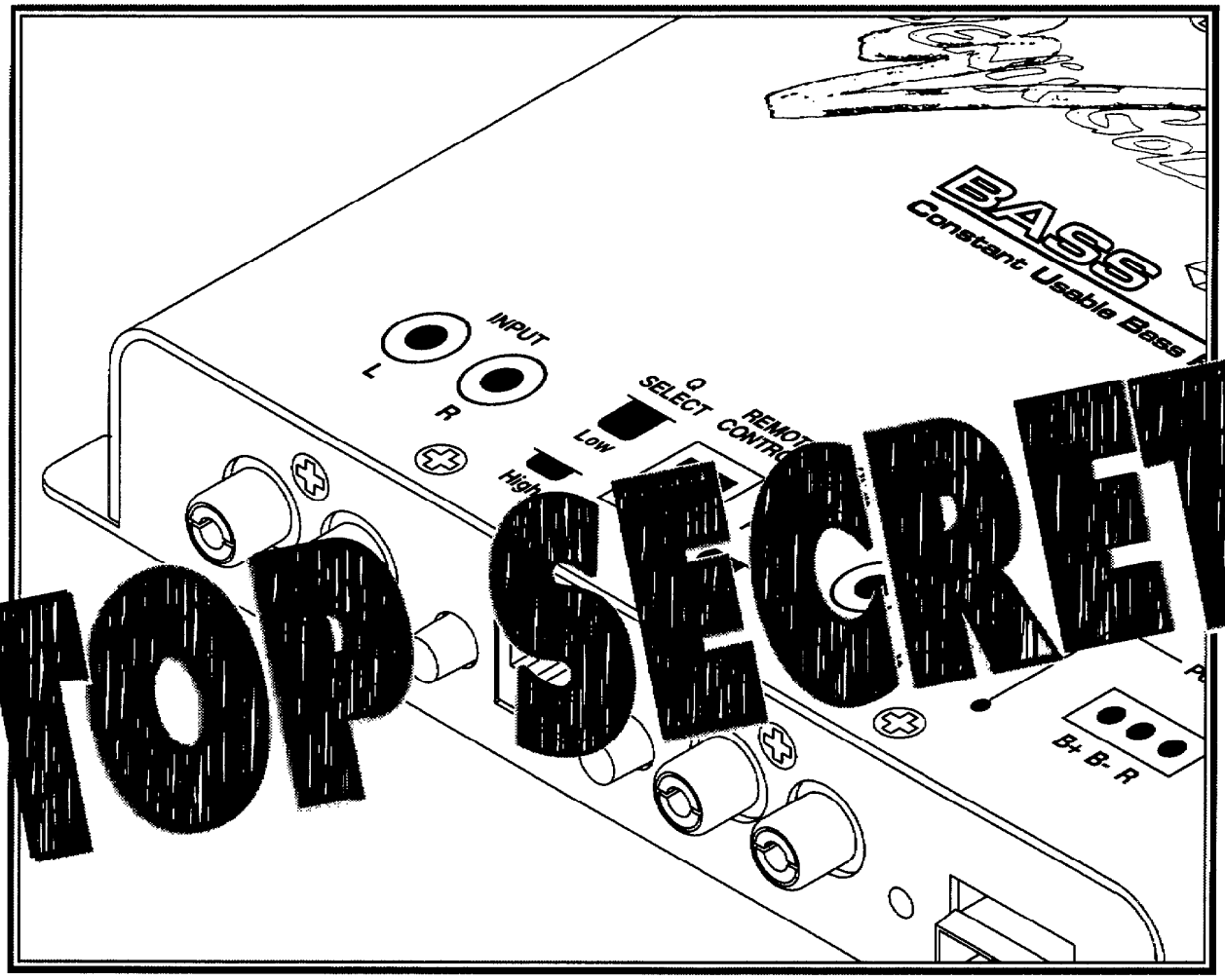
Phoenix Gold

WHAT THE HECK IS A BASS CUBE?



TOP SECRET

AND HOW OR WHY WOULD YOU SELL ONE?!

[all the secret stuff!!]

BASSCUBE SELLING TIPS....the "Secrets of the CUBE!!"

The BassCube is one of those products that is typically not very well understood,or maybe the more correct term is, a poorly understood product. Most people think that the BassCube is some kind of "Sub-Harmonic Synthesizer", something akin to what a competitor of ours produces. But the BassCube is a unique and totally revolutionary product, not so much in what it does, but HOW you use it in ANY car audio system. The concept of USEFULNESS (or logic!) is relatively new to car audio thinking. In other words building and designing products that actually DO something, not destroy things. Plus....not that many people even know what a "Sub Harmonic Synthesizer" IS,... or does. DO YOU?

THE 70's -DISCO!!

In the late 70's (yes, of this century!,) there existed a company called DBX. They developed this really cool thing, and yep, it was called the "Sub-Harmonic Synthesizer". What it did was "sample" the audio signal and find the lowest fundamental frequency (i.e., bass) and create a half to full octave lower note of that frequency. At this period in time there were NO compact disc's, MD's or DAT's, just vinyl, or morecommonly know as RECORDS! Remember those things? Twelve inch, black round thing-a-ma-bobbers with circular"scratches" that were spaced differently for each song? Thats how a record "worked". The narrow, tightly spaced "scratches" are the very high frequency, while the wider "scratches" are the low frequency. The lower the frequency the wider the spacing of these "scratches". What you may not know is that the record companies "limited" the bass response of all records because of how much TIME the bass took up on the record. If there was real low bass on the record it took up to 5 times more room, or greater spacing between the tracks, to repro-

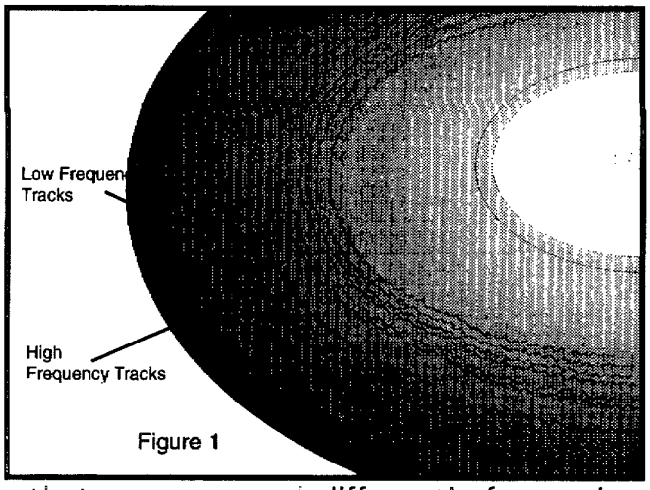


Figure 1

duce 30Hz bass than it did to reproduce 50 Hz bass! That means you had less songs on each record which, at the time, was the proverbial "Kiss of Death", from the Record companies standpoint. The recording industry as a whole concluded that most people DIDN'T have very good home audio equipment anyway so why worry about a 1/2 octave or two of bass extension? SO...they limited the bass to 55Hz and made the bass mono below 70Hz. Or as we say here at PG ..."Bass optional, and .....there weren't any coin slots for quarters!" Virtually EVERY Discotheque in America (if not the world) had a DBX "Sub Harmonic Synthesizer" (or 2) in their sound reinforement audio system.

THE 80's- THE ERA OF BAD VIDEO SOUND

In the 80's AudioControl took this same basic technology and came out with a great product (Really!). It was called the "Phase Coupled Activator", and they still make it. The main market thrust was for the burgeoning Home Video market, and It was specifically designed for VHS machines, which at the time were NOT Hi-Fi OR Stereo. The idea was to "enhance" a poor quality sound reproducer - VHS tape, and this product did just that. Because it could take very poor quality, at least from a frequency response standpoint, audio from a video source (VHS) and MAKE it have some bass response! A very cool product. Then AudioControl took it to the streets (so to speak) and came out with the Epicenter. Now, remember that when the Epicenter first came out, in the early 80"s, we were all still listening to records, and the "optional" bass response we spoke of earlier was still in vogue with the record companies. There were NO car Compact Disc players available, so we were "dubbing" (OK recording- whatever!) our records onto tapes. Which meant that the cycle of "Bass Optional" continued. At the time, the Epicenter was an awesome piece of gear. It took the rolled off bass response of the records and created bass that was NEVER there. COOL!!

THE 90'S - TOO HIP GOTTA GO!

That was in the 80's, but here we are in the later half of the 90's. Compact Disc's are now the rule and not the exception. CD's can do "DC to Light" for frequency response. No more limitations, no more mono bass. So what does our CUS-

TOMER think this "thing" does with the boost knob in the front? Do they know exactly what it's doing ? Yeah, right! All they know is that it turns the bass up and down. But remember that the Epicenter is now "trying to create bass lower than 30Hz. So is it trying to create 10Hz? Or is the "subsonic filter" preventing that? Have you ever heard of anyone using an Epicenter on a bandpass box? Or free-air woofers? Betcha your dealers have and.... they're still crying from the disaster that befell them! Of course none of your retailers ever have customers blowing up woofers after hooking up an Epicenter. Not that the Epicenter is the fault, No! It's actually the customer that's the problem. But are you going to tell the customer that he CAN'T buy an Epicenter, ...so he CAN'T turn the bass up and down remotely? That's some good "negative" selling. Or...maybe you sell your dealer on the advantages of the BassCube so he sells the "kid" a BassCube. You say "Why would I sell a BassCube over an Epicenter?" By the way we want to say up front that there is nothing technically wrong with the Epicenter, other than how the recording industry has changed what you have learned so far. In it's time it was a truly awesome product. But now it's BassCube's time.
So... let us tell you HOW, WHY and WHERE to use the "Cube". The easiest way is to look at HOW the BassCube can and SHOULD be used is through different system designs. So lets begin with.....

USING A BASSCUBE FOR A VENTED BOX

Let's begin with a fairly standard system. A medium sized 4-channel amplifier (40 X 4) with a stereo 50 watt per channel amp for the subwoofers. Probably a fairly standard system nowadays. The 4-channel amplifier has a subwoofer crossover output that is being utilized. Without an external electronic crossover. A Sony headunit and two(2) amplifiers that's it. Pretty simple. So where do we put the BassCube? Physically we'll place it in the trunk with the amplifiers. But where in the signal path? Right after the head unit? Right after the sub out,or what is also know as "lowpass out" on the crossover before the sub amplifier? Actually ....it doesn't matter! That's one of the beauties of the BassCube. It can go in ANY-WHERE! At the beginning of the audio chain, right after the headunit or at the end just before the subwoofer amplifier. As long as there's an amplifier and speakers. You don't even

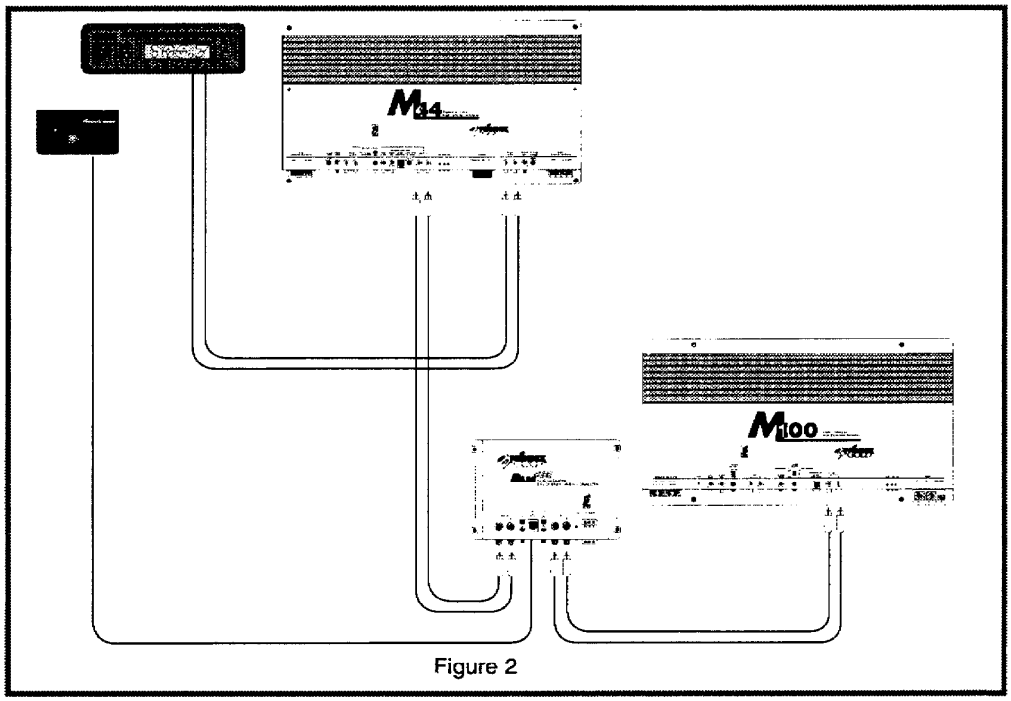


Figure 2

need subwoofers, although it makes for more impressive results if they are there. For this conversation we'll place the BassCube after the subwoofer line out of the 4-channel amplifier, before the sub amplifier (see Figure 2). After mounting the BassCube near the amplifier and doing the normal cable and power connection, we're ready to figure out how do we set the two different switches on this thing? Since the BassCube is a "unity" gain device there are NO gain or level controls to deal with. Unity gain means that whatever AC voltage you input through the BassCube is the AC voltage you get out. One volt in, one volt out. Two volts in, two volts out. Six volts in, six volts out. Got the picture? For vented boxes OR for dB "freaks" we recommend using the two (2) switches in the "High-Q" and "Tracking Sub-sonic Filter" position (see Figure 3). That means that as you adjust the frequency the subsonic filter "follows

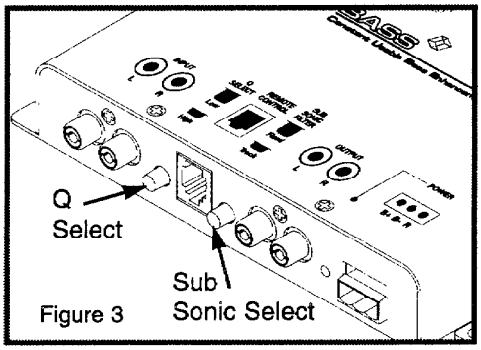


Figure 3

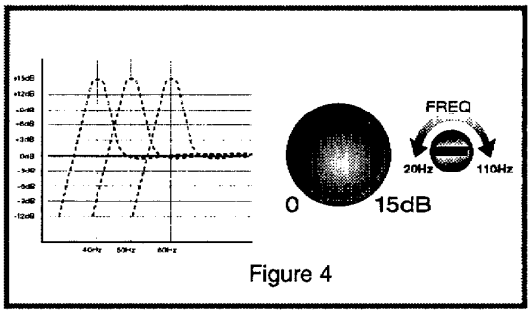


Figure 4

along" (see Figure 4) But before we get into THAT subject - just hang on to that thought because in a few sentences we'll get back to the subsonic "thing". To set this vehicle up correctly you would have those two switches in the positions stated previously. Connect the 20 foot phone cable to the BassCube, and run it to somewhere convenient for the driver to access in the forward part of the interior - like the dash. This "phone" cable that you ran from the back of the car (where the amps are) connects to the back of the FREQUENCY/BOOST remote module of the BassCube. Now for the fun part - with the system on and the "Bass" music the customer will more than likely listen to turn the "Boost" knob (the big knob,OK) up about 1/2 to 3/4 of the way and adjust the HeadUnit volume level up to a fairly high level (NOT clipping!). Take the "FREQ" knob (the small one!) and slowly turn it up and down, "counter -clockwise"(see Figure 4). Remember that this "FREQ" knob works through a range of 20 to 110Hz. As you adjust the "FREQ" knob you will notice the bass level changing. With a vented box it's REAL obvious. At some point you will adjust the "FREQ" knob to where the woofer just seems to go "crazy", as though it's trying to jump out of the box. You just found the WRONG frequency - but that's good (amazing as it seems). Stop there and SLOWLY adjust up and down from that point until the woofer makes the MOST BASS but MOVES THE LEAST. Did you get that last statement?? The woofer MOVES THE LEAST but makes the MOST BASS. Excuse me? This is one of the truly beautiful things about the BassCube, you'll really get to enjoy showing it to your customers. Now you (or you customer) can boost the "wholly sh%t" out of the BassCube, and not damage anything! Because of the way a vented box works, the amplifier isn't working very hard. The lower in frequency, the further the cone moves -UNTIL you reach vent frequency. Then the cone doesn't move much at all...the port does all the work.

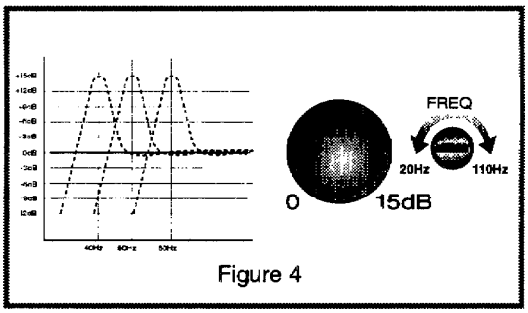


Figure 4

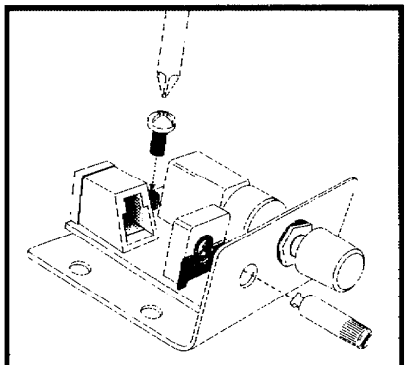


Figure 5

Pretty Cool hun? If this is going into some custom install, you DON'T want the customer screwing around with that frequency knob. If he (or SHE) turns it to the WRONG frequency (like when you were setting it up - Remember!) accidently (yeah, right) they could BLOW the the begezzis out of their woofer(s). No problem, easy fix. Just remove the PC board from the remote module (you did say this was a custom mounting job - Right? see Figure 5) Drill a 3/8 hole in the dash, or wherever, and "pop" off the "snap-in" potentiometer shaft. It's designed to do that (see Figure 6). Now your customer can ONLY adjust the Boost/On-Off function of the BassCube. Really cool.

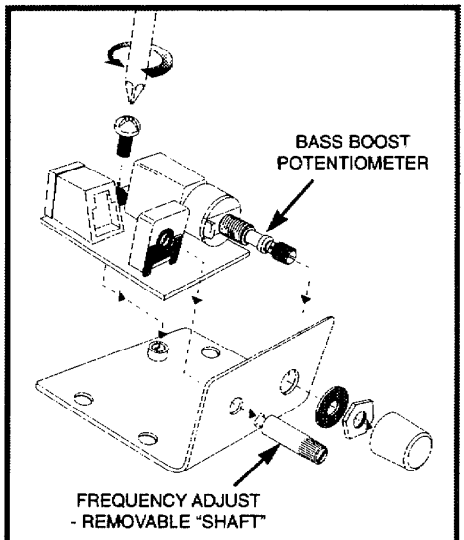


Figure 6

THE SUBSONIC "Thing?"

Now back to that subsonic "thing" we discussed earlier. Let's say that you had adjusted YOUR car audio system and it turns out that the "tuned " frequency was 53 Hz (which means you have an RTA to be able to tell us that!) then the subsonic kicks in at -3dB below this frequency at approximently 44Hz; just 1/3 of an octave below 53 Hz and rolls off at 18dB per octave. At 22Hz your 18dB down from the 53 Hz output level. In sheer power this means if there was 1000 watts RMS connected to the woofers, at 22 Hz only 15 watts RMS would "squeak though"!! This is the Ultimate protection device for those dB crazies. (see Figure 7)

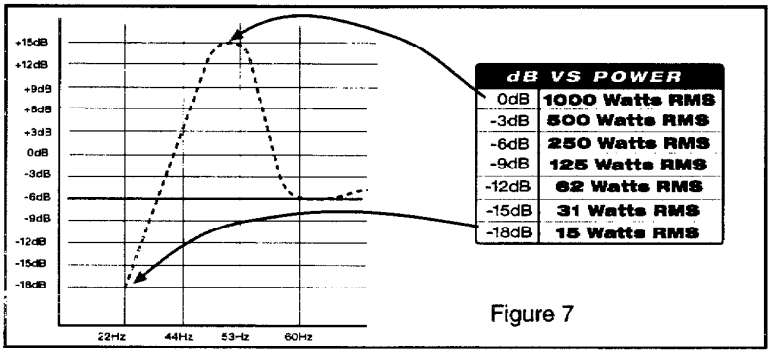


Figure 7

SPECIAL NOTE:

Think of the audio spectrum from 20Hz to 20,000Hz as a semi solid object - lets say clay. (see Figure 8) And this semi solid object had thickness, let's say an inch. If we thought of this audio spectrum as energy, for conversation lets call it a1000 watts of energy. What would happen if we squashed it all down into a narrower band of frequencies. From 30Hz to 80 Hz. If the thickness HAD to stay constant than where would the excess "energy" go? Up is where it would go! (see Figure 9) We're still using the same 1000 watts, it's just concentrated into a much narrower band of frequencies. Kind'a like a comparison of "normal" light to a laser, just that we're talking about audio.

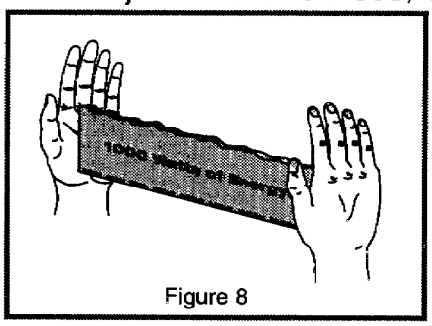


Figure 8

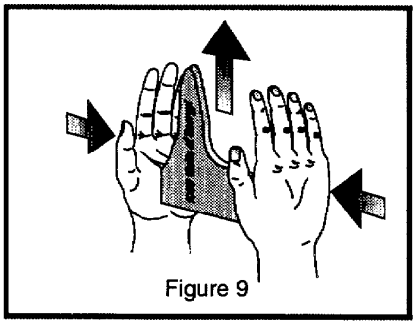


Figure 9

OH! BY THE WAY THERE IS MORE?

Since your "setting-up" the "Cube for a "DB Freak" (or maybe a wanna-be DB freak) there are some added extra SECRET STUFF about the BassCube that we didn't tell anybody. Earlier we told you to REMOVE the frequency potentiometer shaft from the Remote Module (see Figure 6) so your Crazy customer doesn't accidently change the frequency - while driving - with the bass pounding. This would be disastrous for a DB Freak kind'a customer. We also probably don't want this customer having the ability to BOOST bass +15dB either! Now what are you gonna do? Phoenix Gold to the rescue!

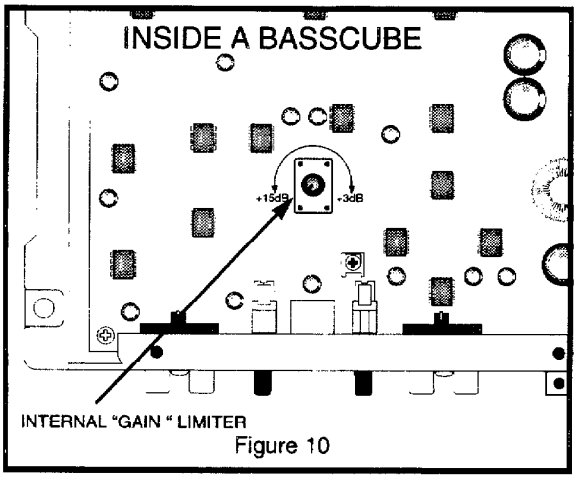


Figure 10

Unbeknownst to you (OR your customer) we've got a couple tricks up our sleeve. Open up the BassCube by removing the 4 -#1 phillips head screws that hold the case lid. Once you've done that you'll notice that inside the BassCube(aee Figure 10, kind'a in the middle is a vertical mount potentimeter. This "Pot" is for YOU (not your customer) to "program" how MUCH boost you are going to give this customer. The pot (see Figure 11) can adjust MAXIMUM boost from +15dB (counter-clockwise) DOWN to +3 dB (clockwise). So your customer will always have some bass boost - BUT you get to determine just HOW much he gets! By the way it comes "out-of-the-box" set at the maximum +15dB of boost.

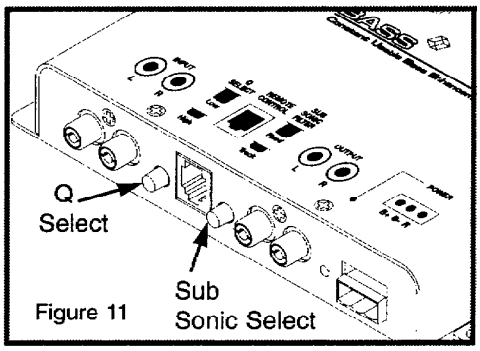


Figure 11

USING A BASSCUBE FOR BANDPASS BOX

- Same as "Vented Box" as described above

USING A BASSCUBE FOR SEALED BOX

Since we went through setting up the "cube" for vented boxes let's try our hand at sealed boxes! Actually it's really easy 'cause all the "tuning" aspects stay the same for sealed as in vented - EXCEPT that now, on the BassCube "Brain" itself, you'll switch the "Q SELECT" to Low and "SUBSONIC" to either **tracking** OR **fixed.** This will all depend on the box/woofer/customer "quotient". What we mean by this "BWC Quotient" is basically ask yourself the following questions about this particular customer.

1. On a 1 to 10 scale How "dB"crazy is this customer?
2. On a 1 to 10 scale How small is the box?
3. On a 1 to 10 scale How small is the woofer?

Consider that 1 is the worst case (least desirable) and 10 is the Best case (meaning most desirable). If this customer rated 14 OR lower between the three categories combined then you should consider setting the "SUBSONIC" filter switch at fixed. You may ask "Why?". That's because there's another "trick we forgot to tell you about. Notice in the Figure 12 that there is another potentiometer. It's located right behind

and slightly left of the "SUBSONIC" filter switch. It has a slot in the top with kind'a a Positive (+) symbol (see Figure 12). It's a PC board mounted type "pot" that you need to us a small screwdriver to adjust (BE CAREFUL!!) You may ask what does the "Fixed" Subsonic filter do, exactly? Basically its a "tune-able" or adjustable subsonic filter - from 15Hz to 45 Hz. The best way to understand what this adjustable subsonic filter (which is marked as FIXED - we'll explain later) does and when or why you would use it is best done with an example. Lets say we have this customer who LOVES bass, but has very little money. He's got one of those swap meet purchased "500" watt amplifiers that's probably more like 35 watts RMS per channel connected to a pair of 8 inch subwoofers. Of course, this guy "thinks" he's got 5000 watts and 18 inch woofers. So he's going to "wail" on those suckers for all their worth! It would seem, knowing full well that's what this customer is going to do, to be prudent and protect yourself from the aftermath of accusations?! The.."You guys are A#@H*&les, these woofers can't take 500 watts, "You sold me Junk!!" I want my money back!"

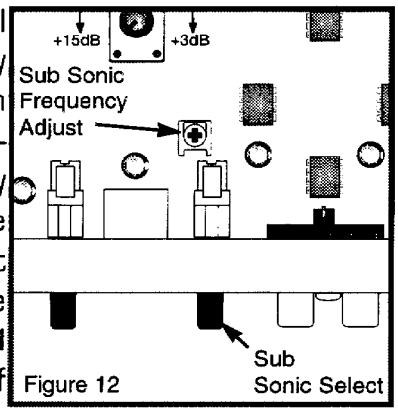


Figure 12

You know the drill.

So why not fix this situation and turn it into a positive! Wouldn't that be like a good thing? So sell this person a BassCube. You may say "How the H#LL is a Bass Cube going to solve this problem?". Easy! Remember, the REAL problem is that this customer is going to overdrive the woofers at very low frequencies. And these woofers DON"T MAKE ANY BASS AT LOW FREQUENCIES. Two reasons why. First - Eight inch woofers WILL NOT make unbelievable bass. Yes, Eight inch woofers make bass, BUT NOT the kind of bass that "dB" Crazies" think " is bass. Therefore you have a situation where there is alot of heat being generated into the voicecoils of the woofers at frequencies that they can't reproduce. Because audio in the signal path is AC volts. There is alot of AC voltage AND current at low frequencies, you know the formula - voltage squared divide by the impedance equals watts. Therefore the heat problem. But if we insert a BassCube into the system we can protect the speakers!! This is where the

"FIXED" subsonic filter switch and "secret" potentiometer under the cover of the BassCube come into play . Notice in figure12 that; with the top of the BassCube off, there is a potentiometer in the center of the PC board (OK maybe not exactly center - but close!) This is the "secret" maximum boost potentiometer. Below that and to the right (as you face the BassCube) there is a small screwdriver adjustable PC board mounted "pot". This is THE sub-sonic filter adjustment. For THIS specific customer you need to protect his woofers from HIM. Plus you want to give him all the bass that is possible from these 8" woofers. If there is anyone out there that REAL-LY thinks that there is *any* 8 inch woofer out there that can do what a 10, 12 or 15 inch woofer can do. BOY!.. do I have some swamp land to sell you!! ALSO...Always remember that these are 8 inch woofers, so there is only SO much bass that is possible to get out of them - and the BassCube will do just that. Adjust the "Boost and Freq" knobs on the remote module as before from the front of the vehicle, just exactly the same as we spoke about earlier in the "how-to-adjust" for vented boxes ....EXCEPT your going to select "Low Q" and "fixed" on the Sub Sonic Filter on the BassCube itself (see figure 13). This means that both switches are in the "out" position. That's because you are using a sealed box now. Again adjust the boost on the remote module to about 2/3rd's of the way up and turn the "freq" knob up and down until you reach the setting that generates the most bass. That's it! Leave it there. Now take a small jewelers screwdriver and adjust the subsonic filter (see Figure 14) up and down like you did with the "freq" knob. But this time you will notice that at some point the bass goes away! That means YOU WENT TO FAR!! Stop and turn the "pot" back until the bass comes back - STOP! You've now protected those 8 inch

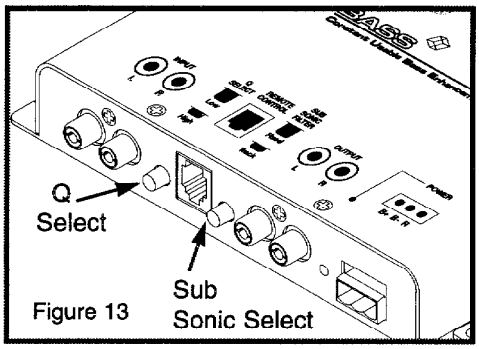


Figure 13

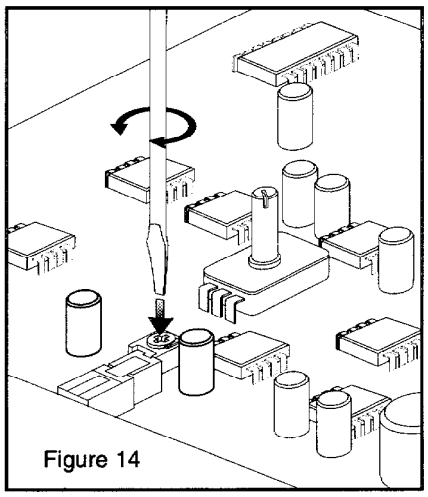


Figure 14

woofers as best as they can be protected, but just remember that these are 8 inch woofers and ARE NOT 18 inch woofers! This is like drag racing. If you customer wanted to race in "D-Gas" he probably WOULDN'T run a Volvo V-6 ! But, more than likely a 350 Chevy small block,...4-bolt mains,ported,polished, 2.02 valves, the whole deal. And if he does 11 second quarter miles now and wants to break the 10 second "barrier"... it starts getting EXPENSIVE. If he then says "I want to break the 5 second barrier, but I don't want to spend ANYMORE money, what do you tell him? Take drugs Man...you can't there from here! Eight inch woofers will ONLY DO SO MUCH NO MATTER WHAT!! If the customer wants more BASS than he needs BIGGER woofers and MORE power. PERIOD. Unless of course you use a BASSCUBE,.... the only way you can cheat "Physics", is by using "Physics" to your advantage.

USING A BASSCUBE FOR "NO" BOX (i.e; Free-Air)

Same as "Fixed Sub-sonic Filter" above. Be careful and listen for "distress signals" when boosting low frequency on "Free-Air woofers. When you hear woofers "yelling and screaming for mercy" it's probably a good sign that you or your customer are going to "blast" them. Be careful!!

ALMOST THE END

Hopefully this paper was helpful. We believe that knowledge IS POWER. The more you understand WHY and HOW we design and build our product, the easier it is to understand where PHOENIX GOLD is "coming" from.
The thinking process, the "why did they do it that way!" kind of stuff.

If you need any audio help please feel free to call us at (503) 288-2008 for "TECH SUPPORT".

If we can't help you....you're in DEEP DO DO?!!

THE END!