

YAMAHA

Powered Mixer

Tables de mixage á amplification de puissance

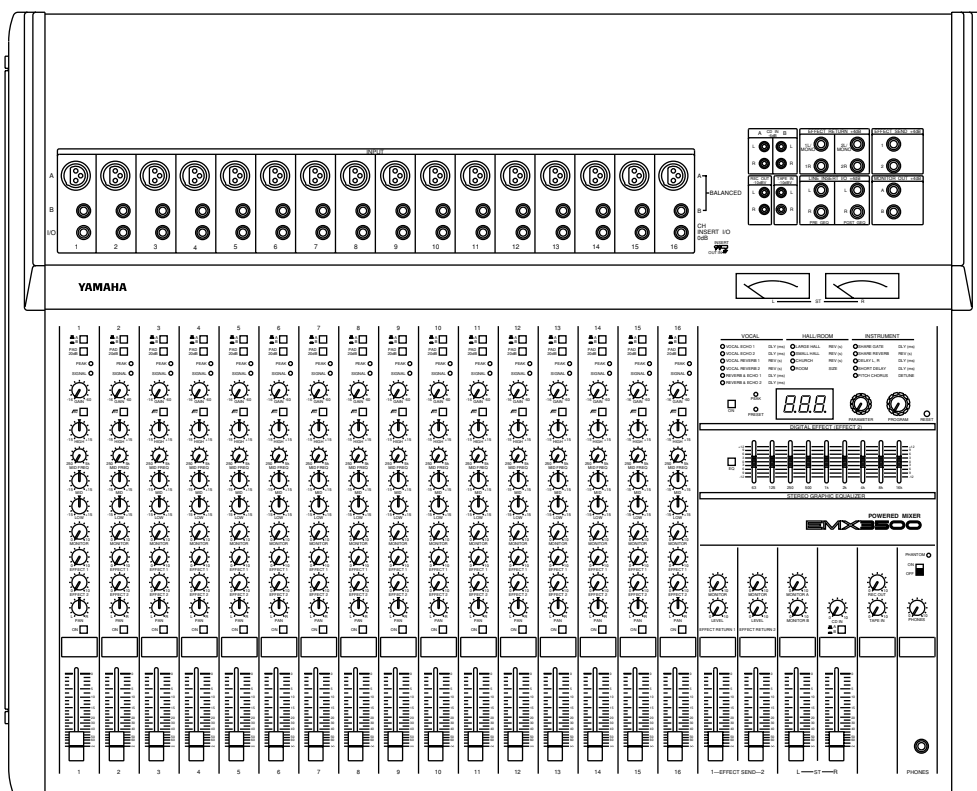
Aktiv-Mischpult

EMX3500

Operation Manual

Manuel d'instructions

Bedienungsanleitung



CONGRATULATIONS!

Your Yamaha EMX3500 Powered Mixer is an ideal choice for medium-scale PA and sound reinforcement applications. The EMX3500 is available in 12- and 16-channel models, each of which features a high-performance stereo power amplifier that delivers a powerful 350 watts per channel into 4-ohm loads.

Each input channel offers a choice of balanced low-impedance XLR or TRS phone jack inputs, and a 20-dB pad switch and input gain control allow precise level matching with any input source. The response of each channel signal can be independently shaped by a three-band equalizer with variable mid-range frequency. Also, each channel has dual EFFECT controls and a MONITOR control that make possible convenient incorporation of external effects and monitoring systems, and a PAN control that can be used to pan the channel signal across the master stereo bus.

The EFFECT 2 control also feeds the EMX3500's internal effects processor, which is one of the highlights of the EMX series. This sophisticated Yamaha digital signal processor provides 15 top-quality digital effects, each of which has a programmable parameter that can be adjusted to create precisely the required sound.

In addition to the internal DSP controls, the EMX3500's master control section includes: a nine-band stereo graphic equalizer that allows overall output response shaping and feedback control in sound reinforcement applications; paired master stereo faders; master EFFECT SEND faders; and EFFECT RETURN controls, which allow the returned effect signals to be sent to the monitor system as well as the stereo bus. There are separate level controls for the dual monitor outputs, and a level control for headphone output. Finally, there are level controls for input from and output to a recording tape deck, and a level control for two pairs of selectable CD IN jacks that allow input from CD players or similar sound sources.

In addition to line-insert I/O jacks for each channel, the EMX3500 offers both pre-GEQ and post-GEQ line insertion to the master stereo bus. These connectors, when combined with the dual effects circuits, give the EMX3500 a formidable degree of signal-processing versatility. In addition, +48V phantom power is provided for convenient powering of condenser microphones.

We urge you to read this operation manual thoroughly in order to get the best performance out 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 coaxial 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 retailer, 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.

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:

GREEN-AND-YELLOW : EARTH

BLUE : NEUTRAL

BROWN: LIVE

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 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.

ADVARSEL!

Lithiumbatteri–Eksplodingsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandoren.

VARNING

Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS

Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

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PRECAUTIONS

Please keep the following points in mind when installing and operating your Yamaha EMX3500 Powered Mixer. Also be sure to read the precautions in the Operating Tips section before using the EMX3500.

- **AVOID EXCESSIVE HEAT, HUMIDITY, DUST, AND VIBRATION**

Keep the EMX3500 away from locations (such as near radiators, stoves, etc.) where it is likely to be exposed to high temperatures or humidity. Also avoid locations where the mixer may be exposed to excessive dust accumulation or vibration that could cause mechanical damage.

- **INSTALL IN A WELL-VENTILATED LOCATION**

The internal circuitry of the EMX3500 produces heat that can become a potential fire hazard if not properly ventilated. When setting up the EMX3500 for operation, be sure to leave at least 10 cm between it and any adjacent walls or surrounding equipment.

- **AVOID PHYSICAL SHOCKS**

Do not drop the EMX3500 or subject it other strong physical shocks, as doing so can damage the it. Handle the mixer with care, and transport it in a suitable hard case or flight case.

- **DO NOT OPEN THE UNIT OR ATTEMPT REPAIRS OR MODIFICATIONS YOURSELF**

The EMX3500 contains no user-serviceable parts. Refer all maintenance and repairs to qualified Yamaha service personnel. Opening the case and/or tampering with the internal circuitry will void the warranty.

- **MAKE SURE THE POWER IS OFF BEFORE MAKING OR REMOVING CONNECTIONS**

Always turn the power OFF before connecting or disconnecting cables. If you insert or remove cables with the power on, you run the risk of damaging both the mixer and any connected equipment.

- **HANDLE CABLES CAREFULLY**

Always plug and unplug cables (including the AC power cable) by gripping the connector, not the cord itself.

- **CLEAN WITH A SOFT, DRY CLOTH**

Never use solvents such as benzine or thinner to clean the EMX3500. Should the mixer become dirty, wipe it clean with a soft, dry cloth.

- **ALWAYS USE THE CORRECT POWER SOURCE**

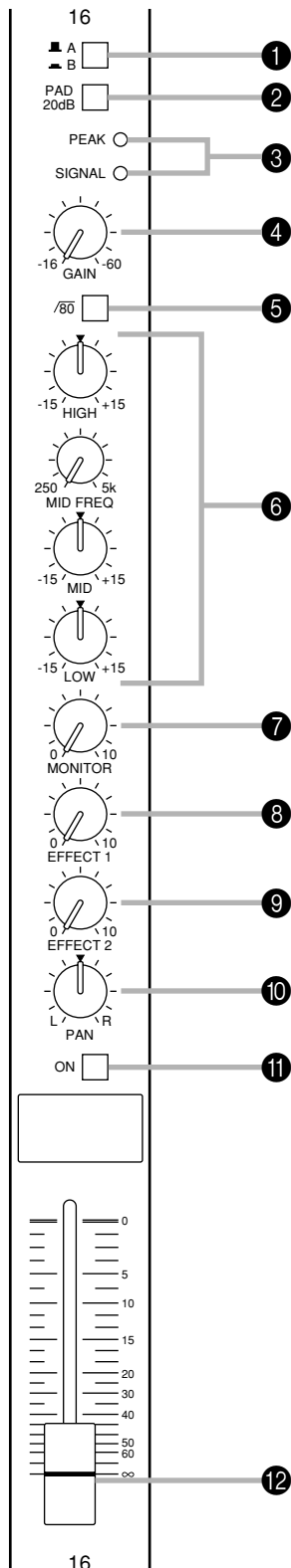
Make sure that the power requirements on the rear panel of the EMX3500 match your local AC mains supply.

- **KEEP SPEAKER PLUGS CLEAN**

Solid phone plugs can overheat when inserted in the rear-panel SPEAKER jacks of the EMX3500, causing a potential fire hazard. Make a habit of checking the metal tips of your speaker plugs, and cleaning them if necessary, before connecting them to the EMX3500.

CONTROLS AND CONNECTORS

Front Panel: Input Channel Controls



1 Input selector switch

This switch selects the input connector via which the source is connected to the channel. Leave the switch out if the source is connected via the A (balanced XLR) input connector. Push it in when the source is connected via the B (balanced 1/4" phone) connector.

2 PAD switch

This switch attenuates the signal applied to channel (at the corresponding A input connector or B input jack on the top panel) by 20 dB prior to the head amplifier and input gain control. This feature can be used to prevent high-level signals from overloading the input circuitry, allowing the mixer to handle a wider range of input signal levels.

3 SIGNAL and PEAK LED indicators

These two LED indicators let you check the level of the signal input to the channel. The green SIGNAL indicator lights when a signal of 10 dB below the nominal channel level is received. The red PEAK indicator lights when the input signal reaches 3 dB below the channel's clipping point. Both of these indicators show the level of the post-EQ/pre-fader signal. If the PEAK indicator lights more than briefly on high-level transients, you should use the PAD switch or the GAIN control to decrease the input sensitivity of the channel. If this does not work, reduce the output level of the connected source.

4 GAIN control

This control adjusts the channel's input sensitivity between -60 dB and -16 dB when the PAD switch is off, or between -40 dB and +4 dB when the PAD switch is on. Continuously variable gain control allows optimum adjustment to virtually any microphone or line source.

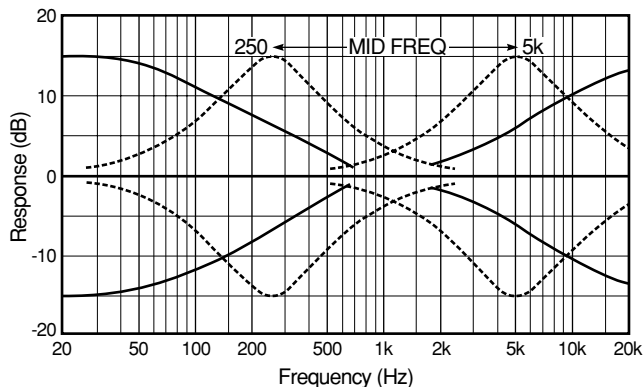
5 /80 HPF switch

This switch causes the channel to be filtered through an HPF with a 12 dB/octave roll-off at 80 Hz. This feature is useful for reducing low-frequency noise such as an AC mains hum or wind noise.

6 Equalizer controls

This set of four controls allows you to individually modify the channel's response. Each channel of the EMX3500 is equipped with a three-band equalizer (EQ) that has shelving HIGH and LOW controls, and a peaking MID control with a sweepable center frequency (which is adjusted by the MID FREQ control). Refer to "Using the Channel Equalizers" on page 12 for details on the use of these controls.

Control	Max. boost/cut	Frequency	Type
HIGH	±15 dB	12 kHz	Shelving
MID	±15 dB	250 Hz to 5 kHz	Peaking
LOW	±15 dB	80 Hz	Shelving



7 MONITOR control

This control determines the level of the post-EQ/pre-fader signal that is sent from the channel to the monitor mixing bus. All signals sent to the Monitor bus are mixed, then fed to the two MONITOR OUT jacks on the top panel after their final output levels have been set by the MONITOR A and B controls in the master control section.

8 EFFECT 1 control

This control determines the level of the post-EQ/post-fader signal that is sent from the channel to the Effect 1 mixing bus. The channel signals mixed by this bus have their overall level set by the EFFECT SEND 1 fader, then are sent to the EFFECT SEND 1 jack. The output from this jack can be processed by an external effect device.

9 EFFECT 2 control

This control determines the level of the post-EQ/post-fader signal that is sent from the channel to the Effect 2 mixing bus. The channel signals mixed by this bus are sent via the EFFECT SEND 2 fader to the EFFECT SEND 2 jack on the top panel. The output signal is also fed into the EMX3500's internal digital signal processor. Thus, a signal fed to the Effect 2 bus using this control can be processed externally or internally.

10 PAN control

This control pans the channel signal across the master L and R buses, thus determining the perceived position of the sound from that channel in the output stereo sound field. If a PAN control is set all the way to the left, for example, the sound from that channel will be heard from the left speaker system only. If it is set all the way to the right, the sound will be heard from the right speaker system only. Intermediate settings will cause the sound to appear at corresponding locations in the stereo sound field.

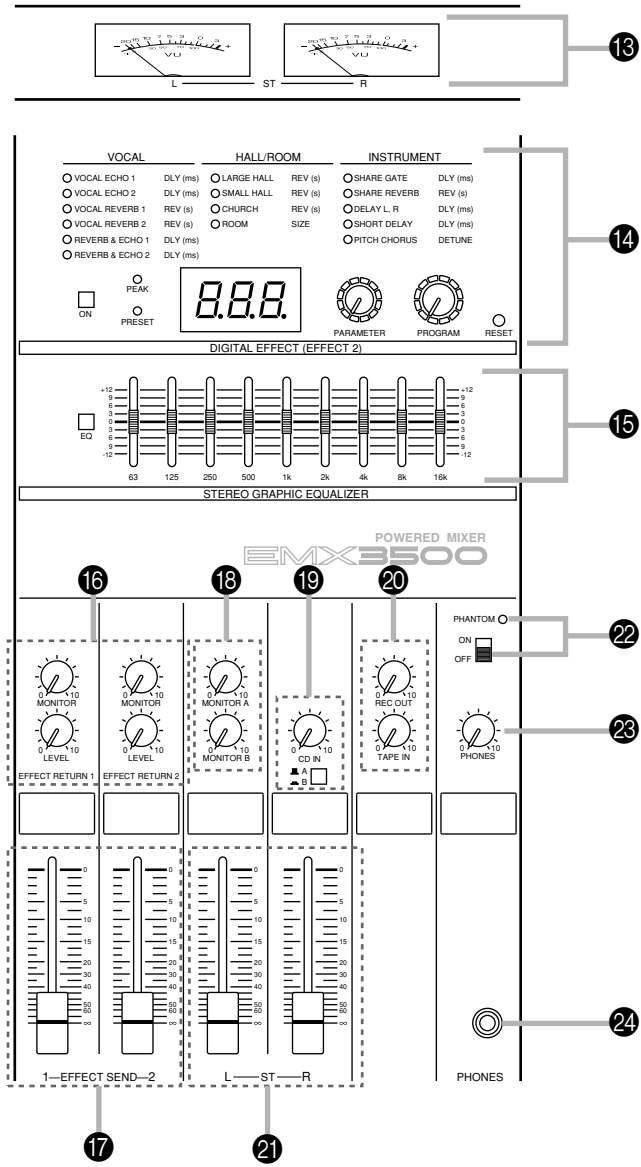
11 Channel ON switch

This switch enables input from the channel to the mixing buses. When turned off (that is, when the button is out), the channel will be removed from the mix. Turning off unneeded channels may help to minimize noise during quiet passages.

12 Channel fader

This is the channel's main level control. It determines the level of the signal that is sent from the channel to the master mixing and effect buses. It is the settings of the input channel faders that determine the "mix," or the balance of sound levels between the instruments or other sources connected to the inputs. When a channel is not being used, its fader should be set at the minimum position to prevent the addition of unwanted noise to the main program signal.

Front Panel: Master Control Section



13 VU meters

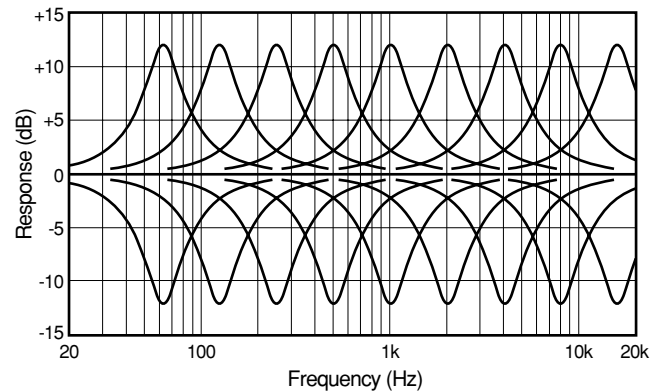
These precision VU meters display the levels of the signals output by the mixer's power amplifier (the SPEAKER jacks on the rear panel). These meters serve as useful guides when setting optimum output levels using the master stereo faders.

14 DIGITAL EFFECT section

This section lets you control the EMX3500's internal digital signal processor. The bank of LED indicators at the top of the section show the current DSP program selection, which is changed using the PROGRAM control. The three-digit seven-segment LED display shows the value of the programmable parameter for the currently selected DSP program, which is adjusted by the PARAMETER control. The PRESET LED indicator lights when the programmable parameter is set to its factory value. The ON switch selects between input from the internal DSP and input from the EFFECT RETURN 2 jacks. The PEAK LED lights when the DSP output signal nears the clipping level. Finally, the RESET switch can be used to restore the DSP factory settings. Refer to "Using the Digital Signal Processor" on page 12 for details on the use of this section.

15 STEREO GRAPHIC EQUALIZER section

The EMX3500's internal stereo graphic equalizer (GEQ) allows fine response shaping of the main program output. This section has nine linear controls, corresponding to 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 a maximum boost or cut of 12 dB. When a control is set to the center or "0" position, the response in the corresponding band is unaffected. The EQ switch turns the graphic equalizer on and off.



16 EFFECT RETURN controls

These controls adjust the levels of the signals that are received at the corresponding EFFECT RETURN jacks on the top panel (or from the internal digital signal processor, when the DSP is used in place of external input to the EFFECT RETURN 2 jacks). Each effect return circuit has two controls. The LEVEL control adjusts the level of the signal that is mixed into the main program on the master mixing bus. The MONITOR control sets the level of the signal that is mixed into the Monitor bus, where it is mixed with other signals for output by the MONITOR OUT jacks on the top panel.

17 EFFECT SEND faders

These faders adjust the overall output levels of the effect mixes that are set up using the EFFECT 1 and EFFECT 2 controls of each input channel. The EFFECT SEND 1 fader sets the overall level of the signal that appears at the EFFECT SEND 1 jack on the top panel. The EFFECT SEND 2 fader sets the overall level of the Effect 2 mix signal, which is sent to both the EFFECT SEND 2 jack on the top panel and the internal digital signal processor. These faders should be used to optimally match the effect mix output levels to the input sensitivities of the effect signal processors used.

18 MONITOR output level controls

These controls adjust the overall output levels of the monitor mix that are set up using the MONITOR control of each input channel. The same monitor mix signal is sent to both the MONITOR OUT A and B jacks on the top panel; however, the output level of each can be set separately using the corresponding MONITOR output level control. These controls should be used to optimally match the monitor mix output levels to the input sensitivities of the power amplifiers used.

19 CD IN controls

The CD IN control adjusts the level of the input signals from CD players or similar sound sources that are connected to the master mixing bus from the stereo CD IN jacks on the top panel. These signals are added to the bus in front of the GEQ, allowing the EMX3500 to equalize the signals from the CD players before output. The CD IN A/B switch, located below the CD IN control, selects between input from the CD IN A and CD IN B jacks.

20 REC OUT and TAPE IN controls

These controls adjust the levels of the stereo signals to and from a connected tape deck. The REC OUT control sets the level of the unequalized pre-fader master mix signal that is sent for recording by the tape deck via the REC OUT jacks on the top panel. The TAPE IN control adjusts the level of the playback signal that is inserted to the master mixing bus from the TAPE IN jacks on the top panel. This playback signal is added to the bus in front of GEQ, allowing the EMX3500 to equalize the signal from the tape deck before output.

21 Master stereo faders

These are the main volume controls for the overall program mix. They independently adjust the levels of the right and left channels of the stereo signal that is sent to both the rear-panel SPEAKER jacks and the PHONES jack on the front panel.

22 PHANTOM ON/OFF switch and LED indicator

The PHANTOM ON/OFF switch turns the phantom power feature on and off. When turned on, this function supplies +48V power to the positive and negative terminals of the balanced XLR connectors (A) via 6.8 k Ω current-limiting/isolation resistors for use by phantom-powered condenser microphones. Signal sources that don't require phantom power should be connected to the phone jack (B) when phantom power is used. The PHANTOM LED indicator lights when phantom power is on.

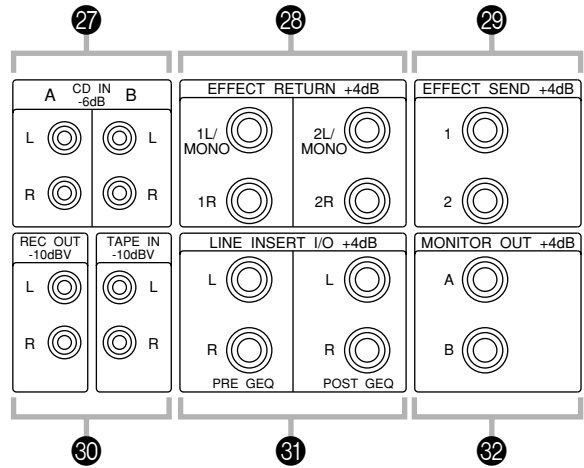
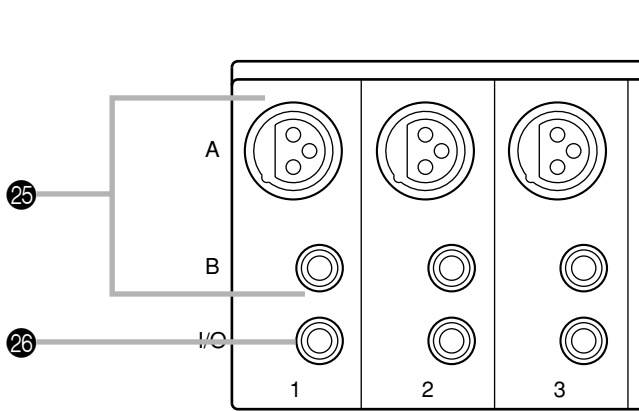
23 PHONES control

This control adjusts the level of the stereo signal delivered from the PHONES jack located directly below it on the front panel. Since this level adjustment is made after the GEQ, the volume of sound heard from the headphones will be affected by both the master stereo faders and the PHONES control.

24 PHONES jack

This jack delivers the main program signal to a pair of 40 Ω stereo monitor headphones. The volume of the output signal is adjusted by both the PHONES control and the master stereo faders.

Top Panel

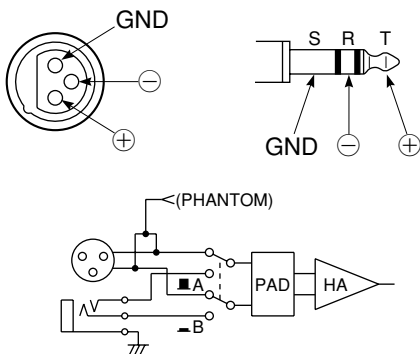


Phantom Power Warning
 To prevent hazard or damage, connect only microphones and cables that conform to the IEC268-15A standard.

25 Channel input connectors

Each of the EMX3500's input channels is provided with both a balanced XLR connector (A) and a balanced tip-ring-sleeve 1/4" phone jack (B). The channel's input selector switch on the front panel is used to select between these input connectors. Signal sources that don't require phantom power should be connected to the phone jack (B) when the PHANTOM POWER ON/OFF switch is turned on.

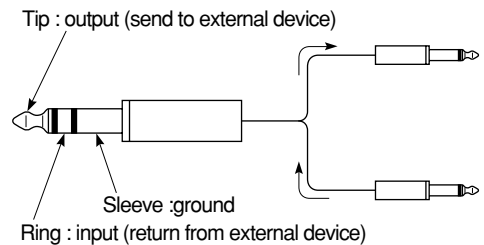
Line	XLR (A)	Phone jack (B)
GROUND	Pin 1	Sleeve
HOT (+)	Pin 2	Tip
COLD (-)	Pin 3	Ring



26 Channel insert I/O jack

Each input channel has a tip-ring-sleeve 1/4" phone jack that serves as an insert patch point for the connection of external signal processing devices or other equipment between the channel's head amplifier (the first amplifier stage after input) and the EQ stage. The channel insertion point is ideal for the insertion of a compressor, noise gate, equalizer, or other effect that needs to be applied to a specific channel only. This jack accommodates both the send (output) and receive (input) lines required by the insert point. The signals are sent and received at a nominal level of +0 dB.

TIP-RING-SLEEVE PHONE PLUG



27 CD IN jacks

These phono jacks accept line-level (–6 dB) input signals from CD players, DAT decks, or similar playback sources. These signals are added to the master stereo mixing bus in front of the GEQ. The selection between input from the CD IN A jack and the CD IN B jack is made using the CD IN A/B switch on the front panel.

28 EFFECT RETURN jacks

The output from external effect units fed by the EFFECT SEND jacks can be returned to the main program mix via these 1/4" phone jacks. Note that both effect circuits have stereo EFFECT RETURN jacks, allowing the EMX3500 to accommodate effect devices with stereo output. To return a monophonic effect signal to both channels of the master stereo mixing bus, use the EFFECT RETURN L jack. (The R jack should be left open.) The levels of the signals input by these jacks are adjusted by the corresponding EFFECT RETURN controls on the front panel. The nominal input level for these jacks is +4 dB.

29 EFFECT SEND jacks

These 1/4" phone jacks deliver the corresponding effect mix signals to feed external effect devices. Note that the EFFECT SEND 2 output is active even when the internal digital signal processor is turned on. The levels of the signals output by these jacks are adjusted by the corresponding EFFECT SEND controls on the front panel. The nominal output level for these jacks is +4 dB.

30 REC OUT and TAPE IN jacks

These phono jacks are used to send stereo signals (–10 dBV) to and from a connected tape deck. The REC OUT jacks send the unequalized pre-fader signal from the master bus for recording by the tape deck. The TAPE IN jacks connect the playback signal from the tape deck to the master mixing bus in front of the GEQ. The levels of these signals are adjusted by the REC OUT and TAPE IN controls on the front panel.

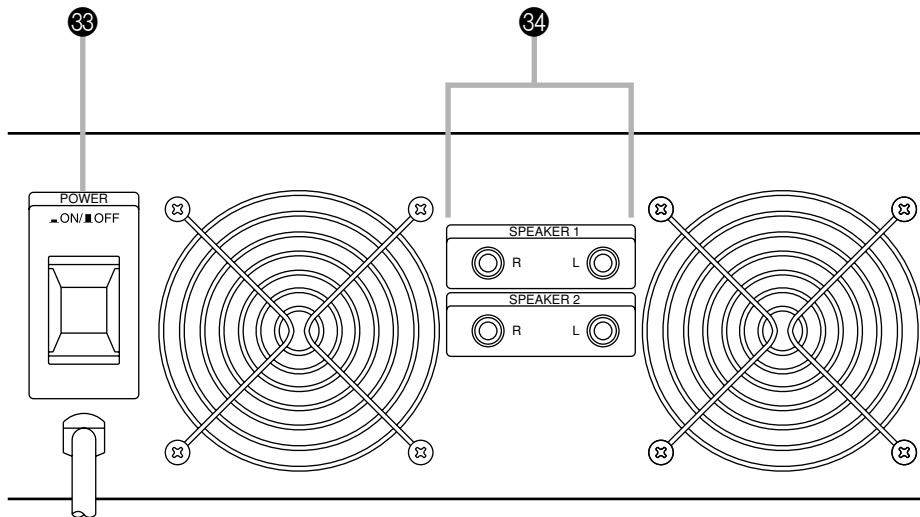
31 LINE INSERT I/O jacks

These tip-ring-sleeve 1/4" phone jacks serve as insert patch points for the connection of external signal processing devices or other equipment to the master stereo mixing bus. There are two pairs of jacks, allowing the devices to be connected both in front of and behind the GEQ. The line insertion points are ideal for the insertion of stereo effects that need to be applied to the entire mix. These jacks accommodate both the send (output) and receive (input) lines required by the insert points. The signals are sent and received at a nominal level of +4 dB.

32 MONITOR OUT jacks

These 1/4" phone jacks deliver the signal from the monitor mixing bus to feed external monitor speaker systems driven by external amplifiers. Although both these jacks output the same monitor mix signal, their output levels can be adjusted individually using the corresponding MONITOR output level controls on the front panel. These jacks have a nominal output level of +4 dB.

Rear Panel



33 POWER switch

This switch turns the EMX3500's power supply on and off. The VU meters on the front panel will light when the power is on.

34 SPEAKER jacks

These standard 1/4" phone jacks are the main speaker-level outputs from the EMX3500's power amplifier. The EMX3500 provides two pairs of stereo speaker output jacks, labeled SPEAKER 1 and SPEAKER 2. The SPEAKER 1 and SPEAKER 2 jacks for each output channel (right and left) are wired in parallel. If you connect a speaker system to only one of the jacks (SPEAKER 1 or SPEAKER 2), the total load impedance of the speaker system may be as low as 4Ω. If you plug speakers into both the SPEAKER 1 and SPEAKER 2 jacks of either system, the load impedance of each speaker system must be no less than 8Ω.

OPERATING TIPS

Cautions for Connected Sources

Please observe the following cautions when connecting sound sources to the EMX3500:

- **TURN THE POWER OFF FIRST**
Always make sure that the mixer's POWER switch is turned off before connecting or disconnecting any cables. Failure to do so can damage the EMX3500 or connected equipment.
- **TURN THE MIXER ON LAST**
Always turn the mixer's POWER switch on after first turning on connected sound sources such as electronic instruments or audio equipment.
- **DO NOT CONNECT AMPLIFIED INPUT**
Never connect the speaker-level output of any amplifier to the mixer's inputs unless you use a suitable high-level attenuation pad or "direct box" to lower the signal's level.

Matching Input Levels

When matching input levels, it is a good idea to first make sure that the speaker systems are **disconnected** from the mixer's speaker outputs. (This must be done with the mixer's POWER switch turned off.) The sound can be monitored using a pair of headphones plugged into the front-panel PHONES jack—but make sure that the master stereo faders are set to their minimum levels at first, 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 will receive. Do this one channel at a time. Begin by setting the lowest possible sensitivity for the input: turn the PAD switch on, set the GAIN control to -16, and slide the channel fader to between "10" and "5" on its scale.

Now apply a signal to the input. Play the connected source instrument at the loudest level it will produce in actual use—or if the source is a microphone, have the vocalist sing his or her loudest note into it—and watch the channel's PEAK indicator carefully. If it lights at this point,

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 PEAK indicator just barely flashes on the loudest peaks. If you turn the GAIN control up all the way and the PEAK indicator still does not light, then reduce the GAIN control setting to minimum, turn the PAD switch off, and gradually increase the GAIN setting again. This time the PEAK indicator should light somewhere in the GAIN control range. If it does not, check that the source is functioning properly and that it is properly connected to the appropriate input of the mixer. You may also want to check the connecting cable for faults.

Since the PEAK indicator lights when the channel signal is 3 dB below the clipping level, it is okay if it flashes briefly on loud peaks. In fact, this is about the optimum input sensitivity setting. When you've matched the first channel, set its fader to minimum and begin matching the next channel. Repeat this procedure for each channel you will use in the mix.

Once the input level of each channel has been matched, set the master stereo faders to their minimum positions and turn the POWER switch off. Reconnect the speaker systems, then turn the power back on. The master faders can now be gradually raised to their operating levels.

Setting Channel and Master Faders

The final positions of the channel faders will naturally depend on the overall mix you set up. However, there are two important points you should keep in mind when setting channel levels.

The channel faders have an optimum range that provides the maximum control margin with minimum noise and distortion. The optimum range for the channel faders on the EMX3500 is between about "5" and "15" on their scales. There is no rule that says you must avoid higher or lower settings, but remember that the best sound quality can be achieved within this range. Settings in this range also provide sufficient leeway for later adjustments.

Remember, too, that changing the setting of any single input channel fader will affect the overall output level. This is why it is important to watch the VU meters when setting the input channel and master stereo faders. These meters

should never read levels higher than about 0 VU. If they do, then the mixer levels are too high and the power amplifier may be overloaded, causing distortion.

It is generally best to use the master stereo faders when making small adjustments to the overall output level. But if these faders must be set to extremely low or high positions (lower than about “20” or higher than “5” on their scales), then the overall mix should be re-adjusted using the input channel faders so that the VU meters show a proper level when the master stereos are set within the range described above.

Using the Channel Equalizers

Each of the EMX3500’s input channels has four equalizer (EQ) controls that make it possible to independently equalize the channel’s signal to some degree. The rule of thumb, however, is that equalization should not be used unless it is absolutely necessary. Always put some effort into proper microphone selection, careful microphone placement, and fine adjustment of source instrument controls before resorting to equalization. Settle for this option only if you have set everything up as best you can and are still not satisfied with the sound.

Channel equalization can be most useful in tonally separating one sound from another, or from a group of sounds. Slightly boosting the high frequency of a guitar sound, for example, can give it the extra bite it needs to stand out more clearly from the background. Vocals tend to stand out better if given a bit of boost in the middle range. Speech generally benefits from a reduction in the low frequencies, to prevent the “boomy” sound that occurs when the speaker gets too close to the microphone. Experimentation and experience will tell you how much of what type of equalization is appropriate for different sound sources.

Also keep in mind the fact that the channel’s PEAK LED indicator is post-EQ. Excessive boosting of a signal frequency may cause the PEAK LED to light more than briefly, indicating that you need to either reduce the input gain or reduce the amount of boost being applied.

Using the Digital Signal Processor

The EMX3500’s built-in digital signal processor (DSP) features 15 top-quality digital effects. Each effect program

has one parameter that can be edited to modify the sound of the effect. The table below lists the programmable parameter and its possible values for each program.

Program	Param	Range	Preset
VOCAL ECHO 1	Delay	1–370 ms	125
VOCAL ECHO 2	Delay	1–370 ms	125
VOCAL REVERB 1	Reverb	0.3–10 s	3.2
VOCAL REVERB 2	Reverb	0.3–10 s	2.2
REVERB & ECHO 1	Delay	1–300 ms	174
REVERB & ECHO 2	Delay	1–300 ms	125
LARGE HALL	Reverb	0.3–10 s	2.4
SMALL HALL	Reverb	0.3–10 s	2.6
CHURCH	Reverb	0.3–10 s	2.6
ROOM	Size	0.1–10	1.8
SNARE GATE	Delay	1–350 ms	100
SNARE REVERB	Reverb	0.3–10 s	1.2
DELAY L, R	Delay	1–740 ms	147
SHORT DELAY	Delay	0.1–99.9 ms	80
PITCH CHORUS	Detune	0–100	12

Use the ON switch in the DIGITAL EFFECT section to turn the internal DSP on and off. The EFFECT RETURN 2 controls will adjust the level of the signal output by the internal DSP, and any input signals to the EFFECT RETURN 2 jacks will be ignored.

The PEAK LED indicator to the right of the ON switch will light if the input signal to the DSP’s analog-to-digital converter reaches a level 3 dB below the clipping level. If the PEAK indicator lights more than just briefly on transient peaks, you should reduce the EFFECT SEND 2 fader setting to avoid distortion of the effect signal.

The current program selection is indicated by the bank of LED indicators at the top of the DIGITAL EFFECT section. (When the POWER switch of the EMX3500 is turned on, the internal DSP will automatically select the program that was selected when the power was last turned off.) To change the program selection, simply turn the PROGRAM control.

The three-digit 7-segment LED display shows the current setting of the programmable parameter for the selected program. Turn the PARAMETER control to change this value. The PRESET indicator will light when the displayed

value is the same as the factory preset value for the parameter.

You can reset all of the internal DSP settings to their factory presets by using a ball-point pen or other fine-tipped object to press the RESET switch. Doing so will restore the programmable parameters of all effect programs to their preset values. It will also return the current program selection to the first program, VOCAL SEND 1.

Using the Graphic Equalizer

The EMX3500's built-in graphic equalizer (GEQ) has two main uses: compensation for acoustic deficiencies in the listening area, and feedback control. Like the channel equalizers, the GEQ should not be used unless it is absolutely necessary. The more equalization you use, the more phase deviation you introduce into the program signal—and the greater the chance that the phase deviation can result in an unnatural, distorted sound.

There are many instances, however, in which the acoustic characteristics of the listening area cause response anomalies. Large areas of uncovered glass or tiled floors, for example, are extremely effective reflectors of high-frequency sound. Amplified sound produced in such environments can seem painfully sharp, in which case 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. In such rooms, a slight reduction in the low frequencies can help to clarify the sound. Please note that in almost all cases, good equalization demands a cut in the offending frequency range rather than a boost in ranges where response is lacking.

The GEQ can also be used—although to a limited degree—to control feedback. Proper microphone placement is the primary means of preventing feedback, but this can be extremely difficult if you're working in a tight stage area. To get around this problem, try cutting response in the frequency range where the feedback is occurring. (You may have to experiment a bit to find this range.) This solution will compromise the overall frequency response of the program, but it is better than running the risk of squealing feedback in the middle of an important performance.

Connecting Speakers

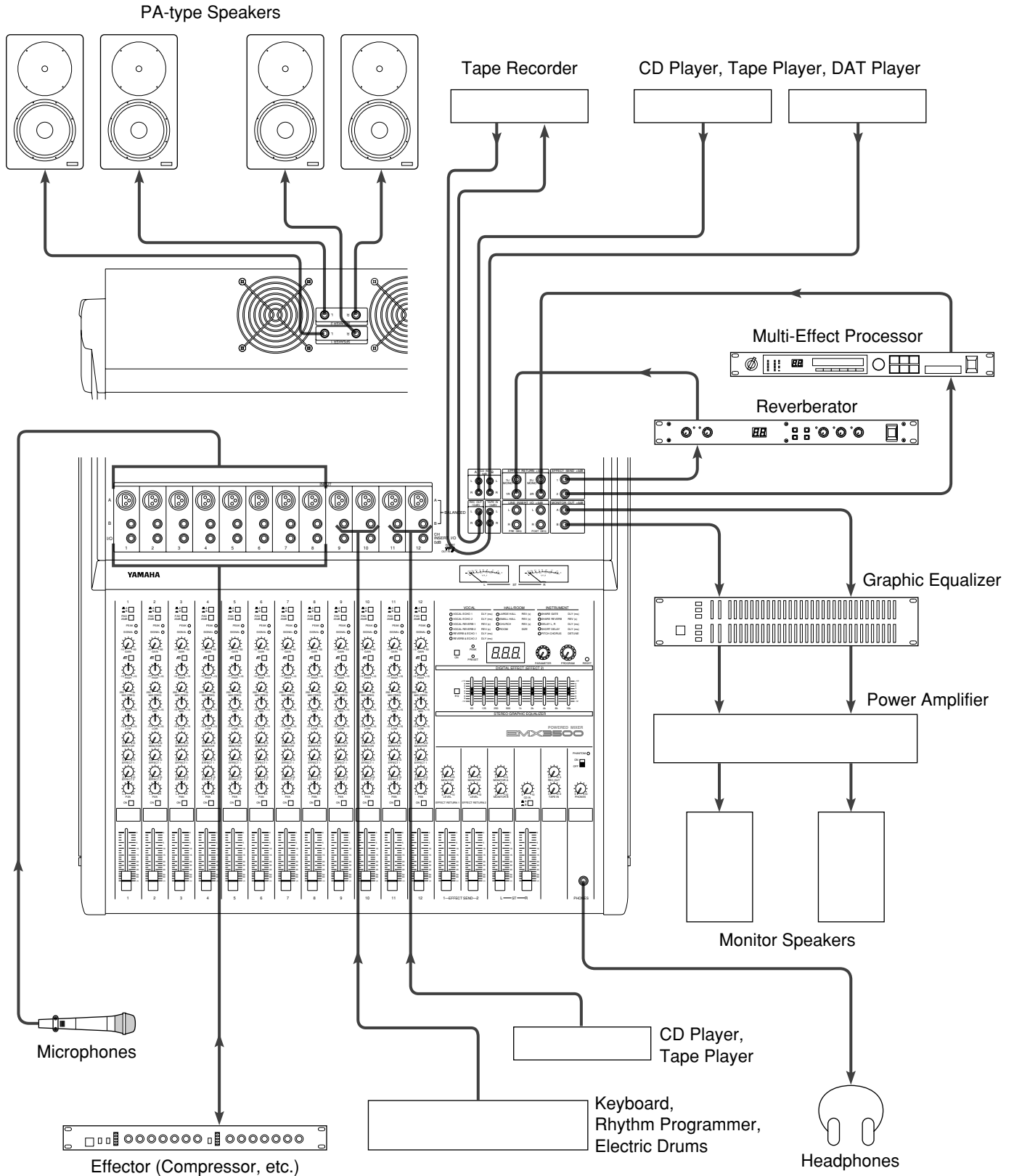
The EMX3500 Powered Mixer has two 1/4" phone jack speaker outputs per channel. The outputs for each channel are connected in parallel internally. This places some restrictions on their use, as described below:

- **If you connect speakers to only one of the output jacks (SPEAKER 1 or SPEAKER 2), on either channel (R or L), the total impedance of the speaker system connected to that channel may be no less than 4 ohms.**
- **If you plug speakers into both the SPEAKER 1 and SPEAKER 2 jacks of either channel (R or L), the total load impedance of the speaker systems connected to each output of that channel must be no less than 8 ohms. (Note that two 8-ohm speaker systems connected in parallel form a 4-ohm load).**
- **The maximum total impedance of speakers connected to the speaker outputs of each channel should be 16 ohms.**
- **The maximum speakers allowable per channel are: one 4-ohm speaker, two 8-ohm speakers, or four 16-ohm speakers.**

Although 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 EMX3500. The EMX3500's maximum output power is 350 watts per channel with a total load impedance of 4 ohms (one 4-ohm speaker or two 8-ohm speakers), or 200 watts per channel with a total load impedance of 8 ohms (one 8-ohm speaker or two 16-ohm speakers).

- **Never connect or disconnect speakers while the mixer's power supply is turned on!**
- **Solid phone plugs can overheat when inserted in the rear-panel SPEAKER jacks of the EMX3500, causing a potential fire hazard. Make a habit of checking the metal tips of your speaker plugs, and cleaning them if necessary, before connecting them to the EMX3500.**

CONNECTION EXAMPLE



SPECIFICATIONS

Maximum Output Power

350W+350W/4Ω, 200W+200W/8Ω, 0.5% THD at 1kHz

Total Harmonic Distortion

Channel Input to Post-GEQ OUT

Less than 0.1%, 20Hz — 20kHz, +4dB output

Post-GEQ IN to SPEAKER OUT

Less than 0.1%, 20Hz — 20kHz, 175W output into 4Ω

Frequency Response

+1, -3dB, 20Hz — 20kHz, 1W into 4Ω

Hum & Noise (Average, $R_s=150\Omega$, w/BPF 20Hz — 20kHz)

-128dB Equivalent Input Noise

-96dB Residual Output Noise (Pre-GEQ Out)

-96dB Residual Output Noise (Effect Send, Monitor Out)

-73dB Residual Output Noise (Speaker Out)

-90dB (Pre-GEQ)

Master fader at maximum level and all channel switches OFF.

-80dB (EFFECT SEND)

Master fader at maximum level and all channel EFFECT controls at minimum level.

-83dB (MONITOR OUT)

Master VR at maximum level and all channel MONITOR controls at minimum level.

Maximum Voltage Gain

64dB CH IN to Pre-GEQ OUT

64dB CH IN to MONITOR OUT A, B

70dB CH IN to EFFECT SEND 1 — 2

0dB EFFECT RETURN 1, 2 to Pre-GEQ OUT

0dB EFFECT RETURN 1, 2 to MONITOR OUT

12dB TAPE IN 1, 2 to Pre-GEQ OUT

10dB CD IN to Pre-GEQ OUT

31dB Post-GEQ IN to SPEAKER OUT at 8Ω
When Post-GEQ IN level is +4dB, SPEAKER OUT level is full power.

Crosstalk (at 1kHz)

70dB Adjacent input channels

70dB Input to Output

Input Channel Gain Control

44dB variable from -60dB to -16dB

Input Channel PAD Switch

0/20dB of attenuation

Input Channel Select Switch

A or B (XLR/PHONE)

Input Channel Equalization

±15dB maximum boost or cut in each band

High: 12kHz shelving

Mid: 250Hz — 5kHz peaking

Low: 80Hz shelving

Turnover/Rolloff frequency of shelving: 3dB below maximum variable level.

Input Channel HPF Switch

80Hz, 12dB/oct.

Graphic equalizer

±12dB maximum boost or cut in each of nine bands:

63, 125, 250, 500, 1k, 2k, 4k, 8k, 16k Hz

CD Select Switch

CD A or B

Level Meters

2 Illuminated meter (0VU=175W/4Ω)

CH Peak Indicators

Red LED on each channel turns ON when post-EQ signal reaches the level 3dB below clipping.

CH Signal Indicators

Green LED on each channel turns ON when post-EQ signal reaches -10dB.

Phantom Power

+48V is supplied to electrically balanced inputs to power condenser microphones via 6.8kΩ current limiting/isolation resistors.

Digital Effect

15 program selection

Power Requirement

U.S & Canada: 120V, 60Hz

General model: 230V, 50Hz

Power Consumption

U.S & Canada: 600W, 750VA

General model: 600W

Dimensions (W x H x D)

12ch model: 684 x 240 x 628 mm

16ch model: 816 x 240 x 628 mm

Weight

12ch model: 34kg

16ch model: 39kg

Note: 0dB = 0.775Vrms.

Specifications and appearance subject to change without notice.

Input Characteristics

Input Terminals	PAD	Gain Trim	Actual Load Impedance	For Use With Nominal	Input Level			Connectors on Mixer
					Sensitivity	Nominal	Maximum Before Clip	
CH Input A, B	0	-60	4k Ω	50 — 600 Ω Mics & 600 Ω Lines	-60dB (775 μ V)	-60dB (775 μ V)	-40dB (7.75mV)	XLR 3-31 type and Phone Jack (TRS) ²
	0	-16			-16dB (123mV)	-16dB (123mV)	+4dB (1.23V)	
	20	-16			+4dB (1.23V)	+4dB (1.23V)	+24dB (12.3V)	
EFFECT RETURN (1, 2)			10k Ω	600 Ω Lines	+4dB (1.23V)	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
CH INSERT IN			5k Ω	600 Ω Lines	0dB (775mV)	0dB (775mV)	+20dB (7.75V)	Phone Jack (TRS) ⁴
CD IN			10k Ω	600 Ω Lines	-6dB (388mV)	-6dB (388mV)	+20dB (7.75V)	RCA Pin Jack
TAPE IN			10k Ω	600 Ω Lines	-10dBV (316mV)	-10dBV (316mV)	+20dB (7.75V)	RCA Pin Jack
LINE INSERT IN (Pre-GEQ)			10k Ω	600 Ω Lines	+4dB (1.23V)	+4dB (1.23V)	+20dB (7.75V)	Phone Jack (TRS) ⁴
LINE INSERT IN (Post-GEQ)			10k Ω	600 Ω Lines	+4dB (1.23V)	+4dB (1.23V)	+20dB (7.75V)	Phone Jack (TRS) ⁴

¹ Sensitivity is the lowest level that can produce an output of +4dB (1.23V) or the nominal output level when the unit is set at maximum gain. (All faders and level controls are at maximum position.)

² CH INPUT phone jacks are balanced. (T=+, R=-, S=GND)

³ Phone jacks are unbalanced without CH INPUT B.

⁴ Insert phone jacks are unbalanced. (T=OUT, R=IN, S=GND)

⁵ 0dB is referenced to 775mVrms and 0dBV is referenced to 1Vrms.

Output Characteristics

Output Terminals	Actual Source Impedance	For Use With Nominal	Output Level		Connectors on Mixer
			Nominal	Maximum Before Clip	
SPEAKER OUT 1, 2 (L, R)	0.08 Ω	4 Ω or 8 Ω	350W/4 Ω , 200W/8 Ω	—	Phone Jack
LINE INSERT OUT (Pre-GEQ)	600 Ω	10k Ω Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack (TRS) ²
LINE INSERT OUT (Post-GEQ)	600 Ω	10k Ω Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack (TRS) ²
EFFECT SEND 1, 2	75 Ω	600 Ω Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
MONITOR OUT A, B	75 Ω	600 Ω Lines	+4dB (1.23V)	+20dB (7.75V)	Phone Jack
REC OUT L/R	600 Ω	10k Ω Lines	-10dBV (316mV)	+10dBV (3.16V)	RCA Pin Jack
CH INSERT OUT	600 Ω	10k Ω Lines	0dB (775mV)	+20dB (7.75V)	Phone Jack (TRS) ²
PHONES (Headphone) OUT	100 Ω	40 Ω Phones	3mW	100mW ⁴	Stereo Phone Jack

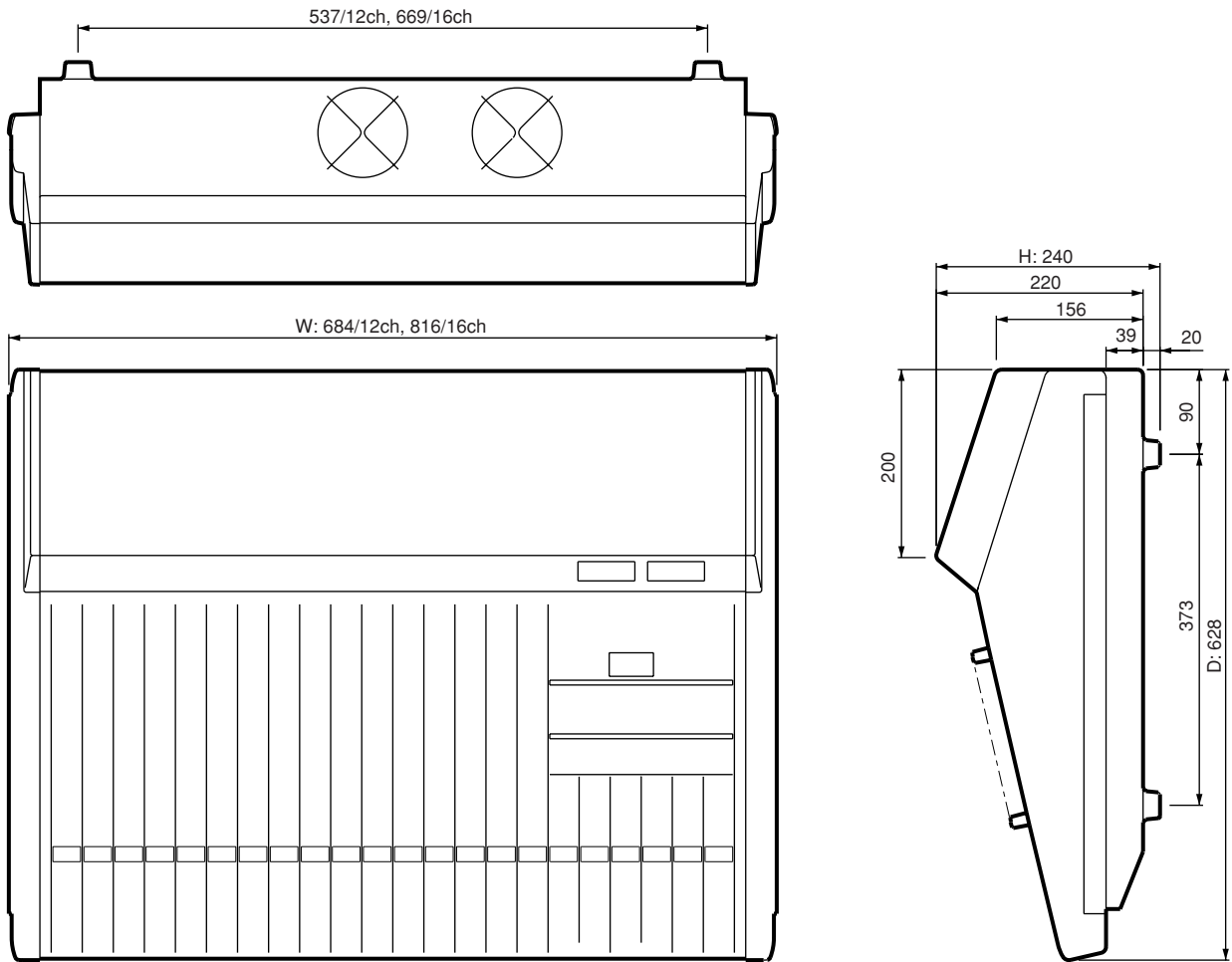
¹ Phone jacks are unbalanced.

² Insert phone jacks are unbalanced. (T=OUT, R=IN, S=GND)

³ 0dB is referenced to 775mVrms and 0dBV is referenced to 1Vrms.

⁴ When SPEAKER OUT level is full power, the PHONES OUT level is 12mW.

Console Dimensions



Unit: mm

BLOCK AND LEVEL DIAGRAMS

