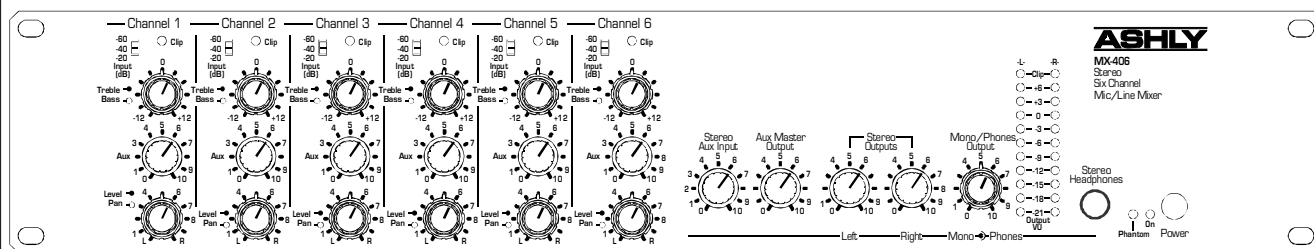


ASHLY

MX-406 Stereo Microphone/Line Mixer

Operating Manual



ASHLY AUDIO INC.

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The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance instructions in the literature accompanying the device.

TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER. NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

TO REDUCE THE RISK OF FIRE OR ELECTRICAL SHOCK, DO NOT EXPOSE THIS APPIANCE TO RAIN OR MOISTURE.

TO REDUCE THE RISK OF FIRE, REPLACE ONLY WITH SAME TYPE FUSE. REFER REPLACEMENT TO QUALIFIED SERVICE PERSONNEL.

**WARNING:
THIS APPARATUS MUST BE EARTHED**

1. INTRODUCTION

Congratulations on your purchase of an Ashly MX-406 stereo mic/line mixer, a professional, studio quality solution to everyday mixing needs. MX-406 features include six channels of mic or line inputs with mic input pad, TRS insert points, and +48V phantom power. Each channel has up to 60dB input gain, separate treble and bass controls, an aux send control, level, and a stereo pan control. An aux input is provided for a stereo program source such as tape or CD. Outputs include aux master, stereo line out (pre-master), stereo left and right, transformer balanced mono out, and stereo headphones. A full 11 segment LED array indicates stereo output level.

Stereo main outputs use 1/4" jacks, stereo aux input and line out use RCA connectors, and a transformer isolated 600 ohm mono output uses an XLR connector. Ashly mixers still use professional quality 16mm metal shaft potentiometers for greater accuracy and long life and of course, Ashly products come with a worry-free five year warranty.

2. UNPACKING

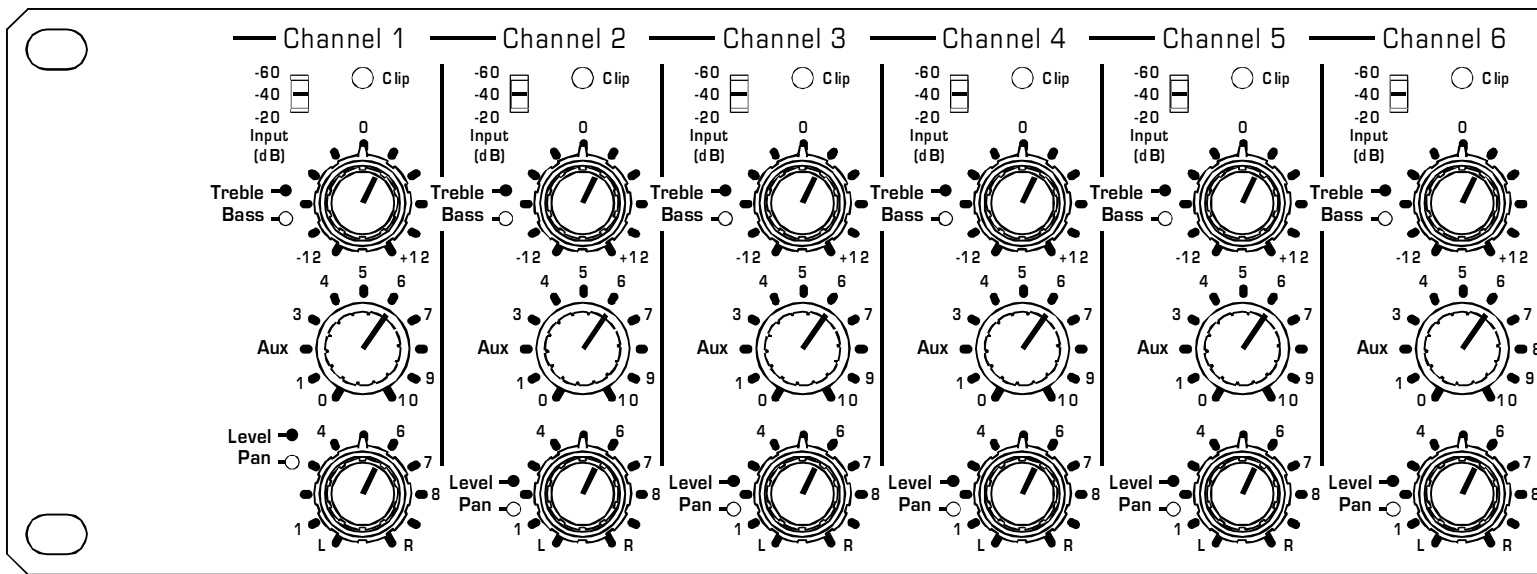
As a part of our system of quality control, every Ashly product is carefully inspected before leaving the factory to ensure flawless appearance. After unpacking, please inspect for any physical damage. Save the shipping carton and all packing materials, as they were carefully designed to reduce to minimum the possibility of

transportation damage should the unit again require packing and shipping. In the event that damage has occurred, immediately notify your dealer so that a written claim to cover the damages can be initiated.

The right to any claim against a public carrier can be forfeited if the carrier is not notified promptly and if the shipping carton and packing materials are not available for inspection by the carrier. Save all packing materials until the claim has been settled.

3. AC POWER REQUIREMENTS

The MX-406 mixer will perform normally from 93 to 125 volts AC, 50-60Hz (some export models are wired for 240 Volts and are labeled accordingly). Use only properly grounded AC receptacles. To reduce the risk of ground loop hum, use a central point for system AC power distribution. In the event of fuse failure, refer this unit to a qualified service technician for fuse replacement using only the same type fuse. Power consumption is less than 20 watts.



4. FRONT PANEL CONTROLS

4.1 Input Gain

This three position switch sets the operating level of the microphone and line input preamp. The corresponding switch values -20db, -40dB, and -60dB refer not to the actual gain, but rather to the expected nominal input signal strength.

Best signal to noise ratio is obtained with higher gain settings. It is therefore desirable to set the gain control as high as possible while still leaving 20dB of headroom for signal peaks. Line level inputs (1/4" jack) will likely use a setting of -20dB, while mic inputs generally require a setting of -40dB for close mic applications, and -60dB for quieter signals. If a channel's clip LED is blinking, first turn down that channel's level control. If the clip LED is still flashing, turn down the input gain.

4.2 Clip

Input Clip LEDs are peak sensitive and monitor all critical points within the input channel. The clip LED turns on whenever any portion of the audio path within the input channel reaches a level 3 dB below actual clipping. Clipping in the MX-406 occurs at +20dB.

4.3 Treble/Bass

This concentric knob is used for broad EQ changes to each input channel. Channel EQ consists of a high shelf control (treble) at 4KHz, and a 250Hz low shelf control (bass). EQ boost or cut is ± 12 dB.

4.4 Aux

The aux send is an additional level control used to send signal from each input channel to monitors, an effect unit, or another mix. The aux master output combines all six channel's aux level signals. The aux control is factory set to pre-fader, pre-EQ, but can be internally switched to post-fader, post EQ. To make this change, refer the following procedure to a qualified service technician:

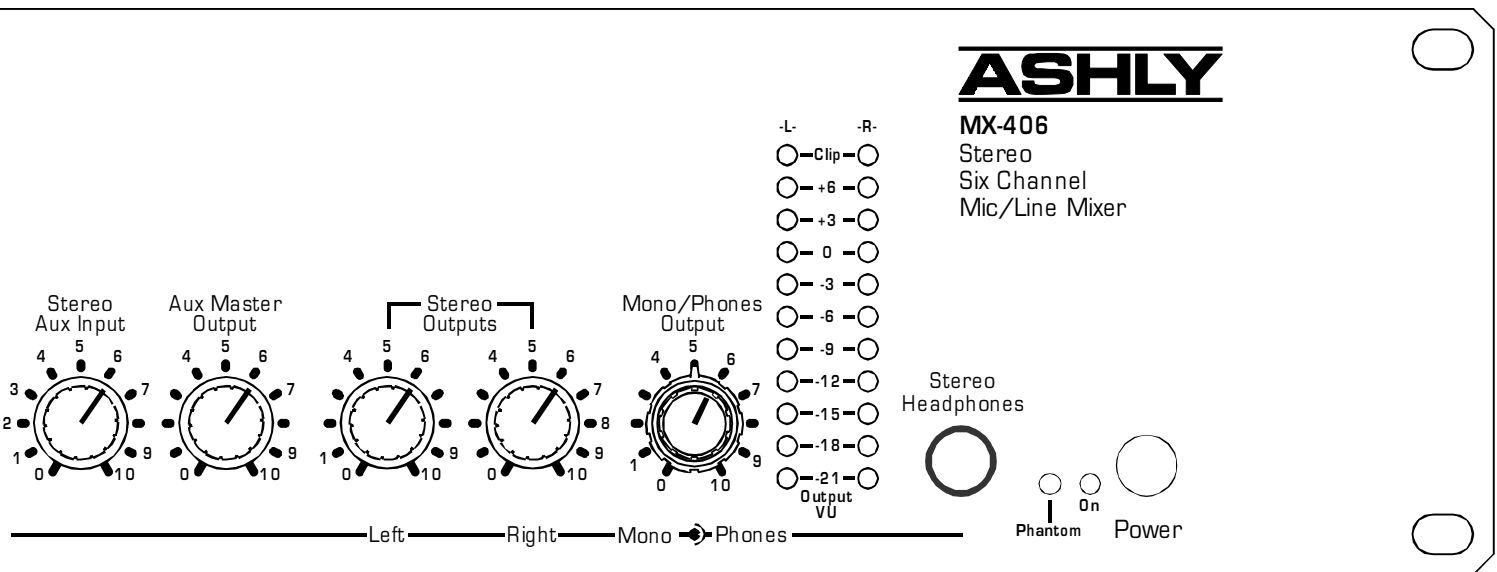
Unplug the unit's AC power cord from the outlet. Remove the bottom cover which is fastened by seven 6-32 screws. Locate the 3 pin header labeled AUX at the middle of the back edge of the front portion of the channel circuit board. Remove the shunt bar from the "Pre" position indicated on the circuit board legend and place the shunt on the "Post" position.

4.5 Level and Pan

This concentric knob adjusts the level and stereo position of each channel. If a channel's level control is always turned up to 9 or more, try increasing the gain first. Conversely, if the level control is consistently turned down to 1 or less, decrease the gain setting first. Remember that the gain setting should be set as high as possible while still allowing 20dB of headroom.

4.6 Stereo Line Input

This control adjusts the level of the RCA jack stereo line input. It can be used for tape, CD, or DVD audio inputs, and can also be used for a stereo effect return. For expanding the channel capacity of the MX-406,



the stereo line input can be used as stacking inputs for supplementing the MX-406 with another mixer, such as an Ashly LX-308 stereo line level mixer.

4.7 Aux Master Output

This control adjust the level of the aux master 1/4" jack output, which gets it's signal from the six aux level controls on the input channels. It is used for an effects unit send, or can drive a power amplifier for monitors or an extra loudspeaker zone.

4.8 Stereo Output Level

These two controls determine the signal level to the 1/4" jack left and right outputs. They are used to drive power amplifiers for the main loudspeakers, or to connect to a stereo recording device.

4.9 Mono Output Level

This control adjusts the level of the summed mono output. It is completely independent of the main left and right master controls. In other words, changes to either left or right output level will not affect the mono output level.

4.10 Headphones Level

This control adjusts the level of the stereo signal to the headphone jack. Headphones should have an impedance of 600 ohms or greater, or signal distortion may result.

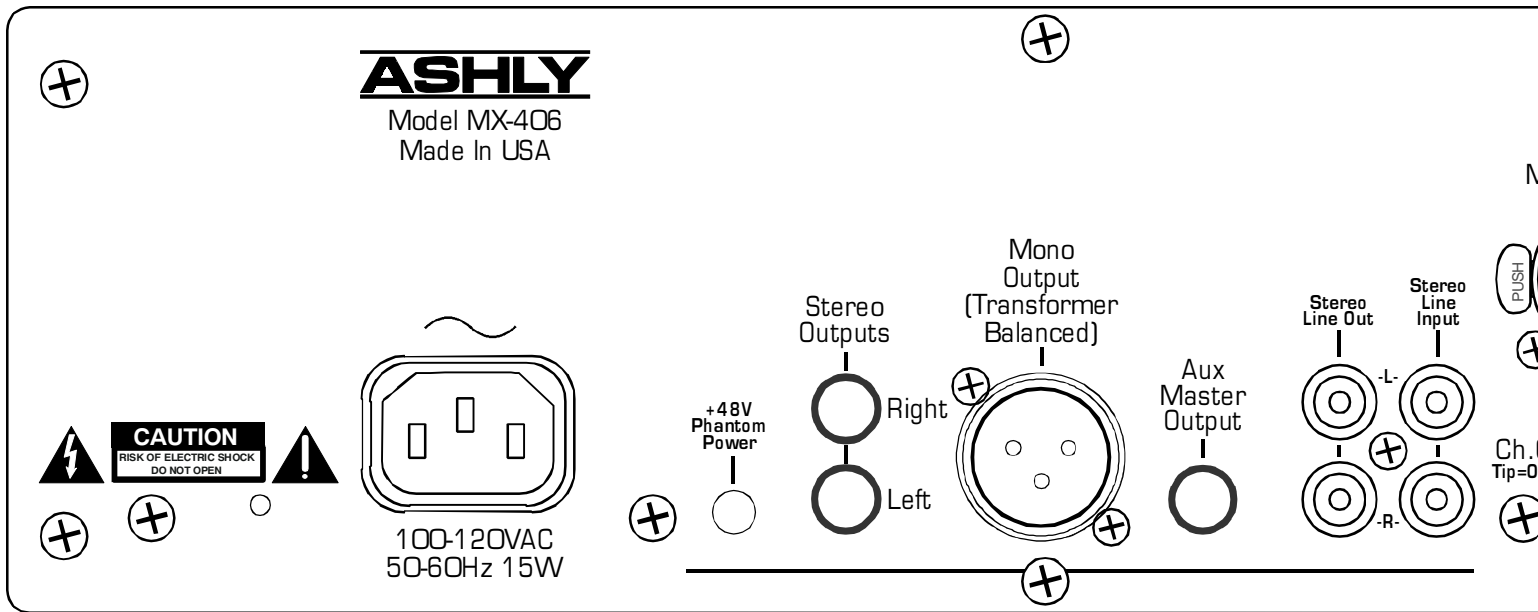
4.11 Output Meters

A pair of peak reading 10 segment LED meters are used to indicate stereo output level in VU. 0 VU is equivalent to +4 dBu (1.228Vrms).

Green LED's are used below 0 VU, yellow above 0 VU and two red LED's indicate clipping. The clip LED's turn on 3dB below actual clipping, detecting excessive signal level on any critical audio path within the master section. If all outputs are turned down and there is still clipping, then one or more inputs must be turned down.

4.12 Phantom Power LED

The phantom power switch is on the back panel. When the switch is pressed in, the LED is lit and +48VDC is applied to all six mic inputs for use with condenser microphones. If there is a mix of both condenser and dynamic microphones, the phantom power will not affect the operation of the most dynamic mics.

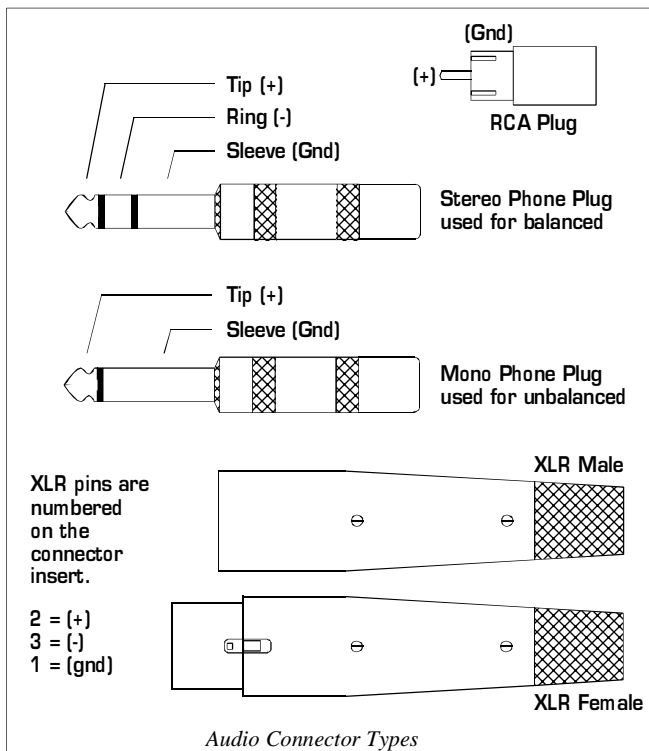


5. CONNECTORS AND CABLES

The MX-406 mixer is fitted with four types of audio connectors: 3-pin XLR type male (mono output), 3-pin XLR type female (mic inputs), 1/4" tip-ring-sleeve (TRS) phone jack, and RCA jack. Certain 1/4" jack connections may use an unbalanced mono plug, which is also shown.

Two-conductor (twisted pair) shielded cable is best for all XLR type connections. Belden No. 8412 or its equivalent is an excellent cable due to its heavy construction. This type of cable should be used for all portable applications. Snake cables containing multiple shielded pairs must be handled very carefully because the leads tend to be fragile, and a broken conductor is difficult to repair.

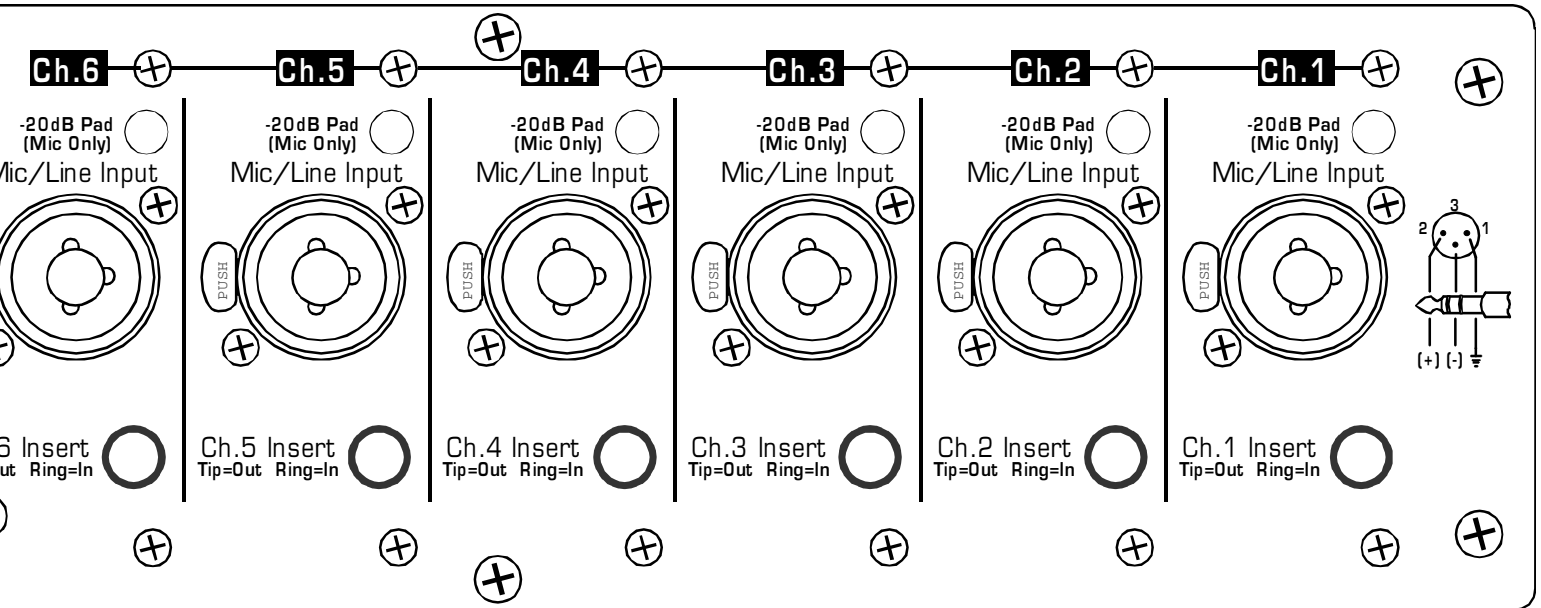
If low level and high level lines are run parallel for long distances, crosstalk may occur. In fact, the crosstalk (signal leakage between cables) can cause an electronic feedback loop, oscillation, and possibly damage to the equipment. To minimize crosstalk, physically separate low level (microphone) cables from speaker cables by the greatest feasible distance. At any point where cables meet, run low level cables perpendicular to high level or speaker cables. If low and high level or speaker cables must be run parallel and in close proximity to one another, they should be bundled separately. In a permanent installation, avoid running speaker cables and mic cable through the same conduit pipe.



6. REAR PANEL FEATURES

6.1 Microphone Input

The MX-406 microphone input is an active balanced type with a nominal impedance of 1200 ohms. Its noise performance is best with a 200 ohm microphone. The Mic input connector is a standard 3-pin XLR female with the shield on pin 1, the (+) in-phase connection on pin 2, and the (-) out-of-phase connection on pin 3.



6.2 Input Pad

The input pad is a 20dB attenuation switch on the rear panel for use with the XLR microphone inputs. It should normally be left in the "out" position for best signal to noise ratio and should only be used when the input is being overdriven with the gain control at its minimum setting.

6.3 Line Input

The line input is a standard 1/4" TRS active balanced type found in the same "combo jack" connector as the mic input. The line input balanced impedance is 20KΩ. It will accommodate a wide range of input levels.

6.4 Channel TRS Insert

A channel TRS insert patch point allows a device such as a remote level controller, graphic equalizer, noise gate, compressor/limiter, or direct out recording device to be used with one or more input channels.

The MX-406 TRS insert jacks use the tip for output and ring for the returning input. These signals will be unbalanced, so cable length should be at a minimum to maintain low noise.

To use the TRS insert as a Direct Line Output (pre EQ) for recording, you must make a special cable with tip and ring connected at the MX-406 end and a tip-sleeve mono plug at the other end. Connecting tip and ring at the mixer insert jack is necessary for uninterrupted signal within the mixer when using direct line outputs.

6.5 Stereo Line Input

The stereo line RCA inputs have a nominal operating level of -10dBu to match most consumer audio sources. This signal is controlled by the Stereo Line Input dial on the front panel. This input is also used as a stereo effects return, or as a stacking input for adding additional mixers.

6.6 Stereo Line Out

The stereo line outputs are nominal -10dBu "pre-master", so they are not affected by the settings of the main Left/Right output controls. These outputs would be used for making a pre-output fader recording off of the stereo mix, or for stacking the MX-406 stereo output into another mixer.

6.7 Aux Master Output

The 1/4" jack aux master output is used to drive a monitor or zone amplifier, effects processor, recording device, or any function which requires level control independent from the main stereo mix. It is pseudo-balanced, which means that while it is a single ended signal, it has balanced impedance for low noise when driving an active balanced input circuit over a long distance.

6.8 Mono Output

The XLR mono output combines the left and right stereo signals (pre output fader), and uses an isolation transformer capable of driving 600 ohm lines. Pin 1 is

ground, pin 2 is (+), and pin 3 is (-). This signal is determined by the mono output level control, with a nominal operating level of +4dBu.

Note: The mono transformer-balanced output is designed to drive up to +24dBu into 600 ohm loads. Because of the nature of an output transformer, the output level increases as the impedance of the terminating load becomes higher than 600 ohms. Whereas a "direct-coupled" output stage like that of the right and left outputs will not change as the load changes, any transformer used in an audio path is affected by its termination impedance. Since line level inputs on audio devices are typically 10KΩ or higher, expect a slight increase (2.5dB) in output level when driving conventional active 10KΩ inputs with the transformer outputs.

6.9 Stereo Outputs

The 1/4" jack stereo right and left outputs are controlled by the left and right master. They are pseudo-balanced TRS jacks with a nominal operating level of +4dBu into any load, and are capable of driving long lines.

6.10 +48V Phantom Power Switch

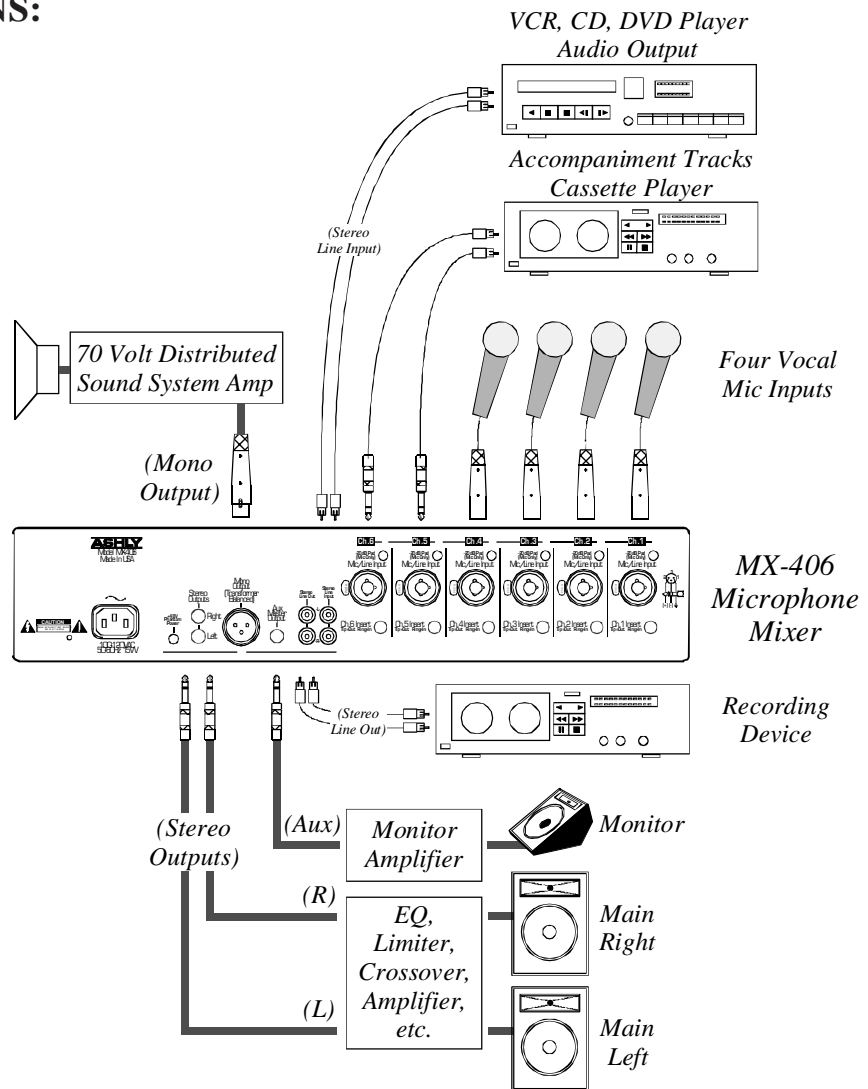
This switch applies +48VDC to all six XLR mic inputs to power condenser microphones. Phantom power will not affect most dynamic mics, which may be used along with condenser mics.

7. TYPICAL APPLICATIONS:

7.1 Small Sound Reinforcement System:

In the setup shown here, the MX-406 is used to mix typical sound sources that might be found in a church, small club, school theater or similar environment. Four of the input channels are used for vocal microphones, while the remaining two channels are used for stereo accompaniment tracks. The stereo line input is used for additional pre-recorded music such as that of a movie soundtrack or CD player. Stereo line output RCA jacks are used to record the event to a cassette, video camera, or even a PC with recording capabilities.

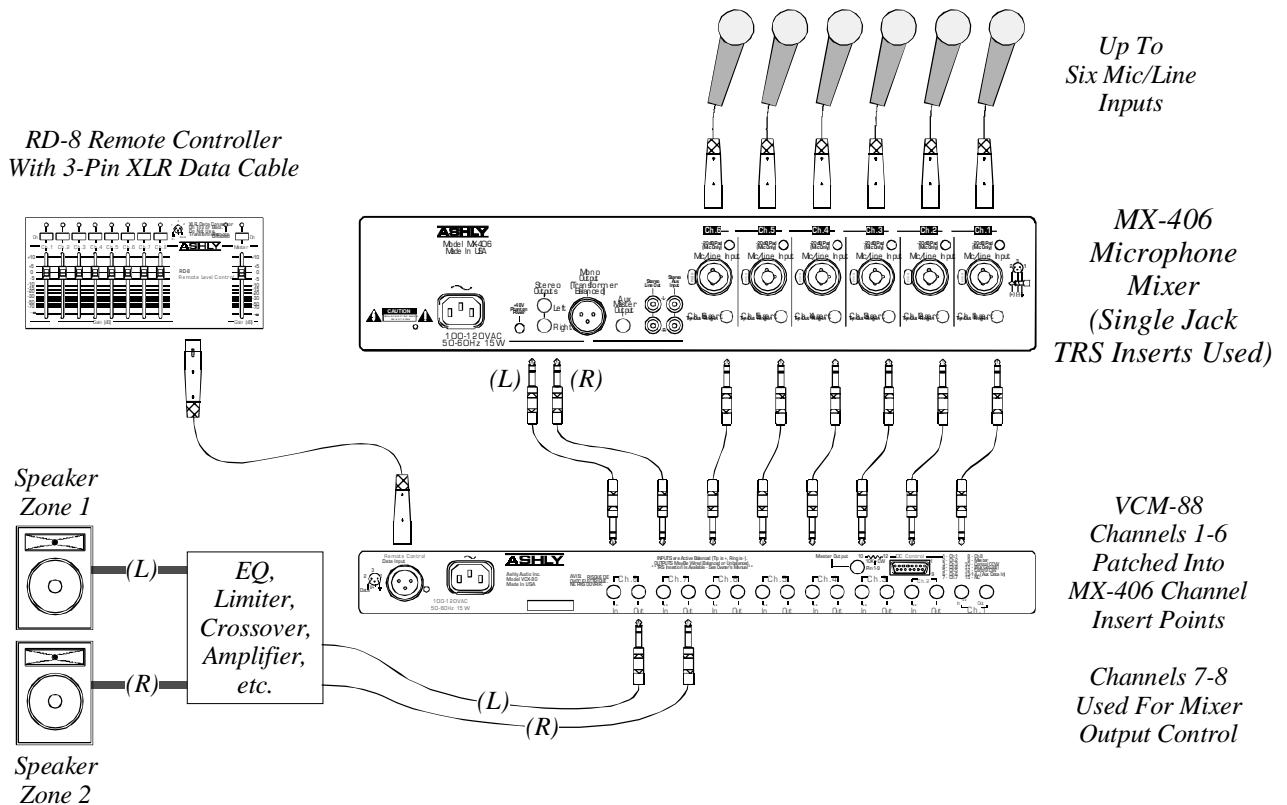
Stage monitors are fed using the aux mix to the master aux output, and left and right outputs drive the main speakers. The mono output drives a 70 Volt distributed sound system amplifier, used for plenum (ceiling) speaker installations.



MX-406 Small Sound Reinforcement System

7.2 Meeting Room, Board Room, or Church Mixer Using Remote Control:

In this illustration, the MX-406 is interfaced with an Ashly VCM-88 eight channel remote level controller, allowing the mixer to be operated from a distance by a non-technical person. Remote control of the VCM-88 is achieved through the use of Ashly's RD-8 desk-top remote controller, RW-8 wall-plate version, or PC control using Protea System Software. The RD-8 and RW-8 use a single mic cable for control data, while PC control uses RS-232 serial communications. Remote control can be located up to 1,300 feet from the main audio equipment rack.



Typical Application of MX-406 with VCM-88/RD-8 Remote Control

8. TROUBLESHOOTING TIPS

8.1 No Sound

Check the AC power. Is the power switch on? Check the level meters. If they are operating, the problem is between the mixer and the later components in the system. If there is no meter activity, check to see that you really have an input signal and that it is on the desired channel.

8.2 Distorted Sound

Something is being overdriven in the signal path. If the clip indicators are active, reduce the channel gain and/or press in the pad switch on the rear panel. There are many gain adjustments in the mixer itself and probably several others in other system components which makes it possible to overdrive an input section and then incorrectly try to reduce the gain of the output section. The best way to approach setting gains is to establish the operating level of input stages first by setting their gain as high as possible but leaving about 20dB of headroom for loud peaks, then move on to set the master gain to produce a good meter reading. Proceed to set the gain of equalizers, limiters, crossovers, and amplifiers following the mixer in the same manner, always working toward the later stages of the system.

8.3 Excessive Noise

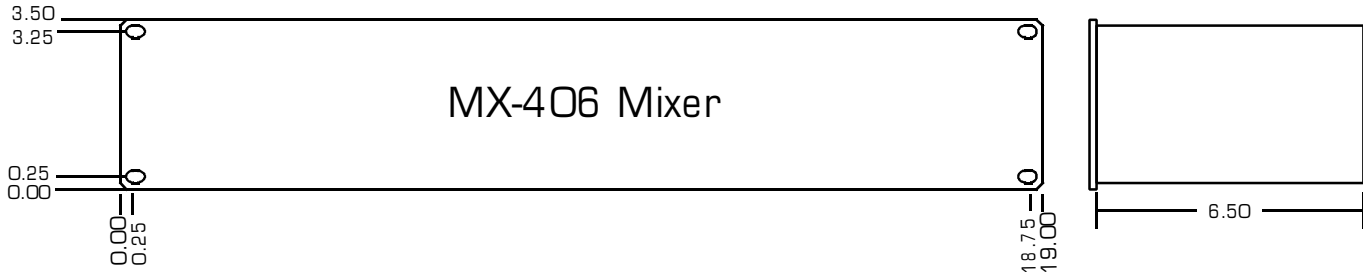
If the noise is in the form of hiss, the problem is usually due to an input stage set for insufficient gain and then compensating for it by increasing the level. Try increasing gain and reducing level. Also, check that the -20dB rear panel pad switch is not unnecessarily enabled.

8.4 Excessive hum

This is usually caused by "ground loops" in the system wiring. A complex sound system with many sources separated by significant distance and using several power outlets has many opportunities for this problem to occur. If possible, feed everything in the system from one power source with a common ground. Use balanced input and output connections between widely separated components.

If you need help, get in touch with your Ashly dealer or call an Ashly technical service representative.

9. DIMENSIONS:



10. SPECIFICATIONS

DISTORTION

THD at +4 dBu, 20Hz-20KHz <0.008%
 THD at +12dBu, 30Hz-10KHz <0.03%
 IMD (SMPTE) at +12dBu <0.03%

HUM & NOISE (20Hz-20KHz at max preamp gain)

equivalent input hum and noise<-128dBu
 residual output noise, TRS outputs,
 all levels at minimum<-110dBu
 residual output noise, XLR output,
 all levels at minimum<-98dBu
 aux output, aux master and
 all ch. aux at nominal<-90dBu

MAXIMUM VOLTAGE GAIN (±2dB)

MASTER

Mic/Line Input to Master Outputs +92dB
 Mic/Line Input to Mono Output, 600 ohm load +88dB

AUX SENDS

Mic Input to Aux Master Output, pre ch. level72dB
 Mic Input to Aux Master Output, post ch. level92dB
 Stereo Line In to Master Output28dB

FREQUENCY RESPONSE

20Hz-20KHz +0.5/-1.0dB

EQUALIZATION

Bass ±12dB at 70Hz, shelving
 Treble ±12dB at 8KHz, shelving

CROSSTALK

adjacent inputs, 20Hz-20KHz <-65dB

VU METERS

Stereo outputs -21 to +6 VU
 0VU = +4dBu

PEAK INDICATORS

Peak Clip indicator on each input channel and left and right outputs, illuminates 3dB below clipping

PHANTOM POWER

+48 VDC applied to all Mic Inputs, switchable on rear panel. Maximum total current draw = 80mA. Maximum single channel current draw = 14mA. Gradual power-up and down to eliminate "pops".

SHIPPING WEIGHT

13 lbs.

POWER REQUIREMENTS

120 VAC nominal, 93 VAC minimum, 50-60 Hz,
 20 watts (240 VAC available)

**unless otherwise stated, specification conditions are:
 150Ω source, Input Level set at "-60", all other controls set at nominal, XLR output into 600Ω or greater.*

11. WARRANTY INFORMATION

Thank you for your expression of confidence in Ashly products. The unit you have just purchased is protected by a five-year warranty. To establish the warranty, be sure to fill out and mail the warranty card attached to your product. Fill out the information below for your records.

Model Number _____

Serial Number _____

Dealer _____

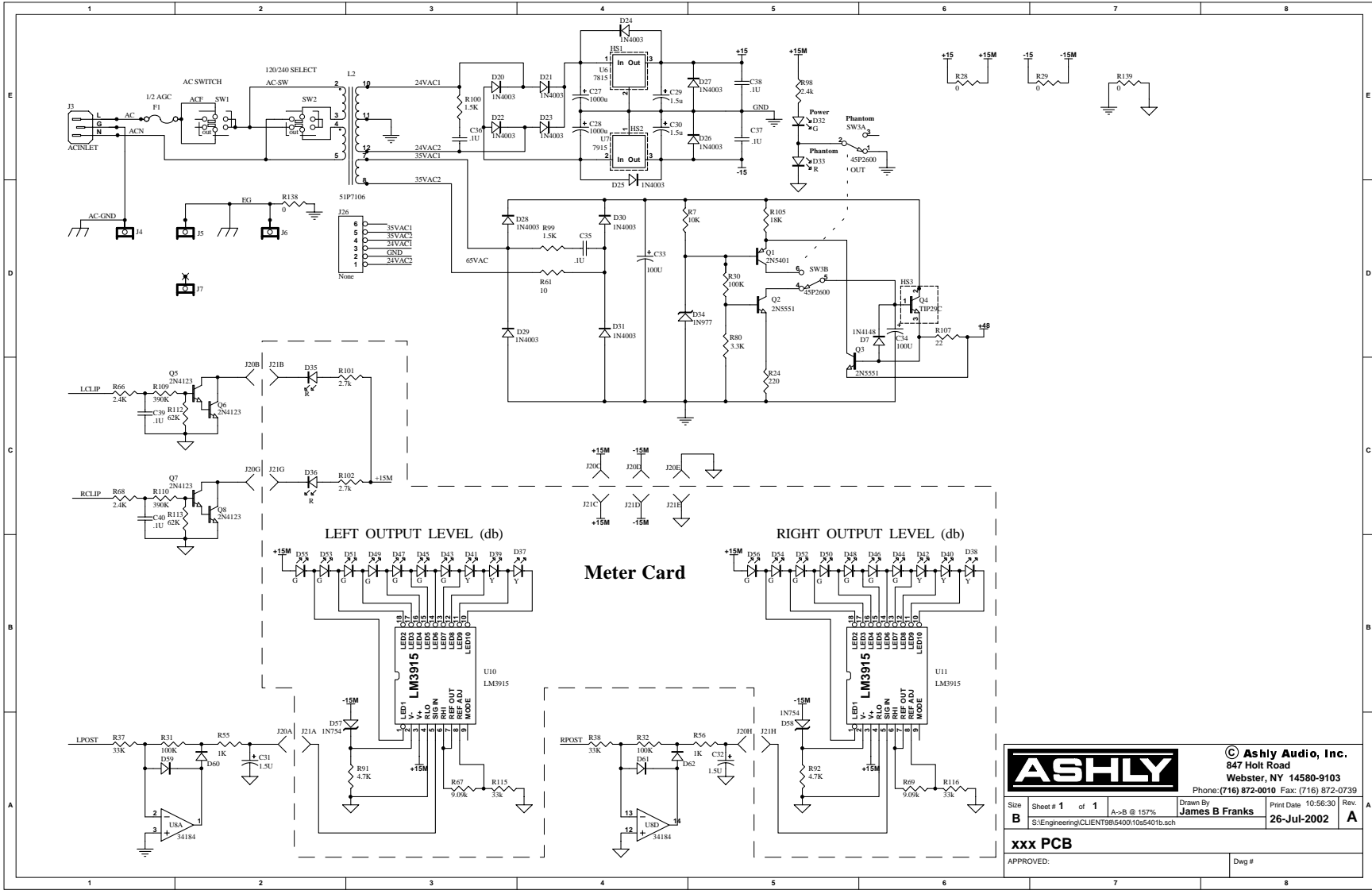
Date of Purchase _____

Dealer's Address _____

Dealer's Phone _____

Salesperson _____

12. SCHEMATIC DIAGRAMS



MX-406 Power and Metering

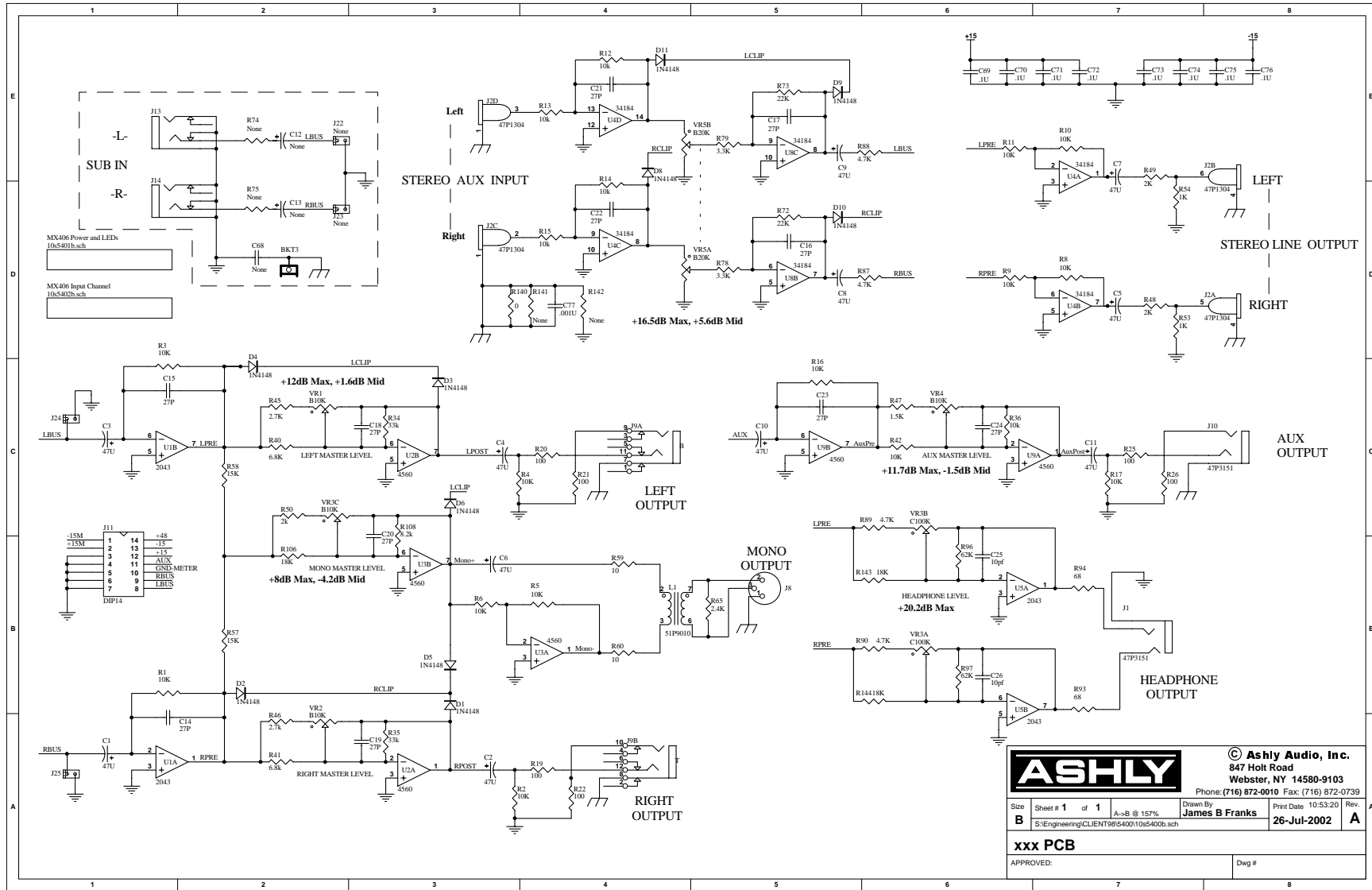
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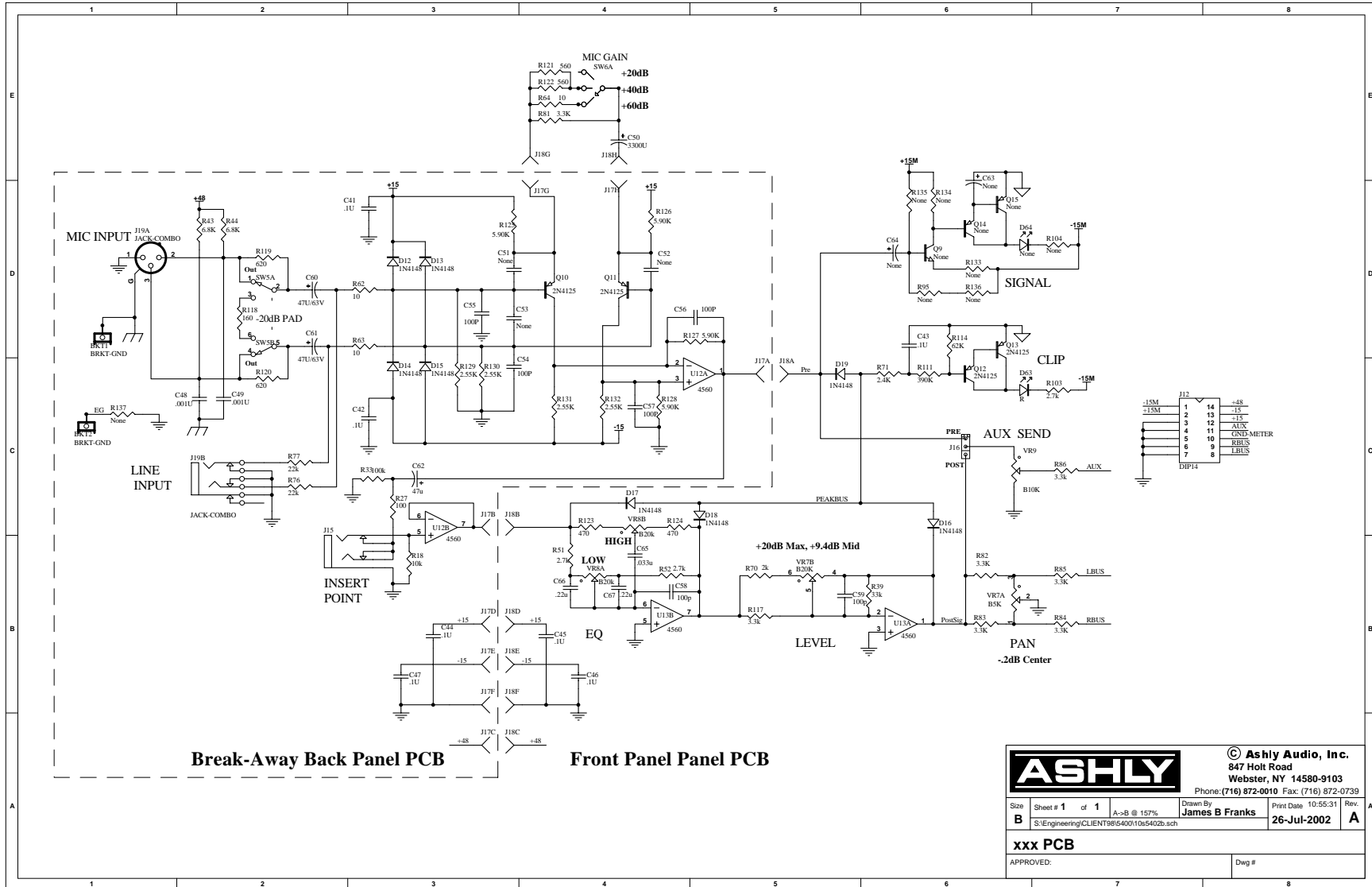
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MX-406 Motherboard Audio Sections



MX-406 Input Channel

ASHLY

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