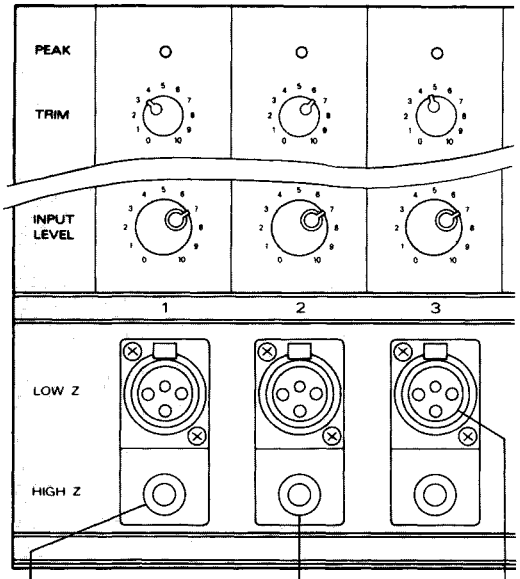
Before connecting other equipment to the Powered mixer, check the impedance and level of both. If the impedances and levels do not match, mixing will be very difficult and the S/N ratio will also be adversely affected.

Each input channel of the MX-106R is provided with a TRIM control. Thorough understanding of the function of a TRIM control will make mixing easier.



The function of the TRIM control is to control the negative feedback volume of the head-amp so that the gain of the head-amp can also be changed. Because of this, enough dynamic range, even for high level signals is ensured. Also, the S/N ratio will be better by decreasing the gain of the head-amp.

For example, a keyboard, a musical instrument and a dynamic microphone with output levels of –10dBm, –20dBm and –40dBm respectively are connected to the MX-106R.



Key Board in –10dBm level

Musical Instrument in –20dBm level

Dynamic Microphone in –40dBm level

If the trim control is set as shown in the left figure, the input level controls can be set to the same position.

The input level controls are used in general between 6 and 8.

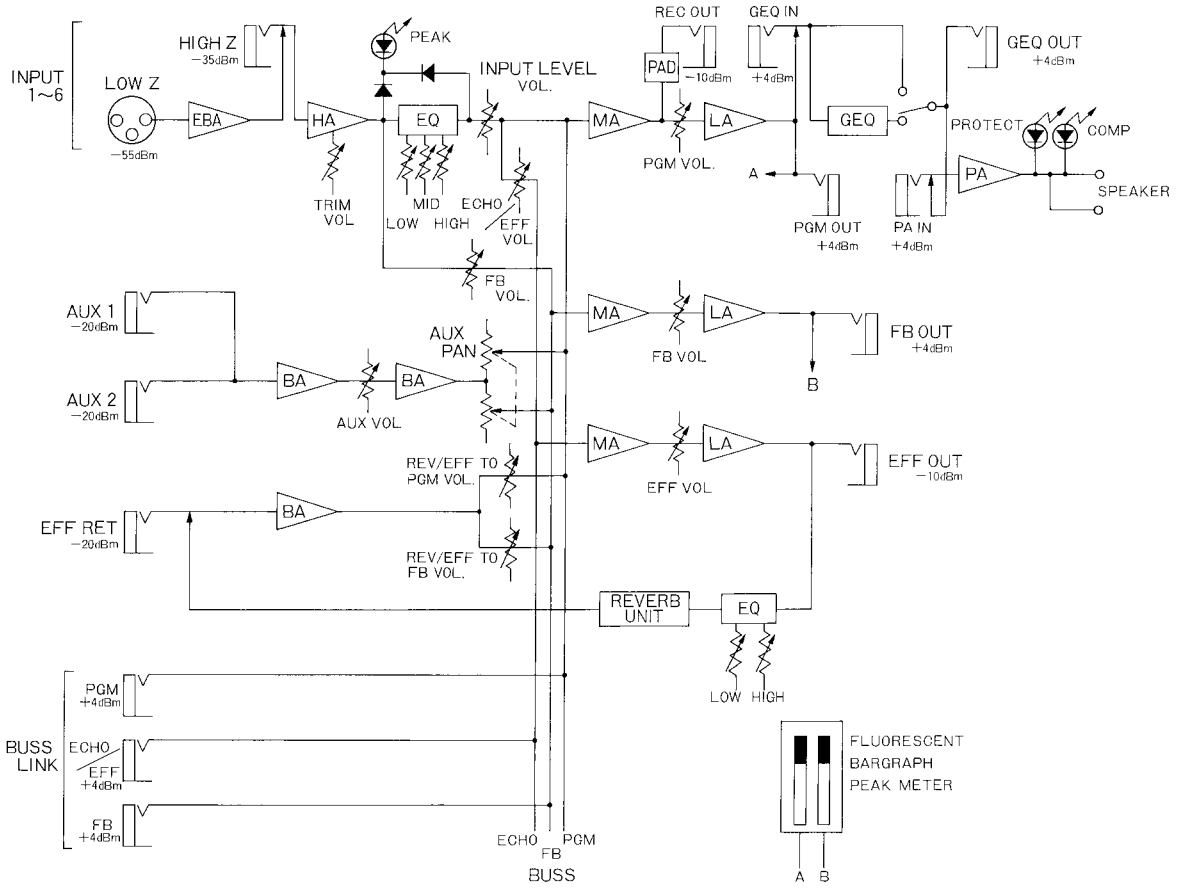
The peak indicator LED illuminates if the head amplifier or equalizer is clipping. The gain of the head-amplifier must be decreased by turning the trim control counterclockwise.

Fault Protection Table

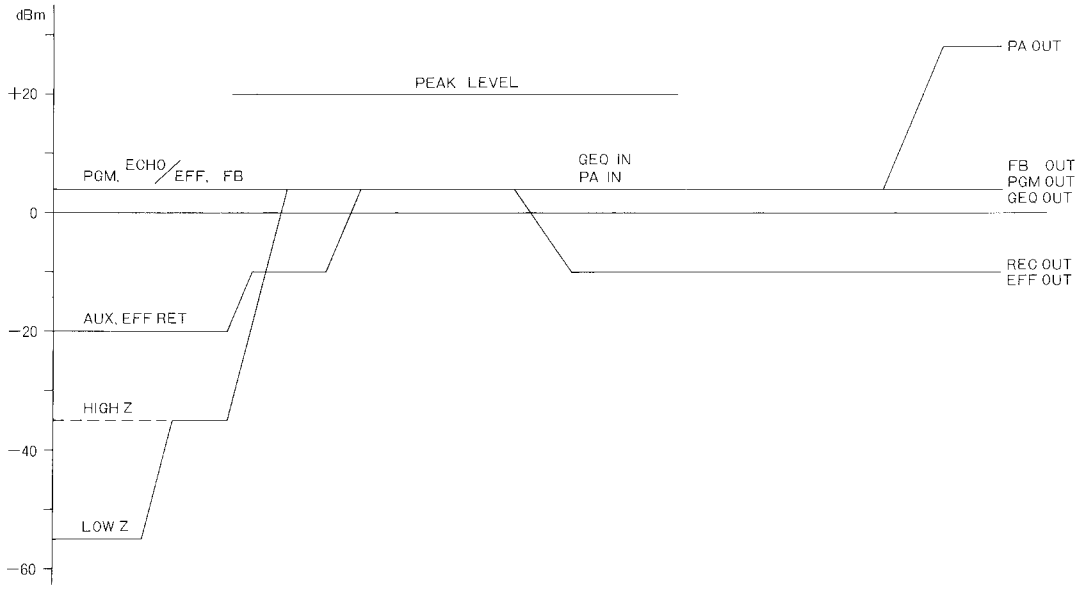
Fault	Protection	Indication	Action	Restoration
Excessive current due to overloads.	Current limiter activates at less than 1 ohm.	Compressor LED illuminates.	Remove excessive lords. Minimum speaker loads 2-ohm.	Automatic restoration after normal loads are obtained.
Short circuits (less than 0.4-ohm)	Current limiter activates, input signal is lowered, unit shuts down.	Amp protection LED illuminates.	Check speaker lines/systems for shorts.	Turn off power switch. Turn on into operational loads.
Temperature rise of heat sink (more than 105° C)	Input signal is lowered. Unit shuts down.	Amp protection LED illuminates.	Check for adequate ventilation.	Automatic restoration after temperature lowers (to 75° - 95° C)
DC drift	Input signal is lowered. Unit shuts down.	Amp protection LED illuminates.	Refer to qualified service personnel.	Automatic restoration after normal bias is regained.

● Block and Level Diagrams

BLOCK DIAGRAMS



LEVEL DIAGRAM



Specifications

MIXER SECTION

Frequency Response
+0, -3dB 30Hz~20kHz (HIGH Z input TRIM at "0" position.)

Total Harmonic Distortion
0.05% +4dBm at 1kHz.

Hum and Noise (Open)

Equivalent Input Noise	–130dBm (20Hz ~ 20kHz)
Equivalent Input Noise	–133dBm (IHF A)
All level Controls Minimum	–102dBm (IHF A)
PGM Master at MAX and all input level controls minimum	–93dBm (IHF A)
PGM Master at MAX and one input level control at MAX	–72dBm (IHF A)

Maximum Voltage Gain

INPUT to PGM out	59dB
INPUT to EFF out	45dB
INPUT to FB out	59dB
INPUT to REG out	45dB
INPUT to GEQ out	59dB
AUX to PGM out	24dB
EFF/RET to PGM out	24dB

Equalization

63Hz ±12dB Peaking	2kHz ±12dB Peaking
125Hz ±12dB Peaking	4kHz ±12dB Peaking
250kHz ±12dB Peaking	8kHz ±12dB Peaking
500Hz ±12dB Peaking	16kHz ±12dB Peaking
1kHz ±12dB Peaking	

Peak Indicators
Red LED on each input channel LED's turn on at 3dB below clipping.

INPUT SPECIFICATIONS

CONNECTION	INPUT	ACTUAL LOAD IMPEDANCE	FOR USE WITH NOMINAL	TRIM POSI-TION	SENSITIVITY (PGM OUTPUT LEVEL +4dB)	MAX BEFORE CLIP INPUT LEVEL	CONNECTOR
CH1	LOW Z	OPEN	50Ω TO 250Ω MICRO-PHONES	10	–55dBm (1.38mV)	–34dBm (15mV)	XLR TYPE NC3F
				0	–16dBm (123mV)	+1.7dB (0.94V)	
≀ CH6	HIGH Z	50kΩ	50kΩ OR LOWER IMP LINES	10	–35dBm (13.8mV)	–14dBm (150mV)	PHONE JACK
				0	–4dBm (1.23mV)	+20dB (7.75V)	
AUX (1~2)	——	10kΩ	10kΩ OR LOWER IMP, LINES	——	–20dBm (77.5mV)	–2dBm (0.61V)	PHONE JACK
EFF/RET	——	50kΩ	50kΩ OR LOWER IMP, LINES	——	+20dBm (77.5mV)	–2dBm (0.61V)	PHONE JACK
GEQ	——	50kΩ	50kΩ OR LOWER IMP, LINES	——	+4dBm (1.23V)	——	PHONE JACK
PWR/AMP	——	10kΩ	10kΩ OR LOWER IMP	——	+4dBm (1.23V)	——	PHONE JACK

OUTPUT SPECIFICATIONS

CONNECTION	ACTUAL LOAD IMPEDANCE	FOR USE WITH NOMINAL	OUTPUT LEVEL		CONNECTOR
			NOMINAL	MAX. BEFORE CLIP	
PGM	600Ω	600Ω OR HIGHER IMP. LINES	+4dB (1.23V)	+20dB (7.75V)	PHONE JACK
EFF	600Ω	600Ω OR HIGHER IMP. LINES	+10dB (775V)	+8dB (1.9V)	PHONE JACK
GEQ	600Ω	600Ω OR HIGHER IMP. LINES	+4dB (1.23V)	+20dB (7.75V)	PHONE JACK
FB	600Ω	600Ω OR HIGHER IMP. LINES	+4dB (1.23V)	+20dB (7.75V)	PHONE JACK
REG	1kΩ	1kΩ OR HIGHER IMP. LINES	–10dB (7.75V)	+8dB (1.9V)	PHONE JACK

POWER AMPLIFIER SECTION

Frequency Response
+0, –1dB 5Hz to 40kHz (200W RMS 4Ω)
Rated Power & Load
300W RMS (2Ω) 200W RMS (4Ω) 120W RMS (8Ω)
Power Output at Clipping
1% THD, 1kHz
348W RMS (2Ω) 238W RMS (4Ω) 140W RMS (8Ω)
Total Harmonic Distortion
Less than 0.1% (200mW ~200W RMS, 20Hz~20kHz)
Typically below 0.05%
Compresser Dynamic Range
Greater than 26dB
Hum and Noise
At least 110dB S/N ratio, 20Hz~20kHz
At least 113dB S/N ratio IHF-A weighted
Damping Factor
Greater than 200 (1kHz 4Ω)

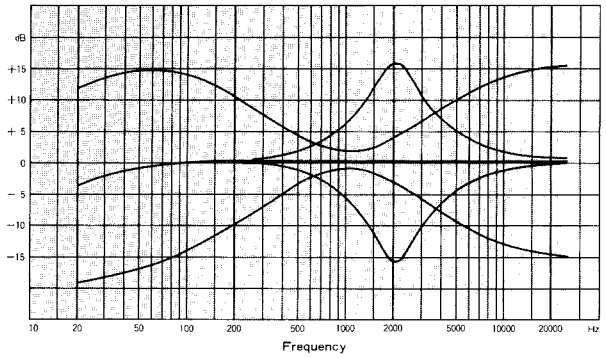
Input Sensitivity
+4dBm (1.23V)
Input Impedance
10kΩ
Output Connector
Phone Jack X2
Power Requirement
600 W 120V AC 50/60Hz
Dimensions
585(W)×333(H)×302(D) (23.03×13.11×11.89) inch
Weight
21kg (46.3 lbs)

*0dBm is referenced to 0.775V RMS.

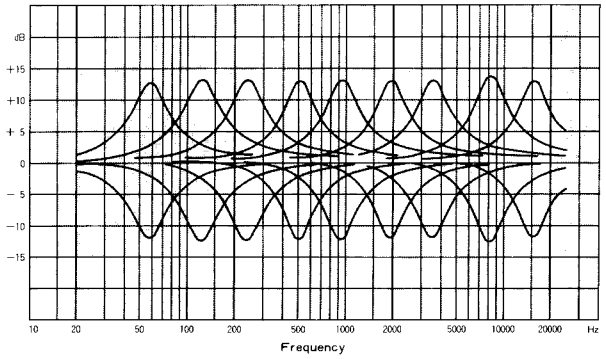
***Specifications are subject to change without notice.**

● Characteristics Diagrams

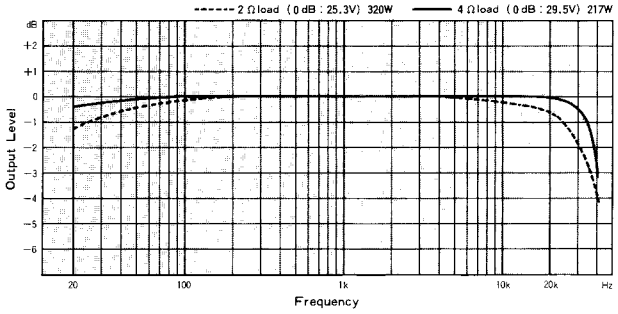
HIGH Z IN. TRIM/MIN. & INPUT EQ



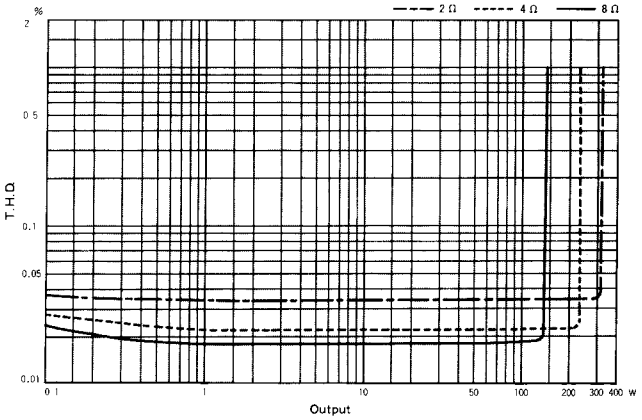
GEQ



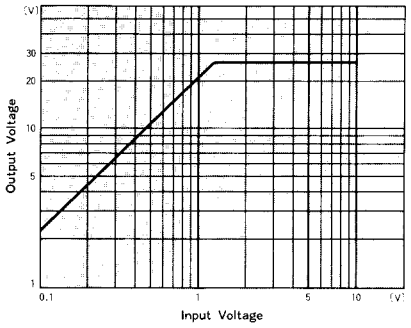
POWER AMP POWER BAND WIDTH



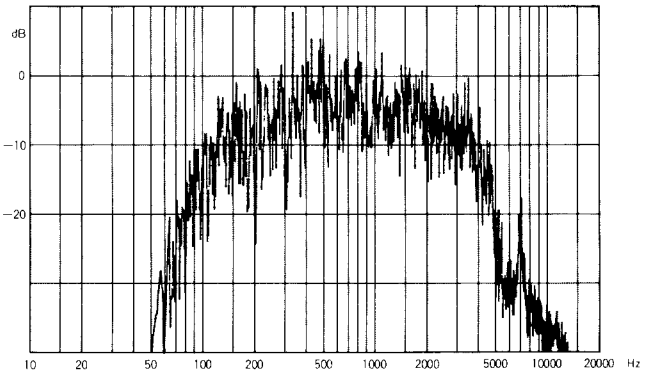
POWER AMP TOTAL HARMONIC DISTORTION



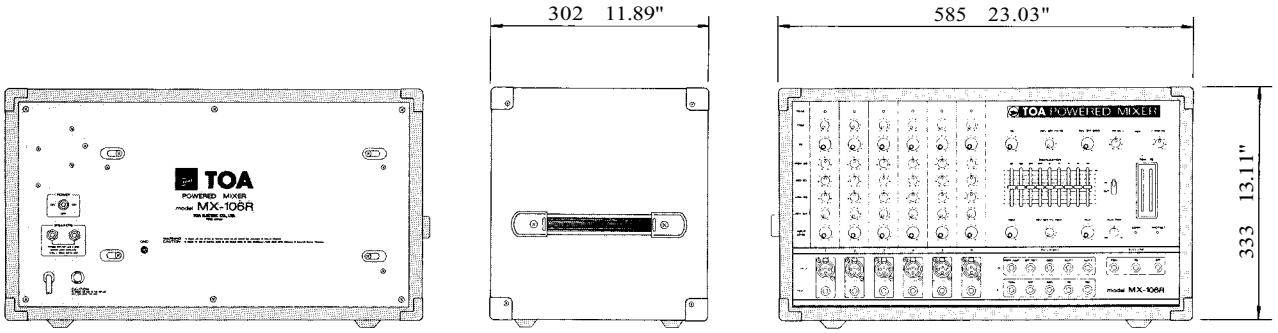
POWER AMP COMPRESSOR



REVERBERATION FREQUENCY RESPONSE



● Appearance



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