

# **AVIOM<sup>®</sup>**

## ***AN-16/o*** *A-Net Output Module*

## **User Guide**

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9310 1022 0001F rev 2.00  
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**PRO**  
**16<sup>®</sup>**



## Certifications

ETL/cETL Listed

EMC: EN 55013, EN 55020, SAA AS/NZS 1053

Conforms to: IEC 60065, EN 60065, UL 6500-2001

Certified to: CAN/CSA E60065, KET1

RoHS Status: Pb-free



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# READ THIS FIRST

## Important Safety Instructions



1. Read these instructions.
2. Keep these instructions
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean only with a dry cloth.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or third prong are provided for your safety. If the provided plug does not fit your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched, particularly at plugs, convenience receptacles, and the point where they exit the apparatus.



11. Only use attachments/accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/apparatus combination to avoid injury from tip-over.
13. Unplug this apparatus during lightning storms or when unused for long periods of time.
14. Refer all servicing to qualified personnel. Servicing is required when the apparatus has been damaged in any way, such as when the power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. No on/off power switches are included in the system. The external power supply should be used to control power to an Aviom device. This power supply should remain readily operable.
16. The solid line over dashed line symbol (  ) indicates that the input voltage must be a DC voltage.
17. The box within a box symbol (  ) indicates that the external power supply is double insulated.



## WARNING!



TO REDUCE THE DANGER OF ELECTRICAL SHOCK DO NOT REMOVE COVERS.

NO USER SERVICEABLE PARTS INSIDE

REFER SERVICING TO QUALIFIED SERVICE PERSONNEL ONLY

To reduce the risk of fire or electrical shock, do not expose this product to rain or other types of moisture.

To avoid the hazard of electrical shock, do not handle the power cord with wet hands.

Replace fuse with same type and rating.

Operating Temperature: 10°C to 50°C (50°F to 122°F)

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Risque de choc électrique – ne pas ouvrir. Pour réduire le risque de feu ou de choc électrique, ne pas exposer cet équipement à la pluie ou la moisissure. Pour réduire le risque de choc électrique, ne pas retirer le couvercle. Pièces non remplaçables par l'utilisateur. Confier la réparation à une personne qualifiée. Attention – utiliser seulement un fusible de rechange de même type.

Cet appareil est conforme à la section 15 de la norme FCC. Son fonctionnement est soumis aux conditions suivantes : (1) cet équipement ne doit pas causer des interférences nocives, et (2) cet équipement doit accepter toute interférence captée incluant les interférences pouvant causer des opérations indésirables.

Cet appareil numérique de Classe B est conforme à la norme NMB-003 du Canada.

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### CAUTION:

- Using any audio system at high volume levels can cause permanent damage to your hearing.
- Set your system volume as low as possible.
- Avoid prolonged exposure to excessive sound pressure levels.

### IMPORTANT:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Changes or modifications to the product not expressly approved by Aviom, Inc. could void the user's FCC authority to operate the equipment.

## Aviom, Inc. Limited Warranty

Aviom, Inc. warrants this product against defects in materials and workmanship for a period of **one year** from the date of the original retail purchase.

This warranty does not apply if the equipment has been damaged due to misuse, abuse, accident, or problems with electrical power. The warranty also does not apply if the product has been modified in any way, or if the product serial number has been damaged, modified, or removed.

If a defect is discovered, first write or call Aviom, Inc. to obtain a Return Authorization number. No service will be performed on any product returned without prior authorization. Aviom, Inc. will, at its option, repair or replace the product at no charge to you. The product must be returned during the warranty period, with transportation charges prepaid to Aviom, Inc., 1157 Phoenixville Pike, Suite 201, West Chester, PA 19380. You must use the product's original packing materials for shipment. Shipments should be insured for the value of the product. Include your name, address, phone number, description of the problem, and copy of the original bill of sale with the shipment. The Return Authorization number should be written on the outside of the box.

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# Warranty Information

Please record the following information for future reference:

Your Authorized Aviom Dealer:

Name: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Phone: \_\_\_\_\_

Serial Numbers of Your Aviom Products: \_\_\_\_\_

\_\_\_\_\_

Date of Purchase: \_\_\_\_\_

Your Authorized Aviom Dealer is your primary source for service and support. The information recorded above will be helpful in communicating with your Authorized Aviom Dealer should you need to contact Aviom Customer Service. If you have any questions concerning the use of this unit, please contact your Authorized Aviom Dealer first. For additional technical support, or to find the name of the nearest Authorized Aviom Repair Station, check the Aviom web site at [www.aviom.com](http://www.aviom.com).

To fulfill warranty requirements, your Aviom product should be serviced only at an authorized Aviom service center. The Aviom serial number label must appear on the outside of the unit, or the Aviom warranty is void.

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# Welcome

Thank you for purchasing the **Aviom AN-16/o Output Module**. This User Guide is designed to familiarize you with your new product and to have your Pro16® system up and running in no time.

## Features

The AN-16/o is part of Aviom's Pro16® Series of products; it can be combined with other Pro16 devices to create digital snakes, audio distribution systems, and monitor systems for applications such as live performance, broadcast, and recording.

### AN-16/o Output Module Features:

- Sixteen balanced line level outputs
- Adjustable output level switches per channel pair
- Signal and Peak LEDs on each channel
- A-Net In, Out, and Expansion jacks
- 1U-high rack-mountable enclosure
- Two D-Sub DB25 multipin audio output connections, each carrying eight channels of balanced audio data

## Conventions Used in this Document

### AN-Series

The AN-16/o Output Module, AN-16/i-M Mic Input Module, and AN-16/i Input Module are referred to generically as the **AN-Series** of products.

When describing audio network configurations, the AN-16/i-M Mic Input Module and most Pro16 console cards can be substituted anywhere the AN-16/i is used.

### Using Personal Mixers

It is possible to create an audio distribution and personal monitor system using any combination of Aviom AN-Series and Personal Mixer products, including the A-16II, and A-16R.

When referring to the use of the personal mixers in system in general, the terms **A-16II Mixer** or **Personal Mixer** are used to describe a case where a standard A-16II Personal Mixer or a rack mounted A-16R Personal Mixer (with/

without the optional A-16CS Control Surface) can be used.

### **Cat-5 Cables**

In most cases Cat-5e and Cat-6 cables can be interchanged. When speaking about interconnections between components in a system, the term *Cat-5* is used generically to indicate the use of any of the applicable cable types.

### **A-Net Distributors**

The A-16D and A-16D Pro A-Net Distributors are referred to generically as *A-Net Distributors*.

# Package Contents

The AN-16/o Output Module box includes:

- One AN-16/o Output Module
- One DC Power supply for the AN-16/o
- Documentation

Options for your system include:

- Cat-5e interconnect cables
- The AN-16SBR System Bridge
- Aviom Personal Mixer products such as the A-16II Personal Mixer or A-16R rack mount Personal Mixer for creating a monitoring system
- A-16D and/or A-16D Pro A-Net Distributors

Also included with the system is a Warranty Registration, found within this User Guide. Be sure to fill out the form and return it to Aviom, Inc. via mail or fax as soon as possible.

## About A-Net

The Pro16® version of A-Net® is a high-speed data transmission protocol capable of sending and receiving high-quality digital audio using readily available Cat-5 cables. A-Net is a proprietary technology developed by Aviom.



A-Net is based on the physical layer of Ethernet, a Local Area Network (or LAN) technology. This provides A-Net with a mature and robust base on which to build. However, it is important to note that A-Net devices are not compatible with Ethernet devices.

As used in the Pro16 series products, the A-Net signal carries sixteen channels of digital data from the Pro16 input module (AN-16/i, AN-16/i-M, or console card) to each A-Net device connected to the system.

Some of the benefits of using A-Net to transmit digital audio are:

- Virtually no latency
- No ground loops
- Easy cabling using readily available components
- An unlimited number of A-Net devices can be used in a system

- Ease in spanning long distances between system components
- ✓ **NOTE:** While the Cat-5e cables and connectors used on your Aviom products look like typical computer Ethernet network connections, do not connect computers, routers, or other home and business networking equipment to your Aviom products.

## Compatibility with Pro64

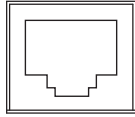
Many Pro16 products can be connected to a Pro64® A-Net system with the addition of the ASI A-Net Systems Interface. The ASI translates Pro64 A-Net data into Pro16 data and separates the 64-channel Pro64 stream into up to four 16-channel Pro16 outputs, depending on the Pro64 sample rate being used.

Only Pro16 devices that have an A-Net In port such as Personal Mixers, A-Net Distributors, and output modules are compatible with Pro64 and the ASI. Pro16 input modules and console cards cannot send their data into a Pro64 network.

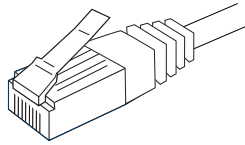
## What is Category 5?

Category 5 (sometimes referred to as *Cat-5*) describes a commonly used type of high performance network cabling. It is used mainly for data transmission purposes to connect computers, modems and other devices. A standard Category 5 patch cable consists of four twisted pairs of copper wire terminated by RJ45 male connectors. The cable assembly is used to provide connectivity between any two Category 5 female outlet jacks. A variation, called Category 5e (or *Cat-5e*), uses additional twists in the cable to reduce interference in high-speed network applications. In general, when using long cable lengths, select *Cat-5e* cables for best performance. **Use Cat-5e Unshielded Twisted Pair (UTP) cables or better for all A-Net applications.**

The RJ45 connector looks similar to the connectors found on a telephone system, only larger. The twisting of the wire pairs helps to shield the cable from unwanted interference from electrical fields or radio interference (sometimes referred to as “RF”). *Cat-5* cabling supports frequencies up to 100 MHz and speeds up to 1000 Mbps.



RJ45 Jack



Cat-5 Cable

## Cat-5 Cables

The cables used with your Aviom system are interchangeable with any standard Category 5e (Cat-5e) cables. If you need a longer cable for a particular application, any computer store should be able to supply you with an appropriate cable. A qualified technician should be able to build custom cables to any length (up to the maximum of 500 feet (150 meters) between components).

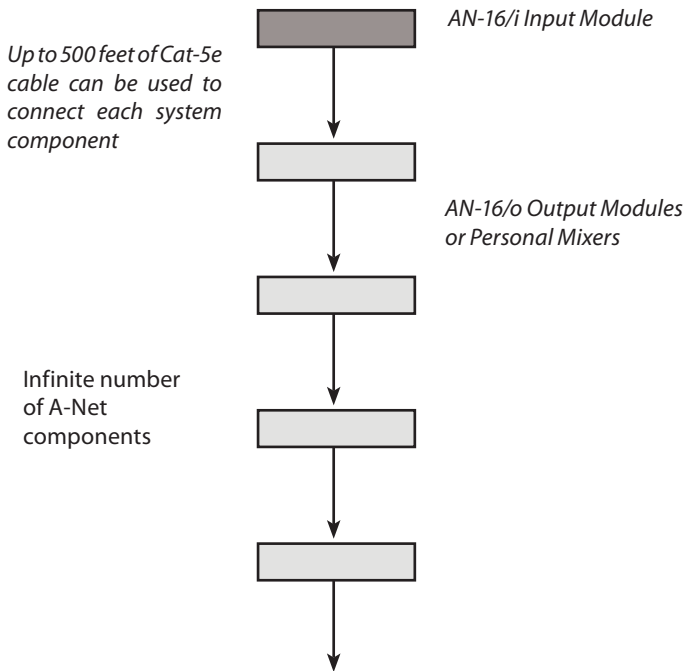
For fixed or permanent installations, you have the option of running Cat-5 cables inside walls and terminating them with readily available wall panel connectors that include the RJ45 jack. (Solid wire is recommended for permanent installations.)

In addition to standard Category 5e cables, Category 6 (Cat-6) cables can also be used.

- ✓ **NOTE:** When purchasing Category 5e cables, be sure to buy only standard Cat-5e UTP cables, not those sold as crossover cables. A crossover cable is used for file transfer between two computers. A crossover cable is not compatible with your Aviom equipment.

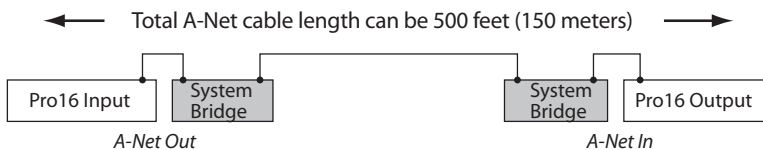
## Cable Lengths

Cat-5e cables used with your Aviom products can be up to 500 feet (approximately 150 meters) in length between devices. The maximum cable length specification applies to the cable connected between the Pro16 input module and the first Pro16 output module (or Personal Mixer) in your system as well as for cable runs between each additional Pro16 A-Net compatible device in your system.



Your cable length performance will be affected by a number of factors including the quality of the cables used, and the number of devices such as cable couplers used or passive wall panel interconnections in use. Use Cat-5e cable for best performance wherever possible. Stranded or solid Cat-5e cable can be used.

When using the optional AN-16SBR System Bridge, the cable length specification applies to the *total* cable length between the two A-Net devices being connected with the AN-16SBR System Bridge. This is similar to what happens when using an inline coupler to extend cable lengths.



Total cable length calculations include cables used to connect I/O modules to System Bridges.

Pre-made cables in a variety of lengths and colors are available at most computer outlets. Cables can be extended by using a simple passive device

called an *inline coupler* to add length to existing cables (as long as you do not exceed the specified maximum cable length). If you need a longer cable on occasion, this is a simple solution. Note that it is possible that the maximum cable length specification can be compromised by using inline couplers or other passive connection devices.

## AC Line Conditioning

Aviom products are digital devices and as such are sensitive to sudden spikes and drops in the AC line voltage. Changes in the line voltage from lightning, power outages, etc. can sometimes damage electronic equipment.

To minimize the chance of damage to your equipment from sudden changes in the AC line voltage, you may want to plug your equipment into a power source that has surge and spike protection. Power outlet strips are available with built-in surge protection circuits that may help protect your equipment.

Other options for protection of your equipment include the use of an AC line conditioner or a battery backup system (sometimes referred to as an *uninterruptible power supply*, or UPS).

## Power Supplies

Your Aviom product uses a DC power supply that has a two-prong power cord. The prongs on the power supply are identical, meaning that there is no need to orient the plug in a specific direction in the power outlet. Some products with two-prong power cords have polarized plugs that can only be inserted into an electrical outlet one way.

The power supply that is shipped with your Aviom product is a universal switching type. It is capable of working with voltages from 90 to 240 volts AC. This means that a separate power supply is not needed to use the products with the AC power systems found in most countries. You should always use the power supply that shipped with your product. When travelling, you may need plug adapters to use the power supply with the AC outlet plug shape variations in use throughout the world.

Should you need to replace the power supply that came with your product, we recommend using only a power supply that meets the following specifications.

<b>Type:</b>	Switching	
<b>Input Voltage:</b>	90-240 volts	50/60Hz 30VA
<b>Output:</b>	24Vdc	0.5A
<b>Polarity</b>	Outer = negative; Inner = positive	
<b>Plug Size</b>	2 mm	



Note that polarity of the plug found on the DC power supply needs to match that of the original power supply that came with your Aviom equipment. Aviom products use a center positive power supply. The outer contact is negative, the inner contact is positive. (See the diagram above.)

## Installing in an Equipment Rack

The AN-16/o Output Module is designed to be installed in a standard 19-inch audio equipment rack. This design is both for easy transportation of the unit and for protection. Each unit takes up one standard rack space (19 inches wide by 1.75 inches high). Optionally, you can place the units on a table top or other flat surface such as a shelf.

The rack ears on each side of the device are designed to support the weight of the AN-16/o without additional hardware. Each rack ear contains holes for two screws per side. Always support the unit with all four screws.

To rack mount the AN-16/o, position it in the equipment rack at the desired location. Use standard rack-mounting screws (10-32 size) to attach the unit to your rack hardware. Tighten all four screws firmly, but avoid overtightening.

You may want to use non-metallic washers between the rack-mounting screws and the device's finished surface to avoid marring the painted finish on your Aviom products.

Always allow adequate ventilation for devices mounted in equipment racks. Avoid placing your Pro16 product directly above or below other rack-mounted devices that produce high levels of heat, such as power amps.



# EtherCon Connector

Some Aviom products use EtherCon® Cat-5 connectors. The Neutrik EtherCon connector is a dual RJ45 type connector. It can receive a standard Cat-5e cable or a cable fitted with the special heavy-duty EtherCon connector.

When using a standard Cat-5e cable, plug the cable into the center of the jack; release the cable by pressing on the small plastic tab built into the cable connector.

The locking EtherCon connector is similar to an XLR cable, the kind commonly used on microphones. Insert an EtherCon equipped cable into the jack until it clicks and locks in place. To remove the cable, press on the metal release tab at the top of the panel-mounted EtherCon jack and pull the connector outward.

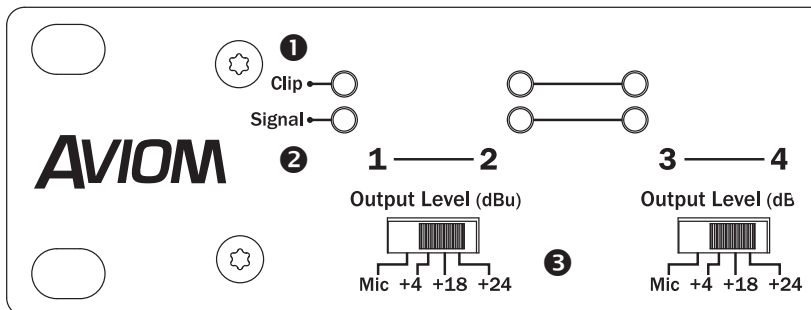
## Cleaning and Maintenance Information

The exterior of your Aviom products should be cleaned with a dry, soft, lint-free cloth. For tougher dirt, you can use a cloth slightly dampened with water or with a mild detergent.

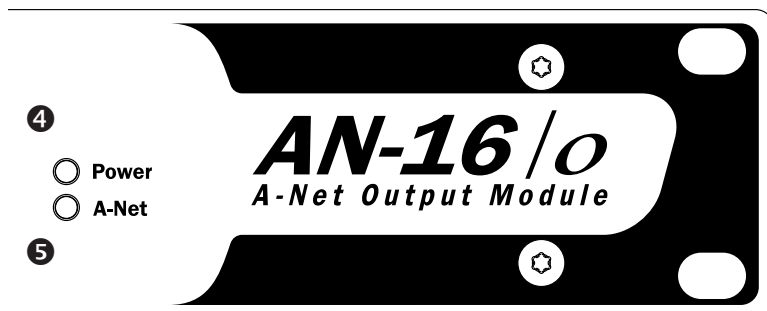
When cleaning your Aviom products, never spray cleaners directly onto the product surfaces. Instead, spray a small amount of the cleaning solution onto a clean cloth first. Then use the dampened cloth to clean the product.

- ✓ **NOTE:** Never use solvents or abrasive cleaners on the finished surfaces of your Aviom products.

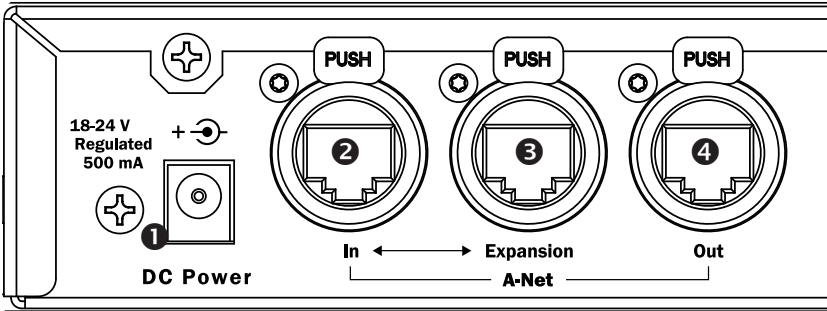
# Front Panel



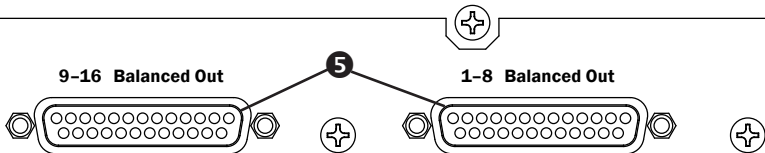
FUNCTION	
1	Clip LED, red - lights when the audio signal hits (0dB) full scale at the input module, indicating that the source audio signal is too high.
2	Signal Present LED, green - lights to show that an audio signal is present on a channel
3	Output Level Switch - in the left position, the channel pair is output at mic level; move the switch to the right to select +4dBu, +18dBu, or +24dBu line-level output.
4	Power LED - indicates that the AN-16/o is on
5	A-Net LED - indicates that the AN-16/o is receiving valid A-Net data



# Rear Panel



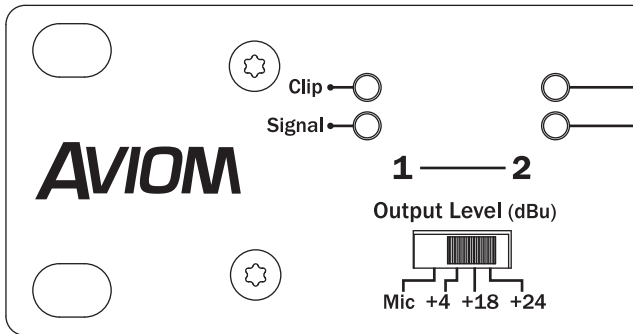
FUNCTION	
1	DC Power Jack - connect the DC power supply here
2	A-Net In Jack - connect the Cat-5 cable from the A-Net input module or console card here
3	A-Net Expansion Jack - used when creating a 32-channel system with two AN-16/i and two AN-16/o units
4	A-Net Out Jack - connects to any A-Net compatible device
5	Analog Audio Outputs - DB25 d-sub jack supplies a balanced line-level audio signal; eight channels per jack



Conceived, designed and manufactured by Aviom, Inc. Made in USA.

# AN-16/o Output Module Front Panel

The front panel of the AN-16/o Output Module contains the channel Output Level switches, Signal Present LEDs, Clip LEDs, the A-Net LED, and the Power indicator.



The AN-16/o front panel

## Channel LEDs

The sixteen numbered Channels on the AN-16/o front panel correspond to the line-level analog audio outputs on the rear panel. Each Channel contains two LEDs, one showing that there is an audio signal present, and another used to indicate that the channel's input source is clipping. Signal and Clip LEDs appear directly above the Channel numbers.

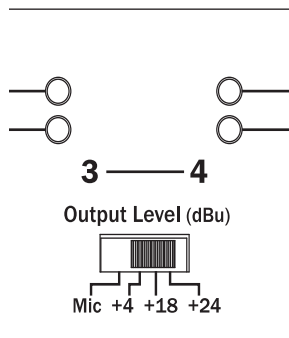
The lower LED, marked *Signal*, will light as long as an audio signal of at least -40dB is present on the channel. It provides an easy way to confirm that audio is present on a channel of the AN-16/o Output Module.

The upper LED is marked *Clip*. It will light if the input signal coming into your Pro16 input module (AN-16/i or AN-16/i-M Input Module, console card, etc.) is too high, causing the audio outputs of the AN-16/o to sound distorted. In general, you want to operate the system so that the Clip LED on the Pro16 input module lights only occasionally. If the LED is on constantly, you should either lower the volume of the source audio coming into the input module or try different Input Level settings. When using a compatible Pro16 console card as the input module, avoid clipping the host console's inputs.

## Output Level Switches

The AN-16/o has been designed to work with a wide range of professional audio gear. There are four Output Level settings available on the front panel—mic level and +4dBu, +18dBu, and +24dBu line level.

The **Mic** setting is appropriate for use with the mic preamp input on mixing consoles, audio interfaces for DAWs, etc. Use this setting if the device you are connecting to has no available line-level inputs.

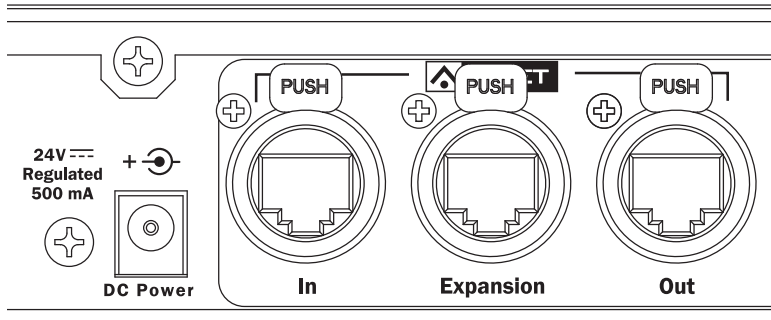


Output level switches on the AN-16/o affect a pair of channels at a time.

Choose a line-level output level setting based on the receiving device's maximum input level before clipping. Check the specifications of your audio gear if you are unsure about its maximum input level. Although you won't harm the AN-16/o or your audio devices by using an incorrect level setting, you do want to avoid sacrificing signal-to-noise ratio or distorting the audio that passes through the system.

# AN-16/o Output Module Rear Panel

On the rear of the AN-16/o Output Module you will find the A-Net connectors, the power supply input, and the balanced line-level audio outputs.



A-Net connections on the AN-16/o rear panel

## DC Power Input

Connect the 24V DC power supply to the jack on the rear of the AN-16/o Output Module. Use only power supplies designed for use with your Aviom products.

## A-Net Connections

There are three A-Net connectors on the rear of the AN-16/o Output Module, marked In, Expansion, and Out.

### A-Net In

The A-Net In jack accepts

- the A-Net signal coming from an AN-16/i or AN-16/i-M Input Module, Y1 card (Yamaha) or compatible third-party Pro16 console card
- A-Net from the Expansion jack of an AN-16/o Output Module or an AN-16/i or AN-16/i-M Input Module
- the A-Net signal coming from the A-Net Out jack of a

Personal Mixer

- the A-Net Out signal from an A-16D or A-16D Pro A-Net Distributor

## A-Net Out

The **A-Net Out** jack is used to connect the incoming digital A-Net data to another A-Net device. This will send the same sixteen audio channels being used by the AN-16/o Output Module to the next A-Net device, creating a digital split. An unlimited number of A-Net devices can be connected in series using this method. Any A-Net device, including the A-16D or A-16D Pro A-Net Distributors can be connected here.

## A-Net Expansion

The **A-NET EXPANSION** jack is used when a 32-channel system is created by using two AN-16/i (or AN-16/i-M) Input Modules and two AN-16/o Output Modules. Using A-Net Expansion allows thirty-two channels of audio to travel down a single Cat-5 cable, up to the maximum of 500 feet, 150 meters.

## Audio Outputs

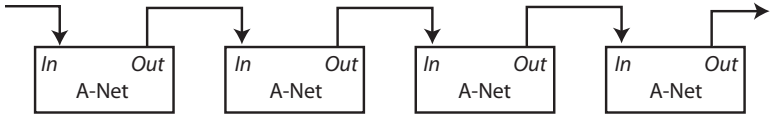
The DB25 multipin outputs on the rear of the AN-16/o Output Module can be used with any device that can accept a mic- or line-level audio output, such as mixing consoles, wireless transmitters, recording devices, and powered speaker systems.

## A-Net Connections

In a simple Pro16 system, the easiest connection method uses what is called a *daisy chain*. That is, each A-Net device is connected in series. The first device in the chain receives the A-Net signal from the Pro16 input module such as the AN-16/i Input Module or a compatible Pro16 console card. Each successive A-Net compatible device gets its A-Net connection from the A-Net Out jack of the device preceding it in the chain.

## Series Connection of A-Net Devices

The diagram below illustrates a series connection of A-Net devices.



In this diagram, A-Net is connected from device to device using Cat-5e cable. The A-Net Out port on the first device connects to the A-Net In port on the next, and so on.

There is one drawback to this connection method, however. If one A-Net device in the chain is disconnected from the A-Net signal chain, all units beyond this point will not get any audio until the unit is reconnected to a valid A-Net source.

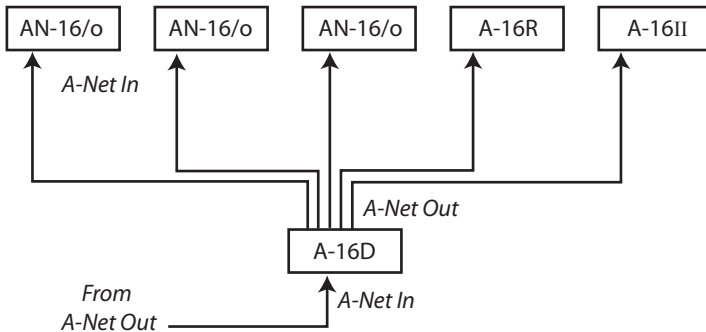
A parallel A-Net connection solves that problem. By using the optional A-16D or A-16D Pro A-Net Distributor, parallel A-Net connections are possible. In fact, any combination of series and parallel connections can be used to solve even the most complex audio routing problems.

## Parallel A-Net Routing

Connecting A-Net devices in parallel involves the addition of an A-Net distributor. Any number of A-Net distributors can be added, creating an infinite number of digital splits.

### Using an A-16D A-Net Distributor

A variety of A-Net compatible components are shown connected in parallel to an A-Net Distributor in the diagram below.



The A-Net signal from the Distributor is connected to each A-Net compatible device with a Cat-5e cable. Removing one A-Net device has no effect on the other A-Net outputs being used.



When designing an A-Net system, Pro16 modules can be connected in any order; simply connect A-Net Out to A-Net In as needed.

# Multi-Channel Systems

When more than sixteen channels of audio are required in a Pro16 digital snake or audio distribution network, there are several options available. Systems using sixteen or thirty-two audio channels can be configured with no additional hardware using the built in A-Net Expansion port. For systems larger than thirty-two channels, Aviom offers the AN-16SBRR System Bridge as an option. The System Bridge allows up to four A-Net streams to be combined into a single Cat-5e cable for distribution over long distances.

## 32-Channel Systems

Aviom's products work in modules of sixteen channels. Thirty-two channel systems can be configured as:

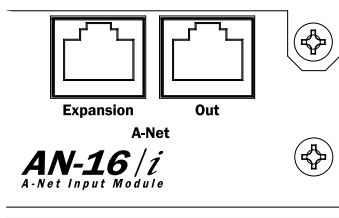
- 32 channels send by zero channels return (32 x 0 )
- 16 channels send by 16 channels return (16 x 16)
- 0 channels send by 32 channels return (0 x 32)

The descriptions above are similar to those used for traditional multi-core analog audio snakes. The configurations refer to the number of audio channels used as inputs on each side of the snake. For example, the "32" in the 32 x 0 configuration means that 32 audio inputs can be connected at the stage to send to the front-of-house (FOH) mix position. The "0" means that on the there are no audio inputs used to send audio back to the stage position.

A thirty-two channel system is comprised of four AN-Series units, two input modules and two output modules. Since the system is modular, you can connect the AN-Series units as needed, making any of the configurations mentioned previously available at any time. Simply move and re-patch the units.

## A-Net Expansion

In a thirty-two channel system, the A-Net Expansion jack is used to combine two A-Net data streams into a single steam that can travel down one cable. At the receiving end of the digital snake or audio network, the A-Net Expansion jack is used again to separate the data into individual 16-channel data streams.



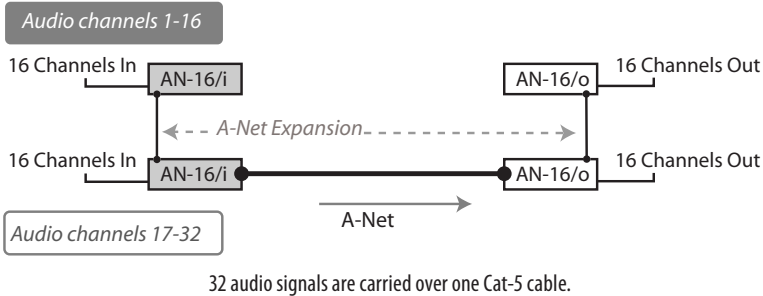
A-Net Out and A-Net Expansion ports on the AN-16/i

Some points to remember about using the A-Net Expansion jacks on the AN-16/i and AN-16/o to create a digital snake or audio network:

- When creating a system with four AN-Series units, one A-Net Expansion jack will be connected to an A-Net *In* port while the other A-Net Expansion jack will be connected to an A-Net *Out* port.
- The A-Net *Out* jacks on the AN-16/o Output Modules should be unused when only four AN-Series units are being used to create a system. These are then available for adding extra AN-16/o Output Modules for digital splits or for connecting to a Pro16 monitor mixing system.
- The cable connecting the two sides of the system (carrying thirty-two channels of audio) should be connected to one A-Net *In* port and one A-Net *Out* port.
- Do not connect Cat-5e cables carrying expanded system data (more than 16 channels) to an A-16D or A-16D Pro Distributor or Personal Mixer product.
- The maximum cable length specification of 500 feet (150 meters) applies to the length between an A-Net *In* port and an A-Net *Out* port. Cables used to connect devices via the A-Net Expansion jacks must fall within this maximum distance.
- An A-Net Expansion port is *never* connected to another A-Net Expansion port.

# 32-Send System

The 32 x 0 configuration has all audio inputs on one side of the digital snake (or audio network) and all audio outputs on the other side.

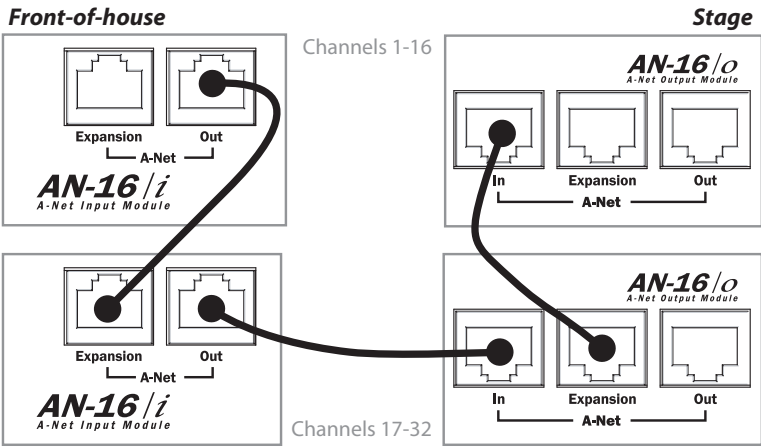


With this configuration, two AN-16/i (or AN-16/i-M) Input Modules receive up to thirty-two analog audio signals as inputs. One AN-16/i contains channels 1-16, while the other has channels 17-32.

## To configure a 32 x 0 system:

1. Connect the first sixteen line-level audio sources to inputs 1-16 on the first AN-16/i Input Module.
2. Connect the second group of sixteen audio sources to inputs 1-16 on the second AN-16/i.
3. Connect a Cat-5e cable from the **A-NET OUT** jack on the first AN-16/i to the **A-NET EXPANSION** jack on the second AN-16/i.
4. Connect a Cat-5e cable from the **A-NET OUT** jack on the second AN-16/i and run it to the destination where the AN-16/o Output Modules are located; plug this cable into the **A-NET IN** jack on the first AN-16/o Output Module.
5. Connect a Cat-5e cable from the **A-NET EXPANSION** jack on the first AN-16/o to the **A-NET IN** on the second AN-16/o.
6. Patch the audio outputs from the two AN-16/o Output Modules into the desired destinations.

- ✓ **NOTE:** Any combination of line-level AN-16/i and mic-level AN-16/i-M Input Modules can be substituted in the example above. Console interface cards do not have A-Net Expansion ports and cannot be used to send 32 channels over a single Cat-5e cable. The AN-16SBR System Bridge is required for applications using console interface cards.



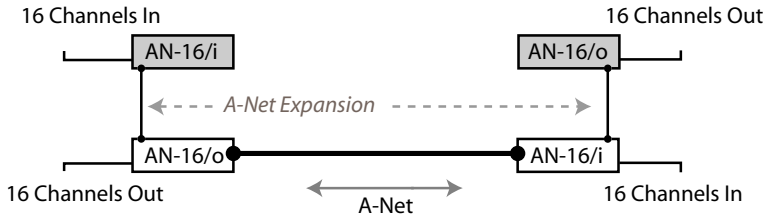
Cat-5e connections for a 32 x 0 system, shown in a live performance setting

Remember that the maximum cable length between A-Net devices is 500 feet (150 meters).

# 16-Channel Send/Return System

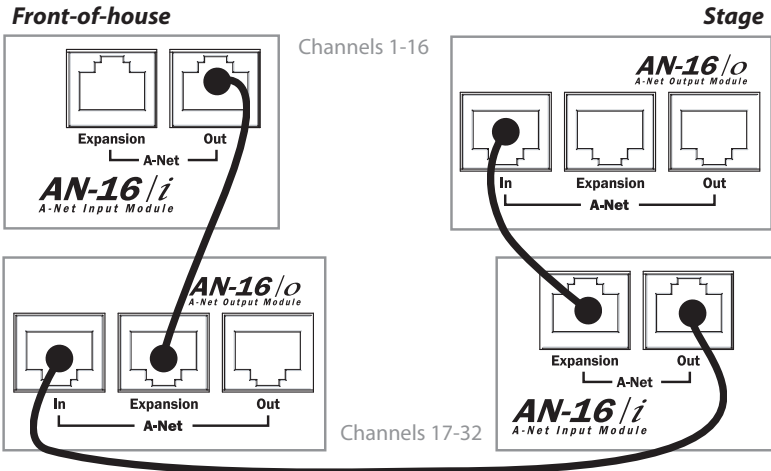
The 16 x 16 configuration has sixteen inputs and sixteen outputs on each side of the digital snake.

Using this configuration, each side of the digital snake has one AN-16/i Input Module and one AN-16/o Output Module. Sixteen channels of audio move in each direction over a single Cat-5e cable.



Each side sends and receives 16 channels.

As in the previous example, the A-Net Expansion jack is used to combine the A-Net data from two devices for transmission down one cable.



Cable connections for a 16 x 16 system; any version of the AN-16/o Output Module can be substituted here.

### To configure a 16 x 16 system:

1. Set up one AN-16/i and one AN-16/o on each side of the digital snake. (For example, one set of an AN-16/i and an AN-16/o is placed at the front-of-house mix position. The matching set of one AN-16/i and one AN-16/o is placed on the stage.)
2. Connect sixteen line-level audio sources to inputs 1-16 on the first AN-16/i.
3. Connect a Cat-5e cable from the **A-NET OUT** jack on the first AN-16/i to the **A-NET EXPANSION** jack on the first AN-16/o.
4. Plug a Cat-5e cable into the **A-NET IN** jack on the first AN-16/o Output Module. This cable will be used to span up to 500 feet between the two sides of the digital snake.
5. Connect the cable from the **A-NET IN** jack in Step 4 to the **A-NET OUT** jack on the second AN-16/i Input Module.
6. Connect the second group of sixteen audio sources to inputs 1-16 on the second AN-16/i.
7. Connect a Cat-5e cable from the **A-NET EXPANSION** jack on the second AN-16/i to the **A-NET IN** on the second AN-16/o.
8. Patch the audio outputs from the two AN-16/o Output Modules into the desired destinations.

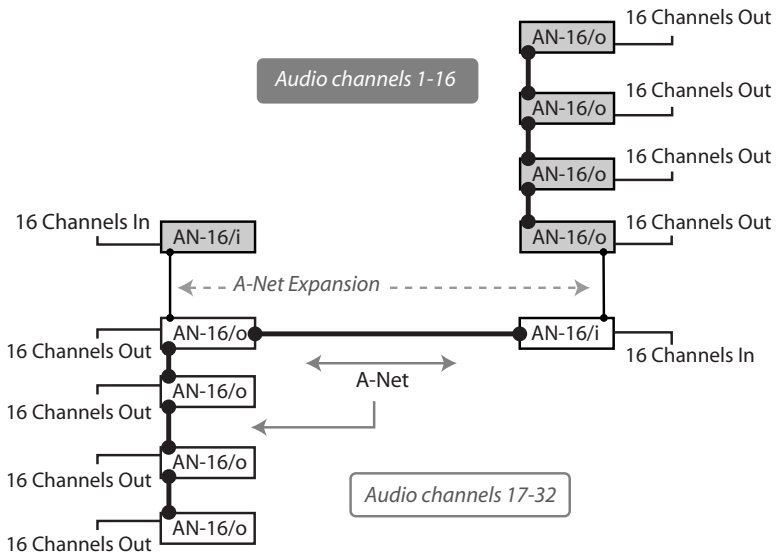
Any combination of line-level AN-16/i and mic-level AN-16/i-M Input Modules can be substituted in the example above.

## Adding Audio Outputs - Splits

As mentioned previously, the A-Net Out jacks on the AN-16/o Output Modules remain available even when creating a bidirectional digital snake or audio network. This allows additional output modules to be added as needed to suit a variety of audio situations.

Any Pro16 A-Net compatible product can be added to an A-Net Out port. This flexible routing scheme allows you to send audio to a variety of different locations, and to include Aviom's Pro16 Monitor Mixing System for performers.

In the example below, a 16 x 16 digital snake has been expanded to include three additional AN-16/o Output Modules on each side of the digital snake.



An expanded Pro16 system with multiple digital splits

Each AN-16/o is connected via A-Net using a Cat-5e cable. Remember that the cable lengths between each A-Net device can be up to 500 feet (150 meters) long.

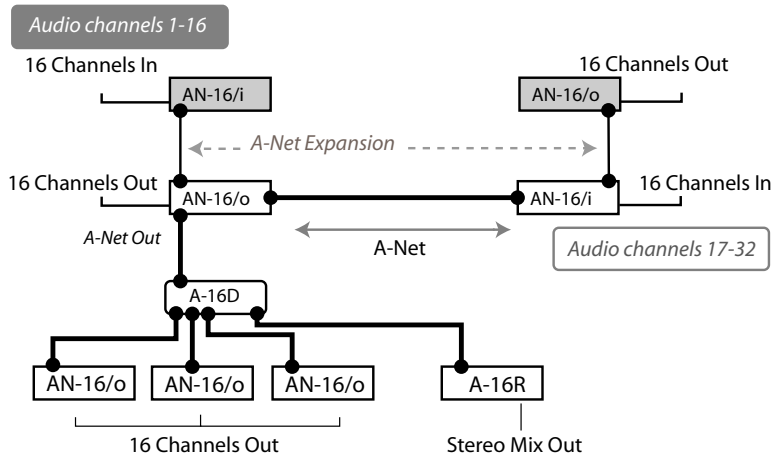
**To expand a Pro16 digital snake or audio network:**

- First start by configuring the network according to your basic needs (either as 32 x 0 or 16 x 16).
- Add additional AN-16/o Output modules by connecting a Cat-5e cable from the A-Net Out port on one of the connected AN-16/o Output Modules to the A-Net In port on an AN-16/o Output Module that you want to use to expand the system.
- Each additional AN-16/o that you want to add is connected by patching a Cat-5e cable from the A-Net Out jack on the module preceding it to its A-Net In jack.



# Adding an A-Net Distributor

While the A-16D A-Net Distributor is not compatible with the data being generated by the A-Net Expansion ports on the AN-16/i, AN-16/i-M, and AN-16/o, you can use an A-16D (or A-16D Pro) A-Net Distributor to add wiring flexibility to your system.



A-Net distributors can be used to add digital splits to a system.

In this diagram, an A-16D or A-16D Pro A-Net Distributor receives A-Net from an AN-16/o Output Module connected to a digital snake configured as 16 x 16. Only audio channels 17-32 are being redistributed to the additional A-Net devices.

From the A-Net Distributor, up to eight parallel A-Net devices can be connected. The diagram shows three AN-16/o Output Modules connected. Each can provide sixteen line-level outputs. Also, an A-16R rack mounted Personal Mixer is shown. The A-16R can be used to mix and monitor the same audio content in stereo. The Cat-5e cable run between the AN-16/o and the A-Net Distributor can be up to 500 feet long, as can the cable from the A-Net Distributor to the A-Net devices connected to it.

# 64-Channel Pro16 Systems

When used with the optional AN-16SBR System Bridge, the AN-16/i and AN-16/i-M Input Modules along with the AN-16/o Output Module can create digital snakes or audio networks of up to sixty-four channels. Up to four Pro16 input modules and four output modules can be used in a variety of combinations to create a flexible and reconfigurable audio distribution network.

Aviom's Pro16 products work in modules of sixteen channels. Systems of up to sixty-four channels can be configured as:

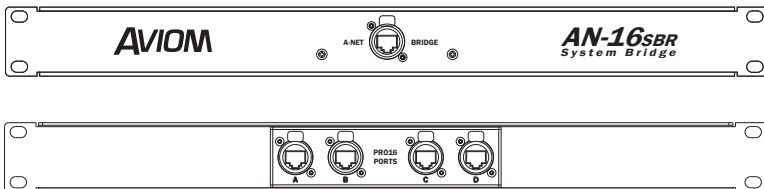
- 64 channels send by zero channels return (64 x 0)
- 48 channels send by 16 channels return (48 x 16)
- 32 channels send by 32 channels return (32 x 32)
- 16 channels send by 48 channels return (16 x 48)
- 0 channels send by 64 channels return (0 x 64)

The AN-16/i-M Mic Input Module can be substituted for any AN-16/i shown in the following diagrams. Use the AN-16/i-M to add up to sixteen microphone signals per module to a digital snake or audio network. Digital console interface cards—including the Y1 card for Yamaha and those made by third-party manufacturers that support A-Net—can be substituted for input modules in the diagrams that follow.

- ✓ **NOTE:** When using the System Bridge to create a network, the Expansion jacks on the AN-16/i, AN-16/i-M, and AN-16/o are not used.

## System Bridge

The AN-16SBR System Bridge is a two-part accessory that takes in up to four individual A-Net data streams at one location and combines them for transmission over a single Cat-5e cable. At the destination, another AN-16SBR is used to separate the A-Net streams. The four separate A-Net data streams can then be connected to A-Net compatible devices as needed.



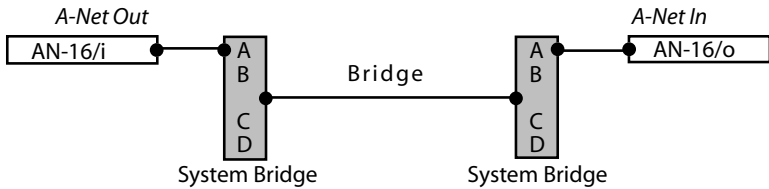
The front and rear panels of the rack-mounted AN-16SBR System Bridge.

The System Bridge contains four A-Net connectors labeled A, B, C, and D. These accept standard Cat-5e cables. These jacks will always connect to an Pro16 A-Net compatible product.

The connection labeled *A-Net Bridge* will always connect to another System Bridge's A-Net Bridge connector.

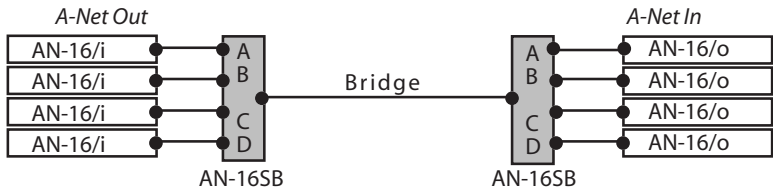
## Connecting the System Bridge

Adding a System Bridge to a digital snake is quite simple. Two System Bridges are needed to create a network. The four A-Net connectors (labeled A, B, C, and D) on one side of the digital snake are directly related to the A, B, C, and D connectors on the other side of the digital snake. That is, if you patch an AN-16/i Input Module into port "A" on one side of a System Bridge, an AN-16/o Output Module would be connected to port "A" on the other side of the System Bridge. See the following diagram.



This diagram shows the relationship of the A, B, C, and D ports on the AN-16SB.

A complete digital snake using four units per side follows the same pattern. An input module connected to port B on one side of the digital snake connects to an output module via port B on the other side of the digital snake. The same goes for ports C and D, as seen in the following diagram.



A-Net ports A, B, C, and D are shown connected in a 64 x 0 configuration

## To connect a 64 channel digital snake:

On the Send side:

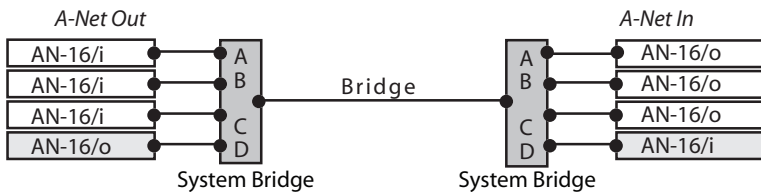
1. Connect a Cat-5e cable from the **A-NET Out** of the first AN-16/i to port A on the first System Bridge.
2. Repeat this process to connect the A-Net Out from the remaining three input modules to ports B, C, and D.

On the Receive side:

1. Connect a Cat-5e cable from port A on the second System Bridge to the **A-NET In** jack on the first AN-16/o Output Module.
2. Repeat this process to connect ports B, C, and D to the remaining AN-16/o Output Modules.
3. Connect the two sides of the digital snake by running a Cat-5e cable (with or without an EtherCon connector) between the two **A-NET BRIDGE** jacks on the System Bridges.

- ✓ **NOTE:** Any combination of line-level AN-16/i and mic-level AN-16/i-M Input Modules can be substituted in the example above. Console interface cards such as the Y1 or those offered by third-party manufacturers can be substituted for input modules shown in the diagrams.

To use other configurations, simply move any pair of input and output modules. In the following example, the devices connected to port D on the System Bridge have been swapped, the devices connected to port D on the System Bridge have been swapped, to create a 48 x 16 system.



A 48 x 16 system is created by exchanging the units connected to port D on the System Bridge.

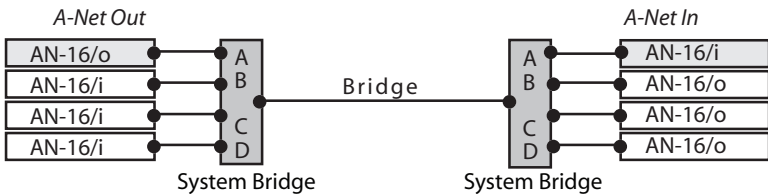
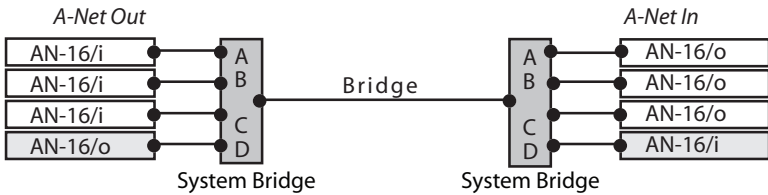
Remember, the total cable length between A-Net devices should not exceed 500 feet, 150 meters. Cables used to connect A-Net devices to the System Bridge are *included* in this calculation.

# Configuration Notes

When configuring 64-channel digital snake systems that send data in both directions, Aviom suggests the following module combinations. While not mandatory, these suggestions are made to accommodate the standard wiring practices that Ethernet uses. (Aviom's A-Net technology is based on Ethernet.) Some wire pairs in a standard Ethernet cable are not next to each other inside the jacket of the cable. This can account for slightly higher data errors in rare cases.

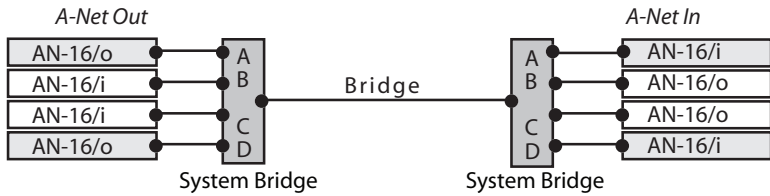
The configuration recommendations apply to systems configured as 16 x 48 and 32 x 32, not those sending data in only one direction. The module combinations are applicable especially when using long cable runs.

For 16 x 48 (or 48 x 16) digital snake configurations, place the three similar modules together, connected to either ports A, B, and C on the System Bridge or to ports B, C, and D. See the following diagrams.



## 32 x 32 Digital Snake Configuration

For a 32 x 32 configuration, place two similar modules together, connected to either ports B, and C on the AN-16SB. The modules connected to ports A and D are also similar by doing this configuration., See the following diagram.



Ports A, and D use the same type of module; ports B and C contain the same type of module.

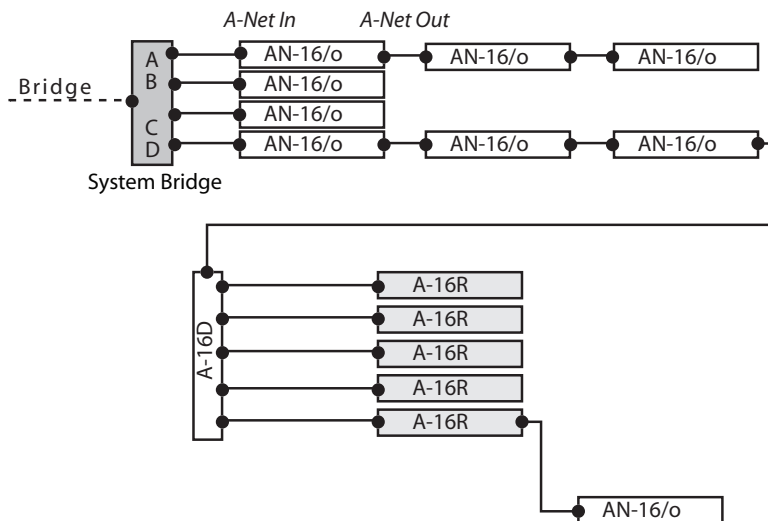
Note that the total A-Net cable length between devices is limited to 500 feet, calculated from the input module to the output module.

- ✓ **NOTE** The AN-16/i Input Modules shown in the preceding diagrams can be replaced with any compatible Pro16 input module or console interface card.

# Expanding a Pro16 Network

As mentioned in the section on 32-channel systems, any available A-Net Out jack on a Pro16 A-Net device can be used to expand an existing system and create a digital split. Any number of additional AN-16/o Output Modules can be added, as can any number of A-16II or A-16R Personal Mixers.

The following example shows one variation of an expanded system.



This system includes multiple digital splits and a monitor system.

This example starts as a 64 x 0 configuration (the input side of the system is not shown in the diagram). Two of the outputs are expanded. Port A of the System Bridge has two AN-16/o Output Modules added. Port D has also two output modules which then feed an A-16D A-Net Distributor.

The A-16D Distributor connects to five A-16R rack mounted Personal Mixers for use as a monitor system for five musicians performing live. Then, another AN-16/o Output Module is connected via a daisy chain to the last A-16R.

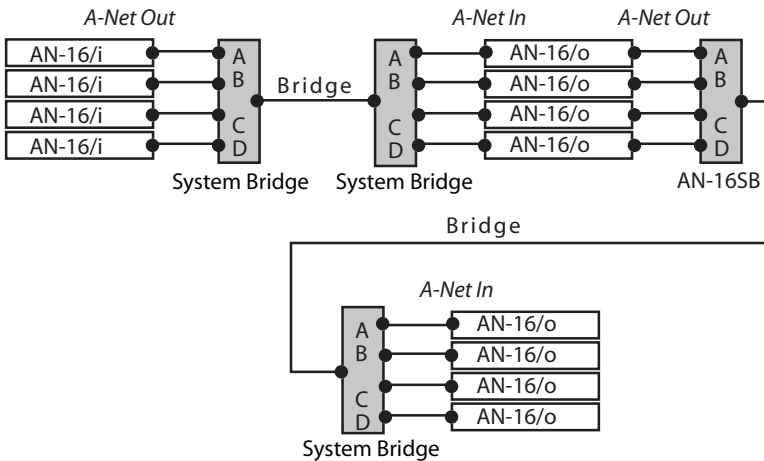
Expansion of a system can continue as your needs require. Any available A-Net Out can be used to connect to the A-Net In on any compatible device.

Again, each A-Net cable used can be up to 500 feet (150 meters) long, making this system capable of spanning long distances between rooms, floors, etc. A-16D Pro A-Net Distributors can be substituted for the A-16D.

## Using Multiple System Bridges

Expansion of a system can include multiple AN-16SBR System Bridges. This allows audio to be fed to different locations as needed. Using multiple System Bridges follows the same connection rules as outlined previously. (Port A on one System Bridge always connects data to Port A on another System Bridge, etc.)

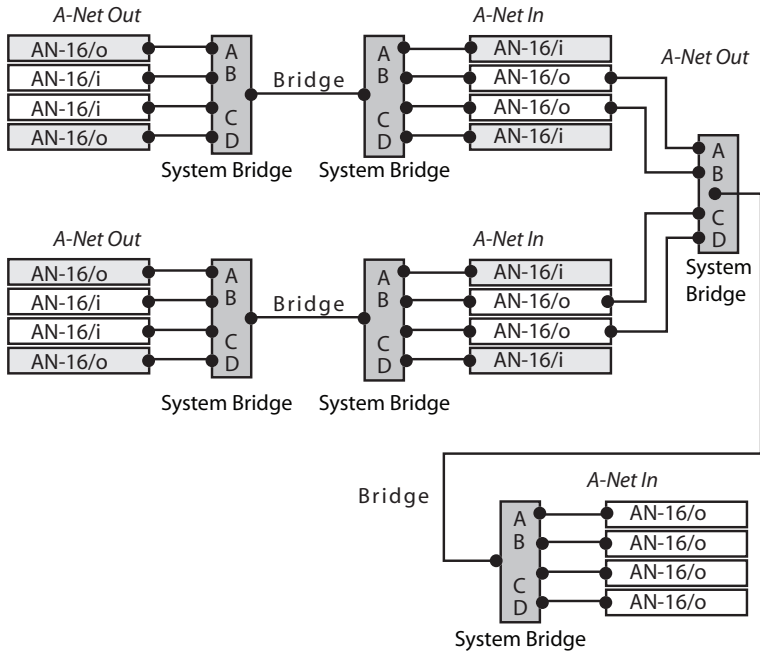
System Bridges can also be used to combine A-Net streams from multiple digital snakes or audio networks in an installation, allowing, for example, ports A and B from Network #1 to be sent along with streams B and C from Network #2 to a third area, creating Network #3.



A second set of System Bridges move 64 channels of audio over one Cat-5e cable to another destination.



The following example shows a more complex system that combines A-Net from two different networks, sending 32 channels from each location to a third user.



Data from two Pro16 networks is combined and distributed to a third location.

As with all A-Net compatible devices, any available A-Net Out can be used as a starting point for expansion.

In the preceding diagrams, any Pro16 input module can be substituted for the AN-16/i modules. These include:

- AN-16/i-M - 16 mic/line inputs
- Y1 card - for use with Yamaha digital mixing consoles; routes audio from the Yamaha interface to A-Net
- Digital console cards from third-party manufacturers that support Pro16 A-Net

# DB25 Wiring Info

The rear panel of the AN-16/o uses a pair DB25 connectors for its balanced line-level audio outputs.

## AN-16/o DB25 Audio Connections

The DB25 multi-pin connectors on the AN-16/o are wired to analog pinout standards. This allows easy interfacing with a variety of audio equipment with the use of readily-available multipin breakout cables or patch bays.

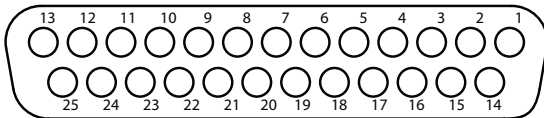
Each DB25 jack carries eight balanced audio channel outputs.

To wire a custom cable for use with the AN-16/o DB25 output jacks, use the following table:

Cable Number	DB25 Pin Number		
	Hot	Cold	Ground
1	24	12	25
2	10	23	11
3	21	9	22
4	7	20	8
5	18	6	19
6	4	17	5
7	15	3	16
8	1	14	2
<b>No Connect</b>	13		

## DB25 Pinout

The pins on the panel-mounted DB25 jacks on the AN-16/o are numbered according to the following diagram.

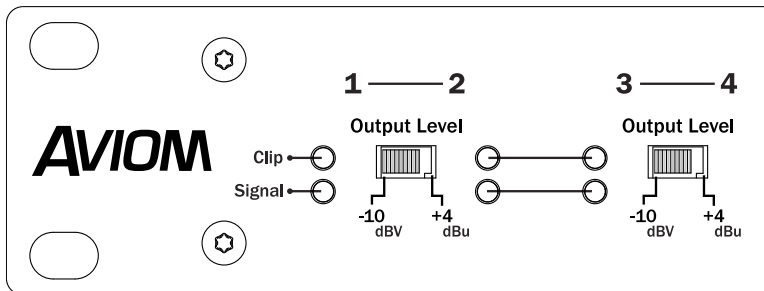


Each DB25 jack carries eight of the balanced line-level audio signals—channels 1-8 or channels 9-16.

# Appendix 1

## AN-16/o Output Module Variations

Previous versions of the AN-16/o are compatible with all Pro16 products. The information provided here details the differences in features of previous models in order to make the integration of new and old products easy to understand.



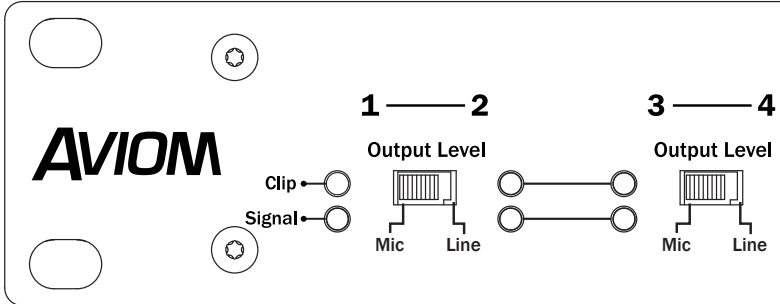
The first two versions of the AN-16/o have -10dBv and +4dBu output levels.

The first two versions of the AN-16/o (discontinued) have a two-position Output Level Switch; in the left position, the channel pair is output at -10dBv line level; in the right position, the channel pair is output at +4dBu line level.

Two variations of this AN-16/o were produced; the only difference is the type of connector used on the rear panel for the audio outputs—1/4-inch TRS or Euroblocks.

A-Net connections on the rear panel of the original AN-16/o use standard RJ45 connectors instead of EtherCon connectors.

The third release of the AN-16/o (discontinued) offered mic-level and line-level outputs, switchable in pairs from the front panel; the front panel level switches are marked **Mic** and **LINE** on this model. The maximum output level from the Line setting was +4dBu.



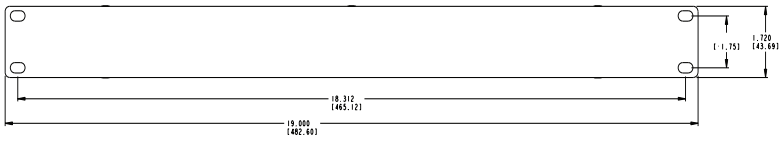
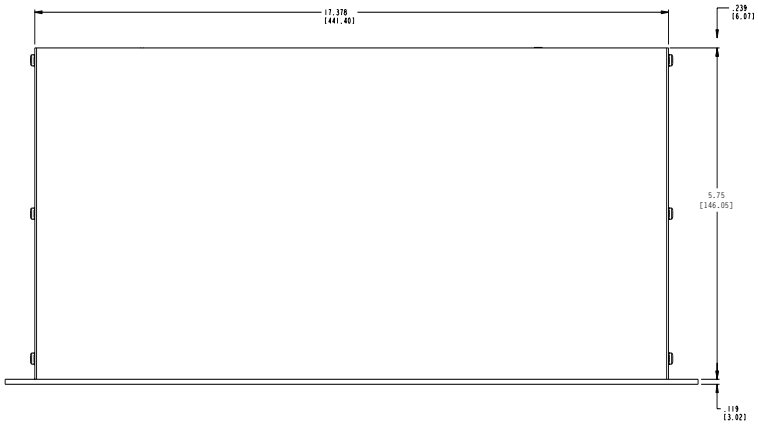
The third version of the AN-16/o can be distinguished by its Mic/Line output level switches on the front panel.

Audio outputs on this model used two DB25 connectors wired to the analog audio standard.

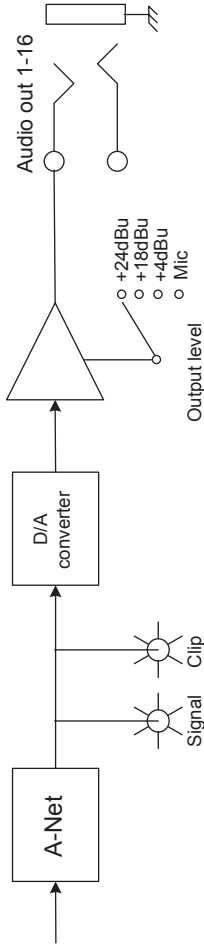
# Specifications

<b>Audio Outputs</b>	16 channels, balanced
	DB25 multipin connectors (2), analog pinout
	Impedance balanced outputs for the Mic, +4dBu, and +18dBu settings; Differential output for the +24dBu output
<b>D/A Conversion</b>	48kHz, 24-bit
<b>Operating Levels</b>	4-position switch, per channel pair
	+24, +18, and +4dBu line-level, or mic-level
<b>Max. Output Level</b>	+24dBu
<b>Metering</b>	LEDs; green: Signal Present; red: Clip; per channel
<b>Output Impedance</b>	226 ohms (+18dBu, +24dBu); 100 ohms (+4dBu, Mic)
<b>Freq. Response</b>	4Hz-22kHz +0.2dB/-3dB
<b>THD +N</b>	< 0.004%
<b>Crosstalk</b>	-90dB
<b>Signal to Noise (unweighted)</b>	92dB typical, A/D to D/A
	Measured from AN-16/i Input Module to AN-16/o v.4 Output Module
<b>Bit Error Rate (BER)</b>	10 <sup>-12</sup>
<b>Digital Connections</b>	A-Net In: 1; A-Net Out: 1; A-Net Expansion: 1; Neutrik EtherCon connectors
<b>A-Net</b>	A-Net Expansion allows 32 channels of audio to be transmitted over one Cat-5e cable when using two input modules and two output modules
	Uses unshielded Cat-5e UTP (or better) cable
<b>Latency</b>	0.620 msec (measured from analog input to analog output)
<b>Power Supply</b>	External, DC, universal switching type
<b>Input Voltage</b>	100-240 volts, 50/60Hz, 30VA
<b>Output Voltage</b>	24 VDC, 0.5 amp
<b>Plug Size</b>	2 mm
<b>Dimensions</b>	19" (482.6 mm) wide x 5.75" (146 mm) deep; 1U high
<b>Weight</b>	6.8 lb. (3.08 kg)
<b>Options</b>	AN-16SBR System Bridge; used to combine up to four A-Net streams for transmission over one Cat-5e cable
<i>All Aviom products are designed and manufactured in the USA.</i>	

# Dimensions



# Block Diagram



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# Warranty Registration

*Please take a moment to fill in this warranty registration form. Return it to Aviom via mail or fax. All information will be kept confidential.*

Model Number \_\_\_\_\_ Product Serial Number \_\_\_\_\_

Model Number \_\_\_\_\_ Product Serial Number \_\_\_\_\_

Model Number \_\_\_\_\_ Product Serial Number \_\_\_\_\_

Model Number \_\_\_\_\_ Product Serial Number \_\_\_\_\_

Date Purchased \_\_\_\_\_

Dealer Name \_\_\_\_\_

Dealer Location \_\_\_\_\_

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**AVIOM<sup>®</sup>**

**1157 Phoenixville Pike, Suite 201 • West Chester, PA 19380**  
**Voice: +1 610.738.9005 • Fax: +1 610.738.9950 • [www.Aviom.com](http://www.Aviom.com)**