

Owner's Manual

# Phantom B7

# Snell

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Part #542-1064

# Snell

## CONTENTS

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A Message from the Designer	3
Phantom B7 Specifications	4
About the Phantom B7	4
Phantom B7 Features	6
Connecting the Phantom B7	8
Speaker Placement	13
Stereo Image	14
Switch Settings	15
Listening Levels and Power Handling	16
Phantom B7 Maintenance and Care	17
Limited Warranty	18

## LIMITED WARRANTY

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For five years from the date of purchase, Snell Acoustics will repair for the original owner any defect in materials or workmanship that occurs in normal use of the speaker system, without charge for parts and labor.

Your responsibilities are to use the product according to the instructions supplied, to provide safe and secure transportation to an authorized Snell Acoustics service representative, and to present proof of purchase from an authorized Snell dealer in the form of your sales slip when requesting service.

Excluded from this warranty is damage that results from abuse, misuse, accidents, shipping, repairs, or modifications by anyone other than an authorized Snell Acoustics service representative. This warranty is void if the serial number has been removed or defaced.

### For EU Customers Only



This symbol found on the product indicates that the product must not be disposed of with household waste. Instead, it may be placed in a separate collection facility for electronic waste or returned to a retailer when purchasing similar product.

The producer paid to recycle this product. Doing this contributes to reuse and recycling, minimizes adverse effects on the environment and human health and avoids any fines for incorrect disposal.

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

### If Service Seems Necessary

Contact the dealer from whom you purchased the speaker system. If that is not possible, call us at 607-352-2488,

or write to:       Snell Acoustics  
                          2 Chambers Street  
                          Binghamton, NY 13903 USA

We will promptly advise you of what action to take.

## A MESSAGE FROM THE DESIGNER

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Thank you for choosing Snell. The Snell Acoustics Phantom B7 is the product of extensive research, development, refinement, listening, prototyping, and more. And because it evolved from the award-winning Illusion A7, the Phantom B7 also rises from the simple proposition, "What is the best we can do, without reference to costs, practicality of manufacture, availability of existing components, or common practices?"

In consequence, the Phantom B7 design is different from conventional loudspeakers in many ways, some quite obvious, some less so. But like any loudspeaker, the B7 is merely a lens through which to view, aurally speaking, the music: an exceedingly transparent and faithful lens, one that will reveal the qualities or deficiencies of associated equipment, of room acoustics, and of the original recording and performance, with great precision.

It follows that it is only sensible to take all reasonable measures to optimize your B7s' associated components, listening room, and setup. I hope you will also budget ample time to study this manual, to get to know your new Phantom B7s intimately, and above all to experiment with setup, placement, and "supporting cast" of equipment and accessories. Only in this way can you be sure of hearing the full musical excellence of which these extraordinary loudspeakers are capable.

Once again, thank you.



—Joseph D'Appolito, Snell Acoustics

## PHANTOM B7 SPECIFICATIONS

Frequency Response ( $\pm 3$ dB)	33-22,000Hz
Crossover Frequency	300Hz; 2.88kHz
Recommended Amplifier Power	50 watts minimum 300 watts maximum
Maximum Output (per pair)	111dB
Sensitivity [1 watt (2.83v) at 1m]	89dB
Nominal Impedance	4 ohms
Tweeter	1" (25mm) Sonotex™ dome
Midranges	Two 4.5" (115mm); magnesium cones
Woofers	Two 8" (203mm) aluminum cones
Wiring	Bi-wirable, tri-wirable, bi-ampable, tri-ampable,
Placement	More than 3 feet (1m) from the woofers to the nearest wall
Dispersion Angle from center	
Horizontal:	+40 degrees
Vertical:	+15 degrees
Weight	160 lbs (73 kg) with feet
Dimensions	
Foot Print (W x D)	18" x 18.5" (457 x 470 mm)
Height	46" (1169 mm)

## ABOUT THE PHANTOM B7

The Snell B7 descends directly from the world-standard Illusion A7, modestly downsized in both form and cost. And like the A7 the Phantom B7 traces its lineage to the very first Snell: the landmark Type A design unveiled by the late Peter Snell in 1976. Like that first Snell, Phantom presents a dramatic new form and grows from its era's most sophisticated technologies. And like the A7 once more, the Phantom B7 was engineered under the direction of legendary designer Joe D'Appolito, whose name is synonymous with

the paired-midrange vertical array widely accepted as the ideal arrangement of dynamic transducers. Finally, in common with both its oldest and its most recent forerunners Phantom reflects a new concept in enclosure design whose refinements yield unprecedented freedom from resonance and spurious vibration. Consequently, its genuinely full-range, extraordinarily uncolored reproduction can be heard with unimpeded clarity and unrestricted detail.

## PHANTOM B7 MAINTENANCE AND CARE

The exterior of the Phantom B7 is finished in either an oiled or painted wood veneer or using a multi-part lacquer-based system. Either is exceedingly lustrous and durable, and requires only very simple care. For wood, use a quality wood polish to clean and protect the finish. For a painted finish use a soft terry cloth towel slightly dampened with water or a highly diluted, very mild detergent. (The towel should be just damp enough to wipe the surface clean without leaving a trail of moisture.) Do not in any case employ any abrasive cleaners, abrasive cleaning materials (this includes plastic "Scotchbrite"-type pads), or any cleaning solution more aggressive than common household glass cleaner. Where a higher degree of shine or a more deep-cleaning action is needed, a high grade of furniture wax for wood, or an automotive wax for paint may be considered.

The Phantom B7 grilles are an engineered, acoustically transparent steel mesh covered with cloth. They should require no care beyond occasional gentle vacuuming, inside and out.

The Phantom B7 has been deliberately engineered to look and perform equally with the grilles in place or removed, as owners prefer. The B7 drivers are sufficiently robust to withstand careful soft dusting and normal daily family use.

Phantom's finishes are very durable, but continuous exposure to direct sunlight could eventually cause color changes or "tan-lines" over long periods of time. A light-diffusing window treatment is usually all that is required to mitigate this very slight risk. Covering the Phantoms with the supplied felt cover during extended periods of non-use will further protect them from environmental damage.

Do not permit the loudspeakers to become wet. Prolonged dampness or standing water will destroy the finish, damage drivers and electrical components, and may compromise the construction of the enclosure.

## LISTENING LEVELS AND POWER HANDLING

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The Phantom B7's are exceptionally clean and clear reproducers, for a nearly distortion-free listening experience that may tempt very high listening levels. The Phantom B7's will happily oblige, but until you become familiar with their capabilities, use your speaking voice as a listening-level reference: If you can not hear easily yourself or others when using normal speaking tones, you may be listening at levels unhealthy for your hearing. Should you hear any distortion, turn the volume down.

Power recommendations and "power-handling" specifications can only serve as vague guidelines at best. Power requirements will depend overwhelmingly upon room size and listening preferences, because as room size/listening distance increase, the power required to achieve a given subjective loudness will rise exponentially. All things being equal, within rational limits more power is almost always better than less power, regardless of room size or listening levels. At the other extreme, while it is tempting to describe the Phantom B7s power-handling as "unlimited," experience tells us that any loudspeaker is capable of being over-driven.

That said, the factor that by far most often compromises performance (or in extreme cases, damages loudspeakers) is the operation of one or more amplifiers beyond its linear range; that is, into audible distortion or clipping. Non-linear (clipped) waveforms induce drivers to move in ways for which they were not designed, and the result is excess heat, which in prolonged or extreme instances will prove fatal to transducer "motor" elements.

Therefore, our advice on the first hand is simply to choose amplification for your Phantom B7s that is adequate to the needs of your room, your listening habits, and your musical tastes, with a generous margin of headroom. Much as we would like to be more specific, with true candor we cannot. Happily, your Snell Acoustics installer/specialist is eminently qualified to advise you in selecting amplifiers.

On the second hand, an amplifier permitted to operate non-linearly—that is, to produce distortion—can damage any loudspeaker, however capable. If your Phantom's playback seems to become strained, harsh, gritty, dynamically "squished," or in any way audibly distorted, even if the effects are heard only in highly transient, dynamic patterns, reduce the volume. Prolonged or repeated operation of your speakers with a distorted signal can cause damage that may not be covered by the warranty.

***A note on multiamp systems: In a multi-amplified system as discussed above the demands made upon amplifiers driving woofers, midranges, and tweeters will not be equal. In general, the woofers will require more power than the midranges, and the midranges more than the tweeters. Be aware that distortion, particularly when transient in nature as is almost always the case, is much less noticeable from a dedicated woofer amplifier than a midrange amp. (To a lesser degree, the same is true of a tweeter amplifier.) Therefore, it is wise in a multiamp system to "size" amplification based upon woofer demands.***

The slim, tall, deeply rounded tower forms a smoothly tapering column that connects ever-changing plane dimensions that are never found to be in parallel in either axis, yet that maintain a consistent cross-sectional area and can thus be calculated for volume with perfect accuracy—a necessity in any loudspeaker design. The result is visually beguiling from every angle, but more important acoustically, it presents no flat plane surfaces and no parallel sides. The vented Phantom B7 enclosure is thus inherently exceptionally vibration-free and all but completely devoid of contributed coloration.

Internally, each of Phantom's three higher-frequency drivers is acoustically isolated, with the entire midrange-tweeter-midrange array decoupled via a massive, individually machined, non-resonant subassembly of wood composites. In this fashion the midranges preserve their impressive clarity and articulation, as well as the integrity of the coherent forward-radiating wavefront (with the tweeter) that contributes so much to the Phantom B7's exceptional sound.

Needless to say, this arrangement of the Snell Phantom B7's midrange and high-frequency drivers is a classic "D'Appolito array" originated by Snell's chief designer—one of the very few such genuinely entitled, technically, to the name. Over the past 20 years countless loudspeakers produced with vertical mid-high-mid layouts have claimed D'Appolito status without any particular technical (or legal) legitimacy. A true D'Appolito array is a far more sophisticated entity in which transducer parameters, dimensions, geometric relationships, and time-domain characteristics of drivers and crossover elements must all be meticulously calibrated to produce

the intended result: a coordinated wavefront with smooth and consistent axial dispersion, wide, consistent horizontal spread over a broad frequency range, and controlled vertical directivity. The resulting "sound-front" minimizes deleterious first reflections from nearest surfaces (floor and ceiling), promotes accurate response with spatial character (polar responses) carefully targeted for natural, musical octave-to-octave in-room balance, and maintains maximal clarity, definition, transient accuracy, and dynamic potential—with freedom from coloration that is achievable in no other way.

Finally, the Phantom B7 incorporates numerous construction details whose acoustical value has been effectively demonstrated by numerous Snell antecedents, from original Type A to the illustrious Illusion A7. Its dramatically radiused front greatly suppresses diffraction, eliminating higher-frequency reflections toward the listening zone and so promoting clarity and definition. Its solid mid/high-frequency sub-structure fixes the drivers in rigid alignment and resists any reactive driver motions, inhibiting resonances. Woofer-mounting construction similarly maintains impressive rigidity and dimensional accuracy. A secondary rear tweeter contributes, a bit counter-intuitively, smoother front-hemisphere high-frequency response at wide angles, and thus more accurate power response over the highest octaves of musical sound for an unforced, spacious, exceptionally musical treble range. (This long-running Snell innovation dates back to the Type A II of 1979.) And of course, each Phantom is meticulously crafted, assembled, and finished, by hand, in calibrated pairs matched both acoustically and aesthetically, to the obsessive standards Snell has long established.

## PHANTOM B7 FEATURES

- ① The geometrically complex form of the Phantom enclosure provides nearly ideal acoustical behavior, with non-parallel plane surfaces, precisely calculable volume, and peerless strength, rigidity, and freedom from unwanted vibration and resonance. The overall cabinet is a vented system (woofers) via a single rear-facing port.
- ② The smoothly elliptical radius of the driver baffle (front surface) reduces re-radiation or "edge-diffraction" for cleaner and smoother response at mid and high frequencies, especially off-axis. Snell pioneered this technique in the original Type A system 35 years ago.
- ③ Phantom's true D'Appolito array is one of a very few such genuinely entitled to the name. Computer-modeled and highly engineered it yields a nearly perfectly coherent forward-radiating wavefront, with a combination of precisely, moderately controlled vertical directivity and broad, smooth horizontal dispersion that approaches the ideal for a two-channel reproducer.
- ④ Developed specifically for Snell, the midrange driver employs a unique magnesium cone, precisely machined to a thickness-contour specified to optimize stiffness and minimize mass, with a natural-rubber surround to eliminate edge resonance. A massive ferrite magnet structure anchors an enormously powerful "motor" with vast dynamic linearity, power handling and cooling. Its special injection-molded alloy basket is strong, rigid, and ideally suited to Phantom's sealed midrange sub-enclosure.
- ⑤ The soft-dome Phantom tweeter develops smooth, naturally resonance-free response well beyond 30 kHz, as well as powerful and accurate output to unusually low frequencies. This allows an unusually low mid/high crossover point, critical to the B7 D'Appolito array's ideal combination of amplitude and directional smoothness. A specialized Neodymium ring magnet is highly efficient, and the increased headroom provides significant power handling capability to provide greater clarity at extreme SPL levels
- ⑥ The tower's secondary rear tweeter contributes to smooth, accurate front-hemisphere response over the highest frequencies at wide angles.
- ⑦ The proprietary woofer employs an aluminum-alloy diaphragm of unexcelled stiffness-to-mass, a 1.5 inch, high-temperature voicecoil, and a oversized, T-shaped polepiece and phase-plug-these are but three factors underpinning this unit's enormous dynamic range, power handling, and linearity. An extraordinarily stiff, injection-molded alloy basket combines remarkable structural stability with huge "windows" for air movement, making it acoustically invisible at low frequencies and so reducing reflections, cavity resonances, and turbulence-noise to insignificance.
- ⑧ Cloth-covered, frame-less aluminum grilles can introduce no higher-frequencies reflections. They are custom-perforated in dimensions and pattern calculated for acoustic transparency, and friction mounted to decouple any induced vibrations.
- ⑨ Each crossover is individually hand built and system-tuned by a Snell technician to within  $\pm 0.5\text{dB}$  of the Phantom B7 Master Reference, ensuring perfect replication of the Phantom design. (This practice is another Snell hallmark from the late 1970's.) The networks are "in-phase" Linkwitz-Reilly designs that preserve ideal response in both amplitude and phase domains throughout all driver-to-driver transitions. Each crossover "leg" is individually constructed on a discrete circuit board, so that induced or capacitive

## SWITCH SETTINGS

The Phantom B7 incorporates three user-selectable switches, which obtain slight crossover/driver re-calibrations. These are provided purely for fine-tuning in-room performance based upon room acoustics and personal preference; there are no "correct" positions.

### Boundary

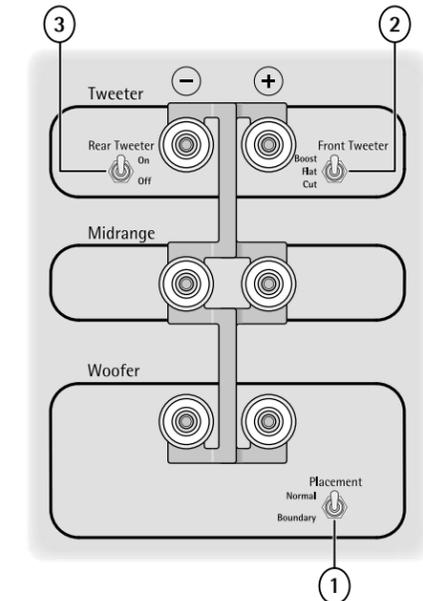
- ① When loudspeaker placement approaches a floor/wall boundary or (especially) a corner, it will emphasize bass output. Selecting the "Boundary" position reduces woofers output by a small degree, thus mitigating the overly heavy or "too-warm" quality that might otherwise result.

### Treble Level

- ② Selecting the "Boost" position for Treble Level will increase high-frequency output by a slight amount, to compensate for installations in which the Phantom B7 may sound insufficiently open and spacious: this can occur when the listening room heavily carpeted, draped, etc., yielding substantial high-frequency absorption. Set this switch to "Cut" to manage excessive brightness, typically in rooms with too many hard, reflective surfaces.

### Rear Tweeter

- ③ An on/off switch allows the rear tweeter to be defeated when the Phantom B7 is placed close to a rear wall. We recommend selecting "On" for most 2-channel applications that conform to our setup recommendations. However, "Off" is generally preferred for multi-channel applications, or when locating the speakers near a reflective back-wall surface.



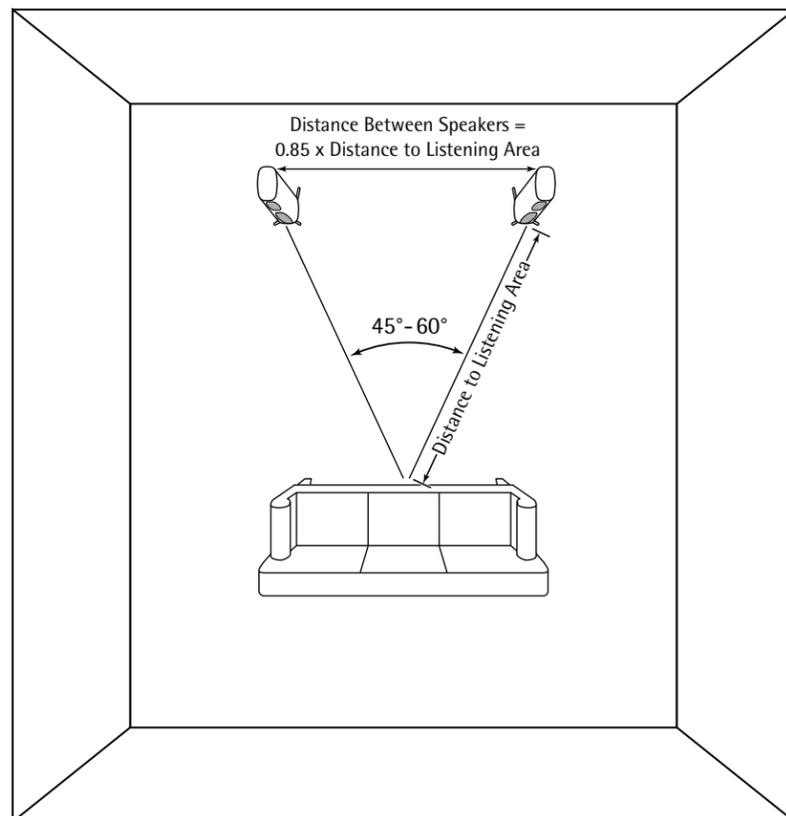
**A note on the input panel switches:** The Phantom B7 switches are no substitute for proper placement and patient setup experimentation. Derive your room's best layout, speaker-location, and fine placement adjustments first, then determine if switch adjustments can contribute to ultimate performance. In most cases the nominally "normal" settings will prove best.

## STEREO IMAGE

The distance between the Phantom B7s will largely dictate breadth of stereo image. If the speakers are placed too close together the image will be too narrow; if too far apart it can become diffuse, ultimately yielding a "hole in the middle" effect. Most rooms will perform best with an angular separation of between 45° and 60° (viewed from above) between the left and right towers. Expressed another way, this is usually arrived at by a separation between the two loudspeakers of about 0.85 the distance from the prime listening position to either speaker. It is quite important that the distance from the left and right speakers to the listening position is equal; using a tape measure to confirm these dimensions will prove well worth the effort.

Toe-in—the angling of the speakers inward toward the listening position—is a matter of room acoustics and individual preference. Generally, toe-in adjustment is best left to the last stage of placement fine-tuning. In typical rooms, as toe-in increases the stereo effect can become more sharply defined, that is, more "pinpoint," somewhat like listening via fine headphones. Aligning the Phantoms square, without toe-in, usually will yield a more spacious sound with a more diffuse center image; adding toe-in generally improves balance of stereo effect for listeners seated off-center. Ultimately, the degree of toe-in will be determined purely by taste, though electing an angle beyond 20° is less usual.

Properly placed, the B7s will produce a palpable "Phantom" soundstage from left to right, with a substantial illusion of sound originating laterally beyond each speaker, as well as a profound impression of depth.

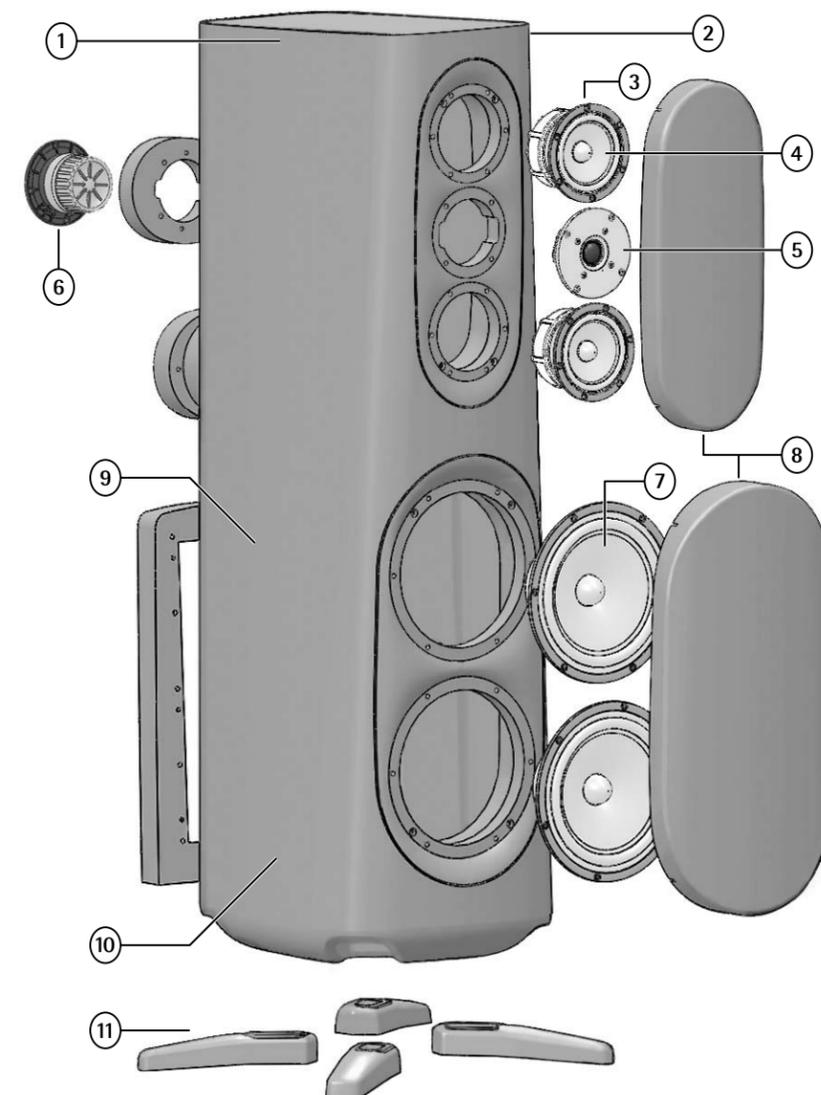


couplings cannot co-influence circuit actions, utilizing best-available components throughout including custom-fabricated air-core inductors and polypropylene capacitors.

- ⑩ Snell's renowned wood shop handcrafts and hand-finishes each Phantom B7, producing cabinets of unequalled workmanship. Phantom is available in select wood veneers and paint finishes. Wood is finished with a sanding process to 600 grit, showcasing the ex-

traordinary grain and beauty of Snell's highly selected woods, and then oiled and hand buffed. The B7 "Gloss" finish is a specially developed multi-part lacquer-based application. Lustrous, deep, exceptionally "hard," and remarkably durable, this yields almost palpably three-dimensional depth, and offers an effectively limitless variety of custom colors on request.

- ⑪ Cast-alloy feet provide a strong and stable base for the Phantom tower, and an attractive form.

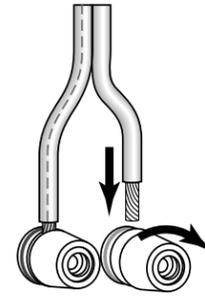


## CONNECTING THE PHANTOM B7

### Choosing Cable

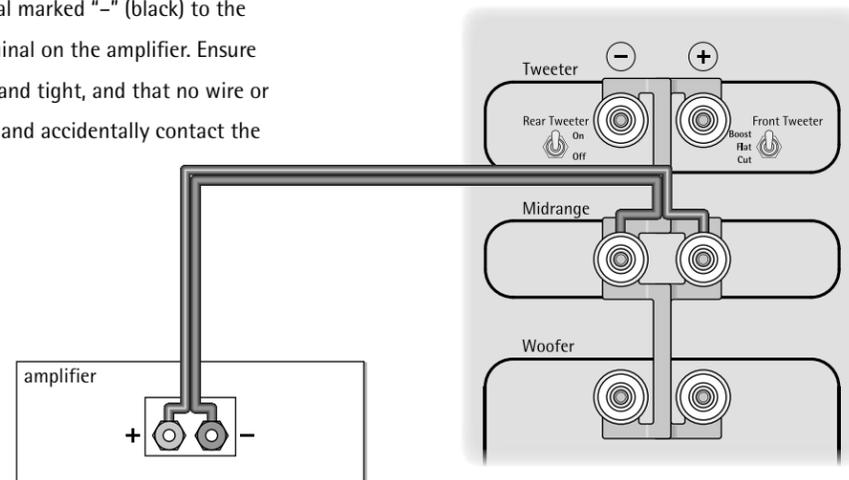
Snell recommends the use of high-quality speaker cabling of substantial weight (gauge); longer runs should receive heavier gauge cables. The specific choice of cabling is an individual one, based upon associated equipment, system layout, and personal preference, but lowest-possible resistance-per-meter and minimal inductance and capacitance can be considered universally desirable.

The selection of wire termination is similarly individual. Bare wire, "banana" plugs, spade-lugs, or pins can be employed. The leading factor is that where terminal connectors are used, they be securely, professionally affixed with gas-tight crimps or solder connections.



### Basic Connections

Retain the speaker terminal jumper straps in their shipped positions. When making connections, be sure to connect the terminals marked "+" (red) to the corresponding connection-point on the amplifier, usually also marked "+" and/or red. Connect the B7 terminal marked "-" (black) to the corresponding "-" (black) terminal on the amplifier. Ensure that each connection is clean and tight, and that no wire or strand can escape its terminal and accidentally contact the opposite terminal.



## SPEAKER PLACEMENT

Speaker placement is a key factor in any listening room setup. Finding the optimum locations for your Phantom B7s is just as important as selecting power amplifier or source components—indeed, potentially more so. However, every listening room and arrangement is different, so without being on the scene we at Snell Acoustics can only advise you as to general principles; there are no "rules." Your Snell Acoustics installer/specialist will be happy to help you evaluate your room and setup options, and can bring considerable practical experience to bear upon the challenge.

**A note on safety:** *The Phantom B7s are large, heavy loudspeakers. We strongly urge you wait until at least one assistant is available to help you in moving and positioning your speakers. We know from experience that when working alone it is far too easy to injure yourself, your speakers, or both. A "two-wheeler" hand-cart, suitably padded with carpeting or similar material, is of incalculable value when positioning the B7s.*

The Phantom B7s' cast-alloy feet are integral to the loudspeakers. Their extremities are threaded to accept the supplied carpet-spikes or glides, four to each speaker. In most cases, it is best practice to approach the final placement of the B7s before installing the spikes, as the loudspeakers are difficult to move with spikes in place. The choice of spikes or glides is up to the individual. In most cases, for both physical stability and acoustic performance, spikes will be preferred on carpeted or other soft surfaces while the glides will better serve wood floors.

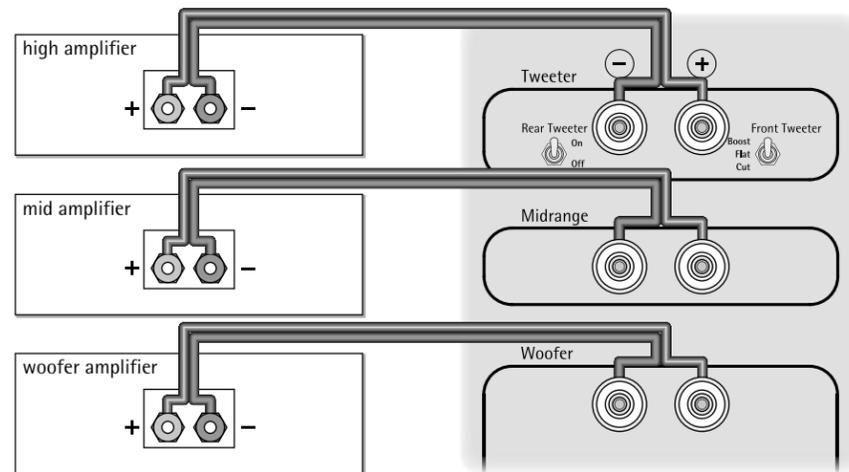
As a general rule, any loudspeaker with low-frequency capability will produce more audible bass output as its location approaches the junction of two room surfaces, i.e., floor and wall; as the location approaches the junction of three surfaces (a corner), bass output increases geometrically.

Unfortunately, these increases are not smooth and linear. In fact, since they are ruled by the standing-wave "modes" of a particular room they are almost invariably just the opposite, lumpy and unpredictable. Consequently, the first (and virtually the only) "rule" of placement: avoid corners.

Similarly, Phantoms will almost always perform best when located well away from the wall behind them. Though this distance is difficult to specify, the optimum location will usually be found somewhere between one and three meters from wall to speaker-baffle, occasionally even approaching half the distance from wall to listening position. Try to avoid placing the Phantom B7s within two meters or less of any large items of furniture, room-dividers or screens, or other large reflective surfaces.

**Triamplifying** (using one amplifier for the low-frequency, one for the mid- frequency, and a third for the high-frequency sections):

- 1 Unscrew the Woofer and Midrange terminals and remove the jumper straps. Unscrew the Tweeter terminals and remove the jumper straps bridging the Midrange and Tweeter terminals.
- 2 Connect the cable from the Woofer terminals to the low-frequency amplifier, i.e. the amplifier selected to drive the woofers.
- 3 Connect a cable from the Midrange terminals to the mid-frequency amplifier, i.e. the amplifier selected to drive the midranges.
- 4 Connect a cable from the Tweeter terminals to the high-frequency amplifier, i.e. the amplifier selected to drive the tweeters.



**A note on deploying amplifiers/channels:** You may consider deploying multiamp components "horizontally" or "vertically." That is to say: in a horizontal setup a single two-channel amplifier would power both B7 cabinets' woofers; another would drive the midranges (or mid/tweeter arrays in a biamp layout); a third both tweeters. In a vertical setup, one three-channel amp (or a grouping of one two-channel plus one single-channel unit) might

power the left-channel woofers, mids, and tweeter, while a twin component or grouping serves the right-channel. Many other arrangements of multiple- and single-channel amplifier components are possible. Experimenting with several "vertical" possibilities may yield small gains (or at least differences) in imaging and dynamics. In all cases, employing identical or precisely gain-matched channels remains critical.

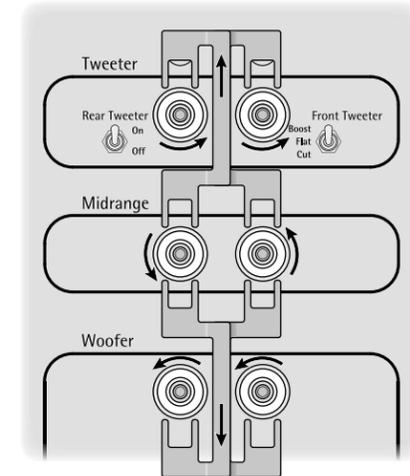
### Bi- and Tri-wiring

By removing one or both metal jumper straps from each Phantom B7, you may elect to run multiple cables, i.e. bi- or tri-wiring. This has the advantage of more fully isolating each crossover-filter section, while also doubling or trebling the overall conductivity between amplifier and loudspeaker.

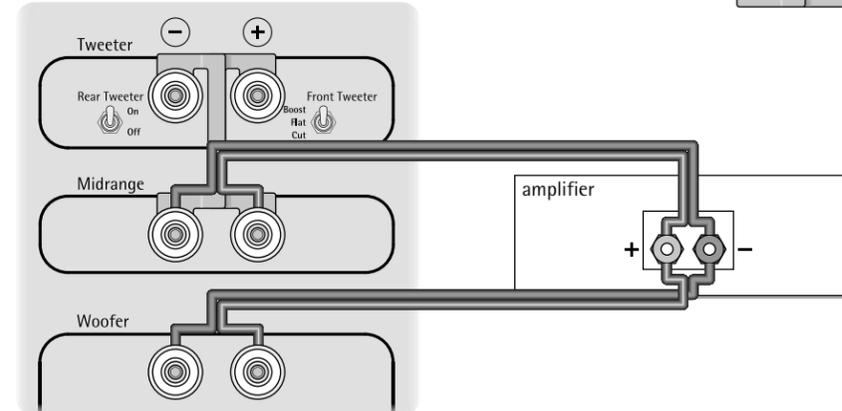
Unscrew the terminals and remove completely the jumper straps between Woofer and Mid terminals to bi-wire bass and mid/high-frequency sections (the most common two-wire configuration). Additionally remove the jumper from Mid to Tweeter terminals to tri-wire the entire B7.

Use equal lengths of identical or at least similar cabling when bi- or tri-wiring each speaker. Your Snell Acoustics installer/specialist will prove a valuable resource in choosing a wiring plan and selecting appropriate cabling.

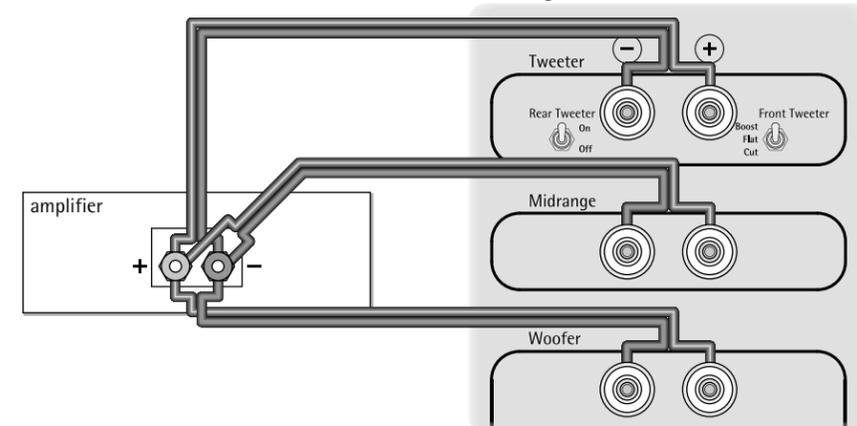
Remove Jumpers



Biwiring Connection



Triwiring Connection



### Bi- and Tri-amplifying

In an extension of bi- or tri-wiring, you may wish to consider multi-amplifying the Phantom B7s. Multiamp setups further the benefits of bi/tri-wiring by further electrically isolating woofer-, mid-, and high-frequency sections, while of course increasing the available power, a factor not to be overlooked.

**NOTE:** Do not employ an external crossover of any sort, whether passive or active. Doing so will interfere with the phase and frequency response of the Phantom B7. The system's internal crossover circuitry is an integral part of the system and necessary to the proper response and function of its D'Appolito array and overall performance.

**NOTE:** It is imperative that the amplifiers (or channels) employed in any multi-amp Phantom setup be identical. At the very least, amps/channels must exhibit perfectly matched gain structures to insure proper performance. Even tiny differences in amplifier gain will defeat the  $\pm 0.5$  dB factory response matching (described above) that is one key to Snell Phantom B7 performance.

### Speaker Impedance in Bi- and Tri-amplified Systems

Some high performance amplifiers provide facilities for matching the output of the amplifier to the impedance load of the speaker. The amplifier may have multiple output connections for various impedance loads, or it may have a switch to select the best impedance match. When the Phantom B7 is used as a full range speaker, i.e., when all the terminal jumpers are connected, its nominal impedance is 4 ohms.

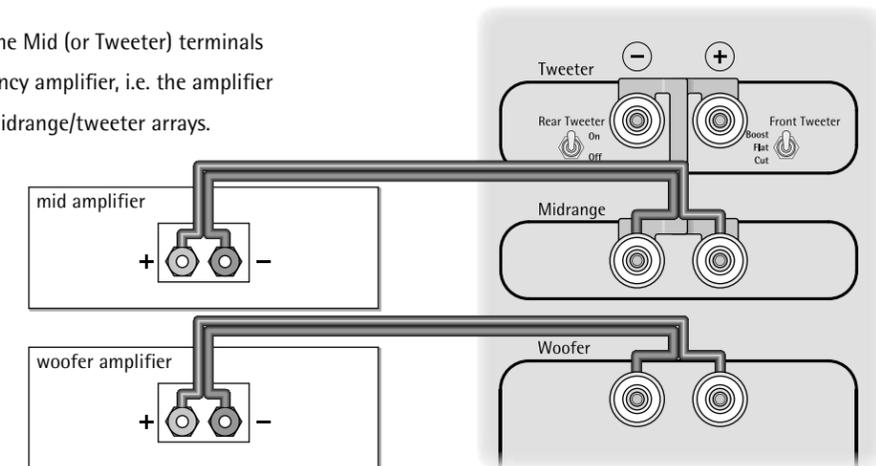
However, when one or both of the terminal jumpers are removed the impedance of the sub-sections of the Phantom B7 will be higher. If the amplifiers driving the speaker in a bi- or tri-amplified have impedance matching capabilities, refer to the chart and configure your system for the best impedance match.

Note: In certain situation the impedance may be higher.

Configuration	Impedance
Full Range	4 ohms
Tweeters only (rear tweeter on)	4 ohms
Midranges only (rear tweeter off)	8 ohms
Tweeter/Midrange (rear tweeter on or off)	4 ohms
Midranges Only	4 ohms
Midranges and Woofers (normal or boundary)	4 ohms
Woofers Only (normal)	4 ohms
Woofers Only (boundary)	8 ohms

**Bi-amplifying** (using one amplifier for the low-frequency, and one for the mid/high-frequency sections):

- 1 Unscrew the Woofer and Mid terminals and remove the jumper straps; be sure to retain the jumper straps bridging the Mid and Tweeter terminals, and re-tighten the Midrange terminals.
- 2 Connect the cable from the Woofer terminals to the low-frequency amplifier, i.e. the amplifier selected to drive the woofers.
- 3 Connect a cable from the Mid (or Tweeter) terminals to the mid/high-frequency amplifier, i.e. the amplifier selected to drive the midrange/tweeter arrays.



**NOTE:** Be certain that the jumper straps are removed entirely before making biamp (or triamp) connections. Failure to remove the jumpers will result in damage to the amplifiers, loudspeakers, or both.