

## EXTENDED LOW FREQUENCY POWERED SUBWOOFER SYSTEM



### SPECIFICATIONS

**Enclosure:** 3/4" MDF

**Low Frequency Transducer:**  
EL-12P 12" Cone

**Amplifier Output Power:**  
400 Watts continuous sine wave

**INFRA™ Module:**  
Patented 8 Hz dual integrator

**System Type:** 1.5 ft<sup>3</sup> Sealed box

**Driver Nominal Impedance:** 4 Ω

**Input Connectors:** Left, Center, and  
Right channel line level RCA jacks

Left and Right speaker level spring  
terminals

**Hi-Pass Outputs:** Left, Center and Right  
channel line level RCA jacks

12 dB per octave, -6 dB at 95 Hz

**Frequency Response:**  
±3 dB 8 Hz to 95 Hz (2π Steradians)

INFRA™ system -6 dB frequency 95 Hz  
(not adjustable)

**Overload Protection:**  
Preset threshold Dynamic Filter circuitry

**Fuse:** 6.3 Amp GDC time-lag

**Finish:** Black textured paint

**Grille:** Black nylon cloth on frame

**Magnetic Shield:** Low flux leakage

**Dimensions:**  
15.5"h x 18"w x 16"d  
39.4cm x 45.8cm x 40.7cm

**Weight:** 56 lbs. - 25.41 kg

**Shipping Dimensions:**  
22" x 23.5" x 22"  
55.9cm x 59.7cm x 55.9cm

**Shipping Weight:** 66 lbs. - 29.94 kg

### OPERATING INSTRUCTIONS:

If you have a line level source (such as a preamp output, surround processor output, or tape monitor insert points on a receiver), send a full frequency range signal via shielded cables to the RCA jack line level inputs. The INFRASUB will send the Left, Center, and Right channel signals to the built in Hi Pass filters. The line level outputs of the Hi Pass filters are available at the Left, Center and Right channel RCA jacks. Send these signals back, via shielded cables, to the inputs of their corresponding power amplifiers.

You will achieve a higher fidelity sound by connecting your INFRASUB to the full range outputs from your surround sound processor and not the low pass subwoofer output. Set the surround sound processor in the full range Left and Right speaker mode with no subwoofer for this configuration. If this mode is not available, it is ok to connect the INFRASUB to the subwoofer output directly.

If you have a speaker level source (the output of a power amplifier), send a full frequency range signal to the Left and Right spring terminal speaker level inputs. As the impedance of this input is high, it is not necessary to use heavy gauge speaker wire for these connections. We recommend running separate cables in parallel with your normal speaker wires connected either directly to your amplifier outputs or the terminals on your Left and Right speaker enclosures. Please take care to maintain the correct signal polarity by connecting the red or + terminals from your amplifier or speaker to the red speaker level inputs on the INFRASUB. Note that there are no Hi Pass filtered speaker level output signals available. In this configuration, best results will be achieved when using satellite speakers with limited bass response.

The INFRASUB combines the signals from all of the inputs, sends them through the INFRA dual integrator and the built-in 400 Watt power amplifier to the specially designed Bag End EL-12P 12" driver. Use the VOLUME control to match the level of the INFRASUB to your satellite speakers. Use the POLARITY SWITCH, if necessary, to reverse the polarity of the INFRASUB. This can be helpful to achieve a seamless blend between the sound of the INFRASUB and your satellite speakers.

### APPLICATIONS:

**Home Stereo**  
**Home Theater**  
**Project Studio**

### INFRASUB-12 DESCRIPTION:

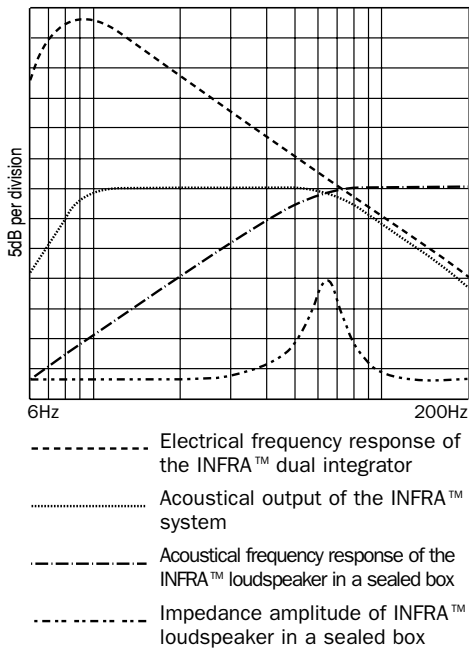
The INFRASUB-12 is a self powered subwoofer system employing a direct radiating 12" cone loudspeaker in a sealed enclosure and a 400 Watt power amplifier mounted to an aluminum plate on the back of the enclosure. The INFRASUB-12 also includes a built-in INFRA dual integrator providing a flat acoustical response down to 8 Hertz, well below the audible range of human hearing.

### INFRA DESCRIPTION:

The INFRA driver is operated below resonance and flattened with an electrical boosting circuit, the INFRA dual integrator. Below resonance the INFRA system exhibits predictable, uniform response and reproduces each note with the same emphasis, reducing the influence of the resonances found in conventional above resonance bass systems. In addition, the use of a low pass filter is eliminated (and with it the associated long variable delay) and replaced with the INFRA dual integrator with its short uniform delay.

Upon close listening, it is clear that the impression of power and impact is greater with an INFRA system when compared to conventional bass systems. This is true even when the two systems will measure the exact same SPL on a calibrated dB meter. This is because the INFRA subwoofer maintains the bass energy in a tight packet, aligned with the upper range signal, providing a greater body impact and a seamless musical connection with the main loudspeakers.

Objectively, the INFRA system meets within the Time-Align® specification and exhibits superior frequency and phase response.



### RESPONSE DOWN TO 8 HERTZ:

The INFRA is a *no compromise* technology with a great degree of flexibility. By extending the frequency response down a full octave below what is considered to be the lowest musical note, low C on a pipe organ (16 Hz), we improve the phase response and reduce the delay throughout the entire audible bass range. This excellent phase response and short signal delay is why, subjectively, the INFRA system is known for its quick, tight and musically connected bass sound throughout the entire bass range, not just the lowest frequencies. With its excellent phase response and extended frequency response, it can more accurately represent the character of the sound being fed into the system than conventional designs and their long signal delays.

### DYNAMIC FILTER:

The Dynamic Filter circuit is a complementary technology to the INFRA dual integrator. It insures that unexpectedly large signals will not overload the system resulting in possible damage or audible distortion. This allows high level operation close to the maximum system capabilities without fear of accidental overload.

The Dynamic Filter circuit dynamically reduces the bass extension to prevent overload. It is inherent in the INFRA design that an overload condition will occur with the lowest notes first, as they require the greatest amount of amplifier power and driver excursion. In an overload condition, the Dynamic Filter circuit will reduce the lowest frequencies to their *maximum safe level*

while not affecting the bass content above the frequency that exceeded the threshold.

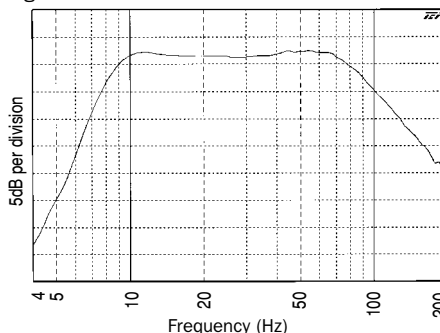
The INFRASUB Dynamic Filter threshold is not user adjustable. It has been factory set to 3 dB below the amplifier overload point. The maximum sine wave output power from the amplifier is 400 Watts. With the Dynamic Filter detector engaged, the maximum sine wave output power is 200 Watts. The full power of 400 Watts or more is reserved and available for short duration impact.

The Dynamic Filter is fundamentally different from the commonly used *limiter* which reduces the level of the entire subwoofer output and is much more audible when engaged. It is more natural not to hear the lowest frequencies and still hear the upper bass unaffected, as often there are sounds in nature without low bass content. It is very noticeable when the entire bass range limits to protect itself. When used in moderation the Dynamic Filter is very subtle and *conceals* the overload condition very well. When the system is turned up too far, the low bass is reduced to the point that only the upper bass is heard. If the user requires this much sound pressure, more amplifiers and speakers are required to achieve the desired level along with the extended low frequency response.

### HOW LOUD AT 8 HERTZ:

While the INFRASUB-12 will reproduce 8 Hz, it is not audible nor does it have enough acoustical power for you to *feel* it. The measurements are taken at close range with sensitive instruments. To achieve a flat response, as shown in figure 1, full amplifier power is used at the lowest frequencies and very little (<1 Watt) in the upper frequency range. The INFRA dual integrator provides the correct signal strength and therefore

Fig. 1



amplifier power at each frequency. As the frequency is lowered, the power and excursion required to maintain a flat acoustical system at high SPL become enormous and not practically attainable

for a single driver system. Fortunately, the improved phase response, one of the main benefits of an extended sub-sonic acoustical response, is preserved because the music content is typically not demanding high power subsonic reproduction.

The ideal listening scenario is to have a full bandwidth 8 Hz playback system and play a good recording without low frequency *noise* present on it. The playback system can then benefit from the improved phase response without requiring excessive power in the lowest octave or engaging the Dynamic Filter circuit.

### SETTING THE BASS LEVEL:

If your application is in a recording studio, you should use professional acoustical measurement instrumentation to set the bass level correctly. For home applications, you can set the INFRA level as desired for your personal taste. You will probably find large variations in the amount of bass energy on various recordings. Until recently, there has not been enough attention to low bass monitoring in the recording studio, post production and mastering process to insure a low noise, uniform low bass response on the recording. With an INFRA subwoofer system, you are able to hear the bass with definition and clarity never before available, making it easier to identify not only the basic level discrepancies, but also the subtleties of the recording environment ambiance and the bass instrument character.

### AMPLIFIER OVERLOAD PROTECTION:

The duty cycle of even the most demanding bass heavy musical material played at full level is below the high temperature protection shut off setting.

Occasionally, when playing a poorly mastered CD with high level sub-sonic noise or when running very dense material highly concealed, the system will self protect and shut off for a short time. If this occurs, turn the level down and/or examine the source material.

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