



Pro-Ax Series Model PX-1590



General

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

Until recently, coax 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 coax designs used paper cone transducers for low frequency reproduction. The woofer portion of this design was always a direct radiator or at best vented. 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 can easily be 25% efficient in its range. The horn-loaded high frequency device also has a definite dispersion pattern. While very low frequencies are always omni-directional, a disadvantage of conventional coax designs for high output sound reinforcement is that in the crossover region there may be great disparity of dispersion between the low and high frequency devices. Thus, many designers have abandoned coax loudspeakers in favor of multiple horn loaded transducers (usually vertically arrayed) covering different frequency ranges. This allows choosing the dispersion pattern for most frequencies, but sacrifices the point-source advantage of the coax.

To control dispersion and increase efficiency levels of low frequency transducers, you must horn-load. And for a true point-source loudspeaker - coax. The challenge is using both concepts in a single design.

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

Dr. Patronis has taken his initial work a step further. By coaxial loading he horn within a horn and designing the high frequency horn as an integral part of the mid-range design, he created the advantage of close driver alignments and thus point-source response. The biggest plus is that one actually can use the high frequency device as a compression loading plug for the cone low frequency or mid-range transducer, making for a very unique loudspeaker. So much so that on April 2, 1991 Dr. Patronis was issued a U.S. patent (5,004,067) on his design.

Description

The OAP Audio PX-1590 is a three-way flyable trapezoid speaker system with a 15" vented woofer for low frequencies, and a horn-loaded coaxial loudspeaker covering the range from 250 Hz to 18,000 Hz. The horn-loaded coaxial system utilizes a 10" transducer horn-loaded to a constant dispersion horn for mid-range. A large format, 2" throat, 3" voice coil, titanium diaphragm compression driver mounted to a fiberglass horn is used for high-frequency reproduction.

The horn and driver are encased in a rotation molded poly-carbonate fairing, allowing 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 fairing 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 reach easily the 1250 Hz crossover point between the 10" and 2" devices. A 24 dB per octave passive crossover net-

work is available for use between the 10" and 2" devices. This allows the system to be bi-amp. The enclosure is trapezoid in shape (15° taper) for multiple arraying. The PX-1590's standard color is black texture with gray, white, and unfinished also available.

Applications

The PX-1590 is used when a compact high spl point-source loudspeaker is needed for voice paging or sound reinforcement. The unique coaxial mid-high section allows designers to accurately predict dispersion patterns for more precise coverage of difficult space. Because of the integral flying hardware and trapezoid shape, suspended arrays are applicable.

Flying Operation

WARNING!!! Rigging and flying of the PX-1590 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, as well as two 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 safe the flying of multiple PX-1590s in vertical arrays. In addition, there are two non-load bearing points on the rear of the enclosure for vertical tilt, when needed. There are two 1/4" 28-thread inserts fitted into the steel plates. This allows these rigging points to be used with the optional flying hardware kit (FHK). Each FHK consists 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 simply slides and locks into the FHP and is held in place by a spring load. The FHT has a round ring with an internal diameter of 1.12 inches, 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 FHKs to fly the PX-1590. If single enclosures are being suspended, you can substitute a 1/4" x 28-thread drop forged I-bolt (FIB) for the FHK. These are available through your OAP Audio dealer.

Warranty

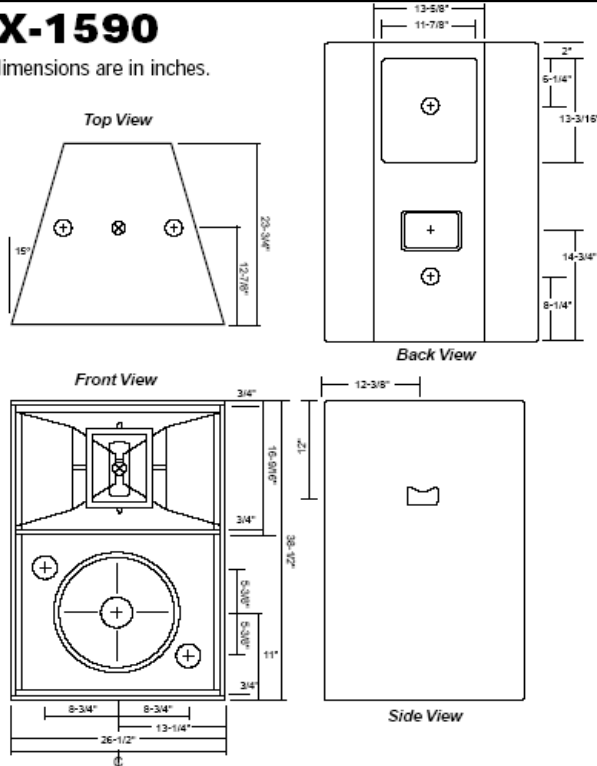
OAP Audio Pro Ax Series loudspeakers are guaranteed against failure due to workmanship and materials for a period of five (5) years from date of purchase and is limited to original purchaser. If such failure does occur, unit will be replaced or repaired (at the discretion of OAP Audio) without charge 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.

Rev. E (05/13)



PX-1590

All dimensions are in inches.



Architectural Specifications

The loudspeaker shall be of the three-way type and trapezoid in shape (15° taper). The loudspeaker shall incorporate a 15" woofer to cover the low-frequency range from 60 Hz to 250 Hz. A 10" transducer coupled to a 90 x 40° constant dispersion horn is utilized to reproduce mid-range frequencies from 250 Hz to 1250 Hz. For high frequencies, a large format 2" throat compression driver, coupled to a 90 x 40° constant dispersion horn shall be used. The high frequency horn and driver shall be housed in a fairing and positioned 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 coaxial. 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 or integral to the enclosure. Six rigging points shall be provided and fitted with 1/4" 28-thread inserts to be used with aircraft type rigging fittings. 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 usable frequency response of the system shall be from 60 Hz to 18,000 Hz. Axial sensitivity of the loudspeaker shall be 108.32 dB, 1 watt at 1 meter averaged from 60 Hz to 8,000 Hz on octave centers. The maximum output of the system shall be 128.98 dB with 300 watts applied to woofer, and 150 watts each applied to the mid and high frequency sections, and averaged from 60 Hz to 8,000 Hz on octave centers. The loudspeaker shall be the OAP Audio PX-1590. NOTE: As a research and development corporation, OAP Audio reserves the right to change specifications in order to improve performance.

Specifications

Frequency Response	60 Hz to 18,000 Hz +3 -6 db
System Sensitivity	108.32 db 1 watt @ 1 meter averaged 60 Hz to 8000 Hz 128.98db at maximum rated input to each transducer averaged 60 Hz to 8,000 Hz.
15" Device	Cast frame with 2.5" voice coil and 96 oz. magnet in a vented closure.
Sensitivity	(60 Hz) – 103 db 1 watt @ 1 meter, 126 db 400 watts @ 1 meter (125 Hz) – 102.5 db 1 watt@ 1 meter, 125.75 db 400 watts @ 1 meter
10" Device	Cast frame 60 oz. magnet with 2" voice coil compression loaded to a 90 x40° constant dispersion horn.
Sensitivity	109.5 db 1 watt@ 1 meter (250 Hz) – 130 db 150 watts @ 1 meter
2" Device	2" throat titanium diaphragm compression driver coupled to a 90 x 40° constant dispersion horn.
2" Device Sensitivity	113 db 1 watt@ 1 meter (1000 Hz) – 132.5 db 150 watts @ 1 meter
Power Handling	2" device: 220 watts program, 10" device: 300 watts program, 15" device: 400 watts program. All components 8 ohm.
Dimensions	26.5" W x 38.5" H x 23.75" D
Weight	145 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.

Rev. E (05/13)