# **CHOOSING THE RIGHT SNAKE**

Snakes are the most complicated part of cabling the band because of the large variety of user needs, wide variety of options available to fulfill those needs and the often times astronomical costs involved in getting everything to work correctly.

Not all acts need a snake. Snakes (multipair audio cables) become a necessity when an act needs a soundman or soundwoman to mix their sound for live audiences.

Before we begin our discussion about snakes, we have to describe the ingredients in a Public Address system (aka a sound system or P.A. system).

Then we need give you the questions you need to ask before buying your first snake.

### A basic P.A. system consists of:

- Microphones, mic stands and mic cables
- A mixer to plug the microphones into, to control tone and volume.
- A power amplifier to amplify the signal from the mixer
- Speakers and speaker cables

# Larger P.A. systems include some or all of the following equipment:

- Microphones, mic stands and cables
- An FOH (front of house) mixing console
- Effects and equalization (E.Q.) usually in an effects rack
- The snake
- Lots of patch cables
- A monitor system with a mixer, effects and E.Q., power amps and speakers
- Microphone splitters
- Direct Boxes
- Electronic crossovers, as most larger P.A.s are bi- or tri-amped
- FOH speakers and power amps
- Feeds to the recording truck
- Feeds to the satellite uplink for live broadcasts.
- Lots of road cases

Sometimes the mixer and amplifier are combined into one unit called a powered mixer. These are wonderful systems for wedding bands and other small groups that do not need a soundman.

However, when it is time to increase the size and versatility of the sound system, it is time to unload the powered mixer and buy a separate mixer and power amplifier.

### The snake is the audio superhighway needed to make larger sound systems work at all.

From this modest beginning, sound system size, complexity and costs go straight up to and including systems that take three semi-trailers of equipment for big venue acts.

By the time P.A.'s have all this equipment, they are so expensive that they are much cheaper to rent than own (at \$20,000 a day and up to rent,

#### they're still a bargain). There are several top-quality national touring companies capable of providing great sound for any size audience.

We are ahead of ourselves, so let's go back to the start of the journey.

### Benchmark

It is really difficult to buy a flexible, reliable, rugged, easy to coil and uncoil long-lasting 100' 20-channel snake for under \$500.

### The snake situation

The snake is the audio superhighway needed to make larger sound systems work at all.

When the decision has been made to add a soundman or soundwoman to the act, the next challenge a band has in cabling is how to buy the right snake.

Snakes are confusing at first, expensive and have lots of points to consider before being purchased. Later on, snakes become really confusing, really expensive and have even more things to consider. The

### "One of my problems is making sure musicians buy the right snake the first time for their use."

point of all this is to never make the same mistake once. Snakes allows us to

combine several balanced (microphone) cables into one smaller diameter multipair cable, making setup and teardown much faster and easier, with less spaghetti than would otherwise be the case.

# The real-world problems with snakes

First of all, there are several questions that must be asked before the purchase of a first snake:

How many microphones and instrument signals do I need to send from the stage to the FOH mixing board? You also need to ask yourself if you are going to need more channels later on. That way you can decide whether it is practical or not to buy a larger channel count snake than you currently need. Include in your thoughts that you may have to add an additional sub mixer or buy a new, larger mixer to accommodate all those microphones.

How many returns do I need to send back to the stage (as drive lines to get signal back from the FOH mixer? Drive lines are a fancy term for the line level signals returned to the stage to "drive" a signal to the power amps from the mixer.

## What is a Snake? A Convenient Audio SuperHighway

Microphones are connected to the snake at the "box end" located on the stage. Instruments travel through the snake using direct boxs to balance the signals, correct levels, and minimize noise and interference.

Your mixing board is connected to the snake at the "fan out". The signals from your mics and instruments travel through the snake to your mixing board for you to mix them into the great sound you want your audience to hear.

The mixed signals return to the stage via your snake's return channels. These signals are usually audio inputs for P.A. amplifiers or stage monitor amps using XLR connectors or 1/4" phone plugs.

The return signal must go to your power amplifier(s) on stage for them to ultimately be heard through your PA speakers. Use line (instrument) cables or microphone cables. DO NOT <u>USE SPEAKER CABLES HERE</u>.

Always use speaker cables to connect your power amp and your loud speakers. Use the largest gauge speaker cables you can to maximize speaker control and minimize power loss. DO NOT USE INSTRUMENT CABLES HERE.



**Special Note:** Those of you with powered mixers absolutely cannot send speaker level signals back to the stage through standard snakes. The wires are too small to accommodate that amount of current necessary. Doing this *will* cause either the power amp in your mixer or your speakers to blow up.

If you have a powered mixer, you need a powered snake, one with speaker lines built in. Nobody recommends the use of these for long runs (over 50 feet). There is

### Let's talk technical about snakes

Each individual pair of conductors in a snake is 100% foil shielded for maximum protection. The aluminum foil is attached to a mylar tape which needs to be 3/4" wide to shield the entire bend radius of the cable, no matter how "kinked up" the snake becomes during setup.

Most manufacturers use 1/2" foil. This just isn't good enough to do the job right.

Snakes have to be CL2 fire rated to meet national electrical codes. Building flexible CL2 rated flat-black-jacketed snake wire is a tough job. Also, there are tradeoffs in flexibility and reliability in a snake. We opt, always, for reliability first, and flexibility second. Our goal is to build reliable snakes for you that you will not swear at during setup.

Pro Co makes two grades of snakes. RoadMASTER, for tough night after night professional use, and StageMASTER, for once to twice a month use for weekend warriors, church youth groups and school presentations. We use the same wire so they sound the same. The hardware, connectors, strain relief and cosmetics are completely different.

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opportunity for crosstalk and damage to your equipment. A better way to do this is to tape two 12-gauge speaker cables to the outside of a standard snake. Clumsy and ugly, but functional and safe.

- How long do I need the snake to be? Pro Co's snake wire is capable of transmitting a balanced signal 2,000 feet without much loss. Most portable snakes average 100' in length.
- A weird question you should ask yourself is "Is the snake I am considering flexible?"

Many snakes are not very flexible, and the time that you will notice this is the first time you use it. Check flexibility before you buy. If you are going to be setting up several times a week, this is very important. Also, if you are going to be coiling and uncoiling your snake every week or more often, you will need to buy a more sturdy snake than you would need if you only move a couple times a month.



If the wire used in your new snake was designed correctly, it will last for years, even with rough use. If the wire was poorly designed, it will not last long. Building very flexible, yet very sturdy snake cable is a science that few manufacturers develop correctly.

### So, what kind of a snake do I need?



### Advanced

You would probably purchase a custom designed snake that allowed for at least one split to the monitor system, with or without isolation transformers and ground lift switches (although Pro Co's rack-mount mic splitters could allow you to continue to use your old snake if it has enough channels). You would buy short sub-snakes to go from the mics on stage to the splitter and short mic cables to go from the splitter to the monitor board and to the snake.

Or you can buy a complete concert system snake, customized to you band's specific needs.

When you become a star, the P.A. will be provided for you and you will not have to worry about your snake any more. You will be glad to pawn that responsibility off onto the P.A. guys. Let them worry about it.



### Intermediate

A hardwired standard fan to box snake, configured for your mixer inputs/outputs and the length you need. Most popular mixers today have either 12, 16 or 24 mic inputs and four returns to the stage. You would ask for a 12x4, 100' (or whatever length you need) snake (12 mics, 4 returns, 100' long), or a 16x4, 75' snake, etc.



Beginner None Solutions: Mixer input connectors are XLR females. Mixer left and right stereo

outputs are XLR males or 1/4" phone jacks, usually balanced. The "fan" end of the snake must be ordered to match the panel connectors on your mixer. If these are not ordered correctly, you may have to change out the correct connectors yourself, probably voiding the factory warrantee for the product.

On stage, microphone inputs in the stage box are all XLR females. Outputs from the snake to the onstage amplifiers (or electronic crossovers) are either XLR males or 1/4" phone jacks, usually balanced.

You will need to purchase balanced or unbalanced patch cables that have the correct ends on them to convert from the snake's outputs to the inputs on your power amps. See the section in this manual on patch cables.

The secret is to get your power amplifiers as close to your speakers as possible and run the shortest speaker cables you can — for good sound, for less strain on the power amplifier(s), and less chance of tripping on the cables all over the stage.

### **Microphone splitters**

A single microphone signal (feed) may have to be split to the FOH board, the recording board, the monitor board and the satellite

Monitor

uplink if the performance is a live broadcast.

Each split needs to be isolated from the others to prevent hum. These splits can be hardwired without isolation transformers, dangerous unless you are using very expensive (like Yamaha 4000s) mixers with expensive input transformers as factory equipment, or, splits can be accomplished with isolation transformers a much safer way to separate the mic signals into more than one path, but considerably more expensive (however, not as expensive as buying Yamaha 4000s). For years we

For years \ designed Handwired feed through Splitter Snake

FOH

custom splitter snakes, with transformers and ground lift switches built in the snake's stage box to help with noise and hum problems. Then we designed off-the-shelf 19" (industry standard) rack-mountable splitters to make everyone's life easier) and lots cheaper.

To see just how complicated a concert snake system can be, visit pages 16-17 of this guide. A full-sized poster of this diagram is available from Pro Co for six bucks, including postage. Check our website www.procosound.com for details. Snakes allows us to combine several balanced (microphone) cables into one smaller diameter multipair cable, making setup and teardown much faster and easier, with less spaghetti than would otherwise be the case.

### The Big Stuff

As already discussed, snakes typically are built with a fan (to plug into the mixer) on one end, and a box (into which you plug the cables on stage coming from the microphones and going to the power amps). There are "quick disconnects" available that allow you to detach the fans and boxes from the trunk of the snake. This cuts setup time way down and if you are moving constantly, they are a great investment.

These snakes are built using timetested multipin connectors which are extremely reliable. Nonetheless, they must be handled with more care than a hardwired version of the same snake.

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You will not find disconnect snakes in a store. They are all built to order, one at a time, because of customization requirements requested by the particular act needing the snake.

Regardless of which manufacturer builds your snake for you, although price is always a consideration in any purchase, do not buy something beneath your band's needs. Pay the long dollar and get a snake that works for you. You may spend \$100 to \$300 more to get what you really need. That's a lot, but a normal 20channel, 100' snake is going to cost \$400 to \$750. Plan that into your budget. Talk to your musical equipment supplier about options and costs up front. If you need a snake and have not budgeted for it, the sticker shock can be numbing.

If you are strapped for cash, try to find a good used Pro Co snake. Unfortunately, used snakes are always at a premium and hard to find. People call us every week to see if we have any used snakes to sell. Alas, we do not manufacturer "used" snakes, although if we did, we would sell all we could build.

Choosing a snake is unlike buying any other cable. Most cables will not badly dent your pocketbook if you make a bad choice. Snakes bite if you let them.



\* For those observant ones in the audience, yes, the monitor fan only has mic inputs, no returns. No returns are necessary here, so the monitor fan is four channels less into the FOH send.