

# **YAMAHA**

**Powered Mixers**

**Tables de mixage á amplification de puissance**

**Aktiv-Mischpult**

**EMX2150**

**EMX2200**

**EMX2300**

Operation Manual

Manuel d'instructions

Bedienungsanleitung

# Congratulations!

Your EMX-series Powered Mixer is an ideal choice for small or medium-size PA and sound reinforcement applications. The EMX2150, EMX2200 and EMX2300 feature 6, 8 or 12 input channels, respectively, feeding a high-performance stereo power amplifier. The EMX2150 delivers a clean 150 watts per channel into 4-ohm loads, while the EMX2200 and EMX2300 put out a powerful 250 watts per channel into 4-ohm loads. The input channels offer a choice of balanced LO-Z XLR or HI-Z TRS phone jack inputs, and a 20-dB pad switch and input gain control allow precise level matching with any input source. Three-band EQ stages on each input channel permit versatile response shaping of the channel signals, and dual AUX send controls allow convenient incorporation of external effects or monitoring systems. The AUX 2/DSP control also feeds the EMX mixer's internal effect processor — one of the highlights of this new series. The new EMX mixers incorporate a sophisticated YAMAHA digital signal processor that provides 15 top-quality digital reverb, delay and echo effects. The effects can even be "edited" to some degree to create precisely the required sound. Each input channel also has a pan control which can be used to pan the channel signal across the master stereo buss. The master control section includes master AUX send faders, aux return controls, the digital signal processor controls, master faders, and independent nine-band graphic equalizers for the left and right channels. The graphic equalizers are essential for overall response shaping and feedback control in sound reinforcement applications. In addition to the main speaker outputs, the EMX mixers also offers stereo line outputs prior to the graphic EQ stage, direct graphic equalizer inputs and outputs, and direct inputs to the power amplifier stage. +48 volt phantom power is even provided for convenient powering of condenser microphones.

We urge you to read this operation manual thoroughly in order to make the most of the mixer's many features and controls. Please keep the manual in a safe place for later reference.

## FCC INFORMATION (U.S.A.)

### 1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

### 2. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product MUST be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

### 3. NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate, please contact Yamaha Corporation of America, Electronic Service Division, 6600 Orangethorpe Ave, Buena Park, CA 90620

\* This applies only to products distributed by YAMAHA CORPORATION OF AMERICA.

## CANADA

THIS DIGITAL APPARATUS DOES NOT EXCEED THE "CLASS B" LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATION OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA "CLASSE B" PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDICTE PAR LE MINISTERE DES COMMUNICATIONS DU CANADA.

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## PRECAUTIONS

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### 1. AVOID EXCESSIVE HEAT, HUMIDITY, DUST AND VIBRATION

Keep the unit away from locations where it is likely to be exposed to high temperatures or humidity — such as near radiators, stoves, etc. Also avoid locations which are subject to excessive dust accumulation or vibration which could cause mechanical damage.

### 2. AVOID PHYSICAL SHOCKS

Strong physical shocks to the unit can cause damage. Handle it with care.

### 3. DO NOT OPEN THE UNIT OR ATTEMPT REPAIRS OR MODIFICATIONS YOURSELF

This product contains no user-serviceable parts. Refer all maintenance to qualified YAMAHA service personnel. Opening the case and/or tampering with the internal circuitry will void the warranty.

### 4. MAKE SURE POWER IS OFF BEFORE MAKING OR REMOVING CONNECTIONS

Always turn the power OFF prior to connecting or disconnecting cables. This is important to prevent damage to the unit itself as well as other connected equipment.

### 5. HANDLE CABLES CAREFULLY

Always plug and unplug cables — including the AC cord — by gripping the connector, not the cord.

### 6. CLEAN WITH A SOFT DRY CLOTH

Never use solvents such as benzine or thinner to clean the unit. Wipe clean with a soft, dry cloth.

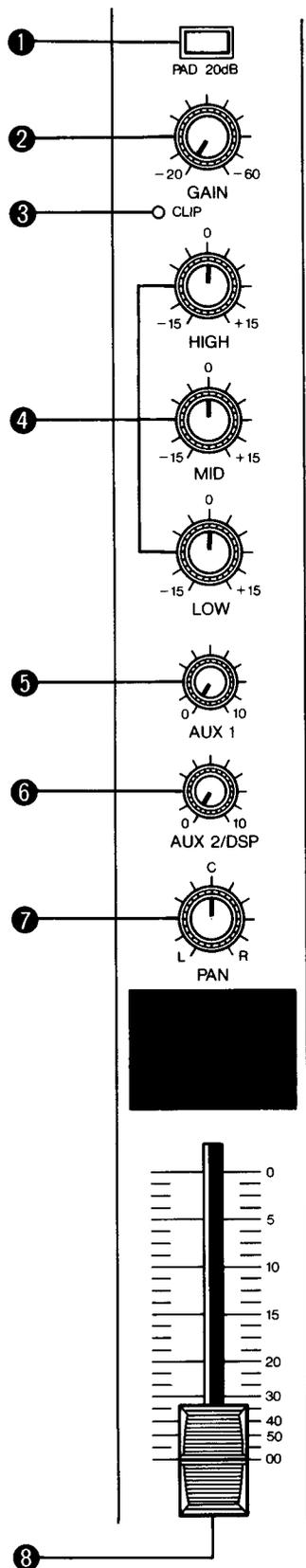
### 7. ALWAYS USE THE CORRECT POWER SOURCE

Make sure that the power source voltage specified on the rear panel matches your local AC mains supply.

ALSO CHECK THE PRECAUTIONS IN THE "OPERATING-TIPS" SECTION

# FRONT PANEL CONTROLS

## Input Channels



### 1 PAD Switch

This switch attenuates the signal applied to the corresponding rear-panel HI-Z or LO-Z input by 20 dB prior to the head amplifier and input gain control. The PAD switch effectively increases the range of input signal levels that can be handled by the mixer, preventing overloading of the input circuitry when receiving high-level signals.

### 2 GAIN Control

This control adjusts the input sensitivity of each input channel between  $-60$  dB (0.775 mV) and  $-20$  dB (77.5 mV) when the PAD switch is OFF (between  $-40$  dB and 0 dB when the PAD switch is ON). Continuously variable gain control allows optimum matching with virtually any microphone or line source.

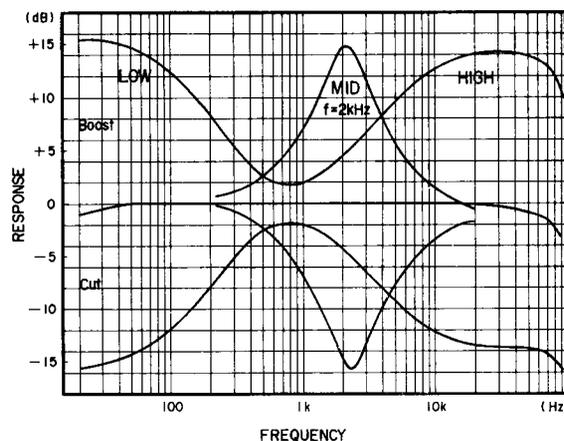
### 3 CLIP LED Indicator

The CLIP indicator LED lights when the post-EQ signal of the corresponding channel's input reaches a level 3 dB below the clipping level of the channel's circuitry. If the CLIP indicator lights more than only briefly on high-level transients it is necessary to decrease the input sensitivity of the channel using the GAIN control and PAD switch or, if this does not provide sufficient attenuation, to reduce the output level of the source connected to that channel's input.

### 4 3-band Equalizer

These three controls permit individually modifying the response of each channel. The HIGH, MIDDLE and LOW EQ controls function as follows:

Control	Range	Freq.	Type
HIGH	$\pm 15$ dB	8 kHz	Shelving
MIDDLE	$\pm 15$ dB	2 kHz	Peaking
LOW	$\pm 15$ dB	100 Hz	Shelving



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## 5 AUX 1 Control

The AUX 1 control determines the level of the signal sent from that channel to the AUX 1 mixing buss, where the AUX send signals from all channels are mixed and fed to the AUX SEND 1 fader and the AUX SEND 1 jack on the mixer's rear panel. The AUX 1 controls can be used to determine the amount of signal from the corresponding input channel sent to external effect devices or power amps (usually for monitoring) fed by the AUX SEND 1 jack. In its factory preset configuration, AUX 1 is pre-EQ/pre-fader thus making it ideal for use with stage monitor systems.

- \* AUX 1 is factory pre-wired for pre-EQ/pre-fader operation, so the AUX 1 signal is not affected by the setting of the channel EQ controls or fader. Internal jumpers allow the AUX 1 control to be rewired for post-EQ/pre-fader or post-EQ/post-fader operation — REFER THIS JOB TO YOUR YAMAHA DEALER OR A QUALIFIED SERVICE CENTER!

## 6 AUX 2/DSP Control

The AUX 2/DSP control determines the level of the signal sent from that channel to the AUX 2 mixing buss, which in turn feeds the internal digital signal processor system as well as the rear-panel AUX SEND 2 jacks via the AUX SEND 2 fader. Please note that the AUX SEND 2 fader affects the level of the AUX 2 signal sent to the internal digital signal processor.

- \* AUX 2 is factory pre-wired for post-EQ/post-fader operation, so the AUX 2 signal is affected by the setting of the channel EQ controls and fader. Internal jumpers allow the AUX 1 control to be rewired for pre-EQ/pre-fader or post-EQ/pre-fader operation — REFER THIS JOB TO YOUR YAMAHA DEALER OR A QUALIFIED SERVICE CENTER!

## 7 PAN Control

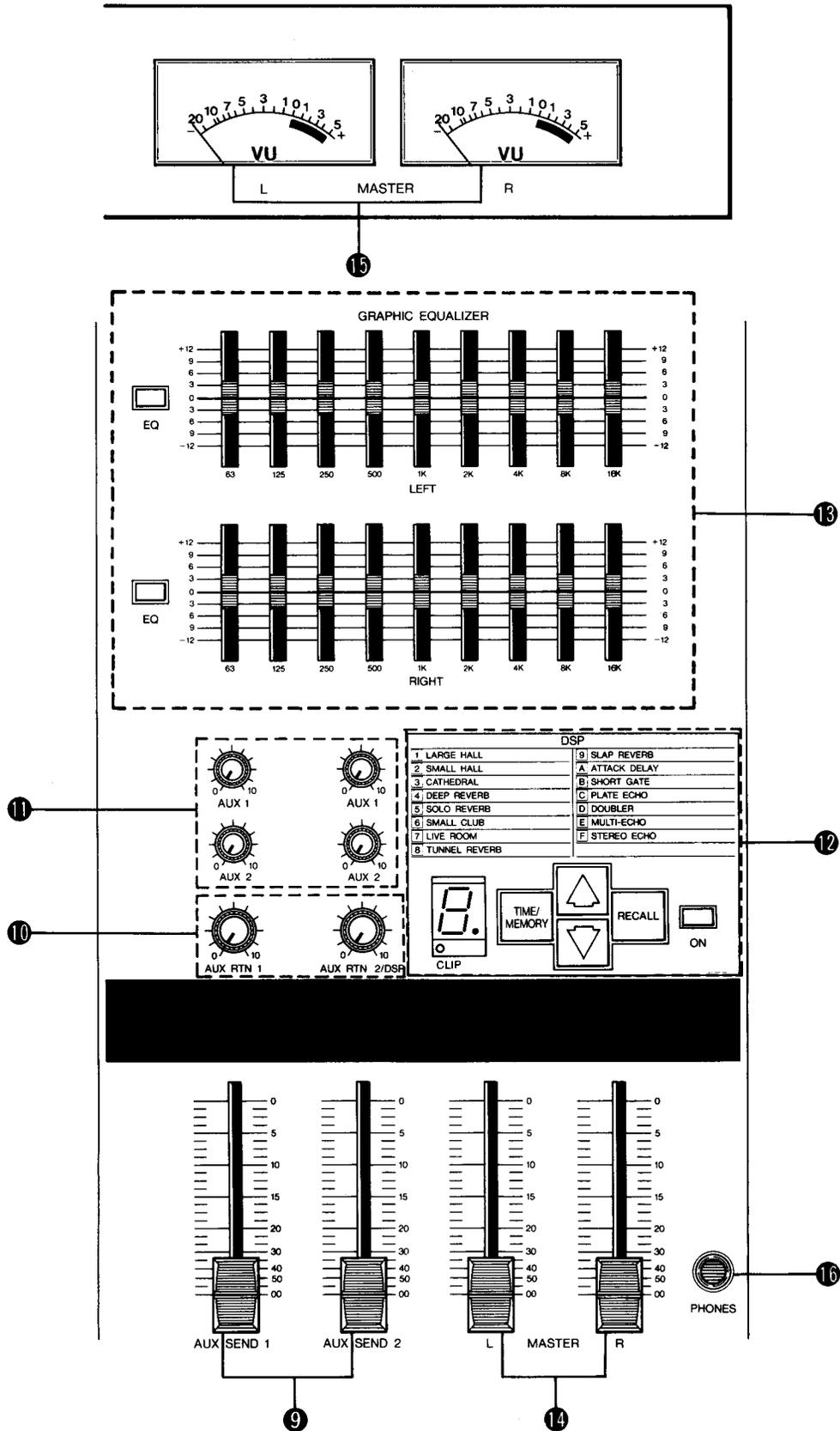
Pans the channel signal across the L and R MASTER busses, thus determining the perceived position of the sound from that channel in the output stereo sound field. If the PAN control is set all the way to the left, for example, the sound from that channel will appear only from the left speaker system. If PAN is turned all the way to the right, then the sound will appear only from the right speaker system. Intermediate settings cause the sound to appear at corresponding locations in the stereo sound field.

## 8 Channel Fader

This is the main level control for each input channel. It determines the level of the signal sent from the corresponding input channel to the master mixing buss and to the mixer's power amplifier via the master fader. The settings of the input channel faders determines the "mix" or balance of sound levels between the instruments or other sources connected to the inputs.

- \* If a channel is not being used, its fader should be set to the minimum position to prevent unwanted noise from being added to the main program signal.

# Master Control Section



### 9 AUX SEND 1 & AUX SEND 2 Faders

These adjust the overall output level of the AUX 1 and AUX 2 “mixes” set up using the AUX 1 and AUX 2 controls. SEND 1 sets the overall level of the AUX 1 mix signal appearing at the AUX SEND 1 jack, and SEND 2 sets the overall level of the AUX 2 mix signal appearing at the AUX SEND 2 jacks (there are two AUX SEND 2 jacks). These controls should be used to optimally match the AUX SEND output level of the mixer to the input sensitivity of the external effect, signal processing device or power amplifier used.

### 10 AUX RTN 1 & AUX RTN 2/DSP Controls

These controls adjust the level of the signal received at the corresponding rear-panel AUX RTN jacks and mixed into the main program on the MASTER buss (when the DSP ON switch is OFF in the case of AUX RTN 2). If the DSP ON switch is turned ON, the AUX RTN 2/DSP control adjusts the level of the effect signal from the internal digital signal processor mixed into the main program (signals received at the AUX RTN 2 jacks will be shut off).

### 11 AUX 1 & AUX 2 Controls (for AUX RTN 1 & AUX RTN 2)

Both the AUX RTN 1 and AUX RTN 2 inputs feature AUX 1 and AUX 2 controls that can be used to send the signals received at the corresponding AUX RTN jacks to the mixer’s AUX 1 and/or AUX 2 mixing busses. Stereo signals received at the AUX RTN L and R jacks are combined into a monaural signal before being fed to the AUX buss.

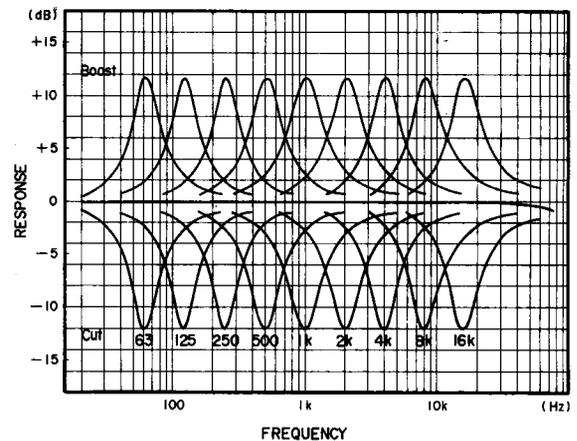
**IMPORTANT NOTE:** These controls should only be used when an independent external source is feeding the corresponding AUX RTN jacks (such as a tape player for background music during intermission, etc). The AUX 1 and AUX 2 controls should NOT be used (they should be set to their minimum positions) when the corresponding AUX RTN L and R jacks are receiving the output from a signal processor which is being fed by the mixer’s AUX SEND jacks.

### 12 DSP Controls & Display

The DSP control section includes  (increment) and  (decrement) keys, a TIME/MEMORY, key, a RECALL key, an ON switch, a single-digit seven-segment LED display, and a DSP PEAK LED. Refer to “Using the Digital Signal Processor Section” on page 11 for operating details.

### 13 Graphic Equalizers & EQ Switches

Independent 9-band graphic equalizers for the L and R MASTER program signals allow fine response shaping of the main output from the mixer (SPEAKER OUT or GEQ OUT). Each graphic equalizer section has 9 linear controls with center frequencies of 63 Hz, 125 Hz, 250 Hz, 500 Hz, 1 kHz, 2 kHz, 4 kHz, 8 kHz and 16 kHz. Each control permits 12 dB maximum boost or cut. When set to the center or “0” position, response in the corresponding band is unaffected. The EQ switches turn the corresponding graphic equalizer sections ON or OFF.



### 14 L & R MASTER Faders

The L & R MASTER faders are the main “volume controls” for the overall program mix, controlling the levels of the signal sent to the rear-panel SPEAKER OUT L (1 & 2) and SPEAKER OUT R (1 & 2) jacks, the GEQ OUT (L & R) jacks, the LINE OUT (L & R) jacks, and the front-panel PHONES jack.

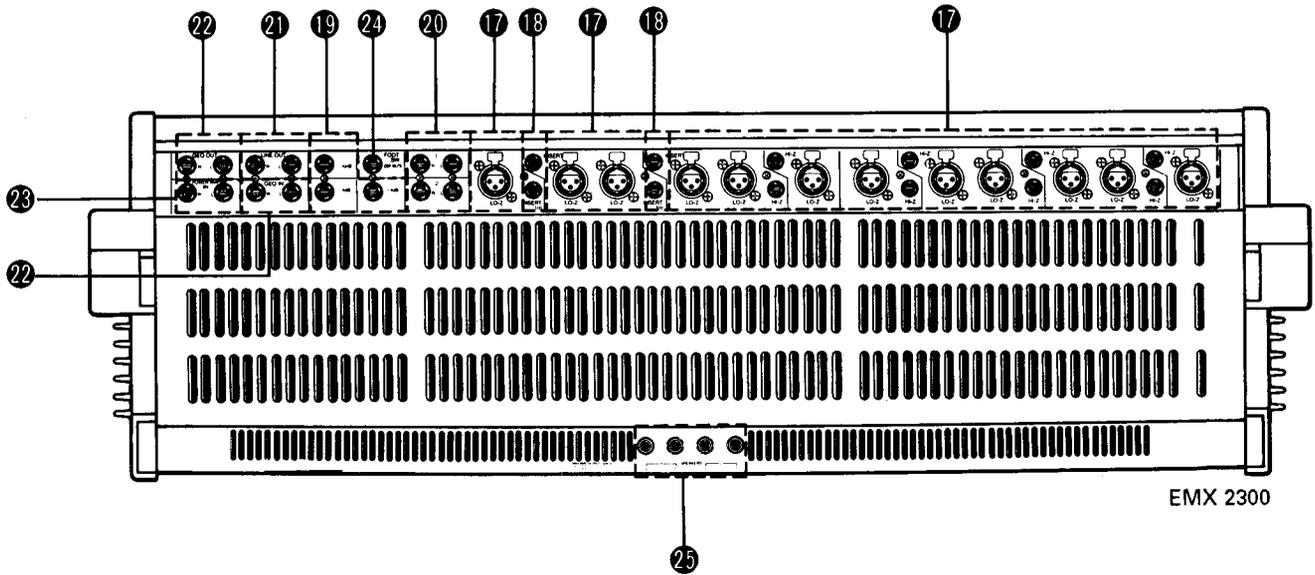
### 15 L & R MASTER VU Meters

These precision VU meters display the levels of the signals appearing at the outputs of the mixer’s power amplifier (SPEAKER OUT L & R). The meters are a useful aid in setting optimum output levels using the L & R MASTER faders.

### 16 PHONES Jack

The PHONES jack delivers the main program signal to a pair of 8 ohm stereo monitor headphones. The L & R MASTER faders adjust the headphone monitoring level.

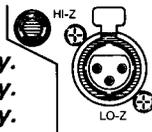
# REAR PANEL CONNECTORS AND CONTROLS



EMX 2300

## 17 HI-Z and LO-Z Input Connectors

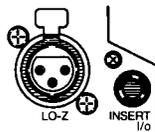
**EMX2150 :** HI-Z on channels 1 — 4 only.  
**EMX2200 :** HI-Z on channels 1 — 4 only.  
**EMX2300 :** HI-Z on channels 1 — 8 only.



All input channels offer a balanced LO-Z (low-impedance) XLR-type connector, while the lower-numbered input channels (listed above) also have balanced HI-Z (high-impedance) tip-ring-sleeve 1/4" phone jacks. The LO-Z inputs are primarily intended for use with professional low-impedance microphones or electronic instruments having low-impedance outputs. The HI-Z inputs will accept either balanced or unbalanced signals from high-impedance microphones, musical instruments or other source equipment. See "Connecting Sources" on page 9 for further details.

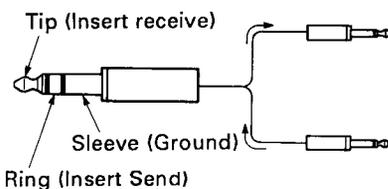
## 18 CH INSERT IN/OUT Jacks

**EMX2150 :** Channels 5 — 6.  
**EMX2200 :** Channels 5 — 8.  
**EMX2300 :** Channels 9 — 12.



These are a TRS (Tip-Ring-Sleeve) type jacks that provide an insert patch point for connection of external signal processing or other equipment between the channel's head amplifier (the first amplifier stage after the input) and EQ stage. The insert points are ideal for insertion of compressors, noise gates, equalizers or other equipment that needs to be applied to specific channels only. The CH INSERT IN/OUT jacks include both the send (output) and receive (input) lines required by the insert point, sending and receiving signals at a nominal -6 dB.

## TRS PHONE PLUG

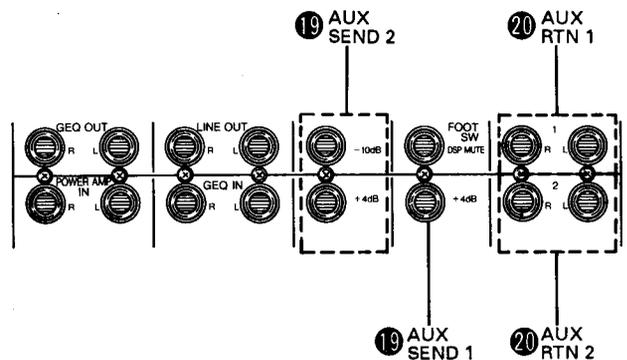


## 19 AUX SEND 1 (+4 dB) & AUX SEND 2 (+4 dB & -10 dB) Jacks

These jacks deliver the AUX 1 and AUX 2 mixes, respectively, to feed an external effect device or power amplifier. Nominal output level of the main AUX send jacks is +4 dB. A second AUX SEND 2 jack is provided with a nominal output level of -10 dB. Use the -10 dB AUX SEND 2 jack if your external signal processor can not handle the +4 dB level of the main AUX SEND jacks. The AUX SEND 2 jack is active even when the internal digital signal processor is ON.

## 20 AUX RTN 1 (L & R) & AUX RTN 2 (L & R) Jacks

The output from effect units fed by the AUX OUT 1 and AUX OUT 2 jacks can be returned to the main program mix via these jacks. Note that the AUX RTN 1 and AUX RTN 2 inputs are both stereo, providing compatibility with 1-in/2-out signal processors and effects. The AUX RTN jacks can also be used to receive the output from independent stereo sources (Tape or CD players, etc) to be mixed into the master program signal. Nominal input level/impedance is -20 dB/10 k-ohms



## 21 LINE OUT L & R Jacks

The LINE OUT jacks deliver the main program signal (L and R channels) at line level (+4 dB). The signal is derived prior to the graphic equalizer, and is not affected by the graphic equalizer settings. The LINE OUT jacks can be used to feed an external power amplifier, a tape recorder, or any other device which accepts line-level input. The LINE OUT jacks can also be used to "cascade" two EMX-series mixers to provide a greater number of input channels. In this case, the LINE OUT L and R jacks of the first EMX-series mixer would be connected to the AUX RTN L and R (1 or 2) inputs of the second mixer.

## 22 GEQ IN (L & R) & GEQ OUT (L & R) Jacks

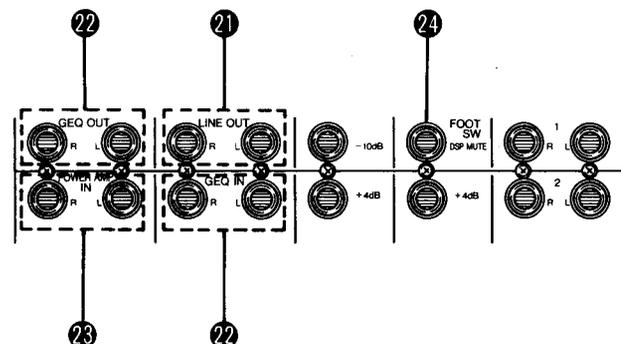
External line-level source signals can be fed directly to the input of the L and R channel graphic equalizers via these jacks. Inserting a plug into the EQ IN L or R jack disconnects the internal mixer program signal for that channel, so only the external source is fed to the graphic equalizer and power amplifier. The GEQ OUT L and R jacks deliver the main program signal after graphic equalization. In all other respects, they function in the same way as the LINE OUT L & R jacks described above.

## 23 POWER AMP IN L & R Jacks

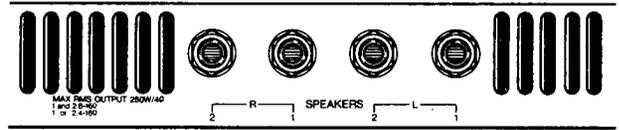
External line-level source signals can be fed directly to the inputs of the mixer's stereo power amplifier via these jacks. Inserting a plug into the POWER AMP IN L or R jack disconnects the internal mixer program signal for that channel, so only the external source is fed to the power amplifier.

## 24 FOOT SW (DSP MUTE) Jack

This jack accepts an optional YAMAHA FC4 or FC5 footswitch, which can be used to turn the selected internal digital signal processor effect ON and OFF.

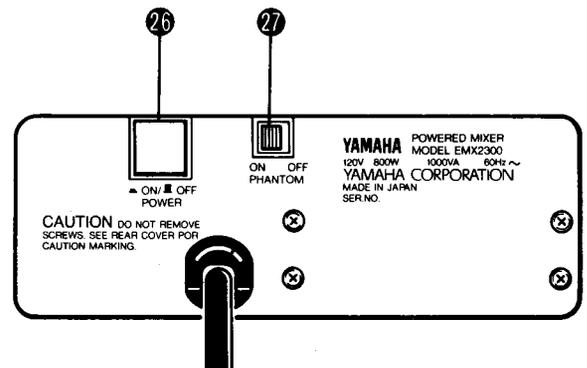


## 25 SPEAKER OUT L (1 & 2) and R (1 & 2) Jacks



These are the main speaker-level outputs from the powered mixer. SPEAKER OUT L (1 & 2) and SPEAKER OUT R (1 & 2) are standard mono 1/4" phone plugs. The "1" and "2" jacks for each channel are wired in parallel. If you connect a speaker system to only one of these jacks — "1" or "2" — then the total load impedance of the speaker system may be as low as 4 ohms. If you plug speakers into both the "1" and "2" jacks of either channel, the total load impedance of each speaker system must be no less than 8 ohms.

## SIDE PANEL



## 26 POWER Switch

Press in to turn power ON, and press a second time to turn power OFF. The VU meters will light when the power is ON.

## 27 PHANTOM Switch

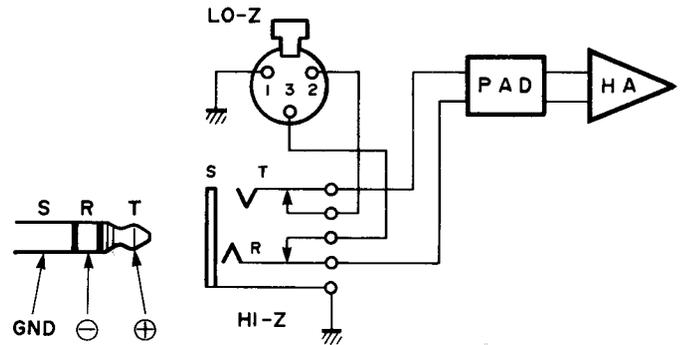
When this switch is turned ON, +48V is applied to the "+" and "-" pins of the LO-Z and HI-Z input connectors via 6.8 kΩ current-limiting/isolation resistors, providing phantom power for phantom-powered condenser microphones.

# OPERATING TIPS

## Connecting Sources

The fact that the EMX-series mixers offer both LO-Z XLR-type and HI-Z phone jack inputs makes it simple to connect virtually any type of source equipment. Please note, however, that not all input channels have HI-Z inputs. Some of the highest-numbered channels have CH INSERT IN/OUT jacks in place of HI-Z inputs. The following chart shows which channels have HI-Z inputs and which have CH INSERT IN/OUT jacks for the three EMX-series mixers described in this manual:

Model	Channels with HI-Z Inputs	Channels with CH INSERT/IN OUT Jacks
EMX2150	1, 2, 3, 4	5, 6
EMX2200	1, 2, 3, 4	5, 6, 7, 8
EMX2300	1, 2, 3, 4, 5, 6, 7, 8	9, 10, 11, 12



Professional low-impedance microphones and other equipment almost invariably are fitted with an XLR connector which matches the LO-Z inputs on the mixer. Electronic musical instruments and other equipment with relatively high-impedance outputs usually have a phone-jack output connector that can be directly connected to the HI-Z inputs using a standard phone plug → phone plug cable. The HI-Z inputs will also accept balanced high-impedance lines from high-impedance microphones or other balanced sources. For your reference, the LO-Z and HI-Z connectors are wired as follows:

LO-Z Connector	HI-Z Connector
Pin 1: GROUND	Sleeve: GROUND
Pin 2: HOT (+)	Tip: HOT (+)
Pin 3: COLD (-)	Ring: COLD (-)

- MAKE SURE THE MIXER'S POWER SWITCH IS OFF WHEN CONNECTING OR DISCONNECTING ANY CABLES.
- ALWAYS TURN THE MIXER'S POWER ON AFTER TURNING ON CONNECTED SOURCES SUCH AS ELECTRONIC INSTRUMENTS, ETC.
- NEVER CONNECT THE SPEAKER OUTPUT OF ANY AMPLIFIER TO THE CONSOLE'S INPUTS UNLESS A SUITABLE HIGH-LEVEL ATTENUATION PAD OR "DIRECT BOX" IS USED TO LOWER THE SIGNAL'S LEVEL.

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## Matching Input Levels

When matching input levels it is a good idea to make sure the speaker systems are DISCONNECTED from the mixer's speaker outputs (this must be done while the power switch is OFF). The sound can be monitored via a pair of headphones plugged into the front-panel PHONES jack — but make sure the L and R MASTER faders are set to their minimum levels to begin with, then raise them just enough to produce a comfortable sound level when you actually begin monitoring input signals and matching levels.

Once all your sources are connected and the entire system is turned on, it is important to accurately match the input sensitivity of each input channel with the source signal it is receiving. Do this one channel at a time. Begin by setting the lowest possible sensitivity for each input: turn the PAD switch ON and set the GAIN control to -20 dB. Set the channel fader to between about "10" and "5" on its scale. "Play" the source connected to the first input channel at the loudest level it will be played in actual use — if a microphone, have the vocalist sing his or her loudest note into it. Watch the channel CLIP indicator carefully. If it lights at this point (with the input controls set for minimum sensitivity) then the output level of the source must be reduced. Normally, however, you will have to increase the input sensitivity to achieve optimum matching. Gradually increase the setting of the GAIN control until the CLIP indicator just barely flashes on the loudest peaks. If you turn the GAIN control all the way up and the CLIP LED still doesn't light, then reduce the GAIN control setting to minimum, turn the PAD switch OFF, then gradually increase the GAIN control setting again. This time you should definitely get a CLIP indication somewhere in the GAIN control range. If there is still no indication, check that the source is functioning properly and that it is properly connected to the appropriate input of the mixer. It may also be a good idea to check the cable for faults (try another cable). Remember, the CLIP indicator lights when the channel signal is 3dB below clipping level, so it is quite OK if it flashes briefly on loud peaks. This, in fact, is about the optimum input sensitivity setting. When you've finished with the first channel, set its fader to the minimum position and proceed to the next channel, once again following the procedure outlined above.

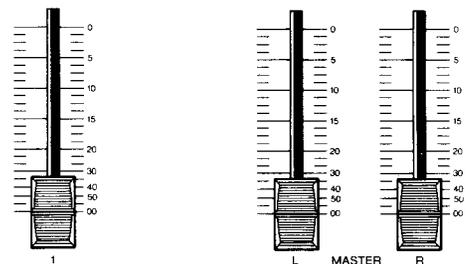
Once the input levels have all been properly matched, set the L and R MASTER faders to their minimum positions, TURN OFF the mixer's power switch, connect the required speaker systems, then turn the power switch back ON. The MASTER faders can now be gradually raised to their operating levels.

## Channel and MASTER Faders

The final positions of the channel will, naturally, depend on the overall "mix" you set up. There are, however, a few important points you should keep in mind.

The channel faders have an "optimum range," which provides minimum noise and distortion, as well as maximum control margin. On the EMX-series mixers the optimum channel fader range is between about "15" and "5" on their scales. There is no rule that says you must to avoid higher or lower settings, but keep in mind that the best sound quality can be achieved within this range. Settings in this also provide sufficient leeway above and below for later adjustments.

It is also important to watch the VU meters when setting the input and master faders. The meters should never read higher than about "0 VU" on their scales. If they do, then the mixers levels are too high and the power amplifier may be overloaded causing distortion. Remember that changing any single input channel fader setting will affect the overall output level. It's usually best to make small adjustments in output level by using the MASTER faders. But if that means setting the MASTER faders to extremely low or high positions (lower than about "20" or higher than "5" on the scale), then the overall mix should be re-adjusted using the input channel faders so that a proper VU meter reading is obtained with the MASTER faders in a more reasonable range.



## Channel EQ

The HIGH, MIDDLE and LOW equalization controls on each channel of the mixer make it possible to independently equalize the channel signals to some degree. The basic rule of thumb is that equalization should NOT be used unless it is absolutely necessary. Always put some effort into proper microphone selection, careful microphone placement and/or setting of source instrument controls to achieve the desired sound before resorting to equalization. When you've set everything up as best you can, but still need to modify a sound, then go ahead and equalize. Channel EQ can be most useful in tonally separating one sound from another or from a group. A bit of extra HIGH EQ added to a guitar sound, for example, can give it a bit

more "bite" and help it to stand out more clearly from the background. Vocals tend to stand out nicely if given a bit of boost in the MIDDLE range. Speech generally benefits from a reduction in the low frequencies — to prevent that "boomy" sound that occurs when the speaker gets too close to the microphone. Experimentation and experience will tell you how much EQ is right for different types of sound. Also keep in mind the fact that the CLIP LED indicator is post-EQ. This means that excessive equalization can cause the CLIP LED to light indicating that you either need to reduce the input gain control or reduce the amount of equalization being applied.

## Using the Digital Signal Processor Section

The EMX-series mixers feature a built in digital signal processor (DSP) that provides a range of 15 top quality digital effects. Each effect program has one parameter that can be edited over a range of 10 steps to modify the sound of the effect to a certain degree. The effect programs, their program "numbers" and the programmable parameters they provide are listed below.

Program Number	Program Name	Programmable Parameter
1 (1)	LARGE HALL	REVERB TIME
2 (2)	SMALL HALL	REVERB TIME
3 (3)	CATHEDRAL	REVERB TIME
4 (4)	DEEP REVERB	REVERB TIME
5 (5)	SOLO REVERB	REVERB TIME
6 (6)	SMALL CLUB	REVERB TIME
7 (7)	LIVE ROOM	REVERB TIME
8 (8)	TUNNEL REVERB	REVERB TIME
9 (9)	SLAP REVERB	REVERB TIME
A (A)	ATTACK DELAY	ROOM SIZE
B (b)	SHORT GATE	ROOM SIZE
C (C)	PLATE ECHO	ROOM SIZE
D (d)	DOUBLER	RIGHT-CHANNEL DELAY TIME
E (E)	MULTI-ECHO	RIGHT-CHANNEL DELAY TIME
F (F)	STEREO ECHO	RIGHT-CHANNEL DELAY TIME

### To Select an Effect Program:

1. Use the  and/or  keys to select the desired effect program. The number of the selected effect program is shown on the 7-segment LED display. When an effect is initially selected, it's number will be flashing on the display indicating that the effect has been selected but not yet recalled (the previously selected effect is still active).
2. Press the RECALL key to recall and activate the selected effect.
3. Use the DSP section ON switch to turn the select effect ON or OFF as required. An optional YAMAHA FC4 or FC5 footswitch connected to the rear-panel FOOT SW (DSP MUTE) jack can also be used to turn the selected effect ON or OFF.

**NOTE:** When the power switch is initially turned ON, program 1 (LARGE HALL) is automatically selected.

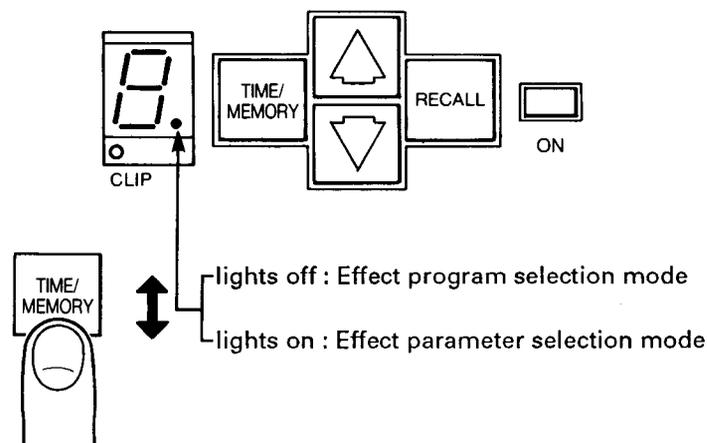
**NOTE:** The EMX mixer's digital signal processor works in conjunction with the input channel AUX 2/DSP controls, the AUX SEND 2 fader, and the AUX RTN 2/DSP control. Refer to the descriptions of these controls on page 4, 6 for details.

**NOTE:** The DSP PEAK LED located to the lower left of the 7-segment LED display will light if the digital signal processor analog-to-digital converter reaches or exceeds 3dB below clipping level. If the DSP PEAK LED lights more than just briefly on transient peaks, the AUX 2 controls settings or AUX SEND 2 fader setting should be reduced to avoid distortion of the effect signal.

### To Edit the Selected Effect:

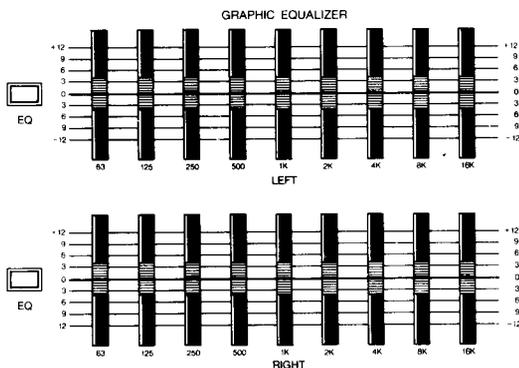
1. First select and recall the effect to be edited.
2. Press the TIME / MEMORY key. The LED dot immediately to the right of the 7-segment LED display will light to show that the TIME mode is active. The current value of the programmable parameter for the selected effect program (0 — 9) will be shown on the 7-segment LED display.
3. Use the  and/or  keys to set the new effect parameter value.
4. Press the TIME/MEMORY key again to return to the normal effect program selection mode (the dot to the right of the 7-segment LED display will go out).

**NOTE:** The initial parameter values for all effect programs are automatically restored whenever the power switch is turned ON.



## Graphic Equalization

Graphic equalization has two main uses in powered mixers like the EMX-series: compensation for acoustic deficiencies in the listening area and feedback control. Like the channel equalizers, the graphic equalizers should be left alone unless it is absolutely necessary to use them. The more equalization you use, the more phase deviation you introduce into the program signal, and this can result in an unnatural, distorted sound. There are many instances, however, in which the listening area itself causes response anomalies due to its acoustic characteristics. Large areas of uncovered glass or tiled floors, for example, are extremely effective reflectors of high-frequency sound. Sound produced in environments like this can sound painfully sharp, and some reduction in the high frequency range may be called for. Smaller symmetrical rooms (a square room being the worst case) can actually have resonant frequencies within the audible low-frequency range. A bit of reduction in the low frequencies can help to make the sound more intelligible. Note that in almost all cases good equalization practice demands a cut in the offending frequency range rather than a boost in ranges where response is lacking. The graphic equalizer can also be used — although to a limited degree — for feedback control. Proper microphone placement is the primary tool for prevention of feedback, but this can be extremely difficult if you're working in a tight stage area. Simply cut response in the frequency range where the feedback is occurring (this will have to be found by experimentation). This will compromise the overall frequency response of the program, but it's better than facing the possibility of squealing feedback in the middle of an important performance.



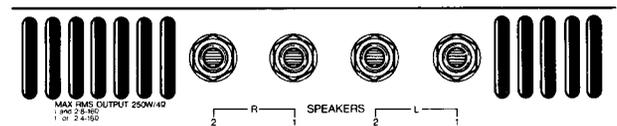
## Connecting Speakers

The EMX-series powered mixers have two 1/4" phone-jack speaker outputs per channel, which are internally connected in parallel. This places some restrictions on their use.

- IF YOU CONNECT SPEAKERS TO ONLY ONE OF THE AVAILABLE SPEAKER OUTPUTS ON EITHER CHANNEL (L OR R), THE TOTAL IMPEDANCE OF THE SPEAKER SYSTEM CONNECTED TO THAT CHANNEL MAY BE NO LESS THAN 4 OHMS.
- IF YOU CONNECT SPEAKERS TO BOTH OF THE AVAILABLE SPEAKER OUTPUTS ON EITHER CHANNEL (L OR R), THE TOTAL IMPEDANCE OF THE SPEAKER SYSTEMS CONNECTED TO EACH OUTPUT OF THAT CHANNEL MAY BE NO LESS THAN 8 OHMS (two 8-ohm speaker systems connected in parallel form a 4-ohm load).
- THE MAXIMUM TOTAL IMPEDANCE OF SPEAKERS CONNECTED TO THE SPEAKER OUTPUT(S) OF EACH CHANNEL SHOULD BE 16 OHMS.
- MAXIMUM SPEAKERS ALLOWABLE PER CHANNEL: ONE 4-OHM SPEAKER. TWO 8-OHM SPEAKERS. FOUR 16-OHM SPEAKERS.

While a higher total load impedance than the recommended 16 ohms will only result in a loss of power output, a total load impedance that is too low can actually damage the powered mixer. With a total load impedance of 8 ohms (one 8-ohm speaker or two 16-ohm speakers) the maximum output power of the EMX2150 is 90 watts, and the maximum power output of the EMX2200 or EMX2300 is 160 watts. With a total load impedance of 4 ohms (one 4-ohm speaker or two 8-ohm speakers) the maximum power output of the EMX2150 is 150 watts, while the maximum power output of the EMX2200 and EMX2300 is 250 watts.

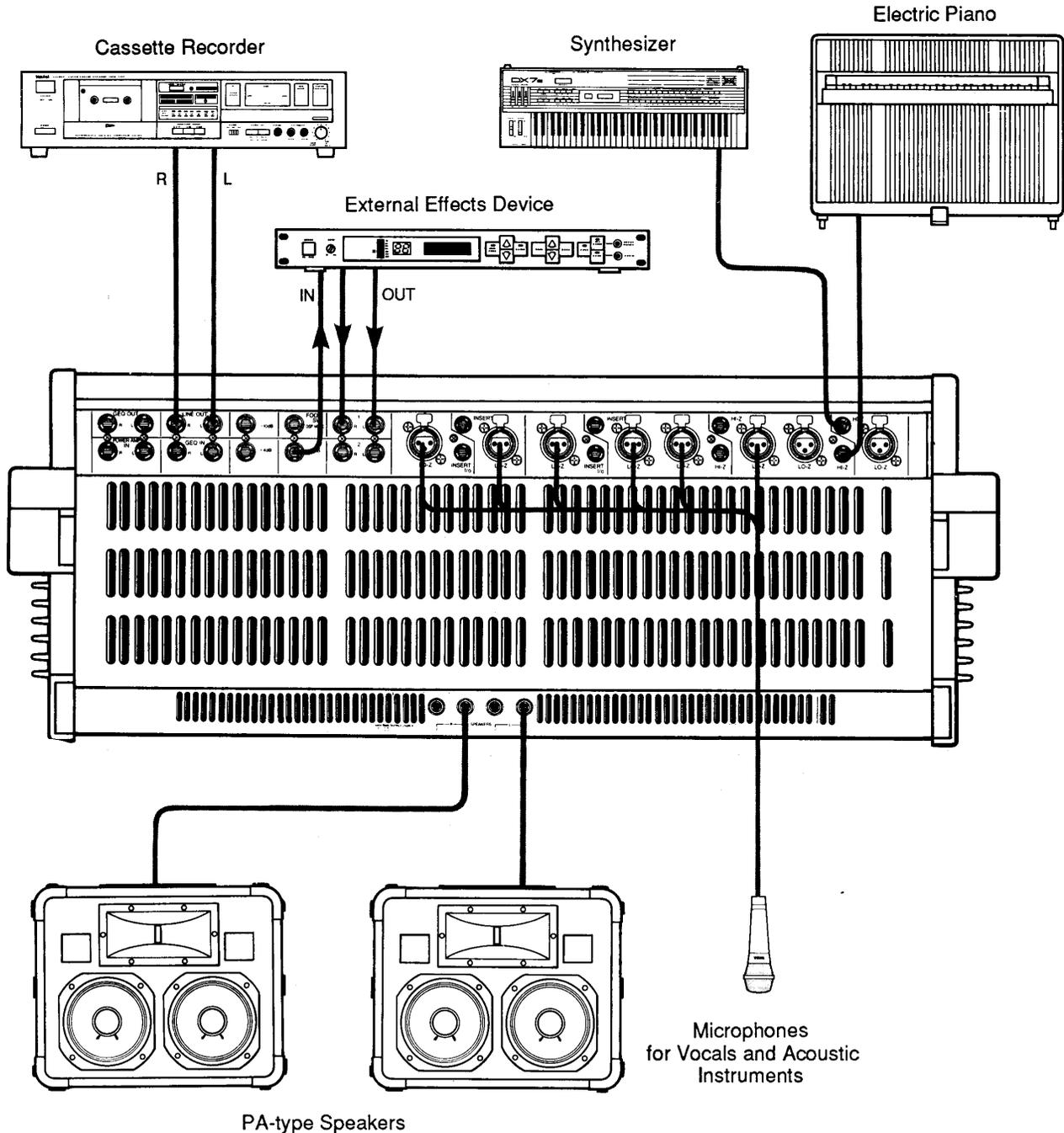
- NEVER CONNECT OR DISCONNECT SPEAKERS WHILE THE MIXER'S POWER IS TURNED ON !!



# SAMPLE APPLICATIONS

## A Small Sound System

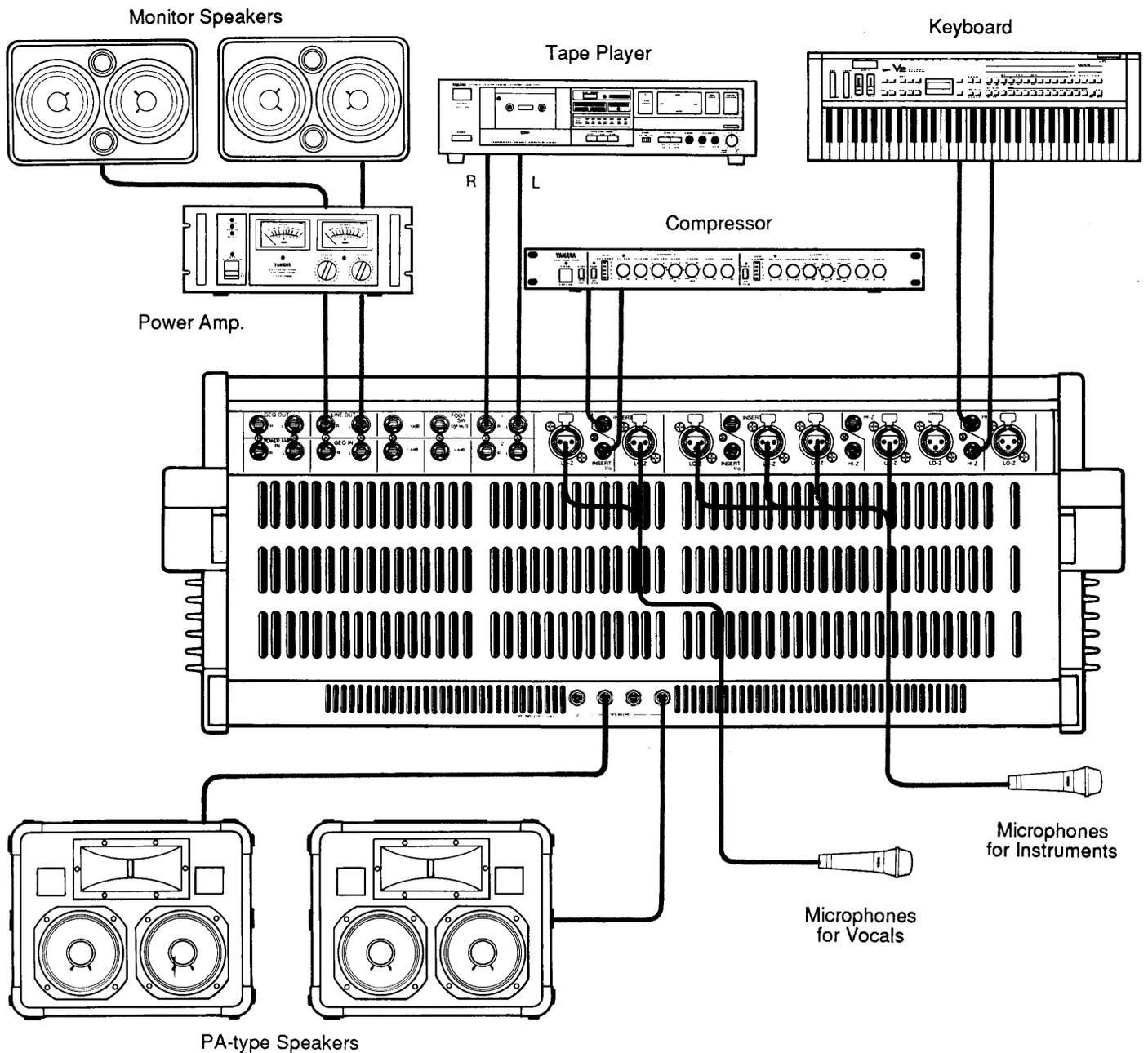
The accompanying illustration shows a simple sound reinforcement system set up using the EMX2200 (8-channel model) Powered Mixer. In the example, microphones are connected to inputs 3 through 8 — some for vocal use and some for pickup of acoustic instruments. The first two channels (1 and 2) directly accept the output from an electric piano and a synthesizer. An external effects device is connected into the AUX 1 send/return loop, complementing the mixer's internal AUX 2 digital signal processor. The LINE OUT jacks are connected to a cassette recorder so that the performance can be recorded directly via the mixer. The PA-type speakers are connected to the mixer's output channel via the SPEAKER OUT 1 jack.



## Sound Reinforcement with On-stage Monitors

This system is basically similar to the simple sound system described above, except that it provides on-stage monitor speakers for the performers and a few other refinements.

In this system the channel 1 and 2 inputs receive the stereo line-level signal from a multi-keyboard setup via the HI-Z inputs, while channels 3 through 8 receive low-impedance microphones. The microphones connected to channels 3 through 6 are used for instrument pickup, while the last two channels (7 and 8) receive the vocals. External compressors are patched into the channel 7 and 8 CH INSERT IN/OUT jacks to provide a smooth vocal sound with minimum level variations. An on-stage monitor mix for the vocalists is set up using the AUX 1 controls: the AUX SEND 1 jack feeds a power amplifier which in turn drives the on-stage monitor speakers. The internal digital signal processor is used for all required effects. A tape player connected to the AUX RTN 1 jacks provides background music during breaks (and/or recorded accompaniment or sound effects for the performance). The LINE OUT jacks feed a remote monitor amplifier and speakers which provide sound in the performer's dressing rooms or other areas.



# SPECIFICATIONS

## Maximum Output Power (Both channels driven)

EMX2150: 150 W/4 ohms, 0.5% THD at 1 kHz. 90 W/8 ohms, 0.3% THD at 1 kHz

EMX2200: 250 W/4 ohms, 0.5% THD at 1 kHz. 160 W/8 /2300 ohms, 0.3% THD at 1 kHz

## Total Harmonic Distortion

POWER AMP IN to SPEAKER OUT

EMX2150: Less than 0.1%, 20 Hz — 20 kHz, 75 W output into 4 ohms.

EMX2200: Less than 0.1%, 20 Hz — 20 kHz, 125 W output /2300 into 4 ohms.

Channel Input to LINE OUT

Less than 0.2%, 20 Hz — 20 kHz, +4 dB output into 10 k-ohms.

## Frequency Response

+1, -3 dB, 20 Hz — 20 kHz, 1 W into 8 ohms (SPEAKER OUT).

## Hum & Noise (20 Hz — 20 kHz, $R_s=150 \Omega$ , input pad @ 0 dB, input sensitivity @ -60 dB)

-126 dB equivalent input noise.

-62 dB residual output noise (SPEAKER OUT).

-88 dB residual output noise (LINE OUT).

-73 dB (77 dB S/N) at LINE OUT, Master fader maximum, all channel faders minimum.

-62 dB (66 dB S/N) at LINE OUT, Master and one channel fader maximum.

-73 dB (77 dB S/N) at AUX SEND, Master fader maximum, all channel AUX controls minimum.

-64 dB (68 dB S/N) at AUX SEND, Master fader and one channel AUX control maximum.

## Maximum Voltage Gain

90 dB CH IN to SPEAKER OUT (EMX2150)

92 dB CH IN to SPEAKER OUT (EMX2200/2300)

64 dB CH IN to LINE OUT

64 dB CH IN to AUX SEND 1—2 (+4 dB)

50 dB CH IN to AUX SEND (-10 dB)

24 dB AUX RETURN to LINE OUT

26 dB POWER AMP IN to SPEAKER OUT (EMX2150)

28 dB POWER AMP IN to SPEAKER OUT (EMX2200/2300)

## Crosstalk

-60 dB at 1 kHz, adjacent channel inputs.

-60 dB at 1 kHz, input to output.

## Input Channel Gain Control

40 dB range (-60 — -20 dB), stop to stop.

## Input Channel Pad Switch

0/20 dB attenuation.

## Input Channel Equalization (15 dB maximum boost or cut)

HIGH: 8 kHz (shelving).

MIDDLE: 2 kHz (peaking).

LOW: 100 Hz (shelving).

## Graphic Equalizer

±12 dB maximum boost or cut in each of nine bands (L/R): 63, 125, 250, 500, 1k, 2k, 4k, 8k, 16k Hz

## Digital Signal Processor Effects

1: LARGE HALL

2: SMALL HALL

3: CATHEDRAL

4: DEEP REVERB

5: SOLO REVERB

6: SMALL CLUB

7: LIVE ROOM

8: TUNNEL REVERB

9: SLAP REVERB

A: ATTACK DELAY

B: SHORT GATE

C: PLATE ECHO

D: DOUBLER

E: MULTI-ECHO

F: STEREO ECHO

## Level Meters

2 illuminated meters (+5 VU = 150 W/4 ohms — EMX2150. +5 VU = 250 W/4 ohms — EMX2200/2300)

## Clip Indicators

LEDs for each input module: CLIP (red) lights when post-EQ signal is 3-dB below clipping.

DSP clip indicator lights when A/D signal is 3-dB below clipping.

## Phantom Power

+48 V DC applied to electronically balanced inputs (via 6.8 k $\Omega$  current limiting/isolation resistors).

## Power Requirements

U.S. & Canada: AC 120 V 60 Hz

General model: AC 220/240 V 50 Hz

## Power Consumption

U.S. & Canada:

EMX2150 500 W, 600 VA

EMX2200 800 W, 1000 VA

EMX2300 800 W, 1000 VA

General model:

EMX2150 500 W

EMX2200 800 W

EMX2300 800 W

## Dimensions (W x H x D)

EMX2150 533.0 x 220.5 x 600.0 mm  
(21" x 7-7/8" x 23-5/8")

EMX2200 613.0 x 220.5 x 600.0 mm  
(24-1/8" x 7-7/8" x 23-5/8")

EMX2300 773.0 x 220.5 x 600.0 mm  
(30-7/16" x 7-7/8" x 23-5/8")

## Weight

EMX2150 21.2 kg (46 lbs. 12 oz)

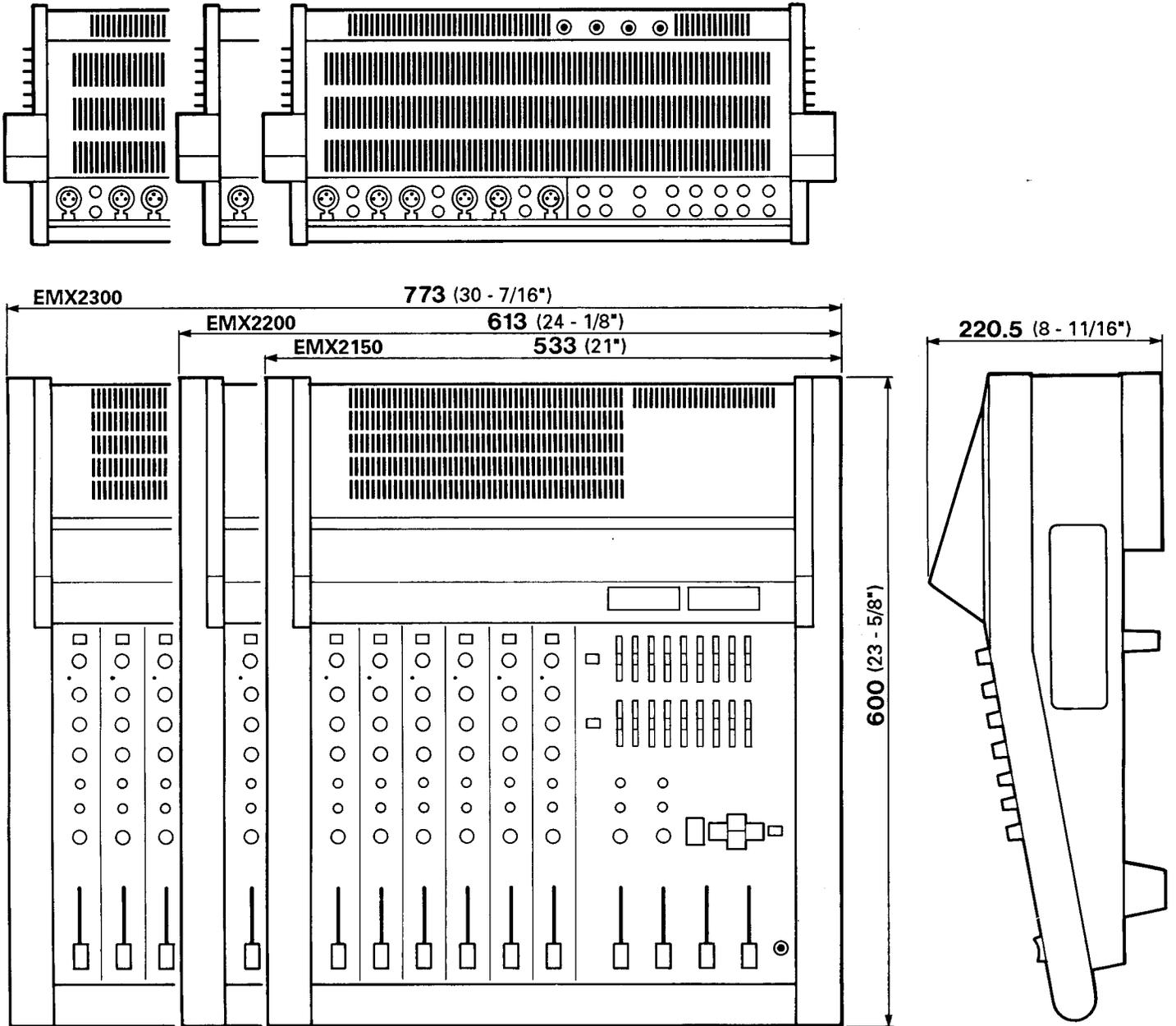
EMX2200 25.9 kg (57 lbs. 1 oz)

EMX2300 30.0 kg (66 lbs. 1 oz)

\* 0dB = 0.775Vrms.

Specifications and appearance subject to change without notice.

## Console Dimensions (W x H x D)



UNIT : mm (Inch)

## ■ INPUT CHARACTERISTICS

Input Terminals		PAD	Gain Trim	Input Impedance	For Use With Nominal	Input Level			Connector In Mixer
						Sensitivity	Nominal	Maximum before clip	
CH Input	LO-Z	OFF (0dB)	-60dB	LO-Z = 4 k $\Omega$	50~600 $\Omega$ Microphones & 600 $\Omega$ Lines	-60dB (0.8mV)	-60dB (0.8mV)	-34dB (15.5mV)	XLR-3-31 type (Balanced) & Phone Jack (TRS) (Balanced)
	HI-Z		-20dB	HI-Z = 10 k $\Omega$		-20dB (77.5mV)	-20dB (77.5mV)	+6dB (1.55V)	
		ON (20dB)				0dB (775mV)	0dB (775mV)	+26dB (15.5V)	
AUX RETURN 1, 2 (L, R)				10 k $\Omega$	600 $\Omega$ Lines	-20dB (77.5mV)	-20dB (77.5mV)	N/A	Phone Jack (TRS) (Unbalanced)
CH INSERT IN				10 k $\Omega$	600 $\Omega$ Lines	-6dB (388mV)	-6dB (388mV)	+20dB (7.75V)	Phone Jack (TRS) (Unbalanced)
GEQ IN (L, R)				10 k $\Omega$	600 $\Omega$ Lines	+4dB (1.23V)	+4dB (1.23V)	+20dB (7.75V)	Phone Jack (TRS) (Unbalanced)
POWER AMP IN (L, R)				10 k $\Omega$	600 $\Omega$ Lines	+4dB (1.23V)	+4dB (1.23V)	N/A	Phone Jack (TRS) (Unbalanced)

## ■ OUTPUT CHARACTERISTICS

Output Terminals			Output Impedance	For Use With Nominal	Output Level		Connector In Mixer
					Nominal	Maximum before clip	
SPEAKER OUT 1, 2 (L, R)	EMX2150		0.08 $\Omega$	8 $\Omega$ speakers	90W	N/A	Phone Jack
				4 $\Omega$ speakers	150W		
	EMX2200 EMX2300		0.08 $\Omega$	8 $\Omega$ speakers	160W	N/A	Phone Jack
				4 $\Omega$ speakers	250W		
LINE OUT (L, R)			600 $\Omega$	10 k $\Omega$ Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
GEQ OUT (L, R)			600 $\Omega$	10 k $\Omega$ Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
AUX SEND 1			150 $\Omega$	600 $\Omega$ Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
AUX SEND 2	+ 4dB		150 $\Omega$	600 $\Omega$ Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
	-10dB		600 $\Omega$	10 k $\Omega$ Line	-10dB (245mV)	+6dB (1.55V)	Phone Jack
CH INSERT OUT			600 $\Omega$	10 k $\Omega$ Line	-6dB (388mV)	+20dB (7.75V)	Phone Jack (TRS) (Unbalanced)
PHONES			150 $\Omega$	8 $\Omega$ Phones	75mW	75mW	Stereo Phone Jack

\* Input level required to produce rated +4dB output level.

All Phone Jack are unbalanced.

In these specifications, when dB represents aspecific, 0dB is referenced to 0.775Vrms.

### SERVICE

This product is supported by YAMAHA's worldwide network of factory trained and qualified dealer service personnel. In the event of a problem, contact your nearest YAMAHA dealer.

Dette apparat overholder det gældende EF-direktiv vedrørende radiostøj.

Cet appareil est conforme aux prescriptions de la directive communautaire 87/308/CEE.

Diese Geräte entsprechen der EG-Richtlinie 82/499/EWG und/oder 87/308/EWG.

This product complies with the radio frequency interference requirements of the Council Directive 82/499/EEC and/or 87/308/EEC.

Questo apparecchio è conforme al D.M.13 aprile 1989 (Direttiva CEE/87/308) sulla soppressione dei radiodisturbi.

Este producto está de acuerdo con los requisitos sobre interferencias de radio frecuencia fijados por el Consejo Directivo 87/308/CEE.

**YAMAHA CORPORATION**

## **IMPORTANT NOTICE FOR THE UNITED KINGDOM**

### **Connecting the Plug and Cord**

### **WARNING : THIS APPARATUS MUST BE EARTHED**

**IMPORTANT.** The wires in this mains lead are coloured in accordance with the following code:

<b>GREEN-AND-YELLOW</b>	<b>:</b>	<b>EARTH</b>
<b>BLUE</b>	<b>:</b>	<b>NEUTRAL</b>
<b>BROWN</b>	<b>:</b>	<b>LIVE</b>

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

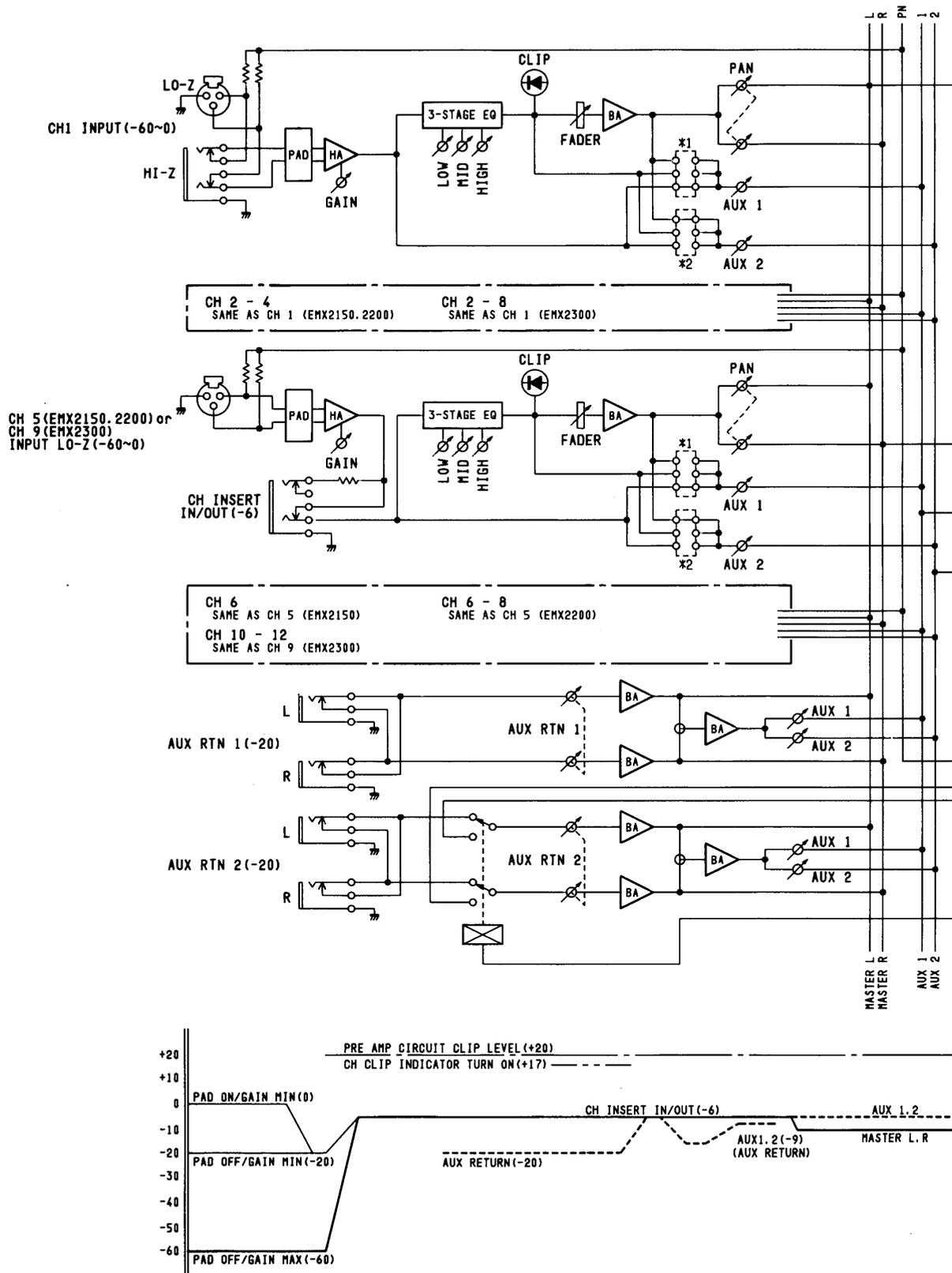
The wire which is coloured **GREEN-AND-YELLOW** must be connected to the terminal in the plug which is marked by the letter **E** or by the safety earth symbol  or coloured **GREEN** or **GREEN-AND-YELLOW**.

The wire which is coloured **BLUE** must be connected to the terminal which is marked with the letter **N** or coloured **BLACK**.

The wire which is coloured **BROWN** must be connected to the terminal which is marked with the letter **L** or coloured **RED**.

\* This applies only to products distributed by **YAMAHA - KEMBLE MUSIC (U.K.) LTD.**

# BLOCK & LEVEL DIAGRAM / SCHEMA DE PRINC



# NCIPE ET NIVEAUX / BLOCK- & PEGELDIAGRAMM

