

# ***HSU RESEARCH***

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## ***Instruction Manual***

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**Model VTF-2**

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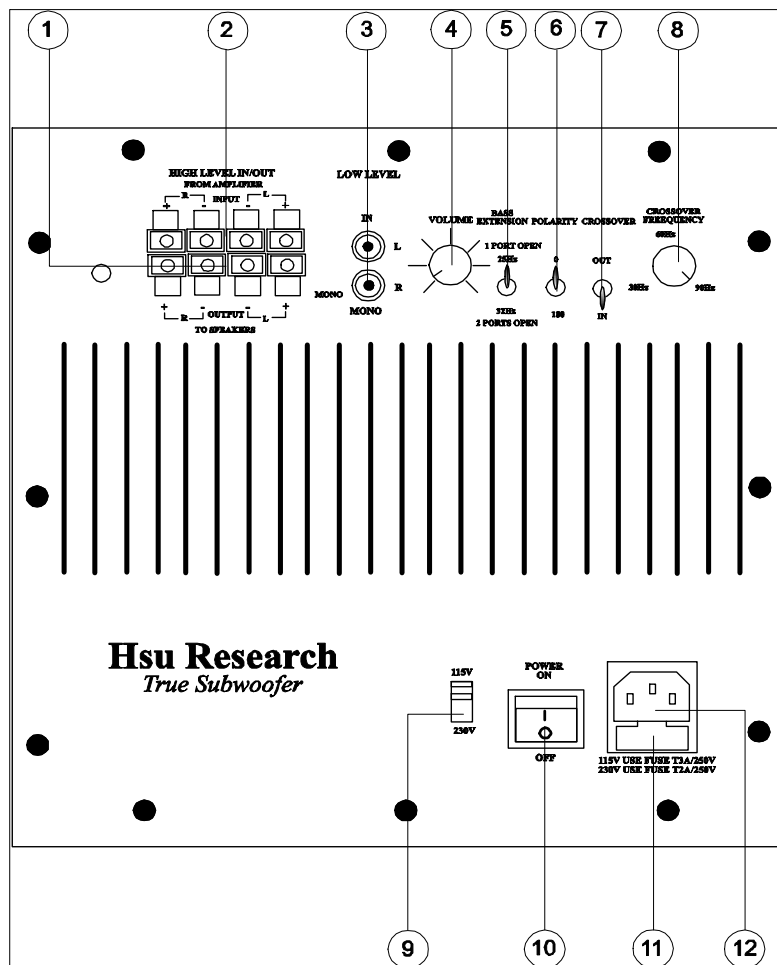
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# Introduction

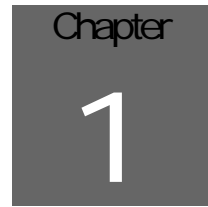
Congratulations! By purchasing a VTF-2, you have chosen one of the best “bang (or boom) for the buck” subwoofers in the market. As an added bonus, the VTF-2 has a very high Spouse Acceptance Factor: it can be used as an end table or placed in an entertainment center. The ingenuity of it all lies in the fact that all the high Spouse Acceptance Factor is achieved without any sacrifice in the Audiophile Acceptance Factor: there is no compromise in the sound at all! In fact, you can optimize it for maximum output or maximum bass extension. Before beginning to enjoy your new subwoofer, please read through this manual to familiarize yourself with all of the features of the VTF-2.

# Rear Panel



1. Speaker Level Outputs: For connecting to the main speakers when speaker level inputs are used.
2. Speaker Level Inputs: For connecting to a system that does not have line level outputs available.
3. Line Level Input: For connecting from a system's sub out or pre-amp outputs to the subwoofer.
4. Volume Control: Used For controlling the volume level of the subwoofer.
5. Bass Extension Switch: For selecting max extension mode or max output mode. See page 5 for details.
6. Phase Switch: Changes the phase of the subwoofer with respect to the main speakers. See page 5 for details.
7. Crossover Switch: For bypassing the internal low pass crossover when an external crossover will be used.
8. Variable Crossover Control: For setting the frequency of the built in variable low pass crossover.
9. Dual Voltage Switch: For setting the amplifier to run on 115V or 230V.
10. Power Switch: For turning the subwoofer on and off.
11. Fuse Housing: Contains a 20 mm 3A (2A for 230V) slow blow fuse.
12. Power Cord Jack: For connecting the subwoofer to your AC outlet.

# Chapter 1: Setting Up



*In this chapter, we will unpack and setup your new subwoofer!*

## Features

The VTF-2 has a unique feature, a variable tuning frequency, with which the user can optimize the performance of the subwoofer according to his or her needs. The tuning frequency can be set to either 25 Hz or 32 Hz. We will further discuss this feature in the next chapter. The unit also features a variable crossover frequency, a phase switch, and a high level high pass through. These features will be discussed throughout the manual. The VTF-2 has an auto-on feature which puts the subwoofer in standby mode (indicated by a red L.E.D.) when it is not receiving a signal and turns the subwoofer on (indicated by a green L.E.D.) when it receives an audio signal.

## Unpacking

Carefully open both box and remove the subwoofer. The easiest way to do this is to open the top of the box, flip the box over so that one side of the subwoofer is resting on the ground, and slide the box up and off of the subwoofer. You may need assistance because the VTF-2 is quite heavy. Included in the box you will find this manual, a sample CD-R courtesy of the Boston Audio Society which has a track with ultra-strong and pure 16Hz and various test tones, a power cord, and a ground cheater plug (three prongs to two prongs). Use the cheater plug if you are experiencing humming or buzzing noise due to ground loops problems. When using the cheater plug, bend back the grounding tab away from the side that plugs in to the wall so that you do not ground it, as this would ground the amplifier and defeat the purpose of using the cheater plug.

## Subwoofer Placement

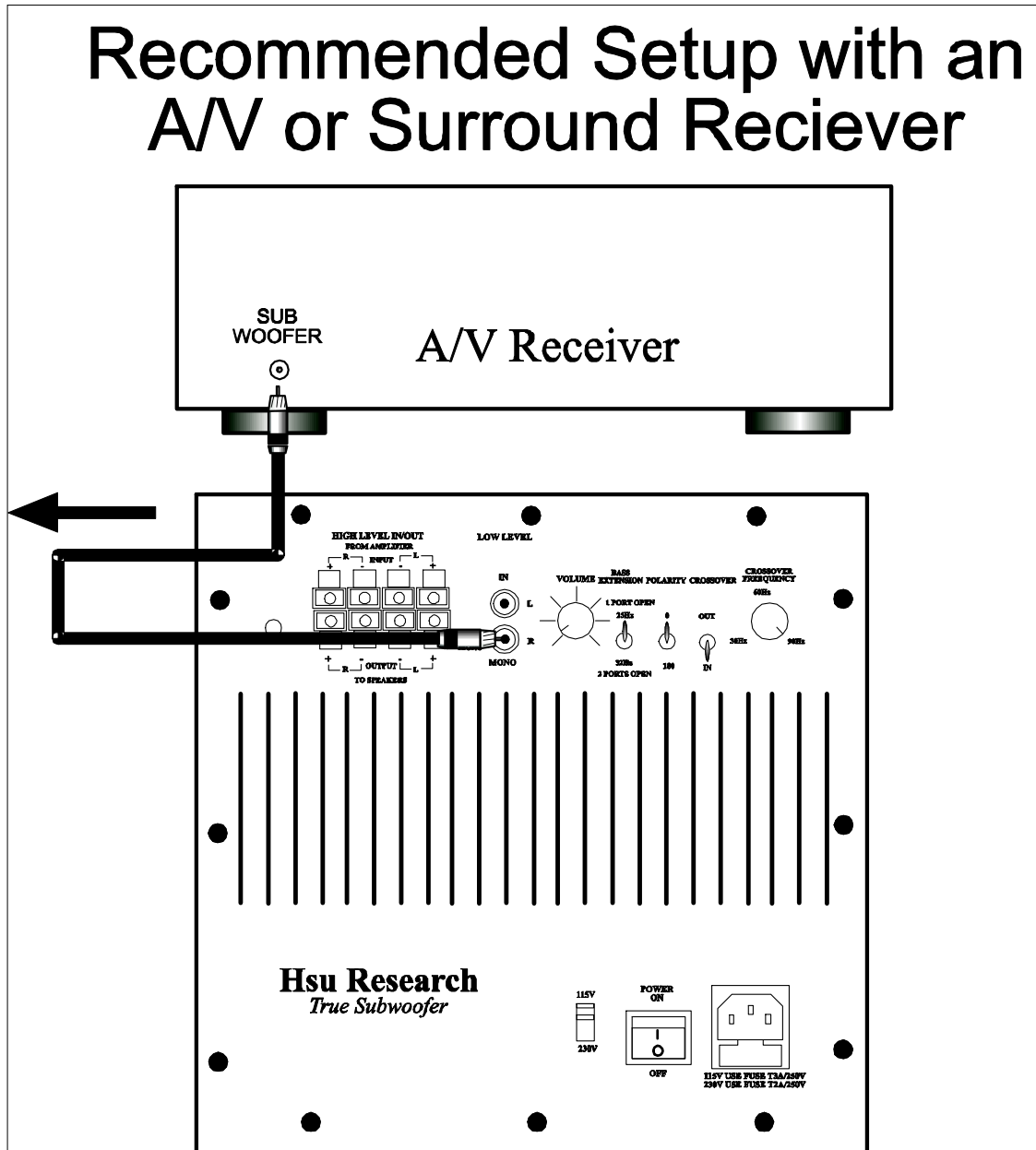
The room a subwoofer is placed in and the placement of the subwoofer contribute greatly to the bass output of a system. Since each room is different, it is up to the user to find a “sweet spot” in the room where the subwoofer will sound best for the specific application. One good way to find a good spot is to put the subwoofer in the listening seat, play pink noise (track 6 of our CD) through the subwoofer and move about your room to find a location where you hear the most bass and the most even bass. Place the subwoofer at this location for optimum results. If you are not able to place the subwoofer in the ideal location in the room, the subwoofer can be used as an end table, against the front wall, or in a front corner. If your couch is up against the back wall, and your room is quite deep (18 ft or more), we recommend that you use it as an end table. If you have at least 19” of space behind the sofa, place it directly behind the sofa, lining up the woofer with the listening position. Always maintain 3 inches of distance between the ports and nearby surfaces. In general, try to avoid sitting half way between the front and back walls. This is where you get a strong null for your room’s standing waves. No matter how powerful the subwoofer is, you will not get much bass at these frequencies. For example, if a room is 18 feet in length, you will not get much 32 Hz output at the null points.

Make sure to have a minimum of three inches of clearance between the open port(s) and the closest surface.

## Connecting To Your System

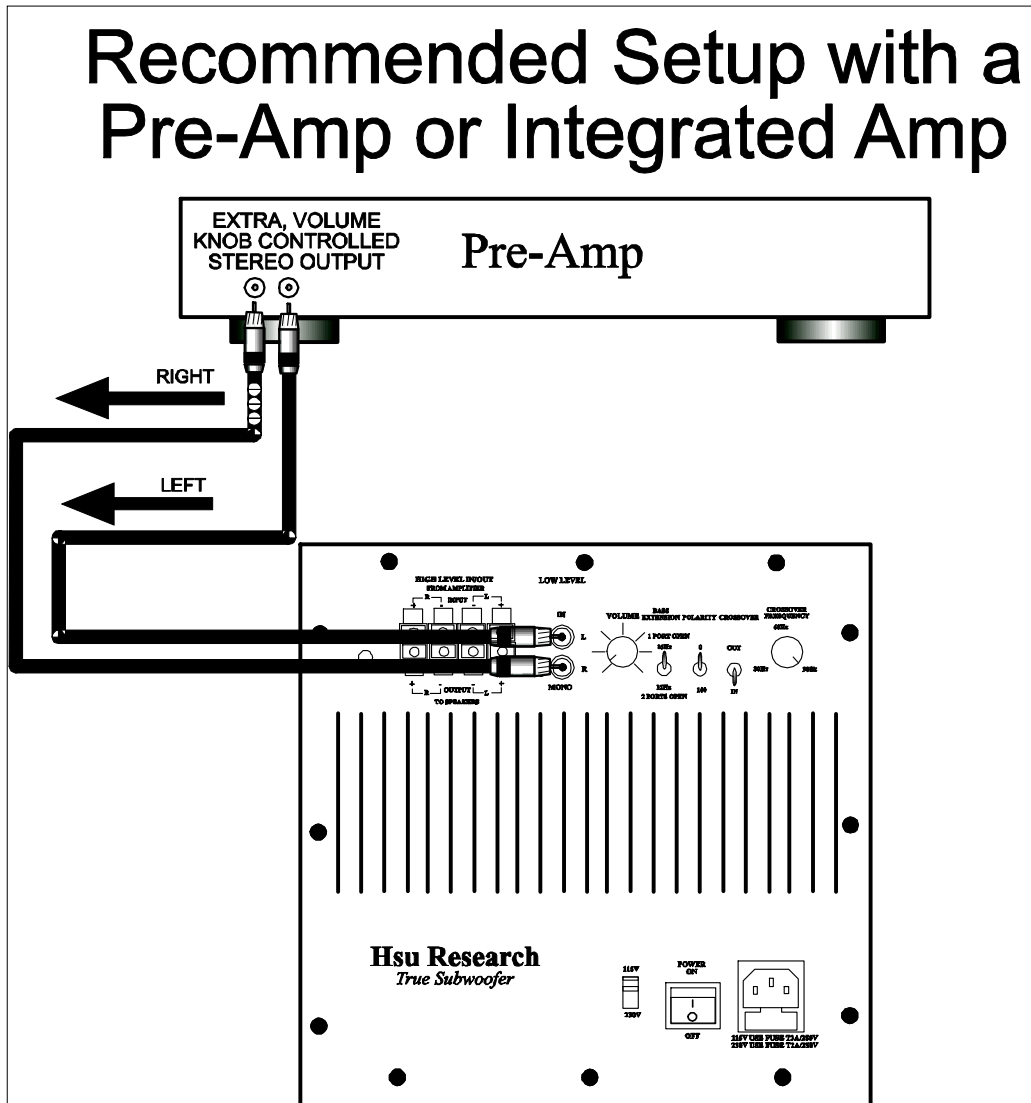
### Connecting to a Dolby Digital or DTS system

All Dolby Digital and/or DTS processors have subwoofer/LFE outputs. If you decide to use the crossover in the processor, connect your receiver or processor subwoofer/LFE out to either one of the line level inputs of your VTF-2. Set the crossover frequency of your processor appropriately for your main speakers and set the crossover switch on the back of the VTF-2 to “out”.



## Connecting to a system with pre-amp outs

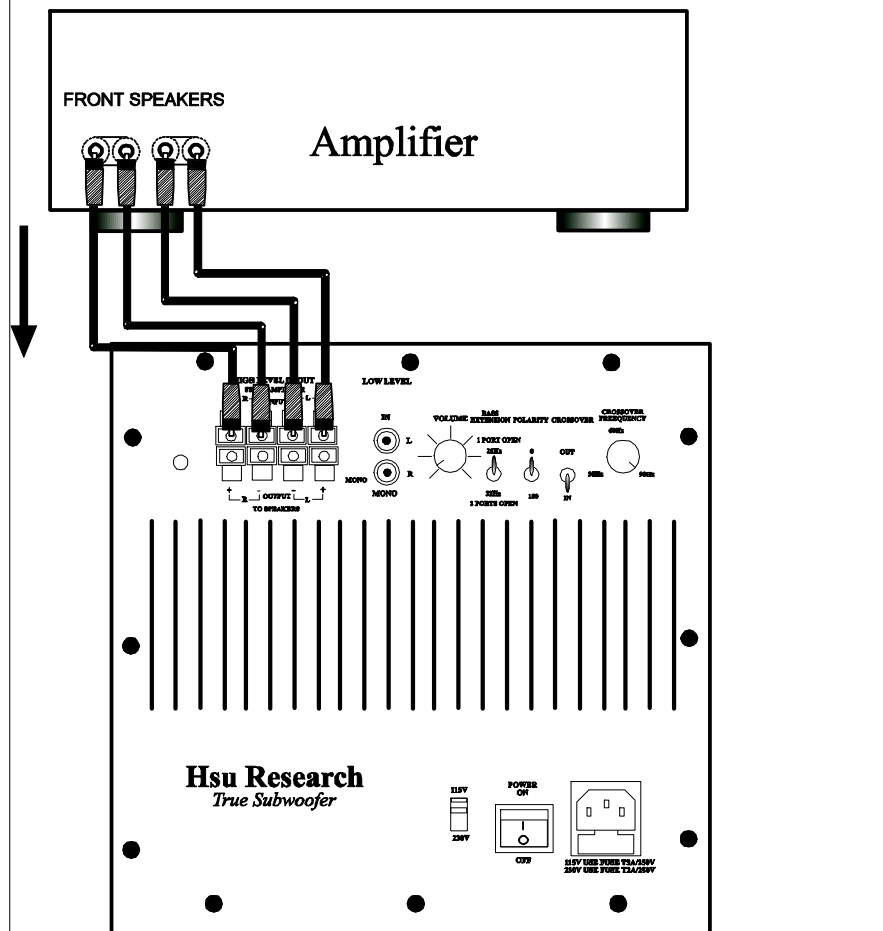
If you do not have a dedicated sub-out jack on your receiver or amplifier or if your preamp/processor does not allow you to select the optimal crossover frequency, you can set your preamp/processor for no subwoofer and large main speakers, then use a pair of RCA cables to connect the front left and right pre-outs to the low-level “in” of your VTF-2. Set the crossover switch on the back of the VTF-2 to “in”.



## Connecting to a system with no pre-amp outputs

If no low level output is available, you need to run speaker wires from your main amplifier or receiver to the subwoofer amplifier. Run the left and right channel to the subwoofer amplifier and secure the speaker wires to the appropriate spring clips located on the back of the subwoofer amplifier under Speaker Level In. Be sure to double check that the polarity (-/+ ) on the receiver or amplifier matches the polarity on the binding posts of the subwoofer amplifier. Also, make sure that the ‘ - ’ outputs on your main amp are true ground, otherwise you would short the output of your main amp. If needed, run speaker wires from the subwoofer amplifier’s high level output to your main speakers.

# Recommended Setup with an Amplifier



## Finishing Up

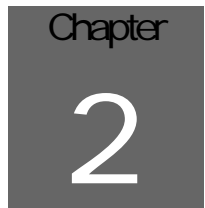
Check to see that the red voltage selector switch on the back of the VTF-2 is set to the correct voltage. It is set to 120V by default. Connect the subwoofer's power cord to an AC outlet.

Congratulations, you have successfully set up your new subwoofer. For recommended testing and listening material, refer to Appendix A of this manual. Also, try out the CD-R that was included with your subwoofer. A track listing for this CD-R can be found in Appendix C of this manual.



# Chapter 2:

## Fine Tuning



*In this chapter we will adjust the settings of the subwoofer so that it is fine tuned to the user's preference and environment.*

### Maximum Extension vs. Maximum Output

A unique feature of the VTF series is its ability to be optimized for maximum bass extension or maximum output. In the maximum extension mode, you get a flat response down to 25Hz. In the maximum output mode, you get extension down to 32 Hz (still better than most subwoofers) with up to 4 dB more output between 30 and 50 Hz. If your program material does not extend below 32 Hz, by using the maximum output mode, you get less distortion for the same sound level and you tax the system less.

Changing between the two modes is easy. For maximum extension mode, plug up one of the ports and flip the EQ switch on the back to the 25 Hz position. For max output mode, leave both ports open and flip the EQ switch to the 32 Hz position. If only one of the ports is visible, our advice is to plug up the port that is not visible for aesthetic reasons. **WARNING:** Do not have both ports open and have the switch at the 25 Hz position as this may damage the subwoofer and void your warranty.

### Phase Switch

Depending on the absolute phase of your main speakers and amplifier, and the relative distance of the subwoofer and the main speakers from the listening position, the bass in the crossover region may be smoother if you reverse the phase of the subwoofer relative to the main speakers. Try flipping the phase switch to determine which way sounds more bass-heavy. The more bass-heavy position is the setting where the output of the subwoofer and the main speakers are most in phase. Play program materials with bass in the crossover region such as music containing bass drums, double basses, bass guitar, etc. to determine the correct setting.

### Variable Crossover

By adjusting the variable crossover on the VTF-2, a user can make the subwoofer perfectly match his or her main speakers. If your receiver or processor already has a built in crossover, you can disable the crossover on the subwoofer by flipping the IN/OUT switch to the OUT position. Most newer digital receivers have a built in crossover so refer to your receiver's manual before proceeding. If you do not have such a crossover, do the following to set the variable crossover on the subwoofer. Find out the lowest frequency your main speakers will output (the frequency they are "-3 dB" at) and set the crossover approximately to this point. By experimenting with the crossover frequency and level control, the user can fine tune the VTF-2 so that there is a seamless link between the subwoofer and the main speakers.

## Volume Level

Using built-in test tones of a receiver/processor, or by using a test CD/DVD (such as the CD-R that comes with Hsu subwoofers), the user should match the levels of all of his or her speakers. We recommend using an SPL meter such as the Radio Shack unit (use "C" weighting and slow settings). Note that the Radio Shack meter is down about 12 dB at 16 Hz, 7 dB at 20 Hz, and 4 dB at 25 Hz. Add these numbers to the readout to compensate for these errors. When using the test tones, measure from the listening chair and set for around 75 dB level in the 40 – 80 Hz range. Do not run test tones at very high SPL as this can potentially damage the subwoofer.

Alternatively, adjust for a bass level you prefer. Some prefer to set the bass level somewhat higher than the main speakers partly for loudness compensation, since most people do not listen to material at reference levels. A good approach is to set the subwoofer level to the highest level where kick drums, etc., are still tight and non-boomy. A good test track for this is the Sheffield Drum Record/Track Record (CD14/20) track 5 (Ron Tutt). Most people tend to set the subwoofer level higher for home theater applications too. We recommend setting about 3 dB hotter for home theater applications. (Some processors/receivers allow you to set different bass levels for different sources.)

# Chapter 3:

## Troubleshooting



*In this chapter we will discuss problems that users may have and their solutions. If you do not find a solution to your problem on the following pages, please email us at [techsupport@hsuresearch.com](mailto:techsupport@hsuresearch.com) or give us a call at 714.666.9260.*

Problem	Cause	Solution
Humming or Buzzing Noise	You have a ground loop problem.	<ul style="list-style-type: none"><li>• Try using the provided cheater plug. Do NOT ground the grounding tab on the cheater plug! That would defeat the purpose of the cheater plug for this application.</li></ul>
	You have an amplifier problem.	<ul style="list-style-type: none"><li>• If ground cheater plug does not help, disconnect all interconnects from the amplifier. If still hums, call or email technical support.</li></ul>
	You have a problem with other equipment.	<ul style="list-style-type: none"><li>• If hum goes away when interconnects are disconnected, hum is coming from the rest of your equipment. Add them back one piece at a time. The one that causes the system to hum is the source of the hum.</li></ul>
No output from the subwoofer (the LED does <u>not</u> light up).	AC power not getting to the amplifier.	<ul style="list-style-type: none"><li>• Check that the power cord is plugged in securely at both ends and make sure that the power outlet the subwoofer is plugged into is functioning properly.</li></ul>
	The amplifier's fuse is blown	<ul style="list-style-type: none"><li>• Check the fuse. The fuse is located just above the power plug on the subwoofer. Unplug the power cord and remove the fuse holder with a screwdriver and check the fuse. If the fuse is blown, the output transistors are probably damaged. Email or call technical support for authorization to send the amplifier back for service.</li></ul>

No output from the subwoofer (LED lights up red).	The subwoofer is not receiving a signal.	<ul style="list-style-type: none"> <li>Recheck the connections between the receiver/processor and the subwoofer.</li> </ul>
	Subwoofer amplifier is faulty.	<ul style="list-style-type: none"> <li>Connect the signal cable to another subwoofer or amplifier. If you get output, then the amplifier is faulty. Email or call technical support for authorization to send the amplifier back for service.</li> </ul>
No output from the subwoofer (LED turns green).	Connection between subwoofer amplifier and woofer is faulty.	<ul style="list-style-type: none"> <li>Remove the woofer and make sure that the two speaker wires that come from the subwoofer amplifier are securely connected to the woofer. If they are not, secure them or call/email technical support for assistance.</li> </ul>
	Driver or amplifier is faulty.	<ul style="list-style-type: none"> <li>Remove the driver from the VTF-2 and connect it to your main amp. If it produces undistorted output, the woofer is fine and the amp may be faulty. If there is no output, or the output is distorted, the woofer is faulty. Email or call technical support for authorization to send the amplifier or woofer back for service.</li> </ul>
Little or no sound from one main speaker.	You used speaker level connections and have mixed up the polarity of the wires, thus shorting one channel of the main amplifier.	<ul style="list-style-type: none"> <li>Correct the polarity of the speaker wires by matching the +/- from the receiver/amplifier to the +/- of the subwoofer's speaker level input.</li> </ul>
	You used speaker level connections and one or both your main amplifier's '-' are not true ground.	<ul style="list-style-type: none"> <li>Connect only to the channel that has a true ground '-'. If neither channel has a true ground '-', email or call technical support.</li> </ul>
Bass output from subwoofer is low	Level on subwoofer or receiver's subwoofer output is too low.	<ul style="list-style-type: none"> <li>Increase the volume of the subwoofer and the subwoofer level or LFE level on the receiver or other source. It is best to set the level of the subwoofer relative to the other speakers using the provided CD-R and a Radio Shack SPL meter, or built-in tones on your preamp/processor. See "Volume Level" section on page 8.</li> </ul>

## Appendix A:

### Recommended Listening

*Visit our website for the most up-to date listing of recommended listening material.*

#### Deep Bass CDs

##### Boston Audio Society CD-1

Track 3, an excerpt from Saint Saens Organ Symphony recorded at Jordan Hall, has the cleanest and highest level 16 Hz Dr. Hsu has ever experienced. It also has a bunch of test signals and other nice recordings done by the BAS members. A “must buy” for any audiophile.

Telarc CD80097: The Ruffatti Organ in Davies Symphony Hall, Michael Murray  
Try track 1 and track 11 (3 min 45 sec into this track). Sub 20 Hz bass.

##### Telarc CD800146: Star Tracks II

Try track 2, starting a little over a minute into the track. Sub to mid 20 Hz bass. The buzzy sound on the right channel later on in the track is on the CD and is not a problem with your main speaker or the subwoofer.

Phillips 412 619-2: Saint-Saens Organ Symphony, San Francisco Symphony, Edo de Waart  
This CD has deep bass down to 16 Hz on track 2. It is one of Dr. Hsu’s regular test discs. The purest deep bass occurs at 9:00 into track 2. Levels here are very low. Abnormally high gain is needed to play this at wall-shaking levels. Remember to turn the volume back down after the movement! The last movement and the Widor piece also have lots of deep bass.

##### Dorian DOR 90117: Mussorgsky’s Pictures at an Exhibition

Mussorgsky’s work is played here by Jean Guillou on the great organ of the Tonhalle, Zurich. It has strong deep bass fundamentals in the 19-20 Hz range, albeit with a generous dose of harmonics. Hence this will sound impressive on systems without ultra-clean deep bass. Tracks 5 and 15 (try 5 minutes into this track) are where the bass is most impressive.

London 410 164-2: Prokofiev Alexander Nevsky, Cleveland Orchestra and Chorus, Ricardo Chailly, conductor.

This has one of the lowest tuned conventional-sized bass drums – around 25 Hz.

##### Argo 417 159-2: Hindemith Organ Works, Peter Huford, organist.

Try track 5, at 4:45. The 19 Hz note here is 6 dB louder than the highest level at any other frequency on the entire disc! Start with moderate level settings.

London 410 145-2: Respighi Pines of Rome, etc., Charles Dutoit Montreal Symphony  
There is an almost pure 22 Hz note on track 4 between 1:22 and 2:29

Argo 414 420-2: Mendelssohn Organ Works, Peter Huford organist

Very, very loud 19 Hz on track 8. Proceed with caution when playing this disc! Start at moderate levels and gradually increase the volume until you reach your system's limit.

Geffen 24233-2: Enya Watermarks

This is New Age music – soothing, ethereal, spacious sound with plenty of low bass (20s to low 30s). Try track 10 (“longships”).

Reference Recordings RR-58CD: Pomp & Pipes!

This CD has sub 20 Hz signals on tracks 4 (3:45) & 9 (6:18), and good, tight drum strokes on track 1, for example. A nice, lively CD with plenty of bass throughout.

Reference Recording RR-S3CD: HDCD Sampler

Excellent for testing bass tightness – the drum strokes on track 1 and three should be extremely tight and gut shaking with no hangover.

Sheffield Lab CD-14/20: The Sheffield Drum & Track Record

The Drum Record tracks are excellent for testing bass tightness. Dr. Hsu's favorite is track 5 on this CD.

DMP CD-460: Thom Rotella Band

About 1 minute into track 12 is a bass guitar solo which is excellent for testing bass transients.

Private Music 01005-82089-2: Jennifer Warnes – The Hunter

Tracks 8 and 9 have very tight and loud mid to low bass

Warner Bros 2656-2: Bela Fleck & the Fleckstones, Flight of the Cosmic Hippo

Track 4 has extremely high levels of deep and mid bass/

Verve 314 517 657-2: Tom Grant, The View from Here

Try track 3: Hang Time. Good, tight, fairly deep bass.

LaserLight 15 313: Virgil Fox

Try track 4: C. Frank's Piece Heroique, sub 20 Hz from 1:30 into track.

Newtown NTN2210: Bass Outlaws, Illegal Bass

Try track 12, “Stereo Bass” - Ultra loud bass in the low to sub-20 Hz.

## Deep Bass DVDs

### Lord of the Rings: Fellowship of the Ring

This is currently Dr. Hsu's favorite demo disc. Chapter 30 is a stunning scene in many respects, and the bass is continuous and loud.

### Titan AE

This was Dr. Hsu's favorite demo disc before Lord of the Rings. The starting scene is great, and so is Chapter 19, the creation of the New Earth. The best scene is the Ice Field chapter.

### Final Fantasy

This is also a great demo disc. It has incredibly deep bass in the dream sequences. Defaults to Prologic mode.

### Event Horizon

One of Dr. Hsu's favorite demo discs. The bass in the starting scene is strong enough to break windows. Make sure you set it to 5.1 mode. In pro-logic mode, it is anemic.

### Titanic

This is a great demonstration disc. Deep bass is very strong through many parts of the movie. Dr. Hsu recommends using chapter 7. Also need to set to 5.1 mode. Defaults to Prologic.

### U-571

The depth charges scene has plenty of deep bass and mid bass.

### True Lies

Chapter 31 "I thought this look like your work" has tremendous low frequencies in the 25-30 Hz range, generated by helicopters. With great subwoofers, it should sound like real helicopters hovering in your room. Again needs to be set to 5.1 mode.

### Air Force One

This is another good demo piece. Again need to be set to 5.1 mode.

### Armageddon

This DVD defaults to 5.1 mode. You get great bass in many of the scenes.

### Haunting

You also get very strong bass on this DVD.

### Fight Club

Watch the "Mid air collision" scene, with a good subwoofer you can feel the air whizzing past you.

### Toy Story 2

Watch the opening scene, it is said to be one of the best tests for a subwoofer's ability.

# Appendix B:

## Technical Specifications

Features: auto-on, soft clipping, and variable tuning frequency.

Frequency Response: 25 - 125 Hz +/- 2 dB in max extension mode, 32 - 125 Hz +/- 3 dB in max output mode.

Woofers: 10-inch, magnetically shielded.

Crossover Frequency: 30 - 90 Hz, 24 dB/Oct low pass.

Input Impedance: 10k ohm (line), 1k ohm (speaker).

Inputs: Stereo line level and speaker level (full-range signal).

Outputs: Stereo line level and speaker level (full-range signal).

Controls: Level, phase (0/180 degrees), crossover frequency (30 - 90 Hz), Volume Level & bass extension (25/32 Hz).

Amplifier Output: 150W rms.

Power Requirements: 115/230 VAC, 250W.

Auto-on/Standby: typically 30 minutes

Dimensions: 18.5" (d) x 16" (h) x 16" (w).

Shipping Weight: 55 lb.

Finish: Black with rounded edges.

Warranty: 1 year for electronics, 5 years on woofer.



# Appendix C:

## BAS Test CD Track Listing

Boston Audio Society — Hsu Research CD-1 — Complimentary Copy — Not for Sale

Notes by the recording engineers.

### 1. Saint-Saëns: Organ Symphony, excerpt from second movement (Poco Adagio)

WARNING: When playing this track for the first time, lower the volume, as your woofers may be at risk. The bottom octave of this recording may damage vented or planar loudspeakers. (The opening string passage should be quite soft.) Boston Civic Symphony conducted by Max Hobart, James David Christie, organist. Two AKG 414 ORTF cardioids, about the third row in Boston's Jordan Hall, spring 1983. This was one of the last times that the Jordan Hall organ, already showing signs of serious asthma, was heard in a public performance. [Micha Schattner]

This recording has the strongest and cleanest 16Hz of any recording I have come across. It's ideal for showing off the TN1220HO. [Dr. Hsu]

### 2. Brahms: Geistliches Lied, op. 30 ("Spiritual Song")

Soli Deo Gloria (the group's new name is New World Chorale), Holly Krafka conducting. This piece was written as an exercise in counterpoint; it is built as a double canon (soprano/tenor, alto/bass) at the interval of a ninth below (which would be very dissonant if the musical lines occurred simultaneously). Having set himself this formidable challenge, Brahms creates a remarkably expressive piece whose text begins "Lass dich nur nichts nicht dauren mit Trauren" ("let nothing afflict thee with grief?"), dedicated to Clara Schumann after her husband, Robert, was confined to an asylum. (The introduction quotes from Robert Schumann's Fourth Symphony, which he had dedicated to Clara.) The final "Amen" abandons the canon and unfolds over a held low E-flat from the organ. [Steve Owades]

### 3. Bruckner: Symphony No. 4 (original version), conclusion

The New Hampshire Symphony Orchestra conducted by James Bolle in the Palace Theater, Manchester, NH on November 16, 1979. It was recorded with two Nakamichi CM-1000 cardioid mikes using Dolby A on analog tape. The venue is quite dry, but one hardly notices, since the music almost never stops. This version portrays Bruckner before the revisions by well-meaning friends — not the amicable bucolic peasant but a person with apocalyptic visions of angels and terrifying demons. I've been recording the NHSO since 1977. [David Hadaway]

### 4. Mahler: Das Lied von der Erde (arr. Schoenberg) ("The Song of the Earth")

Marian Dry, contralto, Arlene Zalman conducting. Recorded in Houghton Chapel, Wellesley College, Wellesley, Mass., in spring 1999, using two Schoeps CMC 56 omnis. This is Schoenberg's chamber reduction of the Mahler orchestral work. [MS]

### 5. Verdi: Requiem: Dies Irae; Mors stupebit ("Day of Wrath"; "Death Shall Be Stunned")

Boston Philharmonic Orchestra, Benjamin Zander conducting, Boston Symphony Hall, March 8, 1981. Four Nakamichi 700s — two omnis for overall pickup and two cardioids used at lower levels as chorus accent mikes. [Peter Mitchell, E. Brad Meyer]

We could not issue this CD without a recording by our late founder, Peter Mitchell. This work is one of the hardest to record with natural dynamic range. The original was captured on videotape using a PCM-1, an early 14-bit Sony professional encoder. Fearing that the quiet passages would be lost in the dithering noise of the processor, we had Rene Jaeger build a custom dbx I encoder with a mild 1.5:1 companding ratio. This type of signal processing actually works better with digital encoding than with analog, since digital is extremely consistent in frequency response and signal levels, eliminating the most common sources of decoding errors. The recording was later decoded and transferred to a 16-bit PCM-F1.

Even once it is captured, few systems can handle the true dynamic range of this work. Play the section from 4:30 to 5:00 and set your system so that the singer reaches a natural maximum level at 4:58 of around 76dB SPL (broadband). Then, if you think your amplifier and speakers can take it, try playing the track from the beginning. (The BAS assumes no responsibility for any damages.) If your system survives, you will be able to hear the door open and close as the off-stage trumpeters rejoin the ensemble at 4:25--4:28. [EBM]

#### 6. Stereo Pink Noise

Stereo pink noise will put flat energy into your room without interference between the channels as the listener's ear or microphone moves across the room, so it gives a better idea than mono noise of the overall performance of the system with both channels operating. [EBM]

#### 7. Mono pink noise

Mono pink noise is useful when you're seated in the sweet spot on the center line between the speakers. The noise should appear to come from a single point at dead center. Any asymmetry in the system or room will reveal itself as a displacement or horizontal smearing of the apparent source. (Results in this test can be improved by getting out a tape measure and making the speakers truly equidistant from the center of your chair.) With the mono noise you will also hear the 2kHz response error that is generated by a phantom center image, since the virtual source is being generated by two real sources neither of which is straight ahead of you. [EBM]

#### 8. L-R Pink noise

This pink noise is mono but out of phase. It will produce an uncomfortable hollow-headed feeling in a system with accurate geometry and symmetrical response. In a surround system it will be entirely in the surround speakers. [EBM]

#### 9-21 Third-octave-wide warble tones, 16-250Hz

These warble tones are at constant level, with frequency varied randomly over the space of one-third of an octave, centered on the standard ISO center frequencies. For example, the 20Hz warble tone varies between about 18 and 22.5Hz. The bandwidth is wide enough so the signals will not excite narrow room resonances too much, but narrow enough to give you a good idea of the overall bass response of your system.

The bands whose frequencies begin with 2, 5 and 1 are marked by a brief tone at the start. The sequence in hertz (with tones marked by a t) is 16, t/20, 25, 31.5, 40, t/50, 63, 80, t/100, 125, 160, t/200, 250. [EBM]

22–23 Downward tone glide, 200–10Hz

Track 22 is a downward linear sweep from 200 to 80Hz 25 seconds long, joined directly to track 23, which is a slower (50 sec) linear sweep from 80 down to 10Hz. Tones mark all ISO third-octave center frequencies, with double tones at 2, 5 and 1 as above. The tones are at 200, 160, 125, 100, 80, 63, 50, 40, 31.5, 25, 20, 16, 12.5 and 10Hz. This slow glide will reveal any resonances or rattles in your system or room.

This sample CD is being provided at no charge to promote awareness of the Society's goals and activities. More than just a local hobbyist club, the Boston Audio Society has been providing a forum for thoughtful and entertaining commentary on the audio scene for 27 years. We are entirely dues-supported and include members from novice enthusiasts to practicing engineers. Our newsletter, the BAS Speaker, is available to members for \$40 a year; a sample issue is \$3. As a promotion, the complete 35-track BAS test CD (normally sold separately for \$40) is yours for free by signing up for one year.

Send a check for \$40 made out to the Boston Audio Society to

David Hadaway

PO 460

Rindge NH 03461

and mention the Hsu Research promotion.

More information on the CD and the BAS is on our website [www.bostonaudiosociety.org](http://www.bostonaudiosociety.org).