

## How to design a car audio system!

Since the beginning of car Audio, the design for systems has not changed. The quality of audio components has gotten way better, but the general idea on good systems has not changed. I will lay out 3 systems for you.

The first system is the basic system. This is one of the most common system designs, and you can get your car sounding incredible for not much money!

The items you need for this system are as follows...

A good Stereo up front with enough power to run all of the interior speakers.

A good set of Front Speakers or Component set.

A good set of rear speakers

A good amplifier

A good subwoofer

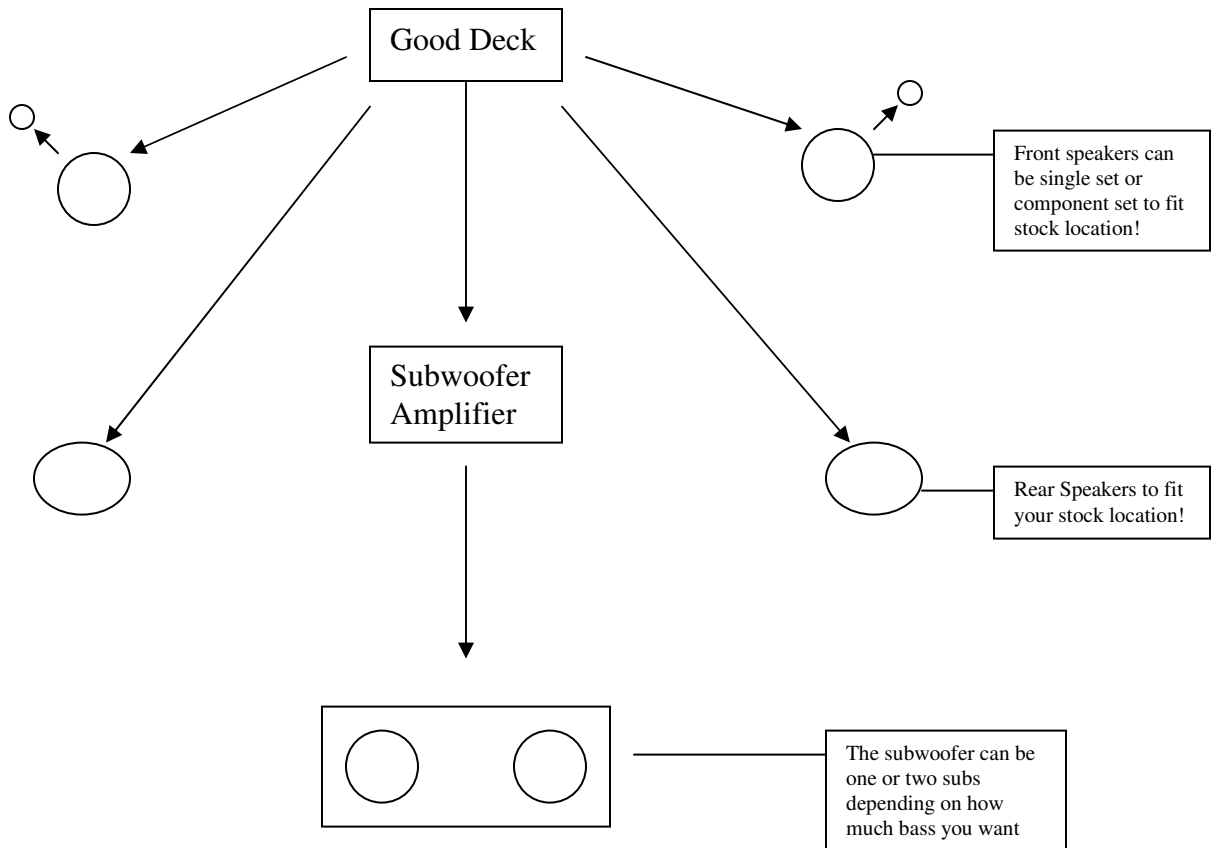
This layout is standard for any vehicle, and depending on how good you want your system to be, will determine how good your vehicle will sound. The rule is "You get what you pay for"!

Note that "Component set" consists of a midrange and tweeter combination. The tweeter will tap off of the midrange. Good Component sets will come with a passive crossover network that is included with the set. If the "Component Set" does not include a cross over, then you should choose a different set that has one! Note that the "Crossover" that comes with the component set will send the proper frequencies to the tweeter and the mid-range. The crossover also provides the protection needed so that the speakers do not receive improper frequencies that will harm the speakers! You can assume that any good quality speakers that you purchase will be crossed over correctly.

Another Note on system design. It is critical that you use the best wire to match the type of items you buy. All amplifiers as well as speakers need to be fed with high quality wire. On basic systems you can use the factory wires that run to the speakers, but make sure you use high quality RCA cables as well as high quality power and ground cables with the proper connectors. This is one area you never want to cut corners on. Don't let a salesman talk you out of going with good cables. We at Outrageous Audio would never let you make this mistake! You do not want to have problems with using too small of wire after your system is complete. Do the research on what wire is going to feed the items that you buy. Some systems that are big require as much as \$400 or more for the proper cables to make the system run properly, and make the equipment you buy last forever. Picture a kinked hose...you don't want your amp being fed with a kinked hose, the amp will struggle and not work properly if not fed with the proper wire or connectors. The first system, plan on about \$70 to \$120 for Wire. On the second system, plan on \$95 to \$250 for Wire. On the last system I design for you plan on \$500 to \$1100 for wire and accessories to make it work correctly!! The wire and cables that you choose is the key to making the system run properly, and will eliminate potential problems. Wouldn't it be horrible to spend \$1500 on a system, and turn it on and you hear engine whine through the system when the car is turned on? Do not skimp on the wire. It is one of the best investments you can make. Bad

connections are the number one reason why amplifiers, decks, as well as speakers get damaged. So please don't ignore this important part of the system!

Here is the layout for a good basic system!



Some special notes on decks in this system. The deck that you purchase for this system should be of very high quality, and should at the bare minimum have one set of RCA outputs on the back of the unit to provide the amplifier with the proper input. Also if you purchase a deck that has a "HIGH VOLTAGE" output to the amp, you will find that the system will be far superior.

If you don't purchase a high voltage deck (Note: High Voltage refers to the output that is fed via the RCA input to the amp) you may not get the full output that the amp is capable of. I would also highly recommend that the deck have a built in selectable subwoofer control that will allow you to adjust the subwoofer from the deck. If you really want a nice system, select a deck that also has built in cross over adjustments for the front and rear speakers as well as the subwoofer control to allow you to tune your system to maximum performance. These decks that have these controls usually are start around \$200. You can design your system to whatever level you want, but spending a little more on the deck in the first place will give you maximum control of each speaker, individually allowing your speakers to be dialed in perfectly to your ear and what you want it to sound like. With cheaper stereos, you will not have as many options to dial in the system.

#### Advantages to this first system

- #1 Can be very cost effective for the maximum sound.
- #2 Very easy to put old equipment (Stock) back in when it is time to sell the car.
- #3 Allows you to purchase many types of different equipment at many different levels.
- #4 Very easy and low cost installation and can be easily installed at home.\*\*\*
- #5 Very straightforward system eliminating the possibility of equipment problems.
- #6 Very user friendly
- #7 Allows for many different levels of equipment purchase from Budget to all out!

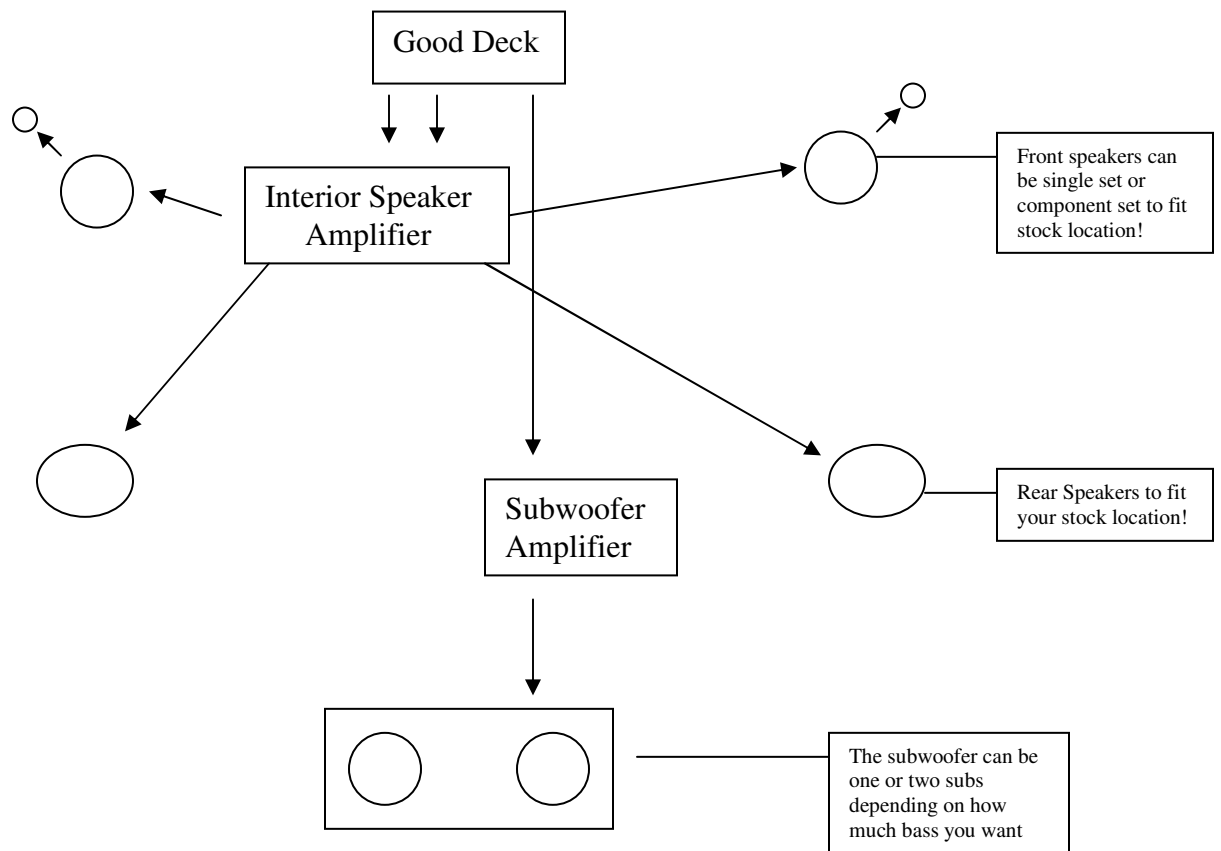
\*\*\* Major Update!! Boy have times changed. It used to be so easy for the average guy to at least try to put a stereo in himself, but the game has changed. With all of the new computers inside the newer cars now, it is nearly impossible to start switching stuff out in newer cars without coming to us for help. For example, General Motors thought it would be easier after the year 2000 to put some of the cars operational computers inside the factory radio to save space. So, if you take out the factory radio, your car may not run properly, and your dash can light up like a Christmas tree. Anti-lock Brake system light, and/or Airbag Lights may come on, showing these systems have been disabled. Well, we have all the right parts to fix this at the Specialty Car Audio shop. Your Big Box stores will have no clue about all of the different modules that are needed for your particular car. Be careful. This GM example is just one of hundreds of complications we are running into now with all of the newer cars. Bose, OnStar, JBL, Infinity, Factory Navigation Systems, Steering Wheel Controls, etc....all of these things make it nearly impossible for the average guy to work on his own car audio system. Don't just "Give it a TRY." If you mess up one of these computers on your car, you will be in for a bill that could run into thousands of \$\$\$\$. Also, remember, a good reliable Car Stereo Store will always have insurance to cover any problems that may happen....and they do happen, let me tell you!

#### Disadvantages of this first system

- #1 At higher volumes the interior speakers may distort due to lack of power.
- #2 If not adjusted properly the subwoofer could be overwhelming.

The second system is for the person who wants to take the system to the next level. It is basically the same as the first layout, but we will be adding a second amplifier to the system to power all of the interior speakers. This will basically eliminate the disadvantages of the first system. When dealing with this second system, there are many different amplifier combinations that can be used. A 5 Channel amplifier will run the entire system but I do not recommend an amplifier like this to do the entire job. They are convenient having the amp all in one chassis, but from my experience it is better to break up the amplifiers and have 2 rather than one due to adjustability and heat problems. The technology changes all the time, so the 5 channel amp or bigger might be the right choice for you, all I ask is for you to do the research. Typically, on a 5 channel amp, the Bass part of the amp tends to be weak. Again, it may be right for you.

Here is the layout for the second system.



As you can see from the diagram I have added a second amplifier to run the interior speakers. This will allow the interior speakers to get the power they need to run at 100%. The interior

speakers will now be able to go as loud as you desire with no distortion if adjusted properly. It is very critical that you purchase a deck (Stereo) that has 3 sets of RCA outputs on the back of the unit, with fully adjustable crossovers for front, and rear as well as have a full subwoofer control. With these controls in the deck, you will be able to control everything from up front. Note the 2 arrows going to the interior amplifier. This represents front and rear RCA outputs being inserted into the amplifier. If you are going to design a nice system like this, I cannot stress how crucial it is to have 3 sets of RCA outputs as well as a "High Voltage" output on these RCA's.

Note: If you use a stereo with only one or two RCA jacks in this system you will lose your ability to fade from front to rear. It is critical to have this adjustment in a high caliber system like this. You can do it, but it is not recommended.

Advantages to this second system

- #1 Can be very cost effective for the maximum sound.
- #2 Very easy to put old equipment (Stock) back in when it is time to sell the car.
- #3 Allows you to purchase many types of different equipment at many different levels.
- #4 Very easy and low cost installation and can be easily installed at home. \*\*\*see update above.
- #5 Very straightforward systems eliminating the possibility of equipment problems.
- #6 Very user friendly
- #7 If installed and adjusted properly will sound like a concert in your car.
- #8 Can be adjusted to sound perfect!
- #9 Allows for many different levels of equipment purchase from Budget to all out!

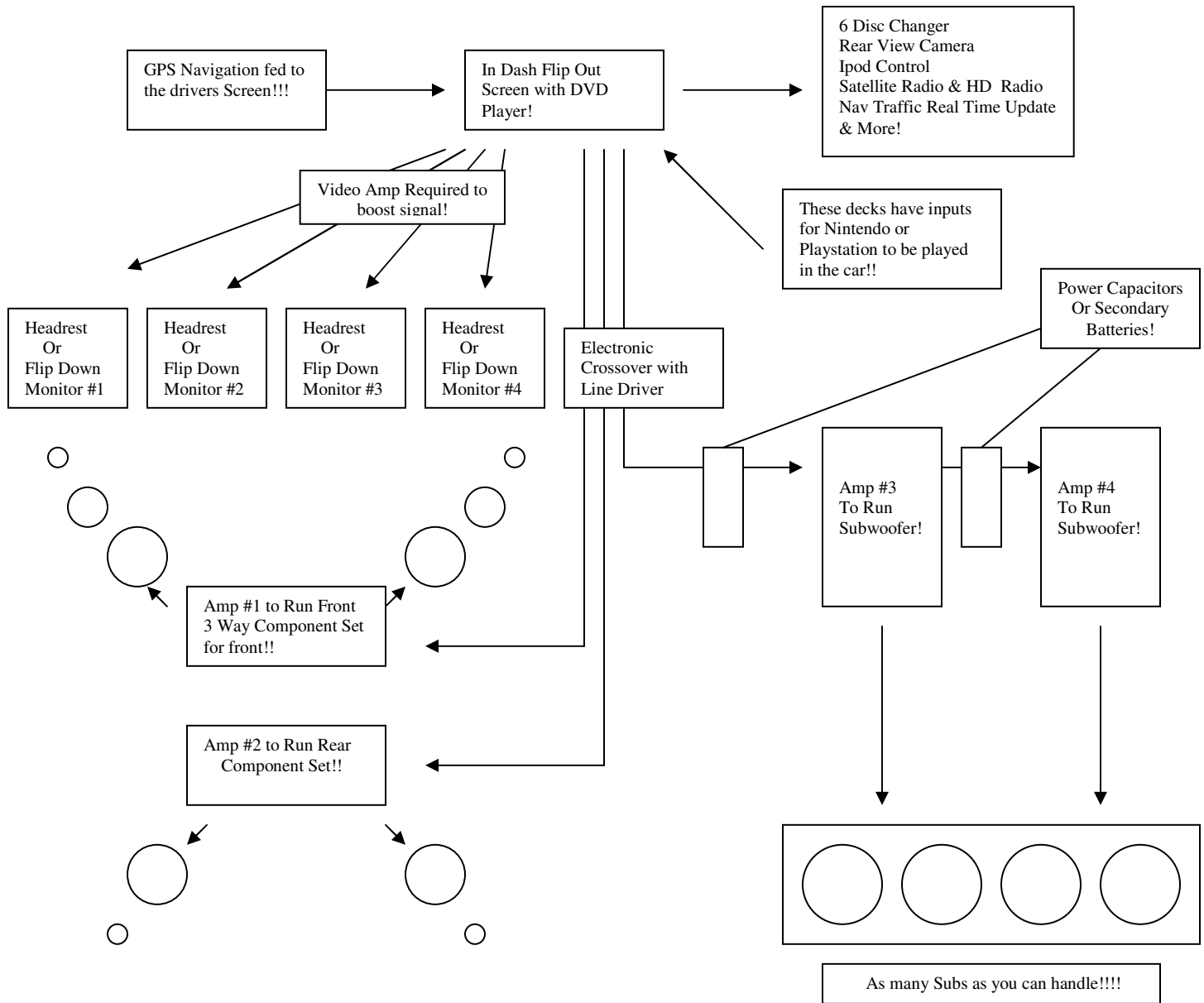
Disadvantages of this second system

- #1 Sound level can damage hearing if not careful!
- #2 If items are not adjusted correctly, could blow speakers. Wrong Cross-over points are a huge factor in blown speakers.

This last system will be all out. This is the dream system. I am not going to hold anything back. This is the all out system that will win competitions. When money is no limit, and you want to gather crowds around your car this is it. Video as well as sound will be shown in this system. If you can afford this dream system, just tell us at Outrageous Audio that you want "The Bad Boy". Plan on dropping your car off for at least 4 to 7 days for this system. You want it all.... well here it is.

This system can be adjusted for whatever car you want. You can add to or take away many of the components in the system. From my experience, this is going all out.

## The Dream System Layout



This system is very big, and very complex. There are many complex issues that will have to be dealt with in a system like this. I will talk about them all.

First of all, with a deck of this caliber, a flip out in dash DVD player. These types of units have a huge capacity for running many different combinations of systems. They usually have an extensive amount of inputs and outputs that will allow you to control many different units that can be added to the system. One of the most popular is multiple screen feeds as well as GPS

navigation systems. The deck will have all the controls you need to handle this monster of a system. The deck will usually control a 6 disc or more changer, and some units will even allow for a DVD changer that reads CD, DVD, as well as MP3 coded media. Also, many of these units allow you to run your iPod, including iPod Video fed right to the touch screen. The unit actually takes over your iPod, and your files come up on the screen and all you do is “touch” the file you want. Simple.

The multiple inputs allow for you to hook video games as well as VCR's, video cameras, as well as any other item you can imagine.

After you get all of your upfront units in order, you really need to purchase a good electronic crossover or digital processor. The electronic crossover/processor will do several things. It will allow you to control all of the system with much more detail than any crossover built into any deck or amplifier. This is crucial in competition systems to get just the right sound out of every speaker.

The front amplifier will power the 3 way separate system for the front. Usually when you step up to a 3 way separate system in the front, which usually consists of a 6” Mid Bass Driver, a 4” Mid range and a tweeter for each side they will have to be a custom installation done to handle all of these drivers in the door, or custom kick pods will have to be purchased to mount these components up front. Custom kick pods usually consist of fiberglass molds made to go right down near your feet pointing the speakers directly at you. In some cars the doors will have enough room for all of these speakers, but major modification is always an issue.

The rear amplifier will run the second set of components in the rear. When purchasing your second set of components for the rear, many of the new component sets will allow the tweeter to be mounted right in the center of the mid range for ease of installation. Both front and rear component sets will come with their own set of crossovers that should be in place for secondary protection even though you have the electronic crossover in place.

The power lines to the amplifiers of this size will have to have Power Capacitors or Secondary Batteries right in front of the Bass amps. Power Capacitors or Secondary Batteries in front of the Bass amps on the power line provide the amplifiers with an enormous amount of boost when hitting big bass notes. Power Capacitors can be used on any system to give your bass amplifier that added boost. It is like putting your amp on steroids.

With systems this large it may be necessary to upgrade the alternator, as well as add a second battery to the system to give the system the added power it requires.

The wire on a system like this will be huge. Minimum 2-gauge wire ran to distribution blocks and circuit breakers throughout.

There is a new technology out called “BATT CAPS”. These are a combination of Battery and Capacitors that are on the market right now that allow for un-surpassed amounts of power made available to your amps. I have installed these “BATT CAPS” in many applications and it has doubled the output of nearly every amplifier. These “BATT CAPS” have not been around for a

long time, so many stores do not know what they are and how they work, but if you can find one of these babies, put it in, and you will not believe the difference. If you use a "BATT CAP" in the proper configuration, it will eliminate the need of upgrading your alternator or adding a second battery.

UPDATE!! Another incredible item that has hit the car audio scene is the "Kinetic" monster batteries. These batteries are very small and put out the power of a deep cycle. They are a gel cell based battery, and are only 6 or 7 inches long. They are a dream for big power in big systems. One small "Kinetic" type battery is equal to 100 One Farad Capacitors in a row. We hardly sell any more capacitors any more with these babies out. There are several different brand names of these small batteries out, but "Kinetic" was the first.

It is also advised that you get the biggest and best battery you can find. I recommend the Blue, Yellow, or Red top OPTIMA gel cell Batteries for any high-end system. They hit hard, and will take any system to the limits.

In a system like this, you can have as much bass as you would like. Or as much bass as your car will allow. Take your pick!! The sky is the limit. At Outrageous Audio....we can take you to the limit!!