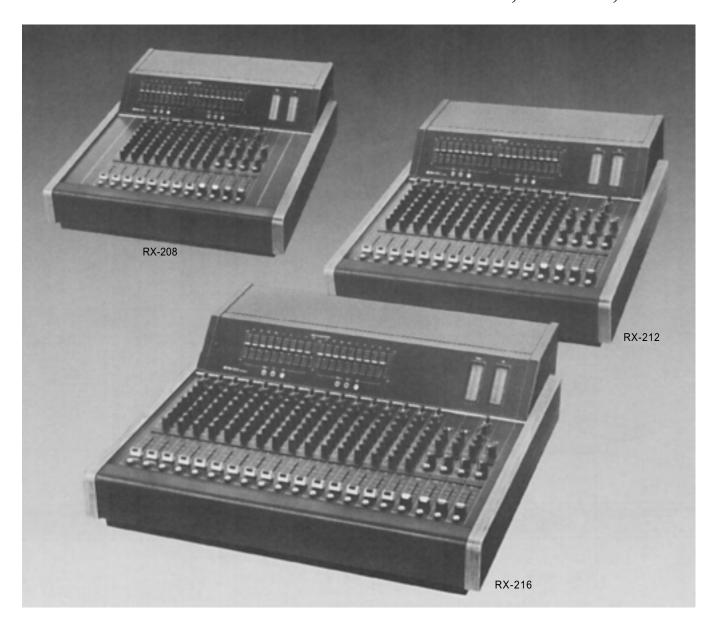


# TOA MIXING CONSOLE

# Model RX-208, RX-212, RX-216





#### **Contents**

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### **Precautions**

**1.** Each model of the RX-208, RX-212 and RX-216 has two versions, 120V AC operation only and 220/240V AC operation with a voltage selector. The voltage selector on the rear panel of the 220/240V version should be check for proper setting prior to operation as improper setting causes trouble. The voltage selector is set for 240V operation at the factory.



#### 2. Power Switch

The power switch should be on after all connections have been completed.

#### 3. XLR (Cannon) Connectors

The connectors are wired in the following manner: Pin 1 is ground (shield); pin 2 is cold (low, minus); pin 3 is hot (high, plus).

**4. Description of components and functions on the RX-208, RX-212 and RX-216.** In our Operating and Instruction Manual explanation of components and functions is made according to our usage for them.

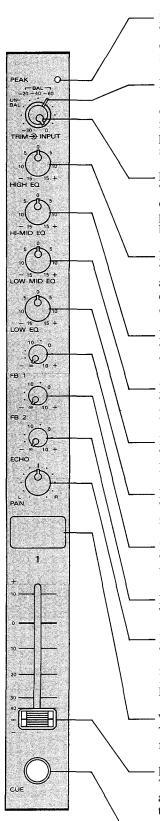
### **General Description**

The RX-208, 212 and 216, are mixing consoles with 8, 12 and 16 inputs respectively, 2 program outputs, 2 foldback outputs, and 1 echo output. Each input channel and line output has a balanced, low impedance, transformer-isolated, XLR connector, and an unbalanced, 1/4" jack. Each input channel includes an accessory send/receive jack for inserting a signal processing device into the signal path, and a phantom power ON/OFF switch for permitting use of a condenser microphone. An input level switch and trim control on each input channel are provided to permit optimum settings. A four-band equalizer is included on each input channel. A peak indicator LED on each input detects excessive inputs and helps avoid clipping. A pan control on each input channel assigns the fader output signal of the channel to programs L and R. A cue switch on each input channel, stereo input, aux/echo input, program output, foldback output and echo send allows monitoring the respective, pre-fader (pre-volume) signals through the phones output. All faders are log-linear type with 60mm of travel. Additional stereo inputs are used to connect a stereo playback deck, disk player and other auxiliary equipment. Two independent foldback outputs are included, (prefader, pre-EQ) signals. An analog, electronic echo is built in, but can be bypassed (via Echo Send/Return for external delay, reverb or special effects). Dual Graphic Equalizers (1/1 octave, 9 bands) are switchable to either the program outputs or foldback outputs. A fluorescent bargraph peak meter (2-color, vertical type) monitors the outputs of the programs L and R, and foldbacks 1 and 2. These consoles are designed for use in professional sound reinforcement systems, and provide versatile functions to meet a wide range of requirements. The high performance and modular construction assures reliability, easy maintenance, and serviceability.

### **Features**

- 1. Balanced, low impedance, (transformer-isolated) XLR connector with an unbalanced 1/4" jack on each input channel and line input.
- 2. An accessory send/receive jack on each input channel.
- 3. A phantom power switch on each input channel.
- 4. Input level switch and trim control on each input channel.
- 5. Four-band equalizer on each input channel.
- 6. Peak indicator LED on each input channel.
- 7. Cue switch on each input channel, stereo input, aux/echo input, program output, foldback output and echo send.
- 8. All faders are log-linear type with 60mm travel.
- 9. Built-in, electronic analog echo unit.
- 10. Dual graphic equalizers (1/1 octave, 9 bands) are switchable to either the program or foldback outputs.
- 11. Additional, stereo inputs for connecting a stereo playback deck, disk player and other auxiliary equipment.
- 12. Fluorescent bargraph peak meters for monitoring the programs L and R, and foldbacks 1 and 2.

### Front Panel, Input Section



#### **Peak Indicator**

The peak indicator lights if clipping occurs in the pre-amp stage of the corresponding input channel. When the light comes on, an adjustment must be made with the Input Level Selector Switch and/or the Input Trim control.

#### **Input Level Selector Switch (INPUT)**

Selection is made in accordance with the output of the microphone or other equipment connected to each input channel (XLR connector and phone jack). (—20, —40 and —60) dB indicates the input sensitivity of the XLR connector input when the trim control is set at the "0" position. The "UN-BAL" position permits using the phone jack input. The unbalanced input sensitivity is —30dB when the trim control is set at the "0" position.

#### **Input Trim Control (TRIM)**

The input trim varies the gain of the pre-amplifier stage of each input channel, providing a continuously variable control of gain in the range of 0 to —30dB from the input level switch position. For instance, with the input level selector switch set at —60dB, the variable range is between -60dB and -30dB.

#### **High Equalizer Control (HIGH EQ)**

The high control in each input channel alters the frequency response of the channel input, allowing a variety of high frequency characteristics. The high control provides  $\pm 15 dB$  of continuously variable shelving equalization at 10kHz, having flat audio response at the detented "0" position.

#### **High-Mid Equalizer Control (HI-MID EQ)**

The high-mid control provides  $\pm 15 dB$  of continuously variable peaking equalization at 3kHz. The detented "0" position is flat.

#### Low-Mid Equalizer Control (LOW MID EQ)

The low-mid control provides ±15dB of continuously variable peaking equalization at 300Hz, having flat audio response at the detented "0" position.

#### Low Equalizer Control (LOW EQ)

The low control provides ±15dB of continuously variable shelving equalization at 100Hz, having flat audio response at the detented "0" position.

#### Foldback Control 1 (FB 1)

The Foldback 1 control assigns the pre-equalizer, pre-fader input signal to the foldback 1 mixing bus. This control is used to route the input signal to stage monitor systems.

#### Foldback Control 2 (FB 2)

The Foldback 2 control assigns the pre-equalizer, pre-fader signal to the foldback 2 mixing

#### Echo Control (ECHO)

The echo control assigns the post-equalizer, post-fader signal to the echo bus.

#### Pan Pot (PAN)

This control assigns the fader output signal of the channel to the Program L, R mixing busses. At the center position, the pan pot routes the signal equally to the L and R mixing busses. Panning from one side to the other gradually assigns the input signal to either the Program L or R mixing busses exclusively.

#### Writing Block

The name of the input equipment or microphone setting can be written in with an eraseable felt pen or a wax pencil.

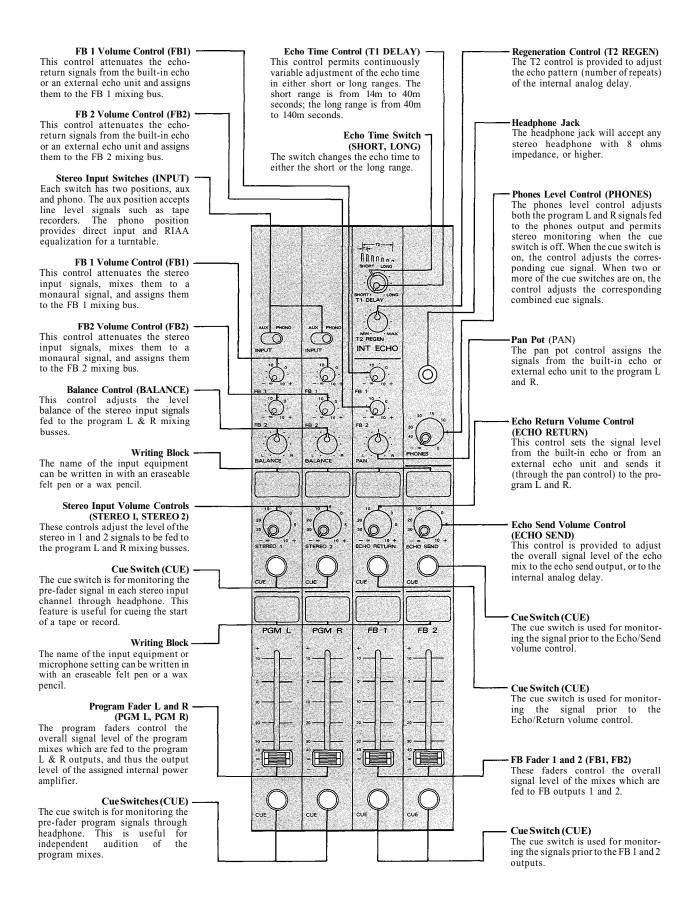
#### **Input Fader**

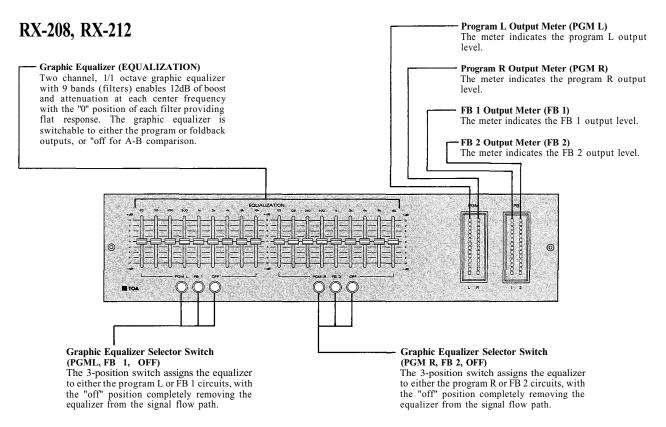
The fader provides continuously variable adjustment of the channel's output to the program L and R mixing busses, and to the echo mixing bus. The nominal level is at the "0" position, with the fader retaining a 10dB margin.

#### Cue Switch (CUE)

The cue switch is for monitoring the post-EQ, pre-fader signal in each input channel through headphones. The switch is a "push-on push-off type. When more than two switches are "on", the signals are combined.

### Front Panel, Output Section

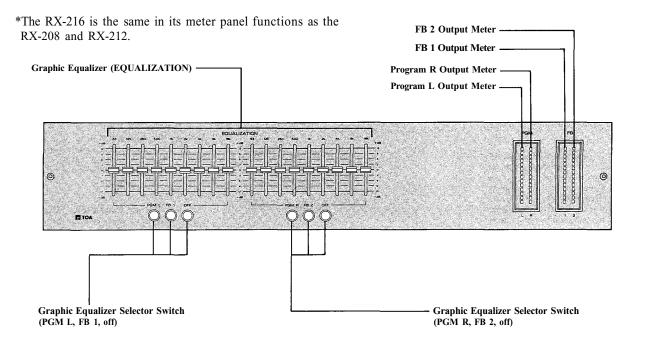




#### **Caution**

The graphic equalizer is normally used for either the PGM or FB mix. For normal operation, only one button should be pressed. If the equalizer is not being used, the "OFF" button should be depressed.

### **RX-216**



#### **RX-208** Accessory Send/Receive Jacks (ACCESSORY 1~8) These jacks are provided as patching points Program Line Output Connectors and Jacks for inserting signal processing equipment (LINE OUT, PGM L, R) such as compressor/limiters, noise gate, etc. These connectors and jacks are the outputs An output impedance of the accessory send of the console deriving the signals after each and an input impedance of the accessory program master fader. The XLR connectors receive are 10k ohms. Both nominal signals are balanced, transformer-isolated, floating, levels are 0dB. Please refer to the detailed with an output impedance and nominal level explanation on page 11. of 600 ohms and +4dB, respectively. The phone jacks are unbalanced, with an output Channel Input, Unbalanced Jacks impedance and nominal level of 600 ohms (CHANNEL IN UN-BAL 1~8) and +4dB, respectively. These 8 standard 1/4" phone jacks are unbalanced with an input level of —30dB and **Phantom Power Switches** Power Switch (POWER) input impedance of 10k ohms. They will accept low or high impedance sources. When This switch provides AC power to the (PHANTOM 1~8) console. Power should only be applied after The phantom power switch on plugs are inserted into these jacks, the input level switch must be set to the "UN-BAL" each input channel permits the all audio connections have been completed. user to supply 48V DC through position Power Fuse the input connectors to a condenser microphone. If phantom **Channel Input, Balanced Connectors** power is not required, the (CHANNEL IN BAL 1~8) switch must be in the "off" posi-The XLR connectors are balanced, transformer-isolated, floating, with an input impedance of 600 ohms, and will accept low impedance microphones as well as other impedance sources. When the XLR connectors are employed, the input level switch on the front panel must be set at the "BAL" positions. Proper adjustment of both input level switch and trim control make it possible to provide the optimum setting for each input. Power Cord **Ground Terminal (GND)** The chassis must be grounded. Ground Terminals (GND) These may be used to provide ground connection Foldback Line Output Connectors and Jacks (LINE OUT FB 1, 2) for tape decks or turntables. These connectors and jacks are the foldback Stereo Input Pin Jacks (STEREO IN 1, 2) outputs deriving the signals after each foldback master fader. The XLR connectors Each stereo input has both AUX input and PHONO input pin jacks that are switchable on the are balanced, transformer-isolated, floating, front panel. RIAA equalization is provided on the with an output impedance and nominal level phono input for accepting turntables with of 600 ohms and +4dB, respectively. The magnetic cartridges. phone jacks are unbalanced, with an output impedance and nominal level of 600 ohms Recording Output Pin Jacks and +4dB, respectively. (REC OUT, PGM L, R) The jacks are unbalanced and provide pre-graphic Echo Output Jacks (ECHO SEND) EQ, pre-program fader signals for connection to These jacks are unbalanced, with an output impedance of 600 ohms. One jack is for +4dB tape recorders. output and the other is for -20dB output. The Auxiliary Echo Input Jack (AUX ECHO IN) jacks are provided for connection to external This standard phone jack is unbalanced and echo machines. The +4dB jack can be used for accepts low or high impedance sources at nominal output cascading. -20dB level. The jack sends an echo or reverb return signal directly to the program L and R mixing busses. Inserting a plug in the jack interrupts the return signal from the built-in echo Sub Input Jacks -(SUB IN PGM L, R, FB 1, 2, ECHO) unit. The echo or reverb return signal can be These five jacks are directly connected to the corresponding mixing busses (program L, R, FB1, 2, and echo), and are provided for controlled by the echo return volume on the front

cascade connection to expand the input

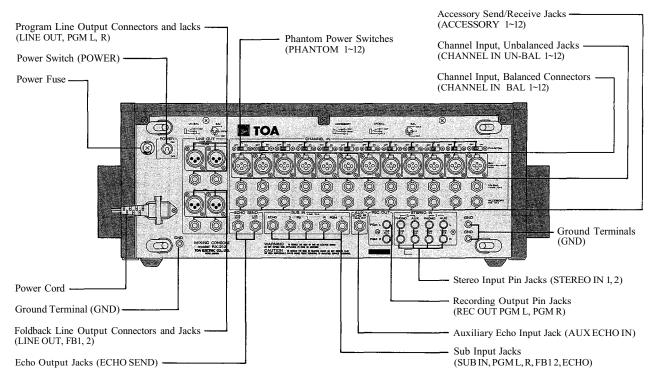
capacity.

panel.

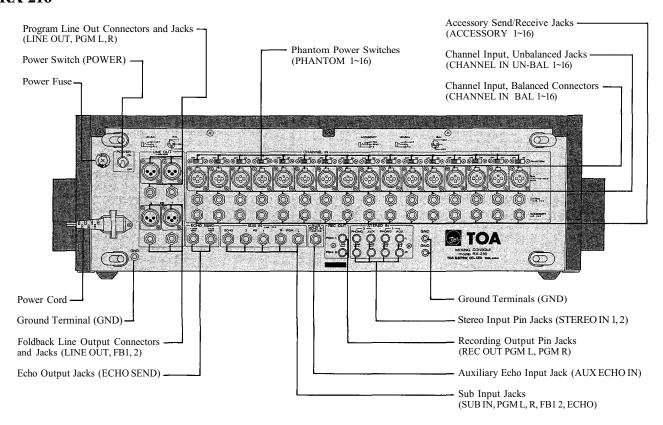
### Rear Panel (RX-212, RX-216)

The RX-212 and RX-216 are the same as the RX-208 in functions, except that the RX-212 has 12 input channels and the RX-216 has 16 input channels.

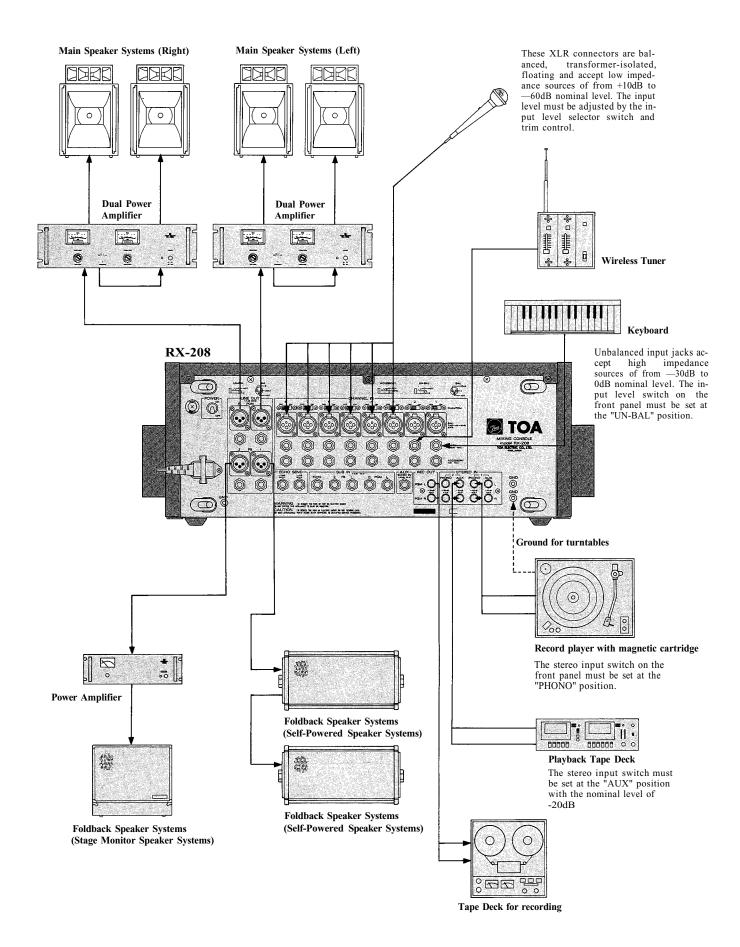
### **RX-212**

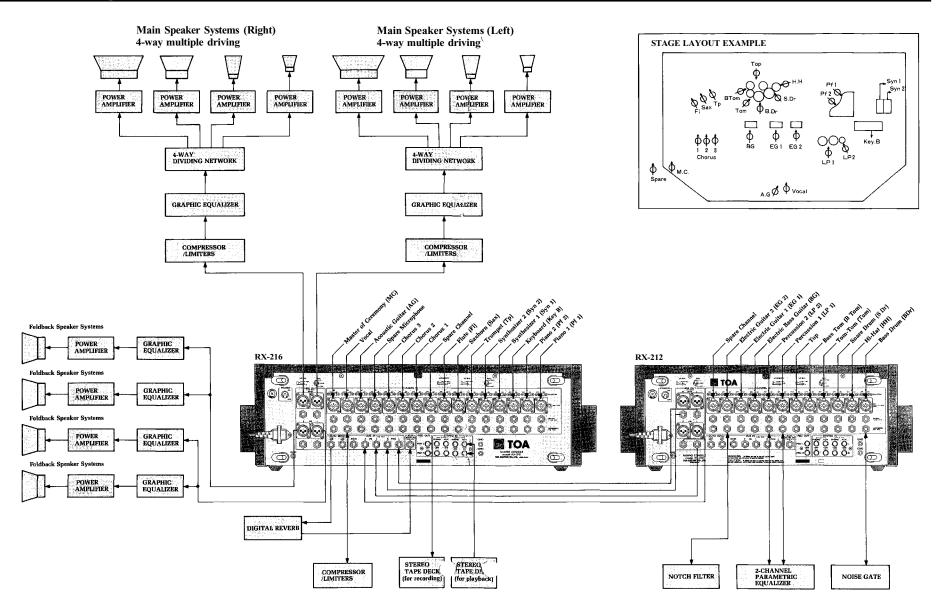


### **RX-216**



### **Connection Example**





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### How to use "channel patching" accessory jack

The accessory jack (Tip, Ring, Sleeve) is provided on each input channel to allow insertion of outboard signal processing devices (example: compressor/limiters, noise gate, equalizer, etc.) into the signal path. The jack functions as both an output and an input (Tip=Receive, Ring=Send, Sleeve=Shield). Connection cables for this purpose should be wired as illustrated in Fig. 2.

Inserting a plug into the jack interrupts normal signal flow and places the external device into the circuitry just prior to the input equalizer section. (See Fig. 1.)

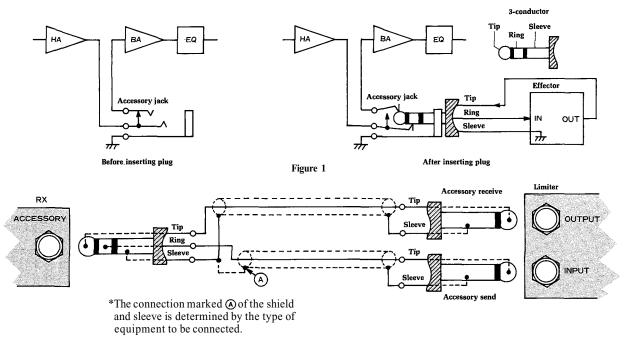


Figure 2

The accessory jacks may also be used as a direct output for each input channel, allowing direct connection to a multi-track tape deck or use as an additional effects mix.

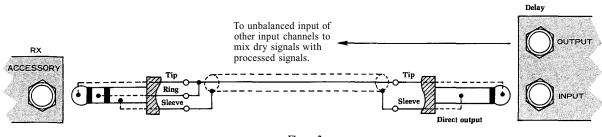
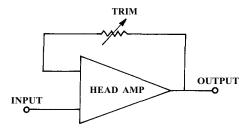


Figure 3

Normal impedance of the accessory send is greater than 10k ohms and the receive impedance is 10k ohms. Both nominal levels are at 0dB (0.775V).

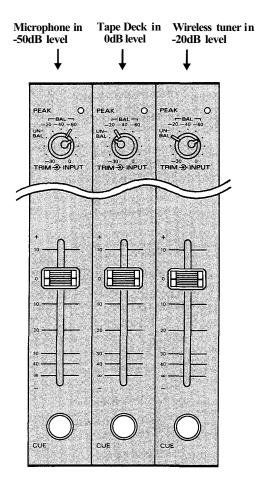
### How to get a good mixing

- •Before connecting the equipment to the mixing console, check the impedance and level of both. If the impedances and levels do not match, mixing will be very difficult and the S/N ratio will also be adversely affected.
- Each input channel of the RX-208, RX-212 and RX-216 is provided with a Trim control. Thorough understanding of the function of a Trim control will make mixing easier.



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

For example, a microphone (balanced) with an output level of —50dB, a tape deck (balanced) with an output level of 0dB, and a wireless tuner with an output level of —20dB are connected to the console.



First the Trim control must be turned down so that the peak indicator will not be lit if an excessive signal comes in. Nevertheless, if it is still on, the input level switch must be rotated to the left 1 step. This can be applied to the "BAL" inputs only, not to the "UN-BAL" inputs.

The input selector switch is set as shown in the left figure. Trim control is set as shown in the left figure. Also, if the volume balance of each instrument (microphone) is kept by the Trim control the position of each channel fader will be uniform, thus mixing becomes easier.

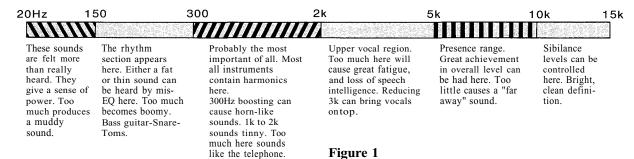
The faders in each channel are used in general between 0 and 10. If the hall is full and there is not enough volume, the master fader must be turned up.

### Channel and Graphic Equalizers

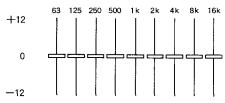
#### **Equalization for music**

The Graphic Equalizer is designed not only for use in preventing feedback and equalizing uneven room frequency response to be flat, but also for equalizing frequency response to your tastes and producing favourable sound for you. Fig. 1 shows each frequency band and its corresponding auditory feeling. Fig. 2 and Table 1 show the relation between each musical instrument and its frequency band. They can be of great help in the equalizer operation. (They are referenced from a book entitled "Practical Guide for Concert".)

#### **EQUALIZATION CHART**



#### INSTRUMENT CHART



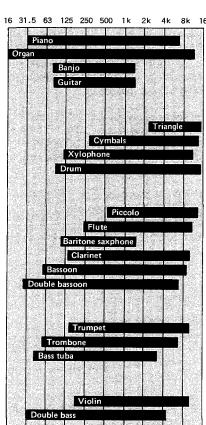


Figure 2

#### INSTRUMENT EQUALIZATION CHART

Acoustic guitar	Bass strings resonate between 70 to 120Hz, body around 300Hz. Avoid boosting these to stop feedback. 3kHz and 5kHz give great "clarity".					
Electric guitar	Resonances differ—depending on type. Good full sounds aroun 300 to 500Hz. Clarity at 3kHz.					
Bass guitar	Extreme lows are at 60 to 90Hz. "Pick" or "pluck" sounds are around 800 to 1200Hz. Upper harmonics clarified about 3kHz.					
Human voice	Good fullness at 150Hz. Watch for "boominess" around 250Hz. Mid-range 10kHz.					
Piano (Acoustic)	Bass strings resonate around 100Hz. Watch for sub-harmonics at 30 to 50Hz. $$					
Piano (Electric)	Good mid-clarity at 3kHz to 5kHz thins out rapidly in high end. Be careful around 1.5kHz to 2.5kHz to avoid the "bar room sound."					
Organ	Usually dies under 200Hz. Has great mid-sounds around 1200 to 2000Hz. Top end cuts off at 6kHz.					
Violin	Rich fullness at 400Hz. Natural raids around 1500 to 2500Hz. Avoid "scratch" sounds at 8kHz.					
Brass instruments	Watch for "hot" mids around 2kHz. Low end boost around 400Hz. Top end clarity at 6kHz.					
Bass drum	Great low "kick" at 40Hz. The mids at $2kHz$ gives the familiar "punch."					
Snare drum	Good fullness at 100Hz. The "crack" is boosted at 2kHz. The snares extend to above $4k$ Hz.					
Tom Tom	The main fullness is around 200Hz. The mid punch extends to $4k\mathrm{Hz}.$					
Floor Tom	Same as tom, but extends down to 80Hz.					
Hi Hat	Watch for the "gong" sound around 300Hz. Good "shimmer" sounds are around 8kHz to 10kHz.					
Cymbal overhead	About the same as hi-hat but has more low end around 150Hz.					
Talk Box	Depending on the guitar sound driving it and the resonance of each player's mouth, should have great "bite" around 1200Hz and dies					

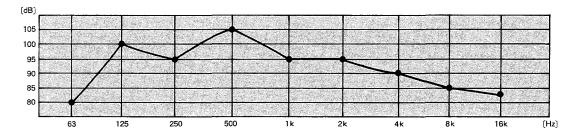
Table 1

above 6kHz.

### **Channel and Graphic Equalizers**

#### **Feedback Prevention**

When the overall gain of a sound system is increased, feedback will occur at frequencies where the system response has peaks. Suppose the system has uneven frequency response like that shown in the following diagram.



The frequency at which feedback will occur when gain is increased is about 500Hz. In this case, feedback may be prevented by attenuating levels at 500Hz by 3dB to 5dB with an equalizer. If the overall gain is again gradually increased, feedback will occur next at about 125Hz. It may be stopped by attenuating the levels 3dB to 5dB at that frequency. In this procedure, sufficient gain in the sound system is obtained before feedback.

### **General Specifications**

```
Graphic Equalizer (±12dB maximum)
Frequency Response
   +0dB, -0.5dB
                          50Hz to 15kHz
                                                                        Center Frequency
   +0.5dB, -3dB
                                                                                     63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz,
                         20Hz to 30 kHz
Total Harmonic Distortion
                                                                                     4kHz, 8kHz, 16kHz
                                                                     Internal Echo Unit
   0.5% at +4dB*/600 ohms at 1kHz
                                                                        Delay Time SHORT 12msec—40msec
Hum and Noise
   (20Hz to 20kHz, input termination of 150 ohms, Input level
                                                                                     LONG
                                                                                              40msec—140msec
                                                                     Peak Indicator
   switch at "BAL -60", Trim at "0", output termination of 600
                                                                        LED turns on when the pre-fader, post EQ signal reaches
                                                                        6 dB before clip.
      Equivalent Input Noise
          -124dB* (20Hz — 20kHz)
                                                                     Phantom Power
                                                                        48V DC is applied to balanced input transformer for
          -127dB* (IHF-A weighted)
                                                                        powering condenser microphones
      S/N
                                                                     Meter ("0" = +4dB* output at LINE OUT)
          64dB; PROGRAM OUT
                (PGM Fader and one Input Fader at nominal
                                                                        2 pairs of fluorescent bargraph meter for PGM L, R and FB 1,
                level)
          64dB; FB OUT
                                                                    AC Line Voltage
                (FB Fader and one FB control at nominal level)
                                                                        AC Mains 50 Hz or 60 Hz
                                                                     Power Consumption
Crosstalk
   -60dB at 1kHz, input to output
                                                                        RX-208
                                                                                   44W
Maximum Voltage Gain
                                                                        RX-212
                                                                                   49W
                                                                                   54W
   84dB CH IN to PGM LINE OUT
                                                                        RX-216
   84dB CH IN to FB LINE OUT
                                                                        Black panel, rosewood trim
   94dB CH IN to ECHO SEND
   60dB
          CH IN to REC OUT
                                                                     Dimensions (W×D×H)
   60dB
          CH IN to ACCESSORY SEND
                                                                        RX-208
   44dB
          STEREO IN (AUX) to PGM LINE OUT
                                                                           564 \times 687 \times 206 \,\mathrm{mm} \quad (22-1/4" \times 27" \times 8-1/8")
   74dB
          STEREO IN (PHONO) to PGM LINE OUT
                                                                        RX-212
   44dB
          AUX ECHO IN to PGM LINE OUT
                                                                           564 \times 687 \times 206 \,\mathrm{mm} \quad (22-1/4" \times 27" \times 8-1/8")
          ACCESSORY RCV to PGM LINE OUT
                                                                        RX-216
   24dB
          SUB IN to LINE OUT
                                                                           684 \times 687 \times 206 \text{ mm} (26-7/8" × 27" × 8-1/8")
   10dB
Channel Equalizer (±15dB maximum)
                                                                     Weight
                                                                        RX-208
   LOW
                    100Hz
                                                                                   21kg (46.3 lbs)
                             Shelving
   LOW MID
                                                                                   22kg (48.5 lbs)
                    300Hz
                                                                        RX-212
                             Peaking
   HI-MID
                    3kHz
                             Peaking
                                                                        RX-216
                                                                                   26kg (57.3 lbs)
                                                                     Accessory
   HIGH
                    10kHz
                             Shelving
                                                                       Fuse
                                                                                      *0dB is referenced to 0.775V RMS
```

Specifications are subject to change without notice.

### **Input & Output Specifications**

#### INPUT SPECIFICATIONS

0dB is referenced to 0.775V RMS.

Input		Actual For Use Load With		Sensitivity*	Input Level (Trim	Connector	
		Impedance	Nominal	Sensitivity	Nominal MAX. Before Clip		Connector
CHANNEL IN	BAL-40	550 ohms 800 ohms 900 ohms	50 to 600 ohms	-80dB (0.08mV) -60dB (0.78mV) -40dB (7.8mV)	-60dB (0.78mV) to -30dB (25mV) -40dB (7.8mV) to -10dB (250mV) -20dB (78mV) to +10dB (2.5V)	-40dB (7.8mV) to -10dB (250mV) -20dB (78mV) to +10dB (2.5V) 0dB (775V) to +30dB (25V)	XLR-3-31 type**
	UN-BAL	25k ohms	10k ohms	-50dB (2.5mV)	-30dB (25mV) to 0dB (775mV)	-10dB (250mV) to +20dB (7.8V)	PHONE JACK
ACCESSORY (RCV)		10k ohms	10k ohms	-20dB (78mV)	-0dB (775mV)	20dB (7.8mV)	3P PHONE JACK***
STEREO IN	AUX PHONO	10k ohms 47k ohms	10k ohms 47k ohms	-40dB (7.8mV) -70dB (0.25mV)	-20dB (78mV) -50dB (2.5mV)	+10dB (2.5V) -20dB (78mV)	RCA PIN JACK
AUXECHOIN		10k ohms	10k ohms	-40dB (7.8mV)	-20dB (78mV)	0dB (775mV)	PHONE JACK
SUB IN		10k ohms	10k ohms	-10dB (250mV)	+4dB (1.23mV)	+24dB (12.3mV)	PHONE JACK

#### **OUTPUT SPECIFICATIONS**

0dB is referenced to 0.775V RMS.

Output		Actual Source Impedance	For Use With Nominal	Output Level		Connector
		Actual Source Impedance	For Ose with Nominal	Nominal	MAX Before Clip	Connector
LINE OUT	PGM L PGMR FB1 FB2	100 ohms	600 ohms	+4dB (1.23V)	+20dB (7.8V)	XLR-3-32 type** and PHONE JACK
ECHO SEND	+4 -20	90 ohms 64 ohms	600 ohms	+4dB (1.23V) -20dB (78mV)	+20dB (7.8V) -4dB (490mV)	PHONE JACK PHONE JACK
REC OUT		1k ohms	10k ohms	-10dB (250mV)	+10dB (2.5V)	RCA PIN JACK
ACCESSORY	(SEND)	1k ohms	10k ohms	0dB (775mV)	+20dB (7.8V)	3P PHONE JACK***
PHONES		18 ohms	8 ohms or higher	75mW/8 ohms, 0dB (775mV)	370mW/8 ohms, +7dB (1.7V)	STEREO PHONE JACK****

<sup>\*</sup>Sensitivity is the level required to produce a nominal speaker output level.

As is described in the beginning of the operation manual, the XLR type connectors of the RX-208, RX-212 and RX-216 are wired as follows.

Pin No. 1 — Ground Pin No. 2 — Cold (Low)

Pin No. 3 — Hot (High)

Specifications are subject to change without notice.

The fuse rating for 120V AC operation is 2 amps., and 1 amp. for 220/240V AC operation. The fuse must always be replaced with same type and rating.

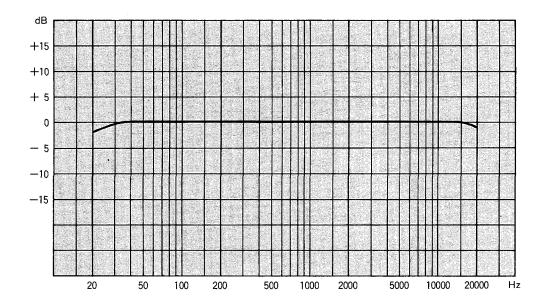
<sup>\*\*</sup>All XLR type connectors are floating, balanced and transformer-isolated.

<sup>\*\*\*</sup>ACCESSORY jacks (3P PHONE JACK) are wired: Tip=Receive, Ring=Send and Sleeve =Common

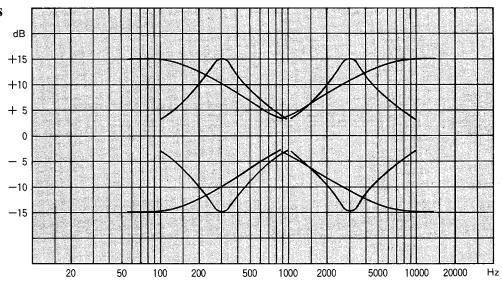
<sup>\*\*\*\*</sup>Stereo phone jack is wired: Tip=Left, Ring=Right and Sleave=Common

## **Characteristic Diagrams**

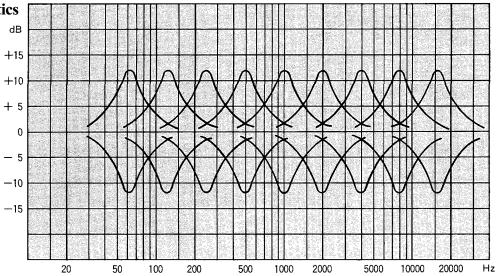
### **Frequency Response**

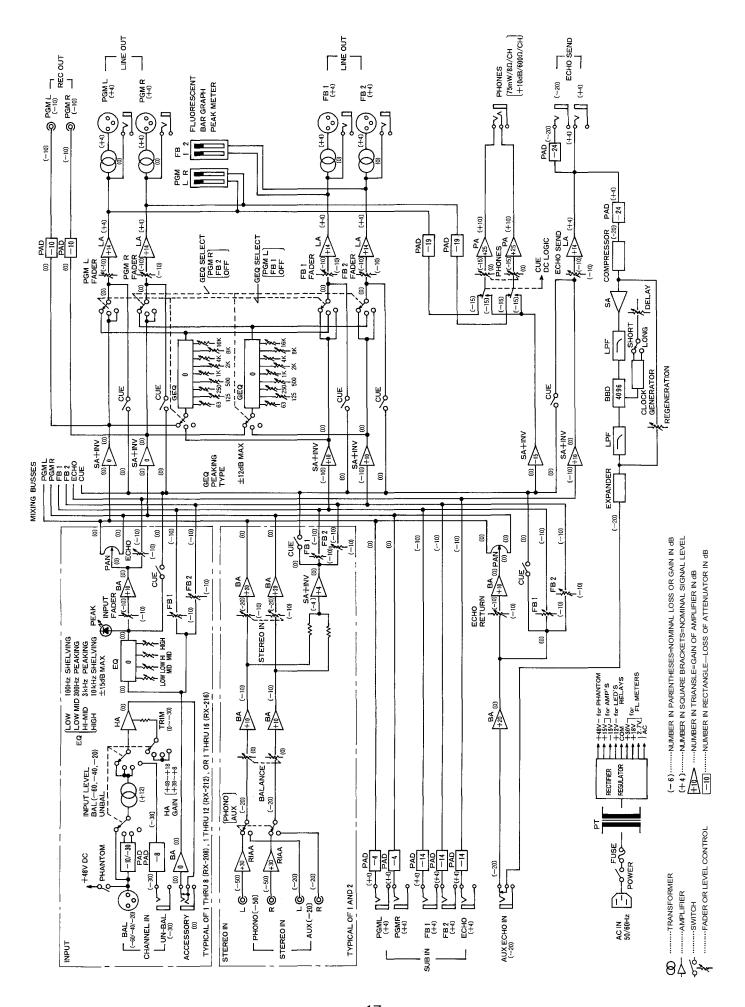


### **Input EQ Characteristics**

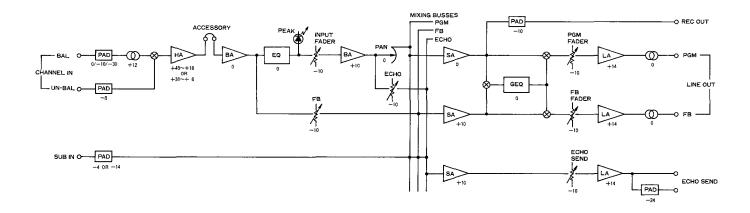


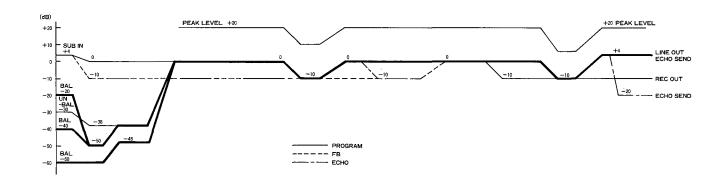
### **Graphic EQ Characteristics**



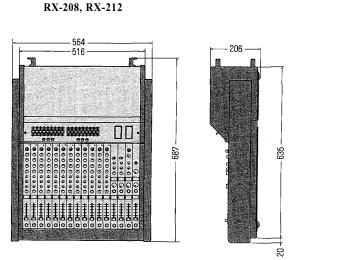


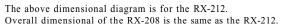
## Level Diagram

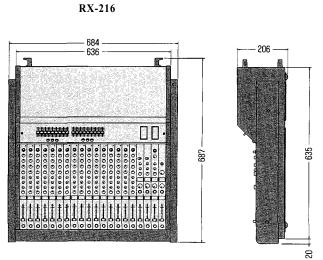




## **Dimensional Diagrams**









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