



AeroX Audio105

Audio Controller for an Automatic
Terminal Information Service (ATIS)



Table of contents

1. Introduction	1
2. Precautions	1
3. Initial inspection	1
4. Specifications	2
4.1 Rear panel	2
4.2 Front panel	4
4.3 Microphone	5
5. Connector pin-outs	6
6. Product description	10
6.1 Power supply	10
6.2 Power-up process	10
6.3 VOL/DATA dial	10
6.4 PTT microphone	11
6.5 Audio outputs	11
6.6 Audio inputs	12
6.7 PTT connector	13
6.8 LIGHTS connector	15
6.9 VOICE MODEM connector	15
6.10 HANDSET connector	15
6.11 USB connector	15
6.12 ETHERNET connector	15
6.13 Redundant connector	16
6.14 Audio electronics	16
7. Troubleshooting	16
7.1 AudioServer software update procedure	16
7.2 Micro-controller firmware update procedure	17

1. Introduction

The AeroX Audio105 is an audio controller that allows digital voice files to be transmitted over ground to air radios. Furthermore, it allows users to append audio messages to be transmitted through multiple audio inputs/outputs. Thus, the AeroX Audio105 fulfills the hardware component of an Automatic Terminal Information Service (ATIS) that produces critical flight safety information in the form of an audible voice information stream that can be transmitted over a radio for pilots. The information transmitted are the weather conditions at the airport, as well as operational information, such as the current runway in use, available approaches, the state of the runway, and breaking conditions. Other information, such as if the airport has certain restrictions, can also be broadcasted through this system.

2. Precautions

- READ AND UNDERSTAND the [Safety](#) (p. 20) section at the back of this manual.
- Although the AeroX Audio105 is rugged, it should be handled as a precision scientific instrument.

3. Initial inspection

- Upon receipt of the AeroX Audio105 inspect the packaging and contents for damage. File damage claims with the shipping company.
- Check the ships with list to ensure all components are received.

4. Specifications

Case material:	Aluminum
Mount:	19 in (EIA-310) 2U rack mount
Dimensions	
Front panel:	48.3 cm (19 in) width, 8.9 cm (3.5 in) height
Case:	43.2 cm (17 in) width, 8.1 cm (3.2 in) height, 27.9 cm (11 in) depth
Weight:	3.5 kg (7.7 lb)
Power requirements:	80 to 264 VAC @ 25 W typical, 40 W maximum, 50/60 Hz 11 to 24 VDC @ 25 W typical, 40 W maximum
Temperature:	-20 to +70 °C

NOTE:

The display limits operational temperature range to -20 to +70 °C, but a heater fitted on the display back can increase that range. Contact factory for more information.

Humidity: 0 to 100% RH, non-condensing

4.1 Rear panel



AUDIO OUT terminal
(CH1 to CH5):

Male 3-pin XLR
600 ohm balanced
Transformer isolated
Separate 3.5 mm, 3-pole jack to the right of the XLR

Adjustable audio
level maximum:

+4 dBu, 1.23 V rms, 1.74 V peak, 3.48 V peak-to-peak

AUDIO IN:	Female 3-pin XLR 600 ohm balanced Transformer isolated Separate 3.5 mm, 3-pole jack to the right of the XLR
Adjustable audio level maximum:	+4 dBu, 1.23 V rms, 1.74 V peak, 3.48 V peak-to-peak
PTT (push-to-talk):	5x Volt free, break before make, normally open / closed relay contacts (contact rating 50 V @ 1 A), NOT protected against overload +5 VDC, 100 mA limited output used with relay contacts to configure pull ups or pull downs. 25-way D plug
Isolated auxiliary digital input:	3.5 to 12 V
LIGHTS terminal strip:	Four screw terminals Volt free, break before make, normally open / closed relay contacts (contact rating 50 V @ 1 A), NOT protected against overload
Redundant 9-pin D connector:	Signals between AeroX Audio105s to control redundant operation
USB port:	USB 2.0 compatible type-A socket
ETHERNET port:	RJ45 socket LAN Supports 1000/100/10Mbps Gigabit/Fast Ethernet
115/230VAC/25W-50/50HZ, Main power inlet:	80 to 264 VAC IEC C14 socket 50/60 Hz 40 W maximum On/Off power switch T2.0A/250V 20 mm HRC fuse (same for 115/230 VAC operation)

11-24VDC @ 25W, power
input screw terminals: 40 W maximum, reverse polarity protected
On/Off power switch

Special features:

HANDSET socket: Supports FAA handset with electret microphone including bias and speaker

RJ11

VOICE MODEM socket: Telephone dial in voice modem

RJ11

NOTE:

Hand held microphone with PTT and audio Out **CH1** cannot be used as they are used to support the FAA handset function.

4.2 Front panel



MIC PTT: Supports Electret hand-held microphone with PTT button

3.5 mm jack, 3-pole

Switch closure compatible PTT input

Loudspeaker: Monitors selected audio source (user-adjustable audio volume)

Line in right channel (internal)

Line out left channel (internal).

Line out right channel (internal).

VOL/DATA dial: Volume control

Navigate menus and data entry

VU LEDs:	<p>Visual indication of selected monitor audio source</p> <p>6x green LEDs and one red LED to show increasing audio level from lower LED up. For optimal performance the audio level should be high enough to light all the green LEDs but not the red LED, or at most only light the red LED occasionally.</p> <p>1x red LED at the top to indicate audio source level is too high and audio may suffer from distortion.</p> <p>Filtered to give fast attack slow decay to make it easier to see peaks.</p>
POWER/ERROR LED:	<p>Green</p> <p>Steady state when power on and status ok</p> <p>Flashing when power on but error detected. When this occurs, all VU LEDs will be continuously lit until the error is cleared.</p>
LCD color display:	<p>Show status</p> <p>Data entry dial allows set up changes</p> <p>Bright, high contrast</p> <p>Long back light life</p> <p>Resolution: 800 x 480 pixels</p> <p>Dimensions: 95.0 mm (3.742 in) width, 53.9 mm (2.083 in) height</p>

4.3 Microphone

Description:	Push-to talk (PTT), electret / condenser microphone with screened audio cable
Frequency range:	20 to 16,000 Hz
Sensitivity:	6.3 mV/Pa/1 kHz/±3 dB
Output impedance:	2.2 kOhm
S/N ratio:	> 58 dB
Coupling capacitor:	0.1 to 4.7 µF
Operating temperature:	0 to 40 °C
Power supply:	1.5 to 10 VDC, 0.5 mA typical current

5. Connector pin-outs

Table 5-1: AUDIO OUT, XLR male 3-pin terminals (CH1 to CH5)

Pin	Description	Schematic
1	ground	
2	+ audio	
3	- audio	
Shell	ground	

Table 5-2: AUDIO OUT, 3.5 mm, 3-pole, jack

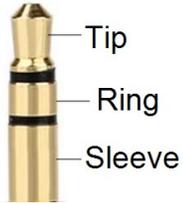
Component	Description	Schematic
Sleeve	- audio	
Ring	- audio	
Tip	+ audio	

Table 5-3: AUDIO IN, XLR female 3-pin terminal

Pin	Description	Schematic
1	ground	
2	+ audio	
3	- audio	
Shell	ground	

Table 5-4: AUDIO IN, 3.5 mm, 3-pole, jack

Component	Description	Schematic
Sleeve	- audio	
Ring	- audio	
Tip	+ audio	

Table 5-5: PTT 25-pin, male, D connector

Pin	Description	Pin	Description	Schematic
1	PTT1 normally closed contact	14	PTT1 common	
2	PTT1 normally open contact	15	ground	
3	PTT2 normally closed contact	16	PTT2 common	
4	PTT2 normally open contact	17	ground	
5	PTT3 normally closed contact	18	PTT3 common	
6	PTT3 normally open contact	19	ground	
7	PTT4 normally closed contact	20	PTT4 common	
8	PTT4 normally open contact	21	ground	
9	PTT5 normally closed contact	22	PTT5 common	
10	PTT5 normally open contact	23	ground	
11	AUX_IN +	24	AUX_IN -	
12	+5 VDC	25	+5 VDC	
13	+5 VDC	shell	ground	

Table 5-6: LIGHTS, 4-way screw terminal strip

Terminal	Description	Schematic
1	ground	
2	Normally open contact	
3	Contact common	
4	Normally closed contact	

Table 5-7: Redundant 9-pin, male D connector

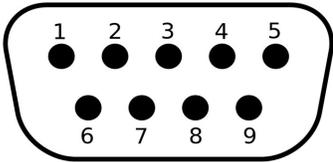
Pin	Description	Pin	Description	Schematic
1	No connection	6	No connection	
2	No connection	7	No connection	
3	Redundant in	8	No connection	
4	Redundant out	9	No connection	
5	ground	shell	ground	

Table 5-8: Chassis main power inlet IEC C14

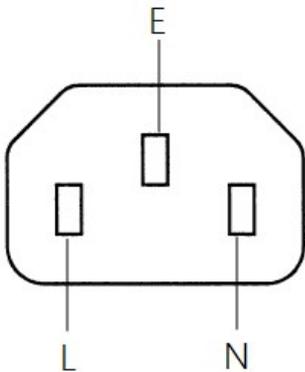
Pin	Description	Schematic
L	live phase	
N	neutral phase	
E	protective earth	

Table 5-9: 11-24VDC screw terminal strip

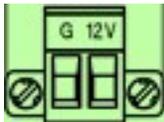
Terminal	Description	Schematic
G	ground (0 V)	
12V	11 to 24 VDC	

Table 5-10: MIC PTT

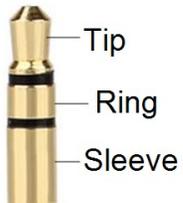
Component	Description	Schematic
Sleeve	ground	
Ring	Microphone audio + bias voltage	
Tip	Switch closure compatible input for microphone PTT switch	

Table 5-11: HANDSET socket:			
4 Pin RJ11	6-4 Pin RJ12	Description	Schematic
1	2	(Black) microphone +	
2	3	(Red) speaker -	
3	4	(Green) speaker +	
4	5	(Yellow) microphone -	

Table 5-12: VOICE modem socket:			
4 Pin RJ11	6-4 Pin RJ12	Description	Schematic
1	2		
2	3	Ring line 1	
3	4	Tip line 1	
4	5		

6. Product description

6.1 Power supply

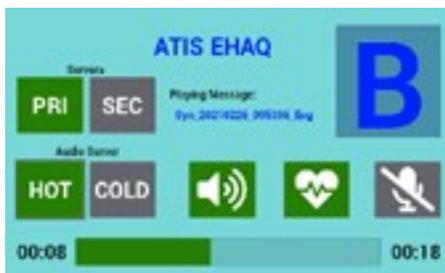
The AeroX Audio105 can use either AC or DC power. The rear panel has a fused and switched IEC C14 connector for 115/230 VAC and a removable screw terminal strip for 11 to 24 VDC. Power can be applied to both the AC and DC inlet at the same time. If the AC supply is on, the current will not be drawn from the DC input unless the DC input is greater than 24 VDC. The DC input is reverse polarity protected up to 30 VDC.

CAUTION:

Voltages greater than 30 VDC can damage the AeroX Audio105.

6.2 Power-up process

The AeroX Audio105 takes approximately 80 seconds to become operational after power-up or reset. Initially, the **POWER** and **VU** LEDs illuminate. After 5 seconds, the AeroX Audio105 beeps and the LCD displays the Campbell Scientific logo. A solid **POWER** LED (not flashing) indicates the power-up process is complete and the AeroX Audio105 is fully operational. The final LCD screen should look similar to the following:



6.3 VOL/DATA dial

Without pressing, rotate the **VOL/DATA** dial clockwise to increase speaker volume and counter-clockwise to reduce the volume.

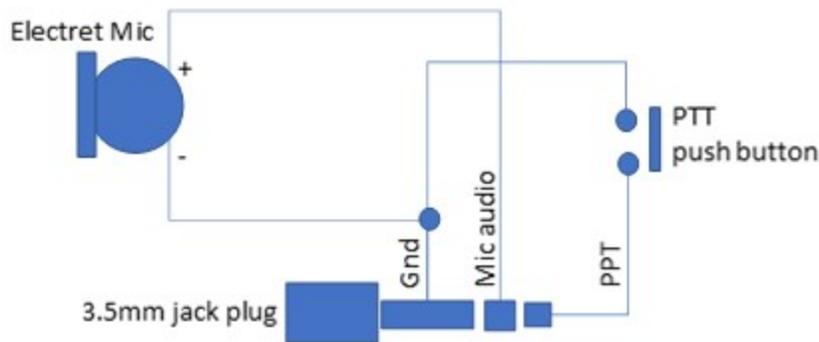
Press the dial to activate the menus. Rotate the dial to navigate the menus and press the dial to select a menu option. The **Configuration** menu allows the output levels for each channel (**CH1** to **CH5**) to be set. The **Updating** menu is used to load new firmware, and the **Testing** menu outputs test tones.

6.4 PTT microphone

The PTT microphone allows the recording of messages directly into the AeroX Audio105. It is plugged into the 3.5 mm jack on the right side of the front panel. To operate, press the microphone button and hold while speaking into the microphone, then release the button when finished recording the message.

NOTE:

The Microphone input is not usable in the NOAA/FAA configuration.



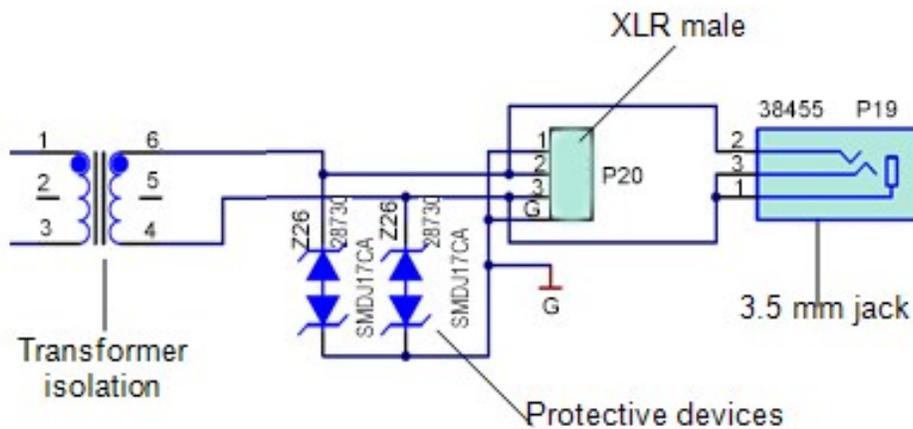
6.5 Audio outputs

The five male 3-pin XLR connectors and 3.5 mm jacks (**CH1** to **CH5**) on the rear panel are isolated, transformer-coupled with a 600 ohm impedance and pro-audio levels. The volume / level can be adjusted during configuration. The XLR connectors are primarily for connecting equipment such as VHF radios and recorders. The 3.5 mm jacks are wired in parallel to the XLR for connecting standard stereo headphones with a 3.5 mm jack and an impedance of greater than 300 ohm. The headphones can be used to monitor the channel audio directly during installation.

NOTE:

The audio only transmits through one side of a stereo headphone. Connecting a headphone with an impedance of less than 300 ohms may cause reduced audio levels out of the XLR channel in which the headphone is connected.

Maximum common mode voltage (pins 2 and 3) relative to ground is ± 17 V. Ideally audio cables are screened. The redundant connection of two AeroX Audio105s requires parallel wiring (for example, CH1 of rack1 to CH1 of rack2 and CH2 of rack1 to CH2 of rack2, ...). If there is a fault detected or power is removed from one rack, it will disconnect the audio outs and the redundant unit will take over driving the audio.



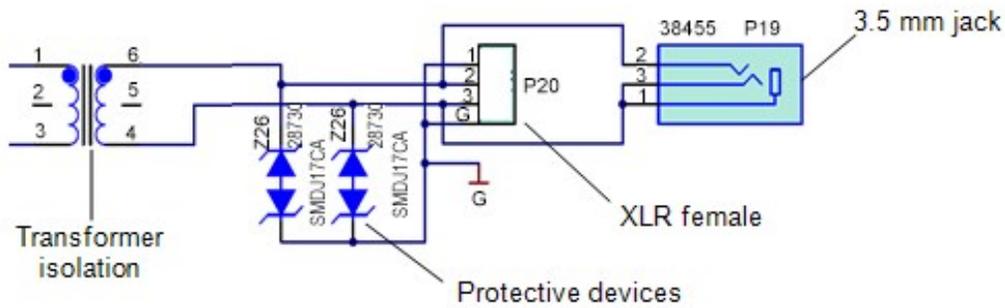
6.6 Audio inputs

The rear panel includes one audio line in that is a female, 3-pin XLR connector with a latch. It is transformer isolated and the sensitivity can be adjusted during configuration. A 3.5 mm Jack is wired in parallel to the XLR connector for connecting standard stereo headphones with greater than 300 ohm impedance and a 3.5mm jack. The headphones can be used to monitor the channel audio directly during installation.

NOTE:

The audio only transmits through one side of a stereo headphone. Connecting a headphone with an impedance of less than 300 ohms may cause reduced audio levels into the XLR input.

Maximum common mode voltage (pins 2 and 3) relative to ground is ± 17 V. Ideally audio cables are screened. The redundant connection of two AeroX Audio105s requires parallel wiring (Line in of rack1 to Line in of rack2). If there is a fault detected or power is removed from one rack it will disconnect the audio Line in and the redundant unit will take over receiving the audio.

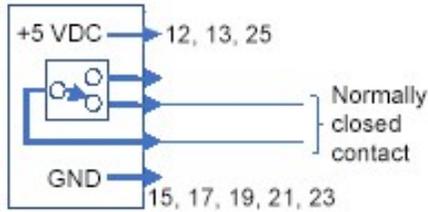


6.7 PTT connector

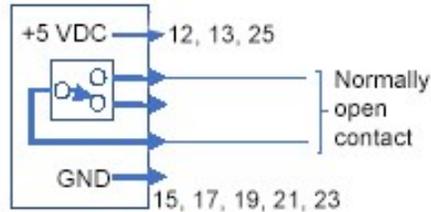
The rear panel includes a 25-pin, D plug that provides five PTT, volt-free, relay contacts that can be independently controlled to activate VHF radio transmitters or other devices. The relay contacts are rated at 50 VAC or DC at 1 A, but are NOT overload protected. Maximum voltage on any contact relative to ground is ± 50 VAC or DC.

The contacts are configured as break-before-make, change-over contacts with the normally open, normally closed contacts and common available on the D connector. A 5 VDC source is available on pins 12,13, and 25 to enable configuration of logic level outputs. The following configurations are possible:

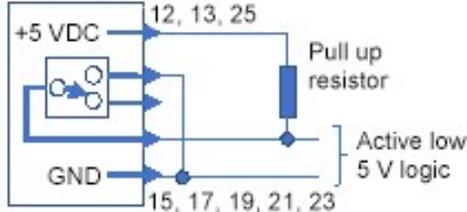
PTT 25-pin D



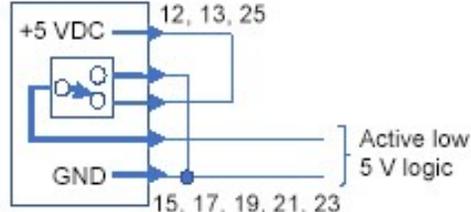
PTT 25-pin D



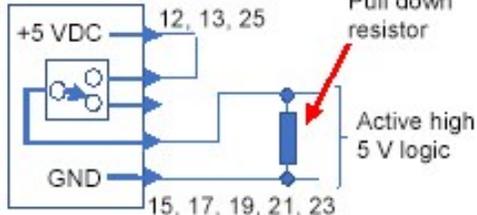
PTT 25-pin D



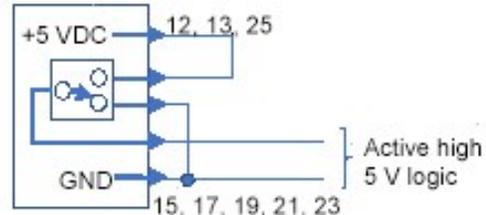
PTT 25-pin D



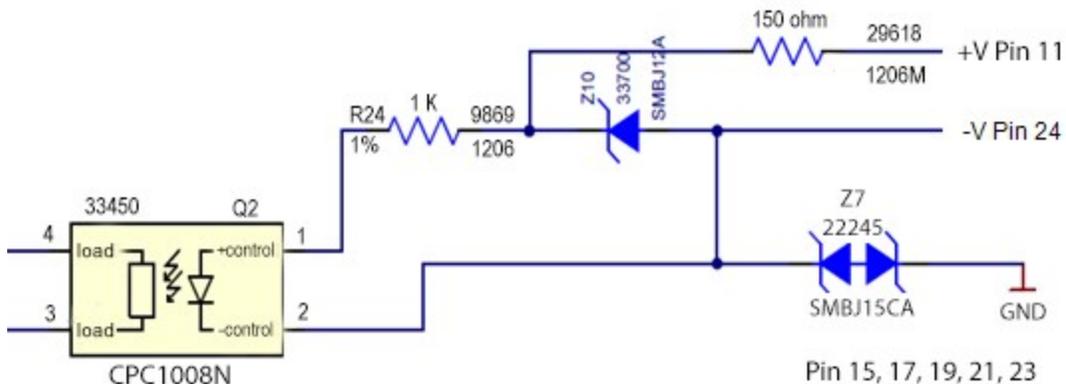
PTT 25-pin D



PTT 25-pin D



An optically-isolated, auxiliary, digital input on this connector can be used with special software (contact factory for support). Maximum common mode voltage for pins 11 and 24 relative to ground is ± 15 V. Input pins 11 and 24 are reverse polarity protected and is active if the voltage applied is greater than +3.5 V.



6.8 LIGHTS connector

The **LIGHTS** connector is primarily used to turn on helicopter landing pad lights and is configured as a single, break-before-make, change-over, normally open, normally closed contact. Rated at 50 V at 1 A, this relay contact is NOT overload protected. Maximum voltage on any contact relative to ground is ± 50 VAC or DC.

The relay normally is connected to the coil of a larger, higher contact capacity relay that switches the heavy load of the lights.



6.9 VOICE MODEM connector

This RJ11 connector provides a standard telephone line connection that supports voice and DTFM decoding as required by NOAA (contact factory). The voice modem is connected to **COM4** of the single-board computer internally.

6.10 HANDSET connector

This RJ11 connector provides line-out audio routed from **CH1** and a microphone input routed from the **PTT** microphone connector on the front panel.

NOTE:

XLR CH1 and **PTT** microphone on the front panel cannot be used because the function is used by the FAA handset function.

6.11 USB connector

Is primarily used for quick configuration stored on a USB flash memory stick, but can support other standard USB peripherals if operating system allows.

6.12 ETHERNET connector

The AeroX Audio105 requires an Ethernet connection to an ASOS or AWOS server to control and generate the audio messages.

6.13 Redundant connector

A redundant AeroX Audio105 rack module connects to this 9-pin D plug to support fault tolerance. For example: if two AeroX Audio105s are used for a single audio stream, the second box will act as a redundant audio box that can take over the audio if the first box fails or is powered down.

A user-supplied cable is required to connect the redundant AeroX Audio105 to the main active AeroX Audio105 and this allows communication of the active state. The cable should be screened with pin-5 rack-1 connected to pin-5 rack-2 and a cross over connecting pin-3 rack-1 to pin-4 rack-2 and pin-4 rack-1 to pin-3 rack-2.

6.14 Audio electronics

Audio electronics controls the audio routing and level; provides regulated power supplies and a Watch dog timer function; and internally connects to **COM2** of the single-board computer.

7. Troubleshooting

7.1 AudioServer software update procedure

Accessing files

1. Insert USB flash drive in AeroX Audio105 **USB** port.
2. Press the **Vol/Data** dial to access the menu.
3. Rotate the **Vol/Data** dial to select **Save to USB**.
4. Press the **Vol/Data** dial and wait for indication that writing is finished.
5. Close menu and remove USB flash drive.
6. Configuration files can now be viewed and edited on a computer. The files will be located in the **AudioServer\Download** directory.

Loading new/edited files to the AeroX Audio105 SBC

1. Place files on a USB flash drive in the **AudioServer** directory.
2. Insert USB flash drive in AeroX Audio105 USB port.
3. Press the **Vol/Data** dial to access the menu.

4. Rotate the **Vol/Data** dial to select "Restart".
5. Press the **Vol/Data** dial and confirm.
6. AeroX Audio105 will restart and copy files from the **AudioServer** directory and replace existing files on SBC.

NOTE:

The AeroX Audio105 update process will not replace files if their versions are the same. Therefore, the USB drive can be left in the USB port without any issues on the next start up.

7.2 Micro-controller firmware update procedure

The AeroX Audio105 has an embedded micro-controller, which includes firmware that the controls its operation. Updating the firmware is similar to updating the AeroX Audio105 software.

Loading new/edited firmware to the micro-controller

1. Place the file on a USB flash drive in the **AudioServer** directory. Name the file **firmware.hex**.
2. Insert USB flash drive in the AeroX Audio105 **USB** port.
3. Press the **Vol/Data** dial to access the menu.
4. Rotate the **Vol/Data** dial to select **Update Firmware**.
5. Press the **Vol/Data** dial and confirm.
6. The AeroX Audio105 will restart and copy files from the **AudioServer** directory and replace the existing firmware.

NOTE:

The AeroX Audio105 update process will not replace files if their versions are the same. Therefore, the USB drive can be left in the USB port without any issues on the next start up.

Limited warranty

Products manufactured by Campbell Scientific are warranted by Campbell Scientific to be free from defects in materials and workmanship under normal use and service for twelve months from the date of shipment unless otherwise specified on the corresponding product webpage. See Product Details on the Ordering Information pages at www.campbellsci.com[↗]. Other manufacturer's products, that are resold by Campbell Scientific, are warranted only to the limits extended by the original manufacturer.

Refer to www.campbellsci.com/terms#warranty[↗] for more information.

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Assistance

Products may not be returned without prior authorization.

Products shipped to Campbell Scientific require a Returned Materials Authorization (RMA) or Repair Reference number and must be clean and uncontaminated by harmful substances, such as hazardous materials, chemicals, insects, and pests. Please complete the required forms prior to shipping equipment.

Campbell Scientific regional offices handle repairs for customers within their territories. Please see the back page for the Global Sales and Support Network or visit www.campbellsci.com/contact  to determine which Campbell Scientific office serves your country.

To obtain a Returned Materials Authorization or Repair Reference number, contact your CAMPBELL SCIENTIFIC regional office. Please write the issued number clearly on the outside of the shipping container and ship as directed.

For all returns, the customer must provide a "Statement of Product Cleanliness and Decontamination" or "Declaration of Hazardous Material and Decontamination" form and comply with the requirements specified in it. The form is available from your CAMPBELL SCIENTIFIC regional office. Campbell Scientific is unable to process any returns until we receive this statement. If the statement is not received within three days of product receipt or is incomplete, the product will be returned to the customer at the customer's expense. Campbell Scientific reserves the right to refuse service on products that were exposed to contaminants that may cause health or safety concerns for our employees.

Safety

DANGER — MANY HAZARDS ARE ASSOCIATED WITH INSTALLING, USING, MAINTAINING, AND WORKING ON OR AROUND **TRIPODS, TOWERS, AND ANY ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.** FAILURE TO PROPERLY AND COMPLETELY ASSEMBLE, INSTALL, OPERATE, USE, AND MAINTAIN TRIPODS, TOWERS, AND ATTACHMENTS, AND FAILURE TO HEED WARNINGS, INCREASES THE RISK OF DEATH, ACCIDENT, SERIOUS INJURY, PROPERTY DAMAGE, AND PRODUCT FAILURE. TAKE ALL REASONABLE PRECAUTIONS TO AVOID THESE HAZARDS. CHECK WITH YOUR ORGANIZATION'S SAFETY COORDINATOR (OR POLICY) FOR PROCEDURES AND REQUIRED PROTECTIVE EQUIPMENT PRIOR TO PERFORMING ANY WORK.

Use tripods, towers, and attachments to tripods and towers only for purposes for which they are designed. Do not exceed design limits. Be familiar and comply with all instructions provided in product manuals. Manuals are available at www.campbellsci.com. You are responsible for conformance with governing codes and regulations, including safety regulations, and the integrity and location of structures or land to which towers, tripods, and any attachments are attached. Installation sites should be evaluated and approved by a qualified engineer. If questions or concerns arise regarding installation, use, or maintenance of tripods, towers, attachments, or electrical connections, consult with a licensed and qualified engineer or electrician.

General

- Protect from over-voltage.
- Protect electrical equipment from water.
- Protect from electrostatic discharge (ESD).
- Protect from lightning.
- Prior to performing site or installation work, obtain required approvals and permits. Comply with all governing structure-height regulations.
- Use only qualified personnel for installation, use, and maintenance of tripods and towers, and any attachments to tripods and towers. The use of licensed and qualified contractors is highly recommended.
- Read all applicable instructions carefully and understand procedures thoroughly before beginning work.
- Wear a **hardhat** and **eye protection**, and take **other appropriate safety precautions** while working on or around tripods and towers.
- **Do not climb** tripods or towers at any time, and prohibit climbing by other persons. Take reasonable precautions to secure tripod and tower sites from trespassers.
- Use only manufacturer recommended parts, materials, and tools.

Utility and Electrical

- **You can be killed** or sustain serious bodily injury if the tripod, tower, or attachments you are installing, constructing, using, or maintaining, or a tool, stake, or anchor, come in **contact with overhead or underground utility lines**.
- Maintain a distance of at least one-and-one-half times structure height, 6 meters (20 feet), or the distance required by applicable law, **whichever is greater**, between overhead utility lines and the structure (tripod, tower, attachments, or tools).
- Prior to performing site or installation work, inform all utility companies and have all underground utilities marked.
- Comply with all electrical codes. Electrical equipment and related grounding devices should be installed by a licensed and qualified electrician.
- Only use power sources approved for use in the country of installation to power Campbell Scientific devices.

Elevated Work and Weather

- Exercise extreme caution when performing elevated work.
- Use appropriate equipment and safety practices.
- During installation and maintenance, keep tower and tripod sites clear of un-trained or non-essential personnel. Take precautions to prevent elevated tools and objects from dropping.
- Do not perform any work in inclement weather, including wind, rain, snow, lightning, etc.

Maintenance

- Periodically (at least yearly) check for wear and damage, including corrosion, stress cracks, frayed cables, loose cable clamps, cable tightness, etc. and take necessary corrective actions.
- Periodically (at least yearly) check electrical ground connections.

Internal Battery

- Be aware of fire, explosion, and severe-burn hazards.
- Misuse or improper installation of the internal lithium battery can cause severe injury.
- Do not recharge, disassemble, heat above 100 °C (212 °F), solder directly to the cell, incinerate, or expose contents to water. Dispose of spent batteries properly.

WHILE EVERY ATTEMPT IS MADE TO EMBODY THE HIGHEST DEGREE OF SAFETY IN ALL CAMPBELL SCIENTIFIC PRODUCTS, THE CUSTOMER ASSUMES ALL RISK FROM ANY INJURY RESULTING FROM IMPROPER INSTALLATION, USE, OR MAINTENANCE OF TRIPODS, TOWERS, OR ATTACHMENTS TO TRIPODS AND TOWERS SUCH AS SENSORS, CROSSARMS, ENCLOSURES, ANTENNAS, ETC.



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Phone: 11.3732.3399
Email: vendas@campbellsci.com.br
Website: www.campbellsci.com.br

Canada

Location: Edmonton, AB Canada
Phone: 780.454.2505
Email: dataloggers@campbellsci.ca
Website: www.campbellsci.ca

China

Location: Beijing, P. R. China
Phone: 86.10.6561.0080
Email: info@campbellsci.com.cn
Website: www.campbellsci.com.cn

Costa Rica

Location: San Pedro, Costa Rica
Phone: 506.2280.1564
Email: info@campbellsci.com
Website: www.campbellsci.com

France

Location: Vincennes, France
Phone: 0033.0.1.56.45.15.20
Email: info@campbellsci.fr
Website: www.campbellsci.fr

Germany

Location: Bremen, Germany
Phone: 49.0.421.460974.0
Email: info@campbellsci.de
Website: www.campbellsci.de

India

Location: New Delhi, DL India
Phone: 91.11.46500481.482
Email: info@campbellsci.in
Website: www.campbellsci.in

South Africa

Location: Stellenbosch, South Africa
Phone: 27.21.8809960
Email: sales@campbellsci.co.za
Website: www.campbellsci.co.za

Spain

Location: Barcelona, Spain
Phone: 34.93.2323938
Email: info@campbellsci.es
Website: www.campbellsci.es

Thailand

Location: Bangkok, Thailand
Phone: 66.2.719.3399
Email: info@campbellsci.asia
Website: www.campbellsci.asia

UK

Location: Shepshed, Loughborough, UK
Phone: 44.0.1509.601141
Email: sales@campbellsci.co.uk
Website: www.campbellsci.co.uk

USA

Location: Logan, UT USA
Phone: 435.227.9120
Email: info@campbellsci.com
Website: www.campbellsci.com