RTS® Digital Matrix Intercom

Innovating the Future of Communications

AES-3
Digital Audio Interface Card
User Manual

Proprietary Notice

Copyright Notice

Warranty Notice

See the enclosed warranty card for further details.

Customer Support

Technical questions should be directed to:

Customer Service Department
RTS/Telex Communications, Inc.
12000 Portland Avenue South
Burnsville, MN 55337 USA
Telephone: 800-392-3497
Fax: 800-323-0498

Return Shipping Instructions

Customer Service Department
Telex Communications, Inc. (Lincoln, NE)
Telephone: 402-467-5321
Fax: 402-467-3279
Factory Service: 800-553-5992

Please include a note in the box which supplies the company name, address, phone number, a person to contact regarding the repair, the type and quantity of equipment, a description of the problem and the serial number(s).

Shipping to the Manufacturer

All shipments of product should be made via UPS Ground, prepaid (you may request from Factory Service a different shipment method). Any shipment upgrades will be paid by the customer. The equipment should be shipped in the original packing carton. If the original carton is not available, use any suitable container that is rigid and of adequate size. If a substitute container is used, the equipment should be wrapped in paper and surrounded with at least four (4) inches of excelsior or similar shock-absorbing material. All shipments must be sent to the following address and must include the Proof of Purchase for warranty repair. Upon completion of any repair the equipment will be returned via United Parcel Service or specified shipper, collect.

Factory Service Department
Telex Communications, Inc.
8601 East Cornhusker Hwy.
Lincoln, NE 68507 U.S.A.
Attn: Service

This package should include the following:

Table of Contents

CHAPTER 1

Introduction

General Description

AES (Audio Engineering Society) is a consortium developed to set standards to provide a common interface between audio devices. Setting standards by which audio equipment is developed insures compatibilities between the devices adhering to these standards. This compatibility allows interconnecting equipment without sacrificing degradation in performance or functionality.

The AES-3 Digital Audio Interface Card expands connectivity to the ADAM intercom system by supporting AES-3 standards. The AES-3 card is capable of eight (8) channels IN and OUT, along with eight (8) AES-3 connections, making it compatible with most third party AES-3 audio devices. Also, it supports all standard hot-swappable and configurable features within the ADAM Intercom family, allowing complete control and monitoring through AZedit.

The AES-3 card supports input sample rates from 16kHz to 108kHz with up to 24-bit audio. Therefore, any AES-3 audio feed will be correctly received, independent of the source console's sample rate. In turn, outputs are compatible with all AES-3 recommended procedures.

The AES-3 card, mated with an AES-3-ID back card, is an ideal solution for MADI router applications. This allows long-haul transfers of your AES-3 data with the ability to swap joined digital audio pairs independently of your hard-wired configuration.

Features

Hot Swappable:	The AES-3 card is hot-swappable to allow live insertion into any IO slot in the ADAM frame. There is no downtime or restart needed.
Compatibility:	The hardware and firmware are compatible with ADAM matrix systems.
Compatible Interface:	The TDM and Control Bus interfaces are compatible with ADAM matrix TDM and control busses.
AZedit Configurability:	The AES-3 card supports downloadable firmware features through AZedit.

Specifications

Performance Specifications

Dynamic Range:

128dB

Input Sample Rate (serial input port – Fsi):

16 to 108kHz

Output Sample Rate (Fso):

44.1kHz

Output Data:

16 bits capable of 24 bits

Output to Input Sample Rate:

.33 to 3

Total Harmonic Distortion + Noise:

120dB

Peak idle channel noise component:

-140dBFS

Resolution:

16–24bits

Digital Filter Characteristics

Passband

Upsampling:

.4535Fsi Hz

Downsampling:

.4595Fso Hz

Passband Ripple:

±0.007dB

Stopband (downsampling):

.5465Fso Fsi/2Hz

Stopband Attenuation:

110dB

Group Delay:

175ms

Group Delay Variation vs. Frequency:

0.0μs

Interpanel Phase Deviation:

0.0°

High-Level Input Voltage, except RXP.RXN:

2.0 – (VD+) +0.3V

Low-Level Output Voltage (lo=-20uA), except TXP and TXN:

0.4V

High-Level Output Voltage (lo=-20uA), except TXP and TXN:

(VD+) -1V

Input Leakage Current:

±10 – ±15mA

Differential Input Voltage, RXP to RXN:

200mV

Output High Voltage, TXP and TXN:

(VD+) -.07 (VD+) -0.4V

Output Low Voltage, TXP, TXN:

0.4 – 0.7V

Switching Characteristics

RMCK Output Jitter

200ps RMS

AES-3 Transmitter Output Jitter:

1ns

TABLE 1. Key Code Color Table for the ADAM cards

Card	**Key Code Color**
AES-3 (7745)	Yellow
RVON-8 (7763)	Blue
AIO-8 (7510)	Orange
Master Controller (7514)	Green
Master Controller -2 (7734)	Violet

CHAPTER 2

Installation

Installation of AES-3 Card into the ADAM System

When inserting the AES-3 card into the ADAM system the following considerations need to be made:

- Gently insert the AES-3 card into the correct slot. If the card is forced or twisted while inserting, a pin on one of the cards could break making the card inoperable.
- When inserting the AES-3 card into the ADAM system, make sure to insert it into a compatible back card. If the card is inserted into a incompatible back card, undesirable results can occur.

On the AES-3 card, Telex has provided a color key code to ensure a compatible connection between cards. The AES-3 card color is yellow, and will only insert into a yellow coded back card.

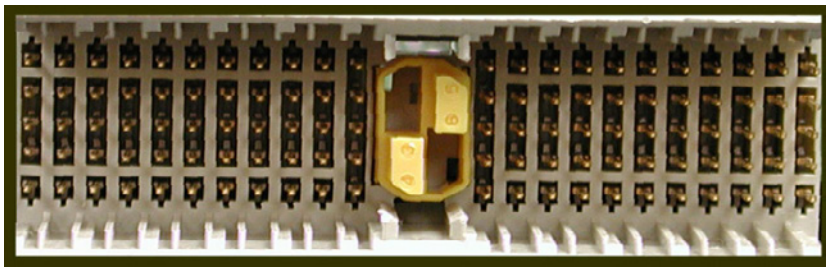


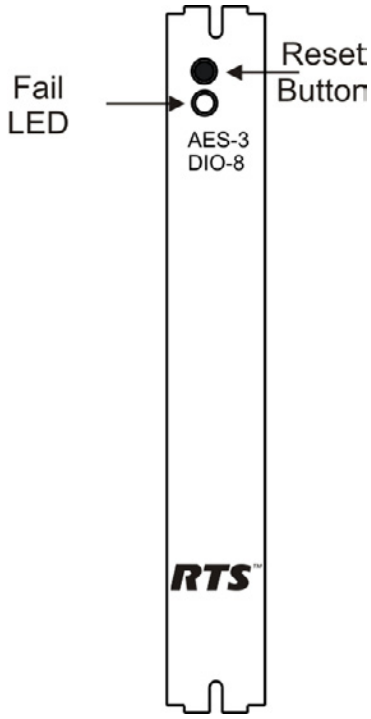
FIGURE 1. AES-3 Color Key Code. This key code only allows the AES-3 to plug into an AES-3 compatible back card.

NOTE: Only newer systems have the color coded back cards.

Fail LED

The **Fail LED** will light up when any one of the following conditions is met:

- During reset, until the card completes its power ON sequence.
- If an ASIC read/write failure occurs.
- If the TDM clock disappears (until it reappears).
- If an error occurs during reprogramming of the flash due to a firmware download (until the card resets).
- If an AES-3 chip could not be initialized at startup.
- If an AES-3 chip was re-initialized because of continued PLL or SRC unlock (A continuous flash is seen).
- While the card is in diagnostic maintenance mode (DIP switch 8 is in the ON position).



IMPORTANT: You must remove the card from the frame in order to change any configuration switch settings.

DIP Switches

DIP Switch 1:	Description:	Accepts and transmits audio at different resolutions: 16-bit and 24-bit. Higher resolution results in higher quality of sound
	OFF (default):	16-bit audio is enabled. The card can accept incoming audio up to 24-bit format. The card transmits outgoing audio at 16-bit format.
	ON:	24-bit audio is enabled. The card can accept incoming audio up to 24-bit format. The card transmits outgoing audio at 24-bit format.
DIP Switch 2:	Unused	
DIP Switch 3:	Unused	
DIP Switch 4:	Description:	Switch 4 controls whether or not the validity bit in the incoming AES stream is monitored and acted upon.
	OFF (default):	The AES-3 card monitors the validity bit in the incoming stream and mutes the incoming AES stream if the validity bit is set.
	ON:	The AES-3 card ignores the validity bit in the incoming stream.
DIP Switch 5:	Description:	There are three (3) types of receiver errors that can occur due to line conditions or clock problems: Confidence Errors – the clock is suspect BI-Phase Encoding Errors – the bi-phase encoding rules have been broken. Parity Errors – an incorrect number of transitions per frame was detected.
	OFF (default):	Monitors three (3) types of minor receiver errors and mutes the incoming audio stream if at least fiver errors occur in any 200ms time window. **NOTE:** The AES-3 card will unmute the incoming audio if none of these errors have occurred for at least 80ms.
	ON:	Ignores mino9r receiver errors. If there are adverse line condition such that there are repeated minor errors, the user may want to ignore these errors and allow the audio to pass unmuted.
DIP Switch 6:	Description:	The non-audio indicator bit is contained in the incoming AES stream and indicates whether or not the AES data can be interpreted as audio. If the switch is set to ON, the non-audio indicator bit is ignored.
	OFF:	The AES-3 card monitors the non-audio indicator bit in the incoming AES stream and mutes the audio if the bit is set.
	ON:	The AES-3 card ignores the non-audio indicator bit in the incoming AES stream.

DIP Switch 7: Description: In normal operation, the AES-3 card attempts to achieve PLL and SRC lock on the incoming AES stream. If a lock cannot be achieved within two (2) seconds, the card resets the chip associated with the AES channel pair.

NOTE: It is possible there is no input stream connected to the card, so no PLL or SRC lock will ever be achieved. In this case, resetting the AES chip is not recommended because any AES output stream from that card using that chip is interrupted.

If an AES output is being used and the corresponding AES input is not being used, the user can prevent the AES-3 card from resetting the AES chip to achieve PLL/SRC lock.

If an AES-3 chip is being re-initialized because of continued PLL or SRC unlock, the Fail LED will flash ON for roughly a half second every 2 to 3 seconds.

OFF: The AES-3 card mutes the incoming audio on loss of PLL and/or SRC lock, and will reset the AES chip associated with that channel pair if either lock remains unachieved for at least two (2) seconds.

ON: The AES-3 card will not reset the AES chip with continued loss of PLL and SRC lock, and will not mute the incoming audio when the SRC is unlocked. It will always mute the incoming audio when the PLL is unlocked.

DIP Switch 8:

WARNING: DIP Switch 8 should always be left in the OFF position. It is reserved for debugging and can have unintended consequences.

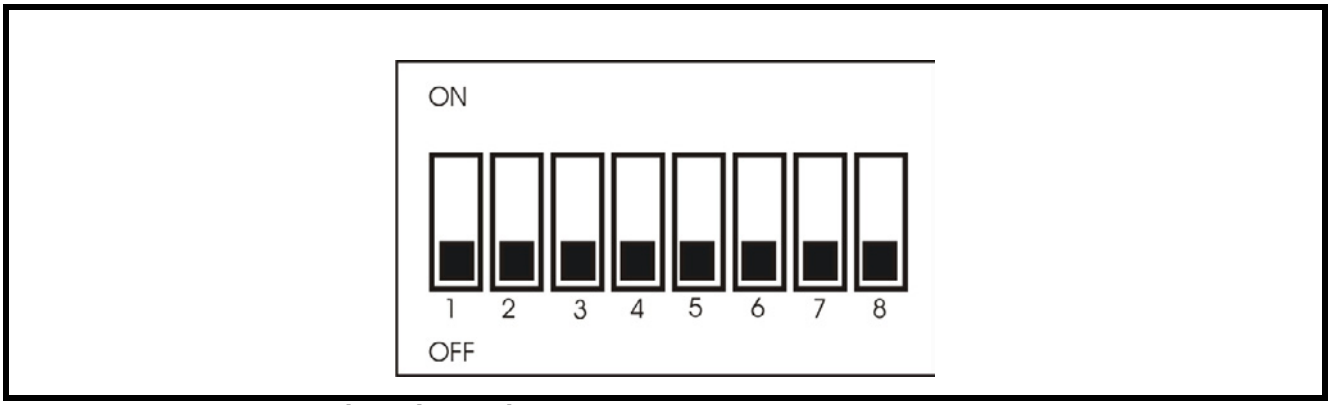
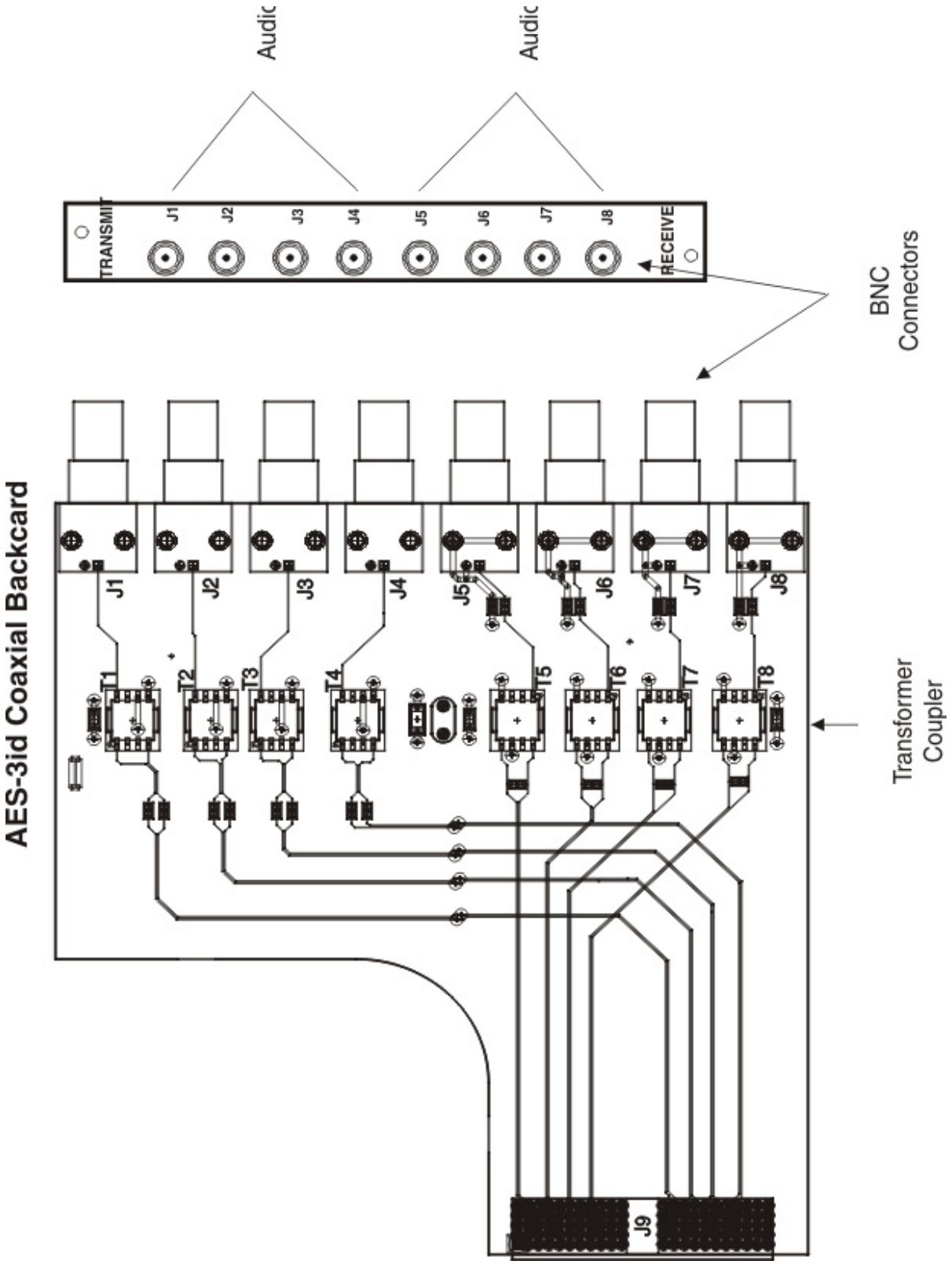


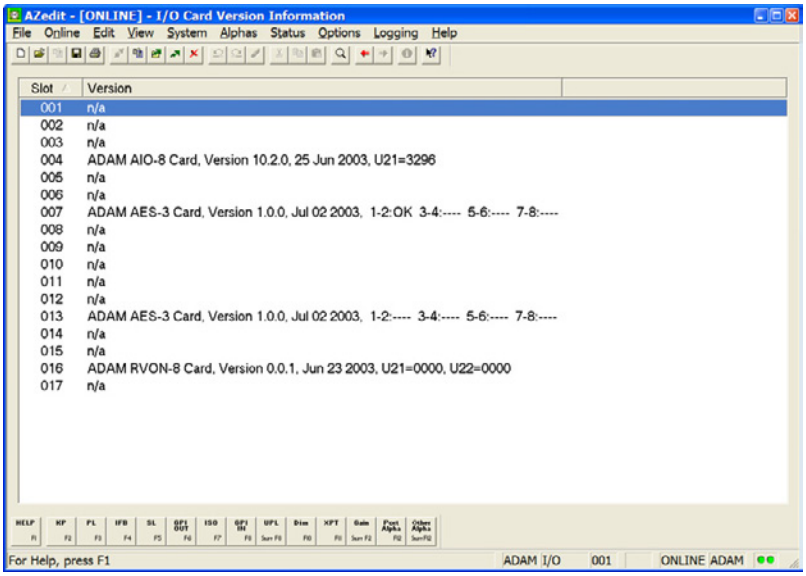
FIGURE 2. AES-3 DIP Switch panel - Switch 1


Audio
Audio
TRANSMIT
J1
J2
J3
J4
J5
J6
J7
J8
RECEIVE
BNC
Connectors
AES-3id Coaxial Backcard
T1
T2
T3
T4
T5
T6
T7
T8
J9
Transformer
Coupler

Download Firmware

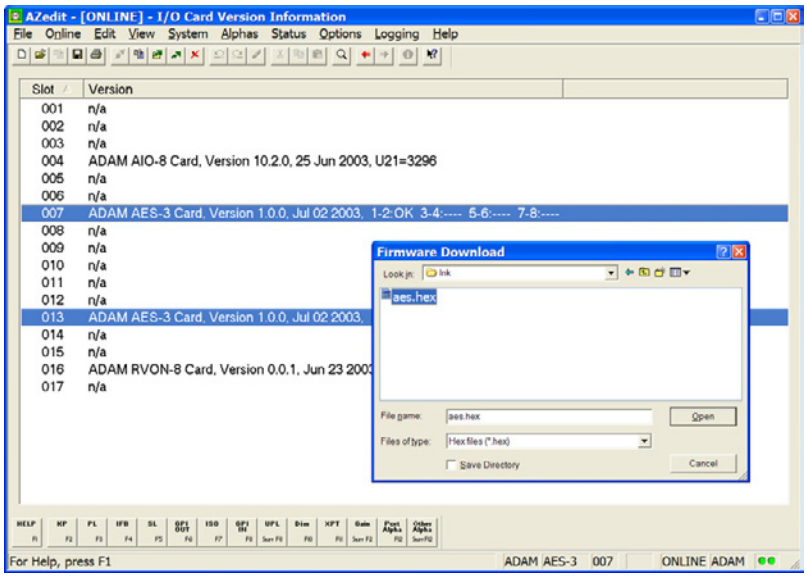
Download AES-3 Firmware through AZedit

1. Open **AZedit**.
2. From the Status menu, select **Software Versions**, then **I/O Cards**.
   The I/O Card Version Information screen appears showing the occupied slots in the system.

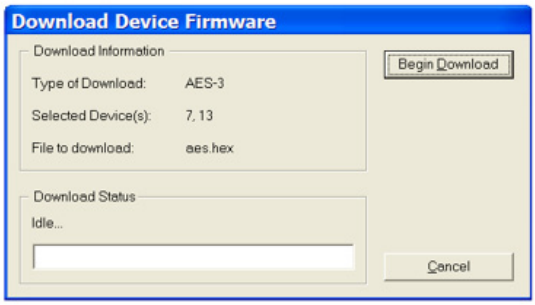


3. Select the **version** to be updated.
   You may select more than one (1) version at a time by holding the Ctrl key down while you select other versions.

4. Press **Ctrl+Shift+D**.
   The Firmware Download window appears.

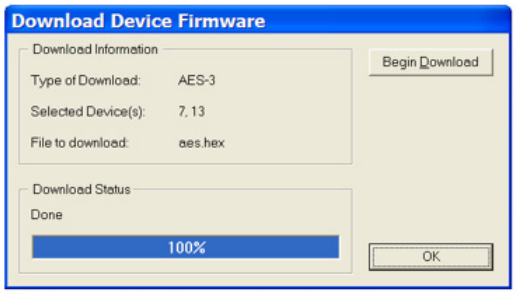


5. Using the browse icon, **browse** to the file to be downloaded.
6. Click **Open**.
   The Download Device Firmware window appears.



7. Click **Begin Download**.
   The download begins.

Once the file is transferred to the intercom, a message indicating Done appears in the Download status window. At this point, the Master Controller must forward the new firmware to the selected card(s).



8. Click **OK**.
   The AES-3 firmware download will be completed by the Master Controller, at which time the AES-3 card(s) will reprogram themselves and reboot. This takes a minute or two to occur.
9. Verify the **version upgrade** in the I/O Card Version Information window is correct.

WARNING: Do NOT power down the frame or pull the AES-3 card(s) from the frame until you have verified the new version information from AZedit. If the card loses power while reprogramming the on-board flash memory, the card may become unbootable, and may need to have its flash chips replaced.