

# YAMAHA

# SOUND

# REINFORCEMENT

# MIXER

# EM-300

OWNER'S MANUAL



# EM-300 PA MIXER

The YAMAHA EM-300 PM MIXER with its twelve input channels, two output channels (stereo) and built-in power amplifier is extremely easy to use and operate. It is equipped with a graphic equalizer, reverberation unit and monitor circuit which extend the mixer's application range from ordinary public address (PA) to business uses.

Please read through these instructions so that you will know exactly how to use the EM-300 in accordance with the intended application.

## CONTENTS

BEFORE OPERATION . . . . .	1
BLOCK DIAGRAM . . . . .	2
CONTROL PANEL OPERATION . . . . .	3
CONNECTION FIGURE . . . . .	5
BACK PANEL OPERATION . . . . .	6
INPUT/OUTPUT SPECIFICATIONS . . . . .	8
CHARACTERISTICS FIGURES . . . . .	9
CABLE CONNECTIONS . . . . .	9
OVERALL SPECIFICATIONS . . . . .	10

## BEFORE OPERATION

Check the following points before operating your mixer.

- **Installation location**

Wherever possible, avoid installing the mixer in a location which is exposed to direct sunlight, or a great deal of humidity, dust or vibration.

- Do not block the ventilation holes in the top, bottom and back panels of the mixer since they are designed to dissipate the heat which is generated internally.

- **Connections**

Make absolutely sure that you use the commercially available power line voltage to power the mixer. Refer to page 5 for the connections and then proceed to connect properly. When performing the connections, make absolutely sure that the power switch is set to OFF.

- **Speaker impedance**

The acceptable speaker load is from 8 to 16 ohms for USA and Canadian models and from 4 to 16 for general models. Do not connect a speaker system with a total impedance of less than the minimum above rating.

- Do not set the controls to the following positions.

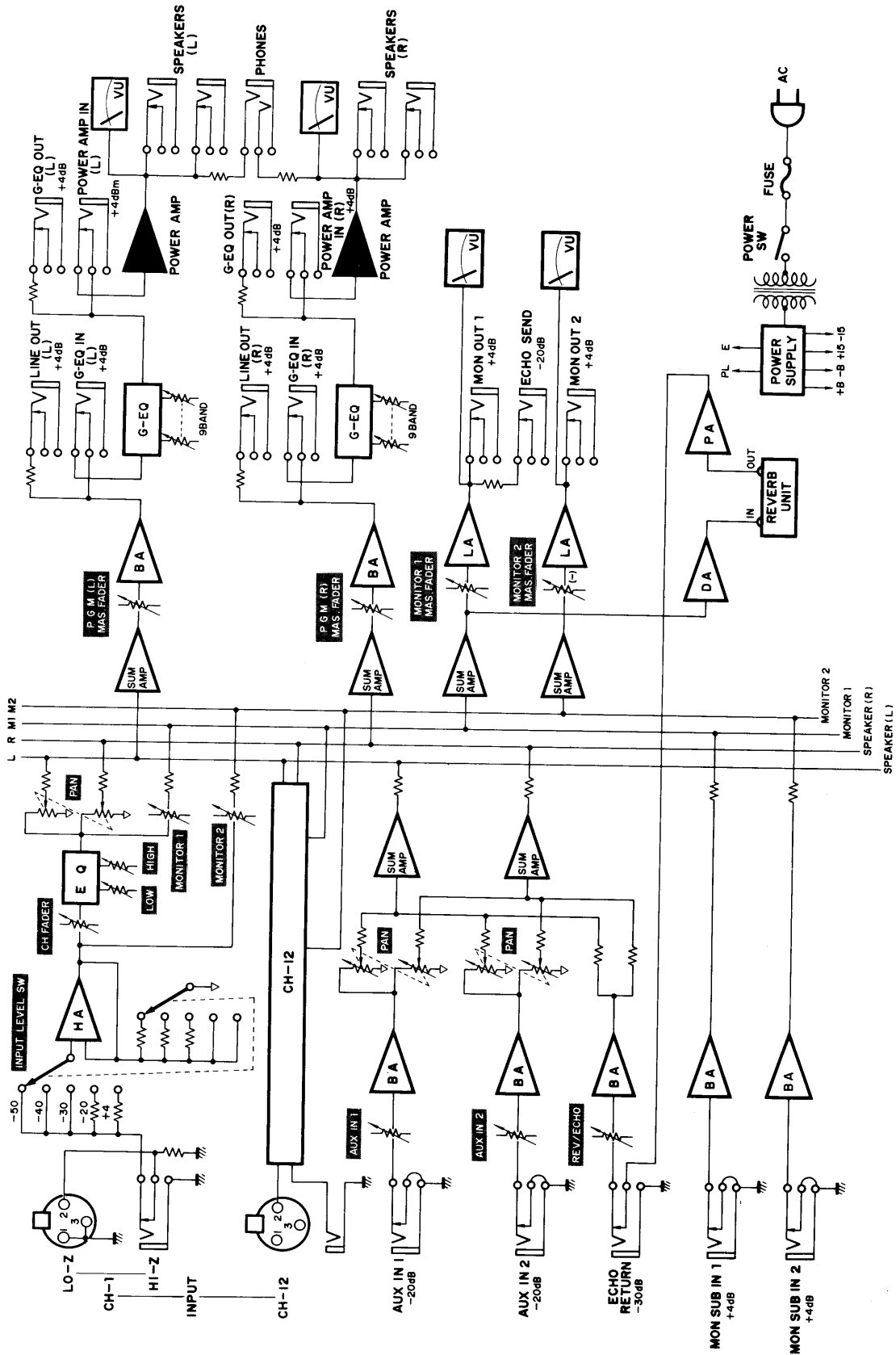
INPUT LEVEL controls	-50 for all channels
Channel faders	Max. for all channels
LOW-EQ, HIGH-EQ controls	Max. for all channels
GRAPHIC EQUALIZER	Max.
Master faders	Max.

Although these positions are not the ones usually used for normal use, bear in mind that if you inadvertently set the controls to the positions given above, the conditions governing the equipment connected to the input connectors and the load speakers may result in damage to the speakers.

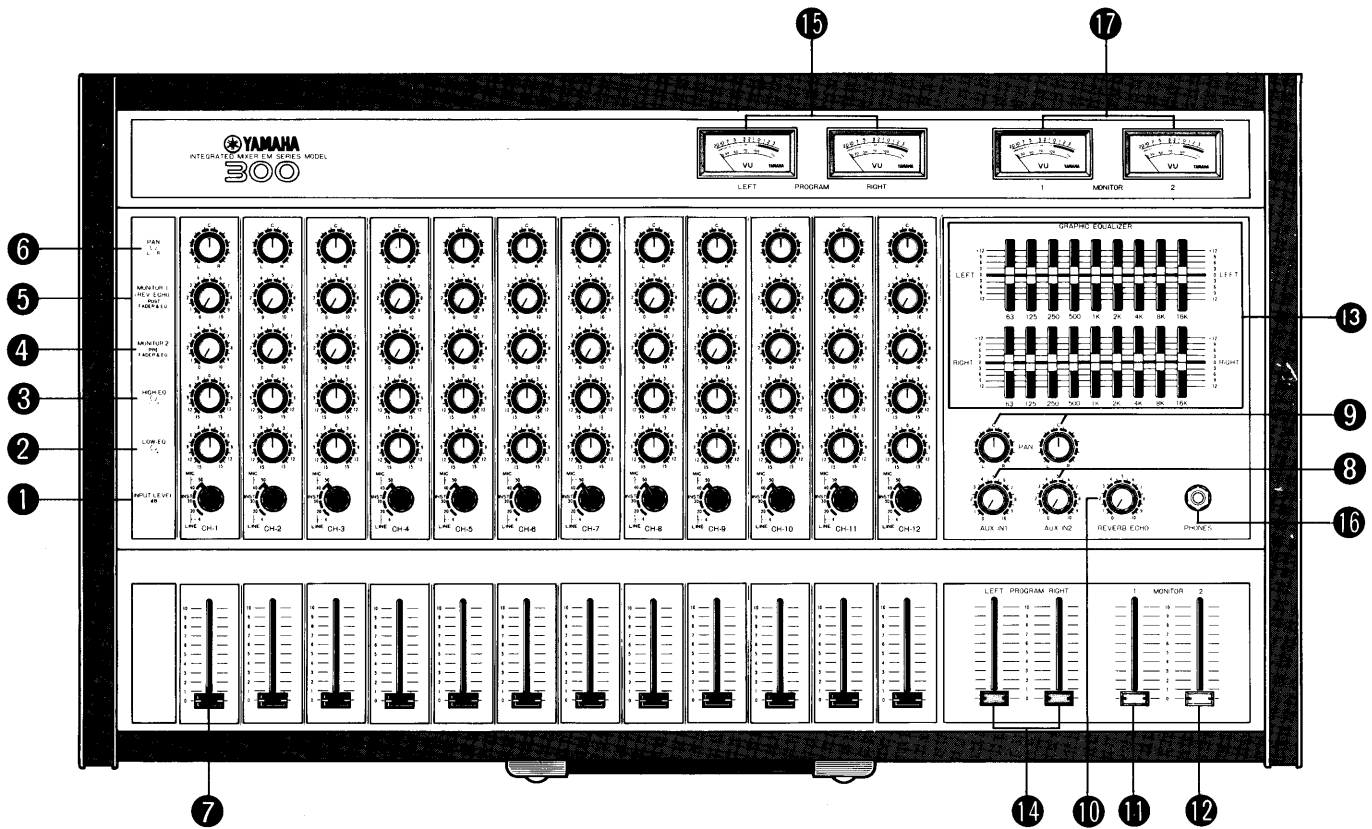
- **Maintenance**

The color of the mixer panels may undergo change if they are cleaned with a paint thinner or similar liquid. Always use a soft dry cloth to wipe off any dirt on the panels.

# BLOCK DIAGRAM



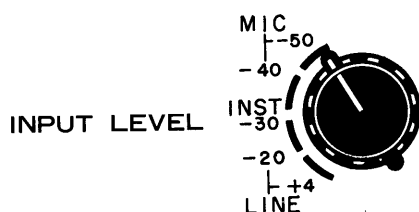
# CONTROL PANEL OPERATIONS



## 1 INPUT LEVEL controls

These controls are used to select the input levels of the channels. They allow a five-step switching (+4/-20/-30/-40/-50dB) of the channel input levels in accordance with the equipment which is connected.

Setting the input levels properly is instrumental in preventing overdrive of the head amplifier, which is cause of distortion in the sound, and in helping to create a clear and natural sound.



The table below lists the general settings. Set the controls to the proper level in accordance with the intended application.

### General settings of input levels

INPUT LEVEL control setting		Input source
MIC	-50	Low-level microphone (dynamic type)
	-40	High-level microphone (condenser type)
INST	-30	Electrical, electronic musical instruments
LINE	-20	Low-level line (general audio equipment)
	+ 4	High-level line (professional equipment)

## ② LOW-EQ controls

These are used to control the sound quality in the low range of each channel. The low frequency of 100Hz can be controlled across a range of  $\pm 15$ dB between the leftmost and rightmost settings, and a flat response can be yielded at the center (0) position.

## ③ HIGH-EQ controls

These are used to control the sound quality in the high range of each channel. The high frequency of 10kHz can be controlled across a range of  $\pm 15$ dB between the leftmost and rightmost settings, and a flat response can be yielded at the center (0) position.

## ④ MONITOR 2 PRE FADER & EQ controls

These are the MONITOR 2 channel controls and they are used to control the signal level which is fed out from the channel fader pre-stage and sent to the MON OUT 2 jacks. They are also used as holdback (stage monitor) mixing controls for performers.

## ⑤ MONITOR 1 (REV/ECHO) POST FADER & EQ controls

These are the MONITOR 1 channel controls and they are used to control the signal level which is fed out from the channel fader and equalizer post-stages and sent to the reverberation circuit, and the MON OUT 1 and ECHO SEND jacks.

These controls perform the following roles in accordance with the intended application.

1. Channel controls for reverberation effect.
2. Channel controls for echo effect.
3. Mixing controls for holdback (stage monitor)

## ⑥ PAN controls

These controls are used to distribute the input signals of the channels to the left and right channels, and also to position the sound images.

## ⑦ Channels faders

These are used to set the mixing level of the channels and to attain an overall balance in the volume.

## ⑧ AUX IN controls

These are used to control the AUX IN 1 and AUX IN 2 input levels.

## ⑨ AUX PAN controls

These are used to distribute the AUX 1 and AUX 2 input signals to the left and right channels, and to position the sound images.

## ⑩ REVERB/ECHO control

This is used to control the overall output level of the built-in reverberation unit. When an echo unit has been connected to the ECHO RETURN input jack, the built-in reverberation unit is cut off, and the overall output level of the echo device is controlled.

## ⑪ MONITOR 1 master fader

This is used to control the overall level of the signals which have been already controlled by the MONITOR 1 controls, and to feed the signals out at the MON OUT 1 and Echo send jacks.

(Reverb signals are not controlled.)

## ⑫ MONITOR 2 master fader

This is used to control the overall level of the signals which have been already controlled by the MONITOR 2 controls, and to feed the signals out at the MON OUT 2 jack.

## ⑬ GRAPHIC EQUALIZER

These nine linear controls for each channel, left and right, vary the frequency response across a  $\pm 12$ dB range for the frequencies centered on 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz, 4kHz, 8kHz and 16kHz in accordance with the intended application or location, and they thereby vary the sound quality of the whole system. For instance, they can be used to control levels at frequency ranges where howl is easily produced, and to control the sound quality finely by emphasizing some of the frequency ranges.

## ⑭ PROGRAM master faders

These are used to control the overall signals which have been already mixed by the channel faders, and to set the sound which is ultimately heard through the main speakers.

## ⑮ PROGRAM VU meters

These are used to monitor the output levels of the left and right channels. An output of  $42.5W/8\Omega$  is indicated when the pointers deflect to 0VU and likewise  $85W/8\Omega$  (full power) when the pointers deflect to +3VU.

## ⑯ PHONES jack

This is the output jack for stereo headphones.

This allows the power amplifier output to be monitored and the volume is controlled by the PROGRAM master faders.

## ⑰ MONITOR VU meter

These are used to monitor the output levels of MONITOR 1 and MONITOR 2.

# CONNECTION FIGURE

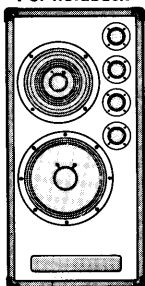
**FUSE:**

Use 7A, 250V fuses. If it is necessary to replace a blown fuse, disconnect the AC plug from the power socket and then replace with a unit having the same ratings. If the fuse should blow during operation, it means that there is a failure and that you should get in touch with your dealer

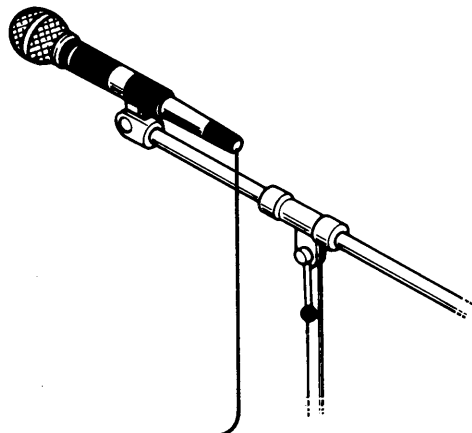
**POWER SW:**

This is the power switch which accommodates reversed polarities with two ON positions that help to minimize hum in certain instances.

For holdback



Microphone

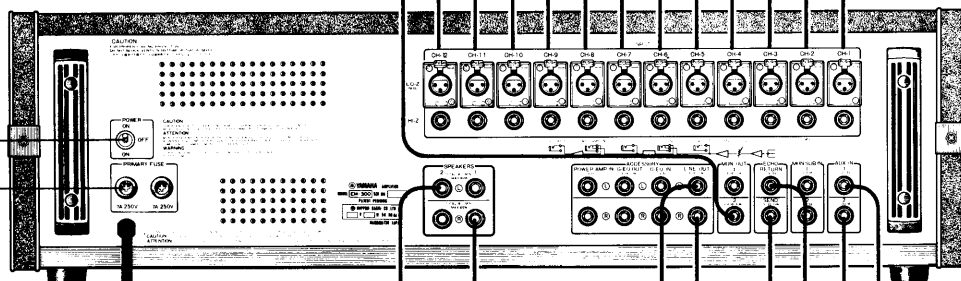


A0112T (Self-Power Monitor)

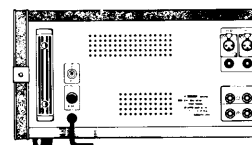
5 MON OUT 1,  
MON OUT 2

1 INPUT

USA & CANADIAN MODELS



GENERAL MODEL

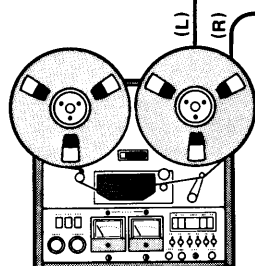


Connect this to the AC power outlet

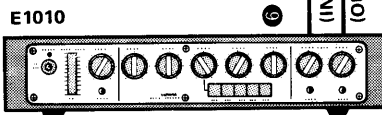
2 SPEAKERS

4 LINE OUT

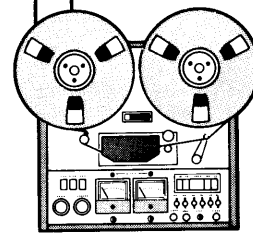
3 AUX IN



Tape deck (recording)

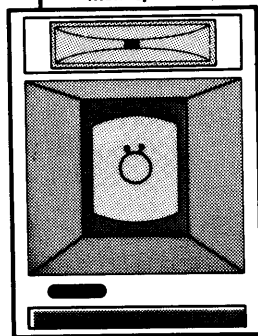


Delay unit (echo unit)



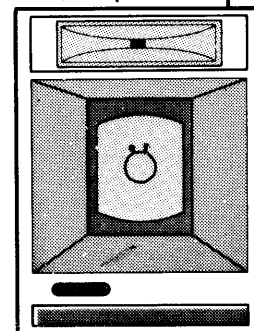
Tape deck (playback)

Main speaker (L)



S4115H

Main speaker (R)



S4115H

# BACK PANEL OPERATION

## 1 INPUT

Both the LO-Z (low impedance) and HI-Z (high impedance) INPUT jacks are unbalanced.

Connect low-impedance and high-impedance microphones, general electrical and electronic musical instruments and LINE inputs to the HI-Z INPUT jacks.

Connect low-impedance microphones to the LO-Z INPUT jacks.

\* It is not possible to use both the LO-Z and HI-Z INPUT jacks simultaneously for the same channel.

## 2 SPEAKERS

Connect the main speakers to these jacks.

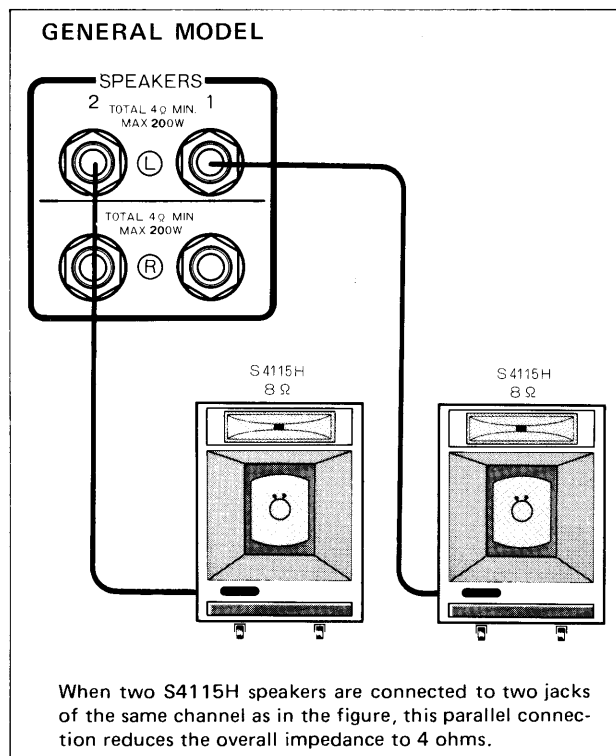
### NOTES:

#### LOAD IMPEDANCE

8 ~ 16Ω U.S.A & CANADIAN MODELS

4 ~ 16Ω GENERAL MODEL

Do not connect a speaker system with a total impedance of less than the minimum above rating.



## 3 AUX IN

Connect the tape deck (playback) or another mixer for increasing the number of channels to these jacks.

## 4 LINE OUT

Use these jacks to feed out the recording output signals or the signals produced when the mixer is being used as a submixer in order to increase the number of channels.

## 5 MON. OUT 1, MON. OUT 2

Use these jacks to connect the holdback (stage monitor) speaker.

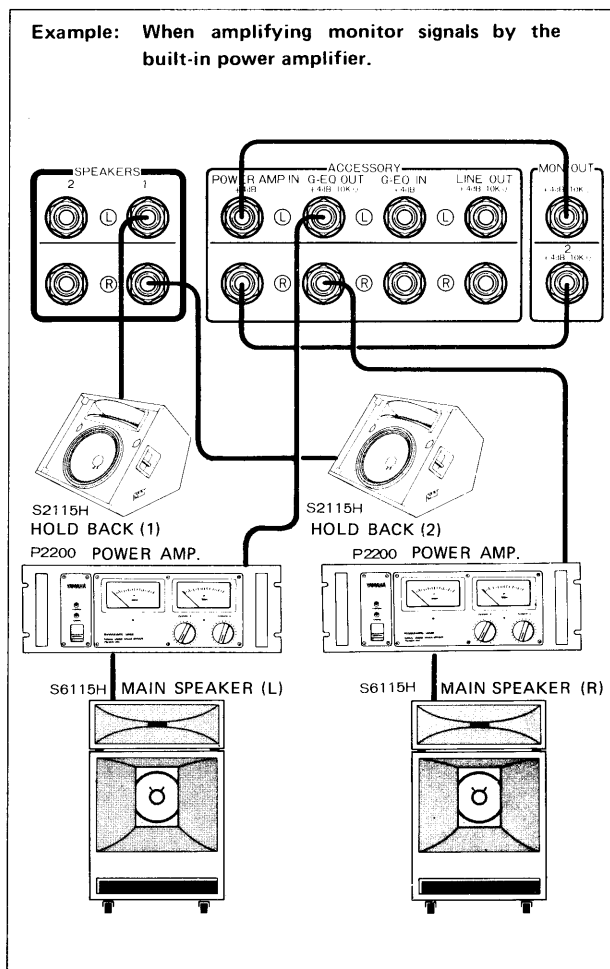
\* A power amplifier is required for both MON OUT 1 and MON OUT 2 jacks. Use a speaker with a built-in power amplifier or use a separate power amplifier.

## 6 ECHO RETURN, ECHO SEND

These are the input and output jacks for the echo unit. (When the echo unit is connected, it is no longer possible to use the built-in reverberation unit.) Use the MONITOR 1 (REV/ECHO) controls to control the echo effect for each of the individual channels, and the MONITOR 1 master fader and REVERB/ECHO control to control the overall effect.

## POWER AMP IN

These external input jacks may be used in various ways, such as when using the built-in power amplifier independently (feeding input signals of another mixer), or when amplifying PGM signals and monitor signals with a separate power amplifier and the built-in power amplifier respectively so as to increase power of PGM signals.



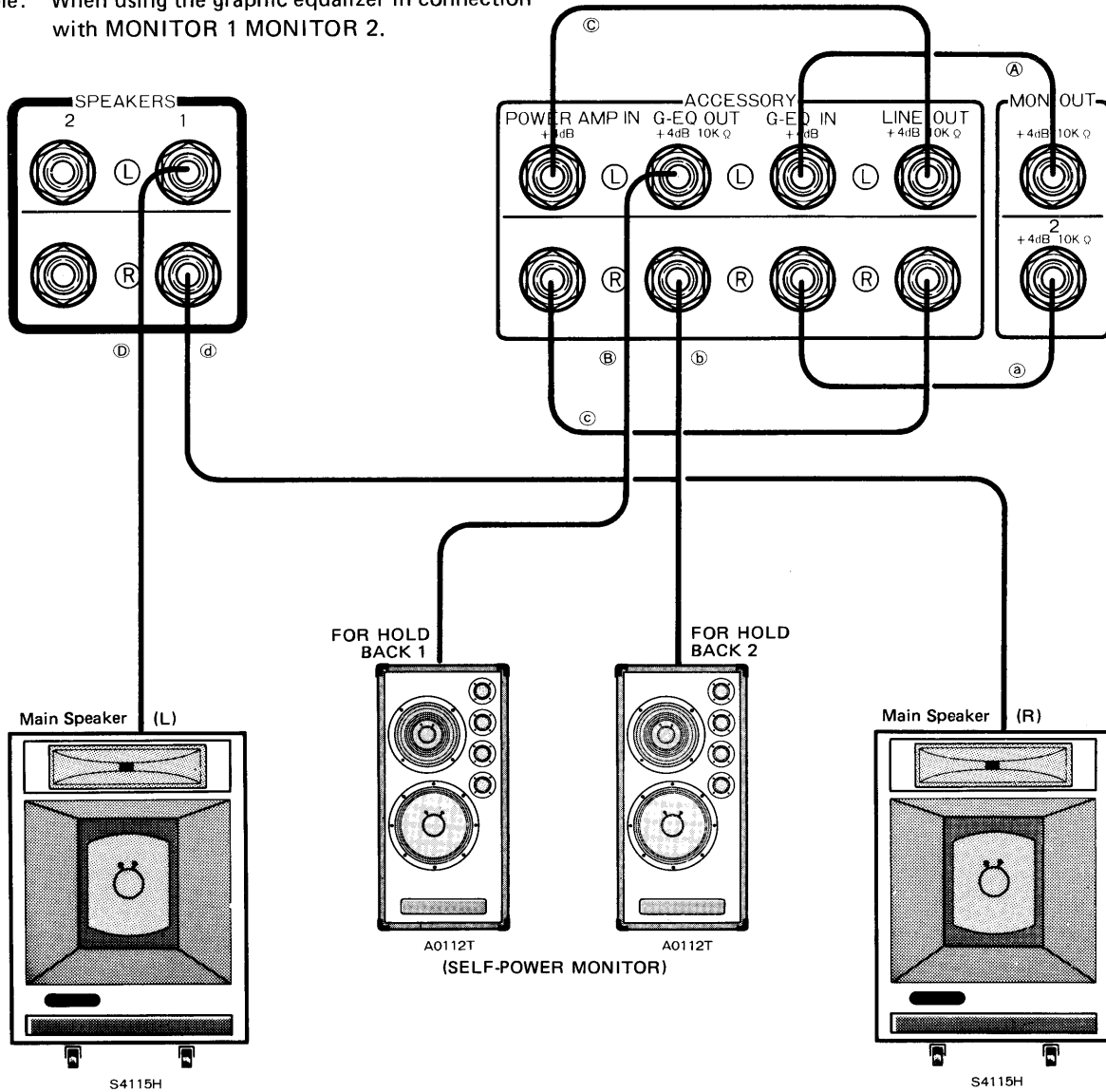
## MON. SUB IN

Connect another mixer to these jacks when you want to increase the number of monitor channels.

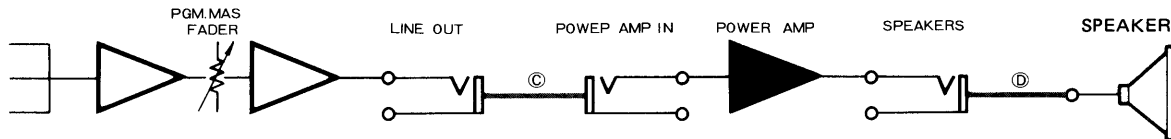
● **G-EQ IN, G-EQ OUT**

By using these jacks, the graphic equalizer built in this mixer may be used independently, or as a monitor. In the above cases, connect LINE OUT jack with POWER AMP IN jack, as PGM signals stop before G-EQ IN jack.

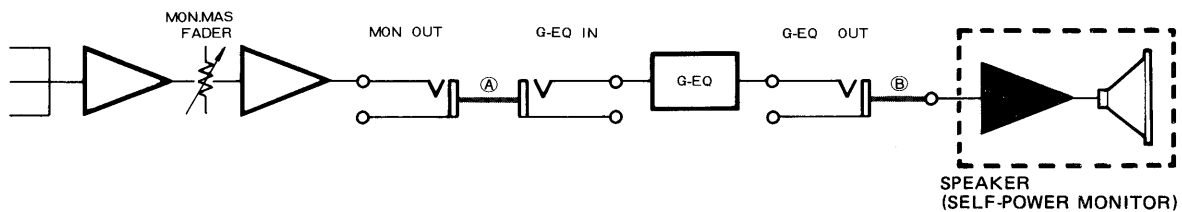
Example: When using the graphic equalizer in connection with MONITOR 1 MONITOR 2.



● **PGM TYPE**



● **MONITOR TYPE**





# INPUT / OUTPUT SPECIFICATION

## ● Input jacks

Connection	Actual Load Impedance	For Use W/Nominal	Sensitivity (at max. gain)	Input level		Connector
				Nominal	Max. befor Clip	
INPUTS (1 ~12 CH) -50 -40 -30 -20 + 4	Hi-Z 10K $\Omega$ Lo-Z 600 $\Omega$	Hi-Z 3K $\Omega$ Lo-Z 150 $\Omega$	-50dB (2.5mV) -40dB (7.8mV) -30dB (25mV) -20dB (78mV) + 4dB (1.23V)	-50dB (2.5mV) -40dB (7.8mV) -30dB (25mV) -20dB (78mV) + 4dB (1.23V)	-22dB (6.2mV) -12dB (193mV) - 2dB (616mV) + 8dB (1.93V) +32dB (31V)	XLR-3-31 and Phone Jack
AUX IN (1, 2)	30K $\Omega$	5K $\Omega$	-20dB (78mV)	-20dB (78mV)		Phone Jack
ECHO RETURN	30K $\Omega$	5K $\Omega$	-30dB (25mV)	-30dB (25mV)		Phone Jack
GEQ IN (L, R)	100K $\Omega$	5K $\Omega$	+ 4dB (1.23V)	+ 4dB (1.23V)	+18dB (6.2V)	Phone Jack
POWER AMP IN (L, R)	30K $\Omega$	5K $\Omega$	+ 4dB (1.23V)			Phone Jack
MON SUB IN (1, 2)	30K $\Omega$	5K $\Omega$	+ 4dB (1.23V)	+ 4dB (1.23V)	+24dB (12.3V)	Phone Jack

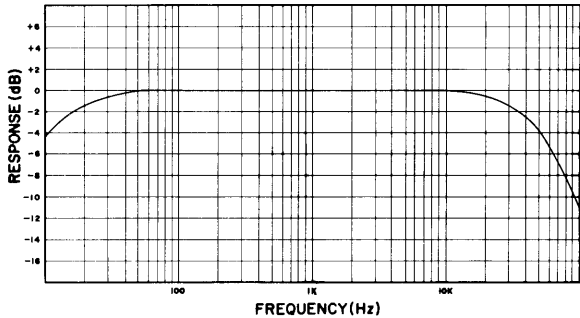
## ● Output jacks

Connection	Actual Source Impedance	For Use W/Nominal	Output level		Connector
			Nominal	Max. befor Clip	
SPEAKER OUT (L, R)	0.065 $\Omega$	4 $\Omega$ 8 $\Omega$	200W 140W		Phone Jack
LINE OUT (L, R)	1K $\Omega$	10K $\Omega$ 600 $\Omega$	+ 4dB (1.23V) 0dB (0.775V)	+18dB (6.2V) +14dB (3.9V)	Phone Jack
GEQ OUT (L, R)	1K $\Omega$	10K $\Omega$ 600 $\Omega$	+ 4dB (1.23V) 0dB (0.775V)	+18dB (6.2V) +14dB (3.9V)	Phone Jack
MON OUT (1, 2)	390 $\Omega$	10K $\Omega$ 600 $\Omega$	+ 4dB (1.23V) 0dB (0.775V)	+18dB (6.2V) +14dB (3.9V)	Phone Jack
ECHO SEND	100 $\Omega$	10K $\Omega$	-20dB (78mV)	- 6dB (0.39V)	Phone Jack
PHONES	150 $\Omega$	8 $\Omega$		+ 2dB (0.96V)	Stereo Phone Jack

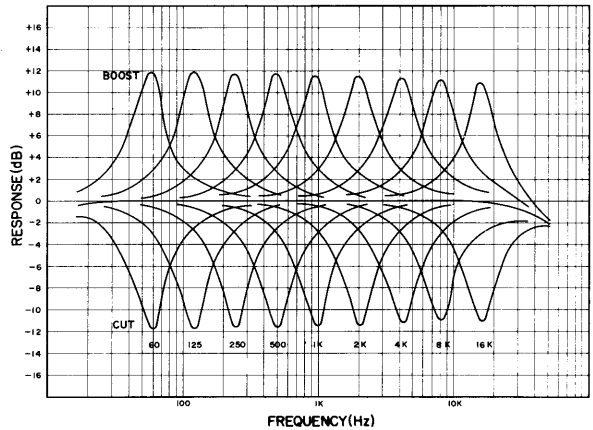
Note: All the inputs and outputs are unbalanced.

# CHARACTERISTICS FIGURES

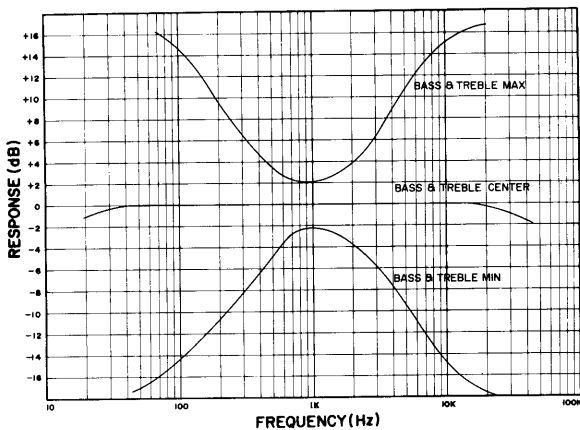
## Frequency response



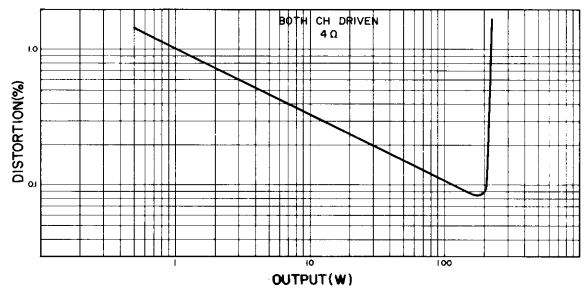
## Graphic equalizer frequency response



## Channel equalizer frequency response



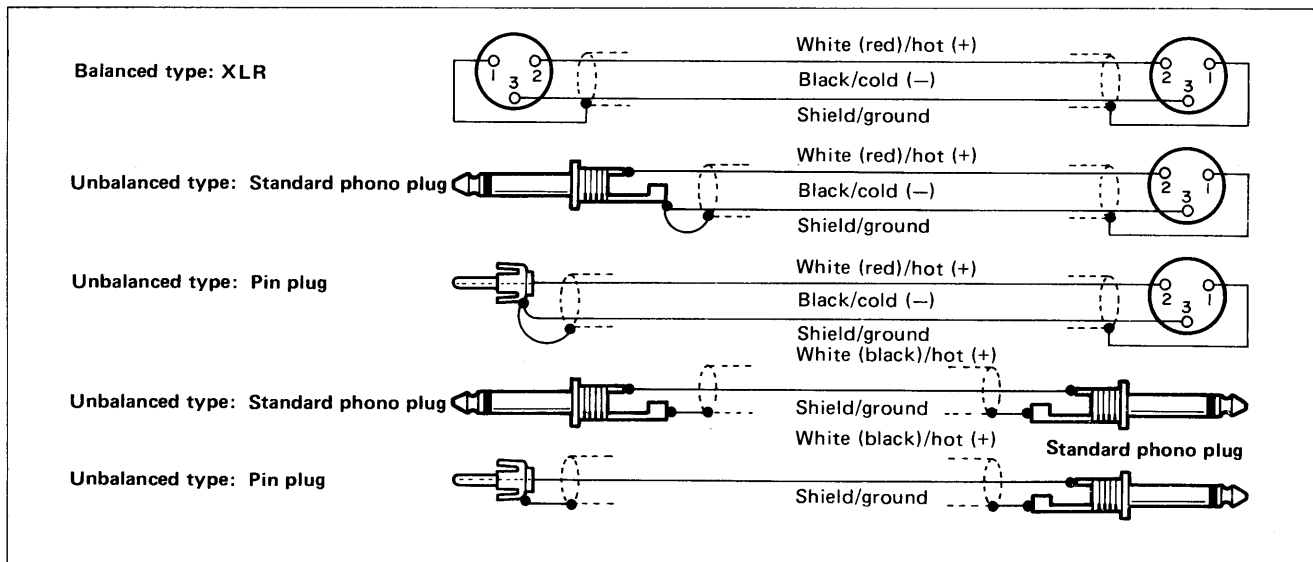
## Output versus distortion



# CABLE CONNECTIONS

There are many types of connecting cables for PA recording. This allows a choice in accordance with the intended application. Such cables are sold on the market but they are costly and there is no great variety. When using the cables, the established procedure is either to make them

yourself, bearing in mind the required length of the cables, or order them from a specialist manufacturer. The types of connecting cables required for general sound systems are indicated below.



# OVERALL SPECIFICATIONS

<b>Channel controls</b> (CH1 ~ CH12)	PAN MONITOR 1 (REV/ECHO) MONITOR 2 HIGH-EQ LOW-EQ INPUT LEVEL switch (-50/-40/-30/-20/+4) Channel faders
<b>Master controls</b>	AUX IN.controls, AUX PAN (1, 2) REVERB/ECHO controls MONITOR master faders (1, 2) PROGRAM master faders (L, R) GRAPHIC EQUALIZER (L, R)
<b>Others</b>	VU meters x 4 (PROGRAM x 2, MONITOR x 2)
<b>Power output</b>	200W per channel (4 $\Omega$ , 1kHz, 0.5%) 140W per channel (8 $\Omega$ , 1kHz, 0.5%)
<b>Frequency response</b>	20Hz to 15kHz 0 $\pm$ 1dB (60W, 8 $\Omega$ ) 20Hz to 30kHz 0 $^{+1}$ dB -3dB (60W, 8 $\Omega$ )
<b>Total harmonic distortion</b>	Less than 0.2% (1kHz, 120W, 8 $\Omega$ ) Less than 0.5% (20Hz ~ 20kHz, 120W, 8 $\Omega$ )
<b>Intermodulation distortion</b>	Less than 0.5% (70Hz : 7KHz = 4 : 1 at 60W, 8 $\Omega$ )
<b>Hum and noise level</b> (20Hz to 20kHz)	-118dB (Equivalent Input Noise)
<b>Maximum gain</b> SPEAKERS (L, R) MON OUT (1, 2) ECHO SEND LINE OUT (L, R) G-EQ OUT AUX IN (1, 2)	81dB (CH IN $\rightarrow$ SPEAKER OUT) 54dB (CH IN $\rightarrow$ MON OUT) 30dB (CH IN $\rightarrow$ ECHO SEND) 54dB (CH IN $\rightarrow$ LINE OUT) 54dB (CH IN $\rightarrow$ G-EQ OUT) 51dB (AUX IN $\rightarrow$ SPEAKER OUT)
<b>Equalizer</b> LOW-EQ HIGH-EQ GRAPHIC-EQ	$\pm$ 15dB (100Hz) $\pm$ 15dB (10kHz) $\pm$ 12dB (63Hz/125Hz/250Hz/500Hz/1kHz/2kHz/4kHz/8kHz/16kHz)
<b>Power supply</b>	U.S.A. & CANADIAN MODELS: AC120V, 4A, 50/60Hz GENERAL MODELS: AC220/240V, 900W, 50/60Hz
<b>Dimensions (W x D x H)</b> <b>Weight</b>	787 x 631 x 229 mm (31 x 24-3/4 x 9") 35 kg (77 lbs)

\* Specifications subject to change without notice.

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