YAMAHA

MC Series Mixers

OPERATING MANUAL

MC1204
MC1604
MC2404

The Yamaha MC-series mixers have been designed to meet a broad variety of applications with uncompromising overall electronic performance and superior control capability. Their broad versatility and plentiful complement of control features make them ideal for sound reinforcement, recording, theater and production applications. Further, state-of-the-art design and technology has made it possible to offer such exceptional flexibility and performance at significantly reduced cost.

Your MC-series mixer should provide you with years of trouble-free performance. To make the most of all the features and performance it provides, however, we recommend that you read this operating manual thoroughly before use.

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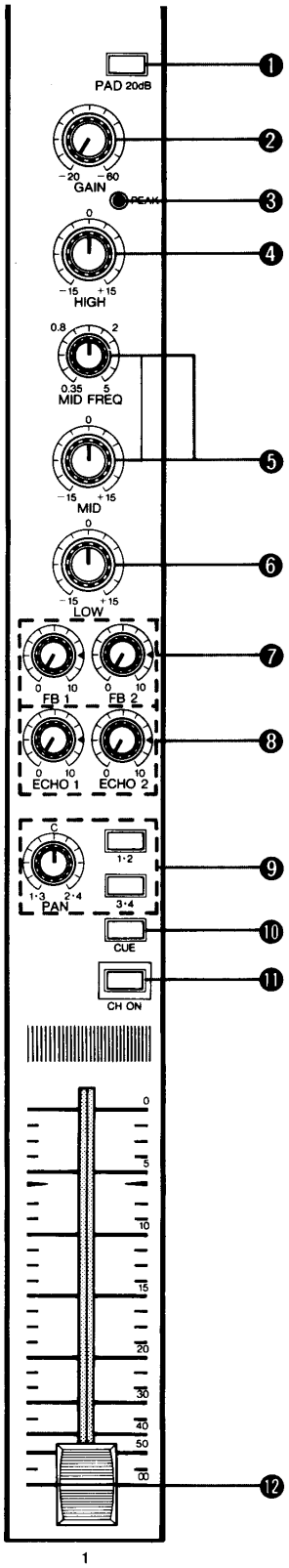


❶ PAD switch, GAIN control and PEAK LED

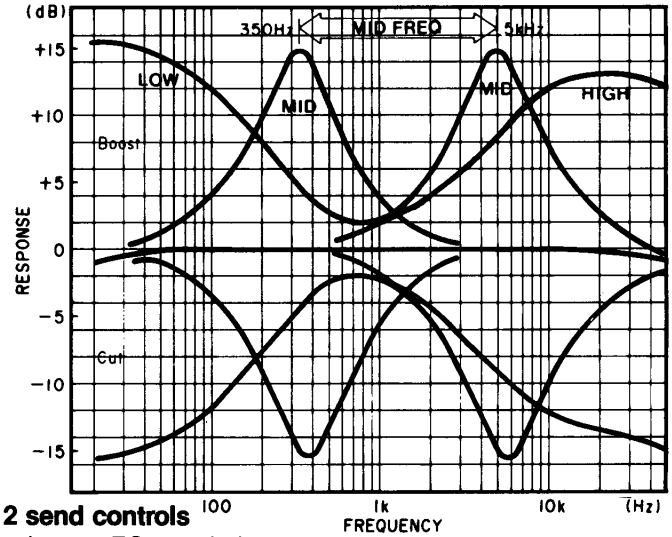
These adjust the input sensitivity of the MC mixers over a wide range. The PAD switch inserts a 20 dB pad ahead of the head amplifier, and the GAIN control continuously adjusts the sensitivity of the head amplifier between −20 and −60 dB.
The PEAK LED lights whenever the channel's post-EQ, pre-fader signal comes within 3 dB of clipping, warning the operator of impending channel overload.

❷ HIGH, MID FREQ/MID and LOW EQ controls

These continuously variable controls allow ±15 dB of equalization in the following frequency ranges:

HIGH ..... 10 kHz shelving.
MID/FREQUENCY ..... 350 Hz—5 kHz peaking.
LOW ..... 100 Hz shelving.

Response is flat at the center position.



❸ FB 1 and FB 2 send controls

These controls feed a pre-EQ, pre-fader signal to the Foldback 1 and Foldback 2 busses which feed the FB 1 and FB 2 outputs, respectively.
These busses would normally be used for stage foldback or monitor speaker systems. Internal P.C. board jumpers are provided for changing the foldbacks to post EQ and fader for use as additional echo/effect sends. This modification can be made at any Yamaha Service Center.

	Post Insert I/O Pre EQ	Post EQ Pre Fader	Post Fader
FB 1.2	FACTORY SET	○	○
ECHO 1.2	○	○	FACTORY SET

❹ ECHO 1 and ECHO 2 controls

Adjusts the amount of post-EQ, post-fader signal fed from that channel to the ECHO 1 and ECHO 2 busses, which feed the ECHO 1 and ECHO 2 outputs, respectively.
The echo busses may be used to feed outboard effect devices or as additional foldback/monitor sends.

❺ PAN control and Group 1-2/3-4 Assignment Switches

The PAN control assigns the channel fader output to group busses 1-2 and/or 3-4 according to the setting of the buss assignment switches. When group assignment switch 1-2 is engaged, the signal is panned between busses 1 and 2. If 3-4 is engaged the signal is panned between busses 3 and 4. Both switches can be engaged, in which case the signal is panned between group busses 1-3 and 2-4. Panning left delivers more signal to busses 1 and 3, while panning right delivers more signal to busses 2 and 4.

❻ CUE button

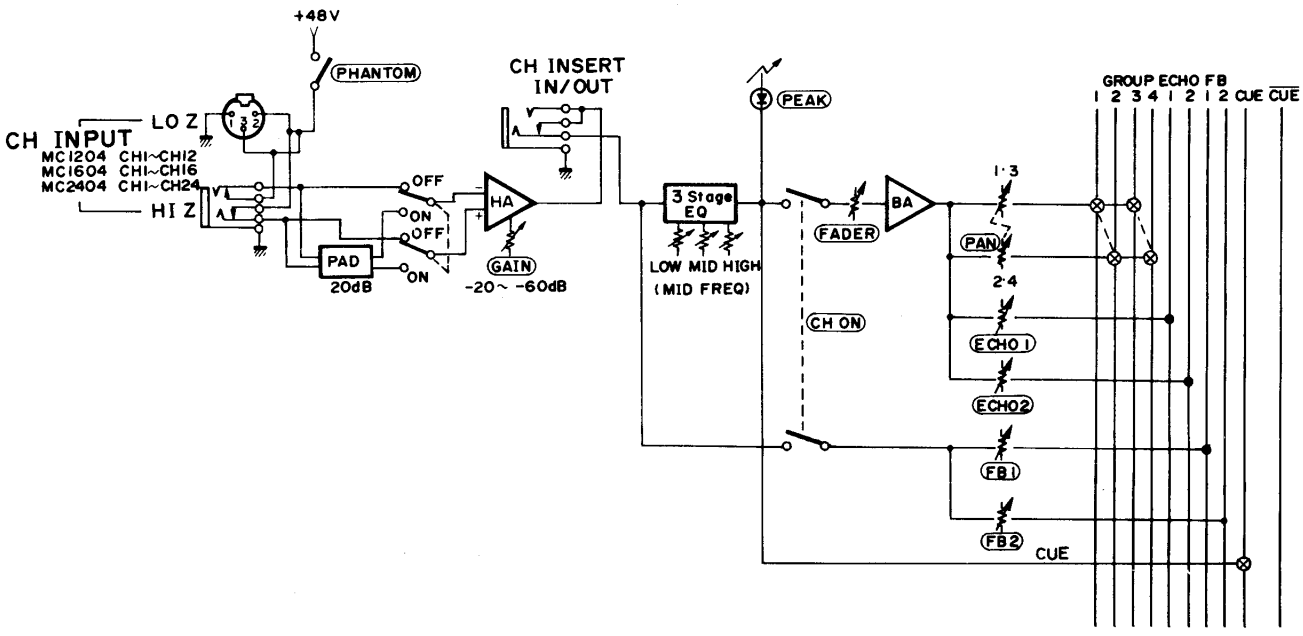
Pressing the CUE button on any channel permits monitoring of only the selected channel signal via the headphone output. All other outputs are not affected. If more than one channel is "cued", their signals are summed and fed to the headphone output.

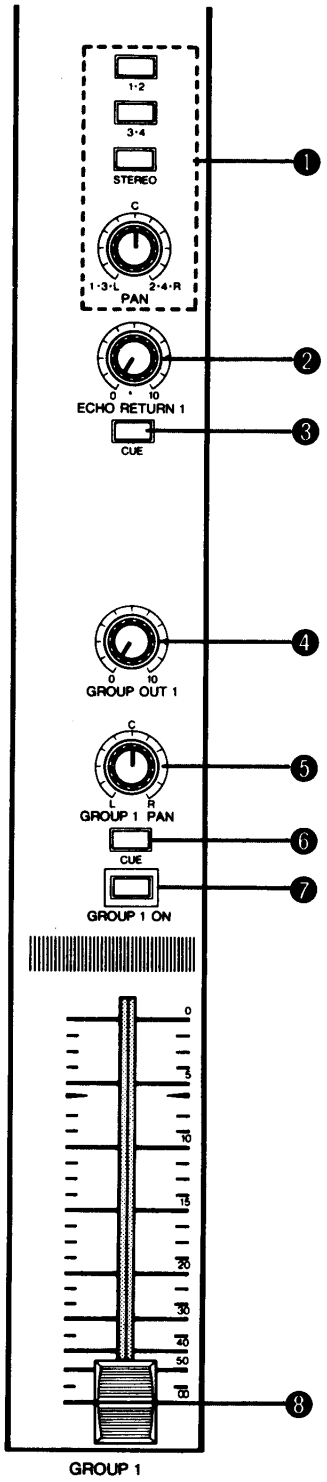
❼ CH ON button

The CH ON button turns the respective channel ON or OFF. This is handy for rapid punch-ins or punch-outs, or for temporarily killing a channel without disturbing the mix fader level.

❽ Channel Fader

These set the mix level of each channel. These smooth linear faders also provide a good visual indication of the overall mix levels. Rated output (nominal) level is achieved with the fader set at "6" (▶◀) on the scale.





❶ Echo PAN control and 1-2/3-4/STEREO assign switches

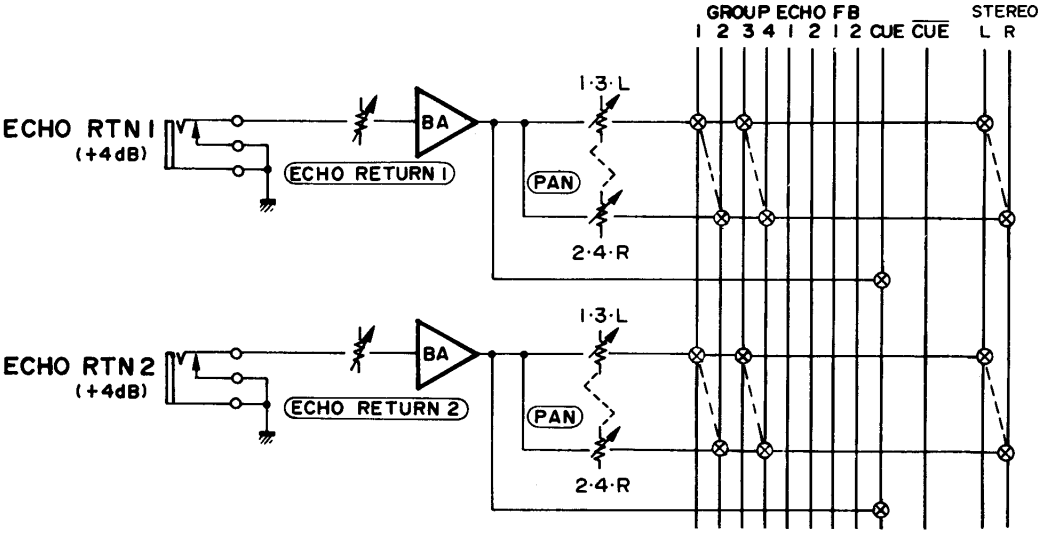
The PAN control assigns the echo return signal received at the appropriate ECHO RTN jack to group busses 1-2 and/or 3-4 according to the setting of the buss assignment switches. The same signal can also be set to and panned across the L/R stereo buss by engaging the STEREO switch. When group assignment switch 1-2 is engaged, the signal is panned between busses 1 and 2. If 3-4 is engaged the signal is panned between busses 3 and 4. Both switches can be engaged, in which case the signal is panned between group busses 1-3 and 2-4. Panning left delivers more signal to busses 1 and 3, while panning right delivers more signal to busses 2 and 4.

❷ ECHO RETURN control

This control is used to match the sensitivity of the corresponding ECHO RTN input to the output level of the external echo device used. Setting this control to "8" on the scale delivers rated output for a +4 dB input level.

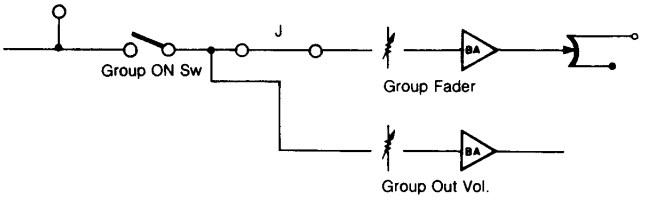
❸ CUE button

Pressing the CUE button permits monitoring of only the selected echo signal via the headphone output. All other outputs are not affected.



❹ GROUP OUT control

This control adjusts the overall level at the corresponding GROUP OUT XLR type connector. The GROUP master fader does not affect the level at the GROUP OUT XLR type connector. Rated output (nominal) level is achieved at a setting of "8" on the GROUP OUT control scale.



	Pre	Post
	Group ON Sw	Group ON Sw
Group Fader (Mix to ST)	○	FACTORY SET

❺ GROUP PAN control

The GROUP PAN control assigns the corresponding group signal to the L and R STEREO busses.

❻ CUE button

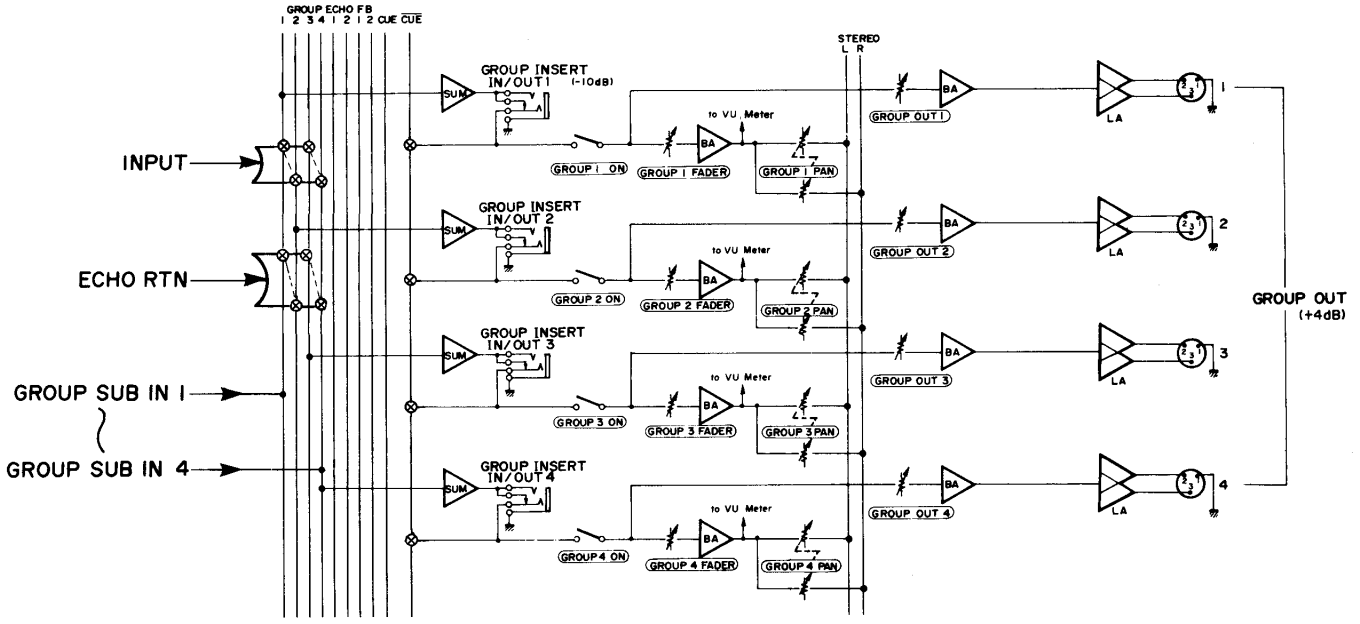
Pressing the CUE button permits monitoring of only the selected group signal via the headphone output only. Signals inserted at the GROUP INSERT jacks are included.

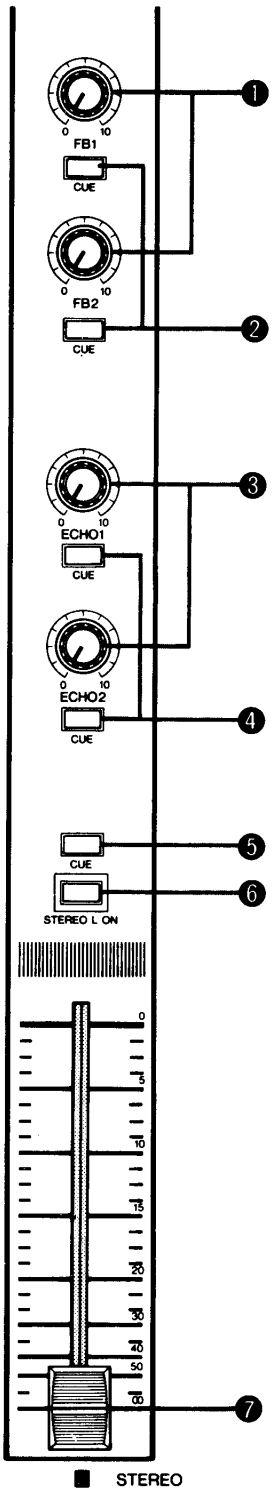
❼ GROUP ON button

The GROUP ON button turns the respective GROUP output ON or OFF. This is handy for rapid group punch-ins or punch-outs, or for temporarily killing a group without disturbing the mix level. The GROUP ON button affects both the group XLR type outputs and the group feed to the L and R stereo buss.

❽ GROUP Master Fader

The GROUP master fader controls the overall level of the corresponding group signal sent to the L/R STEREO program buss. Rated output (nominal) level is achieved with the fader set to "6" (▶◀) on the scale.





❶ FB master controls

The FB 1 and FB 2 master controls control the overall level of the mix on the respective FB busses to be delivered to the FB OUT connectors. Rated output (nominal) level is achieved with the FB master controls set at "8" on the scale.
These outputs could be used to feed the on-stage foldback/monitor power amplifiers and speakers.

❷ CUE button

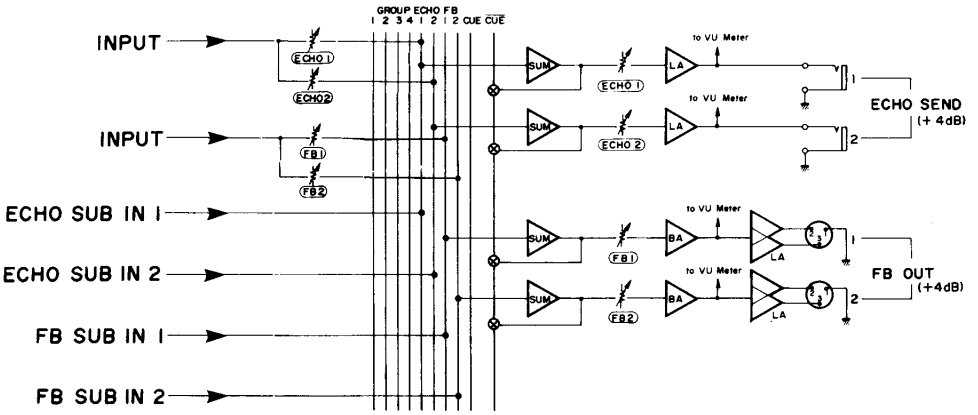
Pressing the CUE button permits monitoring of only the selected FB signal via the headphone output only.

❸ ECHO master controls

The ECHO 1 and ECHO 2 master controls control the overall level of the mix on the respective ECHO busses to be delivered to the ECHO SEND connectors. Rated output (nominal) level is achieved with the ECHO master controls set at "8" on the scale.

❹ CUE button

Pressing the CUE button permits monitoring of only the selected echo signal via the headphone output only.



❺ CUE (STEREO L CUE) button

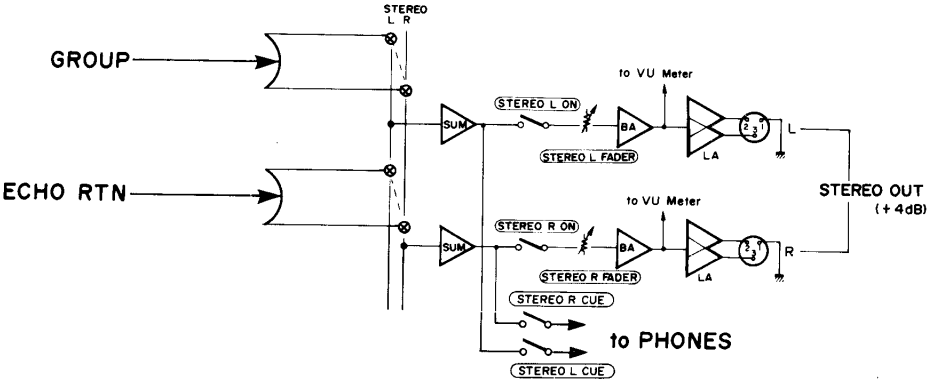
Pressing the CUE button permits monitoring of only the stereo signal via the L headphone output only.

❻ STEREO L ON button

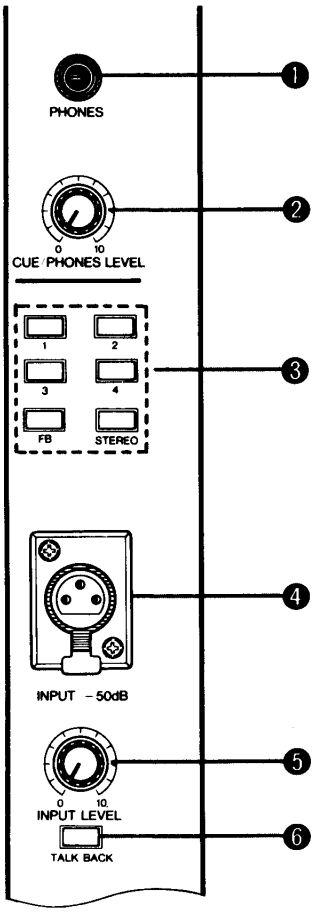
The STEREO ON button turns the respective STEREO L output channel ON or OFF. These are useful for turning off the console outputs after the sound check and all levels have been set.

❼ STEREO L master fader

Controls the overall level of the corresponding STEREO L output channel—including all GROUP, and ECHO RETURN signals assigned to the respective stereo channel. Rated output (nominal) level is achieved with the fader set at "0" (max.) on the scale.



The above applies in the same way to the R channel.

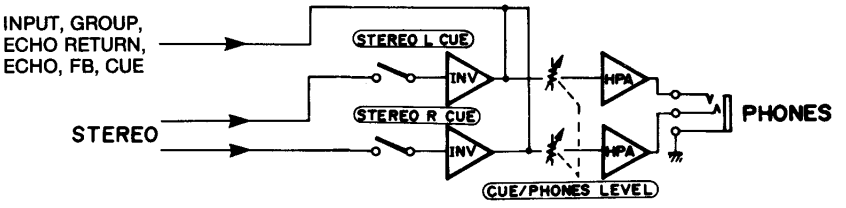


❶ PHONES jack

This jacks accepts a standard pair of stereo headphones. When a CUE button is pressed headphone output consists of the corresponding cue signal.

❷ CUE/PHONES LEVEL control

Controls the volume of the headphone output. Rated output is achieved with the control set at "8" on the scale.



❸ Talkback Assign Switches

These switches determine to which mixing buss the talkback signal is sent. Talkback can be sent to the group 1, 2, 3 or 4 busses, the FB busses or the main stereo buss by engaging the corresponding switch.

❹ Talkback INPUT connector

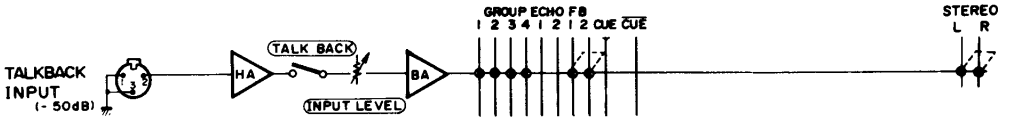
A low-impedance talkback microphone can be connected here. Input level/impedance at this connector is −50 dB/50—250 ohms.

❺ INPUT LEVEL control

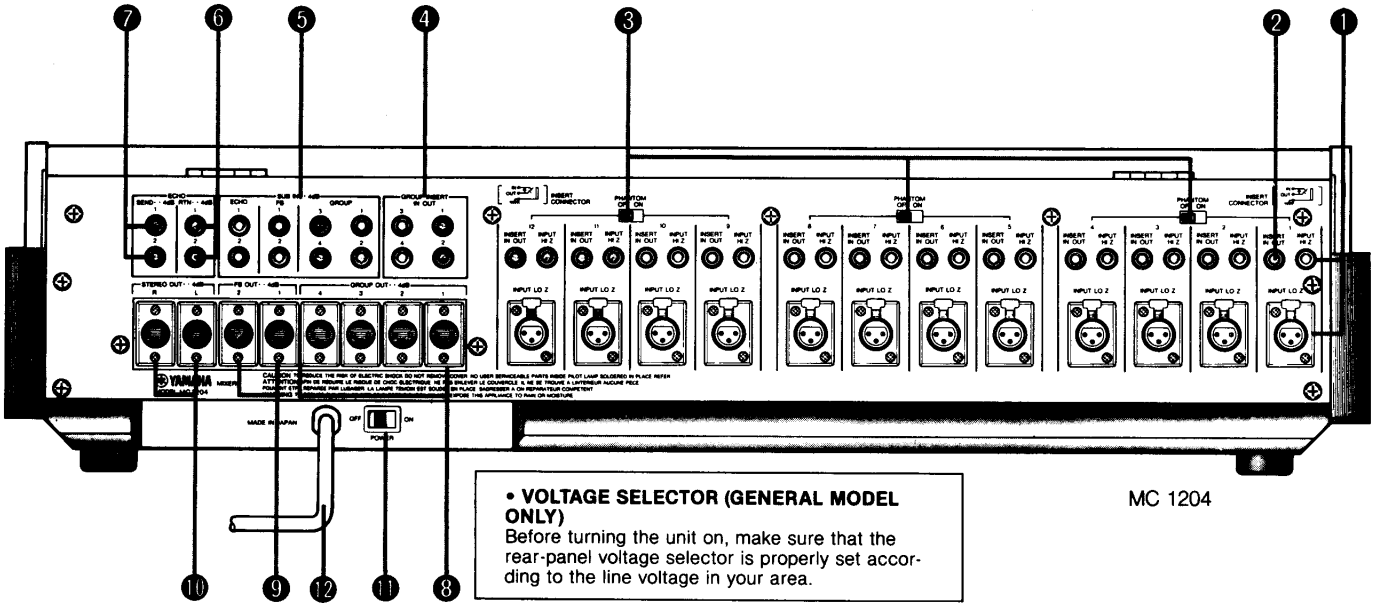
Controls the level of the talkback signal. Rated (nominal) level is achieved with the control set at "8" on the scale.

❻ TALKBACK switch

Engaging this switch activates the talkback send to the selected mixing buss.
The talkback system is a very useful feature for audience announcements and communication between the engineer and performers.



REAR PANEL CONNECTIONS



• VOLTAGE SELECTOR (GENERAL MODEL ONLY)
Before turning the unit on, make sure that the rear-panel voltage selector is properly set according to the line voltage in your area.

MC 1204

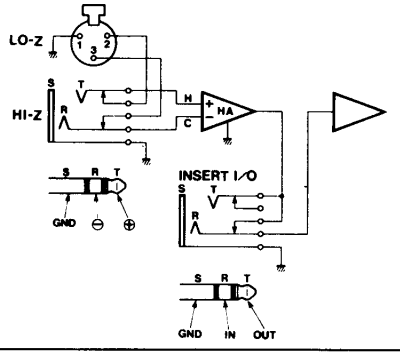
❶ CHANNEL INPUTS

Each input channel has an electronically balanced low-impedance (LO Z) XLR-type input connector and a high-impedance (HI Z) balanced 1/4" TRS (Tip-Ring-Sleeve) phone jack. The inputs are designed for 50—250 ohm microphone or 600 ohm line sources with an input level from −60 to 0 dB. An internal phantom power supply (+48 V) is provided for phantom-powered mics.

❷ CHANNEL INSERT IN/OUT connectors

These tip-ring-sleeve connectors provide an unbalanced insert patch point between the channel gain control and equalizer stages. The IN line accepts a 600 ohm, −10 dB signal, and the OUT line delivers a −10 dB signal capable of driving a 10 k-ohm load impedance. The CHANNEL INSERT input may be used to insert an effect device on a specific channel.

TRS Wiring Block Diagram



❸ PHANTOM switch

The internal phantom power supply can be switched ON and OFF in 4-input-channel sections. When the PHANTOM switch is ON, 48 volts DC is applied across pins 2 and 3 of the corresponding XLR type connectors. The phantom supply is disconnected if a plug is inserted into the HI Z TRS phone jack. Always be sure to turn the PHANTOM supply OFF when not in use.

NOTE: The PHANTOM power supply will not have any effect on balanced dynamic microphones or line sources when ON. If unbalanced sources or transformers with earthed center taps are used, however, hum or even damage to the connected equipment could occur.

❹ GROUP INSERT IN/OUT connectors

These tip-ring-sleeve connectors provide an unbalanced insert patch point between the corresponding group mixing buss and the group cue, ON/OFF and master fader. The IN line accepts a 600 ohm, −10 dB signal, and the OUT line delivers a −10 dB signal capable of driving a 10 k-ohm load impedance.
The GROUP INSERT input is a convenient way of patching in a device such as a compressor/limiter for use on an entire group of instruments.

❺ SUB IN (GROUP, FB, ECHO) connectors

These inputs are intended mainly for connection to a second MC-series mixer in order to increase the number of available input channels. These are all unbalanced inputs with a matching level/impedance of +4 dB/600 ohms.
The outputs of the second console or submixer would be connected to the appropriate SUB IN connectors, thus increasing the number of input channels and allowing the master controls of the main console to control both units (with the submixer master controls at nominal settings).

❻ ECHO RETURN connectors
These connectors accept the output signal from external echo, delay or reverb devices fed by the ECHO SEND connectors. These are unbalanced inputs with an input level/impedance of +4 dB/600 ohms.

❼ ECHO SEND connectors
The signal from these connectors is sent to external echo, delay, or reverb devices. These are unbalanced outputs with an output level/impedance of +4 dB/600 ohms.

❽ GROUP OUT connectors
These connectors deliver the main group output signals to the power amplifiers which will drive the main house speakers in a sound reinforcement system, or a tape deck for recording applications. These are electronically balanced outputs with a rated level/impedance of +4 dB/600 ohms.

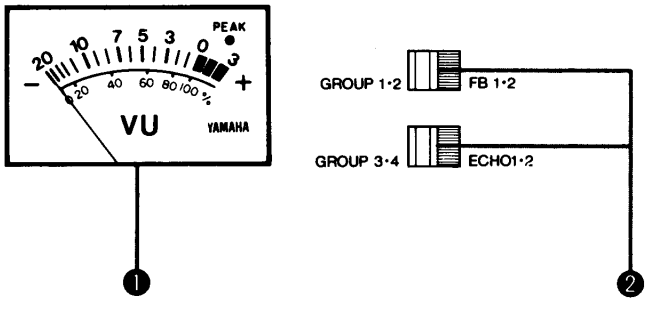
❾ FB OUT connectors
The output from these connectors will mainly be used to drive the power amplifiers which will feed the stage monitor speakers in a sound reinforcement system. In a recording system, both FB OUTs could be used to drive the "control room" monitor system, or only one FB OUT could be used for the control room monitors, and one used to drive a studio monitor or cue system. For theater sound applications, the FB OUTs could be used to drive a "fill" speaker system. These are electronically balanced outputs with a rated level/impedance of +4 dB/600 ohms.

❿ STEREO OUT connectors
The stereo outputs can be used to feed the power amplifiers which will drive the main house speakers in a sound reinforcement system, or a stereo tape deck for recording. These are balanced outputs with a rated output level/impedance of +4 dB/600 ohms.

⓫ POWER switch
Turn this switch ON to apply AC power to the mixer. The VU meters light to indicate power ON.

⓬ AC POWER CORD
This 3-wire cord is for connection to any 120 V AC, 60 Hz grounded outlet. (General model: 110-120 V, 220-240 V, 50/60 Hz).

VU METERS



❶ VU Meters
These are VU-ballistic level meters with built-in peak indicator LEDs. The VU meters can be used to monitor the GROUP 1—4, FB 1 and 2, ECHO 1 and 2, and STEREO L and R output levels. A VU meter reading of 0 dB corresponds to rated output. The PEAK LEDs light at 8 dB above 0 VU.

VU METER READING	−20 VU	−10 VU	−5 VU	0 VU	+3 VU
+4 dB Outputs	−16 dB (123 mV)	−6 dB (388 mV)	−1 dB (691 mV)	+4 dB (1.23 V)	+7 dB (1.74 V)
−10 dB Outputs	−30 dB (24.5 mV)	−20 dB (77.5 mV)	−15 dB (138 mV)	−10 dB (245 mV)	−7 dB (346 mV)

❷ Meter Function Switches (MC1204, MC1604 only)
These switches determine the function of the GROUP/FB and GROUP/ECHO VU meters. The GROUP/FB meters can be switched to read either GROUP 1 and 2 or FB 1 and 2 levels, while the GROUP/ECHO meters can be switched to read either GROUP 3 and 4 or ECHO 1 and 2 levels.

INSTALLATION

AC Power Connection (for models with 3-conductor power cable)
Mixers provided with a 3-wire power cable should be AC grounded for safety and optimum shielding against noise. If a 3-wire AC outlet is not available, or there is any chance the AC outlet may not be grounded, a separate ground wire must be connected from the mixer chassis to an earth ground. Cold water pipes generally provide good grounds unless they are insulated by a length of PVC (plastic) pipe or a water meter. Avoid hot water pipes and gas pipes. When a convenient, confirmed ground is not available, use a length of copper pipe driven into moist, salted earth to a depth of at least 1.5 meters (5 feet). Alternately, use a chemical type grounding rod.

Hook-Up Cables and Hum Avoidance
The mixer's primary inputs and outputs feature electronically balanced circuits and connectors. When these connectors are used with the appropriate 2-conductor shielded cables (e.g. standard microphone cables), these circuits provide optimum protection against hum and noise pickup. The XLR type connectors are wired with pin 2 as "audio high" and pin 3 as "audio low" in accordance with DIN and JIS standards. In the balanced TRS connectors, the tip is audio high and the ring is audio low. Pin 1 in the XLR type connectors, and the sleeve in the TRS connectors are ground. Some professional audio equipment and microphones are wired with pins 2 and 3 (XLR) reversed. Generally, this will cause no problem other than a polarity reversal. However, if such a piece of equipment uses a balanced-type connector for an unbalanced input, or an adaptor is used to match an unbalanced connector to a balanced input, the high side of the audio circuit could be grounded. In this case, reverse the audio high and audio low wiring at one end of the connecting cable, or use a suitable polarity-reversal adaptor. Regardless of connector polarity, if hum is encountered try cutting the shield connection at one end of the cable.
All unbalanced phone jacks are intended for use with standard tip-sleeve 1/4" phone plugs and single-conductor shielded cable. Do not attempt to reduce hum by cutting the shield connection on these cables. Rather, restrict unbalanced cables to about 10 feet (3 meters), and try to set up the system so that either (a) the equipment involved is all connected to the same AC circuit, or (b) the third-wire AC mains ground is used on only one piece of equipment, typically the mixer. Breaking the ground path can create a SHOCK HAZARD.
When routing cables, especially unbalanced cables, avoid strong sources of electro-magnetic interference or radio frequency interference generated by electric motors, fluorescent lights, dimmer panels, etc. To avoid crosstalk-induced feedback, never bundle microphone input cables with mixer output cables: these cables should cross at right angles where practical.

Grounding
Careful grounding procedures are essential for proper operation, not only of the mixer, but of the entire audio system. Many grounding techniques exist, and a number of books have been written on the subject. The following are good sources of grounding information:

THE AUDIO CYCLOPEDIA by Howard M. Tremaine (Pub. Howard W. Sams)
SOUND SYSTEM ENGINEERING by Don and Carolyn Davis (Pub. Howard W. Sams)
GROUNDING AND SHIELDING IN INSTRUMENTATION by Ralph Morrison (Pub. John Wiley & Sons)

"Ground loops" are often caused by multiple paths from the equipment grounds to the AC mains ground (or earth ground). Ground loops are a major cause of hum and noise in an audio system. In severe cases, ground loops can even cause the equipment involved to break into oscillation. This can cause distortion and even damage to amplifiers and speakers. One way to avoid ground loops is to make sure that there is only one path to the AC ground for the entire audio system. A popular method is to cut the shield ground of balanced cables at the input end of the cable. Another technique is to ground all shields at one piece of equipment, typically the console, and cut the shields at the other ends of the cables. (This is NOT possible with unbalanced cables).

Check Mains Voltages
Connect the mixer to the AC mains only after confirming that the line voltage and frequency are correct. A simple check with a voltmeter can save your equipment —and the show. It is also a good idea to check for proper polarity at the AC outlet. The power switch on the mixer should be OFF before connecting the the mixer to the mains. As a further precaution, disconnect the mixer from the mains while audio cables are being installed.

OPERATING TIPS

Matching Input Channel Sensitivity with the Source
The pad switch and continuously variable gain control provided on the mixer's input channels permit setting the input sensitivity of each channel anywhere between −60 dB and 0 dB. With the pad switch set at 0 dB (pad out) the gain control adjusts sensitivity between −60 and −20 dB, while with the pad switch set at −20 dB (pad in) the gain control adjusts sensitivity between −40 and 0 dB. This makes it possible to ideally match the mixer's input sensitivity with a broad range of input sources.
In general, an input sensitivity setting of about −50 dB is commonly used with low output dynamic microphones, −40 dB with medium output condenser microphones, −20 dB with electric instruments (preamplified) and low level (creative audio or hi-fi) line sources, and 0 dB with high level line sources (such as some professional equipment line outputs).
Set the input level switch to correspond to the type of device that is plugged into the corresponding Channel Input jack. Here is one suggested procedure:

1. Connect all input sources to their respective channels. Plug in and wear your headphones to hear the program mix. DO NOT CONNECT any power amplifiers or speakers yet.
2. Set up the mixer so that the signal from each input channel feeds the STEREO mixing buss, and set all channel faders at infinity (minimum). Raise the STEREO L master fader to about "6" on the scale.
3. Start with the lowest input sensitivity (pad in, gain at −20). Bring the channel fader up to "6" on the scale If necessary, gradually increase sensitivity using the gain control until the input is clearly audible. If sensitivity is still too low, return the gain control to the −20 dB setting and set the pad switch to 0 dB, then gradually increase the gain control setting once again. The STEREO L program VU meters should peak around "0 VU". If the meter consistently shoots past "0 VU", or if the signal sounds distorted in your headphones, the input sensitivity is set too high; decrease the input sensitivity until the levels are correct.
   The input peak LED may also be used as a visual aid in adjusting the gain control. If the peak LED is on continuously the gain control is set too high—reduce the gain control level. Normally, the peak LED will light occasionally on louder musical passages (peaks or transients).
4. Repeat the procedure for each input channel, until all channels are set for proper input sensitivity. Turn the Mixer Power Off, and connect your outputs. Turn the mixer power ON again. You are now ready to adjust the remaining controls on each channel.
   NOTE: The console and all signal processing devices connected to it MUST be turned on before the power amplifiers are turned on, or the turn-on transient could easily cause irreparable damage to your loudspeakers. This procedure should be reversed when the system is turned off.

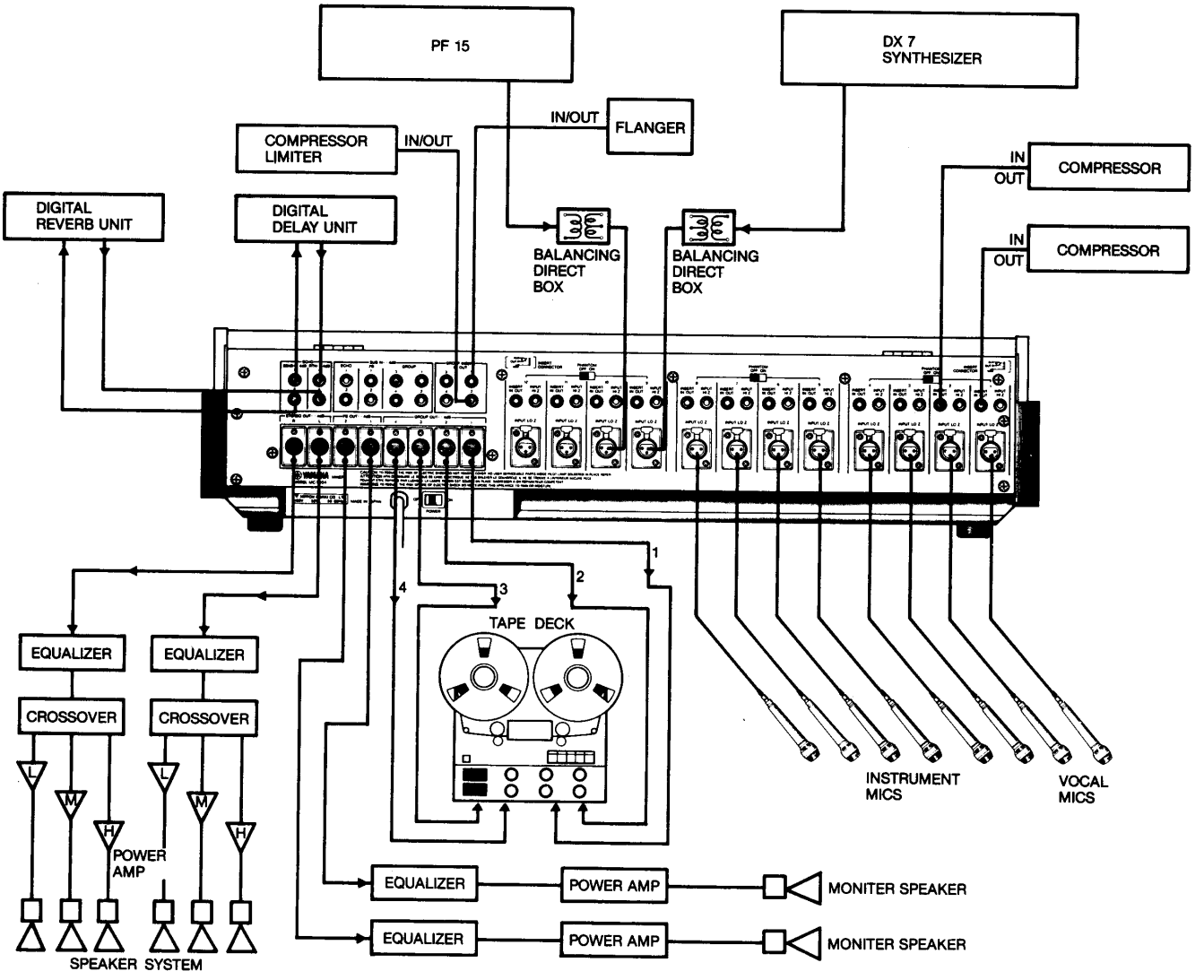
Using the Channel EQ Controls
The Low-EQ control adjusts the channel's frequency response through the low-frequency range. The control has no effect ("flat response") when centered. Low EQ boost (clockwise rotation) gives more "fullness" to vocals, guitars, etc., and more of a mellow character to horns and woodwinds. Low-EQ cut (counterclockwise rotation) removes boominess, avoids some of the excessive energy from drums, and reduces 50 or 60 cycle hum, and stage rumble.
The Mid-EQ control permits peaking boost or cut equalization at the frequency determined by the setting of the MID FREQ control (0.35—5 kHz). Boosting the midrange (especially at around 2.5 or 3 kHz) can greatly increase the overall "presence" of the sound. Vocalists will seem to come forward and stand out from the instrumental backing. Cutting the mid-frequencies has the opposite effect—vocals seem to recede and the overall sound becomes "thinner". It is often effective to cut the midrange response of the instrumental backing just slightly, and boost the vocal channel midrange a little in order to make the vocals stand out with exceptional clarity.
The High-EQ control adjusts the channel's frequency response through the high-frequency range. High-EQ boost (clockwise rotation) gives more "edge" or "bite" to string instruments and more "attack" to percussive instruments. High-EQ cut (counterclockwise rotation) removes some of the breath sound from wind instruments, reduces guitar-string fingering sounds, lessens hiss, and avoids sibilant (lispy) vocal sounds. High-EQ cut also helps to make a performer sound farther away, particularly if reverb is added. The equalizer can be helpful in avoiding feedback, too.
Care should be taken not to "over-equalize" any given channel. Using drums as an example, moving the microphone as little as one inch (2.5 cm) can alter its tonality significantly—without having to adjust the channel equalizer. Also, the type of microphone used can greatly affect the tone achieved. Experiment with different microphones and microphone placement for the best results in your application. A little care in mic placement can save a lot of time trying to "fix it in the mix".

APPLICATION EXAMPLES

The MC1204 will be used in the following application examples. Actual application may require more input channels, in which case the MC1604 or MC2404 are recommended.

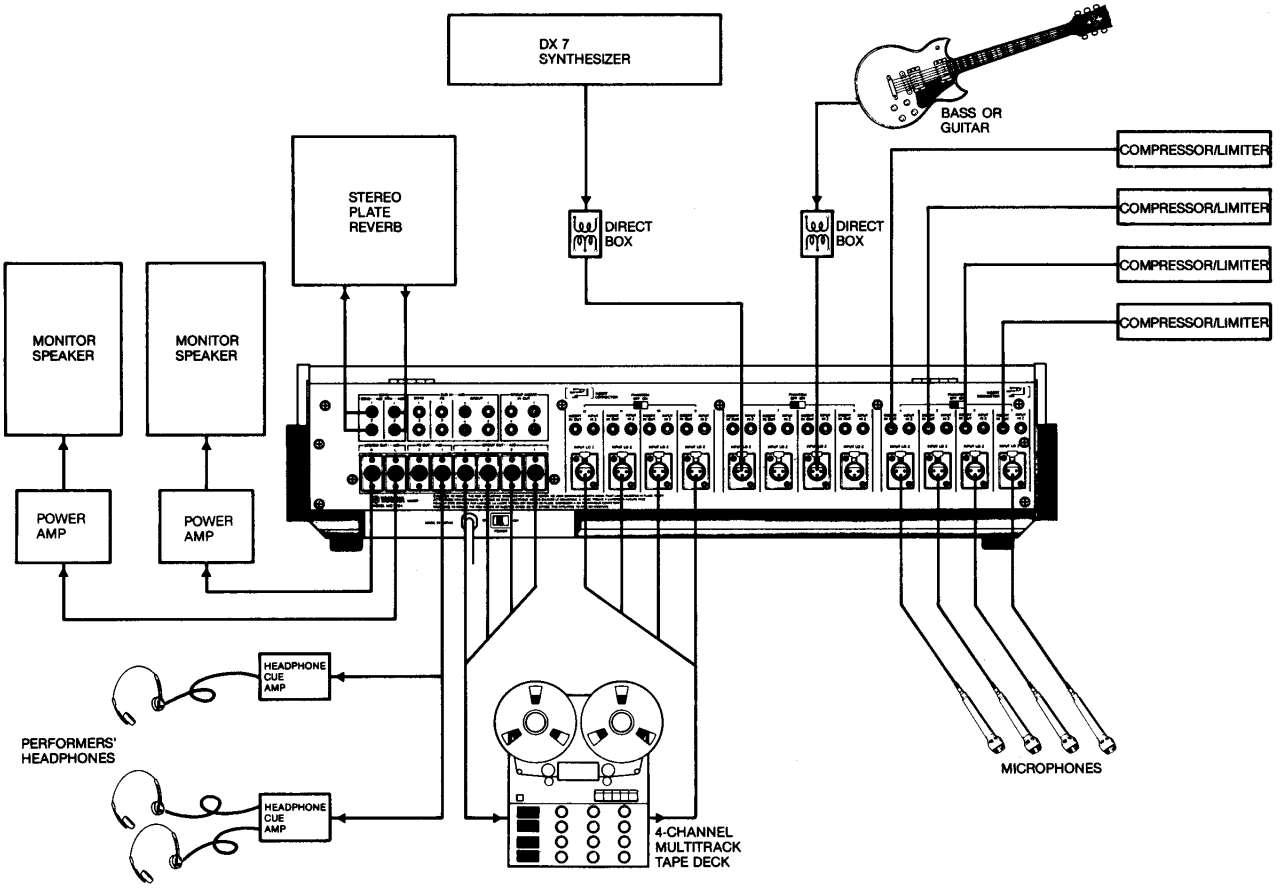
A Sound Reinforcement System

Balanced microphones are plugged directly into the channel XLR input connectors, while unbalanced electronic instrument outputs (synthesizers, etc.) are connected via a balancing transformer type direct box. Compressors are connected at the insert jacks of the vocal mic channels, and a "flanger" effect is connected at the insert jack on one of the instrument channels. The ECHO 1 SEND and RETURN connectors are hooked up to a digital delay unit, while a reverb unit is connected to the ECHO 2 SEND and RETURN. The STEREO OUT connectors feed the main left and right house speaker power amplifiers via graphic equalizers. The FB OUT connectors feed the stage monitor amp/speakers, also via graphic equalizers for feedback control. The GROUP OUT connectors feed a 4-track tape recorder so that the performance can be recorded and remixed later to stereo. The GROUP INSERT IN/OUT jacks may be used to connect a compressor/limiter or other effect which will then process all the channels assigned to that group.



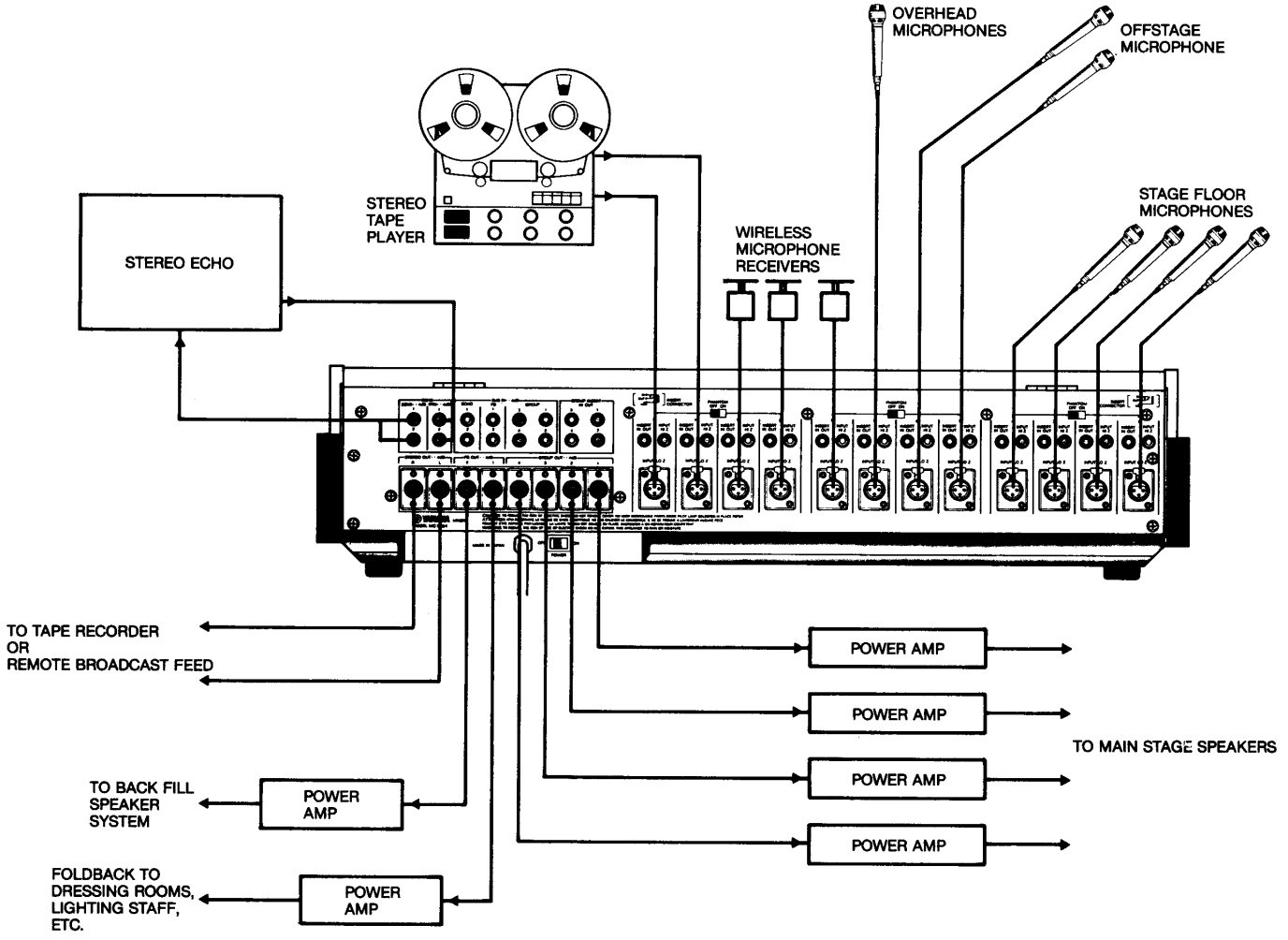
A Recording System

As in the sound reinforcement system shown previously, balanced microphones are plugged directly into the channel XLR input connectors, while unbalanced electronic instrument outputs (synthesizers, etc.) are connected via a balancing transformer type direct box. In this case, however, the last four input channels are connected to the outputs from a 4-channel multitrack tape recorder. Compressors are connected at the insert jacks of the vocal mic channels. The ECHO 1 and 2 SEND and RETURN connectors are connected to a high-quality stereo plate reverb unit. The FB 1 and 2 OUT connectors feed separate headphone amplifiers providing two different headphone cue mixes for the performers. The STEREO OUT connectors feed the control room monitor system, and the GROUP OUT connectors feed the 4-channel multitrack recorder.



A Theatrical Production System

In this application the inputs consist of stage floor and overhead mics, wireless mic receivers and a stereo tape player. The ECHO 1 and 2 SEND and RETURN connectors are hooked up to a stereo echo system for special effects. The GROUP OUT connectors feed the power amplifiers which drive the main stage speakers, and one of the FB OUTs are used to drive a "back fill" amp/speaker system. The remaining FB OUT drives a foldback system for the dressing rooms and lighting staff. The STEREO OUTs are available to drive a tape deck to record the performance, or a remote broadcast feed.



SPECIFICATIONS

Frequency Response	20 Hz ~ 20 kHz 0 $^{+1}_{-3}$ dB (@ 600 Ω, +4 dB)
Total Harmonic Distortion	Less than 0.1% (20 Hz ~ 20 kHz @ 600 Ω, +4 dB)
Noise Level*	
Equivalent Input Noise	−128 dB (Rs-150 Ω)
Residual Noise	−95 dB
GROUP OUT	−86 dB GROUP Level Volume→nominal**
	All CH Assign Switches→off
	−64 dB GROUP Level Volume→nominal**
	One Input Fader→nominal**
STEREO OUT	−76 dB GROUP Fader→maximum
	All GROUP Faders→minimum
	−64 dB GROUP Fader→maximum
	One Input Fader and One GROUP Fader→nominal**
FB OUT	−67 dB GROUP Level control→nominal**
	All Input FB Volumes→minimum
	−62 dB GROUP Level control→nominal**
	One Input FB Volume→nominal**
ECHO SEND	−67 dB GROUP Level control→nominal**
	All Input ECHO Volumes→minimum
	−62 dB GROUP Level control→nominal**
	One Input ECHO Volume→nominal**

Maximum Voltage Gain	
INPUT→GROUP OUT	76 dB
INPUT→STEREO OUT	76 dB
INPUT→FB OUT	76 dB
INPUT→ECHO SEND	82 dB
ECHO RTN→GROUP OUT	12 dB
TALKBACK INPUT→GROUP OUT	66 dB
GROUP SUB IN→GROUP OUT	6 dB
FB SUB IN→FB OUT	6 dB
ECHO SUB IN→ECHO SEND	6 dB

Equalizer Characteristics	
LOW-EQ	± 15 dB (100 Hz Shelving)
MID-EQ	± 15 dB (350 Hz ~ 5 kHz Peaking)
HIGH-EQ	± 15 dB (10 kHz Shelving)

Crosstalk (1 kHz)	
MIXBUS to MIXBUS	Less than −60 dB
INPUT CH to INPUT CH	Less than −60 dB

VU Meter	
MC1204, MC1604	GROUP 1/FB 1, GROUP 2/FB 2, GROUP 3/ECHO 1, GROUP 4/ECHO 2, STEREO L.R
MC2404	GROUP 1 ~ 4, FB 1.2, ECHO 1.2, STEREO L.R

Peak Indicator	
INPUT (Red)	Lights 3 dB below clipping
VU (Red)	Lights 8 dB above 0 VU

Power Requirements	U.S. & Canadian models: 120 V 60 Hz General Model: 110-120/220-240 V 50/60 Hz
Power Consumption	U.S. & Canadian modesl: 70 W General model: 80 W

Dimensions (W × H × D)	
MC1204	762.5 × 185.5 × 654.3 mm (30" × 7-5/16" × 25-3/4")
MC1604	919 × 185.5 × 654.3 mm (36-3/16 × 7-5/16" × 25-3/4")
MC2404	1,232 × 185.5 × 654.3 mm (48-1/2" × 7-5/16" × 25-3/4")

Weight	
MC1204	22 kg (48 lbs. 6 oz.)
MC1604	26 kg (57 lbs. 3 oz.)
MC2404	34 kg (74 lbs. 13 oz.)

*Measured with a −6 dB/octave LPF @ 12.7 kHz.

**nominal = 6 dB below max.

Specifications subject to change without notice.

0 dB = 0.775 V

■INPUTS

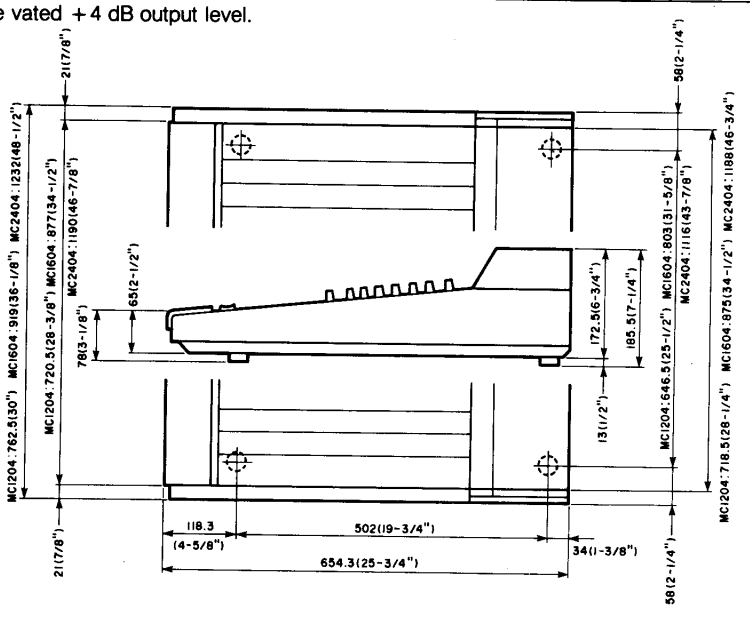
Input terminals	PAD	GAIN	Input impedance	Source impedance	Sensitivity	Input level: Rated level	Input level: Max. non-clipping level	Connector
CH INPUT (MC1204 1~12 / MC1604 1~16 / MC2404 1~24)	OFF(0 dB)	−60dB	LO Z 4 kΩ	50~250Ω Microphones or 600Ω Lines	−72dB (0.195mV)	−60dB (0.775mV)	−30dB (24.5mV)	XLR type (Balanced)
		−20dB			−32dB (19.5mV)	−20dB (77.5mV)	+10dB (2.45V)	
	ON(20dB)		HI Z 10kΩ		−12 dB (195mV)	0 dB (775mV)	+20dB (7.75V)	Phone Jack(TRS) (Balanced)
CH INSERT IN (MC1204 1~12 / MC1604 1~16 / MC2404 1~24)			10kΩ	600Ω Lines	−22dB (61.6mV)	−10dB (245mV)	+20dB (7.75V)	Phone Jack(TRS) (Unbalanced)
GROUP INSERT IN (1~4)			5 kΩ	600Ω Lines	−16dB (123mV)	−10dB (245mV)	+20dB (7.75V)	Phone Jack(TRS) (Unbalanced)
ECHO RETURN (1, 2)			10kΩ	600Ω Lines	− 8 dB (309mV)	+ 4 dB (1.23V)	+20dB (7.75V)	Phone Jack (Unbalanced)
SUB IN (GROUP 1~4 / FB1, 2, ECHO1, 2)			10kΩ	600Ω Lines	− 2 dB (616mV)	+ 4 dB (1.23V)	+20dB (7.75V)	Phone Jack (Unbalanced)
TALKBACK INPUT			10kΩ	50~250Ω Microphones	−62dB (0.616mV)	−50dB (2.45mV)	−10dB (245mV)	XLB-3-31 (Unbalanced)

■OUTPUTS

Output terminals	Output impedance	Load impedance	Output level: Rated level	Output level: Max. non-clipping level	Connector
GROUP OUT (1~4)	150Ω	600Ω Lines	+ 4 dB(1.23V)	+22dB(9.76V)	XLR type (Balanced)
STEREO OUT (L, R)	150Ω	600Ω Lines	+ 4 dB(1.23V)	+22dB(9.76V)	XLR type (Balanced)
FB OUT (1, 2)	150Ω	600Ω Lines	+ 4 dB(1.23V)	+22dB(9.76V)	XLR type (Balanced)
ECHO SEND (1, 2)	150Ω	600Ω Lines	+ 4 dB(1.23V)	+18dB(6.16V)	Phone Jack (Unbalanced)
CH INSERT OUT (MC1204 1~12 / MC1604 1~16 / MC2404 1~24)	100Ω	10kΩ Lines	−10dB(245mV)	+20dB(7.75V)	Phone Jack(TRS) (Unbalanced)
GROUP INSERT OUT (1~4)	600Ω	10kΩ Lines	−10dB(245mV)	+20dB(7.75V)	Phone Jack(TRS) (Unbalanced)
PHONES	100Ω	8Ω Phones	1 mW	20mW	Stereo Phone Jack (Unbalanced)
		40Ω Phones	3 mW	130mW	

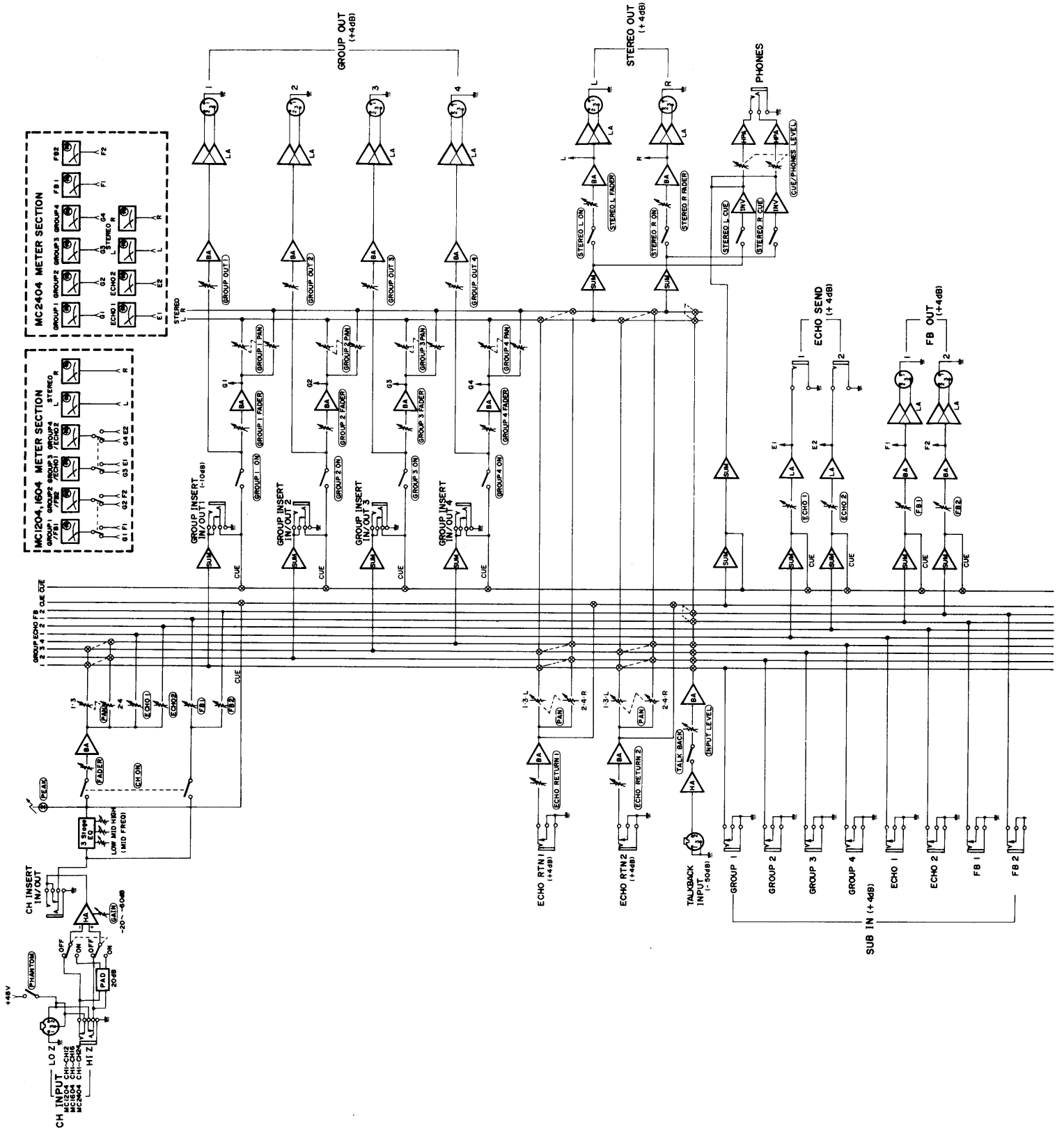
* Input level required to produce vated +4 dB output level.
• 0 dB···0.775Vr.m.s.

Dimension

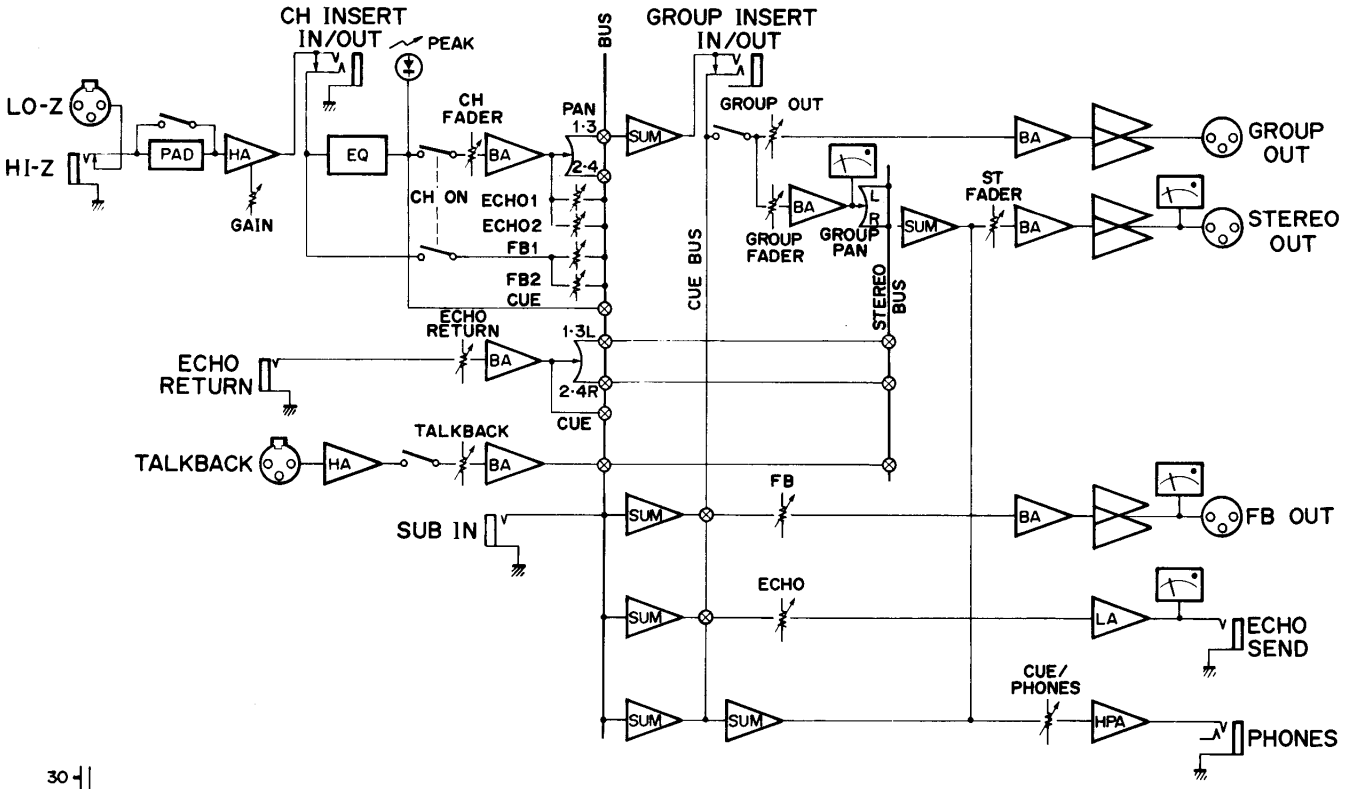


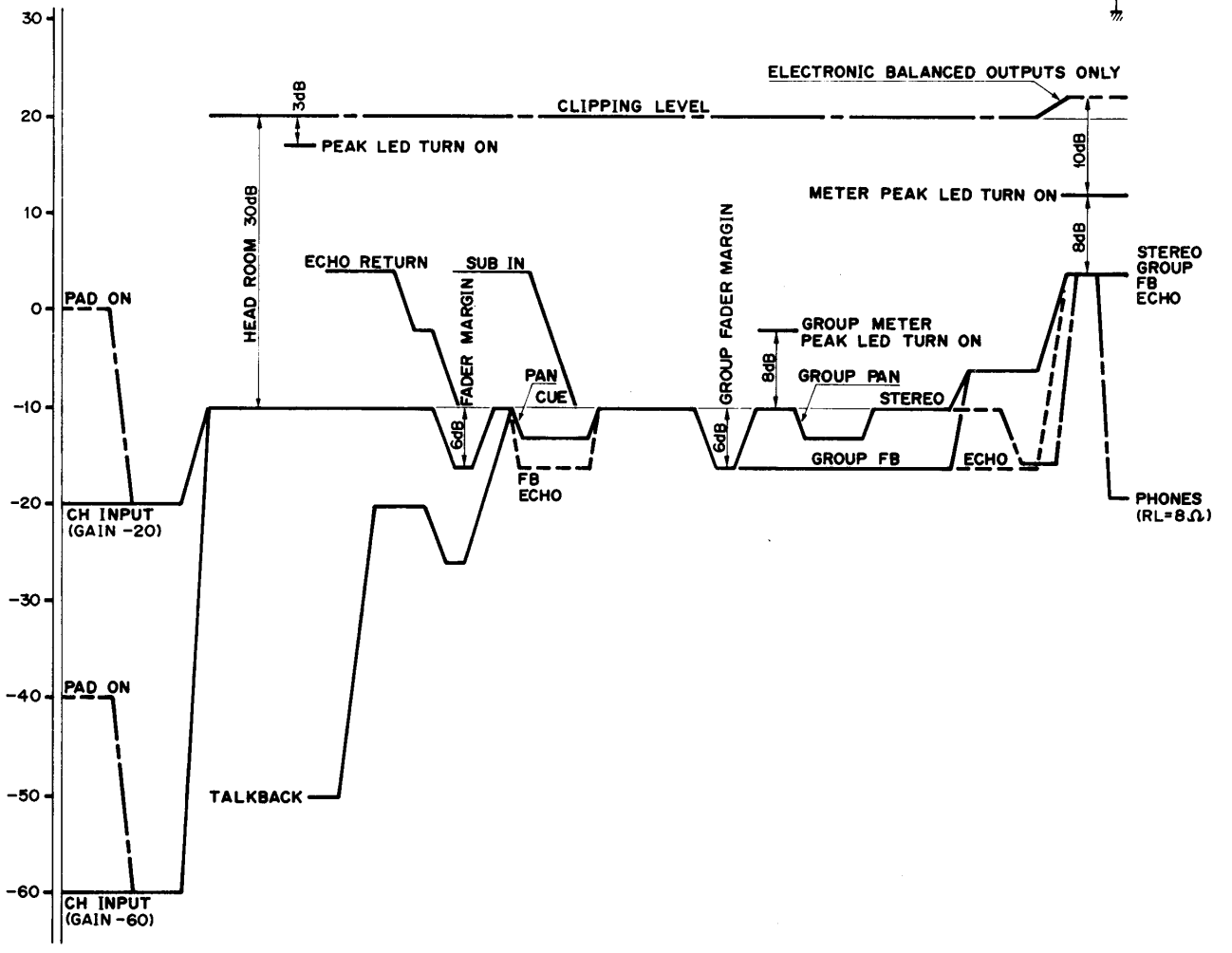
Unit : mm (Inch)

BLOCK DIAGRAM



LEVEL DIAGRAM





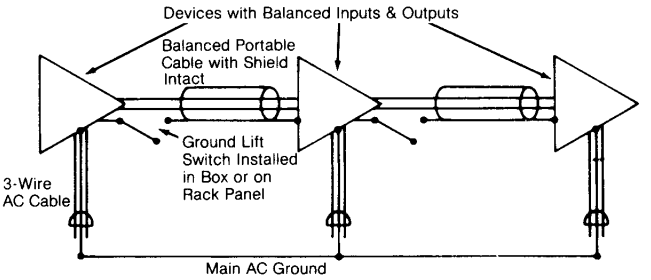
Grounding on the Road

Many of the above procedures are difficult to use on the road. For example, the telescoping shield concept is nearly impossible to use on a portable cable. Similarly, it is a difficult and time consuming process to search for a water pipe ground every time the system is moved from one performance to another. Yet portable systems can be extremely complex, and may have major grounding problems.

The telescoping shield concept can be extended to portable systems by installing a "ground lift switch" on the output of each device, and on the inputs of devices after the mixer. Since microphones are not grounded except through the mixer, there is no need for an input ground lift switch on most mixers. The diagram below shows a typical ground lift switch installation. By judicious use of these switches, each piece of equipment can be AC grounded for safety without causing ground loops.

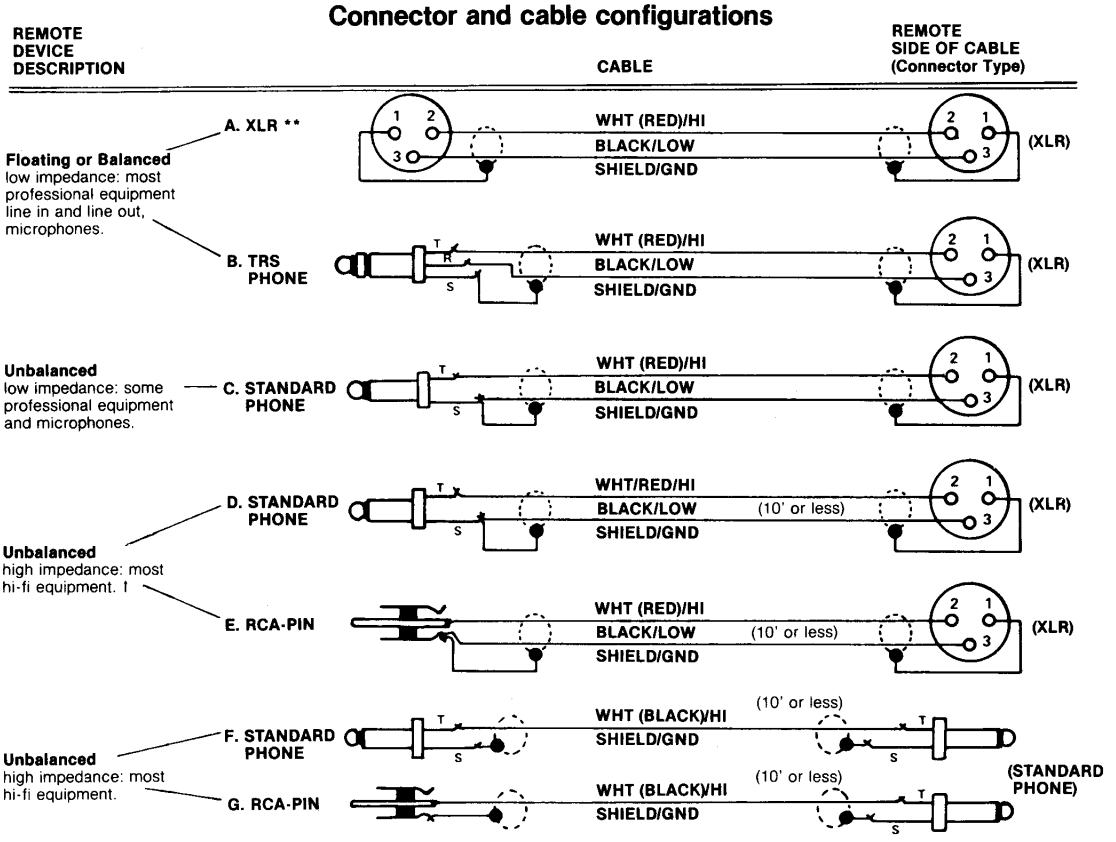
Because of leakage currents from equipment in the audio system, and in the house, some noise currents can ride on the AC ground wire and are able to enter the audio system. This problem is usually most noticeable with sensitive equipment such as the mixer. Lifting the AC ground at the mixer can often solve this problem. However, lifting the AC ground on the mixer also lifts the AC ground on the microphone chassis, causing a safety hazard. Try connecting the mixer and any other sensitive equipment to other AC circuits. The only other apparent solution to this problem is to eliminate the noise on the AC ground, which is not an easy task. Since it has its own ground, a portable AC power distribution system connected to the house service entrance may be the most effective way to avoid all AC noises. Such a system can be designed and constructed by a qualified electrician; check local electrical codes before each use.

Use of Ground Lift Switch



Perhaps the best answer to portable system grounding problems, RFI, EMI, and AC noises, is to develop a versatile grounding scheme. Ground lift switches and adapters, and a portable AC power distribution system allow different grounding techniques to be tried easily and quickly when a problem occurs.

Connector and cable configurations



Connector and cable configurations recommended for use with the MC series. These cables are based on the use of auxiliary equipment that is isolated from the AC power mains.

** This wiring configuration (Pin 2 high, Pin 3 low) matches the MC series wiring and DIN standards. Much of the equipment in the U.S.A. is wired with Pin 3 high and Pin 2 low (shield is still Pin 1). In most cases involving the MC series, this makes no difference. However, interconnections between other manufacturer's equipment may require that Pins 2 and 3 be reversed; consult the manufacturer's literature.

* Use this cable at remote equipment, and install matching transformer with high-Z side toward remote equipment. Then use cable A to join the low-Z side of the transformer to the console. Use of the transformer at the high-Z location allows long cable runs to the low-Z connection.

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