

HOT SPOT



OWNER'S MANUAL



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PART I: *Applications*

How to Monitor Effectively — Using the Hot Spot and Hot Spot V.C.

Without stage monitors, today's live music would probably not sound as good as it does. If you are a musician or vocalist, you know how important it is to hear yourself clearly; you need to keep in tune and in sync with the other instruments in the band. This is often made difficult by the high sound pressure levels of the amplifiers used today. But monitors can also cause more than their share of problems. After reading this section, you will understand why this is so, and what can be done about it.

Gain vs. Power

Feedback, the dreaded "Soundman's Curse", that awful squealing and screeching sound, is caused by a regeneration of sound leaving the speaker and entering the microphone. A never-ending cycle is created and the volume must be decreased to stop it. In a sound system, the amount of gain, or volume before feedback, is not merely determined by the size of the power amplifier. The relationship between the microphones and speakers and the room they are in will affect the gain of the system as well. Let's look at two extreme cases:

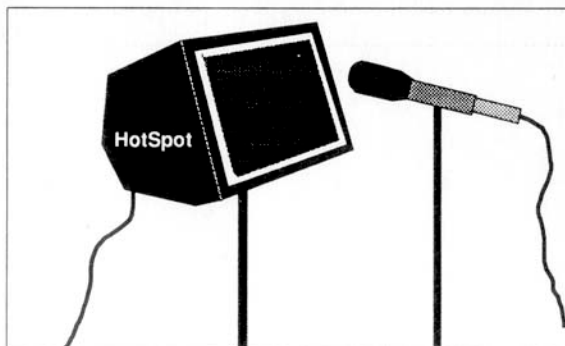


Figure 1-2

In figure 1-2 we see the worst possible case of gain limiting. The microphone is pointed directly at the speaker. We can't turn the volume up at all without going into feedback immediately. We may be using only 1/1000th of the power available to us. With a 100-watt amp, that's only 1/10 of a watt!

In figure 1-3, we have increased the distance between the microphone and the speaker to 500'. We can get 100% gain and use all 100 watts of power without going into feedback.

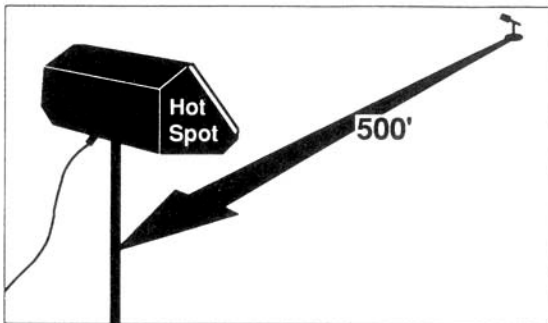


Figure 1-3

Of course, these are extremes, but this clearly illustrates how important the placement of the speakers and microphones is in determining the gain of the system.

Setting up your P.A. System and Monitors.

Obviously, in most cases we can't locate the microphones 500' away from the speakers. Therefore, we have to place the speakers to adequately cover the listening area and, at the same time, place the microphones so that we maximize the gain. Figure 1-4 shows a typical example:

In most cases, the speakers should be placed on stands, slightly above the heads of the audience, and in front of and to each side of the stage. They should be turned slightly inward, but be careful! The more they are turned in, the less gain you will have, as the sound begins to be directed at the microphones. Remember, a few degrees of rotation can make a big difference!

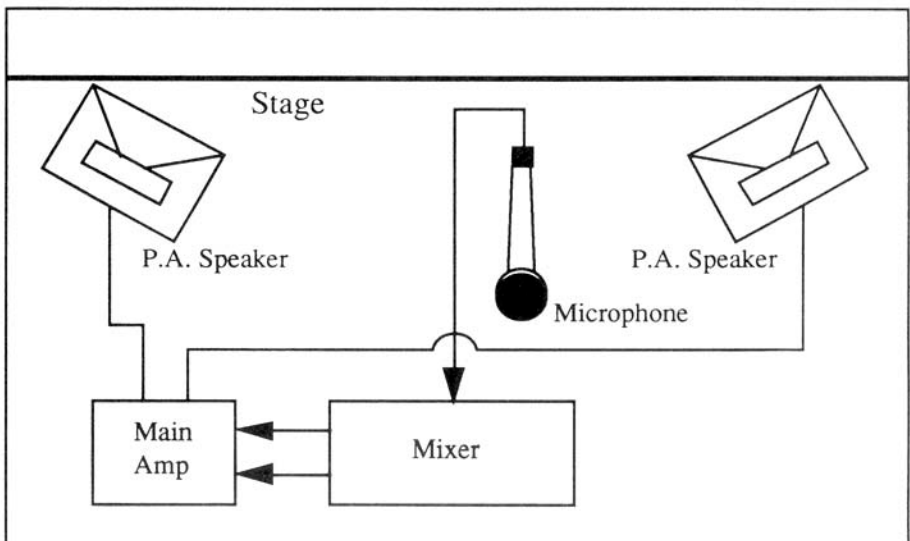


Figure 1-4

Figure 1-5 shows a monitor speaker on stage, in very close proximity to the microphone. If we were to power this monitor speaker with the same amplifier used to power the main speakers, we would experience major feedback problems. Given our knowledge of speaker/microphone relationships and their effect on gain, what do you suppose would happen if the volume was turned up? The monitor speakers, being closer to the microphone than the main speakers, and pointed towards the microphone, will go into feedback first, causing the main speakers to feedback, and so limiting the gain of our entire system to that of the stage monitors.

In order to eliminate this problem, the monitor speaker should have its own volume control, or, ideally, it should be connected to a separate amplifier. With this setup, we can adjust the volume of one speaker system without affecting the other. Thus, the gain of the monitors does not affect that of the main system.

Today's mixers give great flexibility in controlling separate monitor and main levels. Because you put only what each musician needs to hear into his respective monitor mix, the monitors are clearer and easier to listen to.

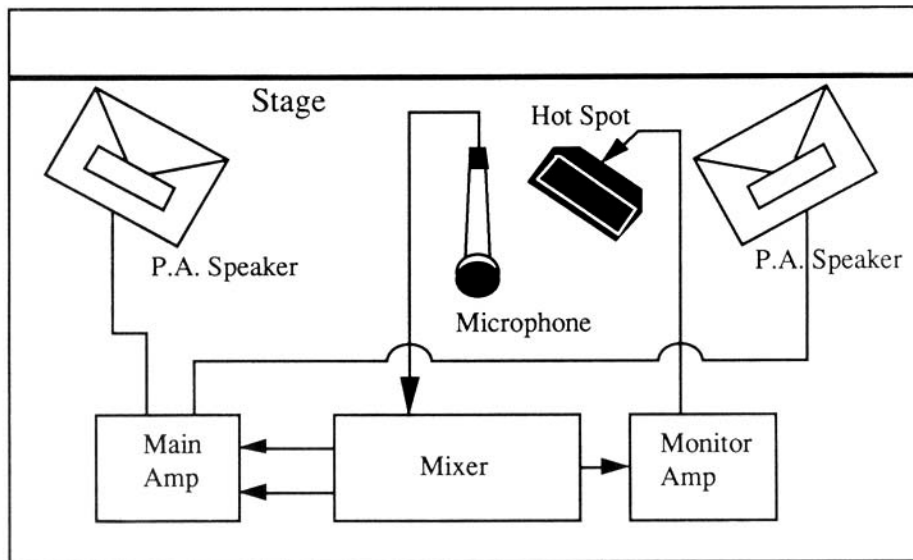


Figure 1-5

Suggestions for Better Monitoring.

A. Proper Placement - The most important factor.

1. Each performer that needs to hear needs his own **Hot Spot**.
2. The **Hot Spot** should be placed close enough to touch. The closer the **Hot Spot** is to you, the louder it is. One of the primary advantages of the **Hot Spot** is its ability to be placed close to the performer, so take full advantage of this.
3. The **Hot Spot** should be placed behind the mic.
4. If one **Hot Spot** is substantially closer to a vocal mic, its volume may need to be reduced so that it will not reduce the gain of the entire monitor system.

B. Use a unidirectional microphone. There are many good brands on the market, with a wide variance in the amounts of rejection, so experiment with several, if possible.

C. Equalizing your system.

1. With all the mics at their working volume in the P.A., increase the volume of the monitors gradually until they reach the point immediately before feedback - they should just ring. Cut the frequency level that is ringing by 2 to 3 dB. Periodically talk through the system while repeating this process, until you either get several notes ringing at once, or you start to have a reduction in quality from overequalization.
2. In high volume applications, reduce all frequencies below 150 Hz in the monitor mix. Since low notes are non directional, they are not really needed in the monitors, as they can be heard equally well anywhere on stage.

D. Distortion problems - If your **Hot Spots** are distorting, it is probably because your amp is running out of power. Either use a larger amp, or reduce the bass frequencies in the monitor mix.

E. Do Not plug or unplug your **Hot Spot** while it is operating, as this may place a temporary short on your amplifier, which could be damaging.

General Guidelines:

DON'T...

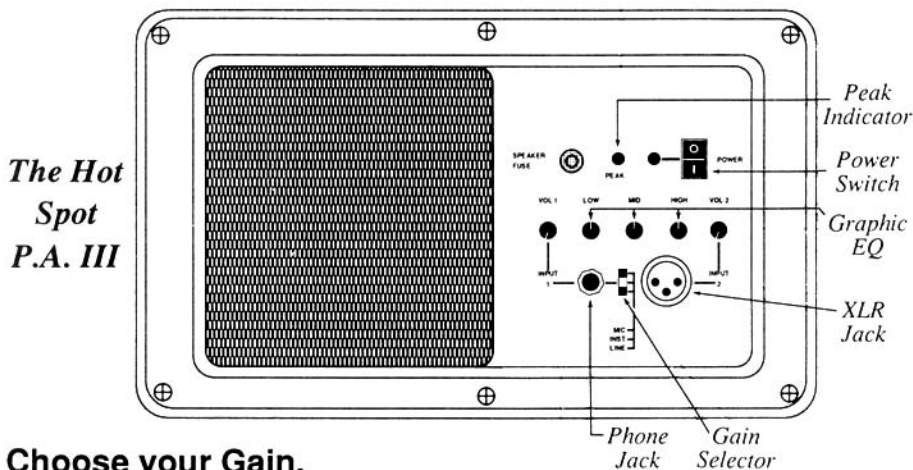
- ▼ Expose your **Hot Spot** to rain or moisture for long periods. (It's not waterproof!)
- ▼ Plug or unplug patch cords while the unit is on. (**P.A. III**)
- ▼ Place a load less than 4 ohms on the P.A.'s amplifier. (see part II)
- ▼ Attempt to make any repairs to the unit. (call your Galaxy Audio dealer.)

DO...

- ▼ Use a unidirectional microphone
- ▼ Handle with care
- ▼ Read this manual!
- ▼ Fill out the warranty & registration card if you haven't already done so!

The Hot Spot P.A. III

This piece of equipment has so many uses that, if you are a musician, you may find yourself toting it around with you wherever you go. You may use it as a practice amp at home, and later carry it with you to the stage or studio, where you use it as a powered monitor. It may also be used as a portable public address system at large meetings or sporting events. With the addition of a portable CD or cassette player, it becomes part of a portable sound system for use in your office, den, or workshop. The list goes on. To make more effective use of all the features of the **P.A. III**, we will now discuss them in detail.



Choose your Gain.

The **Hot Spot P.A. III** will accept several different types of inputs, with either 1/4" phone or XLR-type connectors, and with varying signal strengths. The gain-selector switch, located between the input jacks, lets you choose the gain level most suitable for the signal strength of your input. It only selects the gain for the 1/4" phone jack; however, the line position gain for the 1/4" jack can be changed with a simple internal adjustment.

The gain for the XLR jack is set at the factory to a level that works well for most applications, but this can be changed with a simple adjustment.

A simple modification adds 24 volt phantom power to your XLR jack! See the section on configuring jacks in Part II for more details and instructions on making these adjustments and modifications.

Since the standard 1/4" plug is used to carry a wide range of signals with different strengths, you will need to use a great deal of care in selecting the appropriate gain levels. For instance, most Hi-Z microphones, and many

electric guitars, need a great deal of amplification. In this case the selector should be in the “mic” position, which provides the highest gain, or amplification, of the signal. Electronic keyboards, and electric guitars with active electronics, on the other hand have a relatively high level signal, and should be used on the “inst” setting. The “line” level is designed for the connection of tape decks, tuners, CD players, and other audio equipment that has a -10dBm to +10dBm level output.

Equalizing the signal.

The **Hot Spot P.A. III** has a built-in equalizer with controls for three frequency levels. **Low EQ** provides +/- 15dB shelving at 100 Hz, **Mid EQ** provides +/- 12dB peak/dip at 3 kHz, and **High EQ** provides +/- 15dB shelving at 10 kHz. The signals from both front panel inputs are affected by the equalizer.

The P.A. III as a Practice Amp.

Due to its compact size, light weight, and high power, the **P.A. III** is used as a practice amp by many professionals and amateurs alike. It works well with guitars, synthesizers, and just about any instrument that you would normally amplify. You can also mix a mic signal with your instrument signal for amplifying vocals or an acoustic instrument. Of course, you must always be sure to set the appropriate gain level for the instrument you are using. If you are a bassist, you may find that, with the addition of a bass cabinet and a simple crossover, the **P.A. III** makes a great practice amp for bass guitar. (This setup is detailed in Part II, under “Special uses for your **Hot Spot P.A. III.**”)

Public Address System.

Plug a microphone into the front of your **P.A. III**, and **PRESTO!** you have a portable P.A. system that is both lightweight and compact. We recommend using a unidirectional mic to reduce feedback.

Stage Monitor.

Like the **Hot Spot** and **Hot Spot V.C.**, the **P.A. III** may be used as a stage monitor, preferably placed at waist level or higher, i.e. on a mic stand. In this application, the main difference between the **P.A. III** and the other **Hot Spots** is that only line level inputs are needed, whereas the **Hot Spot** and **Hot Spot V.C.** need amplified sources.

PART II:

Customizing your monitor system.

NOTE:

Some of the modifications presented in this chapter require that the cabinet of your **Hot Spot** be opened. Within the context of the modification, this will not void your warranty. However, we do recommend that the modifications be performed by competent service personnel, as we will not extend your warranty to cover any damages caused by such a modification. We leave this to your discretion.

Ohm's Law and the Hot Spot

It is quite possible that, from time to time, you will want to send the same signal to two or more **Hot Spots**. Luckily, these monitors are designed to be “daisy-chained” or wired in parallel, to fulfill this need. The two jacks on the back of the **Hot Spot** (or **V.C.**) are wired in parallel, which means the signal can travel in one jack and out the other, and thus power an unlimited number of speakers... Well, sort of.

This is something that we hear fairly often:

“All I did was just plug in another speaker and WHAM!, the insides of my amp got fried. I didn't even turn it up that loud!”

The more speakers that are added to an amp, the greater the load. If too many speakers are added, the additional load may cause the amp to heat up. This heat build-up can cause the amp to go into thermal overload or burn out. A sure sign that you are overloading the amp is distortion in the speakers that stops if a fewer number of speakers is used, or a great deal of heat coming from the amplifier, making it too hot to touch.

One easy way to determine the load on your amplifier is to use Ohm's law, which states: "The total impedance of N speakers in parallel is equal to the reciprocal of the sum of the reciprocals. In equation form, Ohm's law is:

$$Z(\text{Total}) = \frac{1}{\frac{1}{Z1} + \frac{1}{Z2} + \frac{1}{Z3} + \frac{1}{Z4} + \frac{1}{ZN}}$$

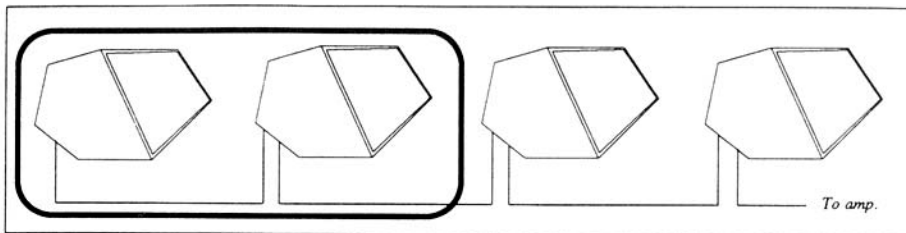
Where Z1 is the impedance (or ohm rating) for the first speaker, Z2 for the second, and so on, for every speaker in the chain. The final figure we come up with is the total impedance of the speaker system, which should not be lower than the minimum impedance rating of the amplifier. We can also use the short form of the equation, which states for two speakers:

$$Z = \frac{Z1 \times Z2}{Z1 + Z2}$$

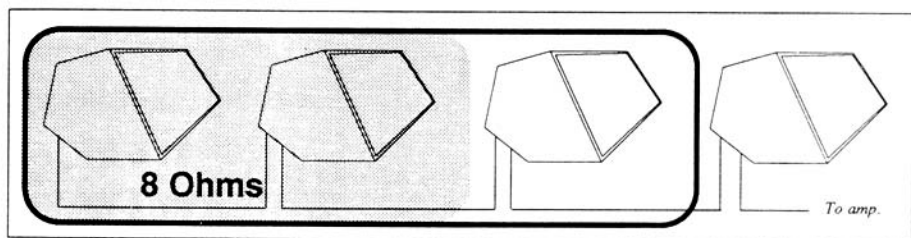
Once you calculate the impedance of the first two speakers, you can use this number as if it represented a single speaker, and plug it into the formula with the next speaker in line. (Remember, this equation only allows us to figure the impedance of two speakers at a time.)

EXAMPLE:

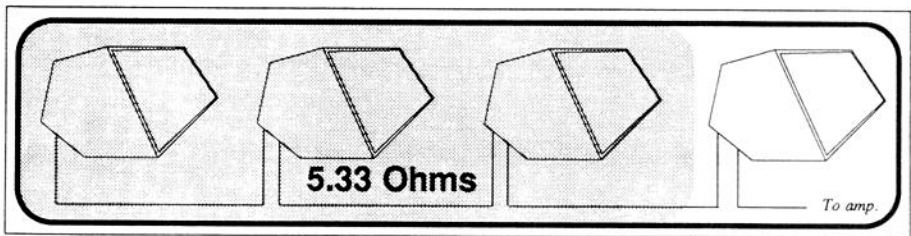
If we have four **Hot Spots** wired in parallel, what is the total load impedance on the amp?



$$Z = \frac{16 \times 16}{16 + 16} = 8 \text{ Ohms for two Hot Spots}$$



$$Z = \frac{8 \times 16}{8 + 16} = 5.33 \text{ Ohms for three Hot Spots}$$



$$Z = \frac{5.33 \times 16}{5.33 + 16} = 4 \text{ Ohms. This is the total load.}$$

Of course, the same rules apply to the **Hot Spot V.C.** and **P.A. III**. The **P.A. III**'s speaker impedance is 8 ohms, and its amplifier is capable of driving loads as low as 4 ohms. The impedance of the **Hot Spot V.C.** is determined by the position of the volume control. Use the table below to determine the actual impedance and dB loss.

Hot Spot V.C. Impedance Chart

Position	Impedance	dB loss
Full clockwise	16 ohms	0
2nd	23 ohms	-3
3rd	33 ohms	-6
4th	46 ohms	-9
5th	64 ohms	-12
6th	90 ohms	-15
7th	130 ohms	-18

Special Uses for your Hot Spot P.A. III

You may have noticed that there is an inconspicuous 1/4" phone jack on the back of your P.A. III. This section explains the purpose of this piece of hardware, and how it can help you make better use of your P.A. III.

The Speaker Jack

You can drive up to four Hot Spots with the amplifier in your P.A. III. **Connecting a standard speaker cable to this jack will automatically disconnect the internal speaker.** You may then connect the other Hot Spots as described in the previous section.

When using additional speakers, you will want to increase the value of the speaker fuse located on the front panel. For an 8 ohm load, the 1.5 amp standard fuse will do. For 5.3 ohm loads, use a 2.5 amp fuse, for 4 ohm loads, a 3 amp fuse.

This jack can be used for both input and output. See figure 2-5, the speaker jack schematic. Notice that, normally, when there is no plug inserted in the jack, the "ring" and "tip" connectors are tied together, allowing the internal speaker to be active. Inserting a plug into the jack opens the switch contact, disabling the internal speaker, unless there is a jumper between the ring and tip lines of the patch cord.

With the Galaxy SC-1 accessory cable you can use the P.A. III with other speakers and turn the P.A. III's internal speaker on or off depending on which end of the SC-1 is plugged into the P.A. III.

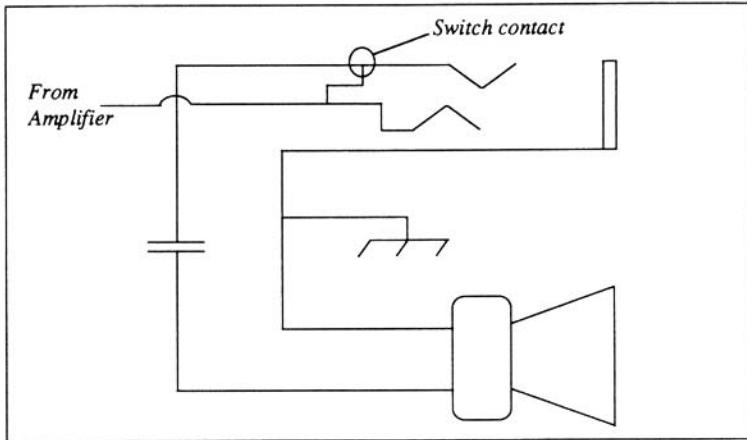


Figure 2-5: Speaker jack schematic

The following are patchcord wiring configurations for several applications of the P.A. III. Refer to figure 2-6 as a key to the connections used for plugs and jacks. **Please Note: Figs. 2-7, 2-8, and 2-9 are used with the speaker jack, while figure 2-10 is for use with the front panel 1/4" phone jack input.**

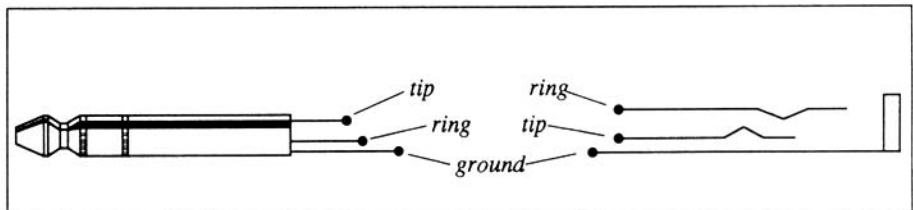


Figure 2-6

Mono patch cord for Hot Spot P.A.III to power external speaker or headphones.

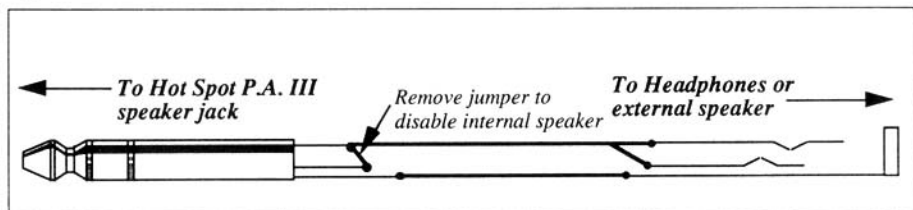


Figure 2-7

Patch cord for Hot Spot P.A. III to feed line input of mixer or power amp. (Available as Galaxy LC-1 accessory.)

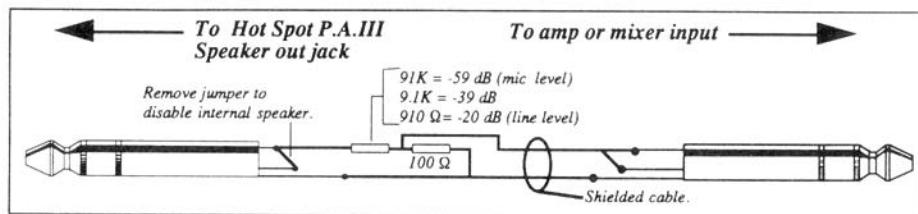


FIGURE 2-8

Wiring diagram for HOT SPOT P.A. III used in a two-way speaker system with bass cabinet.

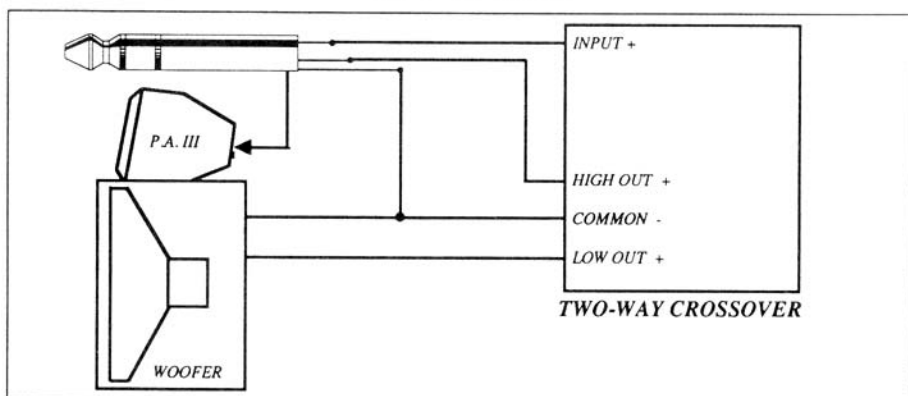


FIGURE 2-9

Patch cord to feed line input of Hot Spot P.A. III with an amplified signal.

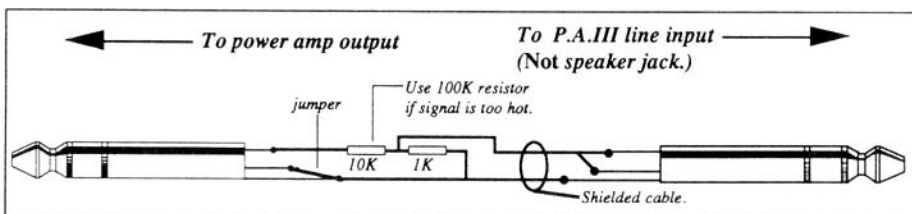


FIGURE 2-10

Note: All resistors are 1/4 Watt, 5%; mount inside plugs.

Configuring the P.A. III's jacks.

In Part I, we learned the importance of gain control. We also learned that the gain level of the XLR jack and the 1/4" phone jack's line position were internally set at the factory. These can be changed with a simple adjustment. We can also add 24 volt phantom power (12 volts on Traveler model) to our XLR jack, for the use of externally powered microphones. In this chapter, you will be instructed on the procedures to perform these modifications and adjustments.

WARNING!

High voltage is present inside the cabinet of your HOT SPOT P.A. III. Therefore, you must make absolutely certain that the power is disconnected before disassembly, or risk serious or even fatal injury. Again, we recommend that you refer these modifications to qualified service personnel.

Disassembly of Unit

You will need:

A Phillips-head screwdriver.

- A. Unplug unit from A.C. power source.
- B. Remove 6 screws found in the perimeter of the bezel.
- C. Remove single screw found on the back of the unit.
- D. The amp/speaker/bezel assembly may now be removed from the enclosure. The bezel fits the shell very tightly. It is designed this way to prevent rattle. It is sometimes necessary to assist the disassembly in the following manner:
 1. On a carpet-covered or similarly padded bench, set the unit on either of the two small ends with the front facing you.
 2. With both hands, hold the unit by the enclosure, tip the other end towards you, pick it up about 8" and give it a hard "rap" down on the bench.

3. The amp/speaker/bezel assembly should pop loose. If not, repeat step "2" with a little more force.
4. A similar technique may be used when reassembling the unit.

Adjusting the gain controls

You will need:

A jeweler's Phillips-head or T.V. alignment tool

Locate the gain control potentiometers on the main circuit board. They are 1-3/4 inches from the right edge of the circuit board (when viewed from the front panel). The one located near the Mid EQ and High EQ controls adjusts the sensitivity of the **Line** setting of the 1/4" input. The one located towards the rear of the chassis adjusts the XLR input gain. Both of these controls offer a wide range of sensitivity from mic to line.

Turning the control clockwise increases the gain, and turning it counter-clockwise decreases the gain. Be careful not to turn the wrong control; this could have adverse effects on the performance of the amplifier.

Now, close the cabinet securely, and test the unit.

Adding Phantom Power.

You will need:

A soldering iron.

A short (1" - 2") length of insulated wire, with about 1/4" of insulation stripped off both ends.

Needle-nose pliers.

First, locate the two solder cups, towards the speaker side of the board, and labeled "PHANTOM POWER." (Solder cups are small vertical metal tubes with solder in them.) While holding the piece of wire with the needle-nose pliers, heat one of the solder cups by placing the hot soldering iron alongside it. As soon as the solder melts, insert one end of the wire, and remove the soldering iron. Repeat this procedure for the other end of the wire, in the other solder cup.

Reassemble the unit. You now have 24-volt phantom power!

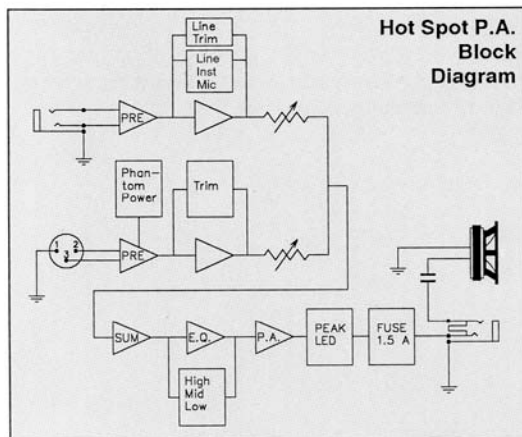
If you need more help...

Galaxy Audio wants to hear from you. If you have a special application, problem or question, please feel free to give us a call or write us.

SPECIFICATIONS

	HOT SPOT	HOT SPOT V.C.	HOT SPOT P.A.
SPEAKER COMPLEMENT	2 - 5" full range drivers w/non-ferrous baskets	2 - 5" full range drivers w/non-ferrous baskets	1 - 5" full range driver w/non-ferrous basket
MAGNET STRUCTURE WT.	80 Oz. Total (2.2 kg)	80 Oz. Total (2.2 kg)	40 Oz. (1.1 kg)
POWER CAPACITY	200 Watts continuous above 150 Hz	200 Watts continuous above 150 Hz	100 Watts continuous above 150 Hz
SENSITIVITY*	96 dB @ 1 Meter, 1 Watt input, (1kHz Octave band)	96 dB @ 1 Meter, 1 Watt input, (1kHz Octave band)	91 dB @ 1 Meter, 1 Watt input, (1kHz Octave band)
FREQUENCY RANGE	100 Hz - 18 kHz \pm 6 dB	100 Hz - 18 kHz \pm 6 dB	20 Hz - 20 kHz \pm 1 dB (amp) 100 Hz - 18kHz \pm 6 dB (speaker)
NOMINAL IMPEDANCE	16 Ohms	16 Ohms	8 Ohms
INPUT CONNECTORS	1/4" phono jack x 2 wired in parallel	1/4" phono jack x 2 wired in parallel	Balanced 1/4" mic-inst-line jack Balanced XLR mic jack
FINISH	Black case and bezel with charcoal grille	Black case and bezel with charcoal grille	Black case and bezel with charcoal grille
WEIGHT	8 pounds (3.6 kg)	8 pounds (3.6 kg)	9 pounds (4.1 kg)
DIMENSIONS	6.75" x 10.94" x 6" (171 x 278 x 152 mm)	6.75" x 10.94" x 6" (171 x 278 x 152 mm)	6.75" x 10.94" x 6" (171 x 278 x 152 mm)
ADDITIONAL FEATURES	-	Volume Control Range: 18 dB; 7 positions at 3 dB each.	Built-in Power Amplifier (See table and block diagram below.)

*Caution: These speakers can produce sound pressure levels which may cause permanent hearing damage after prolonged exposure.



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Hot Spot P.A. Maximum Average Power; Watts at 1kHz.			
System Impedance \ THD	<0.1%	<1.0%	<2.0%
8 Ohms	35	38	40
5.3 Ohms	45	48	50
4 Ohms	50	52	55



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HANDLE KIT (Not Shown)

Vinyl Strap Handle with Mounting Hardware for use on any HOT SPOT, VC, or PAIII.

SA-1 Adapter

Spun Aluminum Stand Adapter for mounting HOT SPOTS on KM series mic stands.

SC-1 Cable

25' Speaker Cable Activates or Mutes PAIII's Internal Speaker when powering external speakers.

LC-1 Cable

25' Line Cable for feeding PAIII Line Input from Speaker Level Output.

SA-YBRF Bracket

Yoke Bracket Kit includes all hardware for mounting HOT SPOTS or PAIII. May be used in conjunction with SA-1 for Optimum Flexibility.

S5C160-8 Speaker (Not Shown)

5" 8 Ω 100 Watt Driver, replacement for HO1 SPOTS. Also suitable for use in distributed systems. 40 oz. Magnet Structure, Non-Ferrous Basket, 1" Ferrofluid Cooled Voice Coil.

