DSP-Z8 IV

DPN v. IV 1.0.10 - Owner's Manual

Before operating the unit, please read this manual throughly and retain it for future reference.

The Zapco DSP-Z8 IV

Digital Signal Processor

Zapco Introduced the world to in-car digital processing in 2004 with the Zapco DSP-6 and the Zapco Digital Processing Network. This was the first full function DSP for the car and included a full line of amplifiers with full function digital processing build in.

The DSP-6 and Zapco DPN were introduced not so much as a consumer product, but as an installer's tool, to get the live musical experience in every car audio installation.

Things of course have changed over the years. When we look around today, almost everything we do is controlled by digital processing. Most often it is invisible and we simply take it for granted, but in our sound systems we want the option of manipulating the digital control to get the sound experience we want to our systems.

While the DSP-6 required extensive training of installers to get the optimum results, the goal with the new DSP-Z8 IV was to develop a Graphical User Interface (GUI) that would make setting up the sound system a breeze for even the least experienced consumer.

Using this manual, you will set up your system inputs. Identify the output channels. Set the Signal Delay to put you dead center in the sound stage, and give each speaker the frequencies it needs for top performance. Then we will lead you through proper system phasing and finally basic system tuning.

Reality Check

Chances are you are not a professional musician or an acoustic engineer. This manual will take you through the proper set-up and basic tuning of your sound system to get a realistic sound stage and have all your speakers operating in the proper frequency range. The 31 band Graphic and Paragraphic equalizers will allow you to modify the sound to suit your tastes.

However: *The car is not your living room.* The automobile is a terrible environment for listening to music. There are reflective surfaces that distort the sound, absorptive surfaces that impede it, and you are never in the ideal listening position.

We highly recommend that you engage the services of a professional installer experienced in system tuning as a final step. A professional tuner will have many hours of experience in system tuning and the necessary tools like a Real Time Analyzer and distortion analyzer to see how the sound waves are acting in your

vehicle. With the proper tools and experience they can tell what frequencies to boost, which to cut, and what other minor tweaks are needed to get the best live musical experience from your car.
Please read this manual all the way through so you will be familiar with each step as you go through the system setup

Before we get started:

1) Make sure you have time to finish the process. You should set aside a good couple of hours to go through the process, save it all, and do some listening.

2) Make sure the installation is mechanically and electronically sound. It makes no sense to add processing to a system if you haven't provided groundwork to let the components operate to their full potential. This means sufficient 12-volt current and good solid ground for the amplifiers and other components so they get full power with no noise.

3) Make sure all speakers are wired correctly, positive to positive, and negative to negative. Even this is not foolproof in a car environment, but it is a necessary starting point. We will discuss this (phasing) more, later in the set-up.

4) Do the research on your speakers. Make a note of the crossover points and the slopes. Are you going to use passive crossovers? It your tweeters and midranges are not ***exactly*** together then the signal delay will not work properly with passive crossovers. For example, if your tweeters are in the dash and the mids are in the doors then you'll certainly need to use the DSP's active crossovers to utilize the signal delay. You'll need to know where to cross the tweeters over and what slopes to use. We can give some general points but you may want to call the speaker manufacturer to be exact.

5) What is the input source? If you are using an OEM stock head unit then you will need to be sure you have all the inputs needed to achieve a full range input for the DSP. Once the needed speaker input leads are connected to the high level input cable, the MIX button on the GUI will sum the signals together and all processing channels will have a full range signal.

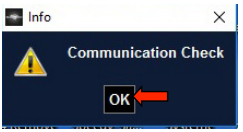
6) Download an RTA. Accurate Real Time Analyzers are expensive equipment. A professional unit will run well over $1,000.00. You can put together a decent system for a laptop for about 150.00 to 200.00. ***However***: *You can download an app for a smart phone or tablet that will get you started for free.* More advanced smart phone apps are available from $20.00 to $40.00. While these free and low cost apps are not highly accurate for professional use, they are fairly close, and are far better that working with no tools at all.

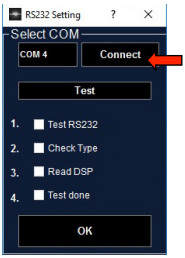
Opening the GUI program

The GUI is how you will set up and control the DSP. You can load the program from the disk that accompanied your DSP-Z8 IV or you can download the file directly from the www.zapco.com web site.

When you click on the Zapco Heat sink to open the program you get the splash screen that lets you choose to open in the DSP-Z8 IV or to open in Demo mode.

When you connect the DSP to the computer and choose **DSP Z8** the system will perform a USB function test at each opening, as below.





Saving Settings and Presets

It is important to note that your DSP is basically a computer. Like with a computer any information not saved be easily lost. If you must pause the set-up process during you must save your work to that point. If you turn the system off during setup all work since the last save will be lost. The DSP-Z8 IV has 10 presets available. As you go through the setup. We will prompt you to Save after crossover settings and again after System phase settings.

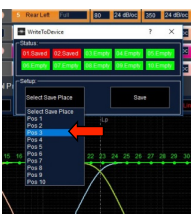
Especially during the early setup stages, you "save to file" on the computer. Then after you have made the initial tuning settings with the GEQ you should save the settings to 2 presets. That way if you make a change to a preset, you will still have the original to compare to.

Saving and preset functions are all under the FILE block at the top left corner of the GUI.
The first thing you should do is create a folder in "Documents" titled *DSP-8IV Settings* or similar where you will save your settings to computer so they cannot be lost if there is a problem at some point with the GUI, or if you accidently erase a preset.

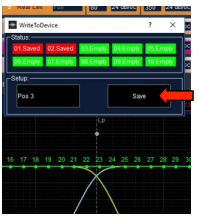
The first time you save, you can navigate to the file you have created, name the setting file (i.e.Z8 001) and click *Save*. Thereafter, every time you click *Save* (or *Open*) the system will go to the same folder.

Save and Save As: *Save* saves the current settings to the file you are working on. So if you *Open* a file and modify the settings and click *Save* you have now changed that file and the original no longer exists. *SaveAs* requires you to assign a new name to the file. So if you open file A and modify it then click *SaveAs,* you can name the new file B and you now have 2 separate setting files. NOTE: Save and *SaveAs* are primarily used as fail-safe backups, or to transfer settings from one DSP to another.

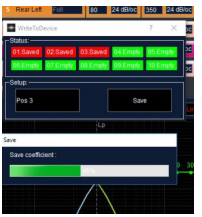
Making A/B comparisons and tuning setups for different sources will be done with Presets, which are created and modified using the *Write to Device* and *Read from Device* commands.
To Create a Preset: 1) "*Click Write to Device*" to open preset choices.



2) Pick an open (green) Preset Number



3) Click Save



4) Progress

5) Confirmation

To call up a preset for modification, click Read From Device. The *Read From* screens look the same as the *Write To* screens but when you click *Read,* you will see the settings load onto the GUI and the new settings will appear in the top section of the GUI screen.

The GUI (Graphical User Interface)

We have designed the GUI to provide an efficient step-by-step set-up of the sound system.

The top front section is where you make the basic set-up and you can see the entire system at-a-glance whenever needed.

#1 Basic Input Mode

Your first decision will be to use 2 channels, 4 channels, or 6 channels of input to the DSP. At the top left you will set up your inputs. the defaults labels are set for 2-ch., 4-Ch., or 6-Ch.

2-Channel Input Mode

After market head units can be 2, 4, or 6 channel inputs. The SPDIF digital inputs and the Aux inputs will default to the 2-Channel mode. As you see at the left, when you are in 2-channel mode the channels 1, 3, 7, and 7 are left channel and channels 2, 4, 6, and 8 are right channel.

4-Channel Input Mode

In 4-channel mode as on the left the front 4 channels are defaulted to 2 left and 2 right input channels to give highs and lows at the front and channels 5 and 6 are set to receive left and right rear channel inputs. Channels 7 and 8 will receive the sum of both front and rear inputs to give a summed bass or center channel as desired. In 6-channel mode channels 7 and 8 will be set to receive the last channels of input.

If you are using speaker level input with an active system, you can use the MIX button to sum the active channels into a full-range stereo pair.

6-Channel Input Mode

#2 Designating Your Channels - Default Crossovers

Next, just to the right of the car you can designate (name) each of your channels by function. Each channel can be Tweeter (TW- highest frequencies only), Tweeter/Midrange (TW/MID) (only midrange frequencies and higher), Full Range, Woofer (Bass above 80Hz), Center Channel, or Sub (Bass below 80 Hz). Naming the channels now will make adjustments easier later.

For example, you can adjust the Left Mid directly without having to remember which channel Left Mid is on. To protect tweeters and midranges from being damaged before all crossovers are set, the DSP-Z8 IV will put default High Pass crossover filters on the tweeters at 5,000Hz and on the Tweeter/Mids at 600Hz. After the delay section below we will assign the correct frequencies to all crossovers, but during this stage we want to be sure they are protected before any speakers are turned on.

#3 Setting the Signal Delay

One of the biggest problems of car audio is the fact that you cannot sit in the center of the vehicle. However digital processing allows us the move the listener to the "apparent" center of the stage by delaying the arrival time of the signals coming from the closer speakers.
The DSP-Z8 IV makes the delay calculation extremely easy. Simply enter the distance (in cm) from your ears to each active speaker in the system. Enter those distances into the chart at the left below (you'll see a spot next to each channel indicator). After all distances are entered you can click the box **SetMax**. When this is done, **SetMax** will turn red and this tells the system where the farthest speaker is.

Now you can click **DelayCalc**, and the system will calculate the delays for each driver and they are displayed on the DELAY section of the chart as below.

Now, even though you are sitting right next to one speaker, it will sound like the speakers are all the same distance from you. You will be "front row-center" for the performance.
This will put you exactly where you want to be 95% of the time. After we finish the basic installation and set-up, and after you've had a few days to familiarize yourself with the sound, you can come back to the fine-tuning sections and tweak the system to your needs. If you have measured the distances correctly the relative delays will not change again. As you continue to listen, and improve both the system and your knowledge of the system, you will find more small changes you can make to bring a more live musical experience to the car environment.

4 Setting the Crossovers

For crossovers and for most of our basic settings, you will want to treat each right and left pair of speakers as a set. So before we go further you we should go ahead and link the Channel pairs so we cut the work in half. You can see below left the linking buttons.

You click the Link between Ch1 and Ch2. It will ask you to confirm, then the link will turn red and the 2 channels will adjust together. In this case we will link all 4 channel pairs.

With the channel pairs linked together, you are ready to ready to tackle the crossover settings.
Here you need to see your crossover notes to see what filters you need to apply to each channel. For each output channel you can type in any desired frequency and then choose a slope of any value from 6dB per octave to 48dB per octave.

For demonstration we will use a 4 way speaker system with tweeters, midranges, mid-bass drivers and sub woofers. We will run the tweeters from 2500Hz and up. Midranges will be mounted close to the tweeters and run from 400Hz to 2500Hz. The mid-bass drivers will run from 80Hz to 400Hz and the subs will run from 80Hz and down.

At the left, you simply highlight the SLOPE box in the desired crossover area and choose a slope from 6dB/octave to 48dB/octave. If you do not want one on or more of the filters to be active this is also where you can turn the crossover filters OFF.

Then (on the right) you click into the box next to it and you can type in the desired filter frequency.

Crossover Filter Notes: 1) Everything in sound tuning is a trade-off to get the best overall result. In general steeper slopes give better protection while shallow slopes give smoother sound. Your speaker's manufacturer is the best source of advice for filter points and slopes. Mismatching of a tweeter to a crossover filter can easily destroy tweeters, so use caution, and research your speakers before choosing a filter system. 2) Note in Ch 3/4 above and 5/6 above that a Band Pass crossover pass the frequencies between the High pass at the bottom and the low pass at the top. i.e. in 3/4 then frequencies Higher (HP) than 400Hz and Lower (LP) than 2,500Hz.

Almost ready to turn the system on, but first... a few things to note:

- When you set the crossovers, each crossover range shows up on the lower graph. You can see which is which by the color match. You can turn the graph lines off by un-checking them at the right. This gives you

a double check. If the crossovers overlap...or if there is a large gap between them, you need to double check your frequency choices. Bad crossover choices can make frequency problems that equalization will not help.

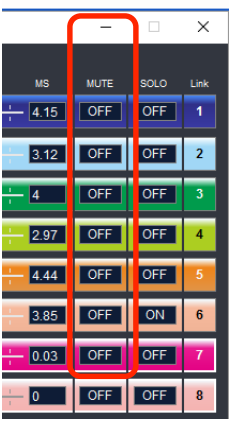
- To the lower right of the graph you can adjust the overall gain and the individual gain of each channel using the slide indicators. The active channels you are working on will be highlighted brighter. We'll cover this more in tuning. For now all Gain controls should be fully up. ***Except*** *Main level*, which should be set to 0dB. (where the red marks begin). The system offers up yo 12dB of gain to compensate for very low output sources, but adding gain sacrafices S/N ratio and increases the likelyhood of distortion. We will say more about gain setting later.

a b c d e f g h

- At the left of the center bar are the controls used for Equalization. They show (a) whether you are using the Graphic Equalizer or the Parametric Equalizer, there is a RESET button (c) to start back at zero, a BYPASS button (d) so you can compare with EQ to without EQ, show which (e) EQ band (1~31) you are using, (f) what Frequency you are adjusting, (g) how much you are cutting or boosting, and (h) the Q factor (or shape) of your adjustment.

5 System Phasing - Important

For first turn-on and tuning, you should set all individual channel gain to -6dB. This will allow for some signal boosting during tuning without overdriving the DSP (clipping). The MAIN output level should be at 0dB.



If you've followed all the steps, you know everything is safe and sound to turn on the system. But you're not ready to tune yet. You cannot go from turn-on to tuning without first checking the phase of the entire system. A system that is out of phase can never be corrected by tuning or equalization.

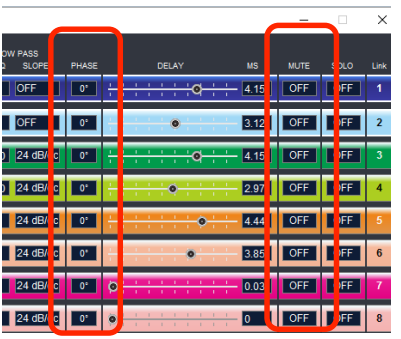
At the very beginning you were asked to assure that all speakers were wired correctly + to+ and - to -, and you did that. But this is a car, and strange things can happen in the car because of reflective and absorptive materials and odd angles and shapes. So now we need to make sure that all channels are arriving to your seating position in the correct phase. For this we will use the best possible tool...your ears.

Tools needed: Music source with high female vocal solo. Music Source with strong male vocal solo. Music Source with strong mid-bass (like kick drums).

Mute Buttons: At the upper right section of the GUI you will seea row of MUTE buttons. When you turn on a channel MUTE, that channel goes dead. You will use the Mute button to turn off the channels you do not want to hear while you are checking phase.

Quiet Please: *Outside noise will distort what you hear in the car. You cannot make these (or any) audio adjustments unless you are in a quiet environment. You will risk long term damage to equipment by trying to compensate for outside noises.*

Begin phase check: R/L Balance in the middle



A) Tweeters; Click to mute all channels except the tweeters. Note that tweeters are the most difficult. They are the smallest drivers and are not loud. You need complete quiet. Play a music track of female vocal and notice where the vocal originates. We have already set the approximate delay, so the vocal should come from a specific location near the center of the windshield. If the tweeters are not correctly in-phase, then the sound will not have a specific location. It will splash and seem to come from everywhere at the same time. you will not be able to locate the sound.To the left of the DELAY bars you see the PHASE buttons. All should say 0 at this point. Click the Right channel tweeter to 180 and listen for the difference. Do this a few times and you will see that in one position the vocal is easily located near the center of the window while in the other it seems to come from everywhere and cannot be located. ***NOTE:*** *Once you establish the proper phase combination of a pair of speakers, it never changes. You do not change one without changing the other. They are now a matched pair.*

B) Midrange and Mid-Bass; Now mute all but the midrange. These are easier because phase is more obvious at lower frequencies and because you can use more volume. The procedure is the same but now you should use the male vocal. Listen for the vocal location. It should be at a specific location near the center of the window. Change the phase of the right speaker as few time and listen to the difference. Use the combination that puts the vocal in the specific central location. Then you can mute all but the Mid-Bass and do the same as for the midrange. **Note;** Another sign of phase in midranges and woofers if bass. When 2 speakers are out of phase there will be less bass. More bass in-phase/less bass out-of-phase.

C) Woofers; Woofers are the easiest. Play something with bass. The make vocal should work fine. If you are using multiple woofers they must be in phase or your bass will go away. When you change the phase of the right woofer it will be extremely obvious which is correct.
Note: Now you have phased each pair of speakers. Hopefully all are still 0, but if not it's OK, but from now on they can only be changed by the pair. Never change only one driver out of a pair. It's best to make a chart of speaker phases so you have it for reference later

D) Tweeters to Mids; Now we start phasing the driver pairs. Again, from here on we change only by the pair. Mute all except the tweeter and Midrange and listen to a musical track. The main vocal should be centered and the sound stage should be spread across the window about 1/2 way up. Listen for this.
Now change the phase of both midranges and see where the sound stage is. If the tweeters and mids are out of phase, the stage will be lost (usually it will drop toward the floor). Do this a few times (always changing only the mids) and see which position puts the sound stage right where it should be, right across the window.

Mid-Bass; Bring the mid-bass in the same way. Un-mute the mid-bass and see where the sound stage goes. If it pulls down to toward floor then reverse the phase of the mid-bass drivers. Try both ways a few times to see which gives the correct sound stage.

Woofers; Woofers can be difficult, but not because of bass. You have already phased the woofers. *There will be bass!* The issue will be the transition from bass to mid-bass. Play a cut with good mid-bass (kick drums are excellent). Look for sharp solid mid-bass. A bad transition will leave mid-bass soft and weak. Also listen for location. you want the bass to be in the sound stage...not in the trunk.

If your woofers in a portable enclosure you may even want to move the box location to see what that does. The Key is finding that combination that gives clean solid mid-bass that seems to come from the front of the car.
Now you have set the R-to-L phase of each pair of speakers and you have blended each pair into the system in the correct phase for the best sound stage.
SAVE: At this point you will want to Write to Device to save the work. Remember to write to 2 positions so you have one to work on and one as reference.
Now you can begin thinking about system tuning. Tuning with the DSP-Z8 IV is laid out in two stages utilizing specific EQ types . The first stage will satisfy the listening demands of 95% of all listeners. The second stage is for touchups and ultra fine tuning of any spot that the stage one EQ did not address.
There are two equalizer types in the DSP-Z8 IV, a Graphic EQ and a Parametric EQ. The default opening and information screen that we have been using contains a paragraphic EQ (you will see that the PEQ button is lit Red). That is because this is the EQ you will use for "touchup" after you have tuned with the first stage Graphic EQ (GEQ).
So when you begin the DSP-Z8 IV tuning process you will click the GEQ button to open the GEQ and use the graphic EQ sliders to equalize the system, comparing the results you see on the RTA screen to desired

frequency curve. Once you have achieved best sonic "curve" with the GEQ you will again *Write to Device* to the same 2 locations you used before.
At this point you will be finished with the GEQ. You can click the PEQ button and return to the default GUI Screen. Note that once you leave the GEQ you cannot return to it without starting over. All further equalization is done with the second stage Paragraphic EQ. The paragraphic EQ allows you to place a boost/cut filter at any frequency you choose and to have any filter shape (Q) you choose. This is an excellent tool for advanced tuner but can be confusing and dangerous for the basic set-up and tuning.

6 System Tuning

System Tuning With the Graphic Equalizer:
** *Take a moment to consider time. Tuning will take time and you need to finish the basic tuning in one sitting. Save your work before you start and save it after you finish.*
Click on the **GEQ** button and you will see the graphic EQ screen.
For each output channel 1~6, the graphic equalizer gives you 31 bands of boost/cut. For Channels 7&8, there are 11 bands each. Each of the equalized bands is placed at the corresponding frequency of the standard real time analyzer. For added versatility the Q (shape) of each band's filter is adjustable from .5 (pin-point control) to 9 (wider control). You see the bands below.

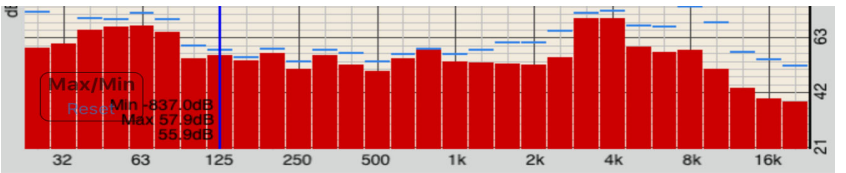
GEQ Tuning

Here is the DSP-Z8 IV GUI with the GEQ screen active

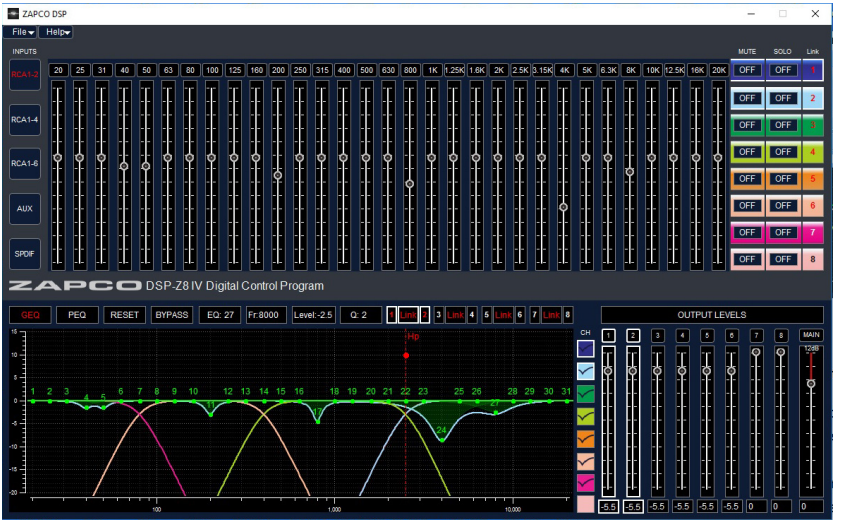
The graphic EQ screen has all the signal information you will need for the basic equalization. The top section give you the EQ controls, and above them you see the frequency of each filter, on the lower left you see the equalization applied in the green bar (the dots match the EQ bands), and (if you have checked on the corresponding color coded boxes) you see the crossover graphs to see which frequencies are in each output channel. At the lower right you have the gain controls.

IMPORTANT NOTE: Remember in tuning that the *GUI display shows you what you are doing to the signal that goes to the speakers. It does **not** show you what the sound result is in the car.*
To properly proceed you will need a Real Time Analyzer to show you the frequency response in the car. Below is an RTA program downloaded to an iPhone. There a any number of free apps available for smart phones that are accurate enough for a basic set-up.

To use the RTA you need a source of "Pink Noise" which is sound containing all octaves of audible sound at equal levels. In other words sound that is audibly "Flat". Pink Noise is available from any number of test disks, or even as a download from audio web sites.
This gives you a sonic reference. You place the microphone in the listening position and play the pink noise and watch the graph to see what the frequency response is in the car.
Then you can use the equalizer to change the response as needed for proper sound. For true professional results you need to have remote microphone securely mounted in a mic stand, but for now you can hold the mic (or smart phone) close to where your head would be and watch the response.



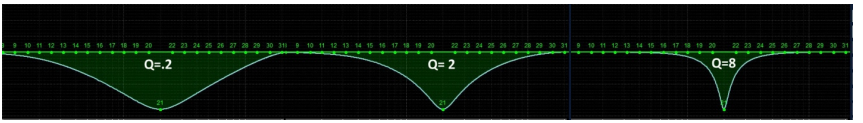
As an example here is a rough start to fix the RTA graph above.



- The area around 60 hertz was reduced to flatten the bass. But you need the bass to be a little stronger than the rest of the response so all non-bass channels were reduced 5.5dB.

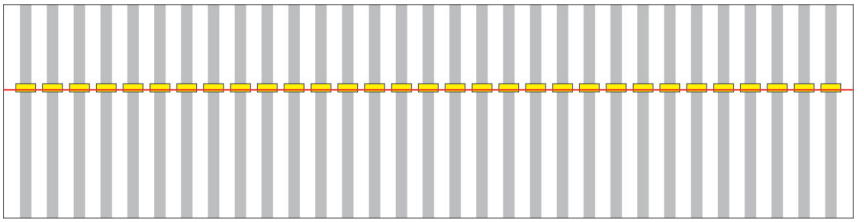
- A couple of spots in the mid bass ands midrange area need to be cut so we cut them with a steep Q to reduce just the areas we need.

- There is a large wide peak in the highs so we reduced those with a wider Q to affect more frequencies



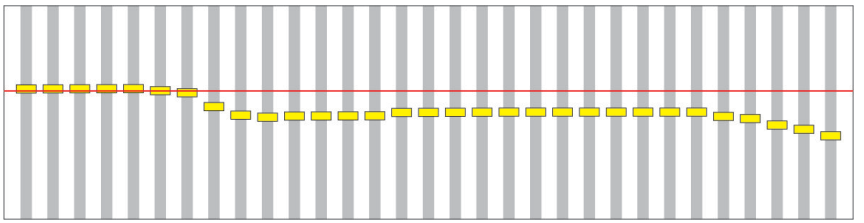
We show some examples of RTA curves to help you in tuning. You will notice that the indicators are mostly below the red "0dB" line. This is to remind that you should alway cut frequencies rather than boost them. Each 3dB of boost added to a frequency doubles the ampunt of amplifier power needed at that frequency. So even though you may start at a reasonable level, It is very easy to cause your amps to go into clipping if you do too much signal boosting during equalization. A good rule... Always Cut-Never Boost

Flat Response Curve



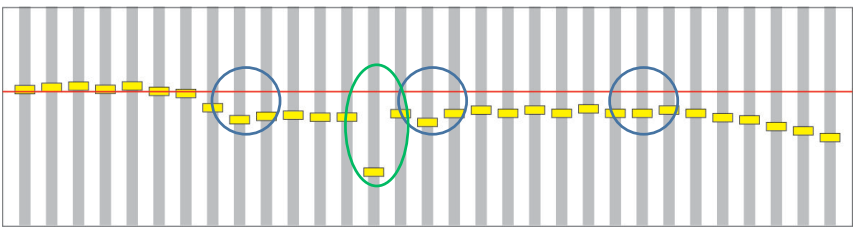
Many people try this first. a. It is very difficult b. It will almost always sound bad. It will be lacking in bass and sound harsh on the high end. How the ear works at different frequencies and volume levels affects what response will sound best

Best Response Curve



The best curve will be higher in the bass frequencies and will have only small changes from one 1/3 octave band to the next, then it will roll of at the higher frequencies.

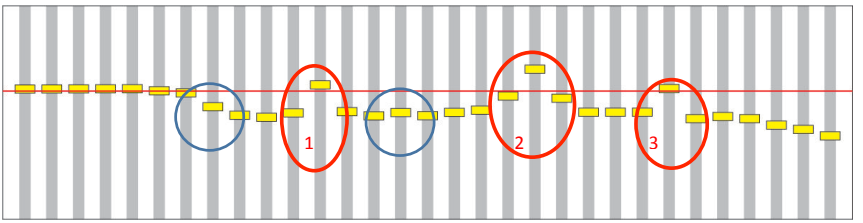
A Good Response Curve



This is actually a good Frequency curve. There are some small out-of-line variations (Blue circles) but they are small and you won't hear them. There is one big variation (green circle) but it is a single low point.

a) Your ear is not sensitive to drop-outs so you likely won't notice it at all. b) Trying to equalize it will only waste power and will likely distort the frequencies on either side of it. If you have a null point directly at the crossover between 2 drivers you may have a crossover spaced too far apart. But if the crossovers are OK then leave as is. Do not try to equalize a null.

Bad Response Curve



The big problem with this curve is the frequency peaks. *Peaks are bad*. The human ear is very sensitive to frequency peaks. The peaks will make music sound harsh and can even irritate the ear. The variations in blue are no problem and can be ignored, but the musical peaks in the red circles need to be equalized out for this system to sound smooth and pleasant.
In this case you would use a high (narrow) Q to reduce the peaks at 1 and 3 and a lower (wider) Q to bring down the peak at 2 and the frequencies on either side as well .
In most cases, the GEQ will provide all the sonic adjustment you need, especially if you are working with a downloaded , or even a stand-alone 31 band RTA.

Tuning Tips:

- **Save** your work at each stage. Before you start using the EQ you should have your set-up saved to 2 presets.
- Remember: there are different EQs for each channel. The graph will always display the active channel or channel pair. If you check the boxes to display all the channels it will be easier to compare the EQ graph to the RTA graph so you know quickly which channel needs to be active to fix a particular problem in the RTA. The color codes will show you at a glance what you have done to each of the channels.
- Leave one of your original presets alone. In you second preset save your work after each channel adjustment.
- For this first tune, try to make the RTA show the "best response curve" above.

When you have the RTA curve as close as you can get it to the "best" curve, *Save Your Work* to 2 presets. Then save the complete setting to your computer as a backup.

At this point you have completed the full system setup. It is now time to *spend some time listening to the system.* You've earned some listening time.

The more you listen and the more you tune...The more you will learn, to make the system better.

Take your time, listen to everything. Can you hear ALL the instruments? Is the sound balanced? Is the base solid? You may decide you need more bottom end, or more upper midrange. Everyone hears things a little differently. You can make adjustment to suit your taste as long as you keep a "smooth" sound. A "smooth" sounding system will always sound great.

What is a smooth sound? Looking at the RTA response, if you can keep the level difference from one RTA band to the next within 2dB, the system will always sound good. NO SONIC PEAKS. Peaks hurt your ears and make the sound harsh.

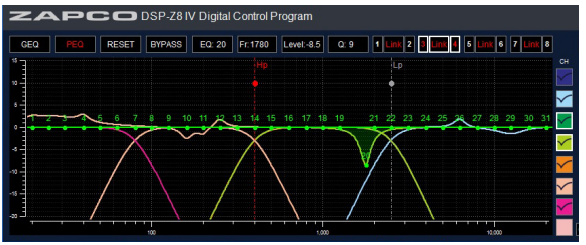
Fine tuning with the PEQ.

NOTE: Remember: When you close the GEQ (or the program) you cannot go back. When you re-open a preset, the GUI will open to the default PEQ page and re-opening the GEQ will re-set the equalization. So you don't want to do that. From here on out you will use only the PEQ. If you like using the GEQ... no problem. The PEQ is set exactly the same as the GEQ as *long as you don't modify the frequencies.* You just use a different set of controls which are specifically designed for fine tuning.

The difference between the GEQ and PEQ is that with the PEQ you have the ability to change the *Frequency* of the filter. Each GEQ filter operates on the center-point of an specific band of frequencies. When you change one frequency you will pull others with it. Also you may find you have a problem at a frequency that is not one of the 31 bands. The PEQ can fix that. It will will also be very helpful if you are using a more advanced analyzer like a 62 band RTA of an FFT analyzer since you can move any currently unused filter to the exact location where it is needed.

Below is a system set-up that has been equalized with the GEQ and now needs some fine adjustment at one EQ band.

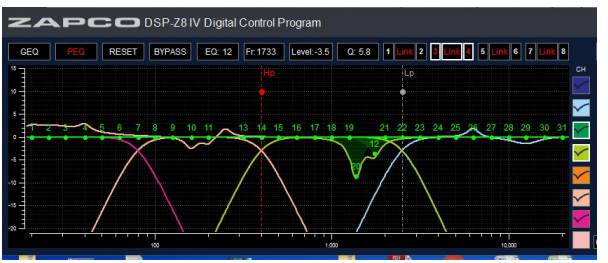
The user has found that the frequency cut at 1,600Hz is not quite right but it is close. Using the PEQ you can click on the filter number to activate it and then click into the Q box above and change using the up/down arrows in steps of 0.1. You can click into the Level box and use the arrows to change the boost/cut in steps of 0.5dB.



You can also click into the Fr: (frequency) box and usethe arrows to change the frequency of the boost/cut but as little as a single frequency. Here the Fr. of band 20 has been changed to 1780Hz.

Here the Fr. of band 20 has been changed to about 1300Hz.

What you can also do is move any desired band to a needed frequency. In this case band 12 was moved 1733Hz at -3w.5dB with a Q of 5.8. This is what we mean by "fine tuning".



But as you can easily see, making all the tuning using the PEQ would be very time consuming, and it is very ease to actually make the setup so complicated that it is difficult to know what to move when. That is why the DSP-Z8 IV method does the majority of adjustments with the GEQ and uses the PEQ only for touch-up tuning.

So now you have completed the system setup. You have tuned the system to the vehicle, And you have probably done some fine tuning. As you spend some time with the system you will probably begin to notice some things not quite right. Don't worry, the system is not getting worse...you're getting better at listening. It's a natural process.

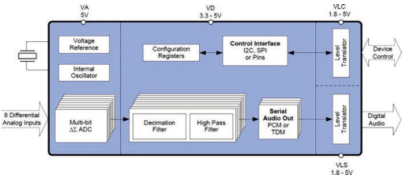
Two things to remember: Always save your work to 2 presets and Always save your work you presets to a file on the PC as a backup.

Have fun tuning!

DSP-Z8 IV Features and Specifications

Quiet in makes Quiet Out

The CS5368 24 bit 192mHz High End Delta-Sigma Analog to Digital convertor gives the Cirrus 47048C DSP chip an input Of 114dB S/N (6dB higher than the chip's built in ADC). What's that mean? It means the output is Quiet. It means that when music goes quiet you still hear the music, and not the hiss.



Processing power

For processing, the CS47048 is a 32bit 192kHz machine with72 bit accumulators. In addition the chip can take up to 5V RMS input. What's that all mean? First, it means power, processing power. It can do a lot and it can do it fast. It can control gain, phase, and signal delay for 8 channels. Control and manage 16 separate crossover filters with 7 different slopes. And manage the boost/cut of over 350 equalizer bands. And it does it all at the same time. And being able to handle 5V inputs means it can accept the signal from today's highest output head units without having to pad the input (which only adds noise).

Technical Specifications:

Inputs:	Main RCA - Aux RCA - SPDIF Digital
Input Range:	300mV~4V* (*Input can be lower or higher but max sonic performance is in this range)
Optimum Input:	4V in for 5V Out @0dB
THD + Noise:	Analog Input 1V to 5V: ≤ 0.005%, Digital Input @0dB: ≤ 0.002%
S/N:	Analog In A weighted: ≥ 106dB, Digital In A weighted: ≥ 110dB
Channel Separation:	≥ 90dB
Noise Floor without signal:	≥ -128dB
Each Output:	Crossover HP/LP/None 6dB Steps 6dB~48dB Signal delay 0 ~ 24ms set by distance with ms override Phase adjustable $0^o/180^o$ Graphic EQ 31 bands Boost/Cut with variable Q Paragraphic EQ 31 bands Ch1~6 and 11 bands Ch7/8 Muting by Channel or linked groups. Also SOLO single channel play
Dimensions:	208mm (L) x 50mm (H) x 128mm (D)
Operating Current:	600ma
Recommended Fuse:	1.5A

Due to continuing product development and improvements, specifications are subject to change without notice.

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