

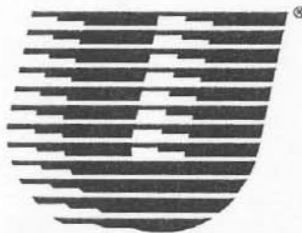
2000 Series

PowerDock™ Mixer/Amplifiers

Models 2303, 2306, 2312, 2603, 2606, 2612

**UNIFIED
ELECTRONICS**

Owner's Manual



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Description:

The 2000 Series, consisting of the models 2303, 2306, 2312, 2603, 2606, and 2612, are monaural mixer/amplifiers in a rack- or shelf-mountable enclosure. These units are fully compatible with all of the Unified Electronics Line's accessory cards, but unlike other "modular" mixers and amplifiers presently on the market, they are fully functional without the addition of additional "modules".

Models 2303, 2306, and 2312 have three input channels, while the models 2603, 2606, and 2612 have six input channels. The features and operation of each channel on all models are identical. Each input is transformer isolated, and will accept mic, line, or auxiliary level inputs. Input trim controls on the rear panel and an optional plug in 43 dB pad allow individual adjustment of each input to match these different levels. Phantom power for condenser microphones is switch selectable for each channel. A LOW-CUT switch can be engaged if the low-frequency content of the output is too high, which is useful when using horn-type loudspeakers susceptible to low-frequency damage.

Muting can be activated automatically or manually and can be individually set for each channel via back panel DIP switches. A MUTE THRESHOLD control adjusts the signal level needed to activate the automatic muting circuitry. A MUTE LEVEL control varies the attenuation of all muted channels simultaneously.

Models 2303 and 2603 are rated at 30 Watts continuous power output, models 2306 and 2606 are rated at 60 Watts continuous power output, while models 2312 and 2612 are rated at 120 Watts continuous power output. Power amplifier outputs are transformer-coupled, with connections available for 4Ω or 8Ω, and 25V or 70.7V for constant-voltage distributed speaker systems. The BRIDGE connection is a transformer coupled 3-screw terminal connector that can be used as an input or an output. The TAPE and AUX outputs, both of which use standard RCA phono jack connectors, provide two ways to monitor the overall mix of the inputs. Another pair of RCA phono jacks provide a preamplifier output and a power amplifier input (PRE AMP and PWR AMP). A rear-panel LINK switch can cut the signal path between this input/output pair, facilitating the use of signal processing equipment. The TAPE and BRIDGE outputs are pre-master level in the mixer circuit, and are unaffected by the master level control. The power outputs, AUX output, and PRE AMP output / PWR AMP input pair are post master level, and are affected by the master level control.

The front panel features consist of: three or six input level controls (depending on the number of input channels), a master level control, treble and bass equalization controls, a bar-graph output level LED display, a "power-ON" LED, and a power on/off switch. The units are powered by conventional 120 VAC 60 Hz lines.

2000 Series Specifications:

Power Output	30 Watts RMS (2303/2603) 60 Watts RMS (2306/2606) 120 Watts RMS (2312/2612)
Inputs	Max sensitivity 0.7 mV (mic)
2303/2306/2312	3 transformer balanced
2603/2606/2612	6 transformer balanced
Power Bandwidth	50 Hz - 20,000 kHz @ 0.5% THD
Frequency Response	20 Hz -20,000 Hz ± 1 dB
Signal to Noise Ratio	> 75 dB master vol max > 90 dB master vol min
Equalization	Treble, Bass, & Low-Cut
Bass	± 10 dB @ 100 Hz
Treble	± 10 dB @ 10 kHz
Low-Cut	- 7 dB @ 60 Hz

Line-level Outputs	BRIDGE In/Out (transformer balanced) TAPE (47 KΩ) output AUX (47 KΩ) output PRE AMP out / PWR AMP in
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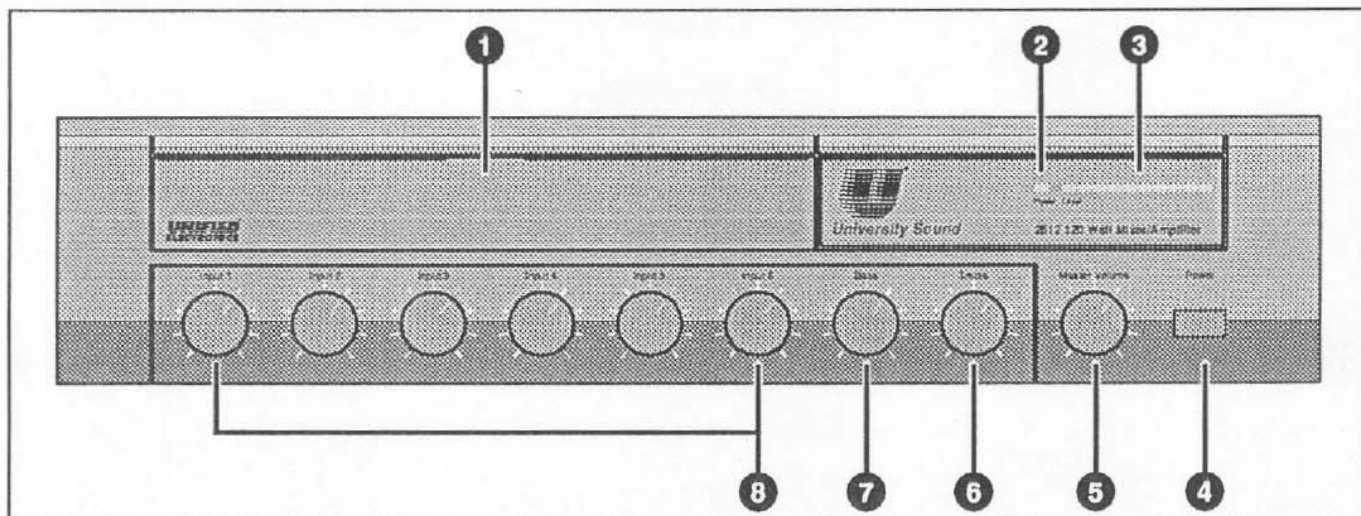
Power Outputs	4Ω, 8Ω, 25V, 70.7V
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Circuit Protection	AC line and output fuses
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Power Supply	
(2612/2312)	120 VAC, 60 Hz, 2.5 Amps
(2606/2306)	120 VAC, 60 Hz, 1.5 Amps
(2603/2303)	120 VAC, 60 Hz, 1.2 Amps

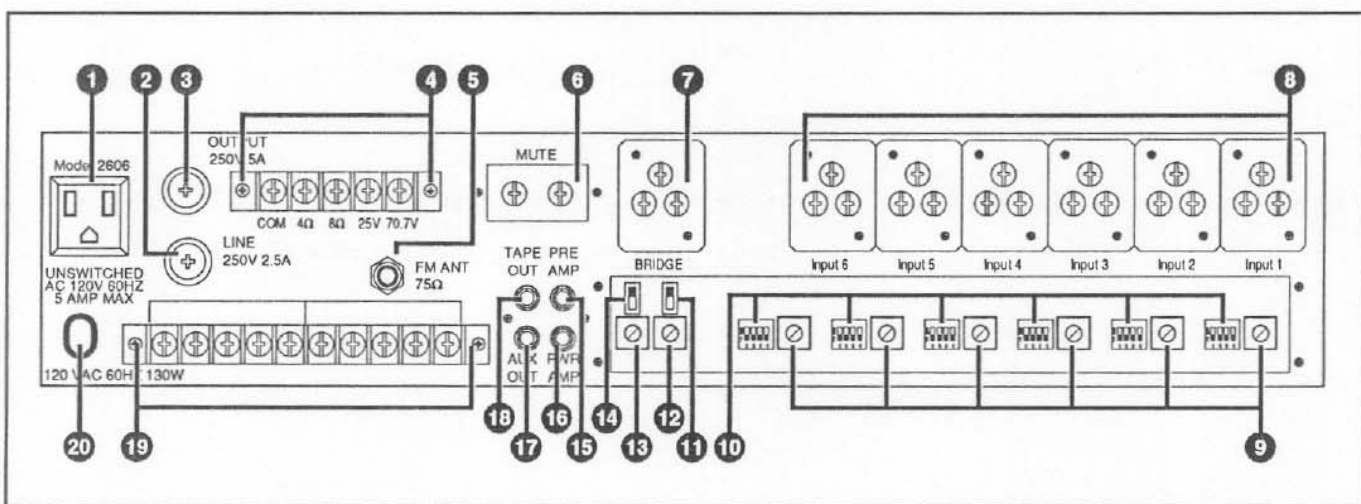
Dimensions	
Height	4.0" (10.1 cm) (2 rack-units w/feet removed)
Width	16.5" (41.9 cm)
Depth	12.25" (31.1 cm)

Weight	16 lbs (7.2 kg) (2303)	19 lbs (8.6 kg) (2603)
	18 lbs (8.1 kg) (2306)	21 lbs (9.5 kg) (2606)
	22 lbs (9.9 kg) (2312)	25 lbs (11.3 kg) (2612)



Front-Panel Features:

1. Unified Line Accessory Slot Cover
2. Power On LED Indicator
3. Signal Level LED Bar-Graph
4. Power On/Off Switch
5. Master Volume
6. Treble Tone Control
7. Bass Tone Control
8. Input Level Controls (inputs 1 - 3 on 2300 models)
(inputs 1 - 6 on 2600 models)



Back-Panel Features:

1. Accessory AC Power Outlet (unswitched)
2. Line Fuse
3. Output Fuse
4. Power Amplifier Output Screw Terminals
5. 75 Ohm FM Antenna Input (for use with DMT-200 accessory tuner)
6. Manual Mute Screw Terminals
7. Transformer Balanced Bridging Input/output Connector (screw terminals)
8. Input Connectors (inputs 1 - 3 on 2300 models)
(inputs 1 - 6 on 2600 models)
9. Input Gain Control (inputs 1-3 or 1-6)
10. Mute State and Phantom Power Selection Switches
11. Low-Cut Switch
12. Mute Threshold Control
13. Mute Level Control
14. Preamp Out/Power Amp In Link Switch
15. Pre-Amp Output (RCA phono jack)
16. Power-Amp Input (RCA phono jack)
17. Aux Output Connector (RCA phono jack)
18. Tape Output Connector (RCA phono jack)
19. Unified Line Accessory Screw Terminals
20. AC Power Cord Input

Unpacking

The unit should be removed carefully from the carton. If there is any evidence of damage which might have occurred in shipment, immediately notify your supplier or the transportation company that delivered it. Claims for damage sustained in transit must be made upon the carrier. Save all packing material for the claim agent who will supply you with the proper forms and give you the necessary instructions for filing a claim.

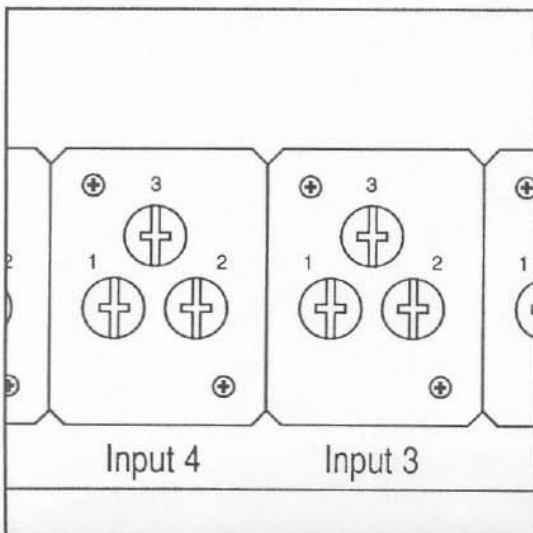
Installation

The unit may be positioned on a flat surface, where clearance allows adequate ventilation through the unit's ventilation holes. With the addition of rack ears, the unit can be mounted in a standard 19"-width equipment rack, and with the removal of the unit's rubber feet will take up two standard rack heights. A single rack space above and below the unit is recommended for adequate ventilation. Do not store or operate the unit in areas where the ambient temperature exceeds 140° F (60° C). Avoid installing the unit in close proximity to equipment that generates a strong magnetic field such as power transformers or electric motors. This field may be induced into the unit and appear as hum or noise in the output.

Power Connections

The unit can be powered from a standard 120 VAC 60 Hz outlet. A standard 3-prong electrical cord is permanently attached to the unit. The AC convenience outlet on the rear of the unit may be used to power other electrical devices. Avoid connecting devices to the convenience outlet that cause power line noise, such as electric motors, as this noise can be picked up by the unit and appear as hum or noise in the amplifier output. The maximum current that should be drawn from this outlet is 5 Amps.

Input Connections and Controls:

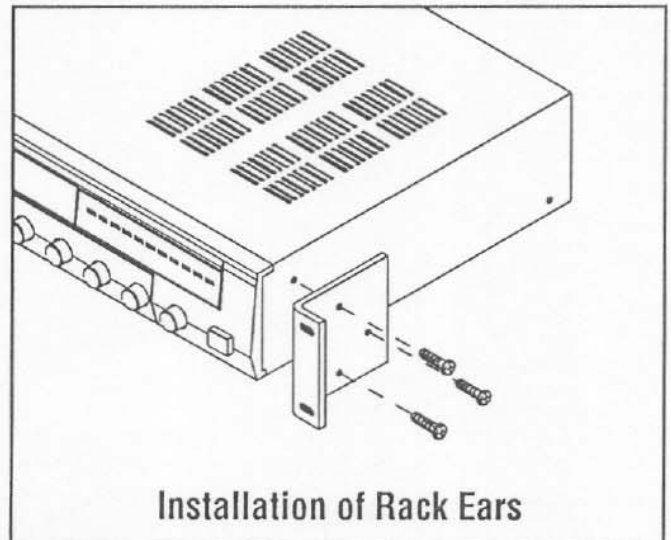


Circuit Protection

If the unit's fuse should blow during operation, the unit will cease to operate. This could be caused by many different things, including a line voltage surge or spike. Disconnect the power and replace the blown fuse with one of the same type and power rating. If the fuse continues to blow, the problem may be associated with the unit's internal circuitry. In this case, do not attempt to defeat the circuit protection's function — permanent damage to the unit or personal injury could result. Refer the problem to a qualified service technician, or return the unit to the factory for repair.



Never use an electric outlet that is not properly grounded, and never remove the ground prong from the electrical cord. Electrical shock can result.

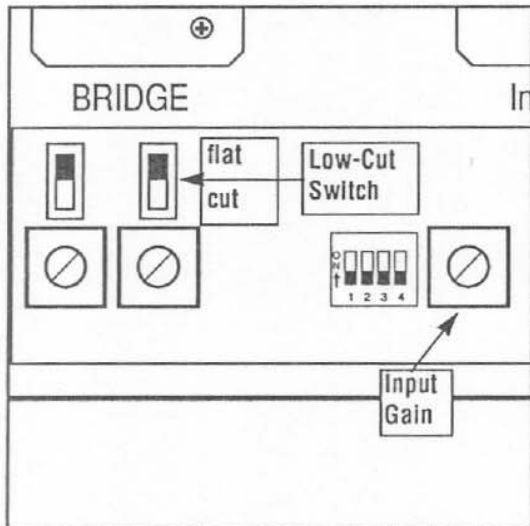


Installation of Rack Ears

Input Channel Connections

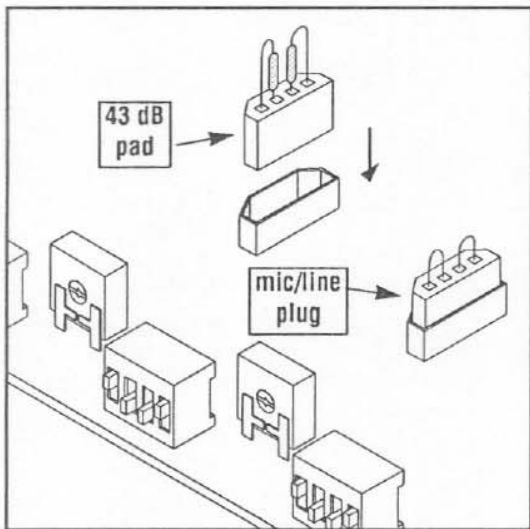
The 2000 Series come standard with 3-screw terminal connectors on all channel inputs. The terminals on each connector are numbered 1, 2, and 3 as shown in the diagram at left. Terminal 1 is the ground. When connecting a balanced input, the two center conductors of the input source cable should be connected to terminals 2 and 3, and the cable shield should be connected to terminal 1. When connecting an unbalanced input, the center conductor should be connected to terminal 2. The shield should be connected to both terminals 1 and 3. To conform with industry standards, terminal 2 is high (positive or "+").

Input Connections and Controls continued:



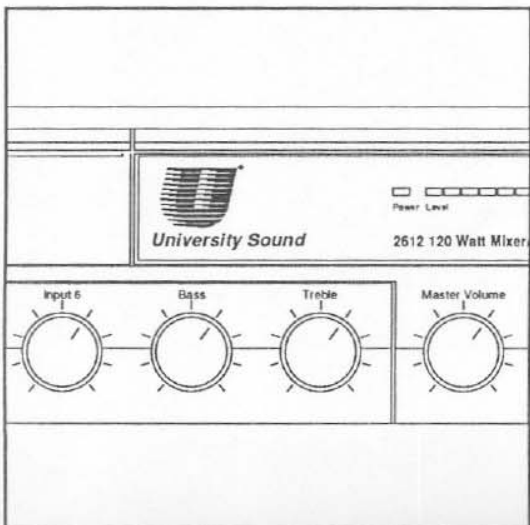
Input Gain and Low-Cut Controls

Microphone, Line, and Auxiliary input levels can be accommodated by each of the input channels. Each input has an individual gain control, located below the input connector and behind the input control coverplate. The coverplate must be removed to access the gain control. This control can be varied continuously from a "mic" level to a "line" level. This way, an input that is slightly above or below its rated level can be accurately matched. To match an input level, use a screwdriver to turn the gain control clockwise for Mic levels and counterclockwise for Line levels. Should exceptionally high levels be encountered, the optional 43 dB plug-in pad can be used in place of the factory installed mic/line jumper plug (see below). When using horn and compression driver speakers, it may be desirable to use the Low-Cut switch to lessen the low-frequency content of the output signal. This protects horn-type speakers from damage caused by low-frequencies.



43 dB Pad Installation

If an input source is encountered that is so high level that it causes an input to overload and distort even when the rear panel gain control is set full counterclockwise, the 43 dB pad can be used to bring the input source down to a manageable level. Remove the unit's top cover and locate the mic/line jumper plug for the channel requiring the 43 dB pad. Pull straight up on the mic/line plug to remove it. Insert the 43 dB pad plug (supplied loose with the unit in a plastic bag) in the same socket and replace the top cover. The rear panel gain control and front panel level control of the padded channel will operate as before, but will probably have to be adjusted to compensate for the reduction of gain. Note that with this pad installed, the input will not be sensitive enough to use with low-level input sources, such as a microphone.



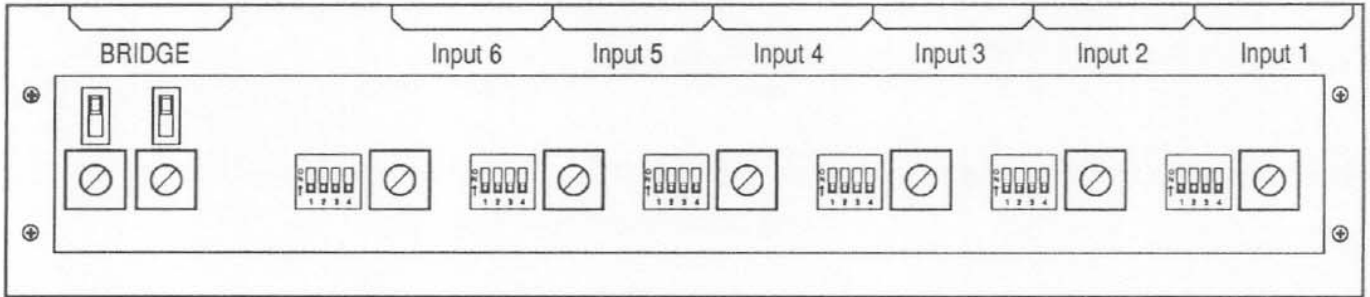
Front Panel Level and Equalization Controls

Once the individual input gains have been set to the proper level, adjustments can be made to the overall mix using the front panel level and equalization controls. When the individual channel levels are set for the proper mix, the master level control allows for uniform output level adjustment. Using the Treble and Bass equalization controls, the sound of the overall mix can be tailored to help compensate for room acoustics and to improve speech intelligibility.

DIP Switch Controls

Phantom power and mute status can be individually set for each channel by means of the rear panel DIP switches. Each 4-position DIP switch controls the phantom power and muting status for the channel next to the DIP switch. Switch assignments are shown in the figure below. A reproduction of this figure is located on the

inside of the plate covering the DIPs and gain controls. This template can be used to record the settings used for a particular installation for later reference. Once the settings are completed and marked on the template, replace the cover and screws to prevent tampering.



Phantom Power

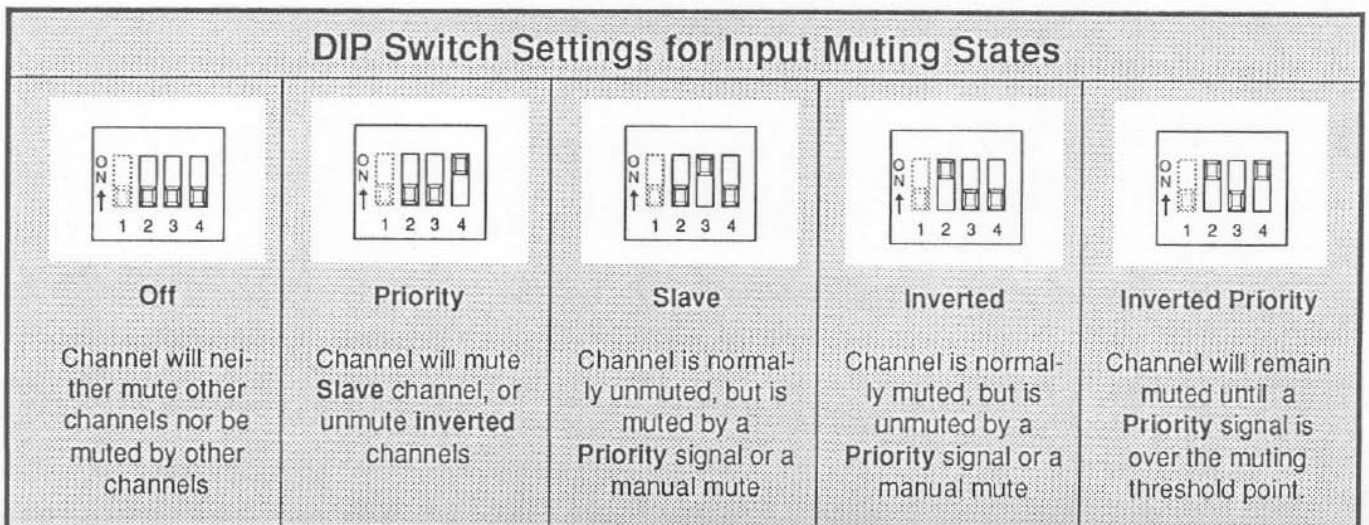
Each input channel is capable of providing a 24 VDC phantom power supply to power electret-type microphones. Switch position 1 (the left-most switch) on each DIP package is used to enable or disable the phantom power voltage. Each input on the 2000 Series has its own phantom power status. This design allows the use of electret-type microphones and non-phantom powered devices on the same mixer. To use 24 VDC phantom power on an input, set its corresponding switch to the "ON" position using a mini flat-head screwdriver. Be careful not to apply phantom power to a microphone not designed to use this power source; damage to the microphone can result.

Programmable Muting

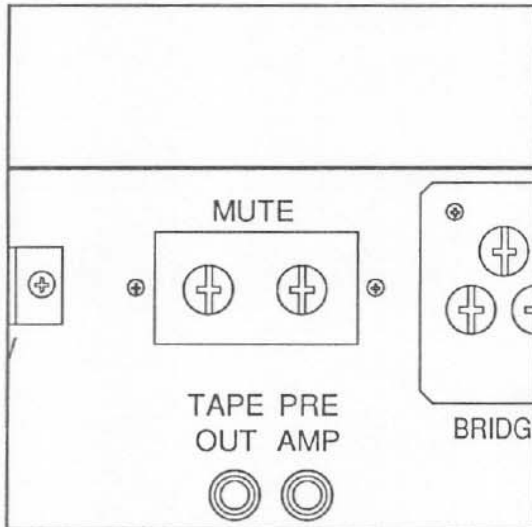
The 2000 Series has very versatile muting capabilities; five different muting configurations are available for each input. The installer may select manual or voice-activated muting and set both the variable mute thresh-

old and degree of attenuation. See the figure below for the DIP switch settings that correspond to each of the muting states. If the mute state of an input is set to "Off," that input will not be affected by the muting circuitry at all; it will not be muted by any other channel nor will it cause any other channel to be muted. The "Priority" and "Slave" states are the conventional muting arrangements found on most other paging mixer-amplifiers. An input set to Priority will mute all channels set to Slave (and unmute channels set to "Inverted"), when a signal is detected on that input. Slave channels will also be muted when the manual muting circuit is activated, while the Priority channels will be unaffected by a manual mute. The "Inverted" mute state will leave a channel normally muted, and unmute it when a signal is detected on a Priority channel or the manual mute is activated. This state is useful for attaching a single-strike tone generator to generate an alert chime before a page is made, since the channel needs to be open only while a page is being made.

(continued on page 8) →



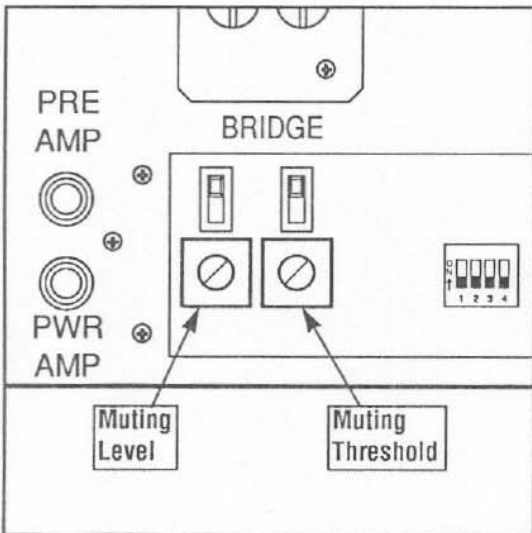
Input Connections and Controls continued:



Music Mute continued:

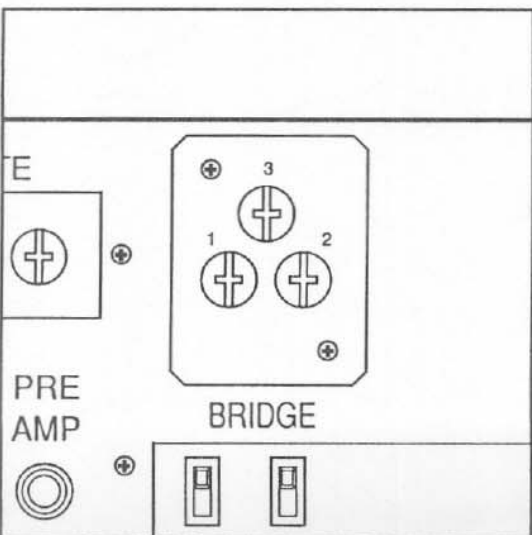
When no page is being made, the channel will be muted to reduce the line noise in the mixer output. A noise gate blocks noise and hum by disconnecting the input until it reaches the selected threshold level. On the 2000 Series, a channel set to "Inverted Priority" remains muted until a signal passes over the muting threshold point on that channel (or any other channel set to Priority or Inverted Priority). A manual mute contact closure also triggers this action.

Note: Setting all three mute programming switches on any of the DIP-switch packages to the "on" (upward) position will block any signal on that input from reaching the mixing buss. However, this input will trigger a mute if the signal on the input (even noise) is above the muting threshold.



The muting threshold — the level a signal must reach before the voice-activation is triggered — can be varied in sensitivity using the "Threshold" control on the back panel. Maximum sensitivity is set by turning this control full clockwise. The degree to which the muting circuit attenuates muted channels can also be varied from 15 dB of attenuation (control turned full counter-clockwise) to a maximum of 40 dB (control turned full clockwise).

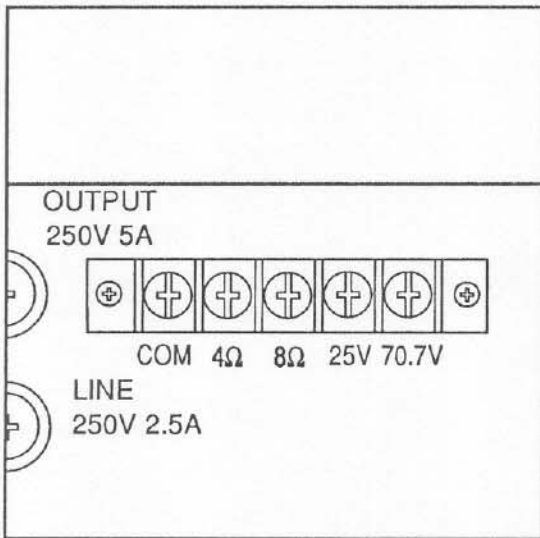
Muting can also be accomplished manually, using a contact closure to make an electrical connection between the two terminals marked "Mute" on the rear of the unit. The contact closure could be an external relay, a push-to-talk button on a microphone, or any other switch that will not carry current to the manual mute terminals. When manual muting is used, the Muting Threshold control should be set as high (least sensitive, or counter-clockwise) as possible to avoid having the muting circuit voice-activated when the switch is not depressed. The mute level control will operate just as it does with voice-activated muting.



Bridging Input/Output

The BRIDGE terminals can be used as an input or output. This transformer balanced connection carries an impedance of 5.6K Ohms, and is designed to allow multiple units to be connected together. Connect the terminals in parallel, and the signal mix of all connected units will appear at the output of each unit. The BRIDGE input/output is prior to the tone circuitry, so each connected unit retains its own bass and treble equalization control, as well as its own master volume control. Due to the inherent impedance loading of this type of circuit, the overall output level will drop slightly as units are connected together. As an example, six connected units will result in a drop of 10 dB at the output of any one unit. When using the BRIDGE as an additional input or output, the impedance of the source or load should be greater than 10KΩ to prevent excessive loading effects. To conform with industry standards, terminal 2 is high (positive or "+").

Output Connections:



Main Outputs

The power output terminals are located on the rear panel just to the left of the manual mute terminals. The power amplifier provides transformer-coupled outputs with connections for 4Ω and 8Ω impedances, and 25V and 70.7V line levels for use with distributed speaker systems. When connecting directly to speaker coils, use the 4Ω or 8Ω output, depending on the rated impedance of the speaker(s). Make certain that the rated impedance of the speaker(s) is not lower than the impedance of the output being used. Using a 4Ω speaker network with the 8Ω amplifier output can cause the amplifier to overload. When using transformer-coupled, constant-voltage speaker systems, use the 25V or 70.7V output. Two important benefits are realized when using constant voltage speaker systems. First, speaker cables can be run far longer with less power loss and signal degradation than with direct speaker coil connections. Second, the installer need only be concerned that the total wattage load of the speaker network not exceed that rated output of the amplifier; no complicated series/parallel calculations of the network's impedance are necessary. These benefits allow the installer far greater flexibility in setting up the sound system. For more information, ask your University Sound representative for a copy of University's Sound System Design Guide and Paging System Design Guide.

Power ratings of the models in the 2000 Series are as follows:

Models 2303 and 2603: 30 Watts RMS

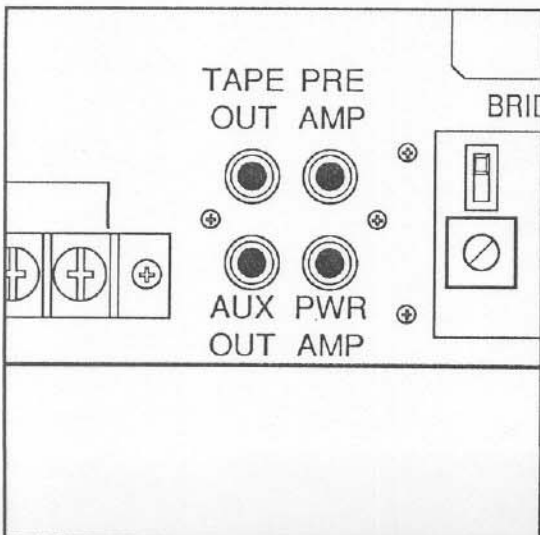
Models 2306 and 2606: 60 Watts RMS

Models 2312 and 2612: 120 Watts RMS

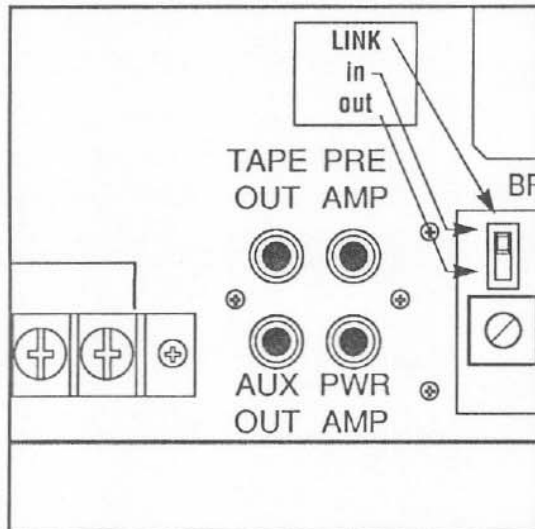
If these ratings are exceeded over continuous operation, the output protection fuse may blow. If this should occur, the unit's power amplifier will cease to operate, but the rest of the unit will continue to function (i.e., the power light will remain on). Reduce the load on the amplifier and replace the fuse with one of like kind and rating. Do not attempt to defeat the protection circuit; doing so could result in permanent damage to the unit.

AUX Output and TAPE Output

These outputs provide two ways to connect the unit's output to a power amplifier. Both outputs use standard RCA phono jacks, located on the rear-panel of the unit. The difference between the outputs lies in where each output appears in the circuit. The TAPE output is pre-master volume and pre-tone controls, and is not affected by the master volume, bass, or treble controls on the front panel. The AUX output is post-master volume, and is controlled by the master level. When connecting either of these outputs, shielded audio cables should be used to avoid RF/EMI interference pickup.



Output Connections:



PRE AMP output and PWR AMP Input

These two RCA phono jack connections serve a couple of important purposes: providing a way to insert signal processing devices (such as compressors/limiters and graphic equalizers) in the signal path, and providing a way to parallel the 2000 Series with other mixer/amplifiers of different model or make. When using the unit with signal processing equipment, connect the PRE AMP output to the signal processor's input, and the signal processor's output to the PWR AMP input. To prevent the dry, unprocessed signal from interfering with the processed signal, the LINK switch should be put in the "Out" position. This cuts the unit's internal signal path between the PRE AMP output and the PWR AMP input.

To use the 2000 Series in parallel with other mixer/amplifiers, keep the LINK switch in the "In" position. To lend additional output power to the mix of the 2000 Series unit, connect the PRE AMP output to the input of an additional power amplifier. To add inputs to the 2000 Series mix, connect the source with the additional input sources to the PWR AMP input. If the 2000 Series unit is being used as a power amplifier only (that is, the only source input to the unit is the source connected to the POWER AMP input), then the LINK switch should be in the "out" position to provide optimal performance.

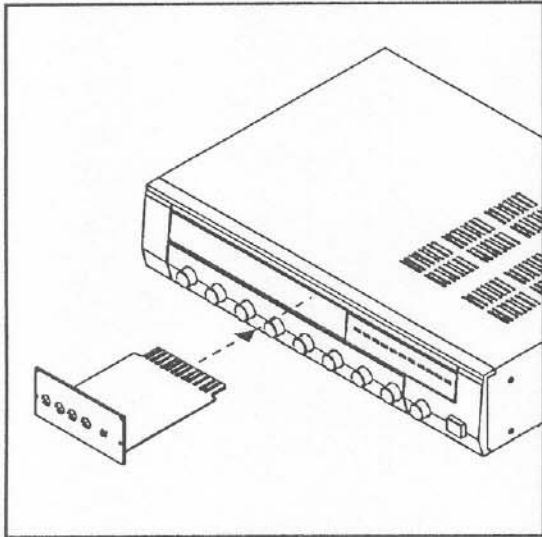
Shielded audio cable should be used for connections in both cases to avoid EMI/RFI interference pickup.



Connections to Unified Accessories and Modules

As part of the Unified Electronics Line, the 2000 Series are compatible with all Unified Accessory cards, which are inserted into the docking port located on the front panel. Any necessary external connections to these cards are made on the rear of the unit by means of a 10-position screw terminal strip. A stick-on label is provided with each Unified Accessory card to identify screw terminal functions; space for this label is provided immediately above the terminal strip. Refer to the accessory card owner manual when connecting to these terminals. See the following pages of this manual for general information on the use of the 2000 Series with other Unified Line products.

Use of University's Unified Electronics Line Accessories & Modules:



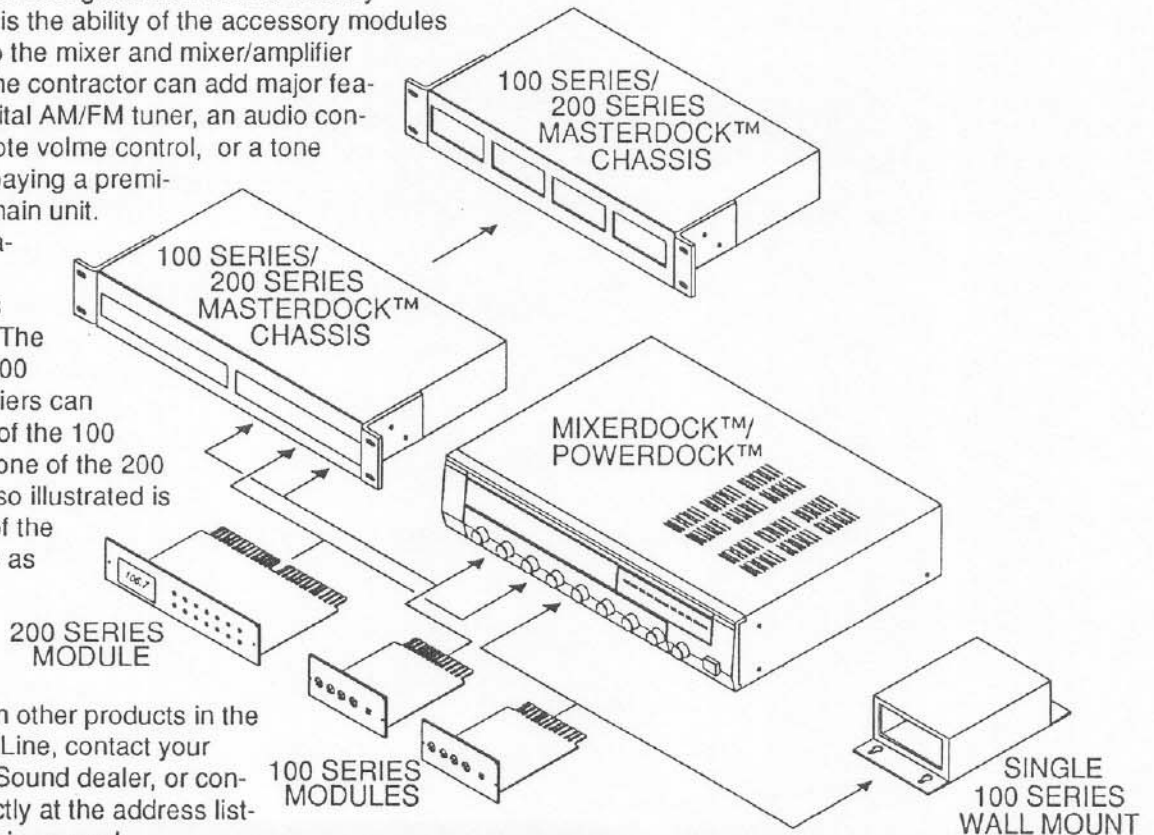
Installation

Installing Unified Electronics Accessory cards in the 2000 Series is an easy procedure. The front panels of the 2000 Series have a removable front cover that protects the accessory slot. To remove this cover, wedge a small flathead screwdriver under the right edge of the cover and pry the cover open. The cover should pop out easily. If you are installing a 100 Series module, the module can be inserted in the right or left slot. Push the card all the way in, making sure that the connection to the card edge connector is firm. Two 100 Series modules can be installed in a 2000 Series mixer/amplifier at one time. If only one 100 Series module is installed, a blank module faceplate can be used to cover the vacant card slot. To install a 200 Series module, the center card-edge guide must be removed. This can be accomplished by removing the phillips-head screw at the top of the guide and pulling the guide out. Only one 200 Series module can be installed in a 2000 Series mixer/amplifier. Refer to the module's owner's manual for further instructions on connecting to and operating the module.

Unified Line Accessories and Modules

The idea behind the Unified Electronics Line is to provide the contractor with a line of products that can be interchanged and interconnected to provide the widest possible variety of system configurations. One of the key aspects of this line is the ability of the accessory modules to plug directly into the mixer and mixer/amplifier units. In this way, the contractor can add major features such as a digital AM/FM tuner, an audio controlled relay, a remote volume control, or a tone generator without paying a premium for a "loaded" main unit.

As shown in the diagram, the Unified accessory modules come in two sizes. The MX-8 Mixer and 2000 Series Mixer/amplifiers can accommodate two of the 100 Series modules or one of the 200 Series modules. Also illustrated is the ability of each of the modules to operate as independent units, using Unified Line MasterDock™ chassis boxes. For more information on other products in the Unified Electronics Line, contact your nearest University Sound dealer, or contact University directly at the address listed on the back of this manual.



Installing the 2000 Series: An Example

In this section, a step-by-step process is outlined for installing a typical multi-input system using the 2000 Series. The methods used here can be applied to most applications involving paging. For more specialized installations, read these steps, but refer to the other equipments' instructions to insure proper installation.

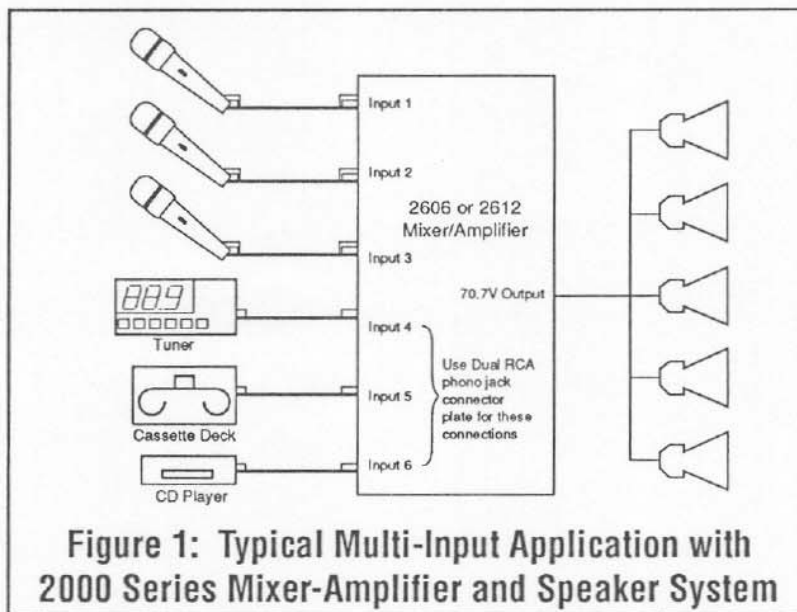
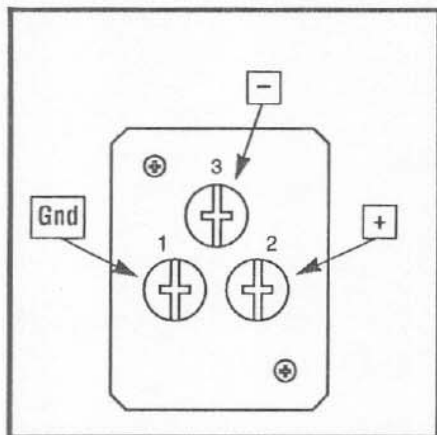
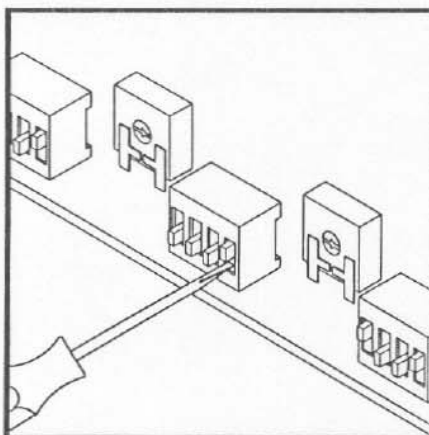


Figure 1: Typical Multi-Input Application with 2000 Series Mixer-Amplifier and Speaker System



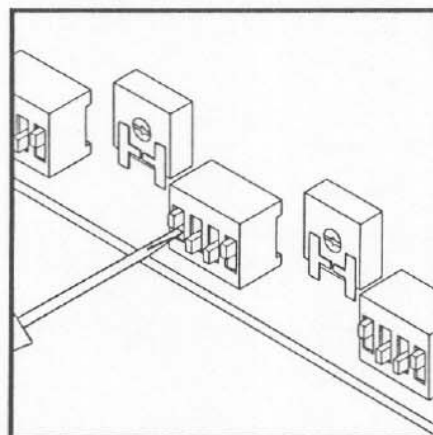
Connect Microphones to Input Connectors:

The 3-lug screw terminal connectors allow for connection of balanced inputs. Many people prefer to use XLR-type connectors with microphones, in which case the standard screw terminal can be easily replaced with a female XLR connector plate, available from your University representative. Balanced microphone cable contains three conductors that correspond to the three screw terminals. The cable shield should be connected to the terminal labeled "1" which is the ground connection. The two center wires should be connected to the terminals labeled "2" and "3." In our example, the first three input channels would be wired in this manner to accommodate the three microphones.



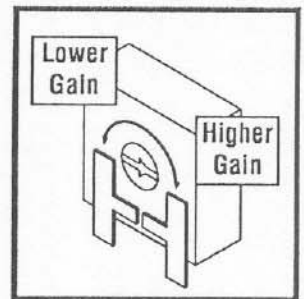
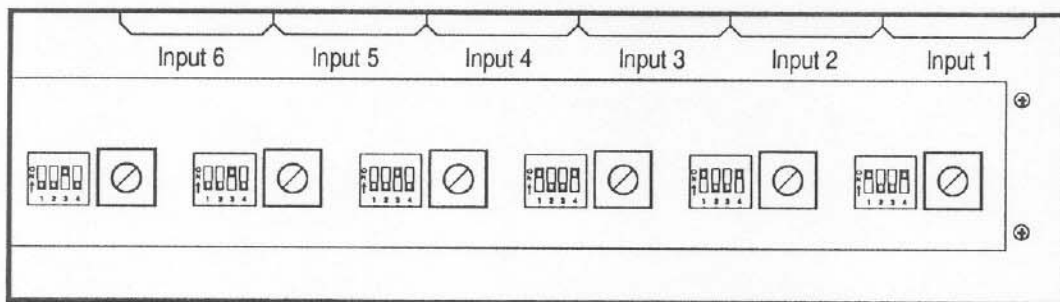
Setting the Muting Status:

The muting status of each input determines how that input behaves during a page. Refer to page 7 for the different muting statuses and their actions. In our example, we want the three music sources to be muted when a page is made on any of the three microphones. Remove the cover plate directly below in the input connectors to reveal the mute status DIP switches. The switches can be set using a flathead screwdriver to move the individual switch tabs. Set the microphone inputs (one through three) to "Priority" status, and set the music inputs (four through six) to "Slave" status.



Setting Phantom Power Status:

With the cover plate still removed, the phantom power status of each input can be set to on or off. In our example, we want to set the phantom power for the microphone inputs to on, while leaving all the other inputs with phantom power off. Using phantom power on an input source not designed to handle it can cause permanent damage to the input source. Note that not all balanced output microphones use phantom power; consult the microphone user manual or data sheet to determine whether phantom power be used for that microphone.

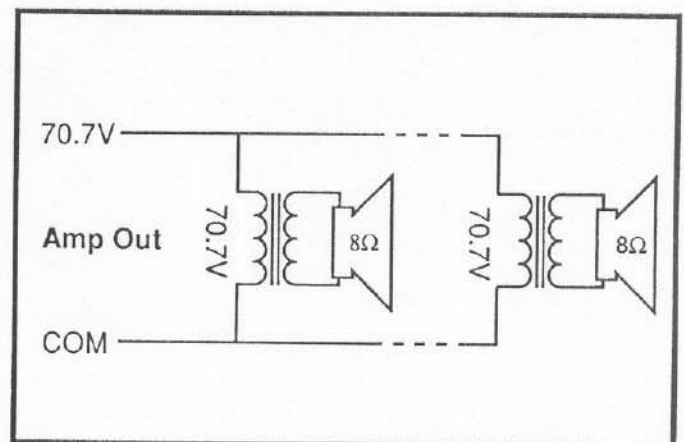
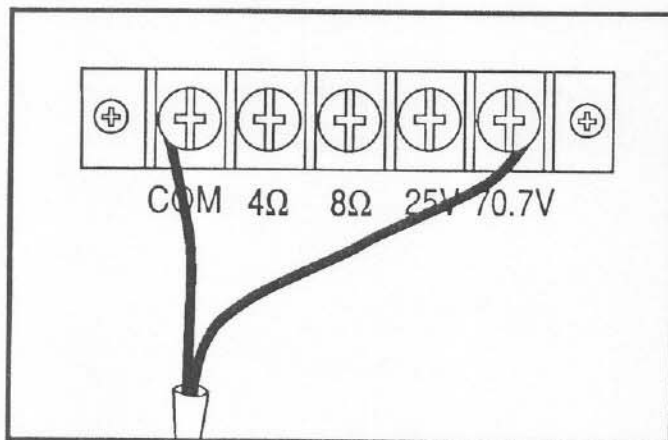


Setting the Input Levels and Equalization:

The figure above shows the proper DIP switch settings for our example application. Next, with all of the components in the system turned on, set the input levels on each input so that the output level at the speakers is consistent no matter which source is being used. Start with all of the level controls on the front of the mixer/amp set to zero (full counter-clockwise) and the BASS and TREBLE controls set to the middle position to prevent accidental speaker damage. Set the MASTER VOLUME control to a midway position. Each input has two level controls; one is located on the

rear panel and sets the input gain, and the other is located on the front panel and is analogous to a mixing console's fader slide control. For each input, set the input's source to an average level, and then slowly bring up the front panel level control. If the volume comes up too suddenly, the gain control on the rear panel should be set back (counter-clockwise) a bit. If the signal is too weak even when the level control is set fairly high, then the gain should be increased (set clockwise). As a general guideline, near full clockwise on the rear panel gain control is a good setting for a Lo-Z microphone source, while near full counter-clockwise is a good

setting for a tuner or tape output. When the output level LED bar-graph is registering in the red only at peaks in the input signal, the input level is properly set. Once this has been done for all of the inputs used, the sources should be checked in combination to make sure that the mix is fairly even and consistent. Some further adjustment of the level and gain controls may be necessary to accomplish this. Additional equalization adjustments can be made with the TREBLE and BASS controls on the front panel. These controls affect the overall tonal balance for all channels.



Making Power Output Connections

In this example, we use the 70.7V output of the amplifier. Using the 25V and 70.7V constant-voltage outputs offers two main advantages over using the 4Ω and 8Ω direct speaker-coil (or constant impedance) connections. First, cable runs with constant-voltage lines can be far longer than with constant impedance lines. It would be impractical

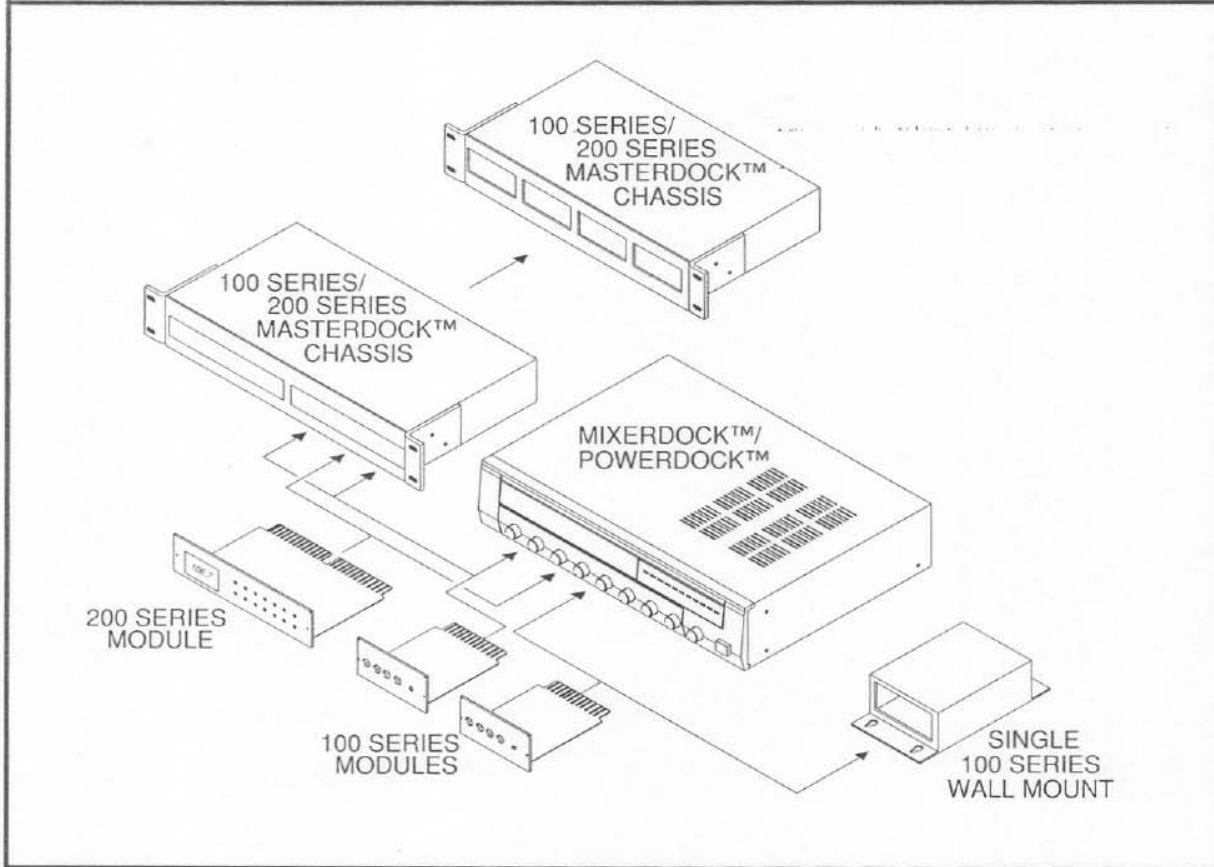
to use constant-impedance cable runs for most of today's building-wide installations; the resistance of the cable length would result in unacceptable power loss and sound quality degradation. Second, it is far easier for the installer to construct networks using constant-voltage lines. With constant-impedance speaker networks, the installer must perform complex series-parallel calculations to determine

whether the proper load is being applied to the amplifier. With constant-voltage networks, the speakers are always wired in parallel, and the load is determined by adding the power tap settings on each of the speaker transformers. If the sum of these settings is less than the rated output of the amplifier, then the system should operate correctly.

Unified Features

As part of University Sound's Unified Electronics™ Line, the 2306 and 2312 PowerDocks™ are fully compatible with all of the Unified Accessory Modules. This allows the 2306/2312 to be adapted to many different installations conveniently and inexpensively. All of the Unified Accessories come on circuit cards that can be plugged into the accessory slot on the 2306/2312 front panel. Any necessary external connections to

installed modules are made on screw terminals on the rear panel of the 2306/2312, preventing tampering and preserving the cosmetic appearance of the unit. For more information on other products in the Unified Line, contact your University Sound dealer or University Sound directly at the address on the back of this sheet.



Block Diagram

