



# CBT Series Line Array Column Speakers

with Constant Beamwidth Technology™



(Note: Some models shown with the included grilles removed to illustrate driver composition.)

## Frequently Asked Questions

090902RK

### 1) In what applications would I use which of the CBT models?

The following are general starting-point guidelines:

**CBT 50LA** – This is the most compact model, although it holds its own versus larger competitive columns on output level. It has frequency response down to 80 Hz, so it's good for both speech and music.

- Audio support of video monitors
- Retail stores, concourses
- Fill areas of transit spaces
- General fill applications
- Conference rooms
- Architectural spaces where a point-and-shoot speaker may be too visually obtrusive.

**CBT 100LA** – This is the tallest model (other than the CBT 70J/70JE combination), providing excellent control. It, too, has frequency response down to 80 Hz, so it's good for both speech and music.

- Lecture halls
- Difficult acoustic environments
- Transit centers
- Conference rooms
- Cathedrals
- Multi-purpose spaces
- Architectural spaces.
- Because it has a flat front, CBT 100LA can be used for applications where the speaker needs to be recessed into the wall.

**CBT 70J** – This is a two-way speaker, with frequency response down to 60 Hz, 500 Watt power handling, and high 100 dB sensitivity for 127 dB maximum continuous SPL (133 dB peak SPL). It provides asymmetrical vertical coverage, sending more sound to the far area of the room than to the near area, resulting in more even coverage of the listening space from front-to-back. Because it provides some down-fill sound, it is fairly forgiving of mounting height. It does not send much sound upward (above its cutoff angle), which may reduce some back-wall reflections.

- High level A/V applications
- Small to medium performance spaces (depending on the amount of bass needed)
- Small to medium houses of worship (also depending on the bass requirement)
- Full fidelity lecture halls
- Delay/fill applications for larger systems
- Large-scale surround sound applications
- Outdoor systems such as baseball fields, racetracks, and theme parks.

**CBT 70J + CBT 70JE** – The addition of the extension cabinet doubles the height of the array, extending the pattern control down to 400 Hz – covering the voice range – while doubling the power handling, increasing the sound level capability by 6 dB and extending the frequency response down to 45 Hz.

- Small to medium performance spaces requiring more bass and/or more pattern control than a 70J by itself
- Highly reflective small to medium houses of worship requiring more pattern control than a 70J
- Full fidelity lecture halls with difficult acoustic environments or where full spectrum sound is desired
- Transit centers with highly reverberant acoustic environments
- Multi-purpose spaces that are sometimes used for speech and at other times need to produce full bandwidth music.

## 2) **Can I really change the vertical coverage with a switch?**

Yes! The CBT 100LA and CBT 70J include switches that change the vertical coverage of the speaker. As far as we know, CBT's are the first passive loudspeaker ever where you can change the coverage with a switch.

The BROAD coverage position of the CBT 100LA is 40°, which is like a narrow-coverage point-and-shoot speaker but with the excellent pattern control of a 1-meter tall constant directivity horn.

The NARROW coverage position is 15°, which is like a traditional column speaker with cut-through long-throw capability, and with the added benefit of constant directivity coverage pattern control so that everyone within the coverage pattern hears the same sound quality.

Similarly, the CBT 70J switches between a BROAD setting of 45° and a NARROW setting of 25°. The reason its coverage is slightly wider has to do with its asymmetrical vertical coverage (which is described in greater depth later in this FAQ).

**3) When I use a CBT 70J with a 70JE extender, what signal do I need to run to each?**

Simply run a full-range signal from the power amplifier to each. All crossing-over is done passively within each of the speaker cabinets. Each cabinet is 8 ohms, so the total load on the amp is 4 ohms.

**4) Are the CBT's outdoor-rated?**

Yes, they are rated IP-54, per IEC 529. The first character, "5", indicates that the speaker is protected against damage from solid foreign objects greater than 1 mm (0.04 inches) in diameter and also that it is also protected from dust (not dust-tight, but dust-protected). The second character, "4", indicates that it's protected against damage from splashing water.

In addition, CBT speakers have passed longer than industry standard tests for UV and salt-spray (The industry standard is between 2 and 8 hours testing. We went all out and tested CBT's for 200 hrs for each factor – UV and salt spray).

Here are some factors that make CBT's great for outdoor use. The cabinets are glass-filled ABS plastic with maximum UV additive. The grilles are made of non-rusting aluminum, which are painted with a high quality polyester paint that stretches rather than cracking. The drivers are treated for outdoor use so they are as weather resistant as polyurethane cones. The backs of the tweeters on the CBT 70J are fitted with weather covers. All the external screws are stainless steel.

**5) What are the input connectors? Does the MTC-PC2 Panel Cover fit for sealing the terminal cup against weather?**

The input connectors are a screw-down terminal strip – nickel over a copper base, with stainless steel screws. These are the same connectors as are on Control 25AV, 29AV and 30.

Yes, the MTC-PC2 fits all CBT models. MTC-PC2 forms a water-tight seal when used with round-jacketed cable.

**6) When would I want to use the Speech position of the Music/Speech Switch? Which is the “flat” frequency response position?**

The CBT 50LA, 100LA and 70J all have a SPEECH/MUSIC switch.

The MUSIC setting is for flat frequency response. The SPEECH position provides a midrange presence peak.

Here are some instances when the SPEECH position might be advisable:

- When the speaker is used in a simple system that does not have parametric EQ or DSP, you might want to use the SPEECH position to emphasize the midrange when used primarily with speech – lectures, addresses, paging, etc.
- In the SPEECH position, there is an additional 4 to 5 dB higher mid-range output. The speaker’s natural output includes this highly sensitive mid-range, while the music setting kicks in a passive filter that flattens the frequency response. Therefore, the extra midrange output comes from increased sensitivity in that frequency range yet the power handling remains the same. Therefore, in the SPEECH position, the speaker has higher maximum SPL in the midrange by 4 to 5 dB.
- For systems with parametric EQ or DSP, it is possible to set the speaker in the speech position and use the outboard EQ to flatten the response (3.5 kHz center frequency, -4 or -5 dB, 3 octave bandwidth). This provides an extra 4 to 5 dB higher output for more headroom at mid-range frequencies.
- For systems where multiple CBT’s are being driven from the same 70V/100V distributed speaker line, there may be acoustic or throw-distance reasons for needing to boost the mid-range clarity of some of the CBT’s by putting them in SPEECH mode while keeping the others in the flat MUSIC mode.

**7) Do the CBT’s have a “down tilt” in their coverage, like I can set for a computer aimable powered column?**

No, the aiming axis for all CBT models is straight in front of the speaker. The CBT’s get aimed vertically by tilting them downward. It is convenient for the installer to know that where they aim the speaker is the aiming axis of the speaker’s coverage.

**8) What is meant by the CBT 70J having “Asymmetrical” vertical coverage? What are the advantages? How do I know where the aiming axis of the speaker is?**

The CBT 70J exhibits true ASYMMETRICAL VERTICAL COVERAGE. In other words, it sends more sound in the direction of the far area of the room than to the near area of the room. This is analogous to the popular “progressive” or “J-shaped” vertical line arrays where the cabinets at the top of the array are almost straight, with the bottom cabinet being more highly splayed. They, too, send more sound in the direction of the far seats than toward the close seats.

In this way, CBT 70J can, in many rooms, send enough sound to those in the back without blowing away those in the front with too much sound. The 70J can be thought of as having a long-throw and short-throw sections built into the same speaker. How even the coverage is in any particular room depends on the depth of the room, the rake of the seating and the mounting height of the speaker. EASE files may be used to map the coverage onto a listening plane.

You may see the claim of “asymmetrical coverage” erroneously made by other manufacturers when their speaker simply provides a down-tilt in the coverage compared to the aiming axis of the speaker. This is an incorrect usage of the term.

The aiming axis of the CBT 70J is simply the direction the front of the speaker is facing. Because the grille has a curve in the bottom half, the direction may be best indicated by the top and bottom panels of the cabinet as well as the back of the cabinet. In the BROAD coverage mode, the speaker covers approximately 17° up from this axis and 28° down from this axis, for a total 45° of vertical coverage. In the NARROW coverage mode, the speaker covers approximately 9° up from the aiming axis and 16° down from this axis for a total of 25° of vertical coverage.

**9) Do CBT’s have enough output to be used where I might normally use point-and-shoot speakers?**

The CBT’s have very high output for column speakers -- more than you might expect – and they do not distort much at high drive levels. This is because of high sensitivity, high power handling, and Dynamic SonicGuard™. It is also the case that speech mode adds to the maximum SPL in the midrange by increasing the sensitivity without diminishing the power handling.

The following are the Max output figures for the CBT models (speech, narrow, 1 meter):  
 CBT 50LA = 115 dB continuous pink noise (peaks of 121 dB)  
 CBT 100LA = 121 dB continuous pink noise (peaks of 127 dB)  
 CBT 70J = 125 dB continuous pink noise (peaks of 131 dB)  
 CBT 70J + 70JE = 125 dB continuous pink noise (peaks of 131 dB) over an extended bandwidth.  
*Note that these models in music, wide mode have a few dB lower Max SPL, depending on the model.*

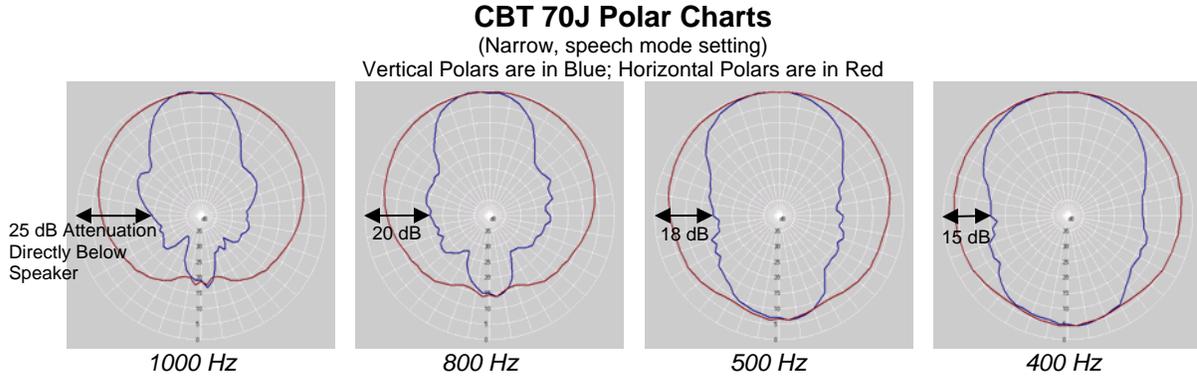
These figures match or exceed that of many point-and-shoot loudspeakers. In addition, CBT’s provide fuller bandwidth sound than most column speakers, down to 80 Hz on the CBT 50LA and 100LA, down to 60 Hz on the CBT 70J and down to 45 Hz on the combination of the 70J and 70JE.

**10) When a CBT model is described as “controlling” the coverage down to a certain frequency, how much pattern control takes place below that frequency?**

With CBT’s, a substantial amount of pattern control takes place below that frequency. The frequency listed as the official “control” frequency – sometimes called “beam control frequency” -- is simply the frequency at which the beamwidth has widened 10° wider than what is listed as that speaker’s *nominal* beamwidth (the percentage is usually listed in the spec). Some loudspeakers lose pattern control quickly below their control frequency. CBT’s, by contrast, continue to provide significant pattern control coverage below that frequency.

For example, the CBT70J is listed as controlling coverage down to 800 Hz. The primary coverage lobe does increase in width below that frequency, as does the amount of sound being sent behind the speaker. However, even down to below 400 Hz, the speaker is still providing a substantial amount of pattern control. Looking at the amount of sound projecting directly below and above the speaker – perpendicular to the aiming axis of the speaker -- at 800 Hz, this region is attenuated 20 dB, which is substantial. At 630 Hz, it is still attenuated 20 dB. At 500 Hz, the perpendicular sound

still continues to be attenuated a significant amount, by 18 dB. At 400 Hz, it is attenuated 15 dB, and at 315 Hz, the sound projecting directly below and above the speaker is attenuated 8 dB. It is not until 250 Hz that the amount of attenuation directly below and above the column is attenuated by less than 5 dB. This is an example of the excellent control that CBT models provide, even well below the “control” frequency of the speaker.



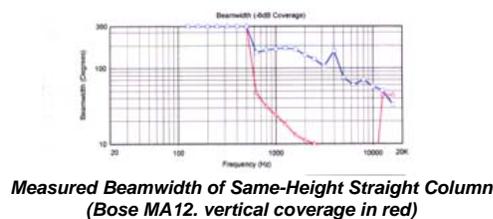
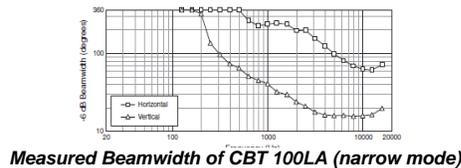
**11) Can I stack multiple CBT columns like I might do with Bose MA12’s or other traditional columns to either: increase the output, extend the pattern control to a lower frequency and/or increase the vertical height of the coverage?**

The answer to whether CBT’s are stackable is “yes”, “no” and “not as much need to stack as there is with other columns”.

**The “no” part:** CBT’s act acoustically as a single source projecting from the center of the array. Therefore, if you put two on the wall with no splay, the grouping will act like two constant directivity horns with their centers some distance apart. Not horrible, but not perfect arraying.

**The “not as much need to stack as there is with other columns” part:** There are two reasons people stack passive columns such as Bose MA12’s. First, the beamwidth of MA12’s gets so narrow at a few frequencies that they only cover a few feet of height. This occurs in the 3kHz to 10 kHz band, so if you need to cover more height (such as raked seating) and if you want those frequencies to get to everyone, you need to stack two or more of them.

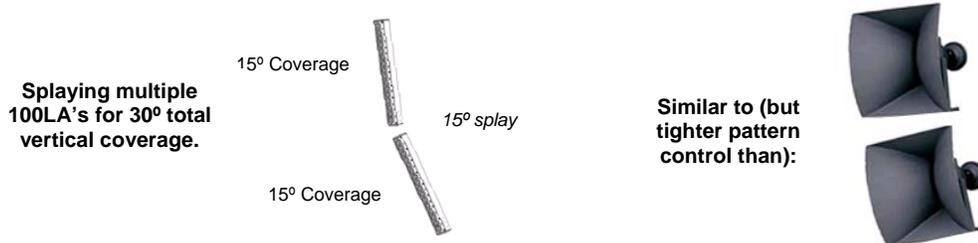
CBT’s do *not* narrow like that. They maintain constant directivity. So there is usually no need to stack them in order to cover a raked seating area.



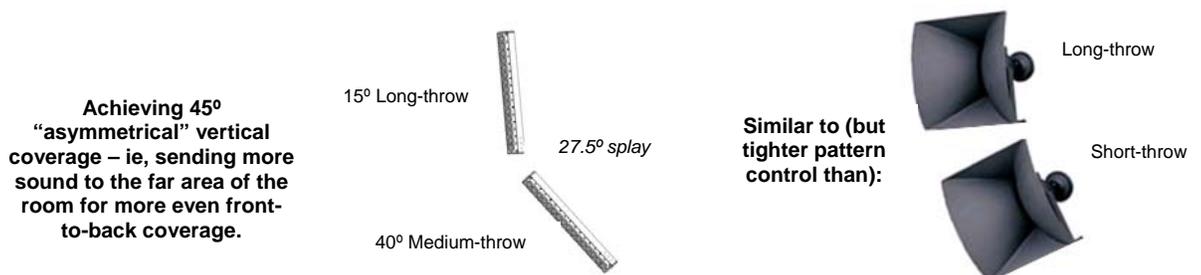
Secondly, people sometimes stack passive columns to get more output. Ours have extremely high output already. Even the little CBT 50LA holds its own level-wise against MA12's. The CBT100LA, with 325 Watts of power handling and up to 96 dB sensitivity (speech mode, narrow vertical coverage setting), has a lot more output. So again, there is no need to stack them for that reason. And CBT's have Dynamic SonicGuard, which targets the frequency of maximum excursion of the drivers. This keeps the CBT's sounding clean at high drive levels. The MA12's do not, so they start distortion on transient peaks at lower volume levels.

**The “yes” part:** The CBT 70JE is an extension cabinet for use with the 70J. It doubles the height, extends the frequency to which pattern is controlled (to 400 Hz), increases the LF output (to 130 dB [1W, 1m], peaks of 136 dB), increases the power handling (to 1000 Watts) and extends the LF response (to 45 Hz). This is the way to extend the CBT 70J.

**Another “yes” part: SPLAYED STACKING --** You can use multiple 100LA units together, applying them as you would constant directivity horns. For example, you can set two CBT 100LA's in their 15 degrees vertical coverage mode and splay them at 15 degrees for 30 degrees of coverage.



**Unique mixing of coverage patterns via splayed stacking --** You can set the top CBT 100LA at 15 degrees coverage and a bottom CBT 100LA at 40 degrees coverage and splay them to get a long-throw/short-throw coverage with pattern control as good as if you were using 1 meter tall constant directivity horns. This is one of those really cool things you can do with CBT's that you can't do with anyone else's passive column speakers.



JBL does not provide stock brackets for doing this, but the many M6 rigging points on the back of the cabinet make it convenient for a qualified rigging professional to install them in this configuration.

**Options for Extending Pattern Control to Lower Frequencies --** People also stack columns in order to extend the frequency of pattern control. Note from earlier in this FAQ, that the CBT speakers provide significant pattern control below the “control” frequency, so again, it may not be necessary to do so.

The best “stock” combination in the CBT lineup is the combination of CBT 70J and CBT 70JE. This configuration controls pattern (within  $\pm 10^\circ$ ) down to below 400 Hz, which is usually considered as covering the entire voice range, while providing significant attenuation of sound to the areas below and above the speaker down to an even lower frequency.

**11A) Can the 70JE extension cabinet be used with the 100LA, thereby extending the frequency to which pattern is controlled?**

Yes, but with some important caveats.

Using the included wall brackets, we can only recommend the *stock* CBT configurations – a single CBT 50LA, a single 100 LA, a single 70J, or a combination of 70J and 70JE.

A 100LA and 70JE can be installed as if they were end-to-end, however: a) JBL does not provide combining brackets for this configuration [although the many M6 rigging points on the back of the cabinet make it convenient for a qualified rigging professional to install them in this configuration, see below], and b) you will need to EQ the system [see below].

Mounting Considerations – The 100 LA and 70JE are not designed to be physically attached to each other and cantilevered from a single wall bracket. However, there are many insert points on the backs of these cabinets -- eighteen M6 insert points for the 100LA and ten insert points for the 70JE -- for versatility of installation by a qualified installation professional, who is responsible for safely rigging the grouping.

Acoustic Aspects -- Acoustically, the CBT 70JE extension cabinet can be used with the CBT 100LA, however you will need to EQ out a frequency response bump in the 100 Hz to 600 Hz range.

Technical Explanation: The 70JE is designed primarily to work with the 70J. Because its purpose is to extend the length of the 70J/70JE array at low-midrange frequencies, the frequency response of the 70JE extends higher than a traditional LF speaker. When used with the 100LA (instead of with the 70J), this results in a frequency response bump (up to 5 dB at the center of the frequency band) between 100 Hz and 600 Hz or so, where the LA and the JE overlap. You will need to drive the system with a unit that has a parametric EQ so you can notch out this bump.

**11B) Can multiple CBT 70JE extension cabinets be used with a single CBT 70J to extend the pattern control to a lower frequency?**

If pattern control ( $\pm 10^\circ$ ) down to below 400 Hz from the 70J/70JE combination is not enough, multiple 70JE's can further extend the height of the column. A 70J with three 70JE extension cabinets controls pattern ( $\pm 10^\circ$ ) down to below 200 Hz. The system will need to be EQ'd to compensate for an overlap bump, for the same reason explained above. Again, the installer is responsible for safely rigging the grouping, as JBL does not provide brackets for non-stock configurations, such as this.