



Pro-Ax Series Model PX-1090



General

Utilizing a loudspeaker consisting of a high frequency compression driver and horn, coaxially mounted to a woofer has been a preferred way to achieve "point source" frequency response. Several manufacturers have seen the merit of this type of system and developed some very impressive studio monitors.

Until recently, co-ax type loudspeakers have not been used for high level professional sound reinforcement. There were several problems. A horn loaded high frequency compression driver is very efficient. Original co-ax designs used paper cone transducers for low frequency reproduction and the woofer portion of this design was always a direct radiator or at best a vented design. A properly designed bass reflex enclosure would give the low frequency device an efficiency rating in the 4% to 5% range at best. In contrast, the high frequency device could easily be 25% efficient in the frequency it covered. The horn loaded high frequency device also has a definite dispersion or polar pattern. While very low frequencies are always omni-directional, a disadvantage of conventional co-ax designs for high output sound reinforcement is that in the crossover region there could be great disparity of dispersion between the low frequency and high frequency devices. Because of the difference of efficiency and dispersion patterns, many sound system designers have abandoned co-ax loudspeakers in favor of multiple horn-loaded transducers (usually vertically arrayed) covering different frequency ranges. While this gives the designer the flexibility of choosing the dispersion pattern for most frequencies, he gives up the point source advantage of the co-ax.

If you want to control dispersion and increase efficiency level of low frequency transducers, you must horn load them. If you want to have a true point source loudspeaker it has to be co-ax. The hard part is using both concepts in a single design.

Dr. Eugene Patronis of the Georgia Institute of Technology has addressed his problem for several years. His early work using the "horn within a horn" included actual loudspeaker designs for several manufacturers and a major motion picture theatre chain.

Dr. Patronis set out to take his initial work a step further. Why not take the idea of co-axially loading the horn within a horn from the ground up? In other words, design the high frequency horn as an integral part of the mid-range horn design. You then could accomplish the advantage of close driver alignments so that point source response would exist. The biggest plus is the fact that you can actually use the high frequency device as a compression loading plug for the cone mid-range transducer.

These design factors make for a very unique loudspeaker. So much so that on April 2, 1991 Dr. Patronis was issued U.S. patent (5,004,067) on his design.

Description

The OAP Audio PX-1090 is a two way, horn loaded coaxial loudspeaker covering the range from 150Hz to 18,000Hz. The PX-1090 utilizes a 10" transducer horn loaded in a 3/4" birch plywood constant dispersion horn. Usable low-frequency response is down to 150Hz for voice applications. Higher crossover points are advisable for very high spl applications when used as a mid-range device for full range music systems. A large format 2" throat driver with a 3" titanium diaphragm compression driver mounted to a constant dispersion fiberglass horn is used for high frequency reproduction.

The horn and driver are encased in a rotation molded poly-carbonate

faring. This faring allows for an aerodynamic transition of mid frequency sound waves from the throat to the mouth of the mid-range horn. The rear housing of the high frequency driver with the faring forms a device that properly compression loads the 10" transducer. This compression loading device (CLD) gives the 10" transducer a compression ratio of 4:1 thus improving the per excursion output capability and high frequency response of the 10" device allowing it to easily reach the 1250Hz crossover point between the 10" and 2" devices. Because of the co-ax design of the system, time delay is not absolutely necessary if a 24db per octave Linkwitz-Riley crossover is used. If delay is desired for perfect time alignment, the OAP XP-2300 controller is available with a time alignment card that provides 1.14 ms of time delay offset between mid and high. A passive crossover network is available as an option when an active crossover is neither available or desirable. The enclosure is trapezoid in shape (15 degree taper) for multiple arraying. The PX-1090 standard color is black texture with gray, white and unfinished available as options.

Applications

The PX-1090 is used when a compact high spl point-source loudspeaker is needed for voice paging or sound reinforcement of mid and high frequencies. It also may be used as a mid-hi section of a music system when used with a low frequency loudspeaker such as the OAP Audio PX-15.

Flying Operation

WARNING!!! Rigging and flying of the PX-1090 should be done by persons familiar with standard rigging practices. If you are not familiar with these practices, please consult the factory, your dealer, the local stage hands union or a rigging supply company in your area.

Two rigging points are available on the top of the enclosure as well as two rigging points available on the bottom. These rigging points consist of a 16 gauge steel plate fastened to the top and bottom panels. These panels are then tied together with 1/4" threaded rod via the steel plates. This type construction eliminates any load bearing from the wooden enclosure and makes flying of multiple PX-1090's in vertical arrays safe. There are two 1/4" 28 thread nuts press fitted into the steel plates. This allows these rigging points to be used with the optional flying hardware kit (FHK). Each FHK consist of one flying hardware plate (FHP) with two screws to secure it to the steel plate, and one flying hardware tie down (FHT). The FHT has a round ring with an internal diameter of 1.12" allowing it to be used with standard rigging hardware. An additional non-reinforced rigging point is available on the rear of the enclosure when raking is needed. You must use a minimum of two FHK's or FIB's (1/4" 28-thread drop-forged I-bolts) to fly the PX-1090.

Warranty

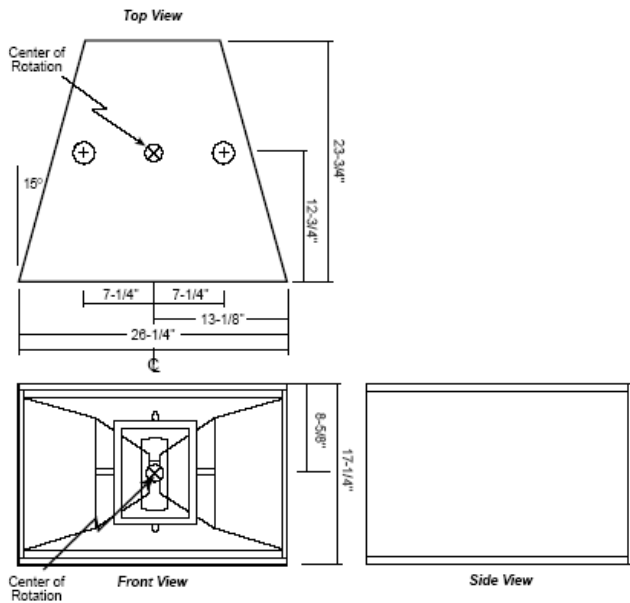
OAP Audio Pro Ax Series loudspeakers are guaranteed against failure due to workmanship and materials for a period of five (5) years from date of purchase and is limited to original purchaser. If such failure does occur, unit will be replaced or repaired (at the discretion of OAP Audio) without charge for labor or materials. Unit must be delivered to OAP Audio or one of its authorized service facilities prepaid. In warranty items will be returned prepaid. Items not covered by warranty includes finish or appearance items, burned coils, or failure due to operation under other than specified conditions. This warranty also does not include any incidental or consequential damages. Repair by other than OAP Audio or an authorized service facility will void this guarantee.

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PX-1090

All dimensions are in inches.



Architectural Specifications

The loudspeaker shall be of the two way co-axial type and trapezoid in shape (15° taper). The loudspeaker shall incorporate a 10" transducer coupled to a 90°x40° constant dispersion horn to reproduce low and midrange frequencies. For high frequencies a large format 2" throat compression driver, couples to a 90°x40° constant dispersion horn shall be used. The high frequency horn and driver shall be housed in a faring and placed in the throat of the 10" horn in such a position and manner that it becomes a compression loading device for the 10" speaker as well as making the loudspeaker system co-axial. The useable frequency response of the system shall be from 150Hz to 18,000Hz. Axial sensitivity of the loudspeaker shall be 100.7db 1 watt at 1 meter average sensitivity using a 24 db per octave active crossover at 1250 Hz. It shall have a power handling capability of 300 watts program power with optional passive crossover. The enclosure shall be constructed of 3/4" birch plywood stiffened internally. All exposed corners shall be rounded for damage resistance. All handles and hardware shall be recessed and integral to the enclosure. Five rigging points shall be provided and fitted with 1/4" 28 thread nuts to be used with aircraft type rigging fittings. The top and bottom of the enclosure shall be 3/4" thick. The top and bottom shall be reinforced with 16 gauge steel plates and connected together with 1/4" threaded rod to facilitate rigging one enclosure to another. The loudspeaker shall be the OAP Audio PX-1090. NOTE: As a research and development corporation, OAP Audio reserves the right to change specifications in order to improve performance.

Specifications

Frequency Response	150 to 18,000 Hz.
Sensitivity	100.7 dB 1 watt@ 1 meter average sensitivity (with active crossover)
Power Handling	2" device: 220 watts program, 10" device: 300 watts program. All components 8 ohm.
10" Device	Cast frame 80oz. magnet with 2.5" voice coil compression loaded to a 90°x40° constant dispersion horn
2" Device	2" throat titanium diaphragm compression driver coupled to a 90°x40° constant dispersion horn
Dimensions	26.5" W x 17.625" H x 23.75" D
Weight	80 lbs.
Trapezoid Taper	15°
Flypoints	Five: 2 on top and 2 on bottom tied together with 1/4" threaded rod. 1 on back non-load bearing
Color	Black texture is standard with white and unfinished optional
Grill	Textile-type grill standard in black, white, pumice, or wheat colors. Black epoxy 16 gauge steel perforated optional.

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