

CREATIVE



Sound Blaster ROAR SR20A White Paper Evolution, Concept and Technology Overview

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Sound Blaster Roar: A Study in Purpose-built Perfection

When it comes to designing the perfect music system -- be it a sound system for the living room, speakers for a mixing studio, or a near-field desktop system -- the most important thing is its musicality.

This means that the speaker is faithful to the original source and reproduces audio where Timbre and Tonality is not altered from the original source in any way. Ultimately *musicality* is not dissecting, nor changing the sound, but a total cohesive presentation that puts every element of the sonic fabric together as it was reproduced originally.

Simply put, a good speaker system – due to its ability to accurately reproduce the original source – enables listeners to achieve *oneness* with the music being played. That in a nutshell is what we have set-out to achieve with the Sound Blaster Roar SR20A.



Main Design Considerations

Through our many years of research in one-piece speaker systems, and countless in-house research projects in our sound laboratories and listening rooms, Creative has identified key usage patterns in the portable speaker category. We have also narrowed down some major pitfalls in the design of today's portable speaker.

Here are our findings:

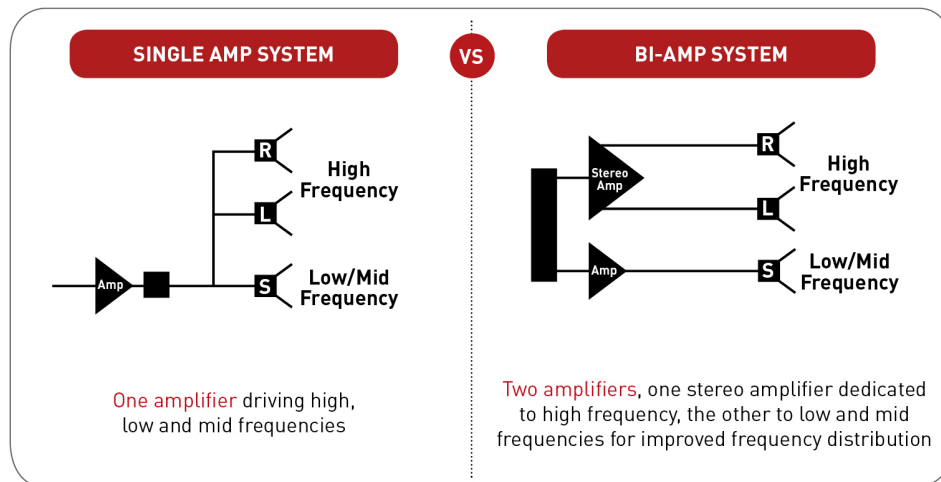
1. Portable speakers are used both 'near-field' (meaning at the desk or on a bed) and 'mid-far field' (when used as a main stereo system in a studio apartment or at a party or on a picnic)
2. Portable speakers are used when the listener is (most of the time) NOT at the acoustical axis, meaning they are either standing up or walking around or using it mostly for ambient or background music.
3. Portable speakers are often used and listened to (played back) at mid to soft volume levels. In this case most designs lack "bass" when played at these levels.
4. Portable speakers are often impulse purchases (via heavy discount, brand hype or for its industrial design), with sound quality being the lowest consideration. Most portables have such poor fidelity; they hardly suffice to provide decent sound for a bedroom.

As a result of these observations, we set out to configure and incorporate the following design elements into a portable speaker that would excel in the portable speaker category:

1. **Bi-Amplified Design -- Two Amps, Not One**

Most portable speakers have a passive radiator -- meaning, it is not powered. With this approach the passive system's single amplifier must reproduce the whole audio spectrum; low frequencies rapidly "use up" the amp's headroom.

As higher frequencies ride along on lower frequency waveforms, they can be distorted even when the high frequencies themselves will not be clipping. Having two amps as opposed to one, the amp is free to drive each speaker to its safe maximum limit and efficiency. It also allows greater power management of high and low frequency. At lower volume playback bass is still evident. System also plays louder without losing too much bass (common in many other portables).



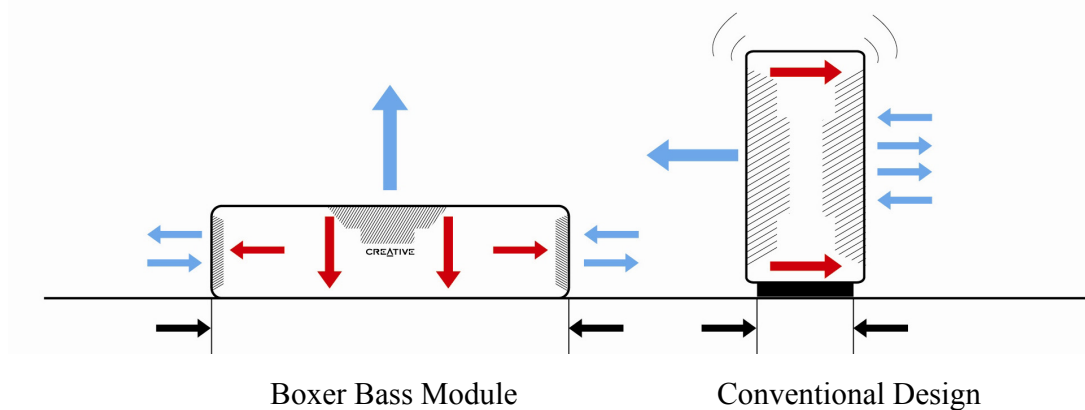
Conventional

vs.

Active or Bi-Amplified

2. 'Boxer-Style' Low Centre of Gravity Design

Unlike top-heavy, front/rear-designed speakers that vibrate and move out of position at high volumes, the Sound Blaster Roar is designed to be remarkably stable with its low centre of gravity.



The dual opposing radiators produces equivalent counter-forces, this symmetry of force prevents the unit from moving during extreme driver excursions.

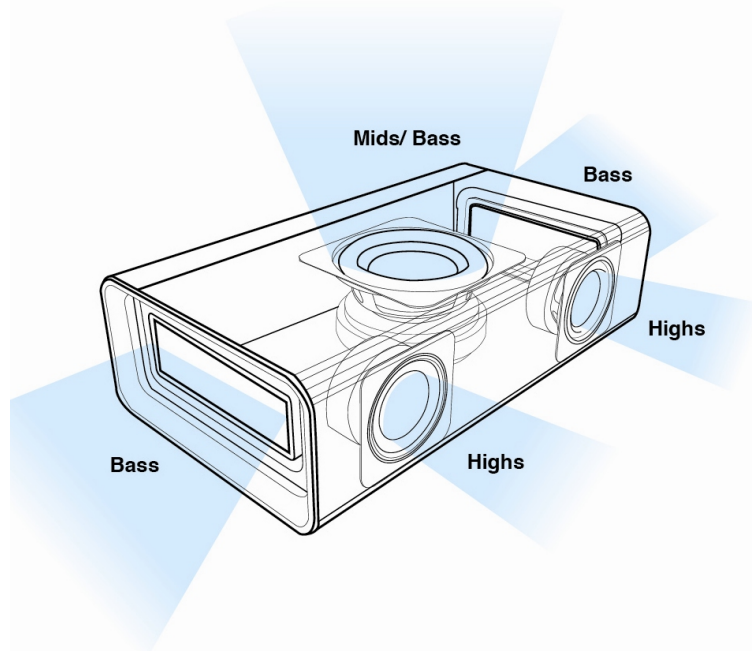
The top firing “active” driver which incidentally also moves the “most” is backed by the base of the unit and by the surface on which the unit is resting. The rear forces of the active driver are then distributed to the dual radiators. This three-action” pistonic approach provides a very stable platform for a bass module.

Conventional active/passive approach has the active driver firing in one direction with passive drivers firing to the rear produces uneven forces. This together with the “top-heavy” and small footprint design causes the speaker system to move. On bass heavy or loud playback the product may tend to “move”.

3. Space-Filling Dispersion

Dispersion which refers to the throw of sound into its acoustic space is a very important factor in reproducing spacious sound for a loudspeaker system. For a one-piece speaker system, it is always a challenge to deliver a convincing “stereo” stage, width, depth and even height of conventional 2-piece speakers. Most one-piece speaker systems tend to sound “boxed-in”, and point-sourced” thereby lacking in stereo width and depth.

With SR20A’s five driver approach, the front left /right drivers disperse frequencies forward, the active bass unit disperses less sweet spot-dependant midrange upwards for height while both side firing radiators deliver “space-filling” bass, this creates a holosonic soundscape enabling improved width, height and depth while preserving the stereo focus.



Components and Supporting Technologies

The Sound Blaster Roar SR20A comes with the following components and technologies that allow the loudspeaker to punch well above its weight in the wireless speaker category:

Far-field Dual Left-Right Channel Satellite Drivers

The Sound Blaster Roar SR20A delivers highly detailed highs. This is due to the inclusion of dual 1.5” high frequency drivers that are made for ‘Far-field’ high-frequency dispersion. These drivers feature a Kapton voice coil former with excellent dielectric properties for improved thermal handling. ‘Far-field’ here refers to the driver’s ability to “throw” sound further than competing portable speaker systems (not on the context of a full blown professional monitor).

Bass/Midbass Driver

The Long-throw 2.5” heavy duty midrange/bass driver – that features rubber surrounds with ideal flex properties -- is used for midbass bass duties for the SR20A.

Bluetooth 3.0

The SR20A features *Bluetooth* 3.0 wireless technology. This has all to do with the new way we live, work and play. *Bluetooth* wireless technology is aimed at allowing users to make effortless and fast connections between various devices.

Bluetooth wireless technology’s adaptive frequency hopping (AFH) capability was designed to reduce interference between wireless technologies sharing the 2.4GHz spectrum. AFH works within the spectrum to take advantage of the available frequency. This is done by detecting other devices in the spectrum and avoiding the frequencies they are using.

Range:

Operating range is typically 10 meters or 30 feet.

Data rates:

Up to 3Mbps.

Also *Bluetooth*’s high adoption rate enables very wide compatibility.

AptX Codec Support

What is aptX? Originally developed for use in the professional audio and broadcasting sectors, aptX is a real-time digital audio data reduction system that compresses linear audio samples by a factor of 4:1 with no perceptible audible degradation and with negligible delay.

Why aptX? To manage the transfer of stereo audio, the *Bluetooth* Special Interest Group (SIG) has ratified a profile known as A2DP (Advanced Audio Distribution Profile).

Bluetooth stipulates maximum available bandwidth for A2DP at 768kbps. So for high quality stereo music, it is necessary to use some form of audio coding to reduce the required data rates.

Take for example, a 16-bit stereo (regarded as entry level for audio systems) with a minimum sample rate of 44.1 kHz to match the venerable audio CD:

Dynamic Range:

16 Bit Digital Audio = $20\log_{10}(2^{16}) = 96.32 \text{ dB}$

20 Bit = 120.4 dB etc....

Taking CD quality as the benchmark, 16-bit, 44.1 kHz has a dynamic range of 96dB.

To achieve this level of dynamic range in bandwidth limited applications, it will be necessary to use at least 16-bit audio as the raw input and then a compression technology that can reproduce virtually all the dynamic range at the output.

Uncompressed audio utilizes a bandwidth of 1.411Mbps for CD quality and for the vast majority of wireless applications, full bandwidth is simply impractical. Issues of design, efficiency, power optimization and error resilience will all put pressure on available data rates.

AptX uses advanced ADPCM principles which encode the entire frequency range of the audio. MP3 uses psychoacoustic techniques, which throw away audio they deem unimportant, SBC reproduces limited audio bandwidth.

So what is the bandwidth of aptX? Here's the breakdown:

CD 16 bit /44.1kHz	20Hz- 22kHz
aptX	20Hz-22kHz
SBC	20Hz-17kHz

AAC Content Support

AAC (Advanced Audio Coding) is the default file format on the iPhone, iPod™ and the iTunes™ software, and for downloads from the Apple iTunes store. The compression scheme it uses is better than that of MP3, and AAC can better render the higher frequencies produced by certain musical instruments and by the human voice. With AAC, you get richer audio.

Sound Tuning or Voicing -- It's All about Sound Quality

Most Portable loudspeakers today are “clones”. Cheap plastic knock-offs that share the same generic design and are re-badged, re-shelled from a common contract manufacturer. So as long as it looks good, nobody cares.

Tuning: From the Sonic Soul of our In House reference systems

Built as a research project, our in-house reference systems are benchmarked to some of the most exotic playback systems. With a key goal of attaining accuracy with musicality, the system is continuously tuned and tweaked for best objective accuracy and subjective “musical” results.

Our high performance Gigaworks T3 and the latest Signature series T4 Wireless lineup shares similar intrinsic tonal characteristics with striking accuracy AND musicality.

Though the SR20A is a portable wireless system, the in-house system serves to provide a guiding “voice”. Smooth tonal balance with detailed vocals, tight rhythmic midbass and full spectral bass

There were multiple iterations before we could get the right tuning for the SR20A.

Catch every word in any music with full warm midrange and detailed tight bass.



HM-8 FRONT VIEW



HM-8 REAR VIEW

In-House reference Powered High resolution Active speaker HM-8

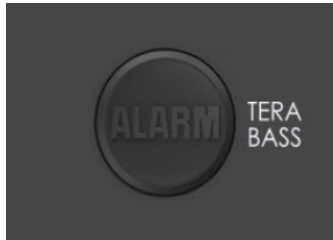


PA-1 FRONT VIEW



PA-1 REAR VIEW

In House reference Pre-Amplifier PA-1



TeraBass

What is it?

TeraBass is a feature that intelligently compensates the loss of perceived loudness in bass during low level playback without artificially over accentuating bass levels. TeraBass processing will intelligently increase the loudness of bass at low to medium levels and this processing will decrease as master volume level increases until near or at maximum output where no processing will be applied.

Why the need for TeraBass?

Because of the dynamic nature of use. Outdoor? Bedroom? Nearfield? Midfield? or simply personal preference.

Like our in-house reference systems, the Roar is tuned to be accurate, balanced, and well defined while delivering full spectral output at maximum levels with minimal or no compression. (NOT common in many battery operated portables).

Like a professional loudspeaker, the SR20A is designed to go low and accurate. Most loudspeakers in this class tend to artificially boost low frequencies making the playback boomy and lacking midrange. Bass from the SR20A is tight, deep and uncolored. Midrange is neutral and full bodied.

The SR20A is designed for use just about anywhere. However, when it is played back at low to medium levels for Eg late night listening, the listener may not perceive bass that well and needs that improved subjective musicality. TeraBass will help add excitement to the playback.

TeraBass will also compensate for the loss in bass when the loudspeaker is placed in-less-than ideal acoustical environments.

Our research has shown that due to these dynamic usage conditions, the need to be able to turn ON and OFF TeraBass is critical.

When do I use TeraBass?

TeraBass is best used when:

- The Roar SR20A is listened to at low to medium volume levels (Eg Near-field use)
- The Roar SR20A is placed in an environment where there is an absence of boundary walls for bass reinforcement. (Eg , Outdoor)
- The Roar SR20A is placed on very dense material like marble or granite or in mid to far field listening conditions. (Eg : Dance Hall, in-door gatherings)

When do I turn off TeraBass?

Unlike many competing designs in the portable segment, which has no option to turn off any bass “enhancement” processing feature, this often ends up with the loudspeaker sounding boomy, and tiring to listen to when placed in a corner.

Do not use TeraBass when:

- The unit is placed in an enclosed environment when there is sufficient bass from boundary walls. (Eg, Bathroom counter top, small bedrooms or dorms)
- When the unit is sounding boomy and having a bloated midrange, this will affect the transparency of the overall playback.

Link Security : LS MODE



There are many ways to maintain Bluetooth connectivity; The Sound Blaster Roar has just about the most comprehensive and versatile Bluetooth connectivity options available for a portable wireless speaker.

Three Options are available. Default (LS2), Friendly (LS1) and Free-For-All (LS OFF).

LS Mode 2 : (Default) Creative Bluetooth Multipoint mode:

Allows you to connect up to 2 Bluetooth devices at the same time while playing music on one device at any one time. Requires music to stop playing for another device to pair or connect.

Great for single user with 2 or less Bluetooth devices who may not want to share the Sound Blaster Roar.

LS Mode 1: "Friendly" access mode:

Allows Bluetooth devices that have been paired to the speaker before to takeover control of the Sound Blaster Roar by simply initiating connect on their Bluetooth device.

Great for single or multiple users with 2 or more Bluetooth devices who may want to wirelessly connect to the Sound Blaster Roar and share music.

LS OFF mode: "Free For All" access mode:

Leaves the Sound Blaster Roar in discoverable mode even with 1 device connected via Bluetooth.

Great for sharing music with a group of friends anywhere, even in the meeting room for discussion and presentation without touching the speaker.

Anyone can take over control of the Sound Blaster Roar instantly.

Note:

- Multipoint is only available in LS mode 2 only.

Other Features

The Sound Blaster Roar also comes with the following other features that enhance its usability

High-Performance Built-In Microphone

The microphone of the SR20A is located right above the Creative badge behind the metal grille. This allows hands-free calls via your smart phone.



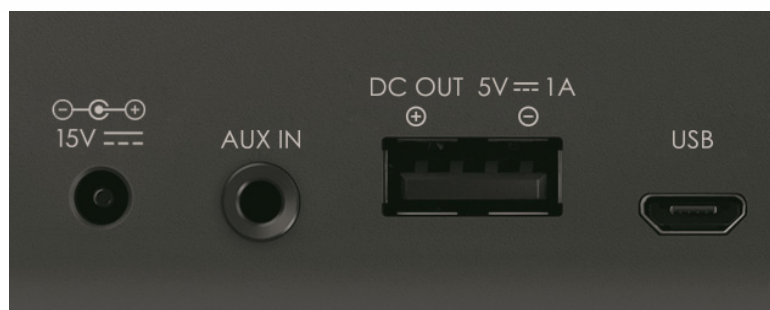
Monocoque Endo-skeletal Chassis

This construction allows for maximum rigidity and stiffness, and translates all created energy into clean audio output. The lack of separate individual parts joined together also means that the speaker chassis doesn't rattle when bass-heavy audio tracks are pumped out at high volume.



Dual-Charge Functionality

The SR20A supports high powered consumer electronics-class 15V DC charging. The built-in dual 3000mAh high capacity battery also charges your smartphone at DC 5V 1A.



Integrated MicroSD WMA and MP3 Player

The Sound Blaster Roar SR20A conveniently features an integrated MicroSD WMA and MP3 Player that allows users to play audio directly from a MicroSD card, so users do not need to always commit their smartphone to play music.

Type of files playable from the inserted SD Card are; MP3, WMA, WAV.

Playback features:

- Repeat Shuffle mode for all music on microSD Card
- Play from last location
- Skip Fwd and back track while playing a track (Press FW/RW button)
- Quick Skip Fwd and back folder when playback is paused
- Recording
 - Record from Bluetooth, Mic, and Line in
- Bedtime mode:
 - Playback volume will gradually reduce to a minimum and playback stop after 15 minute.
 - (Press/hold the REC/Voice Play button while playing a track to activate this function)
- USB Micro SD card reader
 - When connected to PC via USB cable, PC can access the Micro SD card inserted into the Micro SD slot (up to 32GB)
- USB Audio
 - Able to switch between USB SD Card reader and USB Audio mode





NFC (Near-Field Communication)

Located on the top right corner, the SR20A features a NFC receptor; simply establish Bluetooth connection to any NFC-enabled smart device without needing to access setup.

NFC builds upon Radio-Frequency identification systems by allowing two-way communication between endpoints.

Smart devices featuring NFC allows a simple contactless connection (about 3-5cm) to pair and establish a bluetooth connection. This eliminates the needs to access the Bluetooth menu within the smart device. This makes setup and the Bluetooth connection extremely easy.

Manual Pairing is still available by using the Bluetooth button.



ROAR

Useful for parties or where “public address” is required. ROAR “boost” overall loudness and uses the in-built Digital Signal Processor to provide more spaciousness and depth to address a wider audience.

USB Host Audio for access to SoundBlaster control panel.

Connect the SR20A to a PC or Mac and it will function as a host audio device- like a powerful external Sound Blaster. PC users can also utilize the downloadable Sound Blaster Control Panel software to access SBX Pro Studio technologies -- such as SBX Bass and SBX Dialog Plus -- that intelligently enhance PC audio in real time.



MegaStereo Feature

The Sound Blaster Roar SR20A is already a stereo speaker system, with left and right signals routed via the respective left and right high frequency drivers.



Left

Right

(Normal mode, plays respective left and right channels)

MegaStereo mode

An option is provided for 2 Sound Blaster Roars to be connected together with the MegaStereo cable to deliver “MegaStereo” where the left Roar’s high frequency drivers both deliver the left channel and the right Roar’s high frequency drivers both deliver the right channel. This enables for a much wider stereo soundstage one would normally associate with in a typical home stereo system.



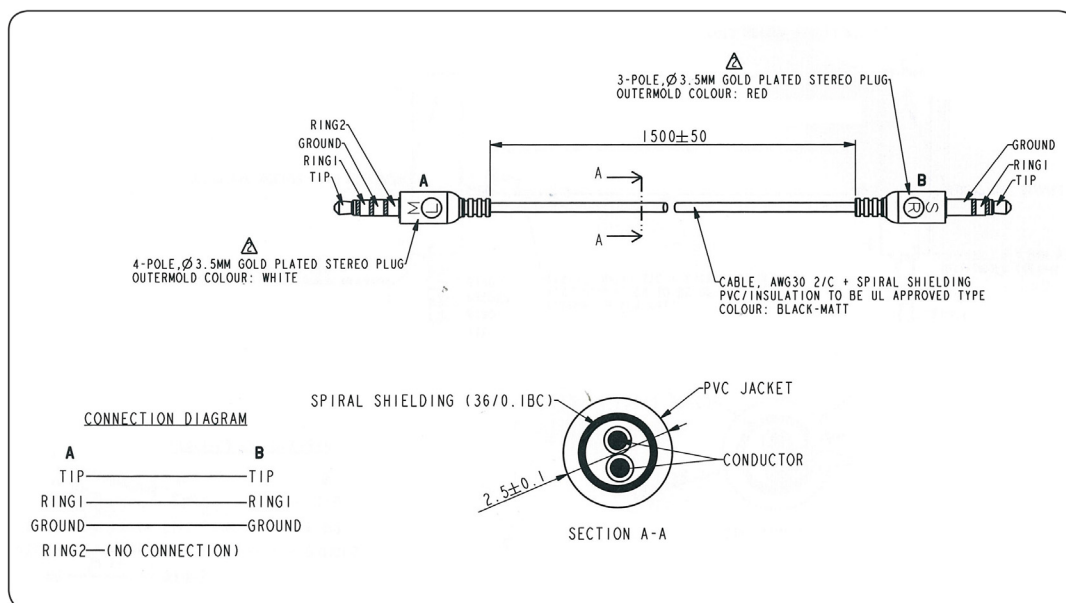
(MegaStereo Mode, where the left loudspeakers delivers the left channel and right loudspeaker delivers the right channel.)

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The following is achieved by inserting the Proprietary MegaStereo's cable white jack (master) to the left Sound Blaster Roar's Auxiliary Input and the red jack (slave) to the right SoundBlaster Roar's Auxillairy Input.

The left (Sound Blaster Roar SR20A) detects the MegaStereo cables' white jack (master) and its built-in processor configures it to play only the left channels on both drivers, configures the Auxiliary socket as an output and sends out the right channel signal to red jack (slave) on the right Sound Blaster Roar to play only the right channels on both drivers.

Below shows a schematic of the Proprietary MegaStereo cable.



3.5mm Analog Aux-in Cable usage

MegaStereo cable also doubles as an Aux-In analog cable. Where the White (Master) 3.5mm jack connects to the source device and the Red (Slave) 3.5mm jack connects to the loudspeaker.



The MegaStereo cable can be purchased separately at Creative.com

Note:

- Aux-in for both speakers are disabled when the MegaStereo cable is connected.
- May not work with audio devices using the OMTP standard.