

## Installation Manual



## FEATURES

- Patented Voice-Matic® automatic mixing
- LEVEL-MATIC II® AGC on Main output
- Smooth NOM attenuation control
- LAST MIC HOLD
- MixLink ILS® linkable chassis for input expansion
- Remote chassis linking for Room Combining
- Eight (four) OCMR electronically balanced Mic/Line inputs each with:
  - Automatic/Standard channel selection
  - Phantom power ON/OFF switching
  - Switched 20dB input pad
  - Switched 100 Hz High-Pass filter
  - Pre/Post gate selection to Aux outputs
  - Post-gate buffered preamp output
  - Pre-level control buffered preamp output
  - Channel Status logic output
- Three-band TEQ® on all Mic/Line inputs
- Remote level adjustments of all inputs and Main Output with 60dB control range
- Two independently adjustable auxiliary outputs
- Two electronically balanced auxiliary inputs
- Assignable mixing of Aux inputs to outputs for "Mix-Minus" connections
- Removable screw-clamp connectors
- Rugged all steel chassis for maximum RFI and EMI protection
- Remote switching of all inputs and Main output
- Remote Automatic/Standard mode selection
- Power-transient noise suppression circuitry

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## DESCRIPTION

The VM-4083 / VM-4043 Voice-Matic automatic mixer includes all the features needed to head the signal processing chain of any automatically mixed sound system.

All electronically balanced microphone inputs are independently convertible for line level signals and include switchable phantom power; switched input padding; defeatable 100 Hz High-Pass filters; 3-band TEQ equalization; Automatic/Standard mode selection; channel-status logic outputs; two single-ended buffered preamplifier outputs - one pre-level control and the other post-gate; plus pre/post gate assignment to an auxiliary output mixing bus. Individual three band input TEQ tone controls allow compensation for various frequency response characteristics from a mixture of microphone types. Automatically mixed input channels route through an enhanced Level-Matic II<sup>®</sup> AGC circuit (with DIP switch bypass). Two line level sources may be mixed to the outputs via an accessory pair of electronically balanced auxiliary inputs. DIP switch programming allows removal of these auxiliary signals from the mix to selected outputs. This feature can be used to make a mix-minus connection of a teleconferencing interface to the mixer; and to use a single tape machine for both recording and playback without the need of a switch.

The electronically balanced Main output is a mix of the gated microphone signals with NOM count attenuation and Level-Matic II<sup>®</sup> AGC, ungated signals from input channels switched to STANDARD mode, plus the auxiliary input signals assigned to this output. An auxiliary mix bus bypasses both the NOM attenuation and Level-Matic II<sup>®</sup> circuitry. Dual electronically balanced Aux outputs are provided for tape recordings, teleconferencing, hearing assistance systems, and other off premises transmissions.

The Auxiliary output signals include pre/post gate selection from all microphone channels, plus the auxiliary inputs assigned to these outputs (each auxiliary input is defeatable from the Aux output bus). Both auxiliary outputs have an independent level control to compensate varying input sensitivity requirements of external devices wired to these outputs. To prevent power surge transients, a supervisory sensing circuit mutes the Main output and Auxiliary output #1 during power interruption to the mixer.

All audio inputs and outputs use convenient and reliable, removable screw-clamp terminal blocks for ease of installation. Set-up adjustments for the automatic mode are simplified by a level indication which illuminates when an input channel sensitivity control is optimally positioned.

The mixer may be set to LAST MIC HOLD mode for the continuity of room ambience in the sound system and to other output devices. The LAST MIC HOLD feature keeps the most recently activated input channel held to the ON status until another active input is detected.

The VM-4083 / VM-4043 is linkable for the expansion of automatically mixed inputs. MixLink ILS<sup>®</sup> combines all the features of the automatic mixers, including Dynamic Threshold Sensing, NOM count attenuation, Level-Matic II<sup>®</sup> AGC, LAST MIC HOLD and Automatic/Standard mode selection among all linked chassis. Identical signals are transmitted to the Main Outputs of all linked mixers.

Aux bus signals are similarly combined and transmitted to the linked chassis Auxiliary Outputs. Easy configuration of room combining projects is possible via remote activation of link mode among the VM-4083 / VM-4043 Voice-Matic<sup>®</sup> Mixers.

Complete remote control capability is provided for all standard end-user adjustments. Each of the Automatically mixed inputs, Auxiliary mix inputs and the Main output may be connected to independent 10kOhm linear potentiometers for up to 60dB remote level adjustment range. Remote switching activates 90dB muting of the corresponding inputs and/or Main output. Remote selection of Automatic/Standard mixer operation is also provided.

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## APPLICATIONS

The Voice-Matic Microphone Mixer is ideal for use in multiple microphone sound systems installed in Board Rooms, Court Rooms, City Council Chambers, Churches, Schools, Conference Rooms, Teleconferencing Systems, Hotels, and Convention Centers.

The VM-4083 / VM-4043 automatic mixers are particularly effective in reducing the pick up of background noise that may be amplified by a sound system, or for replacing standard mixers in systems that produce feedback howl without adequately loud sound levels. Rooms which sound reverberant with standard mixers will have much better quality and improved intelligibility with a VM-4083 / VM-4043 Voice-Matic Mixer.

## OPERATING PRINCIPLES

The Voice-Matic<sup>®</sup> Microphone Mixer is unique in operating principle. It uses Dynamic Threshold Sensing (DTS) to differentiate between active and inactive microphones. Dynamic Threshold Sensing utilizes a combination of the amplitude and history of the signal to determine channel access. DTS generates a threshold reference which decays over an 80dB range from a high level to a low level in a 10ms or less interval. All microphone inputs are referenced to the threshold simultaneously. The first channel whose instantaneous amplitude equals or exceeds the sweeping threshold is given temporary ON status for 200ms. Simultaneously, the threshold is reset high for 7ms and another sweep is initiated. Since any active input will equal or exceed the decaying threshold earlier in its sweep, the average sweep time is only 3 to 4ms and the frequency of the intervals will be increased.

On a repeated sweep the same or a different channel may have the highest instantaneous amplitude and receive temporary ON status. In this way, the active microphone channels are detected and their ON status is renewed. Several microphones can have simultaneous ON status and be effectively updated without dropouts. Rather than turning an inactive microphone OFF it is attenuated by an internally pre-set 30dB. The microphone is rapidly turned ON when it receives a signal, preventing upcutting of leading syllables. A continuous count of the number of ON microphones is used to adjust the master amplifier gain according to the rule of reducing gain by 3dB for each doubling in the number of simultaneously active microphones.

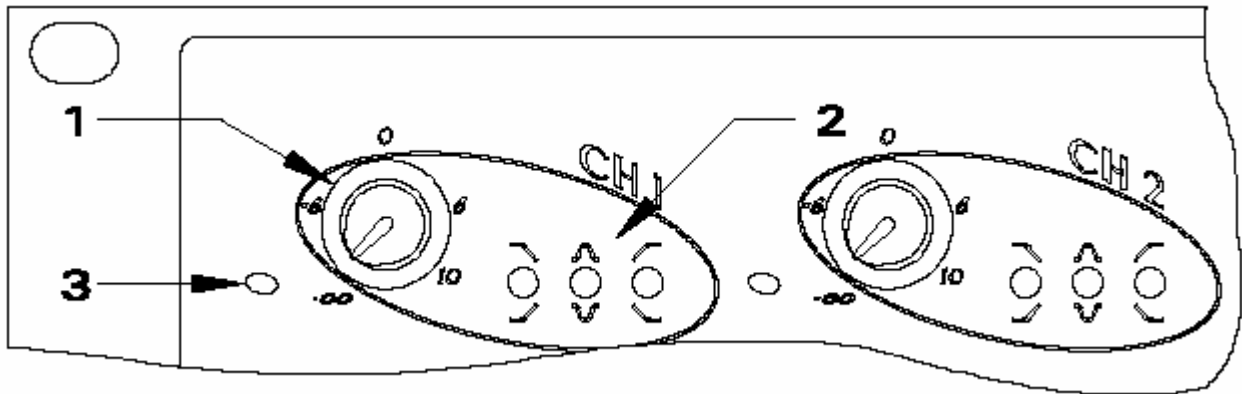
The Level-Matic II<sup>®</sup> AGC incorporated in the VM-4083 / VM-4043 mixer performs an important function typically performed by a manual operator in a sound system. The Level-Matic II<sup>®</sup> AGC circuitry automatically adjusts the master output gain to maintain a uniform output signal level for input level variations of as much as 10dB. The Level-Matic II<sup>®</sup> gain control is based on the loudness versus frequency and loudness versus time response of the human ear. A loud talker causes the master gain to decrease. If the talker stops talking the gain holds as established by the talkers average speaking level. If a quiet talker then begins to use the system, the gain increases to a new value as established by his average speaking level. Two control voltages are created in the circuitry, one circuit establishes a semi-stationary control voltage and another circuit creates a voltage which follows the signal peaks. At any instant, an attenuation circuit is governed by one, but not both, of these control voltages. Gain corrections are made at a constant slew rate to minimize gain "hunting".

The three-band equalizer incorporated on each of the Mic/Line inputs on the VM-4083 / VM-4043 is designed to compensate for an undesired frequency response in a source. The equalizer utilizes transversal technology (TEQ<sup>®</sup>) to produce three adjustable minimum phase response curves focused on the speech spectrum of the typical human voice. The transversal equalizer utilizes an analog all-pass phase shift network and the application of Fourier Transform theory to synthesize a filter by its time response. This creates an equalizer with a continuous smooth response curve without band-edge ripple, excellent transient response and minimum coloration of the original signal.

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## CONTROL

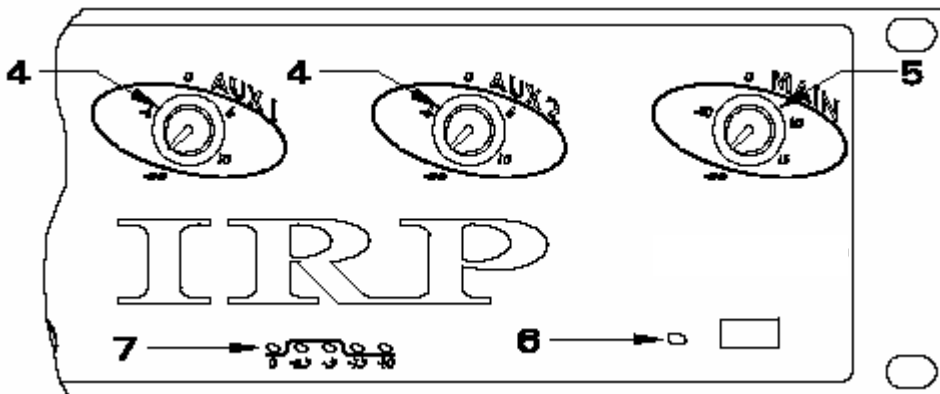
### FRONTPANEL



**1. INPUT CHANNEL SENSITIVITY CONTROL:** This control is used to adjust the amount of amplification (gain) between the input and output stage of the channel.

**2. TEQ:** These are tone controls used to adjust the low (L), mid (M), and high (H) frequency response for the respective channel. Both the low and high frequency controls use a shelving characteristic filter which starts at 320 Hz and 2000 Hz respectively. The center control is Boost/Cut centered at 800 Hz. Each control has 20dB of range.

**3. STATUS LED:** This indicates when a channel has been activated.



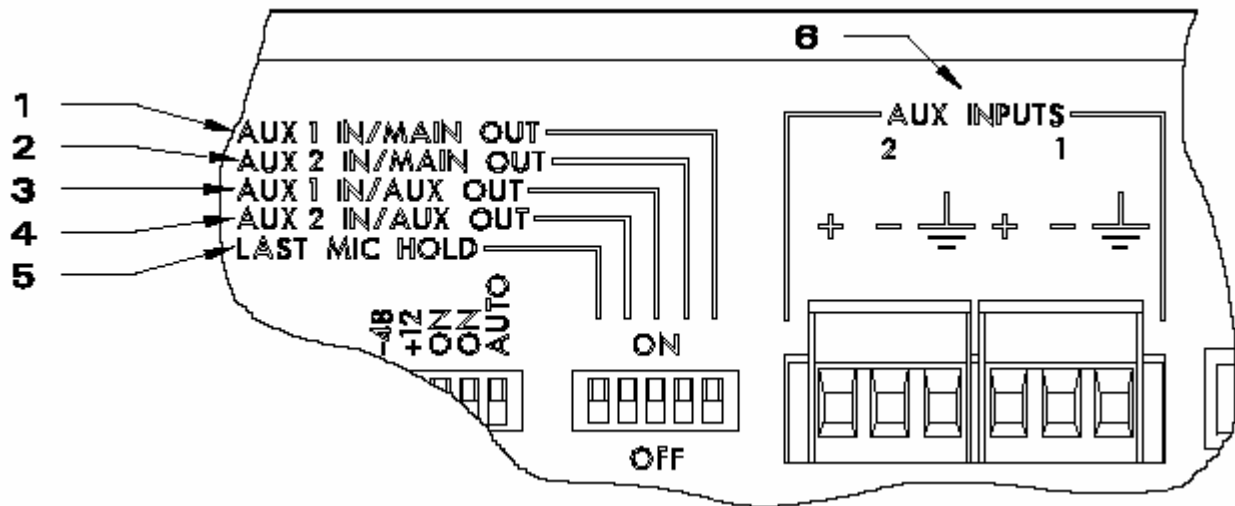
**4. AUX 1 & 2 IN CONTROLS:** These controls are used to adjust the amount of amplification (gain) between the input and output stage of the respective auxiliary input.

**5. MAIN OUTPUT CONTROL:** This is used to adjust the output level of the MAIN output.

**6. POWER:** Depressing this switch energizes the VM-4083 / VM-4043 and is indicated as such by an adjacent LED. The LED will illuminate approximately 2 seconds after switch activation and gives "power on" indication.

**7. LEVEL-MATIC:** These LED's indicate the amount of gain reduction the AGC (Automatic Gain Control) is applying to the main output to achieve a uniform output level.

### REARPANEL



1. **AUX 1 IN/MAIN OUT:** This switch is used to assign the AUX 1 input to the MAIN output.

2. **AUX 2 IN/MAIN OUT:** This switch is used to assign the AUX 2 input to the MAIN output.

3. **AUX 1 IN/AUX OUT:** This switch is used to assign the AUX 1 input to the AUX outputs.

4. **AUX 2 IN/AUX OUT:** This switch is used to assign the AUX 2 input to the AUX outputs.

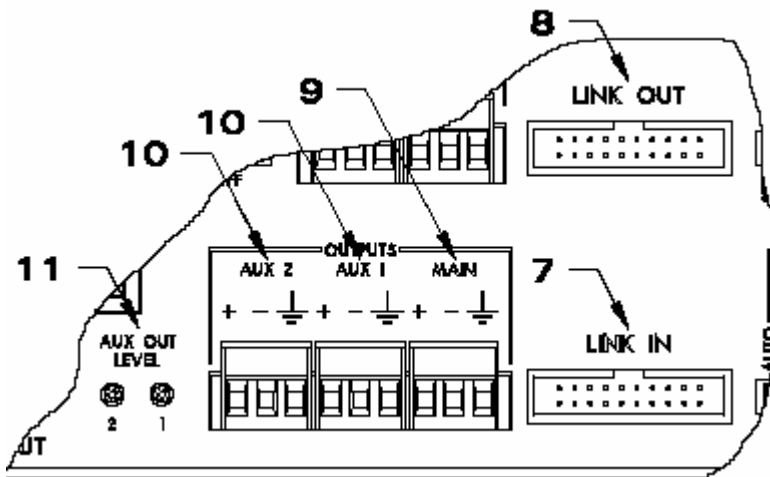
5. **LAST MIC HOLD:** This switch is used to enable (ON) or disable (OFF) the LAST MIC HOLD feature. The LAST MIC HOLD circuitry keeps the most recently activated microphone channel held to the “on” state until another input channel receives a signal. This feature can be used to enhance microphone continuity during breaths and between musical phrases when reinforcing a soloist, while the mixer is in AUTO mode. LAST MIC HOLD can also be engaged to keep the continuity of room ambience in the sound system, recording signal or broadcast signal.

6. **AUX 1 & 2 INPUTS:** These are electronically balanced inputs which can be used to interface signals from a cassette deck, CD player, other mixers or any other line level signal which may need to be interfaced to the VM-4083. Each AUX input can be assigned to either the Main output, AUX outputs or both. This signal routing versatility allows a “Mix-Minus” configuration to be created with the VM-4083.

“**Mix-Minus**” signifies that the input signal to a device is a mix of all signals without (Minus) the output signal from the device. The “Mix-Minus” configuration eliminates electrical feedback paths when simultaneously connected inputs and outputs of an external device are interfaced to the VM-4083.

7. **LINK IN:** These connectors are used for the linking of additional VM-4083’s to provide more automatically mixed inputs. The LINK IN and LINK OUT on the same unit SHOULD NEVER BE CONNECTED TOGETHER.

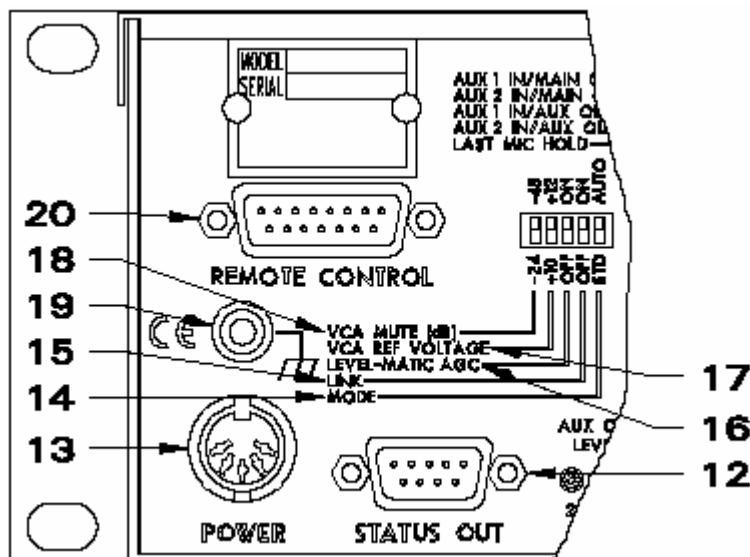
8. **LINK OUT:** These connectors are used for the linking of additional VM-4083’s to provide more automatically mixed inputs. The LINK IN and LINK OUT on the same unit SHOULD NEVER BE CONNECTED TOGETHER.



**9. MAIN OUTPUT:** This is an electronically balanced output which is a mix of the gated microphone signals with NOM (Number of Open Microphones) count attenuation and LEVEL-MATIC AGC, ungated signals from input channels switched to standard mode (STD) plus the AUX input signals assigned to this output. The MAIN output is muted during power interruptions to the mixer.

**10. AUX 1 & 2 OUTPUTS:** These are electronically balanced outputs which are a mix of the pre/post gate selection from all microphone channels plus the auxiliary inputs assigned to these outputs. The AUX outputs are not affected by NOM attenuation and LEVEL-MATIC circuitry. Both AUX outputs have identical signals, but each output has an independent level control. The AUX 1 output is muted during power interruptions to the mixer. AUX 2 output is **NOT** muted.

**11. AUX OUT LEVEL 1 & 2:** These two controls are used to independently adjust the level of the AUX 1 & 2 outputs.



**12. STATUS OUT:** Microphone status outputs are available at this point via a DB-9 connector (See Figure 1 for pin configuration). The STATUS OUT provides an open collector output for each microphone channel. The STATUS OUT is low (transistor conducting) when the corresponding

microphone is ON. Loads connected to the STATUS OUT must have an externally supplied power source or an external pull-up resistor for input termination when connecting to a logic circuit. Refer to the *STATUS OUT APPLICATIONS* section for more details on the use of the STATUS OUT.

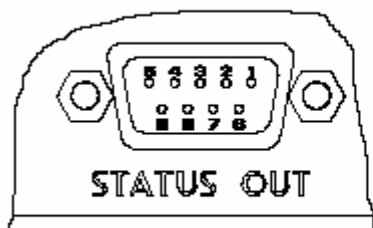


Figure 1

Pin	Function
1	Input 1 Status
2	Input 2 Status
3	Input 3 Status
4	Input 4 Status
5	Input 5 Status
6	Input 6 Status
7	Input 7 Status
8	Input 8 Status
9	Ground

**13. POWER:** This five pin din connector is used to connect the PS-1 external, low voltage AC power supply to the VM-4083.

**14. MODE:** This switch is used to select whether the mixer will operate in standard mode (STD) or in automatic mode (AUTO). (STD) mode can be used if manual, attended operation of the mixer is desired. In (STD) mode all microphones are open. Channels individually set to (AUTO) mode will continue to be affected by the LEVEL-MATIC (if LEVEL-MATIC is activated on the mixer) and channels set to (STD) mode will bypass the LEVEL-MATIC.

**15. LINK:** This switch enables (ON) or disables (OFF) the link between mixers. LINK mode combines all the features of the automatic mixers, including Dynamic Threshold Sensing (DTS), NOM count attenuation, LEVEL-MATIC AGC, LAST MIC HOLD and Automatic/Standard mode selection among all linked chassis. Identical signals are transmitted to the MAIN and AUX

outputs of all linked mixers. Easy configuration of room-combining can be accomplished via remote activation of LINK mode among the VM-4083 / VM-4043 mixers. In order to successfully link two units, a link connector must be inserted in the (LINK OUT) jack of one unit and into the (LINK IN) jack of the other unit. Also, either the (LINK) switch on the lower unit must be in the (ON) position or pin 14 on the REMOTE CONTROL connector, of the lower unit, must be connected to ground (pin 15) to enable the link function.

**16. LEVEL-MATIC AGC:** This switch enables (ON) or disables (OFF) the LEVEL-MATIC AGC circuitry. When activated, the LEVEL-MATIC AGC circuitry will automatically adjust sound system gain to maintain a uniform output level by sensing changes in average input signal. This compensates for sound level variations between loud and soft talkers or from varying talker to microphone distance.

**17. VCA REF VOLTAGE:** This switch is used to select either +10 or +12 VDC as the VCA reference voltage. This reference voltage is available from the REMOTE CONTROL connector. Using the +12 VDC setting allows externally connected remote potentiometers to add 10 dB of gain to the system beyond the setting of the INPUT SENSITIVITY CONTROL. When the switch is set to +10 VDC, the maximum amount of gain the remote control can contribute to the system is governed by the setting of the INPUT SENSITIVITY CONTROL.

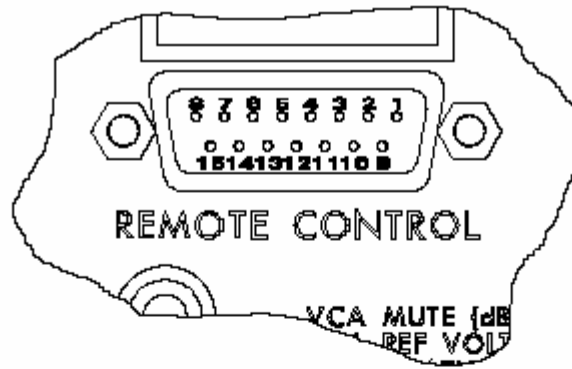
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**18. VCA MUTE (dB):** This switch is used to select the range, either -24 or -48 dB, which the remote control operates in before activating the 100 dB mute on the respective channel.

**19. CHASSIS GROUND:** This terminal is used as means to earth ground the VM-4083 / VM-4043 chassis. For the best possible RF interference immunity, this connection must be connected to a high integrity earth ground. When linking units, all of the chassis ground points should be connected together.

**20. REMOTE CONTROL:** The remote muting and level control for the MAIN output, all CHANNEL INPUTS and AUX 1 & 2 inputs as well as the VCA reference voltage, LINK and AUTO/STD control points are accessed at this DB-15 connector (See Figure 2 for pin configuration).

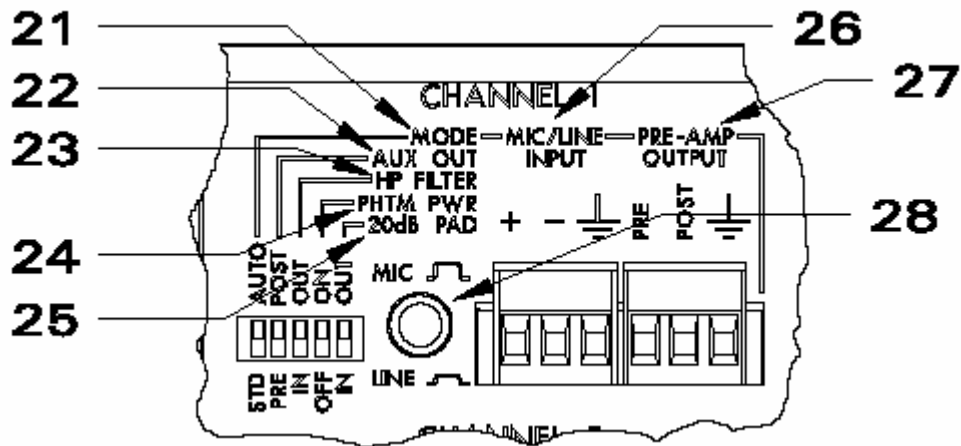
Muting of the inputs and MAIN output is accomplished by a simple contact closure to ground or an open collector output. The toggling of functions such as LINK (ON/OFF), AUTO/STD are also accomplished by using a simple contact closure to ground or open collector. The remote level control of the inputs and MAIN output is accomplished by using a 10 kOhm linear potentiometer. Refer to the *REMOTE CONTROL APPLICATIONS* section for more details on the use of the REMOTE CONTROL.



Pin	Function
1	Input 1 Remote Level/Mute VCA
2	Input 2 Remote Level/Mute VCA
3	Input 3 Remote Level/Mute VCA
4	Input 4 Remote Level/Mute VCA
5	Input 5 Remote Level/Mute VCA
6	Input 6 Remote Level/Mute VCA
7	Input 7 Remote Level/Mute VCA
8	Input 8 Remote Level/Mute VCA
9	Main Output Remote Level/Mute VCA
10	Aux 1 Remote Level/Mute VCA
11	Aux 2 Remote Level/Mute VCA
12	VCA Reference Voltage
13	Auto/STD Mode
14	Link Mode On/Off
15	Ground

**21. MODE:** This switch is used to select whether the respective MIC/LINE channel will operate in standard mode (STD) or in automatic mode (AUTO). (STD) mode can be used if manual, attended operation of the channel is desired or when a channel needs to be left open. In (STD) mode both the Voice-Matic and LEVEL-MATIC circuitry are bypassed.

**22. AUX OUT:** This switch is used to select either pre-gate (PRE) or post-gate (POST) signal to the AUX outputs. This simply means that when the switch is set to (PRE), the signal that is sent to the AUX outputs is un gated and when set to (POST), the signal sent to the AUX outputs is gated.



**23. HP FILTER:** This switch is used to enable (IN) or disable (OUT) the 6dB/octave 100 Hz high pass filter on the respective channel. This feature can be used to minimize microphone handling noises and other undesirable low frequency sounds.

**24. PHTM PWR:** This switch is used to enable (ON) or disable (OFF) the +15 VDC phantom power supply on the respective channel. The PHTM PWR feature should be switched (ON) whenever using electret condenser microphones and (OFF) when using dynamic microphones, wireless microphone receivers or any other signals which do not require phantom power.

**25. 20dB PAD:** This switch is used to enable (IN) or disable (OUT) the 20 dB pad on the respective channel. The 20dB pad is provided for microphones which have a high output level or for any signal that may overload the channel input. The 20dB pad may also be engaged to make better use of the control range of the INPUT SENSITIVITY control. For example: if the INPUT SENSITIVITY control has to be set between the -20 and -10 settings, the 20 dB pad should be engaged to allow the control to be set more in the middle of the control range allowing the INPUT SENSITIVITY to be set more accurately.

**26. MIC/LINE INPUT:** This is an electronically balanced input which will accept both microphone and line level signals depending on the setting of the MIC/LINE switch.

**27. PRE-AMP OUTPUT:** Both PRE and POST unbalanced signals from the respective channel are available at this point. The PRE signal is pre-input channel sensitivity control, pre-TEQ and pre-gate. The PRE signal is also not affected by the remote level control. The POST signal is post-INPUT CHANNEL SENSITIVITY control, post-TEQ, post-gate and is affected by the remote level control. Both the PRE and POST outputs are affected by the high pass filter (HP Filter).

**28. MIC/LINE :** Depressing this switch inserts a 40dB balanced attenuator between the transformer and the MIC/LINE input connector to allow the channel to accept line level signals.

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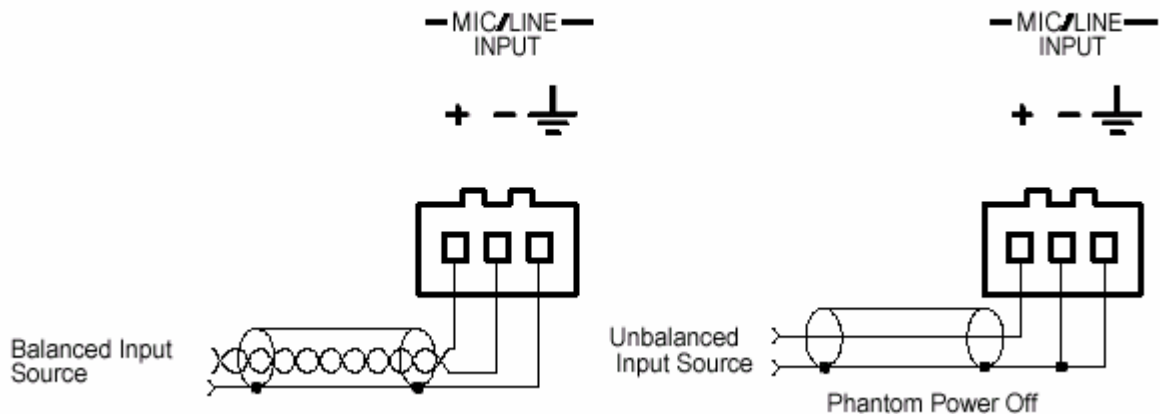
## VM-4083 / VM-4043 INSTALLATION

**1. MOUNTING:** The VM-4083 / VM-4043 is intended to be mounted in a standard 19" equipment rack. 2RU of rack space is required.

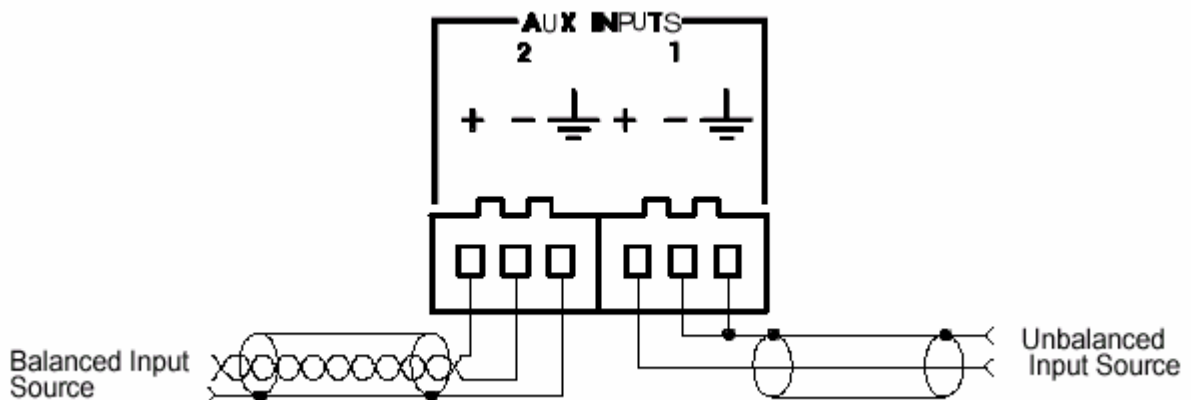
**2. POWER CONNECTIONS:** Once the VM-4083 / VM-4043 is mounted, the PS-1 power supply (packaged with the VM-4083) is now ready to be connected. **Before plugging the VM-4083 / VM-4043 into an AC outlet be sure that the PS-1 voltage select switch, located near the three pin AC socket on the PS-1, is set in the proper position for the type of AC voltage available in your area.** Plug the PS-1 into the connector labeled POWER on the rear of the unit. The five pin power connector used is keyed so be sure to line up the keys on both connectors before attempting to insert the connector into the unit.

Once the PS-1 has been plugged into to the VM-4083 / VM-4043 and the voltage select switch set in the proper position, the AC cord can now be connected to the PS-1 and then to a grounded 115/230 VAC 50/60 Hz power source.

**3. MIC/LINE INPUT CONNECTIONS:** These inputs are electronically balanced and can be configured to accept both microphone and line level signals via a switch setting located on each channel. Two conductor, shielded twisted pair cable is recommended for connecting to these inputs.

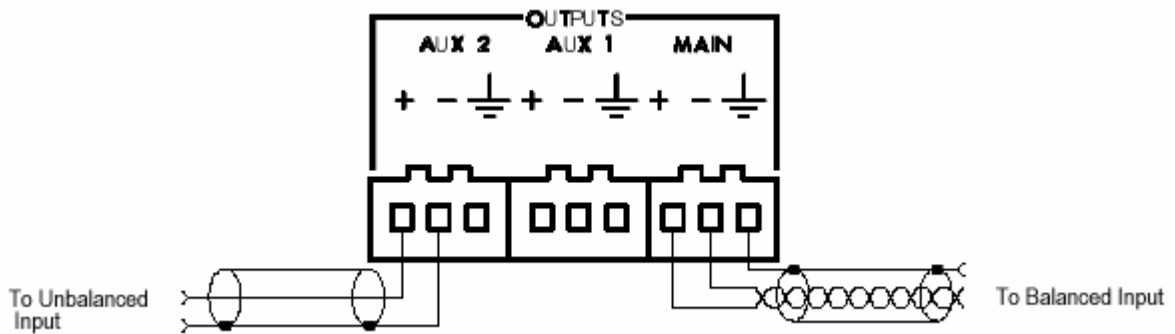


**4. AUX INPUTS CONNECTIONS:** These inputs are electronically balanced and configured to accept a line level signal. Two conductor, shielded twisted pair cable is recommended for connecting to these inputs.



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**5. OUTPUT CONNECTIONS:** These outputs are line level and should never be terminated to a load of less than 600 Ohms.



**6. REMOVABLE SCREW-CLAMP CONNECTOR TERMINATION:**

1. Solid or stranded wire up to 12 AWG may be used.
2. Strip back 5/16" of wire insulation then insert the bare wire into the screw-clamp opening and tighten the screw down onto the wire.
3. DO NOT TIN WIRE WITH SOLDER!!! Cold flow of solder will loosen the connection of tinned wires.
4. Multiple conductors may be terminated together whenever the 12 AWG equivalent is not exceeded. It is recommended that multiple conductors be the same AWG size. The wires must be twisted tightly together, especially when mixing AWG sizes.

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## **VM-4083 / VM-4043 SET UP PROCEDURE**

- 1.** Connect all input sources to the MIC/LINE inputs. Connect MAIN and AUX outputs to their designated inputs.
- 2.** Set all channel switches in the desired configuration. When using dynamic microphones, the phantom power switch should be set to the (OFF) position. When using condenser microphones the phantom power switch should be set to the (ON) position and the 20 dB pad may have to be enabled. If a wireless receiver is connected to one of the MIC/LINE inputs the MIC/LINE switch should be depressed and the phantom power switch set to the (OFF) position. Some wireless microphone receivers have a mic level output, therefore the MIC/LINE switch should be in the (MIC) position and the phantom power switch set to the (OFF) position.
- 3.** Rotate the MAIN OUTPUT control fully counter-clockwise.
- 4.** Rotate the L, M, and H TEQ controls to the center position.
- 5.** Turn (ON) the LEVEL-MATIC so that the indicators can be used during the set up procedure. This switch is located on the rear panel of the unit.
- 6.** Turn (OFF) the LAST MIC HOLD feature to insure the gating of the MIC/LINE input channels is working properly. This switch is located on the rear panel of the unit.
- 7.** Set the main MODE switch (not the MODE switch located on each channel) in the AUTO position. This switch is located on the rear panel of the unit.
- 8.** Set the CHANNEL INPUT SENSITIVITY control for each microphone by using normal speech level (conversation level, 60-70 dB) about one foot from the microphone or a calibrated signal source so that the -2.5 dB indicator of the LEVEL-MATIC is activated. Rotate all unused CHANNEL INPUT SENSITIVITY controls fully counter clockwise. A practical assessment of proper CHANNEL INPUT SENSITIVITY control settings can be made by monitoring the Status LED activity. Constant flickering of the Status LEDs without talker activity indicates that the CHANNEL INPUT SENSITIVITY control setting is too high for the background noise condition (decrease CHANNEL INPUT SENSITIVITY). An extremely low CHANNEL INPUT SENSITIVITY control setting could cause discrimination against a weak talker. Note that occasional flickering of status LED's is normal and desirable, unless the room is extremely quiet, such as a recording studio.
- 9.** If a CHANNEL INPUT SENSITIVITY control for a microphone has to be operated in the lower end of the control range, the 20 dB pad should be enabled so the CHANNEL INPUT SENSITIVITY control can operate in the middle to upper range of the control.
- 10.** Turn the LEVEL-MATIC (OFF) and bring up the MAIN OUTPUT control to a few dB below feedback then turn the LEVEL-MATIC (ON), if the LEVEL-MATIC function is desired.
- 11.** The TEQ tone controls can be adjusted by simply listening to the MAIN output with a talker speaking into each microphone. This procedure can also be done by listening to each microphone output separately by connecting the PRE-AMP output of each channel to a headphone amplifier and listening to the channel through a set of headphones. Remember when the L, M, and H controls are increased the gain of the channel is increased, thereby increasing the gain of the system. So, the MAIN OUTPUT control or the INPUT SENSITIVITY controls may need to be readjusted, if the TEQ controls are increased and feedback occurs.
- 12.** The unit can be set for LAST MIC HOLD operation if desired.

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13. Connect any line level sources to the AUX 1 and 2 inputs and adjust the levels accordingly into the main mix.
  14. When the inputs and the MAIN output have been adjusted along with the switch settings for the AUX 1 and 2 inputs, the AUX 1 and 2 outputs may be adjusted using the AUX OUT LEVEL controls located on the rear panel of the unit.
  15. With the mixer configured and all the necessary adjustments made, the remote control may now be interfaced to the REMOTE CONTROL connector, located on the rear panel of the unit, if remote control of the VM-4083 / VM-4043 is desired.
  16. The STATUS OUT may be connected and tested if the use of this function is desired.
  17. If you have successfully made it to this step you should have a properly performing AM-4080/4040 in the system that will continue to perform for years to come!

## LINKING FEATURE

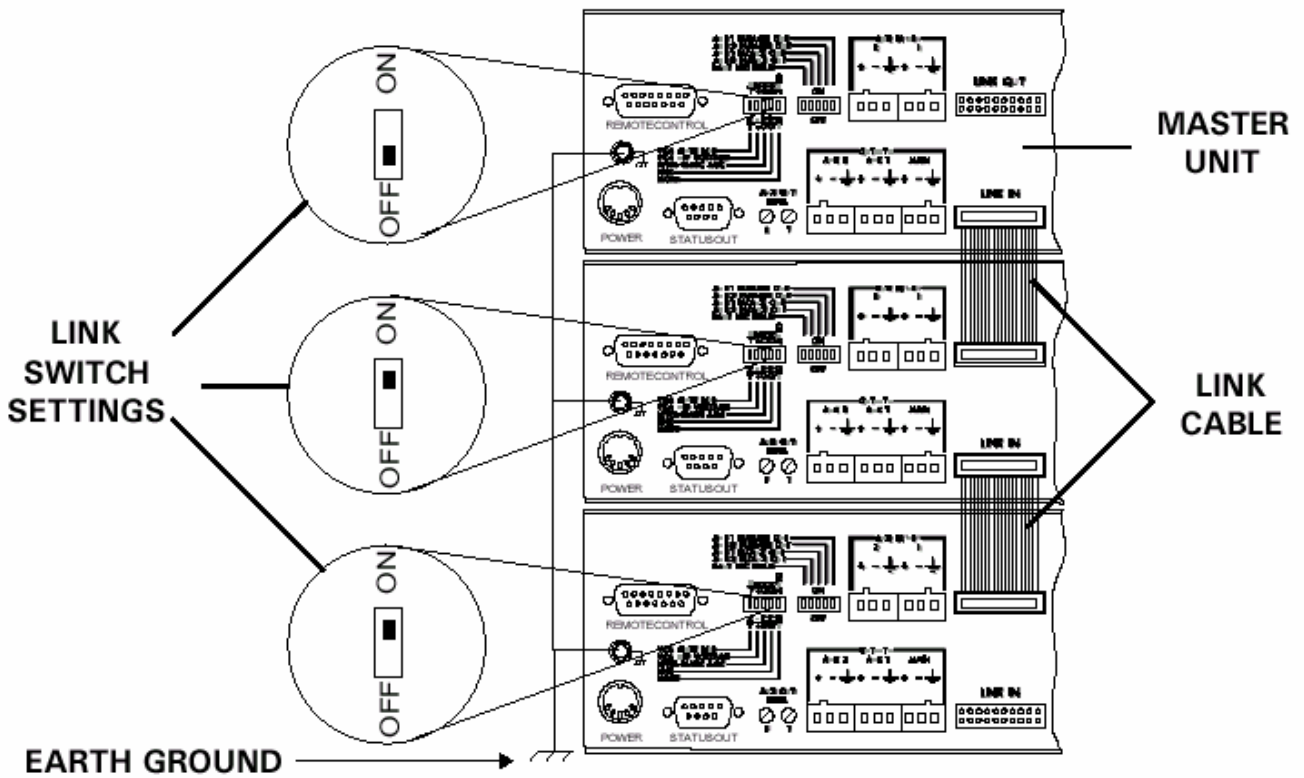
Up to eight VM-4083 / VM-4043 may be linked together for a maximum of 64 automatic mic/line inputs. To enable the linking mode of the VM-4083 / VM-4043 the switch on the rear of the unit which is desired to link must be switched to the (ON) position or pin 14, on the remote connector, must be switched to ground.

That is to say that the unit which is at the **top of the linking chain will become the master unit, not the lower unit**. When the link mode is enabled, the VM-4083 / VM-4043 looks upward for the next unit to link to. This process will stop when either the last VM-4083 / VM-4043 in the chain is reached or the link switch is not engaged on the unit. The master unit combines all of the features of the automatic mixers such as: Dynamic Threshold Sensing (DTS), NOM count attenuation, LEVEL-MATIC AGC, LAST MIC HOLD and Automatic/Standard mode selection among all linked chassis.

It is important to note that the VM-4083 / VM-4043 **must only be linked using the supplied link cable**. The cable length requires the VM-4083 / VM-4043 to be mounted one on top of the other with no rack space in between. It is also important to note that the length of the cable was chosen to minimize noise and signal degradation so **under no circumstances should any attempt be made to lengthen this cable**. Also, when linking units **all of the chassis ground points should be connected together**.

***Although the LEVEL-MATIC LED's may be responding on the linked units, the master LEVEL-MATIC circuit is the only one actually affecting the output. Both the MAIN and AUX output signals will be identical on all linked automatic mixers.***

The linking mode may be used when more than eight channels are needed or for room combining situations since the link mode can be enabled remotely.



## STATUS OUT APPLICATIONS

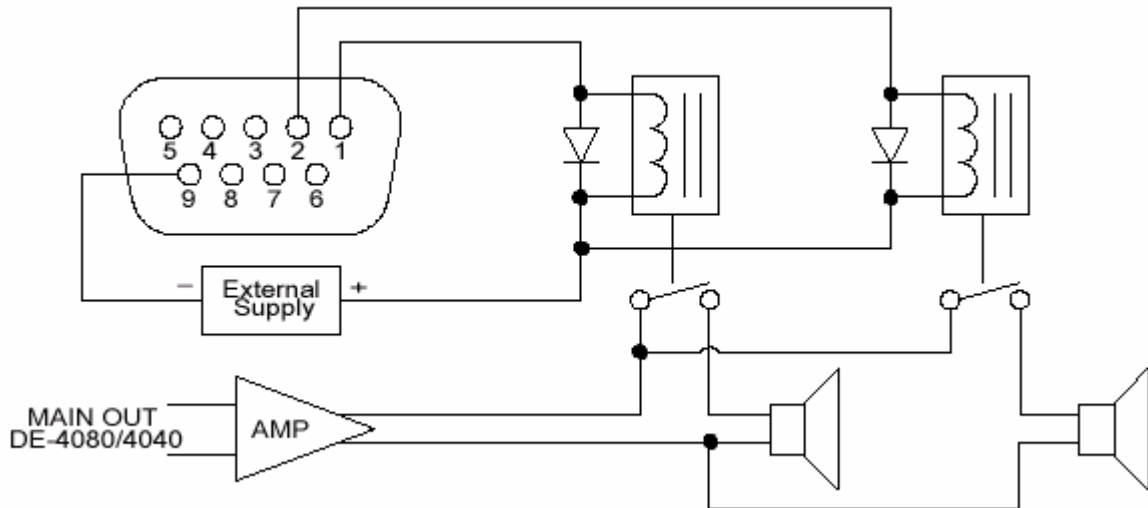
The STATUS OUT provides an open collector output for each MIC/LINE input. The STATUS OUT is low (transistor conducting to ground) when the corresponding MIC/LINE input is ON. Loads connected to the STATUS OUT must have an externally supplied power source. The items that follow are examples of how the STATUS OUT can be used.

Pin	Function
1	Input 1 Status
2	Input 2 Status
3	Input 3 Status
4	Input 4 Status
5	Input 5 Status
6	Input 6 Status
7	Input 7 Status
8	Input 8 Status
9	Ground

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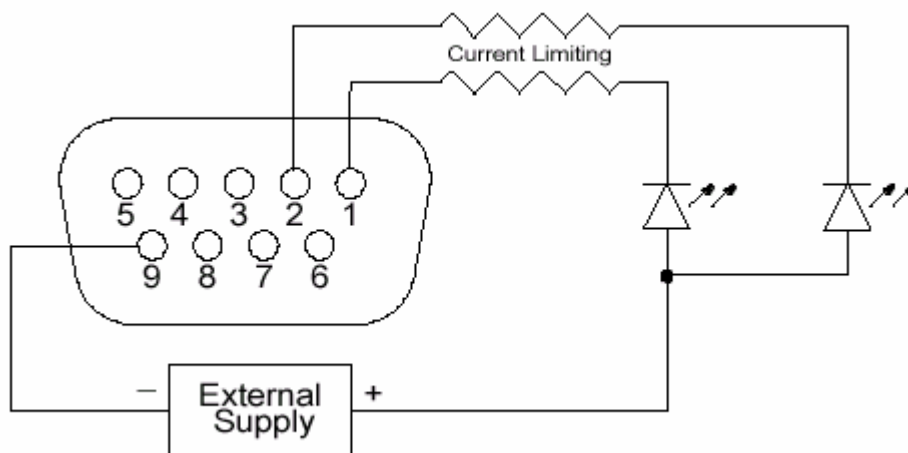
### Speaker Switching:

When used in conjunction with an external relay and power source the STATUS OUT can be used to turn off an overhead speaker which may cause feedback when a particular microphone is activated, because of the proximity of the speaker to the microphone. Be sure to include reversed biased diodes across any inductive load to prevent damage to the STATUS OUTPUTS during switching.



### Remote Monitoring of On Status:

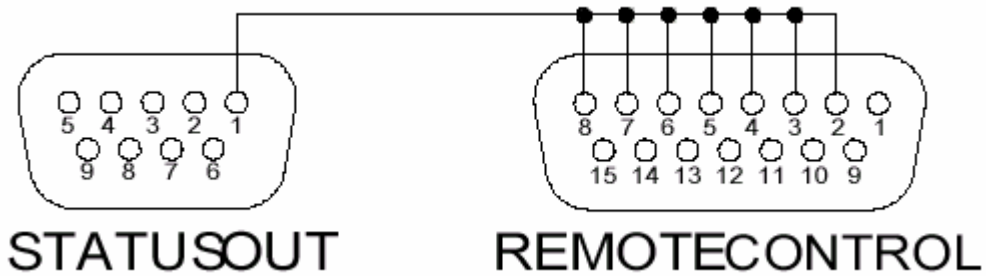
When used in conjunction with an external LED and power source, the STATUS OUT can be used to turn on an LED when a particular channel is being used. This can be used to monitor channel activation remotely. If using an AMX or Crestron unit, the STATUS OUT can be connected to these units for monitoring or contact closure activation purposes.



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### Automatic Chairman Override:

If desired, an automatic chairman override may be wired to give one mic priority over the others. A word of caution when using an automatic chairman override: whenever the microphone which has priority is gated on the other MIC/LINE inputs are muted. This means that whether the microphone is turned on by accident or not the other inputs are muted so this must be taken into account before deciding to use an automatic chairman override.



## REMOTE CONTROL APPLICATIONS

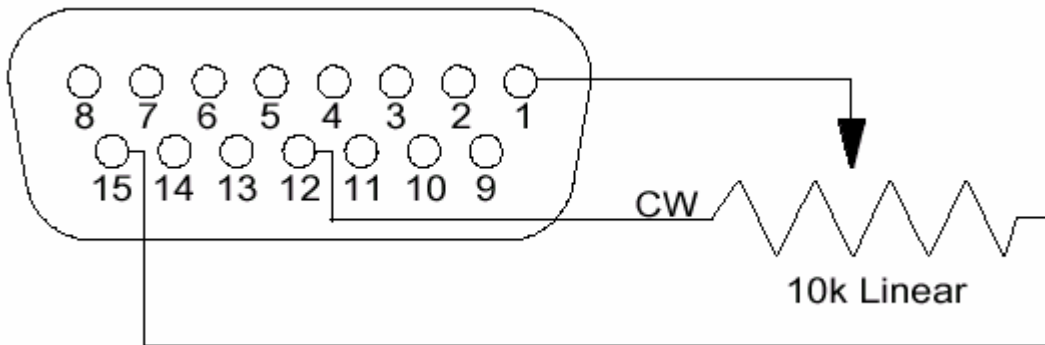
The remote muting, level control, reference voltage, LINK and AUTO/STD control are accessed at this DB-15 connector. Although some of the applications for these functions may seem obvious others may not be obvious. Several applications of the REMOTE CONTROL features will follow.

Pin	Function
1	Input 1 Remote Level/Mute VCA
2	Input 2 Remote Level/Mute VCA
3	Input 3 Remote Level/Mute VCA
4	Input 4 Remote Level/Mute VCA
5	Input 5 Remote Level/Mute VCA
6	Input 6 Remote Level/Mute VCA
7	Input 7 Remote Level/Mute VCA
8	Input 8 Remote Level/Mute VCA
9	Main Output Remote Level/Mute VCA
10	Aux 1 Input Remote Level/Mute VCA
11	Aux 2 Input Remote Level/Mute VCA
12	VCA Reference Voltage
13	Auto/STD Mode
14	Link Mode On/Off
15	Ground

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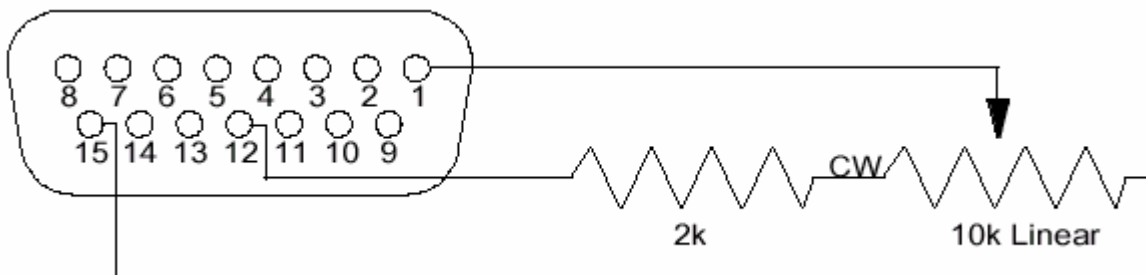
**Remote Level Control:**

All of the MIC/LINE inputs, AUX inputs and the MAIN output can be controlled remotely using a 10kΩ linear potentiometer and connecting it in the following way:



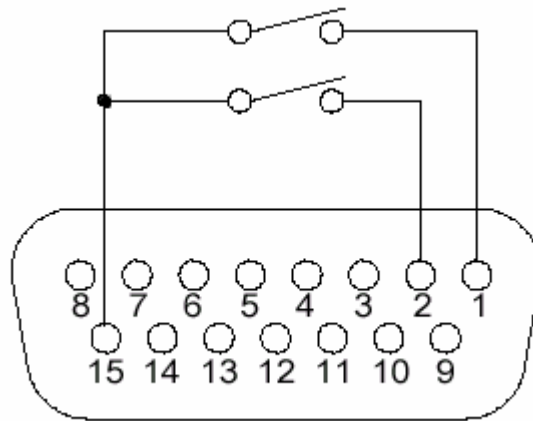
**Remote Level Control With Gain:**

It is possible to get 10dB of gain from the remote level controls by switching the VCA REF VOLTAGE, located on the rear panel, to the +12 position. If it is not desirable to have the 10dB of gain on every remote level control then a gain stop resistor will have to be added to bring the gain back to unity.



**Remote Mute Switching:**

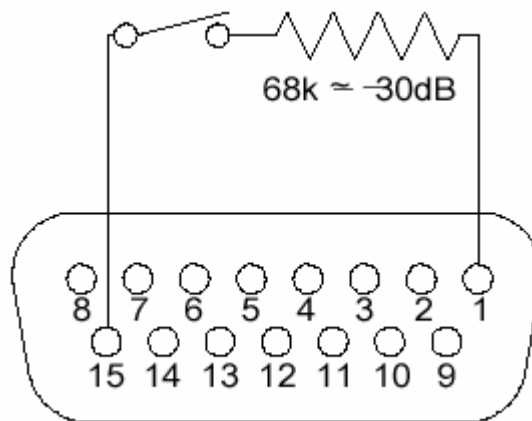
All of the MIC/LINE inputs, AUX inputs and the MAIN output can be muted remotely using a simple dry contact closure or an open collector output to ground. This enables 100dB of attenuation.



**Variable Remote Mute Switching:**

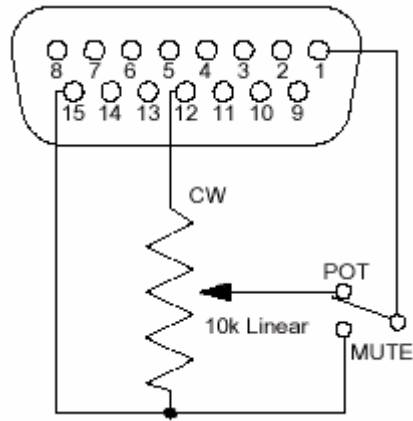
This feature allows muting, but with the ability of muting using a value of less than 100dB. This is achieved by simply adding a resistor in series with the switch to ground. The proper resistor value can be found, once the desired attenuation value is known, using the following formula:

$$R_{\text{mute}} = \frac{(5 \times 10^6 - (100 \times 10^3 \times A))}{A}, \text{ where } R_{\text{mute}} = \text{resistor value in Ohms and } A = \text{attenuation value in dB.}$$



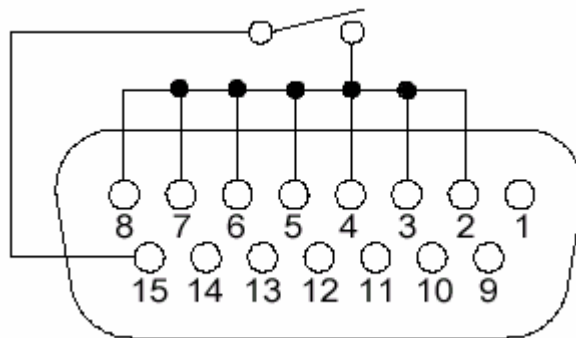
**Combining Remote Mute Switching and Level Control:**

It is possible to use both the mute switching and level control applications together so the input or output can be turned off without disturbing the level control setting.



**Manual Chairman Override:**

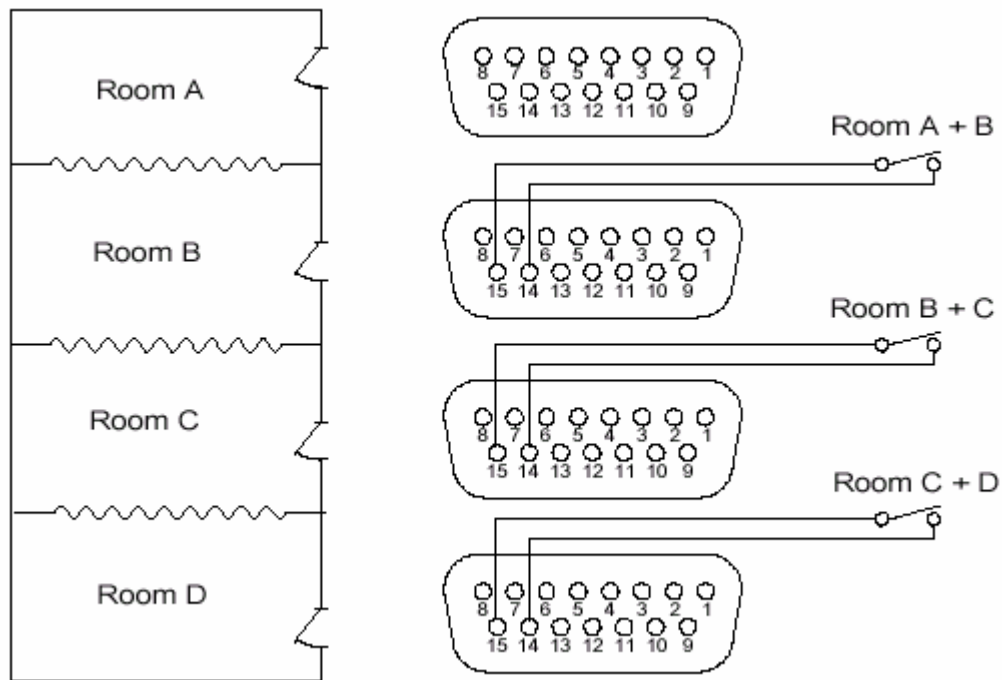
A manual chairman override can be wired so the chairman is able to mute all other microphones in the system. This can be accomplished with one switch wired in the following way:



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### Room Combining:

The AM-4080/4040 can be used for room combining applications in which the floor plan for the rooms is done in a linear fashion. This would be accomplished by enabling the linking function of the AM-4080/4040 remotely.



The LINK switch on the back of each unit must be in the (OFF) position for this type of system to work properly. In the system below all of the rooms can be linked by simply closing all of the switches or a combination of rooms can be linked such as A+B+C or B+C+D.

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## Changes to get the individual mix out of each mixer in a link chain (room combining):

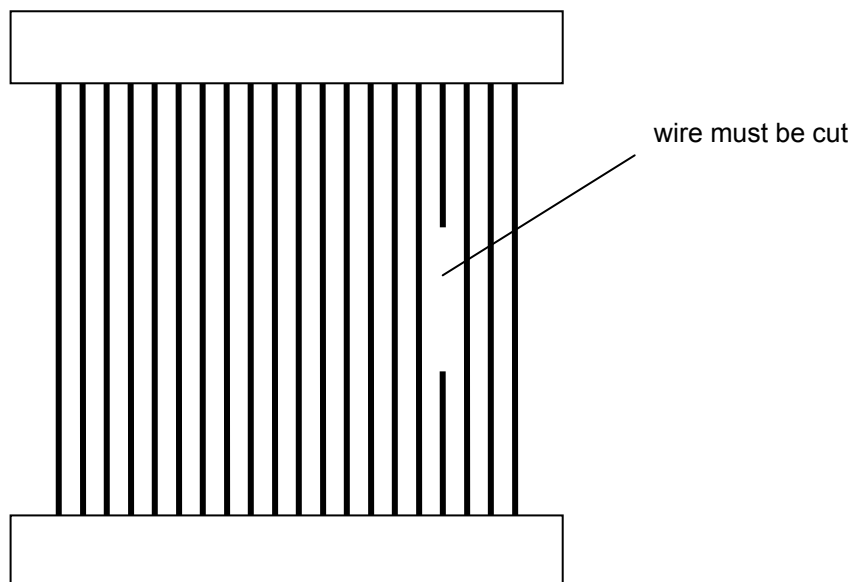
Normally in the LINK modus, each mixer carries the same mix signal (mix of ALL system inputs) at the Main Output. In case that in the LINK modus each mixer should carry only the mixed signal of its own connected inputs, a modification to the link cables must be made.

The Link cable is connected between two devices on top of each other. In this cable, the fourth wire must be cut (seen from behind the devices, from the right side).

Now each device carries only the individual signal mix, but is controlled by the NOM count, etc. of all inputs in the system.

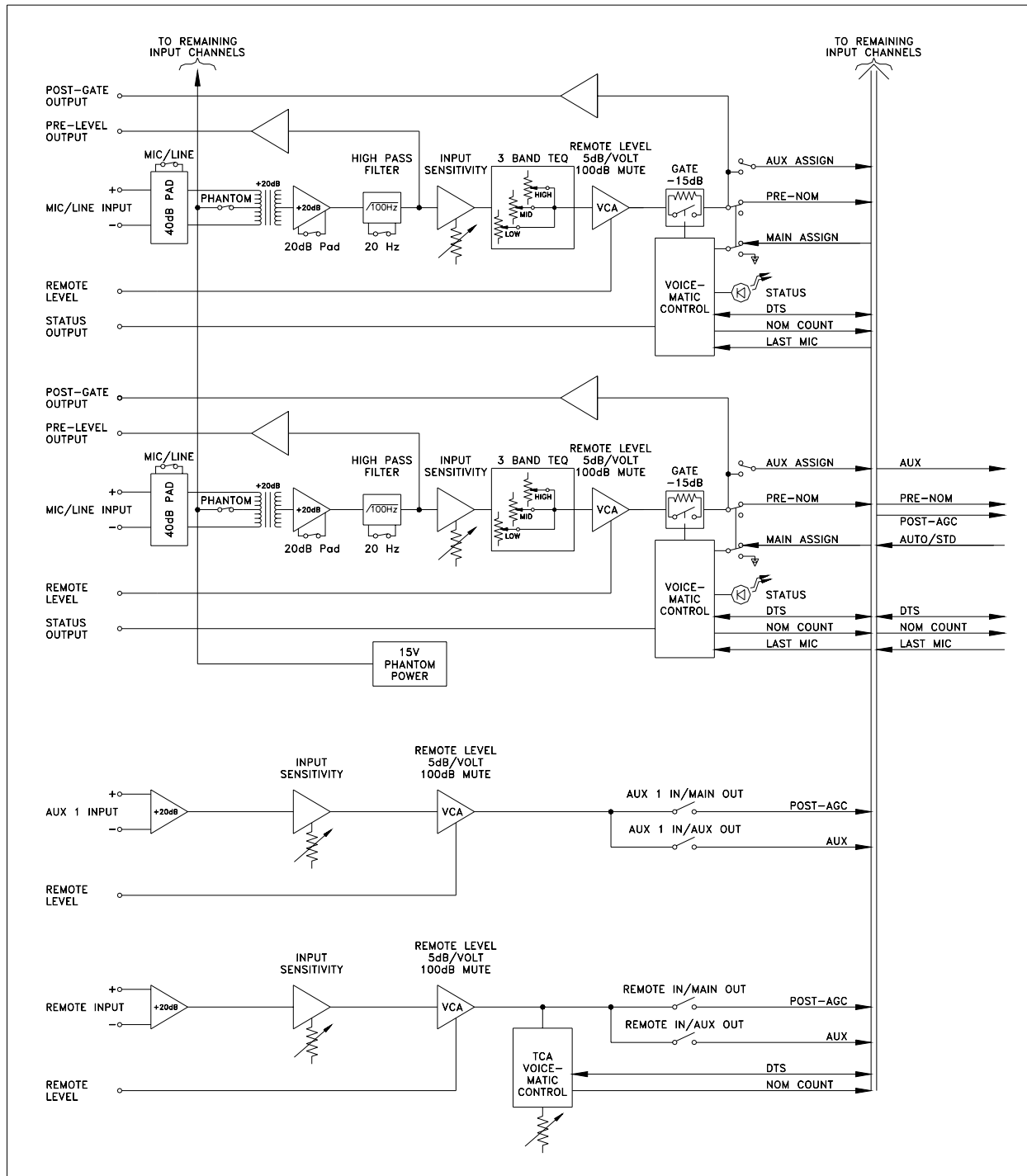
View from the back side:

**Link In** upper device (Master)



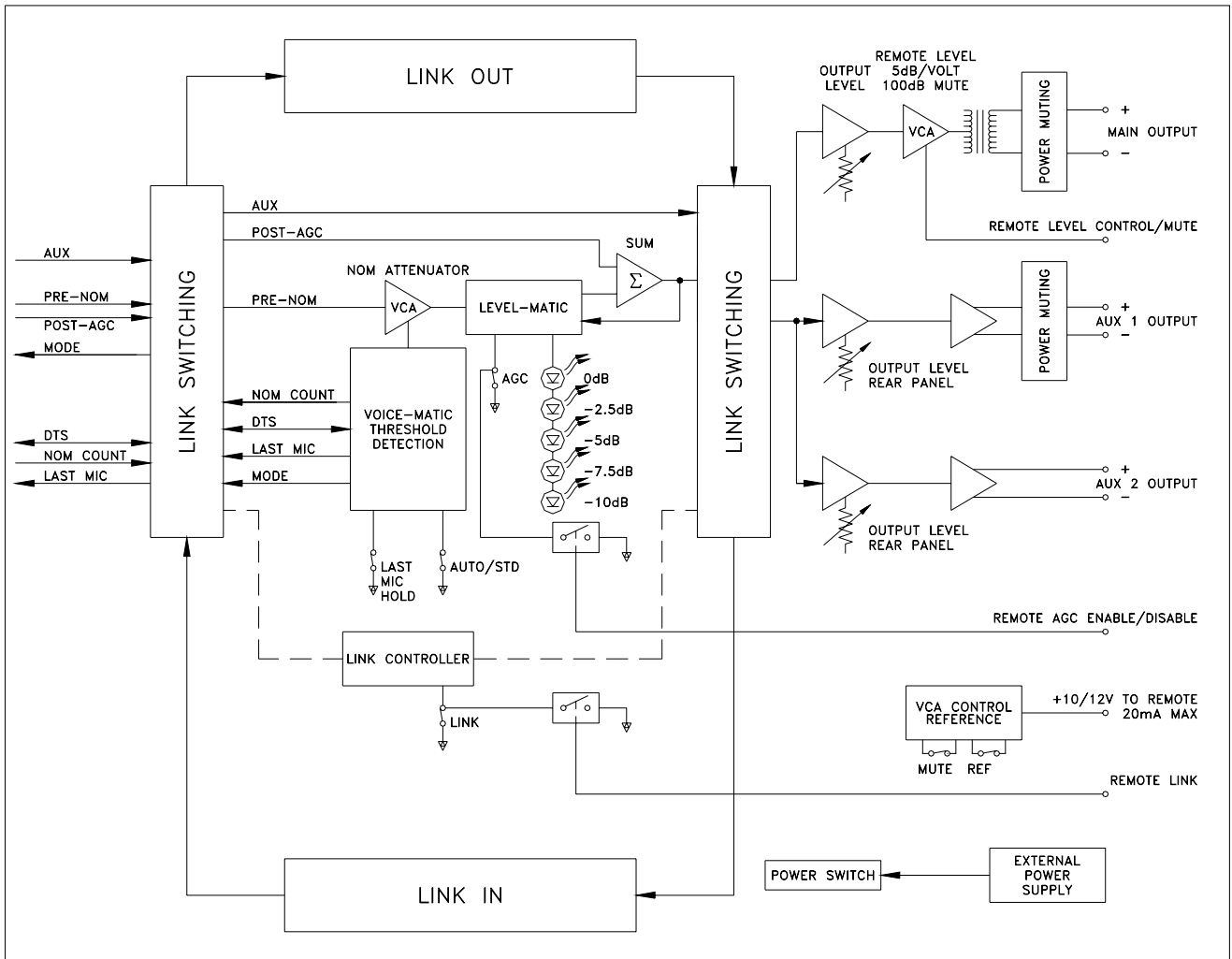
**Link Out** lower device

# FUNCTIONAL DIAGRAM , Part 1



# FUNCTIONAL DIAGRAM , Part 2

(only two Mic/Line Input channels are illustrated)



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## SPECIFICATIONS

Feedback Stability Gain Improvement Factor .....	Typically 8dB for 8 inputs
Background Noise Reduction .....	Typically 8dB for 8 inputs
Channel Off Attenuation .....	30dB
Channel ON Indication.....	LED each channel
Frequency Response (Tone Controls Set Flat) .....	20Hz-20KHz $\pm$ 0.5dB
Gain (Remote Controls @ 0dB).....	90dB maximum
THD .....	<0.1% @ 0dBV output, clipping @ +19dBV output
Audio Inputs And Outputs .....	Removable screw-clamp terminal block connectors
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Level-Matic II <sup>®</sup> Automatic Gain Control .....	10dB gain compensation (defeatable)
Aux inputs & Mic/Line inputs set to STD mode bypass Level-Matic II <sup>®</sup> AGC circuitry	

### Microphone/Line Inputs:

Characteristics .....	OCMR electronically balanced
Input Circuit .....	SSM 2017
Input Impedance .....	1.1 kOhm for rated source impedances of 600 Ohm or less (all channels switchable to balanced, Line Level, 13kW)
Maximum Input .....	-20dBV (0dBV with 20dB pad enabled) +20dBV with 40dB line attenuator inserted
High-Pass Filter (DIP switch bypass) .....	6dB/Octave, -3dB at 100 Hz
Noise (EIN 22 Hz - 22 kHz) .....	-127dBV (150 Ohm source)
Phantom Power .....	+15 VDC (DIP switch for each input)
Mixing Mode Selection .....	Auto/Standard (Dip switch for each input)
Auxiliary Bus Assign .....	Pre/Post Gate (Dip switch for each input)

### Input TEQ Filters:

Type.....	Minimum Phase Transversal
Low Pass .....	320 Hz turnover, $\pm$ 10dB shelving characteristic
Mid Frequency .....	800 Hz, $\pm$ 10dB boost or cut
High Pass .....	2000 Hz turnover, $\pm$ 10dB shelving characteristic
Response Ripple .....	$\pm$ 0.1dB maximum at any flat control setting

### Preamp Outputs:

Impedance .....	560 Ohm single ended (for 2 kOhm or greater load)
Maximum Output.....	+19dBV, unloaded
Signal Sources .....	Both Pre-input sensitivity Control & Post-Gate signals available

### Auxiliary Inputs:

Input Impedance .....	82 kOhm, electronically balanced, 41 kOhm unbalanced source
Input Level .....	0dBV nominal, +19dBV maximum
Output Assignment .....	DIP switch defeatable from both Main & Aux Outputs

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### Main Output:

Characteristics ..... Electronically balanced  
Output Impedance ..... 30 Ohm  
Recommended Load Impedance ..... > 600 Ohm  
Output Level ..... +19dBV maximum, unloaded  
Output Mix ..... Automatic Mic/Line input channels w/NOM attenuation & AGC,  
STD mode Mic/Line input channels plus Aux inputs assigned to the Main Output

### Auxiliary Outputs:

Characteristics ..... Electronically Balanced  
Output Impedance ..... 200 Ohm Recommended Load Impedance  
..... > 600 Ohm  
Output Level ..... +19dBV maximum, unloaded  
Output Mix ..... Pre/Post Gate Selection for each input channel,  
plus Aux inputs assigned to the Aux Mix Bus

### MixLink ILS:

Combines all Main bus signals to all Main Outputs in all linked mixers, combines all Aux bus signals to all Auxiliary Outputs in all linked mixers, unifies DTS, NOM count, Level-Matic II® Automatic Gain Control circuitry.

### Remote Control:

Inputs & Main Output level ..... +10dB to -50dB range from 10 kOhm linear potentiometer,  
can be controlled by remote voltage source, sensitivity of 5dB/Volt, +10VDC, yields a 0dB gain,  
+12VDC (max VCA voltage) yields a +10dB gain  
Inputs & Main Output Muting ..... -100dB typical @ 1kHz activated by dry contact,  
or open-collector to ground  
Automatic/Standard Mode switching ..... Via dry contact closure or open collector to ground  
Linking Mode ..... Via dry contact, or open collector to ground Bypasses  
NOM count, AGC, Auto/Standard switch, LAST MIC HOLD switch for LINKED chassis Remote  
Connector ..... DB-15 socket

### Status Output:

Input Channel Status ..... Open Collector to ground, sinks 50mA max, sinks while  
channel ON (open when OFF)  
Status Connector ..... DB-9 Socket

### Power Supply (furnished with mixer):

Model PS-1 External Power Supply ..... 115/230 VAC 50/60Hz, 0.25 amp maximum  
CSA Listed, CSA/NRTL Listed, TUV Certified, CE Mark

Size ..... 19" W x 3 1/2" H x 11" D (48.3 cm x 8.9 cm x 27.9 cm)

Shipping Weight (with PS-1 Power Supply) ..... 21 lbs

Finish ..... Black

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## ARCHITECT'S SPECIFICATIONS

The mixer shall provide automatic attenuation of inactive input channels and maximum gain to active channels. Each channel shall be operated automatically and shall not be gain modulated by other input channels except as necessary to maintain feedback margin through automatic master gain reduction when simultaneous active inputs occur. A 3dB automatic master gain reduction for each doubling of simultaneously active channels is required. Channel activity shall be sensed by a dynamic threshold method. Static (fixed) threshold gating shall not be acceptable.

The mixer shall be configured with eight microphone input channels; two line level auxiliary inputs; a main sound reinforcement output; and dual auxiliary outputs for broadcast to tape recorders, teleconferencing, hearing assistance systems, and off site premises. All microphone inputs shall be electronically balanced. Auxiliary inputs and outputs shall be electronically balanced. The main sound reinforcement output shall be electronically balanced. All audio input and output connections to the mixer shall be via removable screw-clamp terminal blocks. Automatic mixer operation shall include switch selection for LAST MIC HOLD circuitry, such that the most recently activated input channel shall remain in the ON state until another active input is detected.

Each microphone input shall be convertible, via a push-button switch, to accept line level input signals and shall include switchable phantom power; switched input padding; defeatable 100 Hz High-Pass filter; 3-band TEQ equalization; automatic/manual mixing mode selection; two single-ended, buffered preamplifier outputs, one pre-input sensitivity control, the other post-gate; plus pre/post gate assignment to the auxiliary mixing bus. Input channel status shall be displayed by an LED.

An open-collector status output shall be provided for each input channel. Auxiliary input signals shall be individually defeatable from both the main and auxiliary output mixing bus.

The main output shall be a mix of the gated input channels with NOM attenuation and automatic gain control, ungated signals from channels in manual mode, plus the auxiliary inputs assigned to this output. The auxiliary output mix shall include a pre/post gate selection from all eight input channels plus the auxiliary inputs assigned to the auxiliary mixing bus. Each Auxiliary output shall include an independent level control. A power supervisory circuit shall mute both the main output and the first auxiliary output during power interruptions to the mixer.

The mixer shall be linkable to additional 8 channel mixers for the expansion of automatically mixed inputs. LINK mode shall combine NOM attenuation, dynamic threshold sensing of channel activity, automatic gain control, LAST MIC HOLD, plus automatic/standard mixer mode selection among all identical linked mixers. An identical signal mix shall be present on both the main and auxiliary outputs of all linked mixers.

Individual remote level control capability shall be provided for each of the microphone input channels, the two auxiliary inputs, and the main output. Remote 10k $\Omega$  linear potentiometers shall provide up to 60dB of level adjustment range. Dry contact or open-collector transistor logic closures to ground shall remotely engage 100dB muting @ 1 kHz for all mixer inputs and the main output; shall provide switching between Automatic and Standard mixing modes; and shall enable remote activation of mixer LINK mode. The automatic mixer shall be the IRP model VM-4083 / VM-4043 eight channel Voice-Matic® Mixer.