

Passenger Address / Public Address / Siren Systems

PRODUCT DESCRIPTION

The NAT series of Passenger Address, Public Address, and Siren systems are designed for applications in light to medium aircraft. These systems are used to make announcements or commands inside the aircraft cabin or outside the aircraft over distances of up to several miles. The AA20, AA21 and AA22 series of controllers fit a standard Dzus mount and require only 1.125" (25.58 mm) of panel height.

Passenger Address systems are utilized inside the aircraft for advisory information and/or entertainment. The NAT AA20 and AA21 series feature many options such as built in 25 watt amplifier, auto chime, music input, and radio monitoring. Depending on the size of the cabin and the ambient noise levels, the internal amplifier will adequately drive 2 to 10 speakers. For larger or high noise cabins they can interface to an external amplifier for additional output power.

Special mission aircraft, such as airborne law enforcement (ALE), emergency medical service (EMS), and Search & Rescue (SAR) operations often require the use of an external Public Address with siren functions. Optionally, they can be interfaced to one of the aircraft's radios allowing the pilot to broadcast received signals through the external speaker system. This can provide monitoring of the radio while the flight crew is outside the aircraft, or, relaying announcements from a source other than the pilots. The AA21 and AA22 series controllers combined with an external amplifier can deliver 100 to 700 watts of broadcast power offering versatile solutions. Additional power boosters and system augmentation provide the capability for virtually unlimited power.

NAT offers a selection of speaker systems from simple one horn installations to large multi-speaker arrays. Small lightweight speakers such as the TS100WR and TS200WR, provide effective short range broadcast capability while requiring minimal installation provisions. Longer range requirements can utilize the TS92, TS93 and TS94 series. Both speaker systems use NAT's exclusive lightweight drivers for maximum performance with minimal weight penalty.

Choosing a PA system for your aircraft

The size and type of the aircraft, cabin size or desired distance, and dispersal pattern will determine the most effective system for the application. The type of controller, size of the amplifier (watts), plus the type, quantity and configuration of the speakers all need to be identified to ensure the system will meet the performance requirements.

Passenger Address

Cabin passenger address systems utilize the AA20 and AA21 series controllers. These controllers have built in 20-30 watt amplifiers with optional chime generators and music interface for passenger entertainment. The output can be interfaced to an 8 ohm speaker network or up to eight 150 ohm headphones.

Utilizing a speaker network, specify 1 speaker for every 4 passengers with a maximum of 6 feet between speakers. These can be configured either down the middle of the cabin or staggered from side to side to a maximum of 10 speakers. The impedance of the speaker network must be 8 ohms.

Public Address

When determining how much power will be required it is important to know two pieces of information. First, what is the size of the aircraft and its level of generated noise. Second, what is the distance from the aircraft that the PA is expected to deliver intelligible speech. For intelligible speech this typically means a level of 80-90 dB at the target distance.

Based on a typical target distance of 500 feet, small helicopters such as a Robinson R22 and Schweitzer 300 would specify a 100 to 250 watt system. Light helicopters such as B206, B407, and MD500 would use a 250 to 400 watt system. Medium helicopters such as B212, BK117, BO105, EC135 and B412's should be fitted with 700-850 watt systems to compensate for increased noise and rotor-wash.

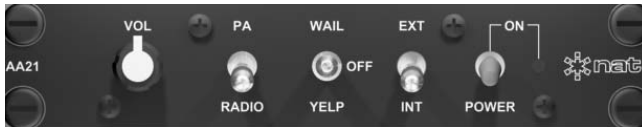
The PA700 system is well suited for larger airframes which generate high noise and/or large amounts of rotor wash. When used with multiple speaker arrays, this system provides sufficient power to deliver intelligible speech up to 1000 feet with a high flexibility in dispersal patterns. The addition of a VR33-002, 28 - 33 VDC voltage converter, boosts the PA700 to 850 watts.

Speakers should be selected to match the audio power available from the PA system and the aircraft speaker mounting options. In many cases, this will be specific and unique to the mission configuration of the aircraft. The general requirement is to have a minimum of one speaker driver for each 100 Watts of audio power.

Figure 1 Examples of dB Levels

Source of Sound	dB
Rocket engine	180
Nearby jet airplane	150
Jackhammer (threshold of pain)	130
Siren, Rock concert	120
Subway, Lawn mower	100
Busy traffic	80
Vacuum cleaner	70
Normal conversation	50
Mosquito buzzing	40
Whisper	30
Rustling Leaves	10
Threshold of hearing	0

AA20 / AA21 / AA22 PA / Siren Controllers



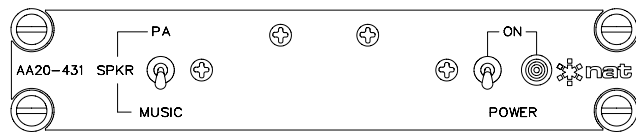
AA21-400

The AA2X series of PA/Siren controllers are compact 1.125" Dzus mounted units for internal Passenger Address systems and external Public Address/Siren systems. Model features can include remote and panel mounted keying, front panel power switch and LED, and, high and low level inputs.

The AA20-431 is a self-contained PA controller with a medium output power amplifier (25-30 W). It features auto-chime plus both speaker and phone outputs. The AA21 series controllers offer the flexibility of both internal and external PA and/or Siren control. A self-contained 35 watt amplifier provides excellent Passenger Address capabilities or ramp hailer. Additional Control lines are provided to interface with any NAT PA amplifiers for high output PA/Siren. The AA22 series of PA/Siren controllers are for use with the PA110, PA220, PA250 and PA700 amplifiers. **Note: The AA20-431 and AA21-400 are TSO certified.**

MODEL	DESCRIPTION
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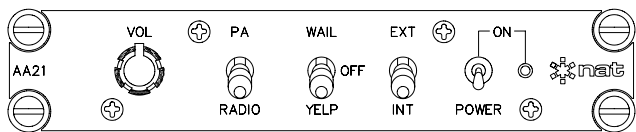
AA20-431	Internal Cabin Paging
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(Refer to Outline Drawing No. 4-1)

3 Tone chime, Mode select, PA/Music, 30 W output into 8 ohm, 80 mW max. into 600 ohm, PA/Seatbelt/No Smoking keys-active low, Message key-active high, Supports up to 8 headsets.
 Weight: 1.3 lb / 0.61 kg
 Power: 2.0 A / 28 VDC
TSO C50c Compliance: (Applicable to units s/n 2000 and above)
 RTCA DO-170 Class II DO-160C
 Env. Cat. C4- BA[MN]XXXXXXABABBTBXXX
 Install Kit: AA35-IKC-1 (Crimp)

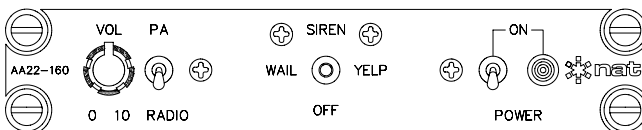
AA21-400	Int/Ext PA Controller
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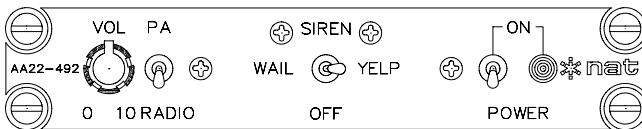
(Refer to Outline Drawing No. 4-1)

Mode select, PA/Music, 35 W max. output into 8 ohm. 6.5 Vrms max. into 600 ohm, PA key - active low. PA110/PA220/PA250/PA700 outputs.
 Radio input 2.5 Vrms into 1k ohm.
 Weight: 1.4 lb / 0.64 kg
 Power: 2.3 A / 28 VDC (Internal Amp)
 0.4 A / 28 VDC (External Amp)
TSO C50c Compliance: (Applicable to units Serial # 1200 and above)
 RTCA DO-170 Class II DO-160D
 Env. Cat. B4-BAB[(SBM)(UF)]XXXXXXZBABB[TTX]MXXXX
 Install Kit: AA21-400-IKC (Crimp)

AA22-160/163	PA Controller
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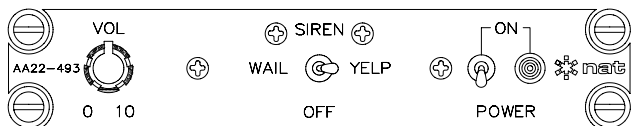


AA22-492/497/592/594 Police/SAR	
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Wail/Yelp swept siren, adj. rate/tone, Mode select, PA/Radio monitor, Siren override at all times. Can be selected as a radio with keyline serving as siren key. Used with PA110 / PA220 series.
AA22-163 has locking PA/Radio switch.
Note: Custom variants available. Contact factory for details.

AA22-493	Police/SAR
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Wail/Yelp swept siren, adj. rate/tone.
 Mode select, PA/Radio monitor.
 Low Z low level output (floating).
 Siren override at all times.
 Used with PA250 and PA700 series.
 Can be selected as a radio with keyline serving as siren key.
AA22-497 same as AA22-492 with 28 VDC NVIS Green B lighting.
AA22-592 same as AA22-492 with 5 VDC lighting.
AA22-594 same as AA22-492 with 5 VDC NVG lighting.

AA22-XXX	
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(Refer to Outline Drawing No. 4-1)

Weight: 1.0 lb / 0.45 kg
 Power: 0.2 A / 28 VDC
 Install Kit: AA20-IKC (Crimp)

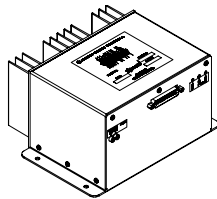
PA110 / 220 / 250 / 700 Power Amplifiers

MODEL

DESCRIPTION

PA110-015

110 W Power Amplifier



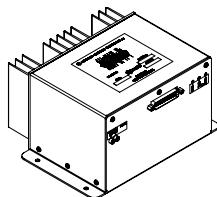
(Refer to Outline Drawing No. 4-3)

High and low level inputs.
Remote power keying.
Power and level indicator.
Local level adjustment.
Used with AA21 and AA22 controllers.
Weight: 4.6 lb / 2.1 kg
Power: 5.0 A / 28 VDC

Install Kit: PA110-IKS (Solder)

PA220-010

220 W Power Amplifier



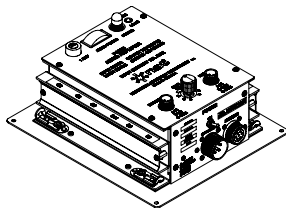
(Refer to Outline Drawing No. 4-3)

High and low level inputs and optional audio key input.
Remote power keying. Dual level indicators and adjustments.
Dual 110 W outputs w/individual control and fusing for full redundancy. Mechanically interchangeable with PA110-015 (different interconnect). Used with AA21 and AA22 controllers.
Weight: 7.75 lb / 3.52 kg
Power: 10.0 A / 28 VDC

Install Kit: PA220-IKS (Solder)

PA250-001

250 W Power Amplifier



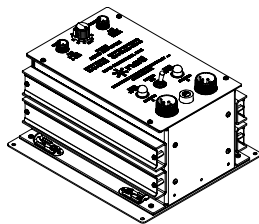
(Refer to Outline Drawing No. 4-4)

Up to 250 W @ 28 VDC.
Up to 450 W @ 36 VDC.
Load Impedance 1.75 Ohms.
Freq Response 500 - 5000 Hz.
Power indicator, variable gain control.
Use AA21, AA22-49X or AA22-59X controllers
Weight: 6.2 lb / 2.8 kg
Power: 15 A max / 28 VDC into 175 ohms
18 A max / 36 VDC into 1.75 ohms

Install Kit: See below.

PA700-001

700 W Power Amplifier



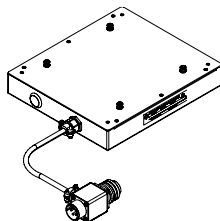
(Refer to Outline Drawing No. 4-5)

Up to 700 W / 28 VDC.
Up to 900 W / 36 VDC.
Load Impedance 1.75 Ohms.
Freq Response 500 - 5000 Hz.
Power indicator, variable gain control.
Use AA21, AA22-49X or AA22-59X controllers.
Weight: 9.25 lb / 4.2 kg
Power: 35 A max / 28 VDC into 1.4 ohms
40 A max / 33 VDC into 1.4 ohms

Install Kit: See below.

VR33-001/002

Power Converter



(Refer to Outline Drawing No. 4-6)

28 - 33 VDC Voltage converter.
Installs directly beneath Amplifier with no additional installation materials required.
VR33-001 boosts PA250 to 400 watts.
Weight: 3.0 lb / 1.4 kg
Power: 5 A / 28 VDC + amplifier current
VR33-002 boosts PA700 to 850 watts.
Weight: 4.2 lb / 1.9 kg
Power: 10 A / 28 VDC + amplifier current

Install Kit: N/A

Installation Kits

Power/Speaker:	PAPWR-IKS	or	PAPWR-IKSR, 90° Backshell	(2 required for PA700)
Rec. Input:	PAREC-IKS	or	PAREC-IKSR, 90° Backshell	(required with AA21 & AA22)
Mic Input:	PAMIC-IKS	or	PAMIC-IKSR, 90° Backshell	(non-aviation applications)
Remote Input:	PAREM-IKS	or	PAREM-IKSR, 90° Backshell	(non-aviation applications)

Speakers



TS100WR

The TS100 and TS200 series of compact loud speakers can be utilized for both internal and external aircraft applications.

The TS100WR and TS200WR offer full 100 and 200 watt capability in a weight reduced package. The driver assembly and mechanical parts are field replaceable for ease of maintenance.

The TS100RA provides a right angle directional output for installations where a standard speaker is not practicable.

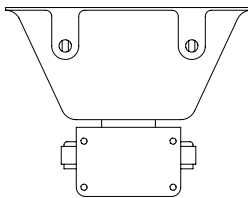
The BP100 offers an even more compact format for tight installation situations.

MODEL

DESCRIPTION

TS100WR

Weight Reduced 100 Watt Speaker

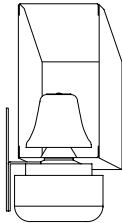


11 ohm/100 watt horn speaker.
All parts are field replaceable.
Weight: 3.85 lb / 1.8 kg max

(Refer to Outline Drawing No. 4-7)

TS100RA

Right Angle 100 Watt Speaker

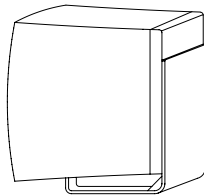


11 ohm/100 watt horn speaker.
Right angle flush mounting speaker.
Used for concealed internal mounting.
All parts are field replaceable.
Weight: 7.0 lb / 3.2 kg max

(Refer to Outline Drawing No. 4-8)

BP100

Small Profile 100 Watt Speaker

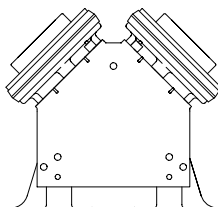


11 ohm/100 watt horn speaker.
For use with PA110/PA220 amplifiers.
Ruggedized aluminum housing.
Small mechanical profile.
Weight: 12.5 lb / 5.7 kg max

(Refer to Outline Drawing No. 4-9)

TS200WR

Weight Reduced 200 Watt Speaker



Dual 11 ohm/100 watt drivers
with single horn speaker.
Effective 200 watt radiated power.
All parts are field replaceable.
Weight: 6.6 lb / 3.0 kg max

(Refer to Outline Drawing No. 4-10)

Speakers



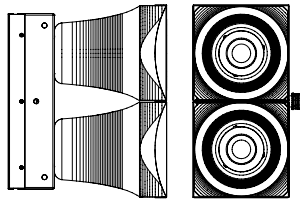
TS92-04XX

The TS92, TS93 and TS94 external speakers are used with the PA250 and PA700 series amplifiers. Available in multiples of two bells, this series of speakers allows the ability to vary the range and/or dispersal pattern depending on the mounting configurations. The driver assembly and mechanical parts are field replaceable for ease of maintenance.

MODEL

TS92-02XX

2 Bell Speaker Array



(Refer to Outline Drawing No. 4-11)

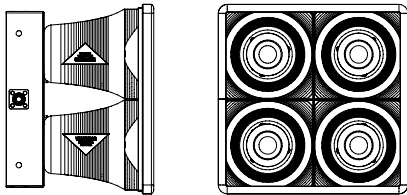
DESCRIPTION

For use with PA250 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 11.0 lb / 5 kg max

Install Kits: TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

TS92-04XX

4 Bell Speaker Array

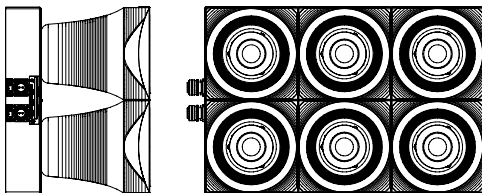


For use with PA250/PA700 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 20.0 lb / 9.1 kg max

Install Kits: TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

TS92-06XX

6 Bell Speaker Array

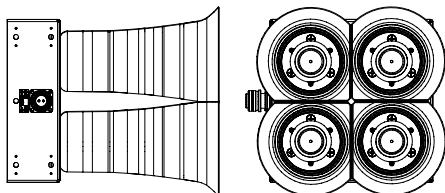


For use with PA700 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 27.0 lb / 12.3 kg max

Install Kits: 2 x TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

TS93-04XX

4 Bell Cloverleaf Speaker Array



For use with PA250/PA700 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 16.0 lb / 7.2 kg max

(Refer to Outline Drawing No. 4-12)

Install Kits: TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

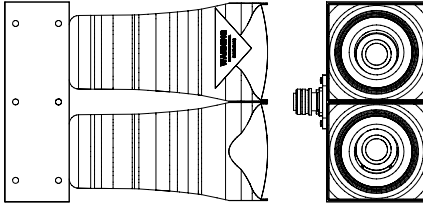
Speakers

MODEL

DESCRIPTION

TS94-02XX

2 Bell Mini Speaker Array

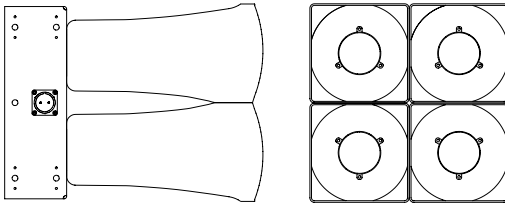


For use with PA250 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 8.5 lb / 3.9 kg max

Install Kits: TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

TS94-04XX

4 Bell Mini Speaker Array

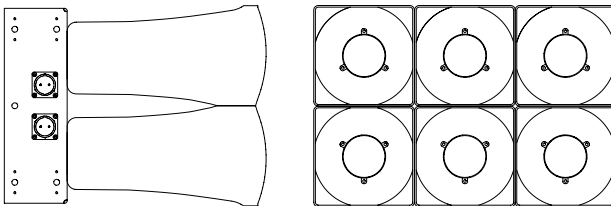


For use with PA250/PA700 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 16.0 lb / 7.2 kg max

Install Kits: TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

TS94-06XX

6 Bell Mini Speaker Array

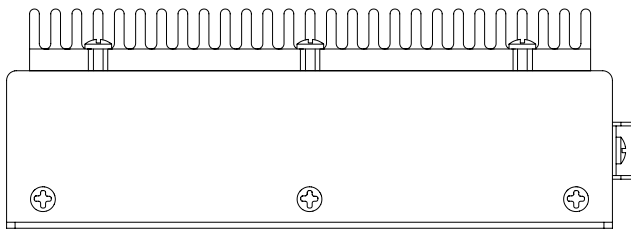


For use with PA700 amplifiers.
High efficient Ferrofluid filled lightweight drivers.
All parts are field replaceable.
Ruggedized aluminum housing.
Weight: 24.0 lb / 10.8 kg est.

Install Kits: 2 x TS90-IKS (Solder) / TS90-IKSR (Solder, 90°)

AA23-001

Speaker Amplifier



Mic (.25 V), Line (.45 V) or H/S (7.75 V) inputs, Muted or partially muted outputs, Adjustable gain, Dual PTT key logic in/outputs, Selectable frequency response, voice or music.
Output Performance: 3.2 ohm: 9.0 W < 0.6% distortion.
4.0 ohm: 7.5 W < 0.6% distortion.
8.0 ohm: 4.5 W < 0.5% distortion.
16 ohm: 2.5 W < 0.3% distortion.

Weight: 0.75 lb / 0.38 kg
Power: 1.0 A / 28 VDC

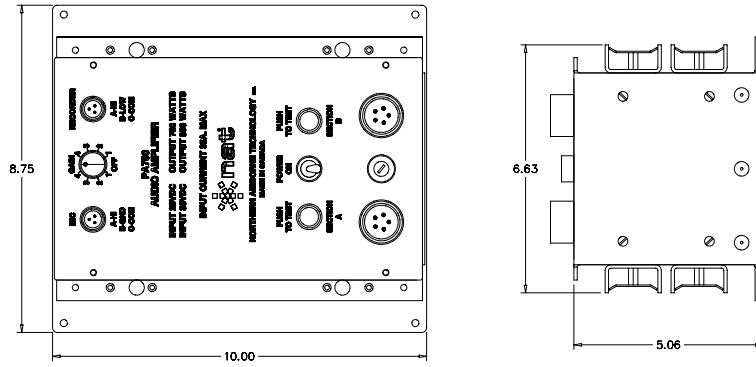
(Refer to Outline Drawing No. 4-2)

Install Kit: AA23-IKC (Crimp)

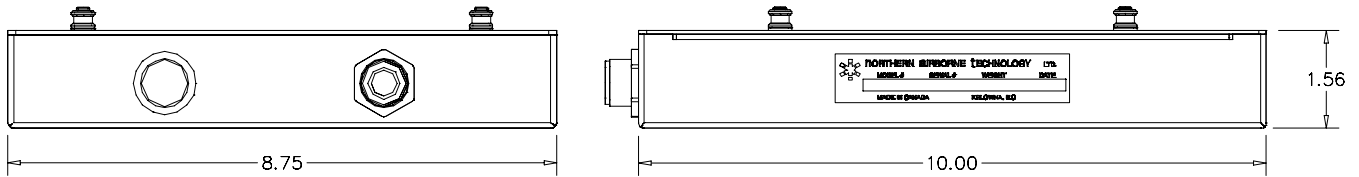
Note: The AA23-001 speaker amplifier can be used to drive either an 8 ohm speaker network or an array of headsets at a 100% duty cycle. It features floating inputs and extensive DC filtering.

Outline Drawings - PA Systems

No. 4-5

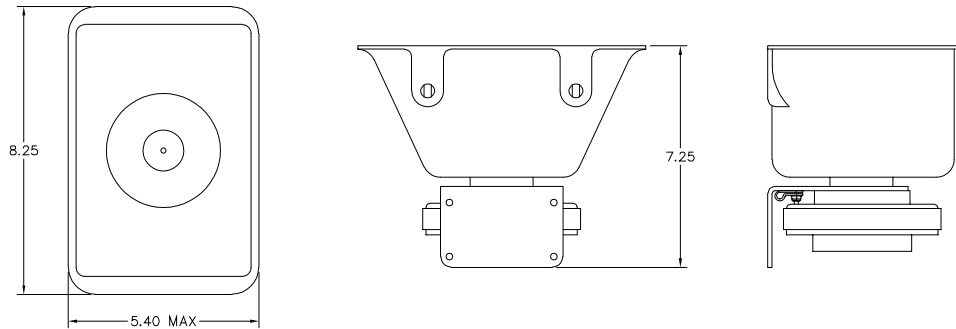


No. 4-6

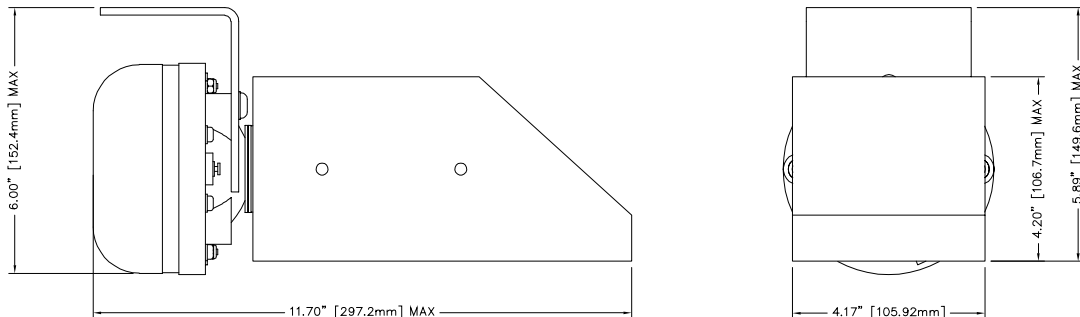


Section 4

No. 4-7

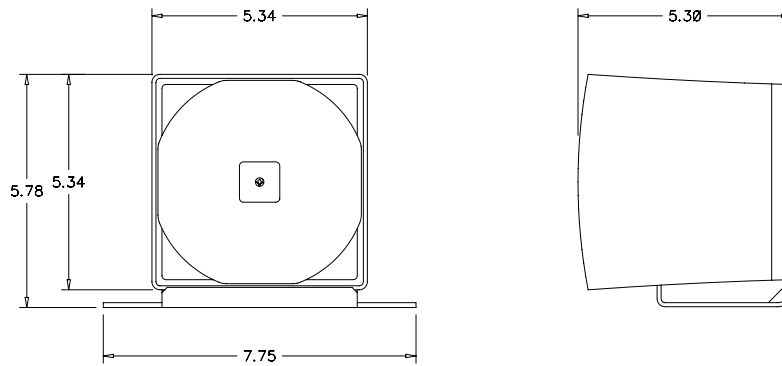


No. 4-8

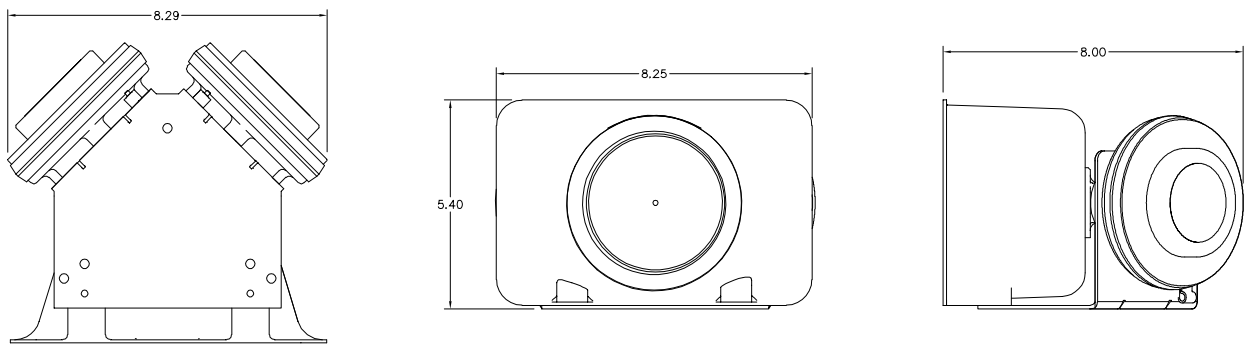


Outline Drawings - PA Systems

No. 4-9

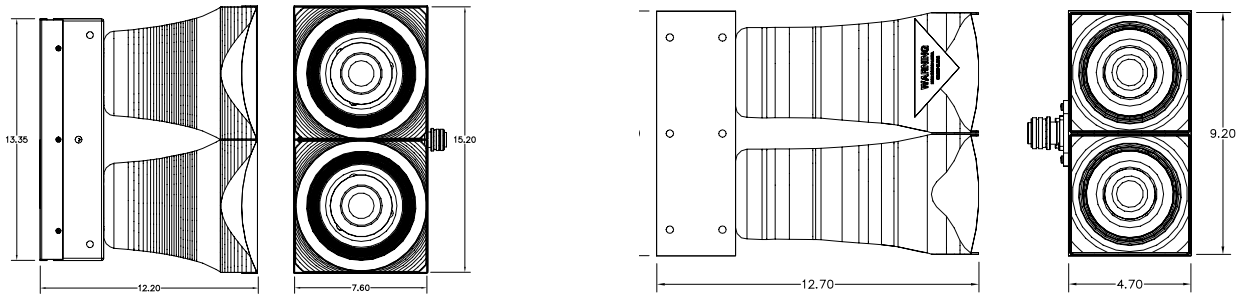


No. 4-10



No. 4-11

No. 4-13



No. 4-12

