

Excerpts from Deborah Henson-Conant's

Gurl's Guide to Amplification

A Fun How-To Guide to Amplification for Beginners
With a Special Focus on Amplifying Harps



By Deborah Henson-Conant

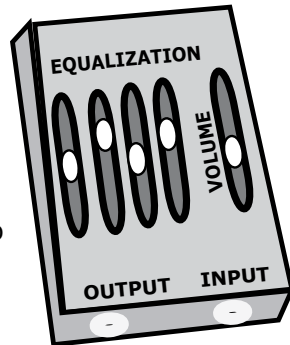
Inside are some of the things I've learned about amplification and definitions for some of the terms that will help you communicate about sound equipment. This book is NOT for experts ... but it IS for the GURL in everyone.

Basic Add-Ins

Once you have your basic system set up, it's fun to start adding a few things. The 3 things I frequently add to my system are: Preamp, Distortion Pedal and Looper, so here's how I set them up and how I use them:

Preamp:

You can certainly live without a pre-amp for awhile, especially if you have your own amp, and can set it close enough to reach the controls - but a preamp is great for these things:

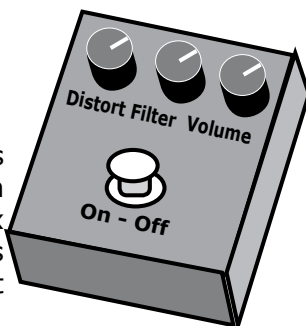


- **Simple EQ:** You can boost or reduce the "lows" and "highs" of your signal to make it sound better, or cut through other sounds better.
- **Oomph:** A preamp gives your sound more 'oomph'
- **Volume Control:** lets you boost or lower the volume of your signal without walking over to the amp.
- **Cable Extender:** If your amp's kind of far away you can use one long cable from your harp to preamp and another from preamp to amp -- and get double the cable length that way.

I generally don't use a preamp with a solid-body electric harp, but when I've retro-fitted an acoustic harp with a pickup, I often use a preamp. Some instruments have a pre-amp built in - which is great, so long as you remember to change the battery! (If the battery's low, your instrument can sound distorted, or have low or erratic volume)

Distortion Pedal:

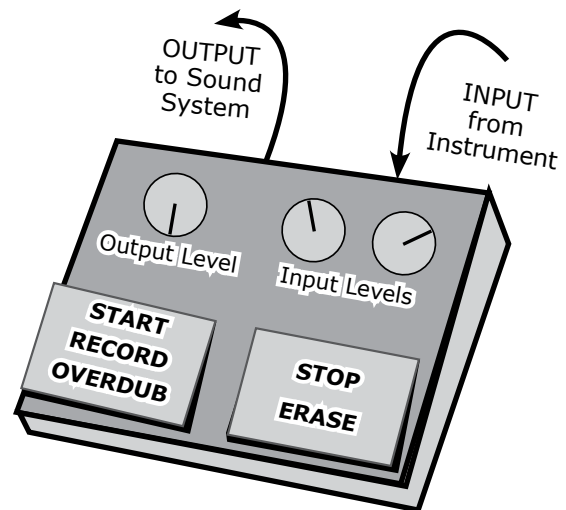
One of my favorite effects is a simple "Rat" distortion pedal. It's about 6" x 6" x 4" - has just a couple dials and one stomp-pedal that turns it on and off.



Why would anyone want to distort their sound?!?!? Aside from the fact that it instantly makes you 30% more cool*, distortion can be a beautiful effect that allows you to play soaring lines and inflect sustained notes, like a singer or a violinist can. (*results may vary)

Looper:

A looper lets you record a snip of playing on the fly, and the looper repeats it while you either overdub more snippets of music on that loop, or play a melody over the looped sound. Depending on the looper, you can

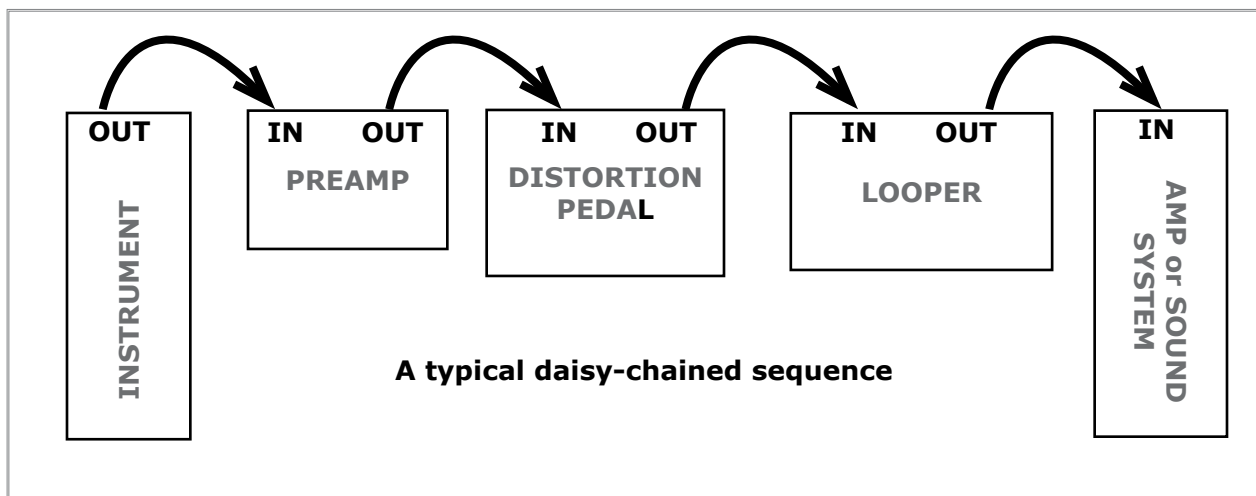


make a loop of a few seconds length - or up to several minutes.

I use a looper a lot to set up a rhythmic groove, and then play more sustained melodic improvisations over it.

Examples of loopers I've used are: Boss RC 20-XL or Line 6 DL-4 (though equipment is always changing and it's likely that I'll be using different loopers by the time you read this!)

Daisy-Chaining Effects:



I frequently use two effects units together and I daisy chain them, which means that my signal (i.e. the cable from my instrument) goes into the first unit. Another cable comes out of that unit and goes into the second unit, and so on.

If you've ever made a daisy chain (yes, a chain out of real daisies – or, in my case dandelions), then you have an idea why this is called "Daisy-Chaining."

The units I use have a bypass function, so when they're not engaged (i.e. when I haven't stomped on the stomp-button), the regular sound of my instrument passes through the device without any effect added.

The daisy-chaining allows me to use all the effects - but the trick is to make sure you get them in the right order. For example, when I use a *looper* and a *distortion pedal*, the distortion pedal has to be first in the chain.

Here's how it works:

I record loops on the looper. Once they're going (once I've stopped recording or overdubbing loops), I put the looper in pass-through mode -- so the sound I'm playing "over" the recorded loops will simply pass through the looper while the looper keeps churning out the loops *as I recorded them*.

So then I stomp on my distortion pedal.

I don't want the *recorded loops* to be distorted. What I want is the sound I'm playing *over* the loops to be distorted.

And assuming I've daisy-chained in the correct order, that's what happens. If I get the boxes backwards, then minute I hit the distortion pedal, everything in the looper sounds distorted.

Make sense? It makes total sense to me, but I still do it wrong occasionally.

Troubleshooting Daisy-Chains: Once you've looped these units all together, they're dependent on each other in some ways. So if, for example, a battery goes out on one unit in the chain, the whole chain may not work properly (or at all)!. That's when you need to calmly *troubleshoot* (see section on "Troubleshooting" later in the book).

In the case of a Daisy-Chain, that basically means to remove all but the most fundamental connection (instrument to amp), see if that connection's working, and if so, then start adding units in one at a time until you discover which unit (or *which cable*) is creating problems.

I CAN'T HEAR YOU!

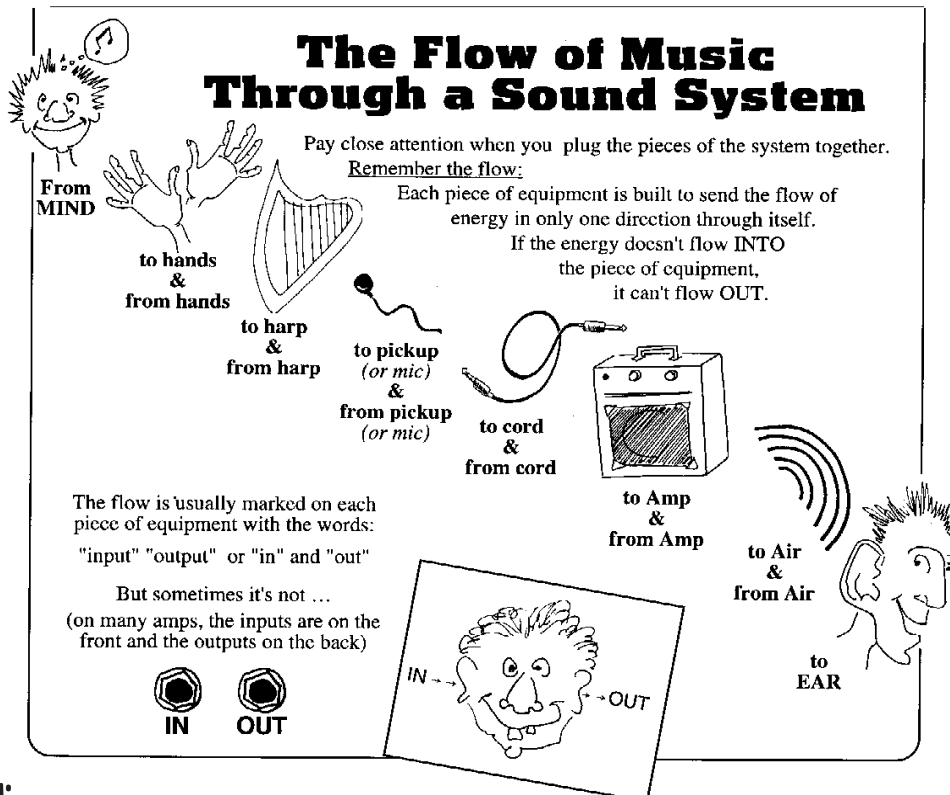
AMPLIFICATION makes something bigger, or louder. You can amplify your harp acoustically by playing harder, getting a bigger harp or playing on a wooden platform ... or you can electrically amplify your harp. To amplify it electrically, you must:

- generate a signal (i.e. play)
- collect that signal and transform (or 'transduce') it from an acoustic to an electronic signal (with a mic or pickup)
- amplify it electrically (with an amp)
- transform (or 'transduce') it BACK to an acoustic signal (using a speaker).

The sound starts & ends **ACOUSTICALLY**
What happens in the middle is **AMPLIFICATION**

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BASIC TOOLS OF AMPLIFICATION:

- **COLLECTORS:** Sound or 'signal' collector (microphone, pickup, or electric harp)
- **CONNECTORS:** Cables to connect all elements of the system
- **EFFECTORS:** Effects devices (Multi- or single effects boxes: distortion, EQ, reverb, compression, etc.)
- **AMPLIFIERS:** guitar or bass amp (all-in-one), pre-amps, a "system" (mixing board, power amp & speakers)
- **SPEAKERS:** all speakers including headphones and built-in speakers (ex. bass or guitar amps)

AMPLIFICATION OPTIONS

	PICKUP SYSTEM	OPTIONAL EFFECTS	AMPLIFICATION SYSTEMS	ULTIMATE TARGET
ACOUSTIC	 NONE	play differently	bigger harp, play harder, wooden platform, etc.	 THE EAR
ELECTRO-ACOUSTIC	 MICROPHONE TRANSDUCER	<ul style="list-style-type: none"> • Preamp • Reverb • Distortion • EQ (Equalization) • Compression • Chorus • Flange • Others (lots!) 	 BASS AMP or GUITAR AMP (an "all-in-one" system)	
ELECTRIC	 BUILT IN		MIXING BOARD + POWER AMP + SPEAKER	

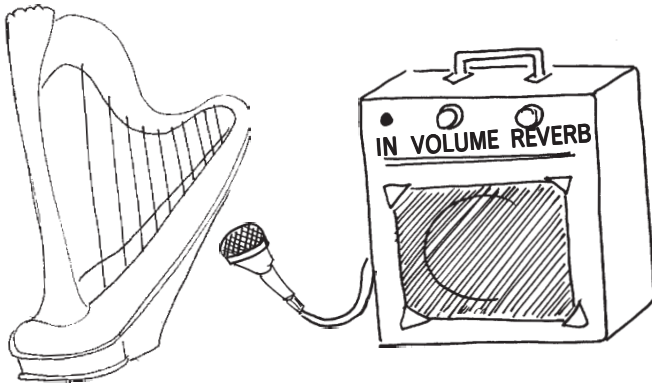
- STANDARD CONNECTORS:**
- Patch cord (aka guitar cord or quarter inch cord** [some people say 'cable' instead of 'cord']: (connects instruments to pre-amps, amps, boards & effects)
 - XLR cord (aka mic cable):** connects mics to board
 - Speaker cable:** connects amp to speakers

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BUILDING A SIMPLE SOUND SYSTEM FROM THE GROUND UP

#1: BASICS

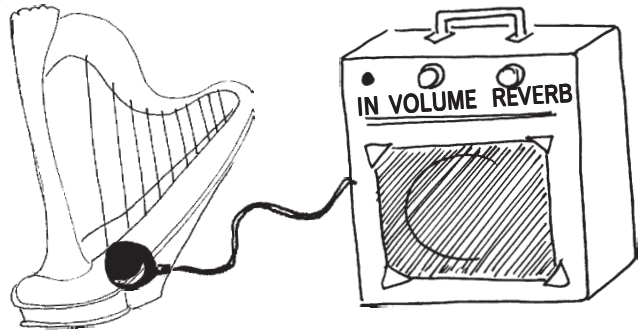


A basic Sound System can include a harp, a microphone & an all-in-one amp (like a guitar amp or a bass amp). You can even try using your home stereo system (but watch out for feedback!).

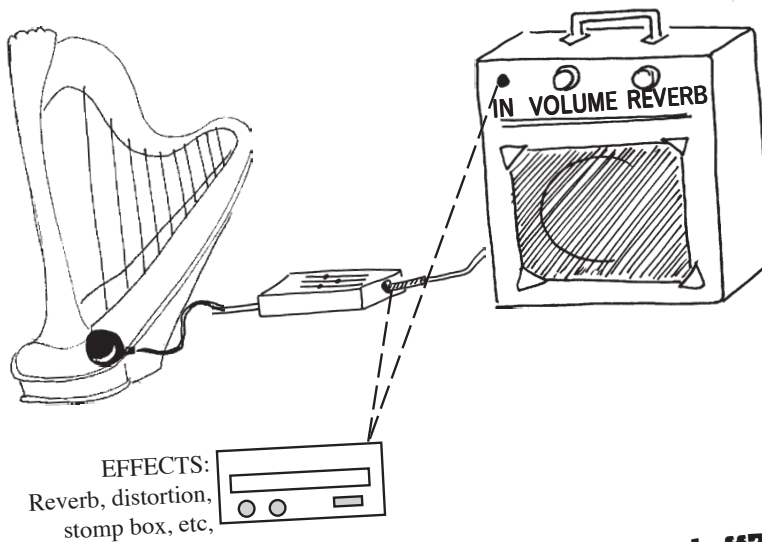
Wrap the microphone in cotton and put it through one of the holes in the back of the harp. Plug the other end of the mic cable into the amplifier.. (You might need some adapters to do this, since the cable ends might not match. You can get adapters at Radio Shack or possibly at your local music store.)

#2: SWITCHING TO A "PICK-UP" (instead of a microphone)

If you want to get a little more sophisticated you can use a pickup instead of a microphone. (The pickup actually goes on the **INSIDE** of the soundboard and is about the diameter of a nickel. (See page 15 for how to install a pickup)



#3: ADDING A PRE-AMP and/or EFFECTS



The next "addition" to the system that most people buy is a "pre-amp." The pre-amp is simply a little amplifier that "boosts" the signal before it gets to the amp. Many pre-amps also have the ability to "equalize" the sound (that means to "balance" the treble, bass or midrange), so they give you more control.

Having a pre-amp is like having a little amplifier right next to your chair. Instead of getting up and going over to the amp, you can increase your volume or change your sound right where you sit.

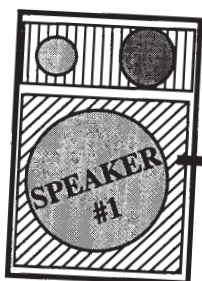
Want more stuff? You can add effects (reverb, distortion, etc.) between the amp & the pre-amp...
or you can go on to the next page ...

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If you want to be more adventurous, you can create A MORE COMPLEX SOUND SYSTEM:
4-CHANNEL BOARD, AMPLIFIER, EFFECTS & SPEAKERS

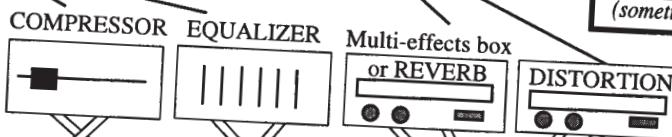
All Boards and systems are different --
 this is a simplified (believe-it-or-not!) generic explanation
 and won't cover every system you encounter



"Speaker Wires" connect the amp to the speakers.

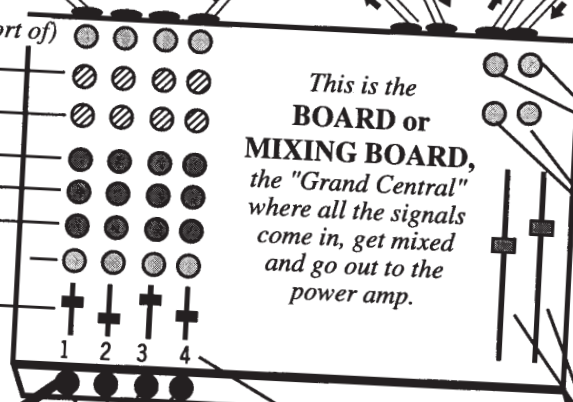
EFFECTS (reverb, distortion, chorus, etc.): Usually, (but not always) the sound comes OUT of the board (via an "effect out") and INTO the effects box, gets "effected," then comes back OUT of the effects box and back INTO the board (via an "effects return"). Then you use the "effects" knob on each channel to control the effect on that channel.

INSERTS (compression, EQ, etc): Usually, (but not always) inserts go into a specific CHANNEL (via an "insert" jack on the back). They usually use a "Y" plug which lets you receive and send the signal through the same cord. You control the insert level from the box, not from the board.



These dials control the volume, basic equalization, effects levels and panning for EACH INDIVIDUAL CHANNEL.

- Gain (loudness, sort of)
- Effects #1
- Effects #2
- Treble
- Mid-range
- Bass
- Pan (Left or Right)
- Channel Faders (volume)



This is the BOARD or MIXING BOARD, the "Grand Central" where all the signals come in, get mixed and go out to the power amp.

Effects Sends: control how much signal from the board goes INTO the effects boxes so you can avoid overloading the boxes.

Effects Returns: control how much signal comes BACK to the board from the boxes. If you turn the "return" up you'll hear more of the "effect" (more reverb or more distortion, etc.)

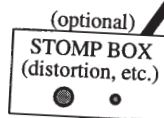
"Patch Cords" (a.k.a. quarter inch cords or guitar cords) connect the harp to the pre-amp, the pre-amp to the amp, effects & many other devices.



Instrument inputs (usually found on the back of the board)

4 channels are for 4 instruments (ex: harp, voice, bass & guitar)

Board Faders: These faders control the OVER-ALL volume (of the whole mix) which comes out of the board) Usually there are two, for left and right channels.



A system like this allows you to do the following:

- have two speakers, placed in different parts of the room
- play for a larger group, or with a larger volume
- put more than one instrument through the system
- mix the volumes of all the instruments
- use one effects device (ex. reverb or compression) for ALL the instruments going through the board
- control equalization, effects & volume for each instrument
- control the volume of the whole mix (all instruments together)

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SOME AMPLIFICATION TERMS

There are **MANY MORE TERMS** than the following that you will encounter, but understanding these should allow you to begin having fun with sound equipment.

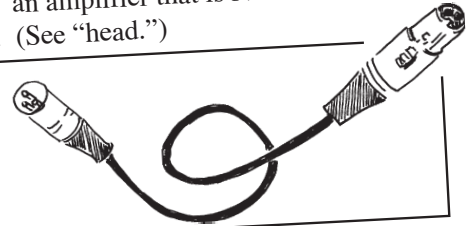
Amp: amplifier. This word is used for two different kinds of devices: an amplifier that is NOT internally wired to speakers and an amplifier that IS internally wired to speakers. (See "head.")

Amp Head: (see "head")

Board: (see "Mixing Board")

Boxes: (see "speakers")

The plugs on this mic cable (and on all professional mic cables) are "canon" plugs, more commonly known as "XLR" plugs



Cables: This is a very complicated subject. There are "shielded," "unshielded," "balanced," "grounded," "stereo," cables and many more! MOST cables go by at least two different names (ex: "XLR," "Canon." and "mic" are all names used to refer to the same kind of cable) And not only are the names confusing, but the uses are confusing. No one cable is "right" or "better." It's all about "compatibility." (see "compatibility") / So how much do you really need to know about cables? Right now, probably just this:

- Most of the time you use just three kinds of cables: mic cables, patch cords and speaker cables.
 - Patch cords and speaker cables basically look alike on the outside, but are different on the inside and are used for different things. Patch cords generally connect equipment; speaker cables connect speakers to the amps (or one speaker to another); mic cords connect mics to the mixing board (but they can do other stuff, too).
 - The only reason to think about "shielded & unshielded," "tip-ring-sleeve," "balanced & unbalanced," "grounded & ungrounded" cables is if your system has a bunch of hum in it. If that happens, you might try interchanging one cable for another and see if it makes the system quieter. (see "compatibility")
- When Audio Nazis start asking intimidating questions like whether your equipment is "balanced" or "unbalanced" or if your cables are "low or high impedance" don't feel stupid. Tell them you don't know, then tell them what the cable looks like (XLR or quarter inch plugs) and tell them the equipment name (i.e. brand name, product number/ name and what it is, ex: "Roland XKE35 Multi-Effects Unit."). They will just have to deal with that.*

Canon Plug: (see "XLR")

Compatibility: Many problems with sound equipment have to do with electrical incompatibility. Sometimes equipment or cables "go bad." Sometimes rooms are wired badly. But even if the wiring in each piece of equipment, each cable and in the room itself is perfect, you may still have incompatibility problems. (Does this remind you at all of dating?) A.C. adapters (electrical adapters), ground lifts, shielded and unshielded cables, direct boxes -- all these things are used, in part to try to create compatibility (or reduce incompatibility) between the parts of your system. The less compatible a system is, the more extraneous noise it makes and the less efficiently and beautifully it expresses the music. **DON'T DESPAIR** if you can't get it right. Just keep switching cables, trying all the possible combinations, and see which works best. Lots of experience will begin to help you fix the problems when you find them ... and you will find them.

Compression: has to do with "dynamic range" (the difference between the loudest and the quietest signals). A compressor "compresses" the range (kind of like a trash compressor -- you don't have LESS trash, it's just more compact) by limiting (reducing) the loudest signals and/or by raising the quietest signals. It's kind of like making short people wear high heels and making tall people slouch.

d.b.: (or "decibel") is a unit of electricity (voltage). **+4db:** Most "professional" audio equipment gives out a signal of +4db. Usually this equipment has XLR or 1/4" jacks.

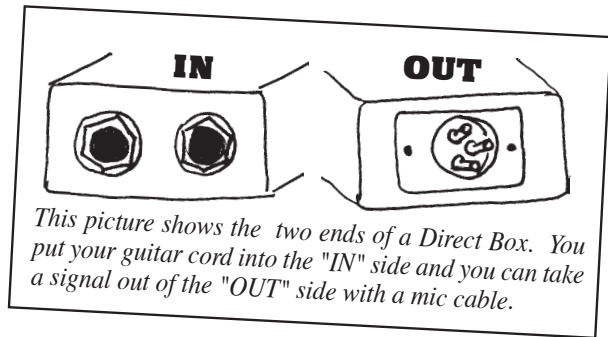
-10db: Most "semi-pro," or "consumer" audio equipment (like cassette decks) give out a signal of -10db. Often, these devices have RCA jacks on them (like on the back of your home stereo). Some equipment (like some Effects Boxes or pre-amps) have a switch on them that allows the voltage coming out to change from +4db to -10db.

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D.I.: (see "direct box")

Direct Box: a device that changes the electrical signal from "high impedance" to "low impedance." Basically, it is like an adapter, to change the signal from one that goes through a "guitar cord" (with a "quarter inch plug" on each end) to one that goes through an mic cable (with an "XLR" plug on each end). Most professional "sound boards" use only XLR cables, but most instruments and effects use "quarter inch" cables. Hence, the importance of the "Direct Box."



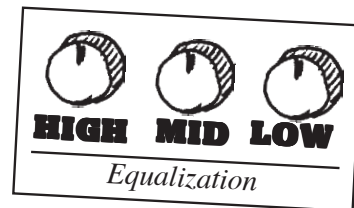
Distortion: when you "distort" the signal you make it more like "noise" and less like a "pure" signal. You can distort your voice on purpose, or sometimes, if you scream very loud, it just naturally distorts. If you have a sore throat it also distorts. Same with sound. You can distort it because it sounds cool and expressive, or sometimes it distorts because it is too loud, or because something gets in the way of the "pure" signal.

Effects: Effects are the various ways you can alter the sound of your harp using electronic modifications.

Effects Box or Effects Unit: the box that holds the "brain" that takes the sound of your instrument and makes it sound differently (which is called "adding effects.") Some effects boxes contain a variety of "effects" such as chorus, reverb, flange, etc.

EQ: see "Equalization."

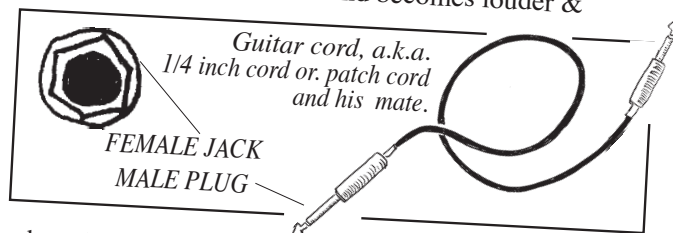
Equalization: the art of balancing the "highs", "lows" and "mids" of your sound to get a sound quality you like.



Feedback: "Feedback" is what happens when your amplified sound gets back into the microphone and becomes amplified again . . . **and again . . . and again!** It's called a feedback "loop" because the amplified sound loops into the system over & over and becomes louder & louder each time. All this happens very fast . . . and it HURTS!

Feedback Loop: (see "Feedback.")

Female: any plug that is the "receiving end" of a connecting cable. A "quarter inch female" jack is the hole on your harp where you insert the "quarter inch male" plug from your "guitar cord" or "patch cord."



Guitar Cord (aka "patch cord" or "quarter inch cord"): the cord, of any length, that connects most instruments to most "effects," "amps" and "preamps." Guitar Cords are like the "hoses" that the electrical energy flows through.

Gaffer Tape: is the tape sound and lighting technicians use for EVERYTHING. It looks like Duct tape, but it isn't! Duct tape is made to become sticky over time (to create a better seal on the "ducts.") **DO NOT USE DUCT TAPE on your harp!** (If you have done already, then get some "Goo Gone" to remove the gummy residue.) Gaffer tape is not particularly sticky and can be applied and removed countless times without causing damage to your instrument. It is more difficult to find and usually needs to be bought at a lighting or theatre supply store. Most music stores do not have it, although they all should. One of the most thoughtful presents anyone ever gave me was a huge roll of gaffer tape.)

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Ground: a ground "grounds" the electricity into the "ground." Bad definition, but here's the practical application: changing the ground or "lifting" the ground can sometimes get rid of nasty hums in your sound system. How to do it?

- #1) If you have a Direct Box, it may simply have a "ground lift" switch on it. Switch it.
- #2) Try switching from a "grounded" ("balanced" or "shielded") to "ungrounded" ("unshielded") or vice versa
- #3) carry around those little "two prong adapters" (it's "ground lift") that cost about 79¢. If your system hums, put an adapter on the end of your 3-prong plugs and then replug them in. *It's an excellent "quick fix" -- however, in the rarest of cases, it might fry your equipment. I do it anyway.*

Head: "head" implies an amplifier that is not internally wired to speakers. The "Amp Head" or "head" boosts the signal from the instrument and then sends that boosted sound signal to the speakers via "speaker wires."

Impedance (High & Low): impedance is a tricky idea, because it has to do with a relationship between two circuits, or two devices. Some sound equipment devices are low impedance and some are high. It has nothing to do with the quality of the device or the "professional level" of the device. But if you use a "low impedance" cord (typically called a "mic cable") to plug into a high impedance device (or vice versa) you will get an "inefficient flow" of current (which usually sounds noisy: distorted or crackly).

Low impedance devices are typically professional mics and pre-amps. They usually use XLR (or "Canon") connectors. If you need an XLR cord to connect a preamp or mic, then they are probably "low impedance" devices. [Note: in professional recording studios, however, almost all equipment (low & high impedance) is connected with XLR cables.]

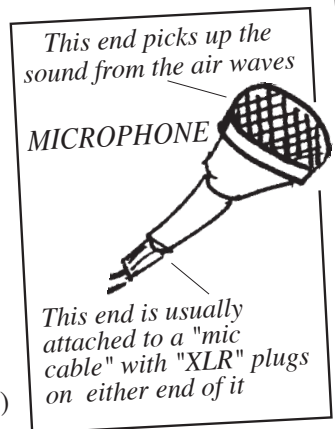
High impedance devices are varied: Synths, pick-ups, P.A. microphones. If you need a 1/4" cord to connect the device, then it's probably (but not always) a high impedance device. Typically, a "high impedance" cord is called a patch cord.

Why do you care about this? Because when you have sound problems and seek advice from "professionals" they may ask you questions involving high and low impedance. See "cables" for more advice.

In: an "in" is the place on any device where you want to plug the cord in so that something can happen to the sound which is connected to the OTHER END of that cord.

Male: any plug that is the "inserting end" of a connecting cable. "Guitar cords" or "Patch cords" have a "male" plug on both ends.

Microphone: a "transducer," that "catches" the sound waves from the air and turns them into electrical signals which go into the amp (and ultimately out the speakers). The difference between a microphone and a soundboard pick-up (both transducers) is that the microphone catches the sound waves from the air, and a soundboard pick-up catches them from the surface of the wood. That is why a microphone hangs free in the air and the pick-up is attached to the wood. (see "pickup")



Mixing Board: All the wires come into the "board" from the acoustic sources (the harp or the vocal mic). They are mixed at the board and then sent out to the amplifier and the speakers. it is like an airport -- all the planes must come in to the terminal and also go out of the terminal, but the contents of the planes changes within the terminal.

Monitor: a speaker that is turned towards the ears of the player instead of towards the audience. A "monitor" allows the performer to "monitor" the sound on stage, allowing them to hear themselves better (if they're in a band). Separate "monitor mixes" allow each player to hear themselves the loudest -- to hear the other instruments they want to hear and to not be quite so overwhelmed with the instruments they don't want to hear.

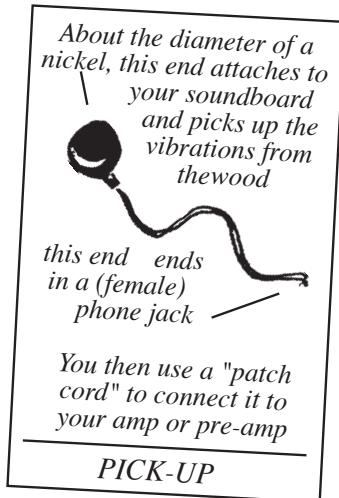
Out: an "out" is the place on any device where the signal that you put in comes out (having been changed somehow within the device).

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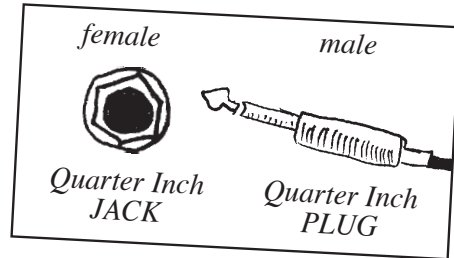
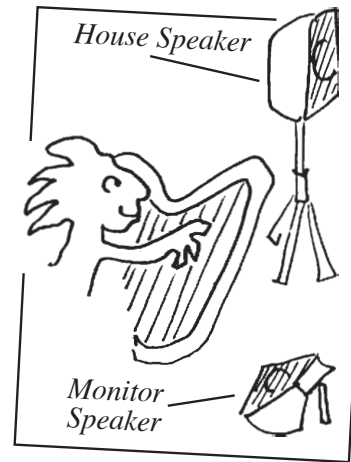
Quarter Inch Plug/Quarter Inch Jack: (a.k.a. phone plug/phone jack; female/male quarter inch) the jacks (holes) and plugs that are used to hold most personal sound equipment together. They're also called phone plugs & phone jacks, because they are what was used in the old switchboards (which you can sometimes still see in old movies). Don't expect everyone to know the difference between a "jack" and a "plug" (and I might have it wrong!)

Patch Cord: (see "guitar cord")



Pickup: a soundboard "transducer," "catches" the sound waves from a soundboard (see "microphone" & "transducer") and transforms them into electrical signal. Note: there are also magnetic pickups (used in electric basses & guitars) and crystal pickups ("piezo" pickups used in electric harps, and other instruments.)

Preamp: an electronic device that amplifies the sound before it gets to the amplifier. Most preamps also have a limited ability to "equalize" the sound (see "equalize.")



RCA cable: like an XLR cord, or a 1/4" cable, this is a cable used to connect audio equipment. Your stereo is probably hooked to your home amplifier with RCA cables, as RCA connectors are most used for "semi-pro" or "consumer" audio equipment. They usually come in pairs (for left and right).

Shielded (a.k.a. "grounded") cables: "Shielded" means that there is a separate "ground" connection made in the cable. So what? So this: 1) a properly grounded system is both quieter and less susceptible to radio frequency interference. 2) but not every piece of equipment is grounded. Sound systems are all about COMPATABILITY, so using a shielded cable with unshielded equipment can sometimes make it MORE noisy. So if you are HAVING noise in your system already, try changing the relationship: if your cable's shielded, try and unshielded one or vice versa. (also see "cables")

Speakers: "Speakers" are the "boxes" where the sound actually comes out of your system. Some amplifiers have built-in speakers. Some have extension speakers. Amplifiers with built-in speakers are sort of like boom boxes, whereas amplifiers with extension speakers are sort of like your stereo set at home (with speakers separate from the stereo unit).

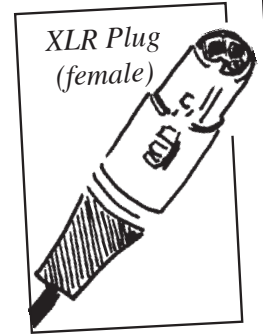
Speaker Wires: These look like long "guitar cords" or "patch cords," but they are not usually as sturdy or high quality. If you try to use them to connect your pickup or pre-amp to your amp, you will probably NOT be happy with the results. They are used to connect from the "amp head" "out" to the speaker "in".

Tip-ring-sleeve: The plugs on quarter inch cables either have a tip & a sleeve or a tip, a ring and a sleeve. If they only have a tip & sleeve, then on the INSIDE there are only two wires. If they have a tip, a ring & a sleeve, then on the inside there are THREE wires. So what? Well, again it all has to do with compatibility and explaining it generally makes it worse (see "cables"). But just so you know what the tip, the ring and the sleeve are, look at your walkperson headphones. The end that plugs into the walkperson is a tiny plug with ... a tip, a sleeve and a ring (of course it looks like a tiny pointed rod with two black lines circling the shaft --

Deborah Henson-Conant

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and sometimes the lines aren't even black). (See drawing.) The "lines" that circle the shaft separate the "parts" of the plug. The top line separates the shaft from the tip; the second line (if there is one) separates the shaft into two parts, so that each can receive and transfer a separate signal. That's why your Walkperson has a tip, a sleeve and a ring -- it uses the tip to transfer one side of the stereo signal (left or right) and the ring to transfer the other side. The shaft is always the ground. Do you need to know this? I don't think so. Not unless you want to start making cables.



Transducer: a transducer is a device that transforms an acoustic signal to an electrical signal or vice versa. In fact, by definition, a "transducer" in the big world is any device which converts energy from one system to another. So basically we're all just big transducers and DIGESTION is a form of transduction.

Unshielded or "ungrounded" cable: (see "cables" and "shielded")

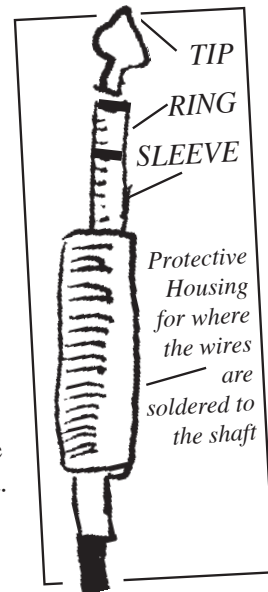
Volume: there are two kinds of volume controls, "faders" or "trims" that "attenuate" (they can turn down a signal, but they can't amplify it) and "gains" that can actually amplify a signal.

It's confusing, but think of it like this. The water company sends water to your house at a certain pressure. If they turn up the pressure, it's like turning up the gain. Your water faucets are like "trims" or "faders" -- if they are "open" you'll get a steady stream of water. You don't have to PUMP the water (which would be like "gain"), you just have to open or close the faucet. So...

Increasing or amplifying the "signal" or water pressure equals "gain";

Opening or closing the faucet equals "faders" or "trims".

BOTH result in an increase or decrease of "volume," but it's important to know how they work together.



XLR: a type of plug that has three pins inside it. Those pins are the "male" end of the cord. The names of the three pins are: "X" or "ground", "L" for left and "R" for right. XLR cables are also known as "mic cables" and XLR plugs are sometimes known as "Canon" plugs.

Some terms I STILL don't fully understand
Line-Level • Mic-Level

NOTE: I have asked many people what these terms mean, and they have all "explained" them to me. I still don't understand them, so if you do maybe it's best not to try to help me. But thank you.

NOTES & QUESTIONS:

Deborah Henson-Conant

Composer – Performer – Coach

HipHarp.com

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