

PA250A INSTALLATION SHEET AND OPERATORS MANUAL



PA250A General Description:

The PA250A power amplifier provides 250 watts of continuous RMS power directly into a minimum 4Ω speaker load or uses the internal 25V/70V output transformer to feed 250W to distributed speaker systems. The PA250A was designed to be used as a 250 watt booster amplifier to increase the power capability of Lowell's MA Series mixer/amplifiers, or as an all-in-one telephone system paging solution. The PA250A includes a balanced transformer isolated telephone paging input and a 600Ω line level electronically balanced isolated input with both inputs controlled by a tamper-resistant volume control located on the rear panel. A Hi-Z unbalanced Aux input with parallel RCA connectors is provided for a music program source input. A unique music ducking circuit mutes the aux music input when a page signal is present at either the telephone paging input or the 600Ω line level balanced input. The mute circuit may be defeated by removing the chassis cover and changing a circuit board jumper. A paging horn protection (also called "trumpet protection") low-cut filter is available by cutting a separate circuit board jumper. A master volume control, main power switch, and circuit breaker are provided on the rear panel.

Getting Started:

Please study carefully the "IMPORTANT SAFETY INSTRUCTIONS" that are given on page 2 before applying power to your PA250A amplifier. Those experienced with the use of a power amplifier will find that the input jacks and terminals, output terminals, and controls follow industry standard conventions and will be very intuitive. Standard 4Ω, 25V, and 70.7V speaker outputs are provided. Those that are not familiar with the speaker wiring required for these industry standard outputs will find a very helpful section covering this topic on pages 6, 7, and 8 of this "Installation Sheet and Owner's Manual".

Optional Accessories (sold separately):

Lowell Manufacturing offers a full line of 19" equipment cabinets, wall mount shelves, rack mount AC power panels, AC power strips, and cooling fans that can be used to install the Lowell Amplifier products.

See www.lowellmfg.com for product details.



IMPORTANT SAFETY INSTRUCTIONS



- ☐ Read these instructions. ☐ Keep these instructions. ☐ Heed all warnings.
- ☐ Follow all instructions. ☐ Do not use this apparatus near water.
- ☐ Clean only with a dry cloth.
- ☐ Do not block any ventilation openings. Install in accordance with manufacturer's instructions.
- ☐ Do not install near any heat sources such as radiators, registers, stoves, or other apparatus (including amplifiers) that produce heat.
- ☐ Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding-type plug has two blades and a third grounding prong. The wide blade or third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- ☐ Protect the power cord and plug from being walked on or pinched particularly at plugs, convenience receptacles, and the point where it exits from the apparatus.
- ☐ Only use attachments and accessories specified by the manufacturer.
- ☐ Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
- ☐ Unplug this apparatus during lightning storms or when unused for long periods of time.
- ☐ Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
- ☐ The plug on the power cord is the AC mains disconnect device and must remain readily operable. To completely disconnect this apparatus from the AC mains, disconnect the power supply cord plug from the AC receptacle.
- ☐ This apparatus shall be connected to a mains socket outlet with a protective earthing connection.
- ☐ When permanently connected, an all-pole mains switch with a contact separation of at least 3 mm in each pole shall be incorporated in the electrical installation of the building.
- ☐ If rack mounting, provide adequate ventilation. Equipment may be located above or below this apparatus, but some equipment (like large power amplifiers) may cause an unacceptable amount of hum or may generate too much heat and degrade the performance of this apparatus.
- ☐ This apparatus may be installed in an industry standard equipment rack. Use screws through all mounting holes to provide the best support.

WARNING: To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture. Apparatus shall not be exposed to dripping or splashing and no objects filled with liquids, such as vases, shall be placed on the apparatus. This product may contain chemicals known to the State of California to cause cancer, or birth defects or other reproductive harm.

NOTE: This equipment may generate, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: Reorient or relocate the receiving antenna.

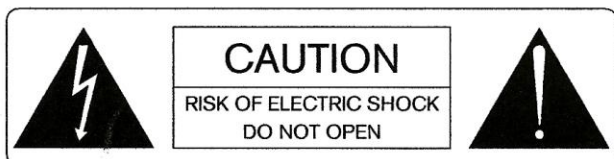
Increase the separation between the equipment and receiver.

Connect the equipment into an outlet on a circuit different from that to which the receiver is connected

Consult the dealer or an experienced radio/TV technician for help.

CAUTION: Changes or modifications not expressly approved by Lowell Manufacturing will void the manufacturers warranty.

WARNING



To reduce the risk of electrical shock, do not open the unit. No user serviceable parts inside. Refer servicing to qualified service personnel.

The symbols shown below are internationally accepted symbols that warn of potential hazards with electrical products.



This symbol indicates that a dangerous voltage constituting a risk of electric shock is present within this unit.



This symbol indicates that there are important operating and maintenance instructions in the literature accompanying this unit.

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Call: 800-325-9660

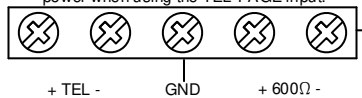
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Instruction Sheet
IS-PA250A
Issued: 5-19-20

PA250A Power Amplifier Block Diagram

Note: The 600 Ω balanced transformer isolated TEL-PAGE input and the 600 Ω electronically balanced input are both line level inputs, but the 600 Ω input has lower input sensitivity than the TEL-PAGE input. In other words, the TEL-PAGE input is a "hotter" input so it takes less input signal to drive the amplifier to full power when using the TEL-PAGE input.



AUX Input
Parallel
RCA Jacks
(Pin +, Sleeve -)

A low-cut filter may be activated by cutting a circuit board jumper. Activating the low-cut filter is recommended when using the PA250A to power paging horns (for trumpet protection).

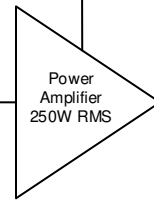
"TEL" Input
& 600 Ω Input
Gain
Control

Mixing
And
Control
Section

"TEL" and 600 Ω
Inputs Mute
the Aux Input.

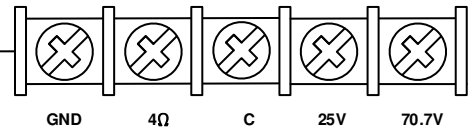
The mute
function may
be defeated by
changing an
internal circuit
board jumper.

Red Peak LED



Note: If the red peak LED flashes, it indicates the peaks are approaching full power. A steady bright red glow could indicate that the amplifier is being over-driven, has oscillation in the system, or has a shorted speaker line.

SPEAKER LEVEL OUTPUTS



Technical Specifications

AC Supply Voltage: 115/230VAC 60Hz \pm 10%, Power Consumption: 480W @ Rated Power

External Circuit Breaker: 5A Internal Fuse: 5X20mm 5A Slow Blow

"Power On" LED (Green): Lights when the power amplifier is switched on.

Dimensions: 19" wide x 3.5" high x 12.5" deep (482mm wide x 88mm high x 317.5mm deep) Color: Black

Weight: 18LBS. (8.2KGS) Shipping Weight: 20LBS. (9.1KGS)

Speaker Level Outputs: Screw terminals. 250W RMS @ 4 Ω , 25V, 70.7V. 200W RMS @ 4 Ω output into 8 Ω load

Peak LED (Red): If the red peak LED flashes, it indicates the peaks are approaching full power. A steady bright red glow could indicate that the amplifier is being over-driven, there is sub-sonic or ultra-sonic oscillation in the system, or the amplifier is loaded with a shorted speaker line.

TEL-PAGE Input: Removable Phoenix Connector. 50mV@ 600 Ω transformer balanced (required for full output power)

600 Ω Input: Removable Phoenix Connector. 500mV@ 600 Ω electronically balanced (required for full output power)

AUX Input: Parallel RCA Connectors, 500mV @ 10k Ω unbalanced (required for full rated output power)

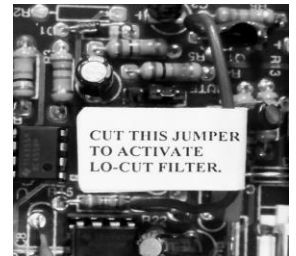
Frequency Response: 20Hz-20KHz \pm 3dB (any input to any output)

Total Harmonic Distortion: \leq 0.3% at 1kHz at rated power (4 Ω direct output)

Hum and Noise: \geq 90dB below rated output (unweighted)

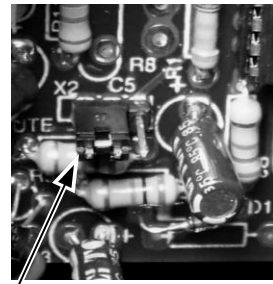
Paging Horn Protection Low-Cut Filter

The PA250A includes a low-cut filter (also called a "trumpet protect" filter) that is not activated when the amplifier is shipped from the factory. When the amplifier is to be used to power paging horns that can be damaged by the low frequency energy that is often present in paging/music signals, we recommend that a qualified technician activate the low-cut filter by removing the chassis cover and cutting the red jumper that is located directly behind the recessed gain control on the input circuit board. The red jumper is labeled as shown in the picture to the right. The low-cut filter has a 3dB down point at 400 Hz.

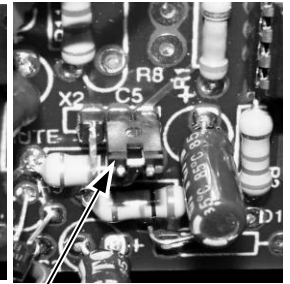


Amplifier Muting-Priority Scheme

The amplifier includes unique voice-activated (VOX) ducking/muting circuitry. When a page is made into the "TEL" input or 600 Ω line level input, music that is feeding the Aux input will duck in volume (not be completely muted). If the incoming page is strong enough in level, the music volume will be completely muted. When the page has been completed, the volume of the music will return to its normal level. The muting circuit can be defeated by a qualified technician, by removing the chassis cover and repositioning the X2 MUTE jumper that is located behind the recessed gain control on the input circuit board.



Jumper X2 in Mute-Active Position as set at the Factory



Jumper X2 shown in Mute-Defeated Position

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PA250A Front Panel



PA250A Rear Panel

- | | | |
|----------------------------------|---------------------------------|---------------------------------|
| ① LED Peak Indicator (Red) | ⑤ Main Power Switch | ⑨ Parallel Hi-Z Aux Input Jacks |
| ② LED Power-On Indicator (Green) | ⑥ Input Voltage Selector Switch | ⑩ TEL-PAGE & 600Ω Gain Control |
| ③ IEC Power Cord Connector | ⑦ 4 Ω/25V/70.7V Speaker Outputs | ⑪ TEL (Telephone Page) Input |
| ④ Amplifier Circuit Breaker | ⑧ Master Volume Control | ⑫ 600Ω (Line Level) Input |

Amplifier Installation and Connection

INSPECTION

This unit was carefully checked and packed before leaving the factory. However, it is always a good idea to inspect the shipping container and unit for indications of improper handling. If the unit has been damaged, make an immediate claim to the dealer or distributor from whom it was purchased. If the unit was shipped to you, notify the transportation company without delay, saving all packing materials, in order to process the claim.

INITIAL PERFORMANCE CHECK

Before installing the amplifier, continue the inspection by running a quick performance check. Connect an 8Ω test speaker to the 4Ω direct output terminals and a tuner, tape deck, or CD player to one of the aux inputs and set the controls for operation. **CAUTION: TO PROTECT THE SPEAKER FROM DAMAGE, DO NOT TURN THE UNIT ON UNTIL ALL CONNECTIONS HAVE BEEN MADE. IN ADDITION, MAKE SURE THE UNIT IS GROUNDED BEFORE TESTING.** In this way you can check the basic operation of the amplifier before actually installing the unit and making all of the final terminations required for the permanent installation. If shipping damage has resulted in the amplifier being inoperable out of the box, call Lowell Customer Service to arrange for a replacement.

SOUND SYSTEM WIRING AND INSTALLATION GUIDELINES

Never run microphone cables near AC power wires, data cables, telephone cables, or speaker wiring to avoid pick-up of extraneous signals. Do not run high impedance unbalanced wiring more than 20' to avoid picking up noise and affecting the frequency response of the system. Avoid running speaker cables near data or telephone cables, or other low voltage wiring that could pick up the signal from the high level speaker cables. Always use shielded cable for microphone and line level cables except the balanced 600Ω input line from a telephone system may be typical telephone twisted pair cable. Make sure that all speakers are wired in phase with each other and always test the speaker lines to make sure there are no short circuits before connecting them to the amplifier output.

PASSIVE CONVECTION COOLING AND VENTILATION

This unit is cooled via passive convection and therefore designed for continuous operation. Excessive heat due to poor ventilation can shorten the lifespan of electronic equipment and could void the manufacturer's warranty. Do not block the amplifier's vent slots located on the top and bottom of the chassis.

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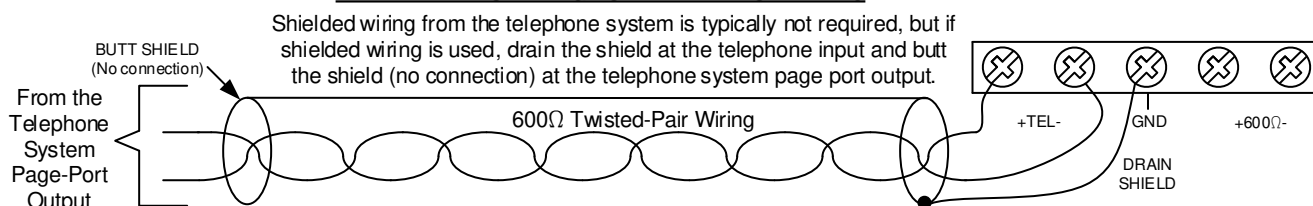
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MOUNTING THE AMPLIFIER: The PA250A may be placed on a wooden or metal wall-mount shelf. Do not remove the rubber feet from the bottom of the amplifier chassis. When the amplifier is placed on a countertop or is shelf-mounted, the rubber feet maintain the proper spacing under the amplifier for passive convection cooling. Do not place anything on top of the amplifier where the vents on the top of the chassis would be blocked. Rack mount ears are built into the front panel of the PA250A. If the amplifier will be rack mounted, we recommend that you provide a minimum of 1.75" of open space above and below the unit to assure proper ventilation. Provide ventilation fans in the equipment cabinet if that is required to maintain an amplifier operating temperature of no higher than 92° F. To mount the amplifier in a Lowell equipment cabinet, use standard 10-32 Phillips-head machine screws (like the Lowell model RS or RSP rack screws) with integral plastic washers to protect the finish of the front panel of the amplifier. The PA250A is very heavy, so we recommend that you provide rear support for the amplifier when rack mounting it to remove some of the load from the built-in rack mount ears.

POWER WIRING: The AC power cord is equipped with a North American style NEMA 5-15P plug and the "VOLTAGE SELECT" switch is set to operate on a 115 VAC 50/60 Hz. power source. If this unit is to be used where the "VOLTAGE SELECT" must be switched to 230 VAC, remove the plug from the end of the cord and replace it with one appropriate for the local power grid receptacle standards. The internal wire color code for the cord supplied with this unit is: Green: Earth "E" or Safety Ground, White: Neutral "N", and Black: Line "L" or Hot. Note: If a British Standard BS1363 plug is installed, it must be provided with a 5 Amp fuse. Since electrical color codes vary around the world, make sure that the correct connections are made to the cord even if the local color code is different. If in doubt, obtain the services of a locally qualified electrical professional. **NOTE: THIS UNIT MUST BE EARTH GROUNDED.**

TEL-PAGE INPUT CHANNEL: The amplifier includes a 600Ω transformer balanced "TEL" telephone page input. This input accepts a low impedance balanced 600Ω line level signal that would typically be available as a page port output from a telephone system. Note: The "TEL" Input and the 600Ω Line Level Input are both 600Ω balanced line level inputs, but the "TEL" Input is a "Hotter" input requiring less input signal to drive the amplifier to full power. If distortion results from feeding the "TEL" input with a high level signal, use the 600Ω Line Level Input instead.

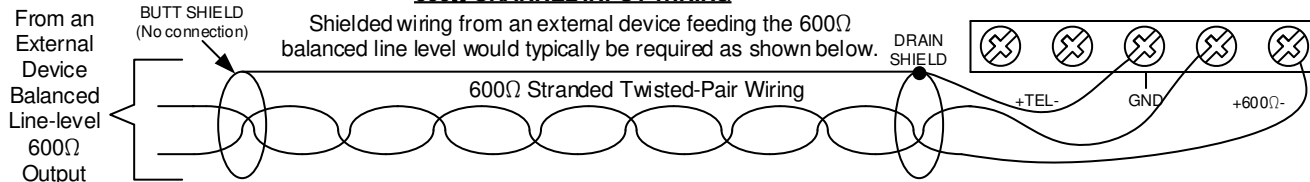
"TEL" TELEPHONE PAGE CHANNEL INPUT WIRING



600Ω INPUT CHANNEL

The amplifier includes a 600Ω electronically balanced line level input channel. This input accepts a low impedance balanced 600Ω line level signal that would be fed from an equalizer, from another system, or from some other outboard device. Note: The "TEL" (telephone page) input and the 600Ω Line Level Input are both 600Ω balanced line level inputs, but the "TEL" input is a "Hotter" input requiring less input signal to drive the amplifier to full power. If distortion results from feeding the "TEL" input with a high level signal, use the 600Ω Line Level input instead.

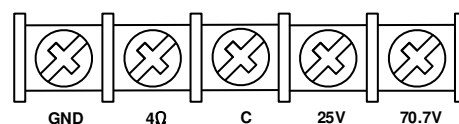
600Ω CHANNEL INPUT WIRING



LINE LEVEL AUX INPUT: The amplifier includes a mono high-impedance unbalanced auxiliary input which may be used for connecting signal sources such as an AMFM tuner, CD player, Cassette deck, or an unbalanced feed from an equalizer or mixer/preamplifier. Two (2) parallel RCA-phono connectors are provided for the aux input so stereo input cables can be connected to this mono input. Mono inputs need only use one or the other of the RCA-phono connectors. Note: Connecting 2 pieces of equipment that have grounded AC plugs with a standard unbalanced RCA cord can cause a ground loop that will cause a "hum" or "buzz" in the speakers. If this occurs, feed the amplifier using the "Tel" input because the built-in isolation transformer will eliminate the ground loop.

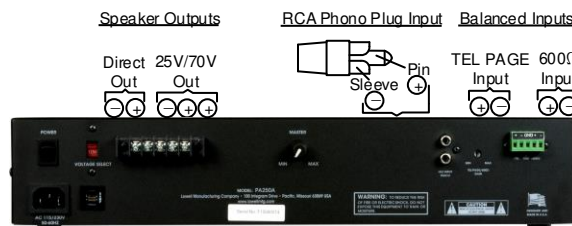
Speaker System Connections

The PA250A includes a speaker output screw terminal strip. Connect a minimum 4Ω speaker line to the 4Ω output. Note: A speaker line with an impedance greater than 4Ω can safely be connected to the 4Ω output, but it will draw less than full amplifier output power. For 25V or 70V operation, connect the low side of the speaker line to "C" and the hot side to the 25V or 70.7V terminal. Never connect a 4Ω or 8Ω speaker system (that has no 25V or 70V matching transformer) to the 25V or 70.7V output.



Speaker Signal Polarity

In a paging amplifier, making sure that a positive going input signal results in a positive going speaker output signal, is often not critical. If, however, multiple amplifiers feed speakers covering the same area, observing correct polarity can be important so all speakers are in phase with each other. The picture to the right shows how inputs should be wired to result in no polarity change in the PA250A.

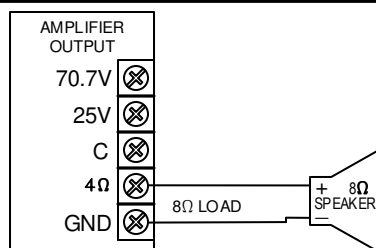


8 Ohm Series/Parallel Speaker System Wiring

The Lowell PA250A power amplifier includes a direct 4Ω output that can drive a minimum 4Ω speaker line without the use of a line matching transformer. The impedance of the speaker load must always be equal to or greater than the 4Ω impedance of the amplifier output. For example, it is safe for the amplifier if the 4Ω output is used to drive an 8Ω load or a 16Ω load, but it is not safe for the 4Ω output to drive a 2Ω load. Overloading the amplifier output can cause distortion, damage the amplifier, and void the manufacturer's warranty. It is also important to pay attention to the power rating of the speakers used. If a 4Ω speaker is fed from the 4Ω output of an amplifier and the amplifier is turned all the way up, the speaker will receive the amplifier's maximum output. A speaker must be chosen with sufficient power handling capacity for the amplifier used. For example, if a 4Ω speaker can handle 250 watts and it will be fed from the 4Ω output of the amplifier, an amplifier with a power output of 250 watts or less should be chosen so that if the amplifier is turned all the way up, the speaker will be able to handle the amplifier's full power output. All of the Series/Parallel configurations shown below will result in load impedances that will be safe for the PA250A amplifier when connected as shown. Verify that the 250W maximum amplifier power when divided between the speakers, will not exceed the power rating of the speaker chosen.

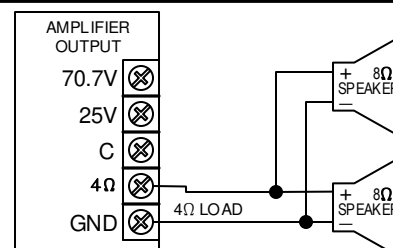
One 8Ω Speaker

Result:
One speaker
receives less than the
total amplifier power.
(200W RMS @ 8Ω)



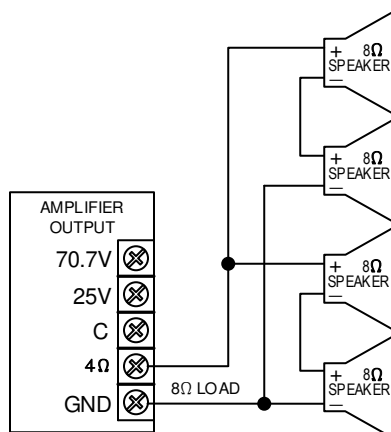
Two 8Ω Speakers wired in Parallel

Result:
Each speaker receives
1/2 of the
total amplifier power.
(1/2 of 250W RMS @ 4Ω)



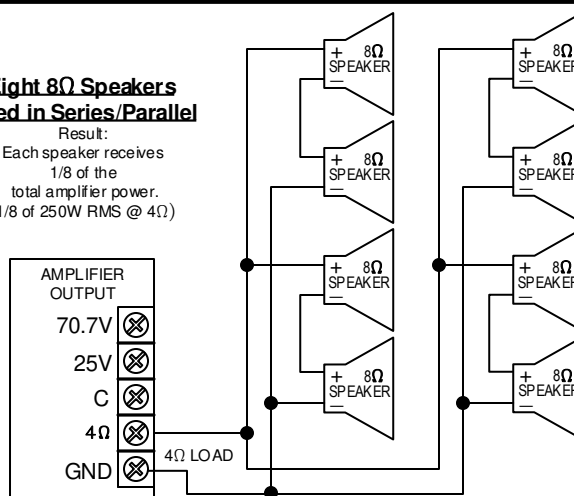
Four 8Ω Speakers wired in Series/Parallel

Result:
Each speaker
Receives 1/4 of the reduced
total amplifier power.
(1/4 of 200W RMS @ 8Ω)



Eight 8Ω Speakers wired in Series/Parallel

Result:
Each speaker receives
1/8 of the
total amplifier power.
(1/8 of 250W RMS @ 4Ω)



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70V / 25V Speaker System Wiring

70 volt and 25 volt "Constant Voltage Distribution Systems" have been a source of confusion for people for a long time. Our Series/Parallel speaker wiring discussion on page 6, illustrates why industry engineers developed the "Constant Voltage" concept. Series/Parallel configurations are manageable for small localized systems using up to 4 to 8 speakers and when no expansion is anticipated. Even with only 4 to 8 speakers, wiring a Series/Parallel configuration can be confusing. Nobody would ever want to attempt Series/Parallel wiring for 8000 speakers spread over an entire office complex. The 70V and 25V speaker systems (and the 100V system which is used in Europe) rely on inexpensive line matching transformers to simplify the "impedance matching" and "amplifier loading" issues. The line matching transformers allow all of the speakers in a 70V or 25V speaker system to be wired in parallel regardless if there are 8 speakers or 8000 speakers in the system, as long as **the total of all transformer taps used does not exceed the power rating of the amplifier**. Parallel connections make field wiring easy and it makes it possible to add speakers anywhere along the speaker string without any concern about Series/Parallel load impedance. The term "Constant Voltage" can be misleading. "Constant Voltage" means whether you have a 10W 70V amplifier, 100W 70V amplifier, or a 1000W 70V amplifier, the output will be at 70.7V when the amplifier is turned all the way up. When a 70V amplifier is turned down, it will be running at less than 70V. The key thing to remember is that the transformer power tap values are calculated for when the amplifier is running at a full 70V. A 70V speaker transformer tapped at 5 watts, will only draw a full 5 watts, when the amplifier is at its full 70V output.

70V / 25V Constant Voltage Speaker System Advantages:

A 70V or 25V speaker system is easy to design and easy to wire in the field because all speakers can be wired in parallel. The higher transmission voltages used greatly reduce the power lost in the speaker lines so smaller less expensive speaker wiring can be used. The volume of a single speaker on the line can be adjusted louder or softer by adjusting the power tap used on that speaker's matching transformer. That adjustment does not affect the volume of the other speakers in the system. The volume adjustment of a single speaker on the line or the volume adjustment of groups of speakers in a zone can be made accessible to the user by way of inexpensive wall-mount autoformer-based volume controls. The settings on wall-mount volume controls can be easily bypassed during pages or during emergency announcements. (See Lowell "priority attenuator" volume controls that include a "-PA" in the model number). It is easy to add speakers to the system in the future without having to change any of the existing wiring. If adding additional speakers in the future will require a more powerful amplifier at the head-end, an amplifier with a higher output power capability can replace the existing unit without changing any of the existing speaker wiring or any of the existing speaker transformer tap settings. For example: A Lowell MA60 could be replaced with a Lowell MA125 so that more speakers could be added to the system, with no other changes required to the existing speaker wiring or transformer taps.

Individual Speaker Transformer Tap Settings:

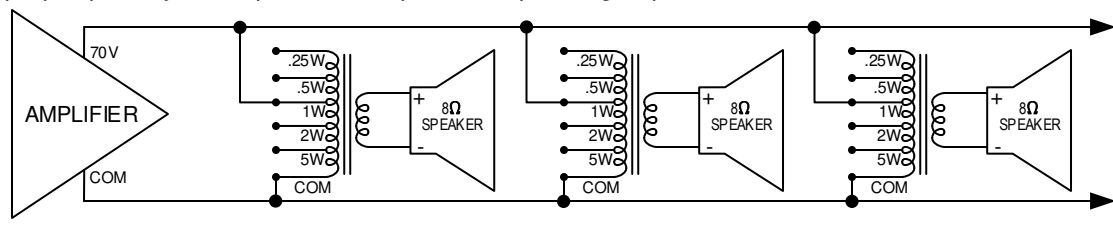
A 70V or 25V speaker that is chosen by the system designer, has a matching transformer with a maximum power rating. For example, the Lowell R1810-72 (shown to the right) has a Lowell TLM-572 5-watt 70V/25V dual voltage transformer. That means that this speaker can be used on both 70V systems and 25V systems. The 8 Ω secondary of the transformer is connected directly to the 8 Ω input terminals on the 810 speaker. The primary has transformer taps for either 70V or 25V at 0.25W, 0.5W, 1W, 2W, and 5W. When a designer is mapping out the coverage of these ceiling speakers, he/she will determine how many speakers are required and in what locations, and what power tap will be used for the speakers to be loud enough for this application. Let's say for example that the designer has determined that 100 speakers will be required tapped at 1W each at 70 volts. That means that our total speaker load is 100 watts. The speakers will be wired in the field in parallel as shown below making sure the connections are made with the proper polarity to keep all of the speakers operating in phase with each other.

Lowell R1810-72



Note: Always insulate the transformer taps that are not being used so they don't short together.

To More Speakers



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70V and 25V Amplifier Load Calculations and Amplifier Selection:

Never use a speaker load (the sum of all speaker transformer taps) that exceeds the amplifier power rating. Overloading the amplifier can cause distortion and could damage the amplifier and void the warranty.

In fact, it is good design practice to limit the speaker load to 85% of the amplifiers power rating. That designed-in headroom allows for future expansion (adding a few speakers) and also the reduced load will increase the lifetime of the amplifier by allowing it to run cooler. Continuing with the example from page 7, the designer knows that the expected speaker load is 100 watts. What would be an appropriately sized amplifier for that system? If the designer considers a 125W amplifier, $125 \times .85 = 106.25$ watts. It would be good design practice to limit the speaker load to no more than 106.25 watts, so since the speaker load in the example is 100W, the 125W watt amplifier would be a good choice. Sometimes the amplifier has already been purchased and the number of speakers required is known, but the question becomes what transformer tap setting to use. Desired speaker SPL calculations to determine the speaker transformer tap required are beyond the scope of this paper, but there are some practical considerations when choosing the power tap. If a 125 watt amplifier has already been purchased, using the 85% loading rule of thumb, $125W \times .85 = 106.25$ watts. It would be good design practice to limit the speaker load to no more than 106.25W. Since we know from our example that 100 speakers would be required, it is obvious that tapping the speakers at 1W is the best choice.

Some system designers feel it is best to tap the speaker transformers as high as possible. Consider an example where a sound system that has a 125W 70V amplifier, only has 10 speakers. If the transformers are tapped at 0.25W each, the total speaker load will be $0.25W \times 10$ speakers = 2.5W. If the amplifier is turned all the way up so its output is 70 volts, those speakers will still only draw a maximum of 0.25W each and it would not be possible to get the speakers any louder. That would result in tons of headroom but you wouldn't have much volume out of the speakers. Some designers would suggest that the speakers in this example should be tapped at 5W each so the speaker load would be $5W \times 10$ speakers = 50W. Again, plenty of headroom for the amplifier but more than 12dB more sound pressure level out of the speakers. Other designers would prefer that the speakers be tapped at 1W each (if they are sure that the 1W tap would provide sufficient SPL) because the 1W tap provides 2 higher powered taps that are available if this particular speaker needs to be louder, and 2 lower-powered taps if this speaker is too loud. The designer needs to determine the appropriate tap setting after considering the requirements of the system design. The question might be asked, what happens when the designer has a 125 watt amplifier, and needs 25 speakers tapped at 5 watts each? That results in a speaker load of 125 watts with no headroom. Sometimes a designer is confident that adding speakers in the future will not be necessary, and competitive pressure in a bid situation will not make it possible to use a larger amplifier to provide the desired headroom. Although headroom is always desirable, be assured that the Lowell amplifiers will survive and operate safely when fully loaded.

Wiring Size and Length:

Cable distance should be kept as short as possible to minimize power loss. The chart below can be used as a general guide showing various wire sizes and the maximum distance related to cable loading that speakers can be placed from the unit for an approximate 0.5dB loss (-12.5% power).

2 WIRE COPPER CABLE LENGTHS FOR SPEAKER LINES AT -0.5dB LOSS IN SPL (12.5% POWER LOSS IN WATTS)

AWG SIZE	LOW IMPEDANCE SPEAKER LINE			70.7V SPEAKER LINE (FOR 25V LINE DIVIDE ALL 70.7V LENGTHS BY 8) NOMINAL POWER IN LOAD								
	4 OHMS	8 OHMS	16 OHMS	7.5W	15W	30W	60W	100W	125W	250W	400W	500W
10	120	240	480	-	-	5,000	2,500	1,500	1,100	550	365	275
12	75	150	300	-	6,200	3,100	1,550	940	750	375	230	185
14	50	95	190	7,600	3,800	1,900	950	600	450	225	140	110
16	30	60	120	4,800	2,400	1,200	600	370	290	145	90	-
18	20	40	75	3,000	1,500	750	375	230	180	90	-	-
20	15	25	50	1,920	960	480	240	150	110	-	-	-
22	10	15	30	1,200	600	300	150	95	-	-	-	-
WIRE LENGTHS IN FEET				WIRE LENGTHS IN FEET								

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