LANCe DESIGN

ADX-120E DANTE

ANNOUNCER UNIT

[ENTERTAINMENT VERSION]

Operation Manual

Dante Firmware Version 1.0

ADX-120E

DESCRIPTION

The ADX-120E Commentary Unit (announce box) is designed to provide an 'all-in-one' facility for live broadcast announcer requirements, with all audio and control between the mobile unit and the booth being transported by standard Ethernet, on either copper or fiber. It is tailored to the requirements of entertainment productions, but my find application in a wide variety of production environments.

A single ADX-120E unit provides the following functions:

1) Two high-quality microphone channels; one on a front panel XLR for headset use, and a second on a rear-panel XLR.

2) A Program Channel and two (2) Communications channels to the announcer's headset. There are three volume controls on the top of the unit to control the headset mix of these sources.   Each of the three may be routed to the left ear only, right only, or both.

3) A two-channel wet (RTS-Format) IFB. This output has enough DC current available to operate two IFB beltpacks. This output may also be switched to a dry balanced output, selectable to either of the two program channels.

4) A two-channel wet (RTS-Format) TW intercom. There are two active hybrids in the unit, one for each channel. The truck-end connections are four-wire, and so this eliminates the need for external 4W to 2W converters. The DC current available is sufficient to operate two BP325-type beltpacks. There are noise gates on the TX side of the hybrids, so that any trans-hybrid leakage is minimized on the truck (4W) end.

5) An illuminated, latching "ON AIR" button, and two talk buttons for the two communications channels assigned to the headset. Colors may be assigned via the remote control (from the ADX2400) menus.

Other features include:

1) Power provided by the ethernet connection. The ADX-120E adheres to the 802.3af POE specifications, but this standard does not allow sufficient power for four RTS beltpacks.   Lance Design has available a 1RU switch/power supply (ADX-8000) which provides robust power for up to eight ADX-120Es, with ample reserve for the full beltpack complement.   In addition, this supply contains redundant, load-sharing high-efficiency power supplies with fault indication for maximum reliability, and provides the ethernet switch and fiber interface functions..

(continued)

ADX-120E Features - continued

2) The unit is very compact, and simple to implement. In a typical application, a single CAT5E cable connects each announce box to an ADX-8000 switch/power supply, or other equipment providing ethernet connectivity and DC power.

3) There are several methods of providing partial or full network redundancy. Each ADX-120E has two ethernet ports, which allow for a completely redundant network, if desired.   In addition, most ethernet switches have trunking or 'port aggregation' capability, which allows redundant fiber (or copper) connections between switches.   Contact Lance Design for more information.

4) The audio quality is very high. The microphone preamps are extremely low-noise, transparent parts made by THAT Corp (formerly DBX), and considered to be some of the industry's best. Preamp gain is remotely-controlled over a wide range, with peak hold headroom indication provided.

   Having the preamps almost right at the microphone connector eliminates interference, capacitive roll-off, and noise caused by long cable runs. The A/D converters are highest-quality 24-bit devices, and the digital audio paths are all 24-bit uncompressed.   Talkback, IFB and PL circuits are all full bandwidth, program-quality channels, so all of these paths are extremely clean, and provide excellent audio quality to the announcers' headsets and the PLs.

5) Latency through the ethernet transport is low.   From the microphone connector to the audio output at the truck is approximately 2.2 milliseconds. The IFB and PL paths are the same.

6) Industry-standard Dante networking is utilized for all audio transport.   In addition to providing high-quality audio transport and flexible network routing, Dante networking is compatible with a wide variety of third-party devices.

7) Full remote control of announce unit parameters is provided via the ADX-2400. Preamp gain, IFB and COMM configurations, Phantom power, Mic On/Off Control, etc. are all available at the mobile unit with all control traffic being carried by the Dante network.

System Overview

The ADX announce system consists of the following elements:

- One or more ADX-2400 frames which serve as the 'head end' or truck end of the system, and provide all inputs and and outputs for the truck or control room.

- One or more ADX-120E Announce Boxes or ADX-140 Interface Frames which function as the remote units in the booth or other remote location.

- ADX-8000 or other 48-volt power supplies as required to power the ADX-120E units.   48 volts DC should be applied to the spare pairs in the Cat 5 cable.

- Network infrastructure as required, consisting of standard layer-2 Ethernet switches, fiber optic elements, media converters, fiber and copper interconnects, etc. This is referred to in this manual as 'the network'.

The Truck End

ADX-2400 Front Panel

The ADX-120E Commentator Units connect via Ethernet (copper or fiber) to a standard ADX-2400 Audio Distribution unit in the truck.   These units are available in either analog or AES configurations, and have been well-proven through several years of widespread application in high-end mobile units and other applications.

Front panel metering and headphone monitoring is available for all paths.

ADX-2400N Rear Panel

All DB25 connectors are wired in the industry-standard Tascam/Pro Tools format, and breakout cables and pre-wired jackfields are available from a wide variety of suppliers.   One is Audio Accessories, Inc.   (www.patchbays.com)

Audio Routing and Configuration

The ADX-120E Dante version permits complete flexibility of audio routing. Any of the receive or transmit channels of the ADX-120E may be routed to any other Dante device channels using Dante Controller software, available here:

https://www.audinate.com/products/software/dante-controller

The software is available for Windows or Mac OS, and provides comprehensive control and status of the Dante devices on the network. It is easy to use, and tutorials are available on the Audinate web site.

The available Dante channels on the ADX-120E are as follows:

Transmit Channels (from ADX-120E to Network)

Ch 1   -   Mic 1 (front-panel XLR) – Switched by ON-AIR button.
Ch 2   -   Mic 1 Unswitched
Ch 3   -   Line / Mic 2 (rear-panel XLR)
Ch 4   -   PL 1 TX (ADX-120E talk)
Ch 5   -   PL 2 TX
Ch 6   -   PL 3 TX
Ch 7   -   PL 4 TX

Receive Channels (to ADX-120E from Network)

Ch 1   -   Program 1
Ch 2   -   Program 2
Ch 3   -   PL 1 RX (ADX-120E listen)
Ch 4   -   PL 2 RX
Ch 5   -   PL 3 RX
Ch 6   -   PL 4 RX

These channels may be routed to/from the ADX-2400 in any way desired. The ADX-120E utilizes the high-end 'Brooklyn II' Dante interface, which allows the maximum Dante routing flexibility.

Remote Control

The ADX-120E announce boxes support full remote control from the truck via the ADX-2400 front panel, as well as GPI control of the ON AIR button, with tally status returned via GPI.

GPI Setup

Some ADX-2400 menu options must be set properly for the GPI control to work.

- The GPI menu item in the 2400 must be set to 'MASTER'.   This causes the 2400 to act as the gpi controller, and poll the remote device(s).

- There are two GPI Remote ID menu items on the 2400; one for the gpi 1/3 pair, and one for the gpi 2/4 pair.   These items should be set to match the System ID of the remote device for which control is desired on that given gpi pair.

- There are no menu items in the ADX-120E to enable the remote GPIs. They are always active if selected in the ADX-2400.

- There is a menu item to enable the local (rear panel DB-9) GPIs. These GPI inputs simply parallel the ADX-120E buttons if they are enabled, and could be used for an announcer foot switch, for example.

System Configuraton

Configuration of the system takes place both in the ADX-2400 and in the remote devices (ADX-120E/140) themselves.   This configuration is all done from the ADX-2400 front panel.

There are three catagories of configuration:

1. ## The ADX-2400 Menu Configuration

   The ADX-2400 main menu allows configuration of the GPI operation, Saving and Recalling user and standard setups, and some status displays.

2. ## The ADX-2400 Channel Setup

   The sources, levels and delays (in Normal Mode) for each output (local or network) are set using the channel setup buttons. In Announce Booth mode There are some mixing functions available on local outputs 9-16, and a four-wire PL matrix available on Local/Net outputs 17-24. These do not have to be used, but are available if desired.

3. ## The Remote Device menus

   Each remote device (ADX-120E/140) has an internal menu which may be accessed remotely via the ADX-2400.

   These menus configure the hardware of the remote device itself, and are specific to the particular model, i.e. the ADX-120E has different options from the ADX-140 because of differences in their hardware capabilities.

   These menus configure such things as preamp gain, phantom power, IFB output configurations, headset impedence (level), button color, etc.

   These remote menu settings are saved in the remote devices themselves, and will remain associated with a particular device, even if it is moved or has its system ID reassigned.   These settings are not stored in the ADX-2400 at the truck.

   Status of many of the remote configuration items is displayed by LEDs on the remote devices (rear panel on the ADX-120Es, front panel on the ADX-140s).

Setting System ID Switches

In the Dante-based systems, the System ID switches provide the units with definitive identities, regardless of Dante names or routing. They do not have any connection to the Dante routing.

The System ID switches are two-digit rotary switches on the rear panel of the ADX-120E. The ADX-2400 also has System ID switches, which are behind the removeable front panel, on the PCB sub-panel.

The range for the switches is from 01 through 99 (00 is not a valid ID).

Any numbers from 01 through 99 are valid as system IDs. The only requirement is that each device has a unique number. These numbers provide the identity of the remote devices when accessing remote menus from the ADX-2400.

Accessing Remote Menus from the ADX-2400

The configuration items for the ADX-120E and ADX-140 units are accessible from the front panel of the ADX-2400.   To access these remote unit menus, double-click the **MENU** button on the ADX2400. The display will say: SELECT REMOTE DEVICE. The **MENU** button will be flashing to indicate that a remote device is being accessed.

The menu display will look similar to this:

```
Select Remote Device
ID = 01    ADX120E-01
```

If the selected device is present on the network, its Dante name will be displayed (ADX120-01 in this example).

Scroll to the desired remote device ID

Press **MENU** again.   This will access the menu of the remote device, and the menu might look like this (depending on the type of device and the selected item):

```
ADX120E-01    Config 01
Mic 1 Gain=45dB HR>30dB
```

The configuration and status items may be selected using the knob.   Once the desired item is selected, press the **MENU SET** button to allow changing that item's settings.   Settings are saved automatically after about 10 seconds of inactivity.

Press either **MENU SET** or **MENU** to go back to the item select mode.

When you're done, the easiest way out of any of the menu modes is to just press the **OUTPUT SELECT** button.   This will cancel all menu modes, and you won't have to step backwards out of them.

ADX-120E   Remote Menu Items

The ADX-120E menu items for firmware version 1.0 are listed below. These items may be accessed from the ADX-2400 front panel, or via the RS-232 remote port on the ADX-120E rear panel.

Config Item 01 – Mic 1 Gain (15-60dB)

This is the preamp gain for microphone input 1 (the front-panel headset input). It would typically run around 40 or 45 dB for normal sports use.   A headroom indication is also provided in the lower right corner of the display (HR=XXdB). This headroom is calculated from the peak audio levels, and has about a one-second decay rate. It is fairly accurate, and will give a good indication of headroom before either preamp or A-to-D clipping.

Config Item 02 – Mic 2 Gain (25-70dB)

Same as above for microphone input 2 (rear-panel XLR).   When this input is in the 'Line In' mode, the gain is fixed, and Item 02 will indicate that the input is in line mode.

Config Item 03 – Channel 2 Input (Mic or Line)

This selects either mic or line input mode for the rear-panel XLR input. When in Mic mode, Item 02 sets preamp gain.   When in Line mode, the gain is fixed through at unity through the system. The nominal 0VU level is +4dBm.   Output level at the truck is still adjustable on the ADX-2400.   Line input mode is indicated by a yellow LED on the rear panel.

Config Item 04 – Mic 1 Phantom (On / Off)

Turns on phantom power for Mic 1.   Indicated by a green LED on the rear panel.

Config Item 05 – Mic 2 Phantom (On / Off)

Turns on phantom power for Mic 2.   Indicated by a green LED on the rear panel. Phantom power for Mic 2 will automatically be turned off when Line In mode is selected.

Config Item 06 – Hdst Pgm Select

Controls the signal routing for the program feed to the headset. The selections are as follows:

Off   -   No program audio
Pgm 1   -   Program 1 feeds the headset
Pgm 2   -   Program 2 feeds the headset

Config Item 07 – Com A Sel

Selects which PL the Com A volume control and talk button will access.   The selections are as follows:

Off   -   Com A is disconnected
PL 1   -   Com A is assigned to PL 1 (and Ch1 of wet PL on rear pnl).
PL 2   -   Com A is assigned to PL 2 (and Ch2 of wet PL on rear pnl).
PL 3   -   Com A is assigned to PL 3.
PL 4   -   Com A is assigned to PL 4

Config Item 08 – Com B Sel

Same as above for Com B volume control and talk button.

Config Item 09 – Hdst Pgm To

Controls to which side(s) of the headset the selected Program audio will be routed.

Left
Right
Both

Config Item 10 - Com A To
Config Item 11 - Com B To

Same as above for the Com A and Com B listens

Config Item 12 – Hdst Volume (Normal, High)

This controls the amplitude range of the signals feeding the headphones (front-panel jack). It is really an adjustment for headphone impedence; e.g., it matches the range of the volume control knobs to the impedence of the headphones.   Normal should be used unless high-impedence headphones cause the volume to be inadequate. The High setting provides a 6dB increase in signal level.

Config Item 13 - IFB 2 Mode

This controls the output mode of the IFB 2 connector on the rear panel. The selections are:

Wet - 2 Ch - The connector is configured for wet (RTS) 2-Ch operation.
Dry - Ch 1 - Configured as a balanced dry output of the Ch 1 selection.

Config Item 14 - IFB2 Ch1

Selects the source for Channel 1 of the IFB 2 connector (if wet), or the balanced out (if dry).   Available selections are:

Off
Pgm 1
Pgm 2
Mic 1
Switched Mic 1
Tone

Config Item 15 - IFB2 Ch2

Same as above for Channel 2 of the IFB 2 connector when in wet mode.

Config Item 16 – On-Air Off Clr

This sets the color of the illumination for the On-Air button when it's in the off state.

Config Item 17 –On-Air On Clr

This sets the color of the illumination for the On-Air button when it's in the on state.

Config Item 18 –Com A Off Clr
Config Item 19 –Com A On Clr
Config Item 20 –Com B Off Clr
Config Item 21 –Com B On Clr

Config Item 22 – Local GPI (Disabled / Enabled)

Enables operation of the three GPI inputs on the rear panel (D9 connector). The inputs are available for hand-held or footswitches, and operate the On-Air, Com A Talk and Com B Talk.

The remaining menu items are status items

Status Item 01 – PCB Temperature

This item displays internal temperature of the ADX-120E in degrees Centigrade. Nominal temperature is in the 35 - 45 degree range, depending on ambient and PL and IFB loading.   Temperatures above 55 degrees are cause for concern and operating conditions should be investigated.

Status Item 02 – PL Current (xxx ma)

DC Current drawn by the external PL beltpacks. This should be less than 100 milliamps. The PL power supply will go into a shutdown condition if current is greater than 140 ma.

Status Item 03 – PL Voltage (xx.x Volts)

DC Voltage of PL power supply.   Nominally 25 volts.

Status Item 04 – IFB Current (xxx ma)

DC Current drawn by the external IFB beltpacks. This should be less than 100 milliamps. The IFB power supply will go into a shutdown condition if current is greater than 140 ma.

Status Item 05 – IFB Voltage (xx.x Volts)

DC Voltage of IFB power supply.   Nominally 25 volts.   Note that if a dry mode is selected for IFB2, the power supply will be turned off and voltage will read zero.

Status Item 06 – Default Name

This is the Dante Default name, which the device will be named if the Dante interface is reset to its default condition using Dante Controller

Status Item 07 – Firmware Version

Display of the version number of the firmware installed in the ADX-120E.

Resetting the ADX-120E Menu Variables to a Standard Configuration

The menu variables in the ADX-120E may be reset to a known standard configuration by holding down any of the front-panel buttons during boot-up.. (Hold one of the buttons down and apply power. After the unit initializes the menus will be reset).   The Dante ADX-120E requires about 15 seconds to boot up.

The standard configuration is:

Both Phantoms Off
Mic 1 Preamp Gain = 25dB
Mic 2 Preamp Gain = 35dB
Channel 2 set for Mic Input
Hdst Pgm=Pgm 1
Com A = PL 1
Com B = PL 2
Pgm, Com A, and Com B to both sides of headset.
IFB2 = Dry Ch1 mode.
IFB2 Ch1 Source = Pgm 1
IFB2 Ch2 Sourch = Pgm 2
Headset Volume set to Normal
All buttons in off state = Blue
On-Air = Red
Com A Talk = Yellow
Com B Talk = Yellow
Local GPIs = Disabled

Accessing the ADX-120E Menu Via the Remote Connector

The ADX-120E menus are also accessable via the RS-232 port in the Remote Control connector on the rear panel. Although it's unlikely that you would need this function it allows configuration of the unit in a case where it might be operated with Cobranet hardware other than the ADX-2400.   We also use it for test purposes in the shop.

The connector has a standard old-fashioned PC modem pinout, and will connect directly to a PC comm port or a USB-Serial adapter.   The PC will need to run a generic terminal application (like Hyperlink, or one of the many shareware terminal apps available).

The baud rate is 38.4K, no parity, one stop bit.   When the PC is connected, press return, and you'll see the the ADX-120E menus.   The space bar will toggle between item select mode and variable set mode. The comma and period keys ('<' and '>') take the place of the knob to step through the items or to change the settings.

Reliability Considerations

Since the commentary microphones and communications are typically provided by this system, reliability is of primary concern. The ADX-series products are designed with highest-quality components and conservative ratings so as to be as reliable as possible.

In addition, after manufacture, the ADX products undergo an extensive burn-in process which includes power and thermal cycling to attempt to precipitate out any early-life failures.

Even with these precautions failures are not impossible, and in addition there are other components to the system such as Ethernet switches which must also be considered in evaluating the overall reliability question.

Here are some thoughts on insuring a reliable on-air system:

- Provide a spare announce box and headset. This practice has been going on for decades with analog systems, and it's still a good idea. It protects against failure of the ADX-120E and the headset.

- Use the ADX-8000 to provide power for the ADX-120Es. This unit contains redundant power supplies and will provide highly-reliable power, even in the event of the failure of one of the supplies.

- Insure a reliable AC power source in the remote location for the ADX units and for the Ethernet switch.   If there is any question about the reliability of the AC supply you might consider using a small UPS power supply to provide battery backup. A small 500 watt unit intended for personal computer use will provide an hour or more of operation in the event of power failure.

- Use reliable Ethernet hardware such as switches, fiber GBICs, etc.   Burn in new switches for a few days before putting them on the air. Keep all Ethernet cables and fiber in good condition.

- Many switches have two fiber GBIC ports available. If the switches support this type of operation (trunking), and most do, two fiber runs could be connected between switches, thus protecting against fiber and GBIC failure.

- Consider using standard IT methods for providing a fault-tolerant network, if practical and warranted.   This could mean putting two switches on each end of the system connected by redundant fiber paths, Two Ethernet cables could be run from each ADX120, one to each switch.   This would protect against switch and fiber failure. At a minimum, consider having available a spare switch which could be substituted for a failed switch.

- Another single-point failure possibility is the ADX-2400 in the truck.   The ultimate in reliability would be to have a second unit with booth traffic split between them. This would insure that a failure of that unit would not disable all booth facilities.

NOTES

Dante ADX-120E Specifications

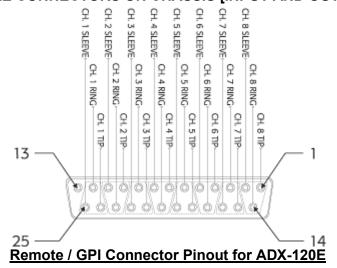|	
Microphone Inputs	2 low-impedence balanced. Phantom power available
Preamp Gain (total path)	+25dB to +70dB
Freq Response	20-20KHz, +/- 0.5 dB
Microphone Channel EIN	125 dB, bandwidth-limited to 25KHz
System Signal/Noise	>105 dB below peak level, bandwidth-limited to 25KHz
Path Distortion	<0.015% for Mic/Line and Dry IFB. <0.1% for PL / Wet IFB
Microphone Preamps	THAT Corporation 1570 / 5171
A-D and D-A Conversion	24-bit
Audio Processing	Dedicated 32-bit Analog Devices DSP
Dante Transmission	24-bit uncompressed
Sample Frequency	48 kHz
Path Latency	Approx 2.25 Milliseconds on all paths (analog to analog)
Headset Outputs	2 channel dry unbalanced. Max power in 600 ohms is 120mw.
IFB 2 Outputs	2 channel wet RTS-format or single-channel dry +4dB nom.
PL Interface (Booth End)	2 channel wet RTS-format. DC current to support 2 beltpacks
PL Interface (Truck End)	4-wire dry +4dBm nominal. 8 assignable 4W Ports
PL Trans-hybrid Loss	Greater than 55 dB
Remote Control	From ADX-2400, From rear-panel RS232, or GPI
Front Panel Switches	Three; On-Air, Com A Talk, Com B Talk. RGB Illumination
System Addressing	Rear panel two-digit rotary switches. Address 01-99
Dante Interface	Brooklyn II Module
Power Requirements	48 Volts DC, 195 ma. 320 ma with four RTS/Telex beltpacks.
Power Source	48V on spare Cat5 pairs
Ethernet Interface	1000baseT Standard Ethernet (switched or redundant ports)
Ethernet Bandwidth Req'd	Approximately 8 megabits each direction per ADX-120E
Dimensions	9" wide x 5.5" deep x 2.5" high Weight approx. 2.5 pounds

Lance Design ADX-2400N Analog Pinout (Inputs and Outputs)

Audio Channel	D-25 Pin	Audio Channel	D-25 Pin	Audio Channel	D-25 Pin
CH 1 +	24	CH 9 +	24	CH 17 +	24
CH 1 -	12	CH 9 -	12	CH 17 -	12
CH 1 SHLD	25	CH 9 SHLD	25	CH 17 SHLD	25
CH 2 +	10	CH 10 +	10	CH 18 +	10
CH 2 -	23	CH 10 -	23	CH 18 -	23
CH 2 SHLD	11	CH 10 SHLD	11	CH 18 SHLD	11
CH 3 +	21	CH 11 +	21	CH 19 +	21
CH 3 -	9	CH 11 -	9	CH 19 -	9
CH 3 SHLD	22	CH 11 SHLD	22	CH 19 SHLD	22
CH 4 +	7	CH 12 +	7	CH 20 +	7
CH 4 -	20	CH 12 -	20	CH 20 -	20
CH 4 SHLD	8	CH 12 SHLD	8	CH 20 SHLD	8
CH 5 +	18	CH 13 +	18	CH 21 +	18
CH 5 -	6	CH 13 -	6	CH 21 -	6
CH 5 SHLD	19	CH 13 SHLD	19	CH 21 SHLD	19
CH 6 +	4	CH 14 +	4	CH 22 +	4
CH 6 -	17	CH 14 -	17	CH 22 -	17
CH 6 SHLD	5	CH 14 SHLD	5	CH 22 SHLD	5
CH 7 +	15	CH 15 +	15	CH 23 +	15
CH 7 -	3	CH 15 -	3	CH 23 -	3
CH 7 SHLD	16	CH 15 SHLD	16	CH 23 SHLD	16
CH 8 +	1	CH 16 +	1	CH 24 +	1
CH 8 -	14	CH 16 -	14	CH 24 -	14
CH 8 SHLD	2	CH 16 SHLD	2	CH 24 SHLD	2

6 FEMALE CONNECTORS ON CHASSIS [INPUT AND OUTPUTS]

Remote / GPI Connector Pinout for ADX-120E

Connector is DB9F

Pin #	Function
1	Ground
2	RS232 Data Out (TX)
3	RS232 Data In (RX)
4	(no connection)
5	Ground
6	GPI 1 In (On-Air)
7	GPI 2 In (Com A Talk)
8	GPI 3 In (Com B Talk)
9	Ground

GPI inputs are TTL-compatible inputs, pulled up to +5 volts with a 5K resistor.   They should be pulled to ground with a dry switch closure to activate.

RS232 Remote port is 38.4K Baud, One Stop Bit, No Parity

Remote Control Connector Pinout for ADX-2400

Connector is RJ-45 Female

Pin #	Function
1	GPI 1
2	GPI 2
3	+5 Volts
4	Ground
5	RS232 Data In (RX)
6	RS232 Data Out (TX)
7	GPI 3
8	GPI 4

GPIs used as inputs are TTL-compatible, pulled up to +5 volts with a 5K resistor. They should be pulled to ground with a dry switch closure or O.C. transistor to activate

GPIs used as outputs are open-collector transistors with a 5K pull-up resistor to +5 volts. These transistors pull to ground when the GPI is active. Current should not exceed 200 Ma.

When ADX-2400 is in Master GPI mode, GPIs 1 and 2 are outputs, and GPIs 3 and 4 are inputs.