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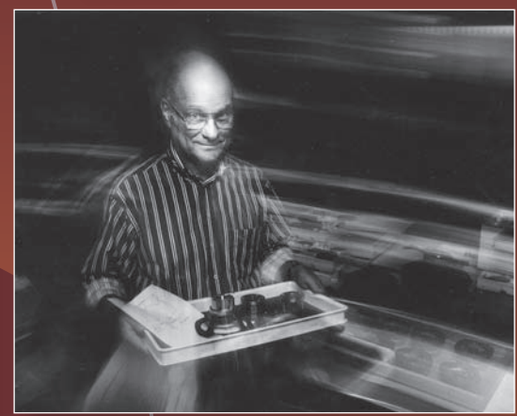
EXOTIC



X1 EXOTIC F8
User's guide

www.seas.no

Thank you for your purchase of the SEAS Exotic F8 full range driver. We are confident that it will provide you with many years of listening pleasure. For best results, we recommend you follow the guidelines below for amplification, enclosure design, and placement.

Your Exotic driver was hand-built by highly skilled SEAS employees, using the highest quality materials available. Prior to leaving our factory, your driver was thoroughly evaluated by a trained laboratory technician, and individually measured in our anechoic chamber. A frequency response graph for your driver is included with this documentation. Please keep it in a safe place for future reference, in the event that service is ever required.

Amplifier recommendation

The Exotic F8 presents a relatively easy load to the power amplifier, allowing a wide variety of designs to be used. A high quality amplifier of moderate power, exhibiting low distortion and noise at very low power levels is highly recommended. Both solid state and vacuum tube amplifiers can be used successfully. When connecting to a vacuum tube amplifier with multiple impedance taps, we recommend using the lowest impedance tap available. For solid-state amplifiers, make sure that the amplifier is stable when driving a 4-ohm loudspeaker load. In some instances, you may experience a slight background noise or hum during quiet passages, or when the music is not playing. This is due to the very high voltage sensitivity of the driver and is not considered a defect. Please consult with the supplier of your amplifier for further details.

Enclosure recommendation

We recommend using a sealed enclosure of approximately 60 litres (2.1 cu.feet) net volume. With no damping material, the resulting resonance frequency and Q should be 56Hz and 0.8 respectively. With suitable damping of the standing waves inside the cabinet, a Butterworth
response with a resonance frequency of approx. 48 Hz may be obtained. Traditional glass fibre insulation material is well suited for damping, but precautions should be taken to avoid health risks. Excellent results may also be obtained with polyester fill, long hair wool, etc.

A bass reflex cabinet will be impractical for most applications, and is not recommended. The cabinet volume would have to be almost 200 litres in order to obtain a good bass response.

Other constructions, such as rear loaded horns, open baffle, etc. may also produce good re-

sults. We encourage experimentation with these designs. However, we urge caution against exceeding the maximum excursion limits of the driver in enclosure designs that do not provide a high degree of rear loading at bass frequencies.

Good quality cables and connectors should be used throughout. For best results, we recommend soldering of the cable connections between the driver terminals and the cabinet connectors.

Listening room and placement

High quality stands should be used to bring the driver height approximately to ear level. Even if your listening room is good and large enough, it is important to determine those positions where the loudspeakers can perform at their best. Placing the cabinets close to the walls or corners will result in more powerful bass, but may also bring about response irregularities in the bass/midrange area. Some experimentation is recommended in order to find cabinet positions that result in a good tonal balance and freedom from coloration.

Pointing the driver axes towards the listening position in a classical stereophonic setup may result in an overly bright tonal balance. A good solution may be to further turn the cabinets so that the driver axes cross slightly in front of the listening position (toe-in). This may result in the desired tonal balance and at the same time a slightly wider listening zone.

Response adjustment

In an acoustically live listening room, it may be desirable to attenuate the high frequency output from the loudspeaker. This can be done very simply, by placing a parallel connection of an inductor and a resistor in series with the driver. Please see the diagram below. A 0.5 mH inductor (L) will start rolling off from approx. 2 kHz. A larger inductor will be effective at a lower frequency. Use a high quality air core inductor with low DC resistance.
The parallel resistor (R) controls the high frequency attenuation. A larger resistance results in more attenuation. Resistors between 1 and 5 Ohms should cover most needs, but other values can be tried without risk of damage. A metal film resistor of 5 watts or higher is recommended.

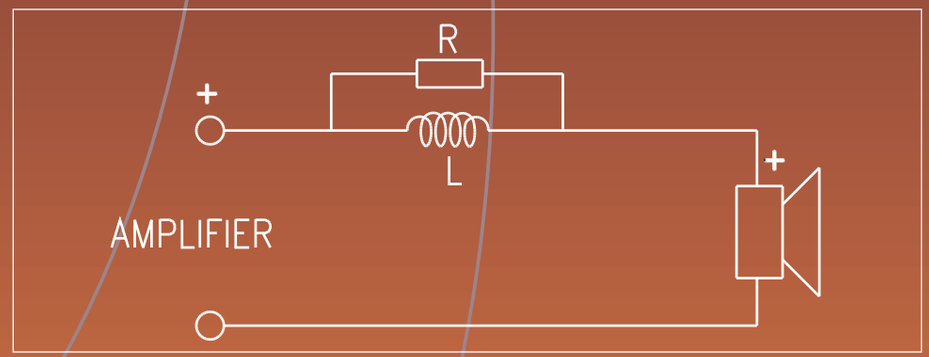
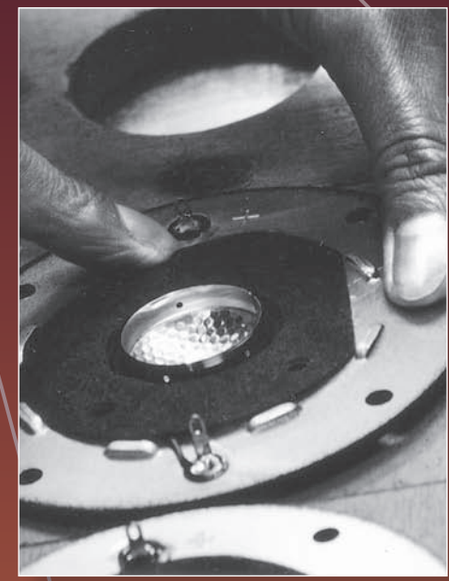


Diagram for response adjustment

Historical background.

SEAS began producing drivers in 1950. The earliest SEAS drivers were “full range” units designed for AM radio receivers, and were based on a paper cone with an integrated corrugated surround and a small Alnico magnet. Because amplifier output power was limited to only a few watts, the sensitivity of these drivers had to be rather high. A very successful driver for SEAS was a 15cm unit with an injection moulded aluminium chassis. It found its way into vast numbers of vacuum tube portable radios that were becoming increasingly popular at the time.

Later, with the start of FM broadcasting, an even wider frequency range was required. To accomplish this with a single driver, a “whizzer” (high frequency) cone was added. As the demand for greater bass output increased, larger cone diameters were introduced. It was not long before SEAS was producing a wide variety of full range drivers, combining high sensitivity and wide bandwidth. 21cm and 25cm were popular sizes, but there was also a range of elliptical (oval) drivers that found use in radio cabinets, extension loudspeakers, and later, TV sets.



The “ Component Hi-Fi era” ushered in higher amplifier power, and with it, the ability to

build more compact loudspeaker systems using multiple drivers. Stereophonic sound followed shortly thereafter, creating even greater demands on cabinet size. Making the cabinets smaller without sacrificing low bass became the main goal, and was made possible by using small, long throw woofers.

The consequence of all of this was a trend towards compact two- or three-way loudspeaker cabinets with an emphasis on good bass. But this resulted in other performance tradeoffs, due to the very low efficiency of such systems. Much of the electrical energy was now being converted into heat, causing temperature variation in the voice coils, and levels as high as 200 degrees centigrade. As the temperature rose, the sensitivity went down, causing dynamic variation in the music. Further, due to the use of multiple drivers, the location of the sound source became more frequency-dependent; leading to confused localization of the stereo image.

In spite of all of this technical development, there are still many music lovers who prefer the sound of vinyl records, tube amplifiers and other equipment that has been declared obsolete in the mass market. They are not convinced that the design goals of modern audio equipment result in sound quality that is closer to the original performance. They will often shun modern loudspeakers that, to their ears, sound slow and congested. Instead, they will search out the second hand market for high efficiency loudspeaker drivers; many of which are more than 50 years old. Full range drivers from brands like Lowther, Philips, Altec, and Western Electric can command very high prices in the second hand market.

As an alternative, designed specifically for these enthusiasts, Seas developed the Exotic F8: a 22cm full range driver based on traditional principles, but designed using the most advanced development tools and materials available. In short, our aim was to develop a high efficiency point source with wide bandwidth, good tonal balance and low distortion. Combined with high quality source components, it results in an effortless, natural sound reproduction, while requiring a minimum of amplifier power.

Design philosophy and construction

- We decided to build an 8-inch driver with a light paper cone containing papyrus fibers, but with a suspension that gives improved performance compared to a traditional corrugated paper surround. The stiffness/weight relationship of the cone paper is optimized for use with a whizzer cone.
- We chose a special surround constructed of foam rubber for low mass and excellent stability. The mechanical impedances of the coil, surround and the cone are closely matched, resulting in a very smooth midrange reproduction.
- To achieve good high frequency output, a light, low inductance voice coil was required. We chose a 26mm diameter, 7.8mm short two layer copper coil combined with a copper shorting cap on the pole tip of the magnet system. A glass fibre voice coil former was chosen, resulting in excellent stability, high frequency transfer, and high mechanical Q.
- A traditional whizzer cone made from a special paper formulation is glued directly into the coil former.
- The spider is a completely new design, made from an acoustically transparent woven fabric and impregnated with a specially formulated resin. This results in a stable and virtually noise free operation. This new generation spider construction also reflects very little sound energy back to the cone, contributing to the extremely clean tonal character of this driver. The construction and size of the spider result in very little softening during use, thus eliminating the need for long break-in procedures.
- The basket is injection moulded from zinc for excellent stiffness and stability. Very large “windows” allow unrestricted airflow and minimal sound reflection.
- The magnet system is based on a heavy Alnico V ring magnet for high sensitivity, excellent stability, and low distortion. The soft steel parts are made from low carbon steel. The effective thickness of the top plate is 12mm, offering the short voice coil a constant force factor and inductance for linear excursions within plus and minus 2.1mm. The pole tip and copper cap extend 3mm outside the top plate, resulting in high symmetry of the force factor and inductance even beyond 2.1mm coil travel.
- The highly flexible lead out wires cause no interference with the cone, as they are jumped directly from the coil former via the outer rim of the spider to the terminal plate. The lead wires are also specially formulated to avoid resonances and ”roping”.