

OPERATING MANUAL

MIXING CONSOLE

CMX-1264/1664/2464



interM

Introduction

Thank you for purchasing a CMX-4 Bus SERIES Mixing Console. The CMX-4 Bus Series provides an excellent balance of operability, functionally and ease of use. In order to take full advantage of the CMX-4 Bus Series capabilities and enjoy years of trouble-free use, please read this manual carefully.

Unpacking and Installation

Although it is neither complicated to install nor difficult to operate your set, a few minutes of your time is required to read this manual for a properly wired installation and becoming familiar with its many features and how to use them.

Please take a great care in unpacking your set and do not discard the carton and other packing materials. They may be needed when moving your set and are required if it ever becomes necessary to return your set for service. Never place the unit near radiators, in front of heating vents, to direct sun light, in excessive humid or dusty location to avoid early damage and for your years of quality entertainment. Connect your complementary components as illustrated in the following page.

Features

- **12/16/24 CHANNELS MONO INPUTS**
CMX-1264/1664/2464 Mixing console provides 12,16,24 channels of mono input that can be mixed down to a Stereo, 4 Groups, 6 Aux sends.
- **XLR type connectors are provided for MIC jacks and 1/4" TRS connectors are provided for the LINE jacks.**
- **4 STEREO CHANNELS**
These mixing consoles provide 4 channels of stereo channel input that can be mixed down to a Stereo, 4 Groups, 4 Aux sends (Aux 1, 2 Pre-/Aux 3, 4-Post)
- **6 AUX SENDS, 4 STEREO AUX RETURNS**
6 AUX SEND systems and 4 STEREO AUX RETURN systems are provided. Even when two 1-in/2-out effect devices are connected, two more AUX SEND systems are still available for use.
- **3 BAND EQ WITH SWEEPABLE MID-RANGE BAND**
All mono input channels include 3 band EQ with sweepable mid-range frequency.
- **4 GROUP MIXING BUSES**
4 Group Mixing Buses, each with its own Master Fader, ON/OFF Switch to Stereo Buses.
- **INPUT CH INSERT I/O JACK and DIRECT OUT JACK**
INPUT CH INSERT I/O jack and DIRECT OUT jack are provided on each channel, allowing you to connect effect devices independently for each channel.
- **SUB IN JACKS and INSERT I/O**
1/4" TRS SUB IN jacks and INSERT I/O are provided on GROUP OUTPUT 1 ~ 4 and STEREO OUTPUT L/R, allowing you to connect sub-mixer or other sound device independently for each output.
- **The PFL (Pre Fader Listen) function allows you to monitor any input channel before the channel fader.**

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- The AFL (After Fader Listen) function allows you to monitor the output signal from GROUP OUTPUT and AUX SEND through monitor output and headphones at any time.
- The TAPE IN and RED OUT jacks provide convenient connection for tape deck playback and recording.
- Phantom power is provided for easy connection of condenser microphones requiring an external power supply.
- AC 12V LAMP CONNECTOR
A BNC type LAMP connector is provided on the right hand side of the mixing console panel, allowing you to operate the mixer conveniently under dark condition.

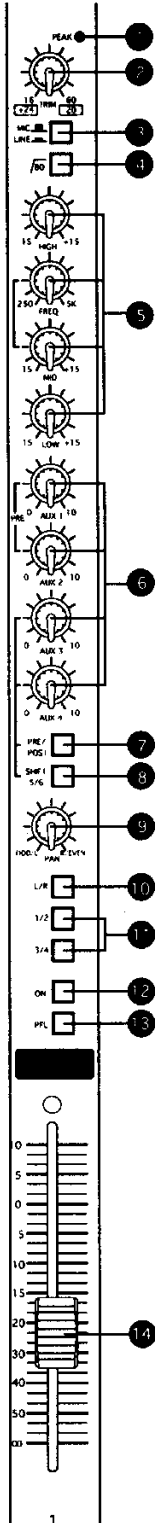
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Precautions

- 1. AVOID EXCESSIVE HEAT, HUMIDITY, DUST AND VIBRATION**
Keep the unit away from locations where it is likely to be exposed to high temperatures or humidity—such as near radiators, stoves, etc. Also avoid locations which are subject to excessive dust accumulation or vibration which could cause mechanical damage.
- 2. VENTILATION**
The unit has ventilation slots on the side and bottom panels. Do not block these vents.
- 3. AVOID PHYSICAL SHOCKS**
Strong physical shocks to the unit can cause damage. Handle it with care.
- 4. DO NOT OPEN THE CASE OR ATTEMPT REPAIRS OR MODIFICATIONS YOURSELF**
This product contains no user-serviceable parts. Refer all maintenance to qualified INTER-M service personnel. Opening the case and/or tampering with the internal circuitry voids the warranty.
- 5. ALWAYS POWER OFF BEFORE MAKING CONNECTIONS**
Always turn the power OFF before connecting or disconnecting cables. This is important to prevent damage to the unit itself as well as other connected equipment.
- 6. HANDLE CABLES CAREFULLY**
Always plug and unplug cables—including the AC power cord—by gripping the connector, not the cord.
- 7. CLEAN WITH A SOFT DRY CLOTH**
Never use solvents such as benzine or thinner to clean the unit. Wipe clean with a soft, dry cloth.

1. Mono Input Section



1. PEAK INDICATOR

This indicator detects peak level after the EQ. It will light red at 3dB before clipping to warn that clipping level has nearly been reached.

2. TRIM CONTROL

According to the level of the input signal, use this knob to adjust the input to an appropriate level. The best balance of S/N and dynamic range will be achieved if you adjust the TRIM control so that the ① peak indicator lights occasionally.

3. INPUT SELECTOR

This switch selects the input connector for the channel. When MIC (MIC) is selected, the input signal will be taken MIC connector (Balanced XLR type). When LINE (LINE) is selected, the input signal will be taken LINE connector (Balanced phone jack).

4. HIGH-PASS FILTER SWITCH

This switch turns on/off a high-pass filter that cuts the signal below 80Hz at 12dB/octave. By using the high-pass filter, you can reduce or get rid of minimizing room rumble, mic popping noise, traffic noise, wind noise and other unwanted low-frequency noises.

5. EQ CONTROLS (HIGH, MID FREQ, MID, LOW)

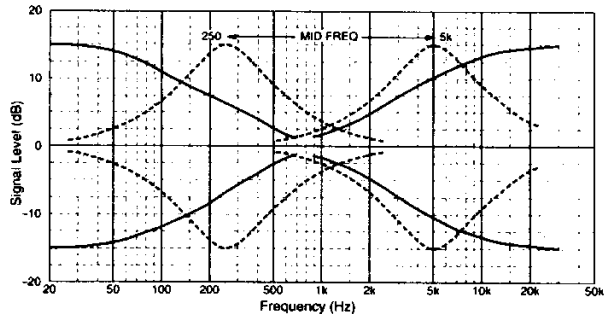
This is a 3-band equalizer with center frequencies, range, and type as shown below.

HIGH: 12KHz, ± 15 dB shelving type

MID: 250Hz ~ 5KHz (variable) ± 15 dB peaking type

LOW: 80Hz, ± 15 dB shelving type

The frequency response is flat when the knob is in the center position.



6. AUX 1~6 CONTROLS

This knobs control the level of the signals sent to AUX buses.

- The AUX1 and AUX2 controls are pre-fader, and the signal levels sent to the AUX1 and 2 buses will be unaffected by the channel fader setting.
- The AUX3/AUX5 and AUX4/AUX6 controls will be affected by the POST/PRE SELECT SWITCH and SHIFT 5/6 SIGNAL SELECT SWITCH setting.

7. AUX 3~6 POST/PRE SELECT SWITCH

1) Post (■, RELEASED SWITCH):

Selects post-fader signal from the point in the channel after the ON SWITCH. Because signal feeding this position will be subject to any adjustments to that channel's inputs fader, this position is usually preferred for effects or echo mixes.

2) Pre (■, DEPRESSED SWITCH)

Pre-Fader signal is taken from the stage preceding the fader or EQ, so it is not affected by the channel's fader or EQ settings.

8. AUX 3~6 SIGNAL SELECT SWITCH

This SHIFT 5/6 SWITCH connects the two level controls (as a pair) to either AUX 3 & 4 sends or to AUX 5 & 6 sends.

When this switch turns on, the AUX signal will be shifted from AUX 3/AUX 4 to AUX 5/AUX 6. In this case, you can adjust AUX 5/AUX 6 signal with AUX 3/AUX 4 controls.

9. PAN CONTROL

This control adjusts the stereo position of the signal between the stereo L/R buses, and also between odd and even pairs of Buses 1 through 4.

This control allows you to place the channel's input signal within the stereo image by assigning more or less of the signal to the left or right submaster controls.

Turning the PAN control to the left (odd/L) of center moves the apparent source toward the left channel and Group 1, 3 buses, turning it to the right moves the source toward the right channel and Group 2, 4 buses.

Centering the control makes the apparent source centered between the channels. If all inputs are panned center, the result is mono. Proper use of the PAN control can sometimes help to control acoustic feedback in a sound reinforcement system by "panning" a mic away to the loudspeaker on the opposite side of the stage.

10. L/R (STEREO) SWITCH

When this switch is on, the signal of each channel will be sent to the stereo L/R buses. When this switch is off, the output signal to STEREO L/R buses will be muted.

11. GROUP SELECTOR (GROUP BUS ASSIGN SWITCH)

When these switches are on, the signal of each channel will be sent to the 4 Group buses. These switches is arranged in two columns. Odd numbered, Left (Group 1, 3) and even numbered, Right (Group 2, 4) indicating which "side" of the PAN pot they will be assigned to.

12. CHANNEL ON/OFF SWITCH

When this switch is on, the signal of each channel will be sent to the STEREO L/R buses, the Group 1~4 buses and AUX 1~6 buses.

When this switch is off, the output signal to each bus will be muted completely. This switch should be turned off for unused channels.

If a channel is off, you can also use the PFL switch to monitor the signal.

- 1) Located after the input fader in the signal chain, the channel ON switch simultaneously disrupts the flow of signal to the PAN control and the POST position of the AUX 3~6 signal select switch.
- 2) The channel ON switch does not affect the CHANNEL INSERT OUT, DIRECT OUT, and the PRE-position of the AUX 1~6 signal.

13. CHANNEL PFL SWITCH

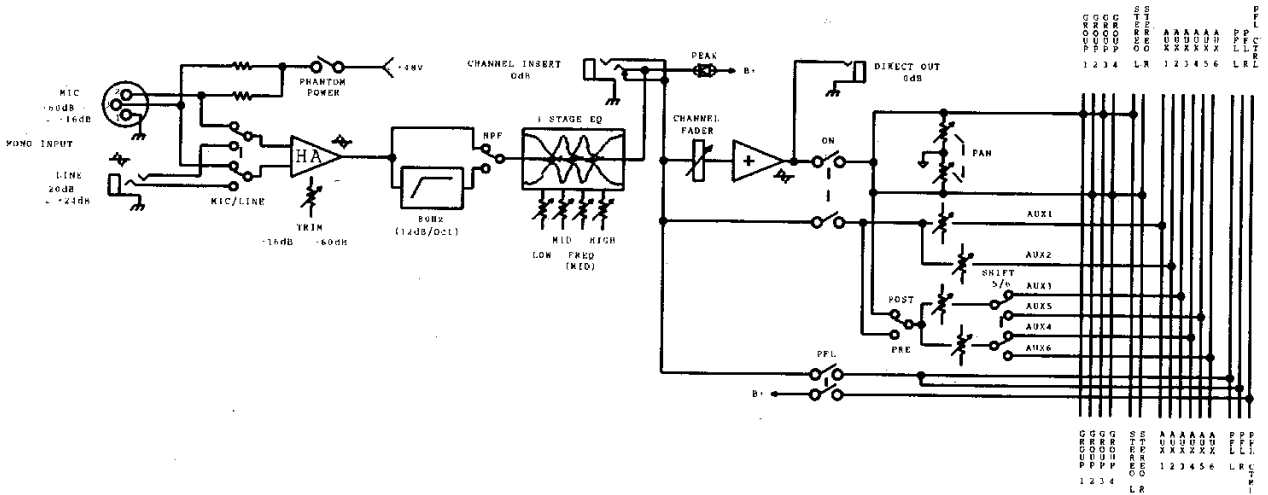
PFL (Pre-Fader Listen) allows the operator to monitor any pre-fader signal individually or in combinations, through the headphone output and monitor output. In the normal position (all PFL switches off) the headphone and monitor output monitor the output of the STEREO "Left" and "Right".

The audio level at the HEADPHONE and monitor jacks are controlled by the PHONE GAIN control and MONITOR OUTPUT GAIN fader.

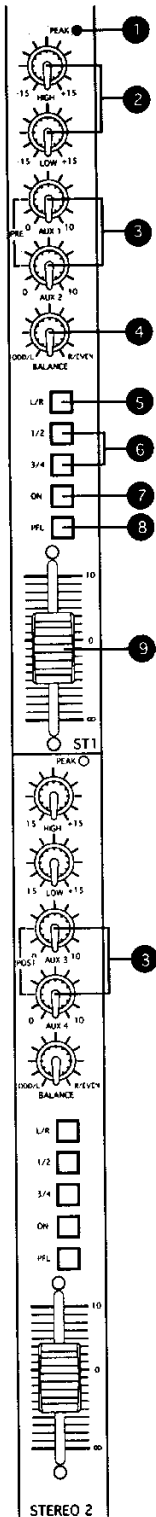
14. CHANNEL FADER

These linear faders control the output level of the channel as it is fed to the STEREO GROUPS.

The control should be normally set at the "0" mark with all controls set to their designated normal operating points, the circuits in the board are optimized for minimum noise and distortion. In other words, the signal levels are high enough to keep noise from creeping in and low enough to ensure plenty of headroom and freedom from clipping distortion. If the fader must run wide-open to get enough level, turn up the GAIN control or increase the setting of the left and right submaster controls. Conversely, if the fader must be pulled way back to get the right level, the GAIN control or stereo submasters should be adjusted. Adjust the GAIN control if the PEAK LED lights, otherwise adjust the stereo submasters. For optimum performance, the channel FADERS should be run close to the "0" mark.



2. Stereo Input Section



1. PEAK INDICATOR

This indicator detects peak level after the EQ. It will light red at 3dB before clipping to warn that clipping level has nearly been reached.

2. EQ CONTROLS (HIGH, LOW)

This is a 2-Band frequency fixed equalizer with center frequencies, range, and type as shown below.

HIGH: 12KHz ± 15 dB shelving type

LOW: 80Hz ± 15 dB shelving type

3. AUX 1 & 2 CONTROLS

This knobs controls the level of the signals sent to Aux buses.

1) The AUX 1 & 2 controls on the STEREO 1 & 3 PANEL are pre-fader, and the signal levels sent to the AUX 1 & 2 buses will be unaffected by the channel fader setting.

2) The AUX 3 & 4 controls on the STEREO 2 & 4 PANEL are post-fader, and the signal levels sent to the AUX 3 & 4 buses will be affected by the channel fader setting.

4. BALANCE CONTROL

This control adjusts the balance or the L/R position of the stereo input signal. Turning the BALANCE control to the left of center moves the apparent source toward the left channel and Group 1, 3 buses, turning it to the right moves the source toward the right channel and Group 2, 4 buses.

5. L/R (STEREO) SWITCH

When this switch is on, the signal of each channel will be sent to the STEREO L/R buses. When this switch is off, the output signal to STEREO L/R buses will be muted.

6. GROUP SELECTOR (GROUP BUS ASSIGN SWITCH)

When these switches are on, the signal of each channel will be sent to the 4 GROUP buses.

These switches is arranged in two columns.

Odd numbered, Left (Group 1, 3) and even numbered, Right (Group 2, 4) indicating which "side" of the BALANCE control they will be assigned to.

7. CHANNEL ON/OFF SWITCH

When this switch is on, the signal of each channel will be sent to the STEREO L/R buses, the Group 1 ~ 4 buses and AUX 1 ~ 4 buses.

If a channel is off, you can also use the PFL switch to monitor the signal.

The channel ON switch does not affect the pre-position of the AUX 1 & 2 signal on the STEREO 1, 3 PANEL, but, it affect the post-position of the AUX 3 & 4 signal on the STEREO 2, 4 PANEL.

8. CHANNEL PFL SWITCH

This switch allows you to monitor the pre-fader channel input signal through headphones. It is convenient to use PFL when you wish to check the sound of the input signal, or when troubleshooting a specific channel.



9. CHANNEL FADER

This fader controls the output level of the input channel signal, determining the volume balance between channels. The channel fader should be lowered for unused channels.

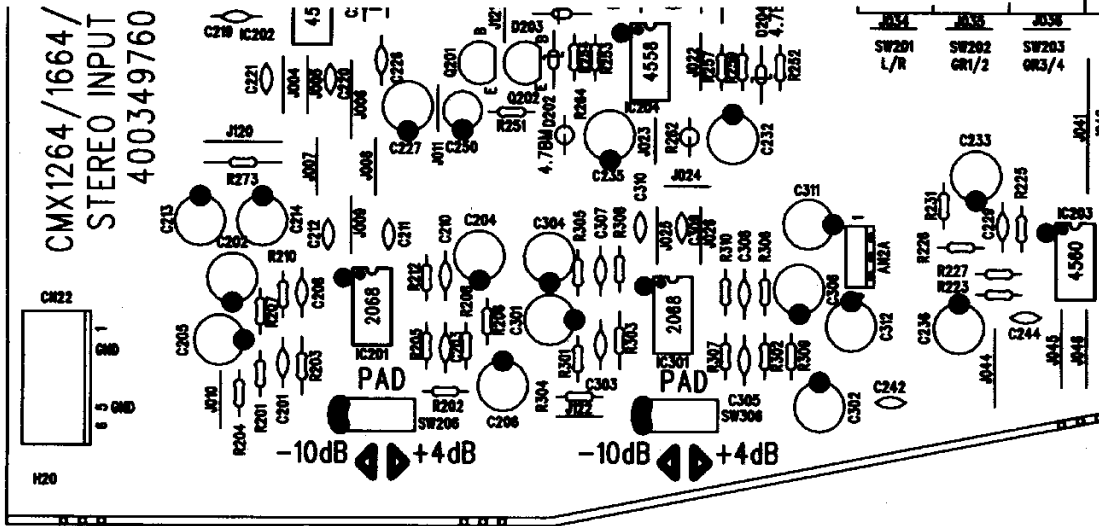
10. PAD SWITCH (STEREO INPUT SENSITIVITY SELECT)

If you select STEREO INPUT SENSITIVITY to either -10dB or +4dB.

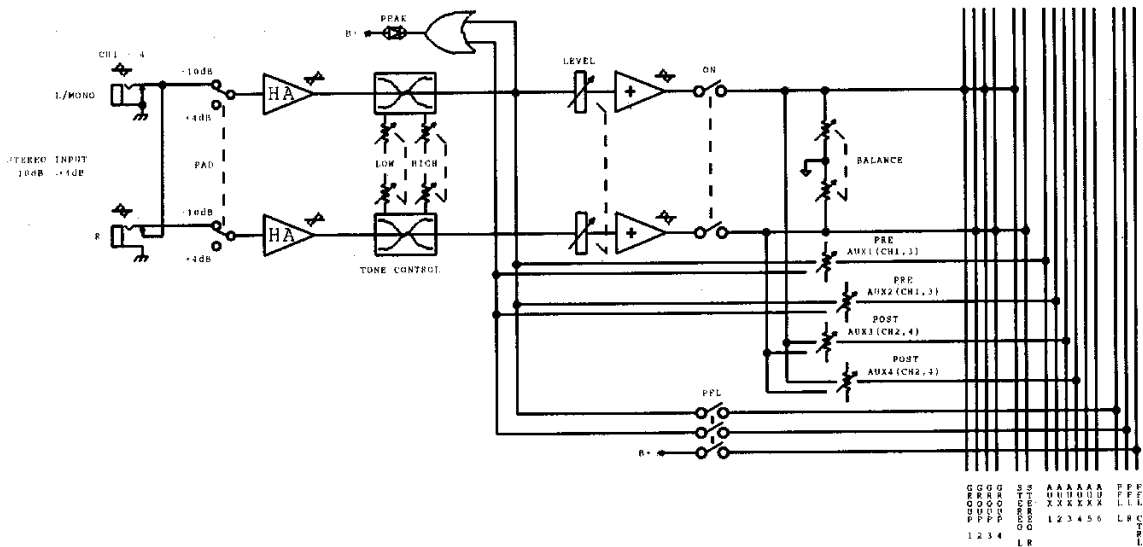
Look at the STEREO INPUT PC Board. The PAD SWITCH is set -10dB position initially on STEREO INPUT PC Board.

This switch selects the appropriate gain for the input signal level.

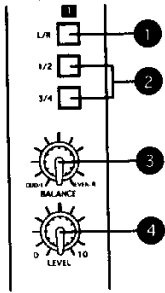
The sensitivity is -10dB when the switch is slid toward left hand side, and +4dB when it is slid toward right hand side.



The select position of the PAD switch is at the bottom side of CMX-4 Bus mixer.



3. Aux Return Section



1. L/R (STEREO) SWITCH

When this switch is on, the signal of each AUX RETURN will be sent to the STEREO L/R buses. When this switch is off, the output signal to STEREO L/R buses will be muted.

2. GROUP SELECTOR (GROUP BUS ASSIGN SWITCH)

When these switches are on, the signal of each AUX RETURN will be sent to the 4 Group buses.

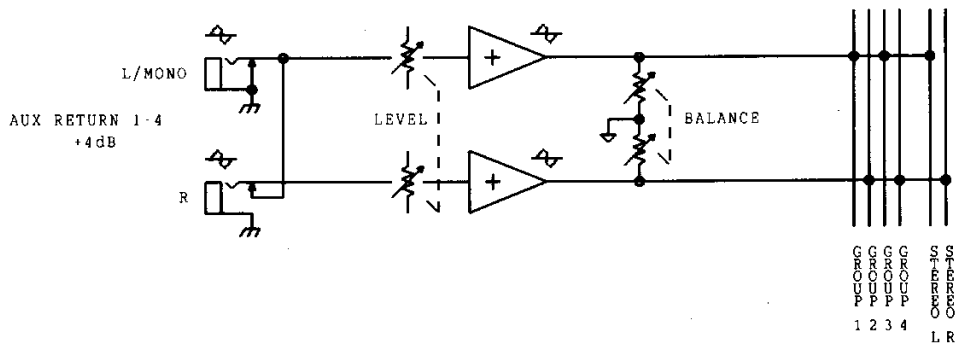
3. BALANCE CONTROL

This control direct the signal coming from the AUX RETURN level control into the left and/or right channels.

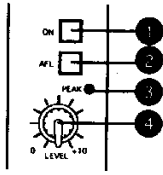
Turning the BALANCE control to the left of center moves the apparent source toward the left channel, turning it to the right moves the source toward the right channel. Centering the control makes the apparent source centered between the channels.

4. LEVEL CONTROL

This control adjusts the input levels from the effect units etc. Connected to the L/MONO, R jacks of AUX RETURN 1~4 are sent to the STEREO L/R buses, and 4 Group buses. If a plug is inserted into only the L/MONO jack, the same signal will be sent to L/R BALANCE control.



4. Aux Send Section



1. ON/OFF SWITCH

When this switch is on, the signal of each channel will be sent to the Aux Send Connectors.

2. AFL SWITCH

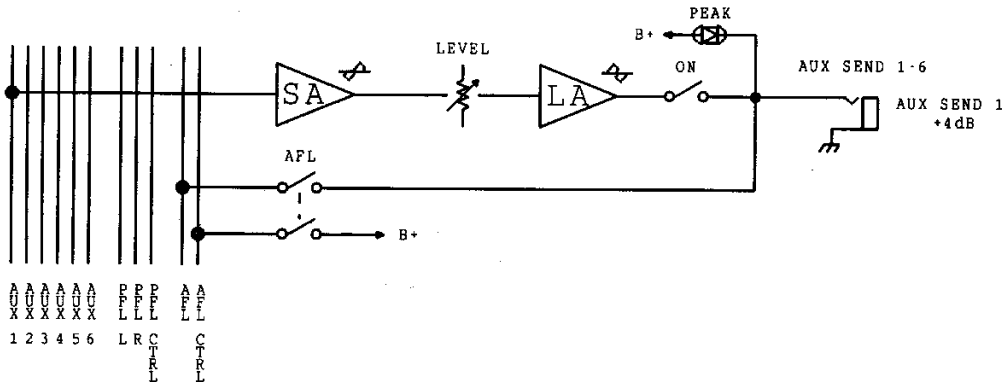
When you wish to monitor the output signals being sent to AUX SEND 1~6, press the appropriate switch. The level of the AUX SEND whose which is on will be indicated by monitor meter.

3. PEAK INDICATOR

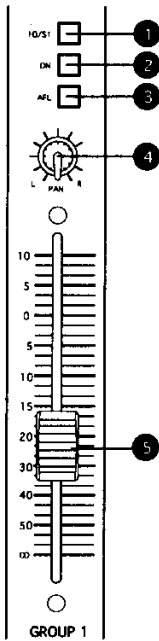
This indicator detects the level of the signal at a point before the AUX SEND connector. It will light red at 3dB before clipping to warn that clipping level has nearly been reached.

4. LEVEL CONTROL

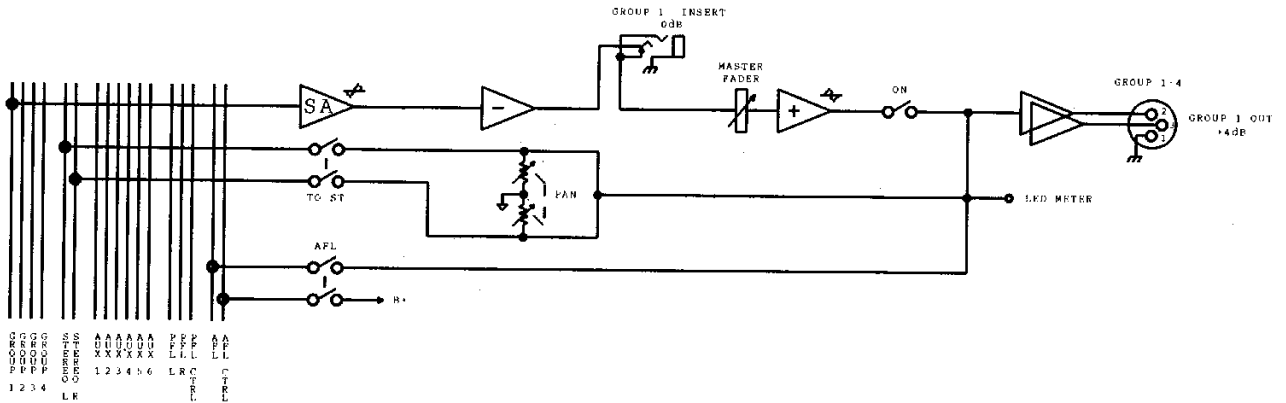
AUX SEND master controls adjust the overall level of the mix on the respective AUX buses to the delivered to the AUX SEND connectors.



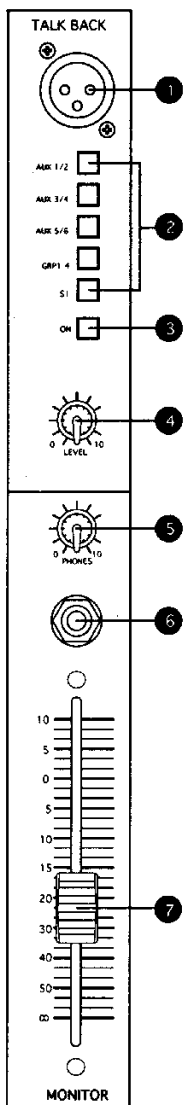
5. Group Section



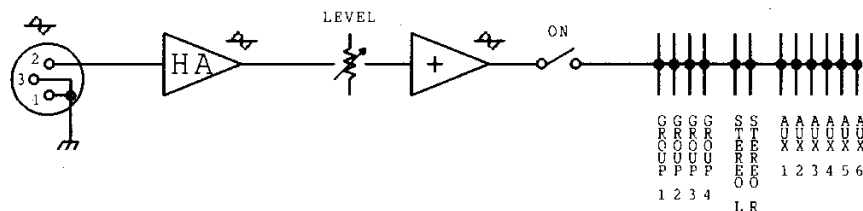
1. **TO ST SWITCH**
When this switch is on, the signal of each GROUP will be sent to the STEREO L/R buses.
2. **ON/OFF SWITCH**
When this switch is on, the signal of each Group will be sent to the Group connectors.
3. **AFL SWITCH**
When you wish to monitor the output signals being sent to GROUP 1~4, press the appropriate switch.
4. **PAN CONTROL**
This control adjusts the panning of the GROUP signal sent to the STEREO L/R buses.
5. **LEVEL CONTROL**
This fader adjust the final level of the combined signals from all channels, and send them to the GROUP output jacks. The GROUP 1~4 level meters allow you to monitor the GROUP outputs.



7. Talkback/Monitor Section



1. **TALKBACK INPUT CONNECTOR**
This input connector designed with unbalanced circuit is used for announcement of operator. The nominal input level is -50dB.
2. **ASSIGN SWITCHES (AUX 1/2, AUX 3/4, AUX 5/6, GRP 1-4, ST)**
These switches select the output destination (mix bus) of the talkback microphone.
3. **ON/OFF SWITCH**
When this switch is on, the signal of the TALKBACK will be sent to the AUX 1-6, GROUP 1-4, and the STEREO L/R buses.
4. **LEVEL CONTROL**
This control adjust the signal level of the TALKBACK input.



5. **PHONES GAIN**
The PHONE GAIN control sets the level at the HEADPHONE jack. Any signal selected by depressing a PFL switch will be monitored through the headphone jack. With no PFL switch depressed, the headphone circuit monitors the left and right outputs in stereo.
6. **HEADPHONES OUTPUT JACK (1/4" TRS STEREO JACK)**
These jacks (tip = left, ring = right, sleeve = GND) may be connected to external power amplifiers for headphone distribution, or you can plug your phones directly into the jack. Use only stereo phones!



(1/4" phone 3 section connector)

CAUTION! MONO (2 WIRE) HEADPHONES WILL CAUSE EVENTUAL CIRCUIT FAILURE.

If your "phones" have this connector, *DON'T* use them.



(1/4" phone 2 section connector)

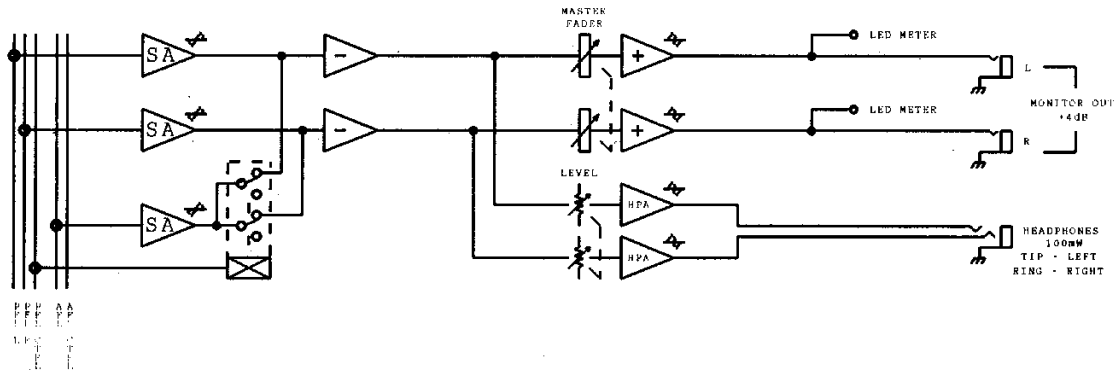
To be safe, the headset connector must have three sections. We realize that in any patchable system, accidents can happen. We do build protection circuits in to assure that a momentary mis-connection will not cause instant failure, but just because the circuit seems to work OK when you try it for a moment or two, don't assume that it will work forever. Sooner or later, it *WILL* fail (2 to 3 minutes). The reason? When the "sleeve" of the 2 wire phone jack is inserted, it will connect *both* outputs together "head to head" and this is not a usable signal combining method.

7. MONITOR FADER

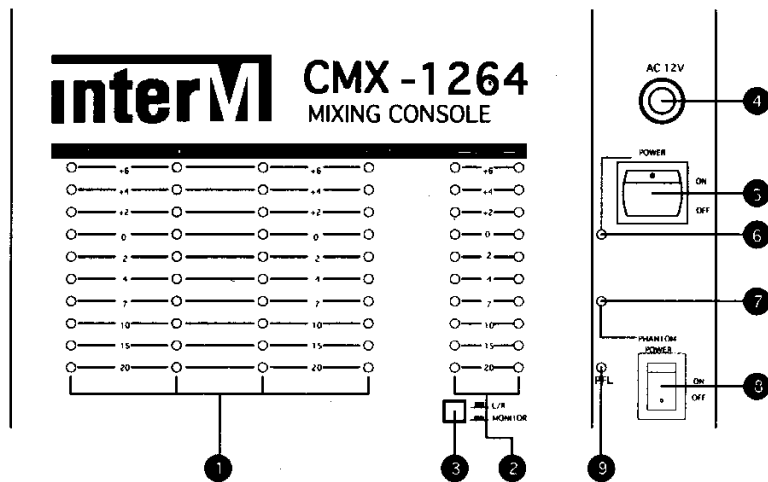
This fader adjust the final level of the combined signals from all channels, and send them to the MONITOR OUTPUT L/R jacks.

Any signal selected by depressing a PFL switch will be monitored through the MONITOR L/R jacks.

With no PFL switch depressed, the monitor circuit monitors the left and right outputs in stereo.



8. LED Section



1. GROUP OUTPUT LEVEL INDICATOR (4 GROUPS)

A vertical row of ten light-emitting diodes shows the continuous output level of Group output.

For optimum signal-to-noise ratio, try to adjust all levels so that program material is usually at or around 0 VU, with occasional but not steady excursions to the +3, or over the level segments.

2. MAIN OUTPUT INDICATOR

A vertical row of ten light-emitting diodes shows the continuous output level of STEREO L/R or MONITOR L/R. The meters are dual function LED meters that indicate signal level as selected by the METER SELECT switch. This type of display is free from overshoot problems of mechanical meters, and is highly visible under poor lighting conditions. Each indicator is calibrated in volume units, such that 0dB corresponds to an output of 1.23 volts, which is +4dBu a standard in the industry.

3. METER SELECT SWITCH

This switch selects whether STEREO L/R or MONITOR L/R will be monitored.

1) STEREO L, R (■, RELEASED SWITCH)

LED meter displays the output levels of the STEREO output jacks.

2) MONITOR L, R (■, DEPRESSED SWITCH)

LED meter displays the output levels of the MONITOR output jacks.

4. LAMP CONNECTOR

A BNC type socket is provided on the right hand side of the mixing console panel to accommodate a flexible swan-neck lamp, and allow operation of the board under dark conditions. The 18-inch long type lamp is available from many professional sound dealers and attaches without tools.

The voltage at the socket is 12.5V AC at a maximum of 0.1 amperes.

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5. POWER SWITCH

This switch turns the power ON/OFF. When in the "ON" position, the power indicator will light.

6. POWER INDICATOR

This indicator lights when the power switch is turned on.

7. PHANTOM INDICATOR

This indicator lights when the PHANTOM switch is turned on, indicating that phantom power is being supplied.

8. PHANTOM POWER SWITCH

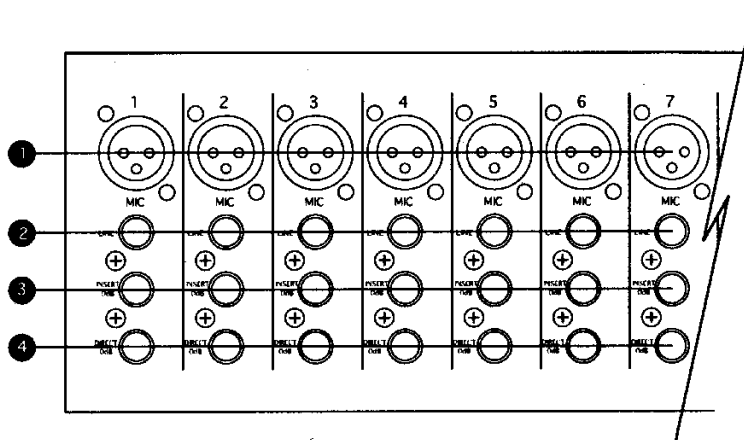
This switch turns the internal phantom power supply on/off. When in the "ON" position, the PHANTOM indicator will light, and 48V DC power will be provided between pin 2 and pin 3 of the XLR-type jack.

If you do not need phantom power, be sure to turn this to the "OFF" position.

9. PFL INDICATOR

This indicator lights when the PFL switch of one or more input channels is turned on.

9. Rear Panel Connectors



1. INPUT SECTION CONNECTORS

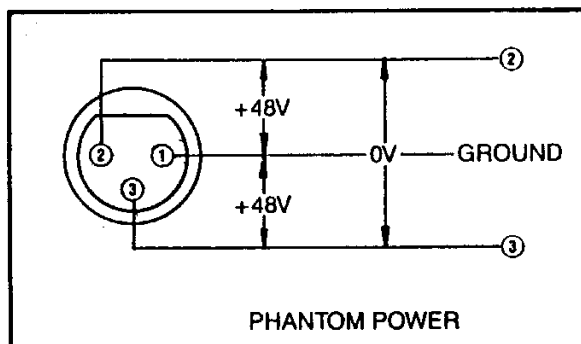
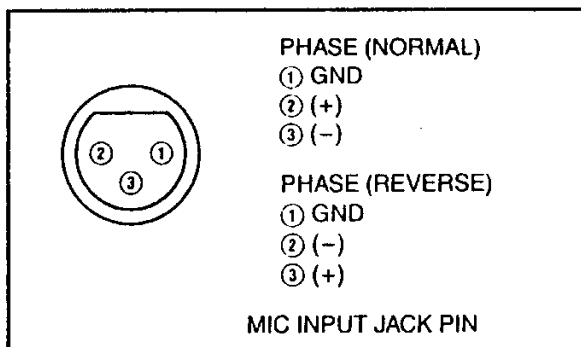
1) BALANCED LOW-Z MIC INPUT CONNECTORS

A 3-pin XLR-type ("Canon") connector is used for balanced low impedance microphone inputs. (1: sleeve, 2: hot, 3: cold)

Microphones of 50-600Ω or 600Ω line level devices can be connected here.

When the PHANTOM switch is turned on, DC +48V will be supplied to pins 2 and 3 of these connectors. The Mic Input is actively balanced; active balancing allows elimination of the input transformer (along with its limitations) while maintaining the RF and hum rejection of a good transformer coupled input.

It is important that, during operation or testing of the mixer, all channel faders remain fully down whenever the mic input is not *properly* terminated with a microphone or equivalent 150-ohm source. An open mic invites the introduction of high noise levels which could produce lower quality sound or an incorrect test measurement.



2) BALANCED LINE INPUT CONNECTORS

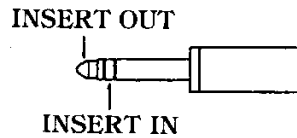
A standard 1/4" phone jack is used for balanced or unbalanced line level signals. Examples of line level signals include most electronic keyboards, synthesizers, turntables (with appropriate preamps), tape decks and the line outputs from other mixers. All input channel controls, including the variable GAIN control, affect the LINE input. Maximum input level before preamp clipping is 12V or +24dB.

3) INPUT CHANNEL INSERT

These are input/output jacks located between the equalizer and the channel fader of the input channel section.

The nominal input level and impedance is 0dB/600Ω, and the nominal output level and impedance is 0dB/10KΩ.

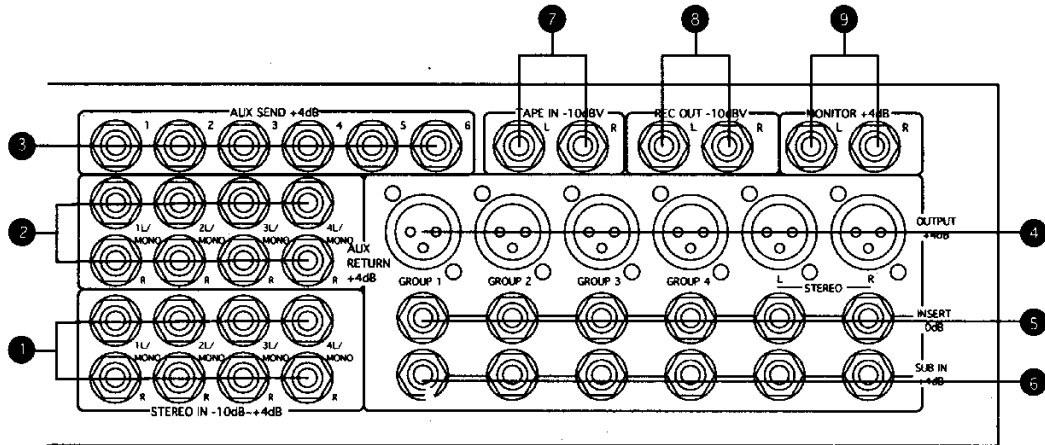
These jacks allow you to insert your own graphic equalizers, compressors, noise filters, or other devices.



4) DIRECT OUT CONNECTORS

These are unbalanced 1/4" phone jacks which output the post-fader signal independently from each input channel.

The channel strip's output signal is always available at the DIRECT OUT connector. Using it does not interrupt the normal signal flow through the channel.



2. OUTPUT SECTION CONNECTORS

1) 4 STEREO INPUT JACKS

These are unbalanced 1/4" phone jacks which input a stereo source with a nominal input and impedance of +4dB or -10dB/600Ω.

If a plug is inserted only in L/MONO, the same signal will be sent to both the L and R buses.

2) 4 AUX RETURN JACKS

These are unbalanced 1/4" phone jacks with a nominal level and impedance of +4dB/10KΩ.

These jacks are usually used to receive the audio returned from an effect unit such as reverb or delay, but they can also be used as supplementary inputs.

If a plug is inserted only in L/MONO, the same signal will be sent to both the L and R buses.

These allow you to return signal from outboard devices, either in stereo pairs or monophonically (many popular effects processors provide a single mono input but have a pair of stereo outputs). In practice, you'll probably want to use the Auxiliary returns to bring in signal from connected effects processors. If the effects processors have stereo outputs, they should be connected to both the left and right Auxiliary return inputs so that their stereo integrity is retained. If they have mono outputs, you can route them to either the left or right inputs and then use the Auxiliary return Balance control to adjust the relative level of each paired signal.

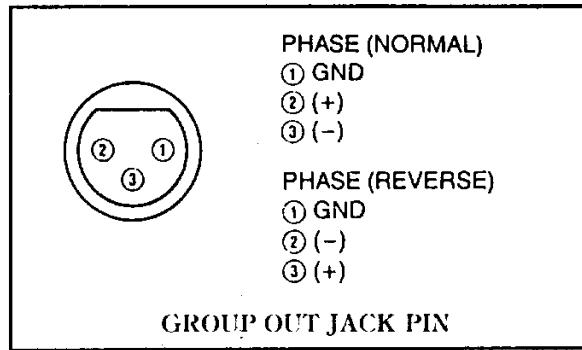
3) 6 AUX SEND JACKS

These are unbalanced 1/4" phone jacks with a nominal output and impedance of +4dB/600Ω.

The AUX SEND output signal is the sum of all of the input channel AUX SENDS.

4) 4 GROUP OUTPUT JACKS AND 2 STEREO OUTPUT JACKS

These connectors deliver the main GROUP output and STEREO 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 +4dB/600Ω.



5) 4 GROUP OUTPUT INSERT AND 2 STEREO OUTPUT INSERT

These 1/4" TRS connectors provide an unbalanced insert patch point before the GROUP MASTER FADER and STEREO MASTER FADER.

The INSERT-IN line accepts a 0dB/600Ω signal and the INSERT-OUT line delivers a 0dB signal capable of driving a 10K-ohm load impedance.

The GROUP and STEREO INSERT inputs are convenient way of patching in a device such as a compressor/limiter for use on an entire group of instruments.

6) 4 GROUP SUB IN AND 2 STEREO SUB IN

These are unbalanced 1/4" phone jacks with a nominal output and impedance of +4dB/600Ω.

These allow you to SUB-IN signal from sub-mixer or other effect processors.

7) TAPE IN JACKS

These are unbalanced 1/4" phone jack with a nominal output and impedance of -10dBV/600Ω.

Your DAT, CD player or cassette deck can be directly connected here for convenient monitoring.

8) REC OUT JACKS

These are unbalanced 1/4" phone jack with a nominal output and impedance of -10dBV/10KΩ.

Your DAT or cassette deck can be connected here to record the audio signal from STEREO MASTER pre-fader.

9) MONITOR OUTPUT JACKS

These are unbalanced 1/4" phone jack with a nominal output and impedance of +4dB/600Ω.

You can monitor the following signals.

- Signal available for monitoring -

1. Post-EQ signal

(When the corresponding mono input channel PFL switch is ON)

2. Pre-Fader STEREO signal

(When the corresponding stereo input channel PFL switch is ON)

3. Post-Fader GROUP master signal

(When the corresponding Group AFL switch is on)

4. Post-Fader AUX SEND signal

(When the corresponding Aux Send AFL switch is on)

5. Post-Fader STEREO master signal

(When the corresponding ALL of the PFL and the AFL switches are off)

General Wiring Procedures

To take full advantage of the excellent signal to noise ratio and low distortion of INTER-M consoles care must be taken to ensure that incorrect installation and wiring does not degrade the performance of the desk. Hum, buzz, instability and Radio Frequency interference can usually be traced to earth loops and inferior earthing systems. In some areas, especially heavily industrial areas, the incoming mains earth will not be adequate and a separate technical earth for all the audio equipment must be supplied. However, check with your local electricity supply company to ensure that safety regulations are not infringed or negated.

The successful, hum free, installation of a system requires forethought, and the establishment of a set of ground rules, which must be consistently adhered to at all stages of installation.

Initial Wiring Considerations

- A. For optimum performance, it is essential for the earthing system to be clean and noise free, as all signals are referenced to this earth. A central point should be decided on for the main earth point system, and all earths should be 'star fed' from this point. It is common electrical practice to 'daisy chain' the earths to all electrical outlets but this method is unsuitable for audio installations. The preferred method is to run an individual earth wire from each outlet, back to the system star point to provide a safety earth screen reference for each piece of equipment.

A separate earth wire should also be run from each equipment rack and area, to the star point. This may or may not be used depending on circumstances, but it is easier to install in the first place, than later when problems arise.

The location of the star point should be convenient, easily accessible place preferably at the chassis of the console, or in the main equipment rack.

- B. Install separate 'clean' and 'dirty' mains outlets, wired individually back to the incoming mains distribution box. Use the 'clean' supply for all audio equipment and the 'dirty' supply for all lighting, vending machines etc. Never mix the two systems.
- C. If necessary, to provide sufficient isolation from mains borne interference, install an isolating transformer. This should be provided with a Faraday Shield which must be connected with earth.
- D. Never locate the incoming mains distribution box near audio equipment, especially tape recorders, which are very sensitive to electro-magnetic fields.
- E. Ensure that all equipment racks are connected to earth, via a separate wire back to the star point.
- F. Equipment which has unbalanced inputs and outputs may need to be isolated from the rack to prevent earth loops.

Audio Wiring

Noise immunity is improved significantly by the use of low impedance sources, such as good quality professional microphones or the outputs from most modern audio equipment. Avoid cheaper high impedance microphones, which may suffer from interference over long cable runs, even with well-made cables.

Having provided all equipment with power and earthing connections, consideration must be given to the method of providing audio interconnection and adequate screening of those interconnections. This must be done in a logical sequence to avoid problems and assist in the localisation of problem equipment.

- A. Connect the control room monitor system to the console outputs and check for any hum, buzz, or RFI. Only when you are satisfied with the quietness of the console and the monitor system should you proceed with the next step.
- B. Connect the multitrack tape recorder, via the noise reduction system, if in use, and again check that the system is clean.
- C. Connect stereo tape records, studio monitors aux sends one at a time, checking and isolating any connection which degrades performance.
- D. Connect all other peripheral devices.
- E. Connect all microphone lines.

By following this sequence much time and future trouble will be saved, and the result will be a quiet, stable system.

Shielding

Audio equipment is supplied with a variety of input and output configurations, which must be taken into consideration when deciding where the screen connections should be made. There are three sources of unwanted signal being impressed on the screen, which are as follows:

- A. Extraneous electrostatic or electromagnetic fields.
- B. Noise and interference on the earth line.
- C. Capacitive coupling between the screen and signal wires.

To minimise the adverse affects of the unwanted coupling to the signal wires, it is important that the screen is connected at one end only, i.e. the screen must not carry any signal current. Any signal on the wires within the screen will be capacitively coupled to the screen. This current will ultimately be returned to the source of the signal, either directly, if the screen is connected at the signal source end, or indirectly via the earthing system, if the signal is connected at the signal destination end. The indirect connection will cause an increase in high frequency cross-talk, and should be avoided wherever possible.

Therefore, in general, always connect the shield only at the signal source end. In high RF areas, the screen can also be connected to earth via a $0.01\mu\text{F}$ capacitor. This will present a short circuit at RF frequencies, thus lowering the effective shield impedance to ground. However, at low audio frequencies the reactance of the capacitor will be sufficiently high not to cause an earth loop problem.

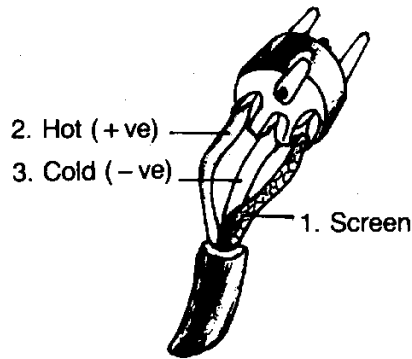
Points to Remember

- In all cases, use good quality twin screened audio cable. Check for instability at the output.
- Always connect both conductors at both ends, and ensure that the screen is only connected at one end.
- Do not disconnect the mains earth from each piece of equipment. This is needed to provide both safety and screen returns to the system star point.
- Equipment which has balanced inputs and outputs may need to be electrically isolated from the equipment rack and/or other equipment, to avoid earth loops.

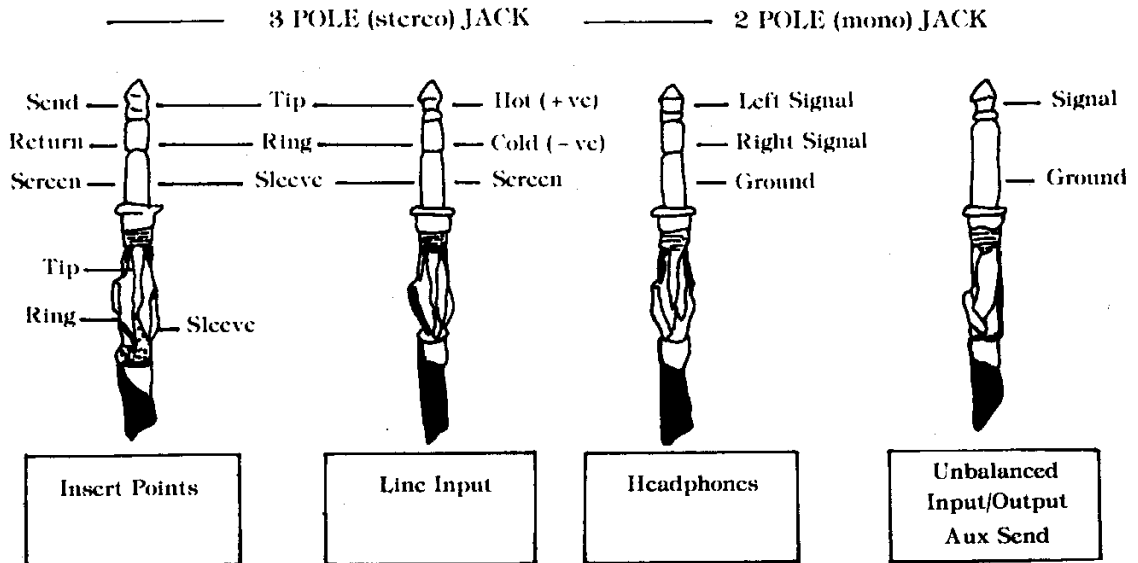
It is important to remember that all equipment which is connected to the mains is a potential source of hum and interference and may radiate both electrostatic or electromagnetic radiation. In addition, the mains will also act as a carrier for many forms of RF interference generated by electric motors, air-conditioning units, thyristor light dimmers etc. Unless the earth system is clean, all attempts to improve hum noise levels will be futile. In extreme cases there will be no alternative but to provide a completely separate and independent 'technical earth' to replace the incoming 'noisy earth'. However, always consult your local electricity supply authority to ensure that safety regulations are not being infringed.

Audio Connectors

Two different types of audio connectors are used, 3-pin XLR and 1/4" three pole ('A' gauge) jacks. These are used in several configurations as shown below.

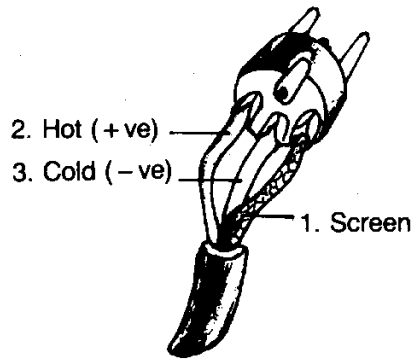


Balanced Input

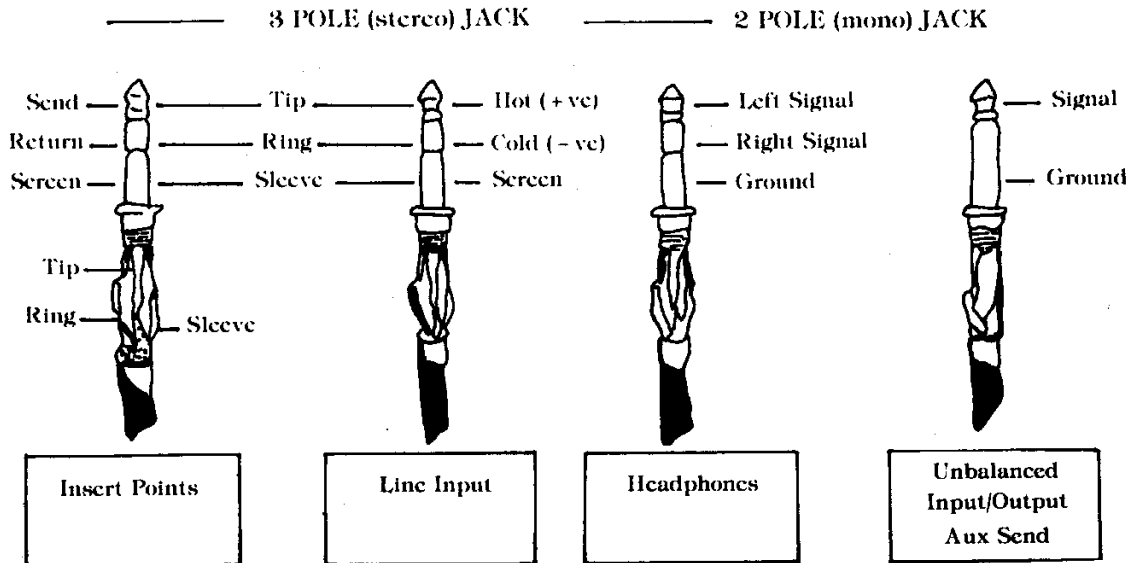


Audio Connectors

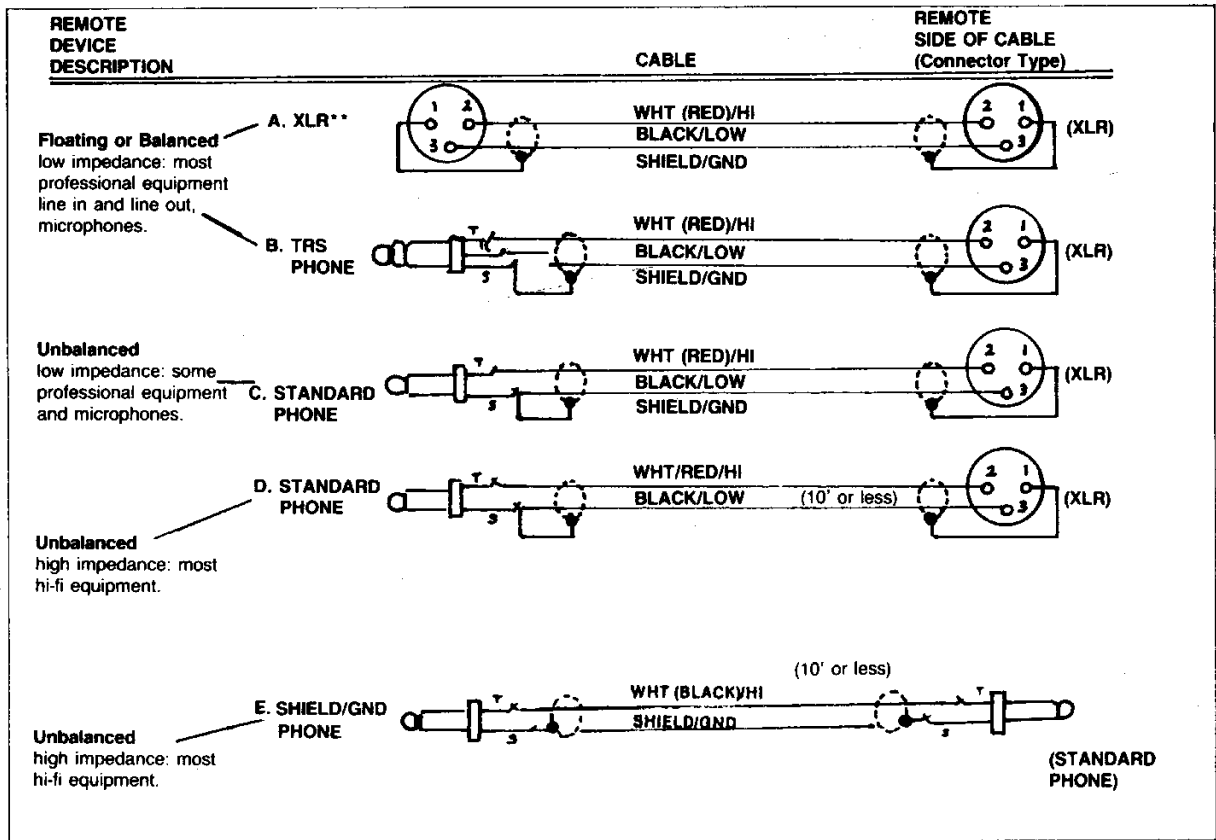
Two different types of audio connectors are used, 3-pin XLR and 1/4" three pole ('A' gauge) jacks. These are used in several configurations as shown below.



Balanced Input



CONNECTOR AND CABLE CONFIGURATIONS



Connector and cable configurations recommended for use with the CMX-4 Bus Series. These cables are based on the use of auxiliary equipment that is isolated from the AC power mains.

Application Examples

1. 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 Aux 1 Send and Return Connectors are hooked up to a digital delay unit, while a reverb unit is connected to the Aux 2 Send and Return.

The Stereo Out Connectors feed the main left and right house speaker power amplifiers via graphic equalizers.

The monitor 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 Jack may be used to connect a compressor/limiter or other effect which will then process all the channels assigned to that Group.

2. 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 AUX 1 and 2 SEND and RETURN connectors are connected to a high-quality stereo plate reverb unit. The MONITOR 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.

3. 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 AUX 1, 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 Monitor outputs are used to drive a "back fill" amp/speaker system. The remaining monitor 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.

4. USING THE MAIN LIVE MIXER

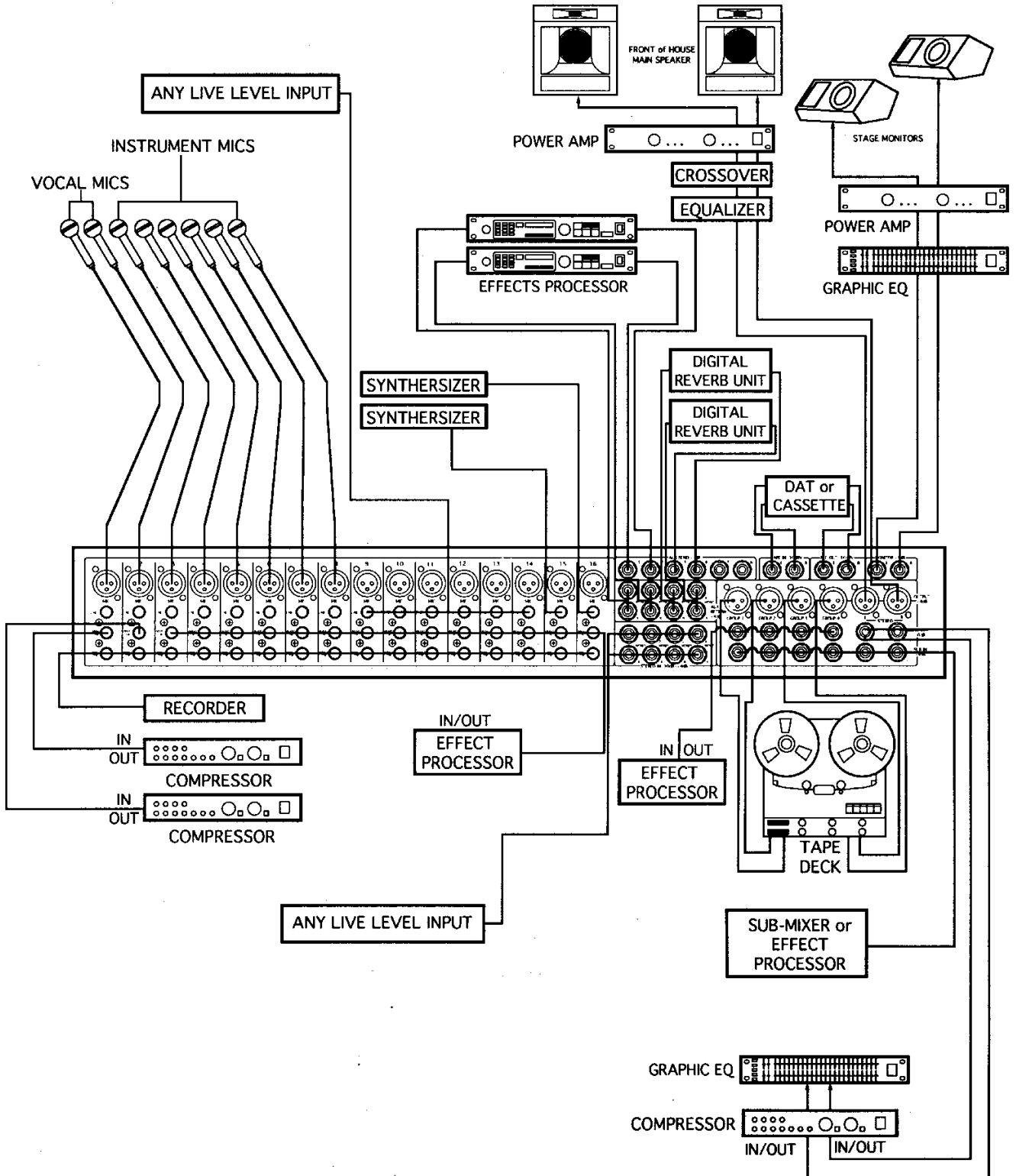
The main connections here involve routing the CMX 4-BUS SERIES MAIN STEREO OUTPUT to the input of a power amplifier, and, from there, to PA speakers.

Microphones and line level signals are connected to various channel inputs.

Signal processors are connected to AUX SEND and Returns and to channel inserts as required.

The Main STEREO INSERTS are connected to a room equalizer. Finally, a submix from MONITOR OUT is connected to the input of a second power amplifier driving onstage monitor speakers so that performers can receive a monitor mix independent of the house mix.

Application Example 2



Specifications

•GENERAL SPECIFICATIONS

Maximum output level (0.5% T.H.D at 1KHz)	+24dB (STEREO L/R) @6000 +24dB (GROUP 1-4) @6000 +20dB (MONITOR OUT) @6000 +20dB (AUX SEND 1-6) @6000 More than 100mW (HEADPHONES) @400
Total harmonic distortion	<0.1% @ +14dB 20Hz-20KHz (ST L/R, GROUP 1-4, MON L/R, AUX SEND 1-6 @6000)
Frequency response	20Hz-20KHz, +1dB/ -2dB (ST L/R, GROUP 1-4, MON L/R, AUX SEND 1-6)
Hum and noise (Average, Rs = 150Ω) (Measured with DIN-AUDIO)	-127dB equivalent input noise
	-95dB residual noise (STEREO L/R, GROUP 1-4)
	-95dB residual noise (MON L/R, AUX SEND 1-6)
	-88dB (STEREO L/R, GROUP 1-4) Master fader at nominal level and all channel assign switch OFF.
	-64dB(68dB S/N)(STEREO L/R, GROUP 1-4) Master fader & ICH fader at nominal
	-80dB(AUX SEND 1-6)AUX SEND Master fader at nominal & all CH, AUX level controls at minimum
	-64dB(68dB S/N)(AUX SEND 1-6)AUX SEND Master fader & ICH AUX level control at nominal
Maximum voltage gain	84dB MIC IN to ST OUT L/R, GROUP OUT 1-4 76dB MIC IN to AUX SEND 1-2 86dB MIC IN to AUX SEND 3-6 44dB LINE IN to ST OUT L/R, GROROUP OUT 1-4 34dB ST INPUT to ST OUT L/R, GROUP OUT 1-4 16dB AUX RETURN IN to ST OUT L/R, GROUP OUT 1-4 28dB TAPE IN to ST OUT L/R 10dB ST SUB IN to ST OUT L/R 10dB GROUP SUB IN to GROUP OUT 1-4 70dB TALKBACK to ST OUT L/R
Crosstalk at 1KHz	-70dB between input channels -70dB between output channels
Gain control (input channel)	44dB variable (-60dB ~ -16dB)
Input channel equalization	±15dB maximum boost or cut HIGH: 12KHz shelving MID: 250Hz~5KHz peaking (variable) LOW: 80Hz shelving * Turnover/rolloff frequencies: located 3dB below maximum boost/cut.
LED meters	10-segment LED × 2 GROUP 1-4, STEREO L/R or MONITOR L/R
Mono channel, Stereo input channel indicators	An indicator for each channel turns on when the pre-channel fader signal is 3dB below clipping.
Phantom power	+48V, DC
Power supply/ Power consumption	
US and Canadian model	CMX-1264 120V AC 60Hz 39W, CMX-1664 120V AC 60Hz 51W, CMX-2464 120V AC 60Hz 69W
General model	CMX-1264 230V AC 50Hz 39W, CMX-1664 230V AC 50Hz 51W, CMX-2464 230V AC 50Hz 69W
British model	CMX-1264 240V AC 50Hz 39W, CMX-1664 240V AC 50Hz 51W, CMX-2464 240V AC 50Hz 69W
Dimensions (W × D × H)	CMX-1264 684 × 623 × 128 mm CMX-1664 796 × 623 × 128 mm CMX-2464 1020 × 623 × 128 mm
Weight	CMX-1264: 18kg CMX-1664: 21kg CMX-2464: 26kg

•INPUT SPECIFICATIONS

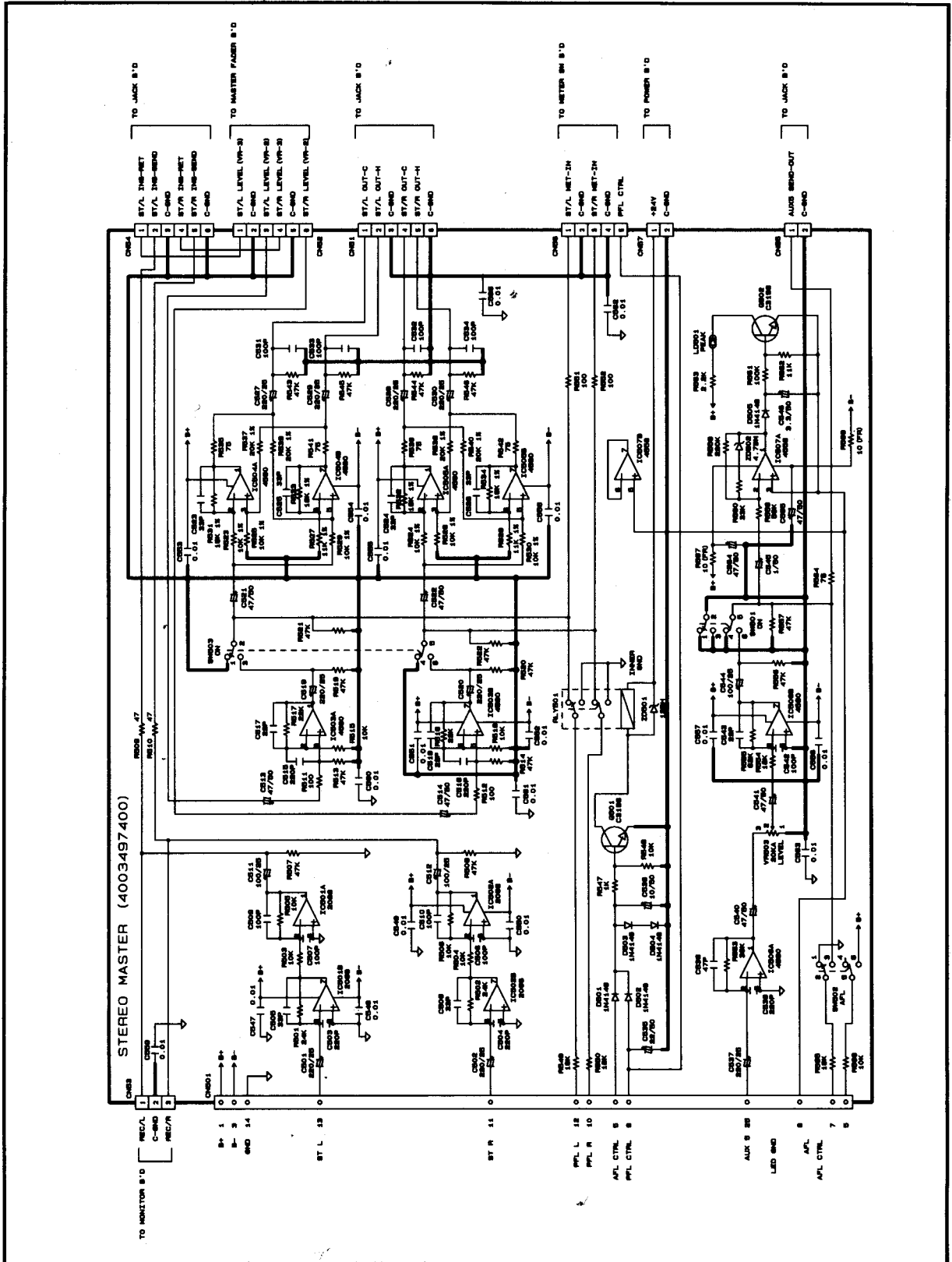
Input Connector	Input Impedance	Nominal Impedance	Input Nominal Level	Connector Type
CH MIC	4K Ω	50-600 Ω	- 60dB	XLR 3-31 Type Balanced
CH LINE	10K Ω	600 Ω	- 20dB	Phone Jack (TRS) T = Hot R = Cold S = GND
STEREO INPUT	5K Ω	600 Ω	- 10dB	Unbalanced Phone Jack
AUX RETURN	10K Ω	600 Ω	+ 4dB	Unbalanced Phone Jack
MONO INPUT INSERT IN	10K Ω	600 Ω	0dB	Phone Jack T = Out R = In S = GND
TAPE IN	10K Ω	600 Ω	- 10dBV	Unbalanced Phone Jack
STEREO OUT INSERT IN	10K Ω	600 Ω	0dB	Phone Jack T = Out R = In S = GND
GROUP OUT INSERT IN	10K Ω	600 Ω	0dB	Phone Jack T = Out R = In S = GND
STEREO OUT SUB IN	10K Ω	600 Ω	+ 4dB	Unbalanced Phone Jack
GROUP OUT SUB IN	10K Ω	600 Ω	+ 4dB	Unbalanced Phone Jack
TALK BACK	10K Ω	600 Ω	- 50dB	Unbalanced XLR Jack

•OUTPUT SPECIFICATIONS

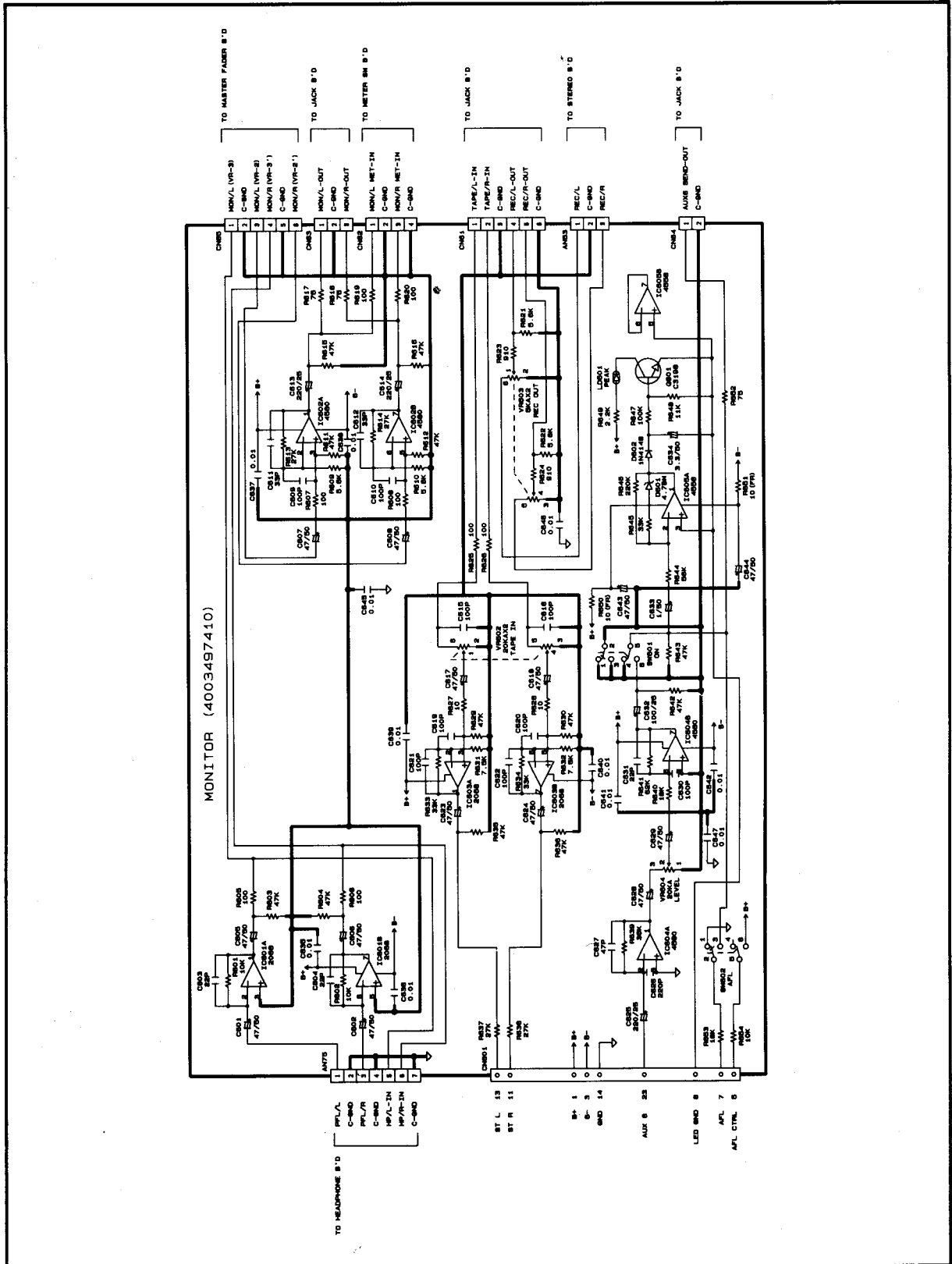
Output Connector	Output Impedance	Nominal Impedance	Input Nominal Level	Connector Type
STEREO OUT L/R	150 Ω	600 Ω	+ 4dB	XLR 3-32 Type
GROUP OUT 1-4	150 Ω	600 Ω	+ 4dB	XLR 3-32 Type
AUX SEND 1-6	75 Ω	600 Ω	+ 4dB	Unbalanced Phone Jack
MONITOR L/R	75 Ω	600 Ω	+ 4dB	Unbalanced Phone Jack
REC OUT L/R	600 Ω	10K Ω	- 10dBV	Unbalanced Phone Jack
MONO INPUT INSERT OUT	600 Ω	10K Ω	0dB	Phone Jack (TRS) T = Out R = In S = GND
STEREO OUT INSERT OUT	600 Ω	10K Ω	0dB	Phone Jack (TRS) T = Out R = In S = GND
GROUP OUT INSERT OUT	600 Ω	10K Ω	0dB	Phone Jack (TRS) T = Out R = In S = GND
DIRECT OUT	600 Ω	10K Ω	0dB	Unbalanced Phone Jack
PHONES OUT	100 Ω	40 Ω	3mW	Stereo Phone Jack

* 0dB = 0.775Vrms
0dBV = 1Vrms

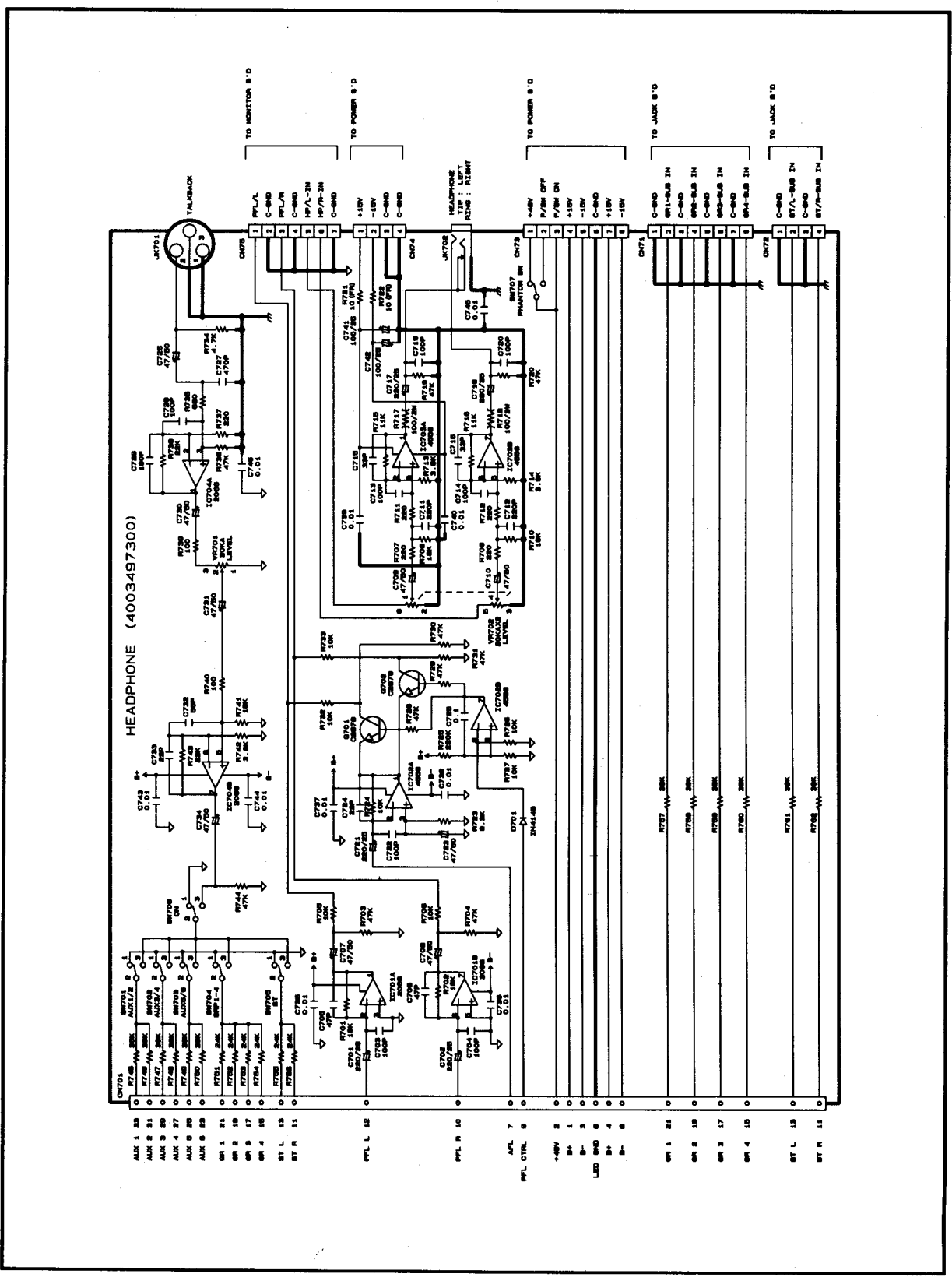
Schematic Diagram



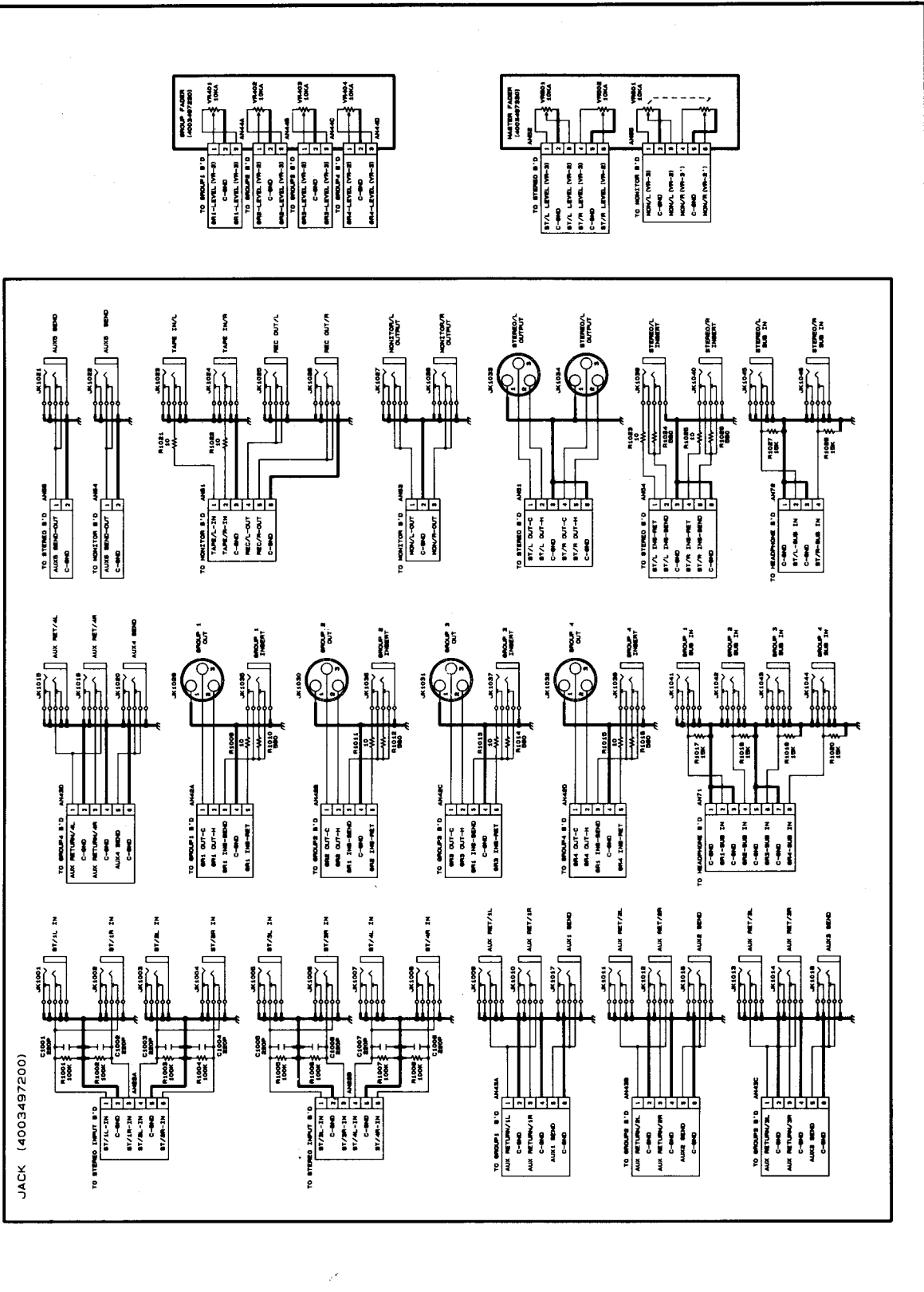
Schematic Diagram



Schematic Diagram

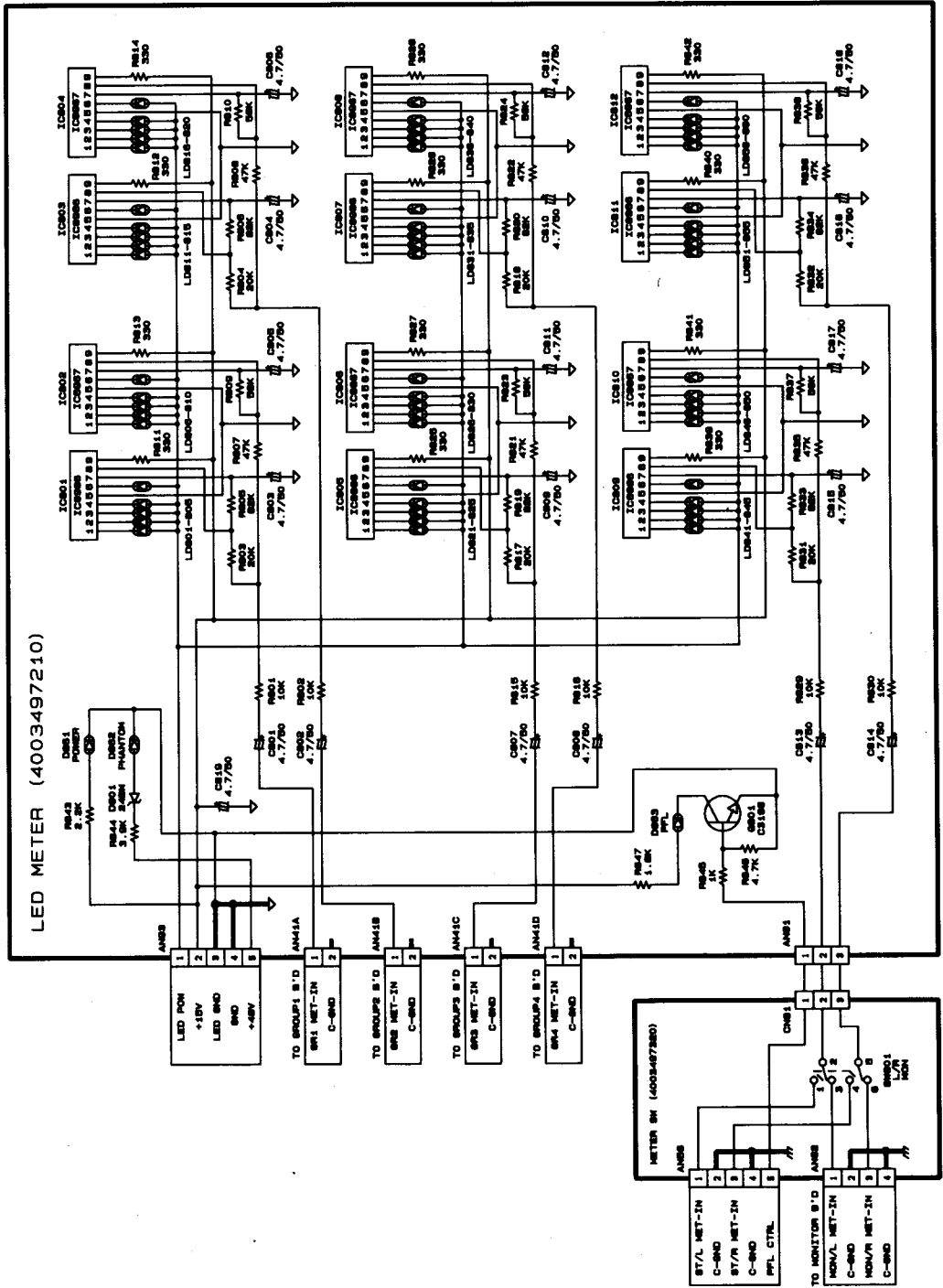


Schematic Diagram



JACK (400349200)

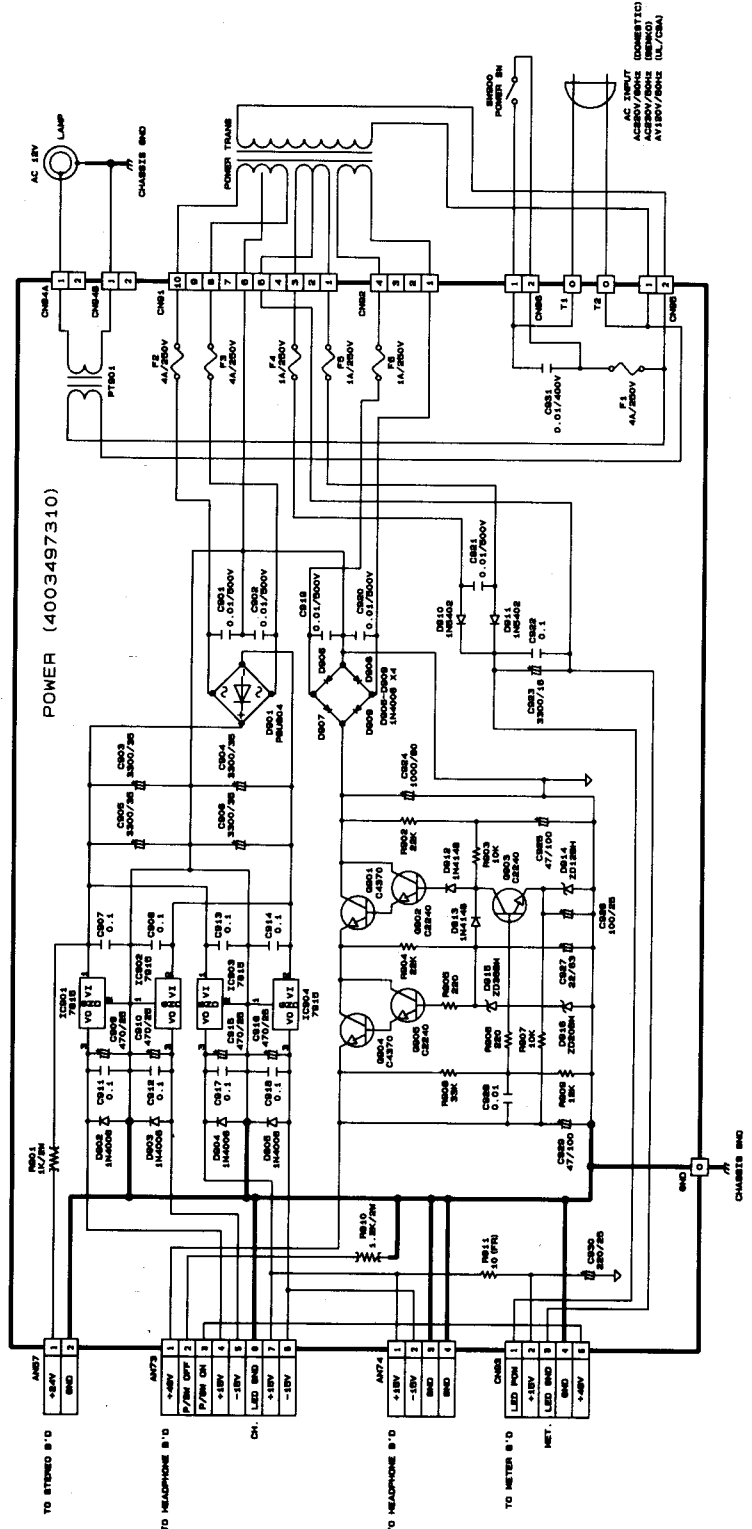
Schematic Diagram



Schematic Diagram

*FUSE TABLE

	DOMESTIC	UL/CSA	REMARK
F1	2.5A/250V	4A/250V	TEAL/250V
F2	3.15A/250V	4A/250V	TS.15A/250V
F3	3.15A/250V	4A/250V	TS.15A/250V
F4	1A/250V	1A/250V	T1A/250V
F5	1A/250V	1A/250V	T1A/250V
F6	1A/250V	1A/250V	TS.01A/250V



interM

MADE IN KOREA
NO : 9007927810