MEDIATECHNOLOGYSYSTEMS INC.

MANUAL

AMX8.8CN
16x8 Automixer and
CobraNet™ Interface

766 LAKEFIELD ROAD, WESTLAKE VILLAGE, CALIFORNIA 91361 U.S.A. www.mediatechnologysystems.com
Part # MAN-0308-MCA-RevB

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CAUTION: ANY CHANGES OR MODIFICATIONS MADE WITHOUT THE EXPRESS APPROVAL AND PERMISSION OF MANUFACTURER, VOID RESPONSIBILITY OF MANUFACTURER FOR COMPLAINCE.

THIS EQUIPMENT HAS BEEN TESTED BY A COMPETANT BODY AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS-B DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FEDERAL COMMUNICATIONS COMMISSION RULES. THESE LIMITS ARE DESIGEND TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL RF ENERGY IN A RESIDENTIAL INSTALLATION.

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-RE-ORIENT OR RELOCATE THE RECEIVING ANTENNA
-INCREASE THE DISTANCE OF ANY EQUIPMENT AND THE DEVICE.
-CONNECT THE DEVICE TO A DIFFERENT A/C POWER CIRCUIT OUTPUT TO THE RECEIVER
-CONSULT QUALIFIED TECHNICIAN OR A RADIO.TV SPECIALIST FOR ASSISTANCE.

MEDIATECHNOLOGYSYSTEMS INC

DECLARATION OF CONFORMITY

The manufacturer of the Products covered by this Declaration is:

Media Technology Systems Incorporated of 766 Lakefield Road, Unit F, Westlake Village, CA 91361-2050 U.S.A.

The Directives covered by this Declaration:

2006/95/EC
2004/108/EC
2002/96/EC
2002/95/EC

The Product(s) covered by this Declaration:

ION Series Interfaces: ION 4.4, ION 8.8

The Basis upon which conformity is being Declared:

The manufacturer hereby declares under its sole responsibility that the products indentified above comply with the safety objectives of the EU's Low Volage Equipment directive, 2006/95/EC, and Electromagnetic Compatibility (EMC) directive 2004/108/EC, and that the following standards have been applied:
EN60065, EN55103-2

The CE mark was first applied in 2009.

Signed:  Stephen J. Woolley

Authority: President MTSI

Date: August 25th, 2009

IMPORTANT NOTE:

*The attention of the Specifier, Purchaser, Installer, or user is drawn to special measures and limitations to use which must be observed when these products are placed in service, to maintain compliance with the above and other relevant directives. It is the responsibility of these entities to assure the **system** is in compliance regardless of the individual component's approvals and certification.*

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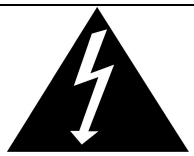
Explanation of Symbols



TO PREVENT ELECTRIC SHOCK DO NOT REMOVE COVER.
NO USER SERVICABLE PARTS INSIDE. REFER TO QUALIFIED AND CERTIFIED SERVICE PERSONNEL. SMPS/PFC CARRY POTENTIALLY LETHAL VOLTAGES.

CAUTION

RISK OF ELECTRIC SHOCK
DO NOT OPEN

The exclamation mark in a triangle is intended to alert the use to the user to the presence of important operating and maintenance/service instructions in this manual.

The lightning flash in a triangle is intended to alert the user to the presence of un-insulated “dangerous” voltages with the product’s chassis that may be sufficient to create a risk of electric shock to humans.

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1 Welcome

1.1 Important Safety Instructions

- Important Safety Instructions:
- Read these instructions.
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water.
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- 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 the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer.
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as 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.

1.2 How to use this manual.

This manual provides you with valuable information for safely and correctly installing, setting up and operating your AMX8.8CN device. It is not possible to cover all aspects of installation and application of complex product. However, we have attempted to supply all critical and essential information, plus advice and explanations where relevant. There is a great body of work re sound systems best practices, available from many sources on line. MTSI will, from time to time add “White Papers” and Application Notes to our website. As well as additional information on amplifier use and other valuable information.

It is particularly important that you read this manual and especially the Warnings and Cautions.

1.3 Terminology: Functions, Names & Acronyms.

Attenuation/Attenuator: An attenuator is used to reduce the level of an incoming signal. Many think the "volume" control on typical audio equipment makes the power of the amplifier greater. In fact amplifiers are typically pre-set with a specific amount of gain. The input attenuator or volume control is used to vary the amount of signal that is allowed through to the amplifier's gain section.

BGM - Back Ground Music: Typically low-level ambient music such as one would find in an elevator or super-market.

CMRR: Common Mode Rejection Ratio, is the ability for an input circuit to reject noise interference and other artifacts induced on the input signal lines. A balanced line, or differential input has two, opposite and equal, plus and minus, input connections and a centre ground reference. The cable has two conductors and a shield or ground connection. At the transmit/send/source end of the cable the audio signal is split and one side is inverted in phase. Over a run of cable any hum, buzz or other electromagnetic inference, not effectively shielded b y the cable is picked up and theoretically induced equally on both the plus and minus conductors. Thus we have the intended signal running out-of-phase and any induced noise running in-phase across the two conductors. These opposite and equal signals are brought into a differential amplifier where the phase of one of the signal that was in inverted is put back into phase and the two signals added together. The signals since they are complementary add together. The noise which was in phase is inverted added together but now out of phase and thus cancelled. The instrumental Instrumentation input is of the highest quality where the circuits and values of the components are closely matched. The more closely matched the two sides of the input are the greater the ability of the circuit to reject and common mode signals.

CobraNet™®: CobraNet™ is a proprietary digital audio networking protocol designed for high quality, low latency digital audio transmission.

http://www.CobraNet™.info/en/

Euroblock: The 'Phoenix/Euroblock' -type connector is a pair of high current, latching, output connectors used for speaker and 70/100V Line loads. Rated at 300V/15A these connectors are reliable, of high quality, and simple to install and re-configure.

LAN-Local Area Network: A digital network normally using CAT-5/RJ-45 or WiFi connectivity for routing data, and digital audio and video signals

Latency: Effectively the time delay between a signal being sent and received through a system, typically caused by signal processing and network transmission time. Low latency is considered in the 2ms to 12ms range. Above the 12ms latency the delay between an original signal and the reproduced signal becomes perceptible and detracts from the intelligibility of the communication. Note: In paging applications latency is not an issue since there is rarely "open-microphone" use as in entertainment or other "Live" uses.

Peak: The LED when illuminated indicates a high level signal is present at the device's input. Caution should be exercised since signals at this level are close to, or are clipping the amplifier. Occasional peaks are acceptable and let the operator know the system noise and headroom are optimal. Constant peak indication should prompt a review of the system and its use demands. All MTSI products are designed to have graceful overload characteristics which progressively, rather than catastrophically clip, thus significantly improving the real-world quality and usability of the overall system.

Phoenix/Euro Type Connector: Phoenix-type 3 circuit connectors are used for audio signal input to the amplifier channels. Input impedance is 20k Ω balanced, 10kΩ unbalanced.

Power: The Power LED when lit, indicates power is applied to the unit.

RS-485: An IEEE standard protocol for signal distribution.

http://en.wikipedia.org/wiki/RS-485

Signal Present: The LED illuminates with the presence of a low level signal at the amplifier's input. This is a useful feature for visually confirming signal flow to this point in a sound system. As discussed under "**Peak**" the quality of a system's ability to "communicate" the program material being transmitted is primarily established at the input to that system. The signal to noise and headroom (isolation from potential clip) of a system is established by the optimum setting of the input gain controls. Having good information when setting the input gain is therefore critical. Being able to observe the **Signal Present** and **Peak** levels gives the operator this critical ability.

SMPS: Switch Mode Power Supply, is a type of power supply topology, which takes the incoming potential energy from the A/C power line and "chops" it into very short pulses. SMPS supplies give very stable and highly regulated output regardless, generally, of variations in the A/C input.

Termination-1: Commonly use term for connecting input and output cables.

Termination-2: In the networked and control & monitoring amplifiers, the RS485 connector is provided with a "termination" selector switch to apply a 150Ω resistive load to the I/O. This is often used to "load" the TX/RX driver. Check the requirements of the interfacing device and select the appropriate setting.

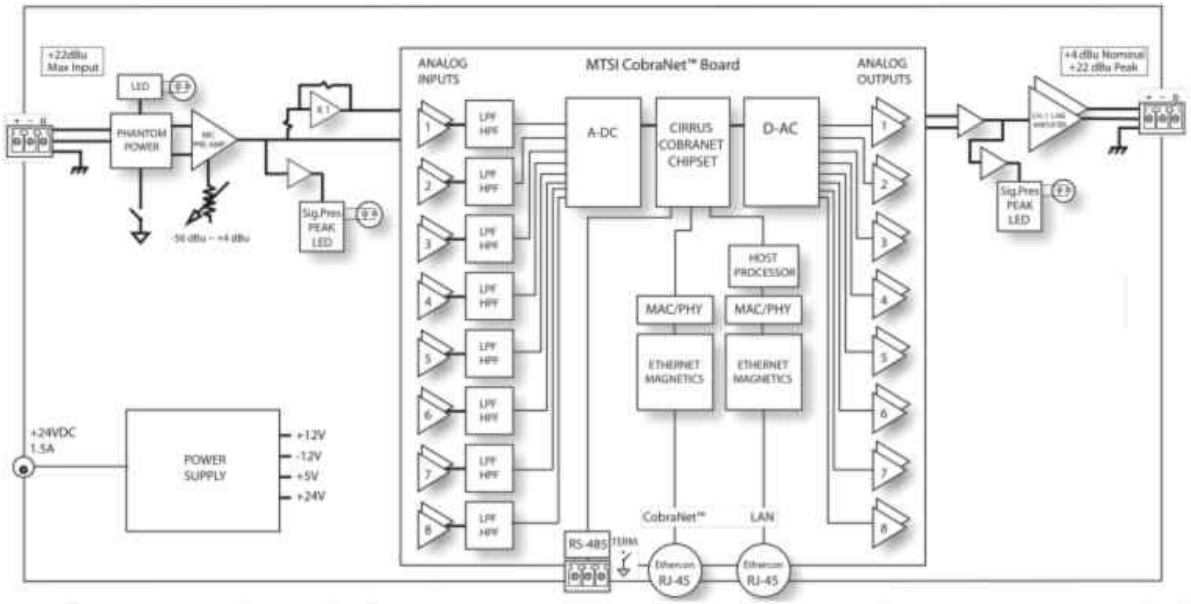
2 Specifications

NOTE: The AMX8.8CN is electronically identical to the ION8.8CN. The primary difference is the DSP firmware , Host processor firmware and GUI software.

Intermodulation Distortion:	<1%
Total Harmonic Distortion:	<1% THD
Small Signal Frequency Response:	20-20kHz ±3dB
Hum & Noise: Typically	>70dB below rated output
Input Sensitivity:	-56dBu @ max gain for +4dBu output
Voltage Gain:	-60dB to 0dB
Input Impedance:	6K Ohms
Output Impedance:	150 Ohms, 600 Ohm min load.
Max Input voltage level:	+22dBu
Max Output Voltage Level:	+22dBu
Input Level Control: Rotary gain control	60dB gain range.
Phantom Power:	+24VDC, switch selectable per channel
Input: Signal Present - Peak Indicators	Bicolor LED, Green, signal present, RED, 6dB before clip
Output: Signal Present - Peak Indicators	Bicolor LED, Green, signal present, RED, 6dB before clip
Input / Output connections:	EUR 3.5mm type
Power Indicator:	RED Led power ON
Power Requirements:	24VDC @ 1.5A max
Wall Wart DC Power supply:	100 - 240VAC 50/60Hz output 24VDC @ 1.5Amps
Dimensions: ION 4.4	
Dimensions: ION 8.8	
Weight: ION 4.4	
Weight: ION 8.8	

3 Functional Description

3.1 Signal Path



3.2 Analog I/O

The AMX8.8CN has 8 analog inputs and 8 analog outputs. Each analog input circuit employs a fully balanced true differential topology designed to maximize CMRR across all possible input connection methods, where the input and output connectivity has been designed to meet AES48 standards for immunity to hum, buzz and SCIN.

Each input stage has a 10kohm input impedance and can accommodate signals of up to +24dBu peak, where the input channel gain is adjustable from 0dB to +60dB, ie –from 56dBu (nominal)/+36dbu (peak) to +4dBu (nominal)+24dbu (peak) via a front panel mounted rotary potentiometer. Each input channel has an individual front panel mounted switch that form phantom power (+24volts DC).

Both input and output channels have front panel mounted signal (-20dB threshold) and peak (-3dB threshold) LED's.

Each output channel is 600ohm impedance and drives signals of up to +24dBu peak.

3.3 Cobranet I/O

The AMX8.8CN also contains a CobraNet™ interface. The digital audio streams are sourced from the CobraNet™ interface/CS496112 chipset (similar to the commonly used CM2 card) and converted into analog audio and/or automixer link signals. The CobraNet™ interface provides 8 simultaneous bundle receivers and 4 simultaneous

bundle transmitters, each with up to 16 simultaneous audio streams (see Cirrus Logic UM23 and PM25 for full details of the CobraNet™ chipset and protocol).

In addition to audio transport, the CobraNet™ port provides control and monitoring capability via SNMP. MTS provides an OEM version of Stardraw control with embedded MTS SNMP drivers for custom GUI rendering. This is downloadable from the MTS website.

The SNMP controls include all the standard CobraNet™ OID's. See Cirrus Logic's UM23 users manual for full details of the chipset and PM25 programmers manual for full details of the SNMP controls…http://www.CobraNet™.info/en/products

See Figure 3-1 for details of the internal block diagram for the Digital Section I/O.

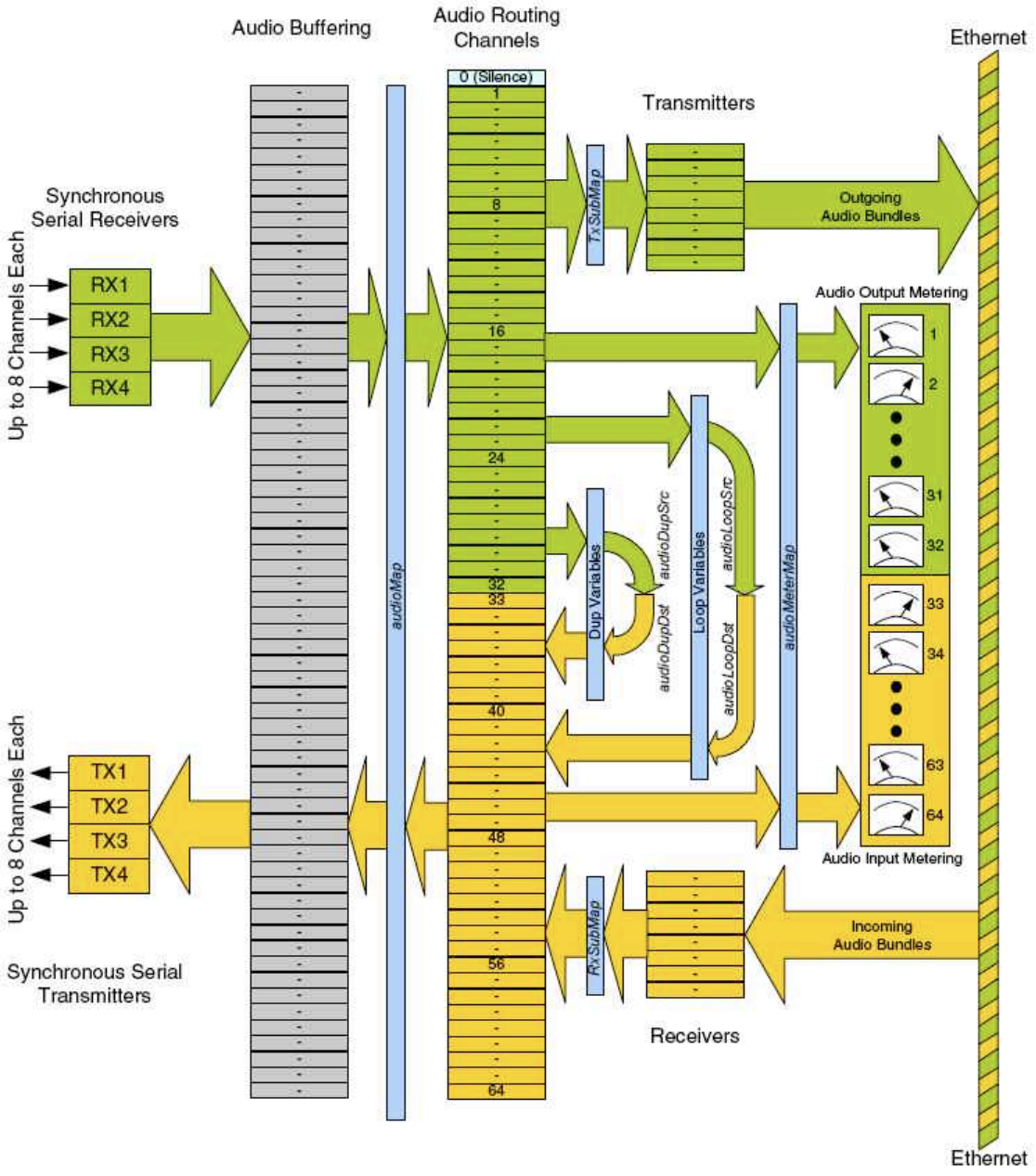


Figure 3-1: Block diagram showing the Cobranet routing of the AMX8.8CN

3.4 Ethernet (LAN) port

There are 2 network ports on the rear panel and the second network port is an Ethernet control port and NOT a redundant CobraNet™ port). The Ethernet port provides control & monitoring capability of all DSP and CobraNet™ parameters using a simple TELNET based protocol.

In smaller systems, it is likely that the CobraNet™ port will be used for both audio transport and control & monitoring. For larger systems, where the audio transport is on a separate VLAN (to control bandwidth), the TELNET port will provide access to separate control & monitoring port that can be added to the general AV/BMS system.

Note: The control & monitoring is either/or, ie TELNET or SNMP, but not both simultaneously.

3.5 RS485 port

The RS485 port provides a serial connection, so that 3rd party serial data can be bridged on to the CobraNet™ network for communications between CobraNet™ nodes (see Cirrus Logic Programmers manual PM25 for more information on Serial Bridging).

3.6 Power Supply

The AMX8.8CN uses an internationally approved "world voltage", external power supply unit, model number:

This supply takes 100-240VAC 50/60Hz and provides 24VDC at 1.5 Amps to the internal supply board. Regulation and supply rails are generated internally by a Switch Mode Power Supply (SMPS) board that derives plus 12 and minus 12 Volt, 5 Volt and 24Volt rails for the various circuit elements, such as the MTSI CobraNet™ board, that make up the AMX8.8CN.

3.7 Installing the Interface

3.7.1 What is Included:

Each MTSI AMX8.8CN is shipped with the following:

- An A/C power cable, IEC type with appropriate mains plug for the region in which it is sold.
- Phoenix/Euro-type input connectors, as required per channel.
- Phoenix/Euroblock-type speaker load output connectors, as required per module.
- Rack mount 'ears' and connecting plate
- Basic Owner's/Operator's Manual and other documentation.

For full documentation on AMX8.8CN software, control and other protocols, please refer to www.mediatechnologysystems.com website for downloads and additional valuable information. Or contact your official distributor.

3.7.2 Air Flow and Cooling Requirements:

The AMX8.8CN product generally does not require special consideration for air-flow or spacing from other products. However caution should be exercised when mounting in proximity to any heat generating device, such as an amplifier. Heat is the enemy of all electronics, reducing the product life and reliability.

The AMX8.8CN is designed to operate in temperatures from +10 to +40degrees Centrigrade

3.7.3 A/C Mains Power Connection:

The AMX8.8CN is designed to operate on all standard A/C Power voltage and frequencies found Worldwide. There is no requirement to set Voltage or Frequency selectors etc.

3.7.4 Power Cable:

Use only the power supply and cable supplied with the AMX8.8CN.

Incoming Power Requirements: Make sure that the power circuit, cables, sockets, breakers etc., feeding your AMX8.8CN are rated to support the power indicated on the rear panel of your AMX8.8CN (in Watts). Care should be taken to assure that the power distribution arrangements are sufficient for the nominal A/C Voltage and the resultant current being sourced by your AMX8.8CN.

3.8 Setup

3.8.1 Unpacking your AMX8.8CN:

It is recommended that the carton and packing material is retained so the AMX8.8CN may be shipped for service should this be required. Any damage caused by improper packaging will not be covered under warranty. Should you chose to dispose of the carton and packaging, make sure to dispose of these parts according to local, state and national requirements and good ecological practice.

3.8.2 What comes with your AMX8.8CN:

A full set of input and output “line” connectors are fitted as standard to your new MTSI AMX8.8CN. A power supply and cables are supplied that are appropriate to the territory within which the AMX8.8CN is supplied.

Level Controls: Initial setting for these should be to the full counter-clockwise position, or minimum. This is an advisable set up convention, which avoids accidental high-level signals potentially damaging the loudspeaker. With an appropriate signal applied to the input, gradually bring up the signal level through the AMX8.8CN and confirm proper system operation. See **Signal Present** and **PEAK** sections.

3.9 Input Wire and Connectors:

Each channel input uses a Euro/Phoenix type input connector set. The line connectors are supplied with your AMX8.8CN. It is recommended that balanced connections are used for all inputs in professional applications, since significantly less hum, buzz or other noise are induced on the signal, particularly in long cable runs such as are found in installations.

For balanced input connect as Figure 3-2 below. For an unbalanced source, use balanced cable and only connect the shield at the AMX8.8CN/8.8. The source should be connected to the + and – of the cable only (not the shield).

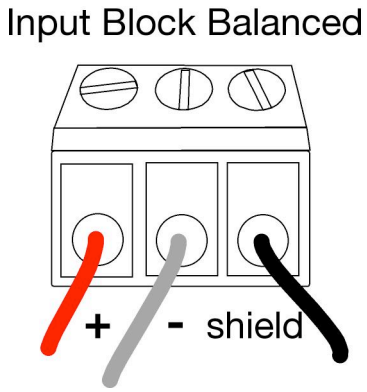


Figure 3-2: Euroblock connector pinout

Note: The Phoenix/Euro type connectors on the left side of the I/O area show the Channel Number, the plus, minus and GND or shield. In the interests of reducing ground anomalies in large systems where signals may be routed from remote sources with the opportunity for ground anomalies, it is common practice to 'lift' the shield on one end (only) of the cable to minimize ground loops. Under any and all circumstances, for safety, check and make sure that proper A/C and systems grounding is practiced. Your MTSI AMX8.8CN is designed in keeping with correct safety grounding approved under international accepted standards. It is also designed with an understanding of the 'Real-World' circumstances of systems installation. The instrumentation differential input, the signal grounding practice and other build aspects are designed to provide the minimum opportunity for A/C and signal borne noise and interference to contaminate your program material and system functionality.

3.10 Ground Pin

Both the AMX8.8CN has a rear panel mounted ground pin (bottom right of the rear chassis panel – see Figure 3-3 below. The 24volt external power supply is ungrounded

and the rear panel ground pin has been provided as a means of connecting the interface to a good ground. This may be necessary if the AMX8.8CN interface (particularly the AMX8.8CN) is located outside a rack and a ground reference is needed to reduce noise.

Figure 3-3: Rear chassis panel showing ground pin

3.11 Network connectors

The MTS AMX8.8CN uses the Neutrik Ethercon socket to provide a more secure, robust connection. Please download the Ethercon assembly manual from the Neutrik website…

http://www.neutrik.com/client/neutrik/media/downloads/Media_240701762.pdf

NOTE: Be careful to remove the RJ45 tab if you are adding the Ethercon shell to the RJ45 connector, otherwise you will not be able to remove the assembly from the Ethercon socket.

4 Automatic Microphone Mixer/DSP Operation

The AMX8.8CN is a 16 x 8 Automatic Microphone Mixer solution with a CobraNet™ port. The AMX8.8CN has 8 analog Mic/line input channels, 8 Cobranet audio streaming input channels and 8 line level audio output channels. In addition, the AMX8.8CN uses spare Cobranet channels for the transfer of audio and linking signals between 2 or 3 AMX8.8CN to make a 30 x 16 or 42 x 24 matrix mix.

4.1 Automatic Microphone Mixer Overview

4.1.1 Automixer Device

Before proceeding to the DSP schematic, it will be necessary to understand how the Automatic Microphone mixer device works. The input section of the AMX8.8CN is shown below (Figure 4-1) and has analog inputs 1-8 and Cobranet inputs 1-6 as 14 channels of audio input to the Automixer device. Cobranet outputs 1-8 are a patch of Analog inputs 1-8 and allow the AMX8.8CN to function as a simple bridge, putting the analog audio inputs straight on to the network for use in other devices.

Cobranet inputs 7 & 8 are fed directly to the 16x7 mixer, as these are the audio feeds from linked AMX8.8CN devices. If the AMX8.8CN is operated as a standalone device, then Cobranet channels 7 & 8 are available as additional non-Automixer inputs.

Cobranet output 9 is the Automixer link output and carries NOM, gating, priority and other control information (Note: this is NOT an audio signal and should never be connected to the loudspeakers to avoid damage).

Cobranet Inputs 9 & 10 are the control feeds from linked AMX8.8CN devices and connect directly to the Automixer link inputs.

Cobranet outputs 10 & 11 are the audio mix-minus feeds from the Master AMX8.8CN to the slave AMX8.8CN.

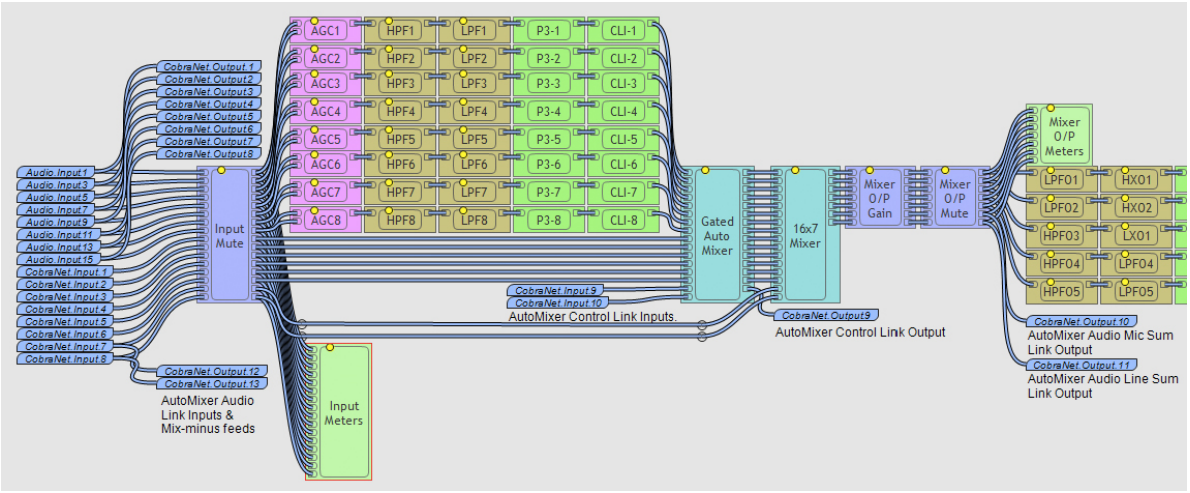


Figure 4-1: AMX8.8CN input section showing Automatic Microphone Mixer device

The automatic mixer device does not actually perform any mixing. The automatic mixer is a set of parallel gates to be connected between microphone input signals and the matrix mixer. This system of gates automatically selects the appropriate channels that should be allowed to pass to the mixer.

Selection is based on signal level at the input, overall audio level for the system, priority level assignment and configured maximum open mic constraints. The automix device features the capability to receive link status inputs from other automix devices, combine this information from the multiple sources and local status and produce operational parameters and a Master link output which can be fed back to the other automix devices allowing them to all operate together based on common a common understanding of the system state.

The Automatic mixer features gating and priority logic and facilities for linking with other automatic mixer devices. The master link output conveys Number of Open Mics (NOM), priority and background level information for the system. The master link output is generated based on the link input signals received from other mixers and state of local gates.

4.1.2 Linking between Master and Slave devices

The AMX8.8CN Automix device, when configured as a link master, features the capability to receive link status inputs from other AMX8.8CN Automix devices, combine this information with local status and produce operational parameters and a Master link output which can be fed back to the other AMX8.8CN Automix devices allowing them to all operate together based on a common understanding of the system state.

If only one AMX8.8CN is used in the system (ie Standalone operation), no linking signals are required. For systems with numerous Automix devices, only one device in the system performs this service, ie it becomes configured as the system 'Master' and other AMX8.8CN as configured as 'Slaves'.

The link signal carries NOM, priority and background level information. The link signals can be routed over CobraNet with 16, 20 or 24-bit resolution, as follows

- Priority – Priority is 0 if no channel is open.
- NOM – Count of open microphones.
- Background – Average peak level measured prior to gating among all inputs.

The values of the link output are calculated as follows:

- Priority – the highest priority seen on all valid input links.
- NOM – sum of all valid incoming NOM values
- Background – Sum of average of background values received on valid links scaled by Internal background control and detected peak level of external background input scaled by External background control.

4.2 AutoMixer Input and Output Signals

4.2.1 Audio Input

Wire microphone & line signals to the inputs. Inputs should have uniform gain. Ideally, unused channels should have their inputs muted prior to reaching the Automix device to avoid unnecessarily triggering the gates.

4.2.2 Link Input

When this AMX8.8CN ***IS*** serving as a link master for the system, connect the slave Link outputs from each of the other AMX8.8CN devices in the system to these inputs.

4.2.3 Master link Input

When this AMX8.8CN is ***NOT*** serving as a link master for the system, connect the Master link output from the AMX8.8CN Link master device in the system to the ***first*** of these inputs.

4.2.4 Gated Audio

One output per audio input channel. This is a gated version of the audio input channel. These outputs are connected to the mixer, which produces the signal(s) sent to the sound reinforcement system.

4.2.5 Link Output

When this AMX8.8CN is ***NOT*** serving as a link master for the system, this output communicates gate priority and background level information to the AMX8.8CN link master device. This output must be connected to a link input on the Link master device for the system.

4.2.6 Master link Output

When this AMX8.8CN ***IS*** serving as a link master for the system, this signal must be fanned out to the mater link input of all AMX8.8CN devices in the system.

4.3 AutoMixer Controls

A summary of the Automixer control panel is shown below (Figure 4-2).

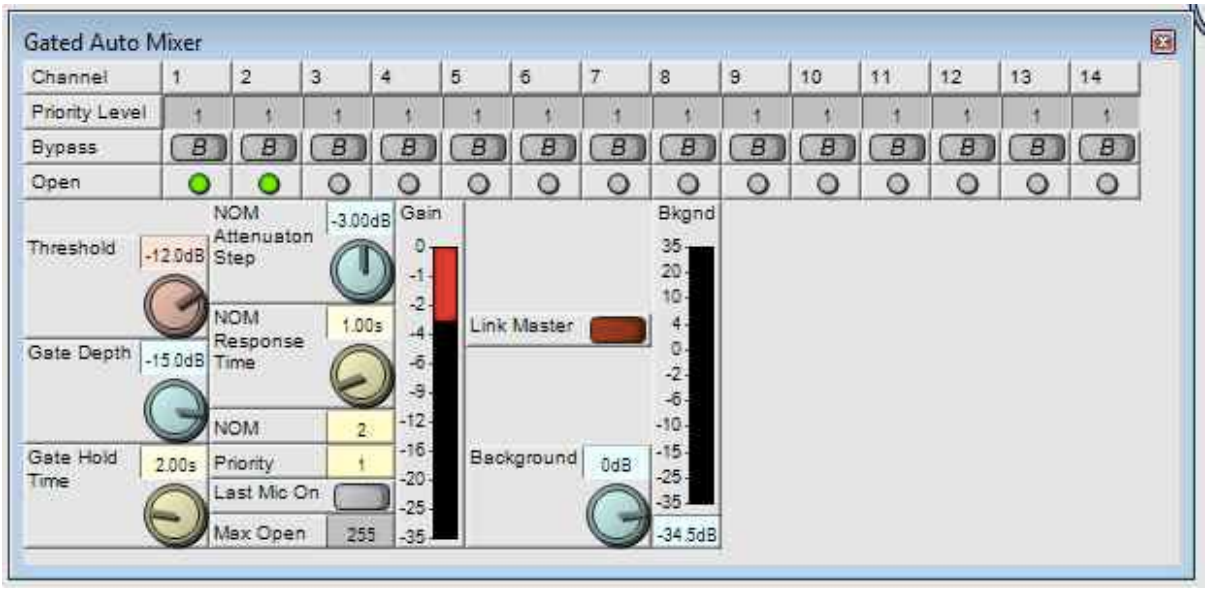


Figure 4-2: AutoMixer Controls

The controls are…

4.3.1 Bypass

Type: Toggle
Default: Disabled

When enabled, audio for the channel is routed directly from the input to output. The gate is deactivated. The *Open* indicator does not light and channel does not contribute to NOM count or background level summing.

When disabled, the channel opens and closes in response to input level as constrained by…

- *Priority*,
- *Maximum open mics*
- *Last mic open* logic.

When open, Open indicator lights and channel is counted as an open mic for NOM computations.

Note: Because bypassed channels are not counted in NOM or background level computation, bypass mode should not normally be used on channels connected to microphones. Bypass mode allows the Automixer device to handle both microphone inputs (needing NOM) and auxiliary inputs (eg AV Sources) that do not need to be controlled by the NOM calulation. In this way, the 16 inputs to the 16x7 matrix mixer can be a flexible number of microphones or line level sources, according to the need of the particular application.

Note: A channel can be disabled by muting the signal before it reaches the automixer.

4.3.2 Priority

Type: Integer
Range: 1 to 20
Default: 1

Defines priority for the channel. Gate will not open if a channel with a higher assigned priority is already open. Gate will close immediately if a channel with higher priority opens. Multiple channels with same assigned priority may be open simultaneously.

Note: to disable priority operation, set all channels in the system to the same priority.

4.3.3 Gate Threshold

Type: dB
Range: -100 to +23 dB
Default: -10 dB

Level threshold for opening and closing the gate. Threshold is relative to the background level as per Background gain on the link master device. When input level exceeds Threshold *plus* the background level, the gate opens immediately. When input level drops below this threshold, the gate waits for *Hold time* to expire before closing. If level goes above the effective threshold before *Hold time* expires, the gate remains open and *Hold time* is reset.

Note: If *Last mic on* is enabled, the gate may remain open. See *Last mic on* documentation for details.

4.3.4 Gate Hold time

Type: Time
Range: 10 ms to 10 s
Default: 1 s

Wait time in open state for closing the gate when input level passes below *Threshold*. *Open* indicator remains lit and channel is counted as an open mic during hold time.

4.3.5 Gate Depth

Type: dB
Range: 0 to -100 dB
Default: -20 dB

Attenuation for channel when gate is in closed state (*Open* indicator extinguished). Milder (towards 0 dB) settings produce a more natural response but may adversely affect gain-before-feedback performance of the system.

4.3.6 Maximum open mics

Type: Integer
Range: 0 to 255
Default: 255

Maximum open mics allowed at any time in the system. No additional gates will open if current NOM equals or exceeds this setting. Mics are opened on a first-come-first-served basis. The same setting should be used for all automix devices in a system. Using higher settings on some devices will cause open mics to be spread unevenly across the system.

Note 1: To disable *Maximum open mics* behavior, set the control to its maximum value (255).

Note 2: If multiple channels are above threshold when NOM drops to a level where a new mic may open, the lowest numbered channel is given preference.

NOM is read and assessed when *Threshold* is first exceeded. If *NOM>=Maximum open mics*, the gate does not open.

4.3.7 Input Open Indicator

Type: LED

Lights when signal level exceeds Threshold + background or due to Last mic on logic and channel is not constrained by Priority or Maximum open mics. Never lights in Bypass mode.

Note: The Input open indicator is available as a 'look at me' trigger for camera presets during video conferencing. The indicator can be accessed using MTS Control (see "MTS Cobranet Interface Programming Manual").

4.3.8 Last mic on

Type: Toggle
Default: Disabled

When enabled the last microphone with gate open will remain open when the *Hold time* expires. The *Open indicator* will remain lit and NOM indicator will show 1 and priority will show 0. The last mic will immediately close when any other gate in the system opens. This feature can produce a more natural responding system based on the idea that in many conferencing scenarios, the last to speak is most likely the next to speak.

NOM is read and assessed when *Hold time* expires. If NOM=1, the gate remains open.

4.3.9 Link Master Controls

These controls are only active on the device configured as the Link master. A device is configured as Link master by the presence of one or more Link inputs.

4.3.10 Link Master NOM attenuation step

Type: dB
Range: 0 to -6 dB
Default: -3 dB

Controls the amount of gain reduction per doubling of the number of open mics. With only one open mic, no gain reduction is introduced. When a second mic opens, the number of mics has doubled and gain of both open channels is reduced by the amount specified by this control. A third open mic will reduce gain by log2(3) (approximately 1.5 times) this setting. A fourth open mic represents a second doubling of open mics reducing gain by two times the setting.

4.3.11 NOM response time

Type: Time
Range: 100 ms to 10 s
Default: 1 s

Time constant for moving from one NOM compensation gain setting to the next in response to change in the number of open mics in the system.

4.3.12 Background gain

Type: dB
Range: -100 to +23 dB
Default: 0 dB

Scaling factor for internal background level measurement. Higher settings produce more aggressive lifting of gate thresholds in the presence of background noise. *Background* must also be tuned based on mixer size. Higher overall setting are required on mixers with fewer active input channels. See *Background threshold compensation* below for a more detailed description of background level computation and threshold compensation.

4.3.13 NOM

Type: Integer
Range: 0 to 255

Count of number of channels with lit *Open indicator* in the system.

NOM is normally in the range 0 to *Maximum open mics* though may exceed *Maximum*

open mics briefly if multiple channels on linked mixers receive an above-threshold input simultaneously.

4.3.14 NOM gain reduction

Type: dB
Range: 0 to -48 dB

Current gain reduction applied to all channels as per NOM reading and *NOM attenuation step* and *NOM response time* settings

4.3.15 Priority

Type: Integer
Range: 0 to 20

Highest priority channel currently in Open state. 0 if no channel is open or one channel is open due to *Last mic on* logic.

4.3.16 Background threshold compensation

Type: dB
Range: +35 to -35 dB

Measured level of background noise with application of Background gain setting. Internal background level is the sum of all pre-gate signals received by all microphone inputs.

Inputs in bypass mode do NOT participate in the background level summing. Inputs to this mix are prescaled by -24 dB to prevent overflow for the largest possible mixer.

The device uses this calculation to adjust effective gate threshold levels. Background threshold compensation level is added to the Threshold setting to produce the effective threshold used to determine the signal level required to open the gates. For example, if Threshold is set to -10 dB and Background threshold compensation reads -10 dB, the effective threshold is -4 dB (adding two equal signals produces a resultant 6 dB higher).

4.4 Setup

The AMX8.8CN DSP input section is shown in Figure 4-3, below.

There are 8 Analog and 8 Cobranet audio input channels available to the AMX8.8CN. Cobranet inputs 7 & 8 are connected directly to the 16 x 7 Matrix Mixer. The remaining 14 audio channels are connected to the Automixer device.

NOTE: Figure 4-3 shows that the Link signal is always Cobranet Channel 9 and the audio 'mix-minus' can be either Channels 10 or 11. This will require both the transmitter and

receiver subchannel mapping of the AMX8.8CN to be configured to ensure that audio and link signals are route to the correct input and output.

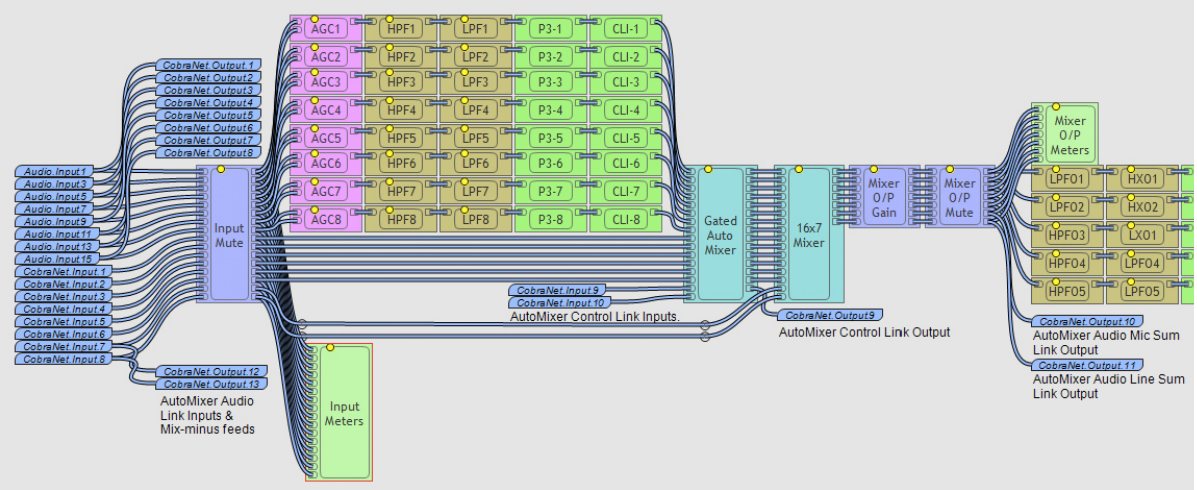


Figure 4-3: AMX8.8CN DSP-Input Section

4.4.1 All Configurations

In all configurations, please apply the following…

- There shall be only one Master AMX8.8CN
- The Master (or 'Standalone') AMX8.8CN has Automixer "Link Master" button enabled. All slaves have "Link Master" button disabled.
- The Master unit will take in all link control signals from the slave units, combine with the Master unit status and send out a Master link control signal to all Slaves. The Master link control signal is the same for all slaves, so Cobranet output 9 (Subchannel 9) is common to all bundles sent from the Master to the Slaves. Usually, this will be set to the first subchannel of each transmitter feeding the Slaves.
- Slaves must connect the incoming Master control link feed to the first Automixer link input ONLY (ie slaves only use one link input and that should be input 15 to the automixer). As Cobranet Input 9 (Subchannel 33) is connected to input 15 of the automixer, the Slave Cobranet receiver collecting the linking signal from the Master should always have Subchannel 1 set to 33.
- The audio 'mix-minus' input channel from the Master unit should be in bypass at the Automixer, as they have already been included in the NOM calculations.

4.4.2 'Standalone' operation

In standalone operation, there are no slave units and hence no Master-Slave linking. This releases the Cobranet inputs 7/8 for use as regular audio inputs to the 16x7 matrix mixer. In addition, outputs 6/7 from the 16x7 matrix mixer are available for Cobranet feeds to other devices.

4.4.3 Master-Slave Operation

Up to three AMX8.8CN can be linked to create a matrix size of up to 42x24.

The linking process is described below…

- The Master unit will take in all link audio signals from the slave units, combine with the Master unit audio and send out a "Mix-Minus" audio signal to each Slave. The "Mix-Minus" audio signal to each Slave has to be unique, which is why there are 2 separate Mix-Minus outputs from the Matrix Mixer.
    - Slave 1 will receive a mix of the Master inputs, plus the sum feed from Slave 2. This will usually be routed to Matrix mixer output 6/Cobranet Output channel 10.
    - Slave 2 will receive a mix of the Master inputs, plus the sum feed from Slave 1.This will usually be routed to Matrix mixer output 7/Cobranet Output channel 11
- Each Slave unit only has bring in the link signal and audio mix-minus from the Master and send its own link signal and audio mix-minus back to the Master.

NOTE: In all cases, the mix-minus inputs channels should have bypass on, as these inputs have already been included in the NOM calculations elsewhere.

To configure for master-slave linked operation, do the following …

- Two AMX8.8CN devices: Master will receive a 2 channel unicast bundle from the slave containing the slave Control link signal and the Slave Mic sum. The Master unit in turn will send a 2 channel unicast bundle containing the Master link signal and Master Mic Sum to the Slave unit

  One audio input channel of each unit (usually channel 16 of the 16 x 7 mixer) will be used for linking, so the matrix size will be 30 x 16

  Set the Link Master to enabled on the Master AMX8.8CN and to disabled on the slave AMX8.8CN.

  For both Master and Slave units, the Automixer Link output is connected to Cobranet output channel 9. In addition, output 6 of the 16 x 7 Matrix Mixer provides Cobranet Channel 10 audio signal. Normally this will be a sum of inputs 1-14 from the Automixer to the 16 x 7 mixer, plus input 15 of the 16 x 7 mixer, as input 16 is used for 'mix-minus' linking.

  A Cobranet Transmitter will be configured to send a 2 channel unicast bundle, where subchannel 1 is set to Cobranet Channel "9" - the link signal and subchannel 2 is set to Cobranet Channel "10" - the audio mix signal.

  A Cobranet Receiver will be configured to receive the unicast signal from the other AMX8.8CN device and set the subchannel mapping so that receiver Channel 1 is mapped to subchannel 41 (ie, Cobranet input channel 9-the linker

input) and receiver Channel 2 is mapped to subchannel 40 (ie, Cobranet input channel 8-the audio 'mix-minus' input at the 16 x 7 mixer).

- Three AMX8.8CN devices: Master will receive a 2 channel unicast bundle from each slave containing the Slave Control link signal and the Slave Mic sum. The Master unit will send a 2 channel unicast bundle to each slave containing Master link signal and Mic 'mix-minus' audio.

  Two input channels of each slave unit will be used for linking, so the matrix size will be 42 x 24

  Set the Link Master to enabled on the Master AMX8.8CN and to disabled on both slave AMX8.8CN's.

  For the Master and Slave…

  One Cobranet Transmitter will be configured to send a 2 channel unicast bundle, where subchannel 1 is set to Cobranet Channel "9" - the link signal and subchannel 2 is set to Cobranet Channel "10" - the first audio mix-minus signal.

  The 16 x 7 Matrix Mixer output 6 is sent to slave 1 and will contain a mix of channels 1-14 (ie the audio feeds into the master AMX8.8CN) plus channel 15 the audio feed from slave 2. The Cobranet channel 10 is sent to subchannel 2 of the first transmitter (the transmitter for slave 1)

  One Cobranet Receiver will be configured to receive the unicast signal from another AMX8.8CN device and set the subchannel mapping so that receiver Channel 1 is mapped to subchannel 41 (ie, Cobranet input channel 9-the linker input) and receiver Channel 2 is mapped to subchannel 40 (ie, Cobranet input channel 8-the first audio 'mix-minus' input channel 16 at the 16 x 7 mixer).

  For the Master only…

  A second Cobranet Transmitter will be configured to send a 2 channel unicast bundle, where subchannel 1 is set to Cobranet Channel "9" - the link signal and subchannel 2 is set to Cobranet Channel "11" - the second audio mix-minus signal.

  The 16 x 7 Matrix Mixer output 7 is sent to slave 2 and will contain a mix of channels 1-14 (ie the audio feeds into the master AMX8.8CN) plus channel 16 the audio feed from slave 1. The Cobranet channel 11 is sent to subchannel 2 of the second transmitter (the transmitter for slave 2)

  A second Cobranet Receiver will be configured to receive the unicast signal from the second slave AMX8.8CN device and set the subchannel mapping so that receiver Channel 1 is mapped to subchannel 42 (ie, Cobranet input channel 10-the second linker input) and receiver Channel

2 is mapped to subchannel 39 (ie, Cobranet input channel 7-the second audio 'mix-minus' input channel 15 at the 16 x 7 mixer).

4.5 Output DSP

The DSP output section is shown in Figure 4-4 below and consists of the following…

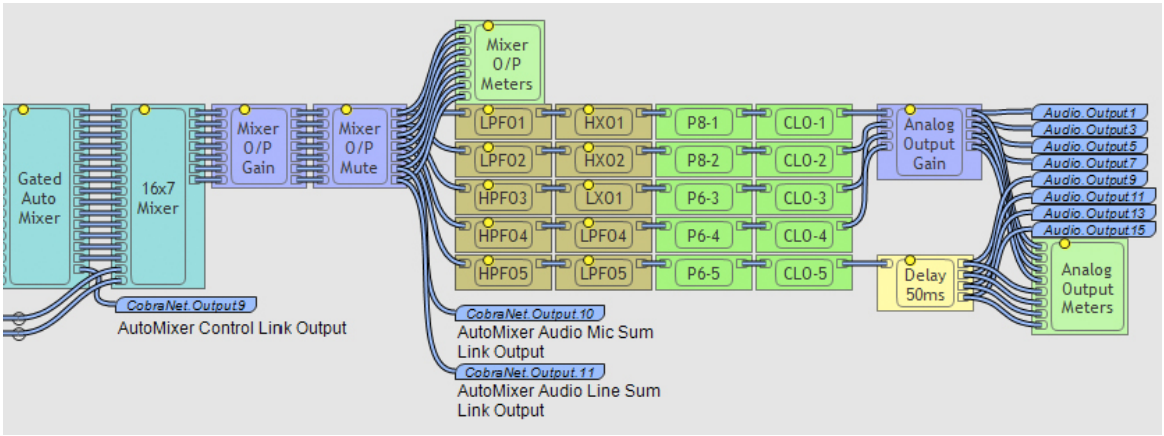


Figure 4-4: Output section DSP of the AMX8.8CN

NOTE: All outputs can be used in any combination of mono or stereo feeds. The following are only suggestions for use in a typical meeting room…

- Mixer Output Gain and Mute: These provide a simple gain (0 to -100dB) and mute of the mixer output sections
- Output channels 1 & 2 both have low pass filters (to remove unwanted HF) and each has a high pass "crossover" with a 24dB/Oct Linkwitz-Riley filter that can be used as a simple High Pass filter or as a crossover to allow channels 1 & 2 to be used as Mid-high feeds in meeting rooms with frontal loudspeakers and a Sub bass unit.

  Output Channels 1 & 2 also have an 8 band parametric EQ and an output RMS Compressor.

- Output channel 3 has a high pass filter (to remove unwanted LF) and a low pass 'crossover' with a 24dB/Oct Linkwitz-Riley filter that can be used as a simple Low Pass filter or as a crossover to allow channel 3 to be used as a Sub bass feed in meeting rooms with a Sub bass unit.

  Output Channel 3 also has a 6 band parametric EQ and an output RMS Compressor.

- Output Channel 4 has both low pass and high pass filters and a 6 band parametric EQ and an output RMS Compressor. Channel 4 would generally be used for feeds to remote AV equipment, or as an undelayed feed to the ceiling loudspeakers

- Output Channel 5 has both low pass and high pass filters and a 6 band parametric EQ and an output RMS Compressor. In addition, Channel 5 has a 4 tap 50mSec digital delay to provide time aligned feeds to ceiling loudspeakers.

5 Control Ports

5.1 CobraNet™

The standard CobraNet™ tools, including CobraNet™ Discovery (CNDISCO) and CobraCAD are available for use with the MTS CobraNet™ enabled AMX8.8CNs. These tools are available as a free download from the Cirrus Logic Website.

MTS uses a custom implementation of the CobraNet™ firmware and the latest MTS_x_xx_xx.bin file (MTS_2_11_13.bin as of Nov 2011) is available as a download from the MTS website. Do NOT use the Cirrus Logic binary file, otherwise the DSP and Amplifier control and monitoring extensions will be missing and more importantly, audio transport will stop.

The CobraNet™ port also provides control and monitoring of all parameters using SNMP. There are two sets of controls, CobraNet™ protocol parameters & DSP parameters.

5.2 Ethernet

There is a simple test GUI available for setting up the CobraNet™ port parameters, the AMX8.8CN parameters and controlling the internal DSP. This can be downloaded from the MTS website.

To use the GUI, the host PC or laptop must be set to the default IP subnet in order to talk to the AMX8.8CN. Figure 5-1 below shows the method of setting up a Windows computer.

- Set the AMX8.8CN Ethernet port to 192.168.192.100 (say). This is done via the VFD – see section below.
- Go to Control Panel and then open “Network connections”.
- Click on the General tab and open “Properties”.
- Select “Internet Protocol (TCP/IP)” and click on properties.
- Finally, change the selection from “Obtain an IP address automatically” to “Use the following IP address” and set as follows:-
  - IP address: 192.168.192.50
  - Subnet mask: 255.255.255.0
    It can be any IP address in the range 192.168.192.2 to 192.168.192.99. Once the IP address and subnet mask has been set then open the GUI application.
- After finishing using the MTS GUI application, return to the Control Panel and reset the selection back to “Obtain an IP address automatically”.

If an intelligent or managed switch/router is in use, then the switch address will need to be set to the same subnet, usually 192.168.1.1 or 192.168.1.254 are the most common default addresses.

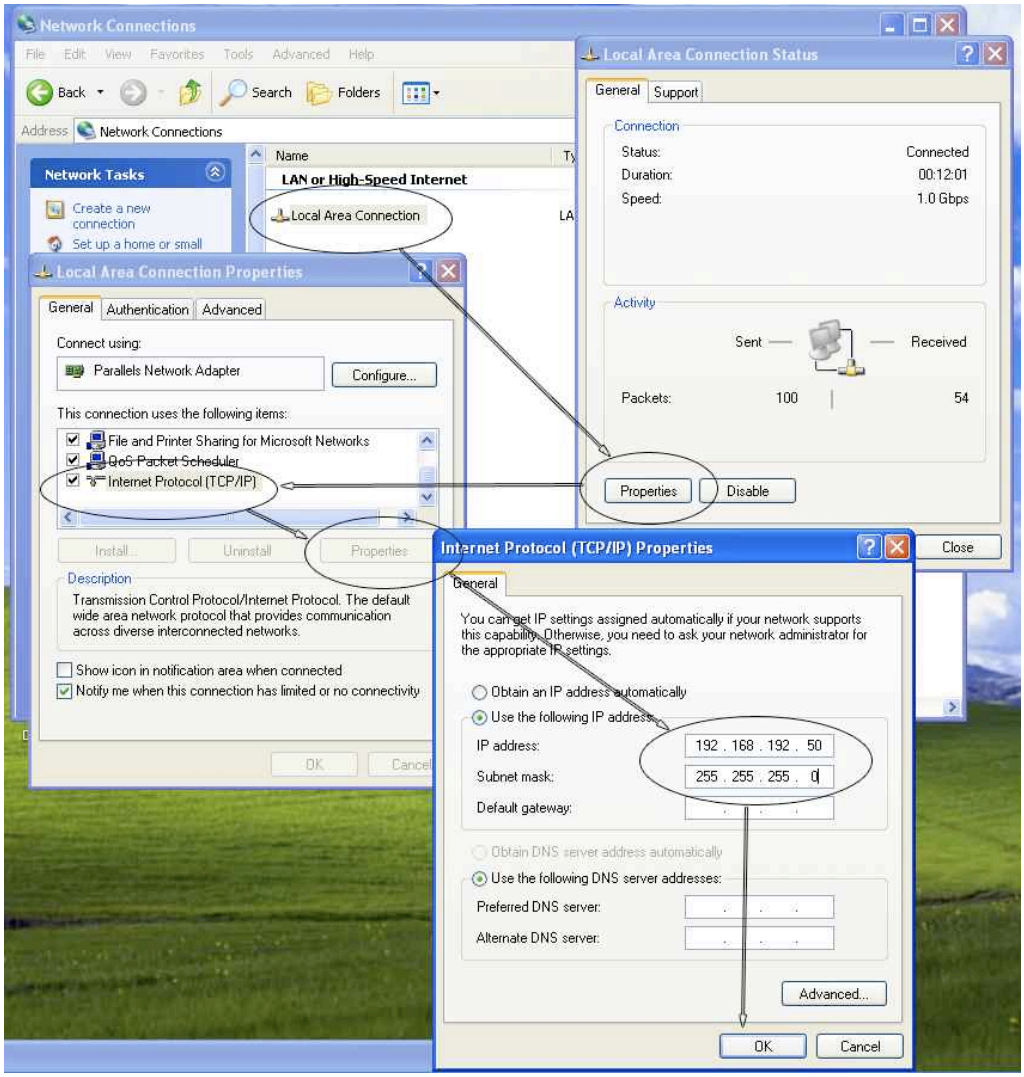


Figure 5-1: Setting up the IP address and subnet mask.

6 GUI

6.1 GUI default page

The GUI application default page is shown below in Figure 6-1.

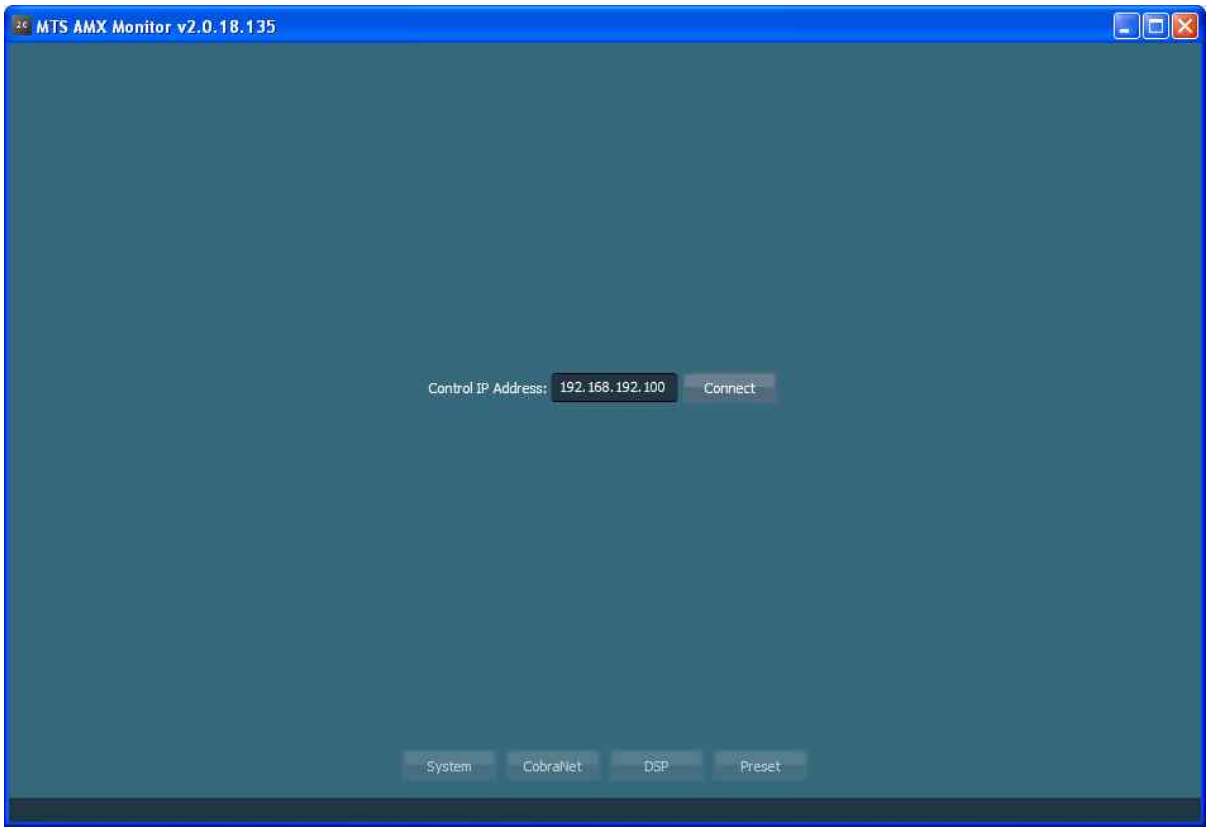


Figure 6-1: GUI opening page

The default page will show 192.168.192.100, as this is the factory IP address set in the GUI. If this is a new AMX8.8CN then simply press “Connect”.

NOTES…

- Each AMX8.8CN will attempt to obtain an IP address by DHCP on power up. This process lasts about 30 seconds. Until the DHCP period is over, it will not be possible to connect to the AMX8.8CN using the GUI. If the AMX8.8CN has been programmed with a default address, then it will not follow a DHCP process.

- The internal UART interrupts are not enabled until after the DHCP process, so AMX8.8CN parameters cannot be changed or updated during the DHCP period.

- Many pages, or sections of pages, have an “UPDATE” button. If changes are made through SNMP or TELNET, rather than the GUI, these changes will only be reflected in the GUI after pressing UPDATE. Otherwise, the GUI would have to continuous poll every setting and the HMI would have little processing time left over.

- Please read the section on Presets When the GUI first connects to the device, **it does not upload DSP values**. This is due to the way the Cirrus chipset parses DSP parameters. The only way to recall DSP values is to recall a preset (usually preset 1- the powerup preset). The process for making changes to the settings is as follows…

    - Connect to the device
    - **Immediately recall the desired preset values (usually from Preset 1- the power up preset).**
    - Make the required changes
    - Save to the preset

    If the user connects to the device, makes changes before recalling a preset and then saves the settings, then most of the values in the preset will be lost.

After pressing "Connect", the GUI finds the device, it will upload the current values from the device to the GUI and will display the screen as shown in Figure 6-2 below.

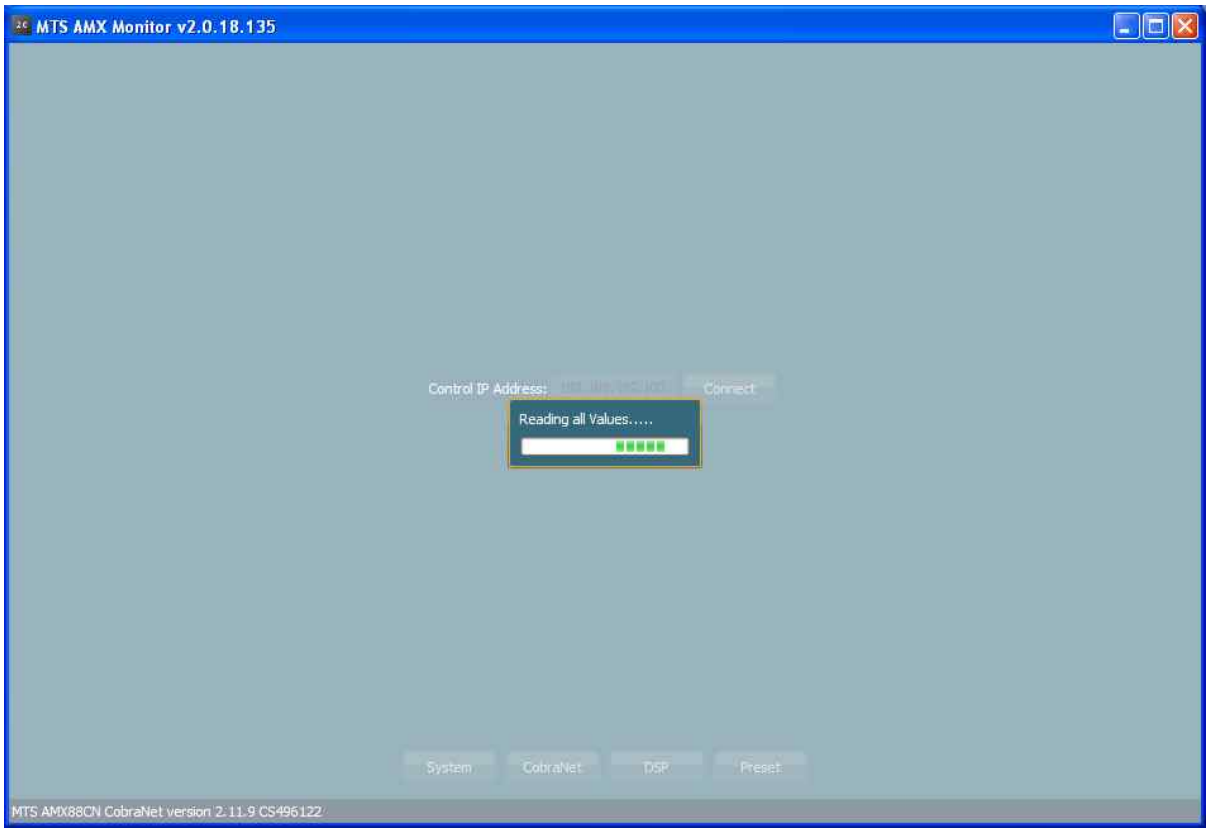


Figure 6-2: Screen shown during value uploading process.

6.2 System settings

Selecting the "System" tab will open the page shown in Figure 6-3 below. The settings are changed as follows:-

- Ethernet IP address: This can be changed from the default address to any address. Enter the new address and press “Set”. Note: once the IP address is changed, the user will need to wait approximately 20 seconds for the application to reconnect, or they can restart the application and enter the new address. Also note that changing to an IP address out side the current subnet will result in a loss of commincations.

- CobraNet™ IP address: As CobraNet™ is layer 2, it does not need an IP address to pass audio. However, for programming via SNMP the default CobraNet™ address of 192.168.192.50 can be changed. The IP address set using the GUI is persistent.

- The CobraNet™ firmware revision is for information only. There is no setting. New firmware should be loaded using CobraNet™ Discovery (CNDISCO).

- The parameters are set as follows:
    - The RS485 bridge status allows the user to switch the RS485 port between a future local/remote AMX8.8CN control & monitoring or serial bridging (TBA). At present, only serial bridging is operational.
    - The RS485 address refers to the address used by the RS485 port to communicate to external devices (TBA).
    - The RS485 Master/Slave switch allows the ION to be slaved to a host processor or act as the Master controller for the MTS wall panels or a remote MTS AMX8.8CN (TBA).
    - The remote MAC address refers to the serial bridging channel settings described in the Cirrus Logic PM25 document. Please note that the remote MAC address value is NOT stored in presets due to issues with the network configuration. This will have to be loaded manually by the users application software.

Figure 6-3: System settings page.

Note: RS485 settings as follows…

- Local = Serial bridging is off. The Master/Slave toggle then determines whether the AMX8.8CN is slaved to a separate PC/Processor or acting as the master to communicate with wall plates (TBA).
- Bridge = Serial bridging, where the CobraNet™ RS485 port is simply a multidrop bidirectional serial communications channel. The data at the CobraNet™ RS485 port is not used by the local ION, but communicated to a remote device(s) on the network. This is the standard Cirrus setup. Master/Slave also has no effect in this situation.
- Remote = Remote control via serial bridging, ie a serial port on a remote CobraNet™ interface can control and monitor the local AMX8.8CN (TBA).
- All RS485 settings need up to 1 minute to establish persistence, as they are stored in the CobraNet™ flash. If the AMX8.8CN power is cycled before the settings are stored to flash, then the settings will be lost.

6.3 CobraNet™ settings

The CobraNet™ settings page is shown below in Figure 6-4.

One of the key features of the MTS AMX8.8CN is the ability to set up to 4 CobraNet™ audio transmitters and 8 CobraNet™ receivers. In addition, MTS has provided the ability to set each bundle subchannel configuration.

The settings are:-

- Transmitter setup: This section covers the CobraNet™ transmitters. The CS496xxx chipset allows for up to 4 transmitters, each of up to 8 channels, subject to an overall channel count of 16 channels. The settings are:-
    - Bundle number: This sets the bundle address of each transmitter. The bundle numbers are 0 (off, ie no transmission), 1-255 are multicast, 256-65279 are unicast and 65280-65535 are private.
    - Priority: This sets the priority of the transmitter. If bandwidth resources are limited, then audio will be transmitted in order of priority.
    - Unicast mode: If the transmitter bundle address is normally unicast (>255), but more than one receiver is available for that bundle address, then the bundle can be transmitted either multicast or multi-unicast.
    - Max Unicast: Depending on unicast mode, the maximum number of multi-unicast bundles can be set between 1 and 4.
    - TX1…TX4: This lists the four transmitters associated with the bundle address and allows the user to set the audio subchannels associated with that bundle. A CobraNet™ CM2 type interface can have up to 16 audio channels, numbered 1-16. The subchannel mapping allows the user to decide which of the 16 audio channels are mapped to each bundle and in which order they are transmitted.
    - Resolution: This sets the word length of the transmitted audio to 16, 20, or 24 bit. Note: if the word depth is set to 24bit, then only 7 audio channels can fit in one bundle.

- Transmitter format settings: The options are 1.33mS, 2.66mS or 5.33mS latency. Note: there are significant trade-offs if changes are made to the 5.33mS default settings (see PM25). Also note that the MTS IONs uses all 16 CobraNet™ channels of the CS496xxx chipset, so only a sample rate of 48kHz is enabled (96kHz operation is not possible).

Figure 6-4: CobraNet™ settings page

- Receiver setup: This section covers the CobraNet™ receivers. The CS496xxx chipset allows for up to 8 receivers, each of up to 8 channels, subject to an overall channel count of 16 channels. The settings are:-
  - Bundle number: Same process and limitations as described in the transmitter section
  - Priority: Same process and limitations as described in the transmitter section
  - Receiver active: This LED only lights if there is a valid transmitter sending audio on that bundle address.
  - RX1…RX8: Same process and limitations as described in the transmitter section

- CobraNet™ status: As follows:-
  - Conductor status: LED lights up, if the AMX8.8CN is the Conductor.
  - Conductor priority: Default is 32. Change the value to increase or decrease the possibility of this interface becoming the Conductor
  - Error count: Running total of CobraNet™ errors detected.
  - Last error code: The CobraNet™ error code of the last error detected.
  - Status LED's: Link shows Ethernet link status. Tx and Rx shows data transfer. Bridge/Local shows serial bridge status.

Notes:

- To enter a value in any of the setting boxes, overwrite the existing value and then press “Enter”/”Return”. If “Enter”/”Return” is not pressed then the value is not stored.
- “Update” gets the current values from the AMX8.8CN NOT sends values to the ION.
- See below for Unicast/Multicast/Multi-Unicast operation

    - If Unicast mode = A (ie always Multicast) and MaxUnicast = 0, then the bundle is always Multicast
    - If Unicast mode = A (ie always Multicast) and MaxUnicast = 1, then the bundle is always Multicast above 1 Multi-Unicast bundle
    - If Unicast mode = A (ie always Multicast) and MaxUnicast = 2, then the bundle is always Multicast above 2 Multi-Unicast bundles
    - If Unicast mode = A (ie always Multicast) and MaxUnicast = 3, then the bundle is always Multicast above 3 Multi-Unicast bundles
    - If Unicast mode = A (ie always Multicast) and MaxUnicast = 4, then the bundle is always Multicast above 4 Multi-Unicast bundles
    - If Unicast mode = N (ie never multicast) and MaxUnicast = 1, then the Multi-Unicast is limited to 1 bundle and receiver priority will determine access.
    - If Unicast mode = N (ie never multicast) and MaxUnicast = 2, then the Multi-Unicast is limited to 2 bundles and receiver priority will determine access.
    - If Unicast mode = N (ie never multicast) and MaxUnicast = 3, then the Multi-Unicast is limited to 3 bundles and receiver priority will determine access.
    - If Unicast mode = N (ie never multicast) and MaxUnicast = 4, then the Multi-Unicast is limited to 4 bundles and receiver priority will determine access.

    When Unicast = N and MaxUnicast is set to 0, this is a null setting and MaxUnicast is actually set to 1 as default.

    All CobraNet™ settings need up to 1 minute to establish persistence, as they are stored in the CobraNet™ flash. If the AMX8.8CN power is cycled before the settings are stored to flash, then the settings will be lost.

6.3.1 Cobranet settings for linking

The screen shot in Figure 6-5 below shows the use of two unicast bundles (256 and 257) to send Cobranet channel 9 (the control link information) between two AMX8.8CN devices.

Figure 6-5: Screenshot showing how to link control signals between two AMX8.8CN

Figure 6-6 below shows the Master receivers configured for 2 slaves. Slave 1 sends link control on subchannel 1 and audio mix-minus on subchannel 2. The Master maps subchannel 1 to “41”, ie Cobranet Channel 9, which feeds the first link control input of the automixer device. The Master also maps subchannel 2 to “39”, ie Cobranet Channel 7, which feeds channel 15 of the 16 x 7 mixer.

Slave 2 also sends link control on subchannel 1 and audio mix-minus on subchannel 2. However, the Master now maps subchannel 1 of slave 2 to “42”, ie Cobranet Channel 10, which feeds the second link control input of the automixer device. The Master also maps subchannel 2 to “40”, ie Cobranet Channel 7, which feeds channel 16 of the 16 x 7 mixer.

Figure 6-6: Showing Master receiving Linking Control and Audio from two slaves

6.4 DSP settings

The next configuration tab is for the DSP inside the AMX8.8CN devices- see Figure 6-7 below.

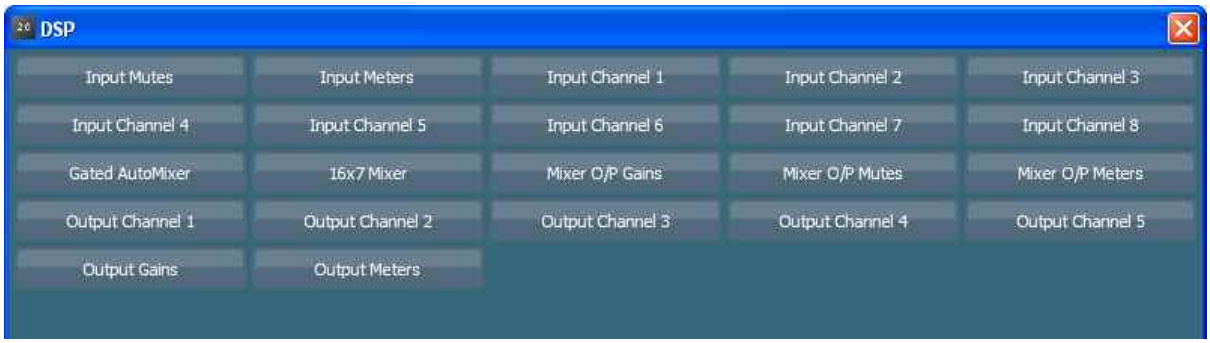


Figure 6-7: DSP configuration tab

The DSP controls are described below…

6.4.1 Input Mutes and Input Meters

The Input Mutes (see Figure 6-8 below) and Input Meters (see Figure 6-9 below) Are simple pages showing how to mute any of the 16 channels of audio.

Figure 6-8: Input Mutes

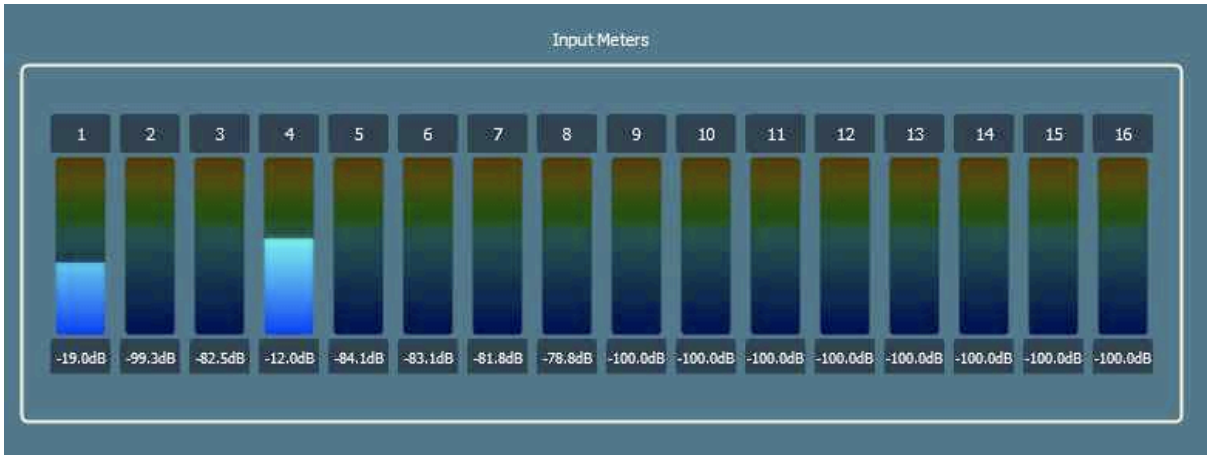


Figure 6-9: Input Meters

6.4.2 Input DSP controls

Apart from the Mute control described above, there are is no further DSP processing on the Cobranet audio inputs. It is assumed that the Cobranet audio inputs will be sourced from external devices (such as the MTS ION2.0-a wall mount 2 channel Cobranet DSP interface) that provide DSP processing.

The DSP processing (described below) for the AMX8.8CN is provided on the analog audio inputs only.

6.4.2.1 Input AGC

The examples used below are for Channel 1. However, Channels 2-8 are identical.

Figure 6-10: Input Channel AGC Controls

Figure 6-10 above shows the AGC settings. The Automatic Gain Control controls signal dynamics so that, despite variations in the input level, the average output level from the

device is at a pre-set level. The automatic gain control is typically used to mimic the action of a sound mixer "riding the faders". The AGC can compensate for loud or soft spoken speakers by automatically raising or lowering the gain. The AGC contains "threshold" and "recovery" circuitry, which makes it particularly suited for applications where speech is the input source.

The Automatic Gain Control uses the RMS value of the audio input to calculate how much gain is required to maintain the audio input at the desired value.

Once the RMS value is above the Threshold Level, the AGC changes to 'sensing mode', were the AGC adjusts (within the constraints of the Response Time and Maximum Gain controls) the gain through the main audio path to achieve an output level in accordance with the Target Level setting.

When the input level falls below the Threshold Level setting, the AGC operates in recovery or freeze mode. If the Recovery control is engaged, gain is restored to unity as per the Recovery Time setting. If the Recovery control is not engaged, gain will remain frozen at its current value until the AGC goes back into sensing mode.

The AGC settings are described below in some detail, as the operation of an AGC may be non-intuitive to inexperienced installers…

- **Threshold Level:** The AGC has two modes of operation: sensing and recovery. When the measured level of the side chain signal is above this Threshold Level setting, the device operates in sensing mode. When the measured side-chain level is below this Threshold Level setting, the device operates in recovery mode.

  Range: 0 to -40 dB
  Default: -20 db

- **Gain Meter:** This meter indicates the amount of gain (or attenuation) being applied to the input signal. Although the meter can only indicate gain reductions of 18dB or less, the AGC is capable of producing greater reductions. The AGC will apply as much reduction as necessary to achieve the output level specified by the Target Level control.

  Range: -18 to +18 dB

- **Bypass:** Bypasses the AGC gain stage. The Audio input is routed directly to the Audio output. The Sensing indicator and Gain meter continue to operate and the AGC continues to compute a gain even though it is not applied to the output.

  Default: Disengaged (not bypassed)

- **Gain Recovery:** When engaged, causes the gain to return to unity once the signal has fallen below the Threshold Level. Gain is restored gradually as per the Recovery Time setting.

Default: Disengaged

- **Recovery Time:** Time constant for restoring gain to unity (0 dB) once input signal falls below the Threshold Level. Gain will only exhibit recovery behavior when the Recovery control is engaged. Implementation note: Standard first-order filter used to ramp gain up or down. Gain will reach 62.5% from previous value towards the target value in the time specified.

  Range: 1 to 100 seconds
  Default: 10 seconds

- **Maximum Gain:** This is the maximum amount of gain that the AGC provides. This prohibits the AGC from applying so much gain to a quiet source that problems such as feedback arise.

  Range: 0 to +18 dB
  Default: 6 dB

  Note: There is no limit to the amount of attenuation the AGC can produce. The AGC will apply as much reduction as necessary to achieve the output level specified by the Target Level control.

  Note: Changes to device gain whether due to change in Side Chain Level, Maximum Gain or Target Level controls are only made when the Sensing indicator is lit. Changes to device gain are always subject to the Response Time control. Changes to Maximum Gain are not recognized until the device enters sensing mode

.

- **Target Level:** This is the desired average RMS level of the output signal. The AGC will apply an appropriate gain or attenuation to the input signal in order to achieve this desired output level.

  Range: -18 to +18 dB
  Default: 0 dB

- **Response Time:** Time constant that determines how fast the AGC adjusts the gain in response to a change in the Side Chain signal level, Target Level or Maximum Gain settings. Implementation note: Standard first-order filter used to ramp gain up or down. Gain will reach 62.5% from previous value towards the target value in the time specified

  Range: 100 milliseconds to 10 seconds
  Default: 3 seconds

6.4.2.2 Input High Pass and Low Pass Filters

Figure 6-11 and Figure 6-13 below show the control pages for the Input High Pass and Low Pass filters.

Figure 6-11: Input Channel High Pass controls

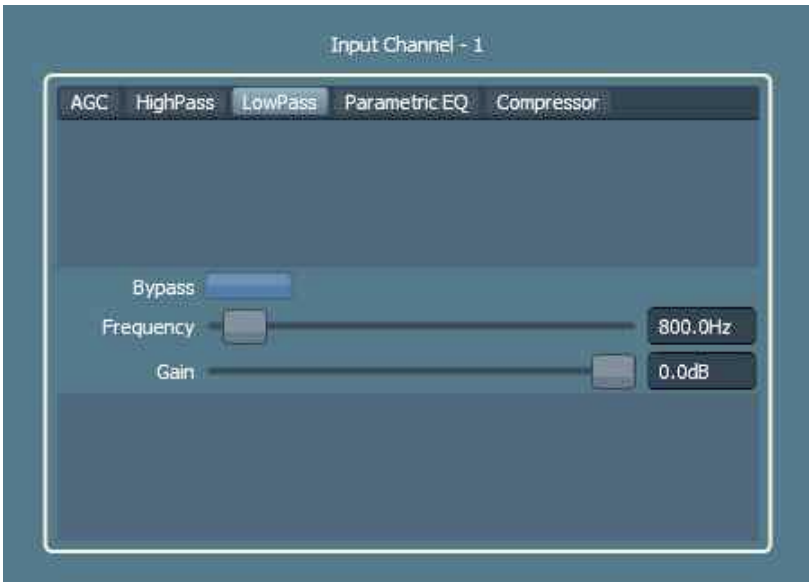


Figure 6-12: Input Channel Low Pass Controls

The controls are…

- **Bypass**: Bypasses the action of the Filter and Gain stage
- **Frequency**: The Filter is a 12dB/Oct slope and the Frequency represents the -3dB point of the slope
  20Hz-20kHz

- **Gain**: Sets the output gain of the filter
  0dB to -100dB

6.4.2.3 Input Parametric EQ

Figure 6-13 below shows the control page settings for the Input Parametric EQ. There are 3 Parametric filters on each of the analog inputs and the tabs on the bottom of the parametric EQ page will bring up the controls for each of the 3 filters respectively.

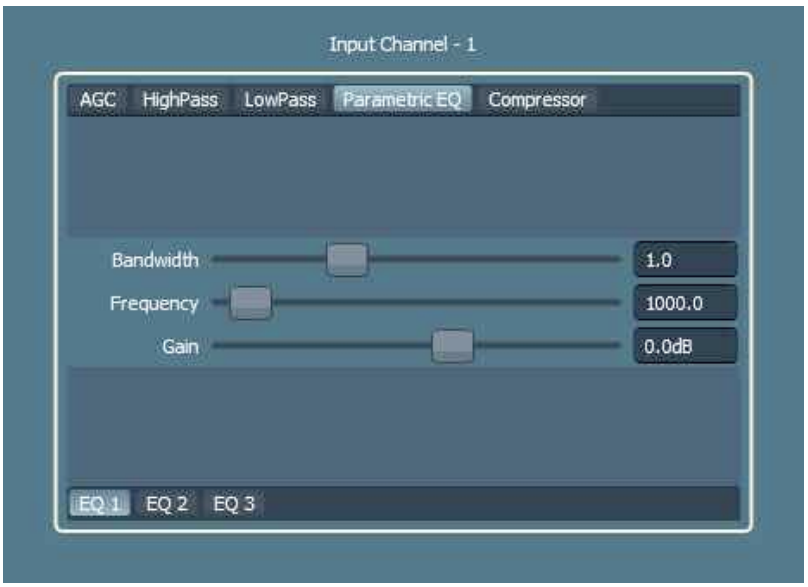


Figure 6-13: Input Channel Parametric EQ

The Controls are…

- **Bandwidth**: Controls the width (in octaves) of the filter's response about the center frequency
  0.1-3.0 Octaves

- **Frequency**:The Frequency control sets the center frequency of the parametric filter.
  20Hz-20kHz

- **Gain**: Sets the output gain of the filter at the center frequency
  +18dB to -18dB

6.4.2.4 Input Compressor

Figure 6-14 below shows the control page settings for the Input Compressor.

The Controls are…

- **Bypass:** bypasses the element so it applies no attenuation to the program channels.
- **Threshold:** Sets the threshold signal level above which attenuation will be applied to the program signals.
  +23 to -100dB

Figure 6-14: Input Channel Compressor

- **Ratio:** The reciprocal of the slope of the response curve in the active region. If the input signal exceeds the threshold by n dB, the output signal will exceed the threshold by n/Ratio. A ratio of 1 causes the element to have no effect; a ratio of 100 has a severe effect, hardly allowing the output to exceed the threshold.
  1-100

- **Region:** Indicates the level of the signal relative to the threshold. Below means the detected signal is less than (Threshold - Soft knee). Above means the detected signal is above (Threshold + Soft knee). Knee means the detected signal is within the range of the soft knee, on either side of the threshold.

- **Attack** sets the time constant that determines how quickly the compressor/limiter can increase attenuation in response to detected signals over the threshold.
  1.0 to 1000mSec

- **Release** sets the time constant that determines how quickly the compressor/limiter will decrease attenuation when the detected signal falls below the threshold.
  10mSec to 30Sec

- **Gain reduction meter** is the current gain reduction being applied to the program signals.

- **Soft Knee** controls how far on either side of the threshold the soft knee reaches. The soft knee allows for a smooth transition between the inactive region and the active region.
  0 to 24dB

6.4.3 Mixer Controls

6.4.3.1 Automatic Mixer device.

The Automixer device is described in some detail in Section 4… Automatic Microphone Mixer/DSP Operation, so it will not be repeated here. However, there are some issues that the user needs to be aware of and these have been described below.

The GUI control page is shown in Figure 6-16 below…

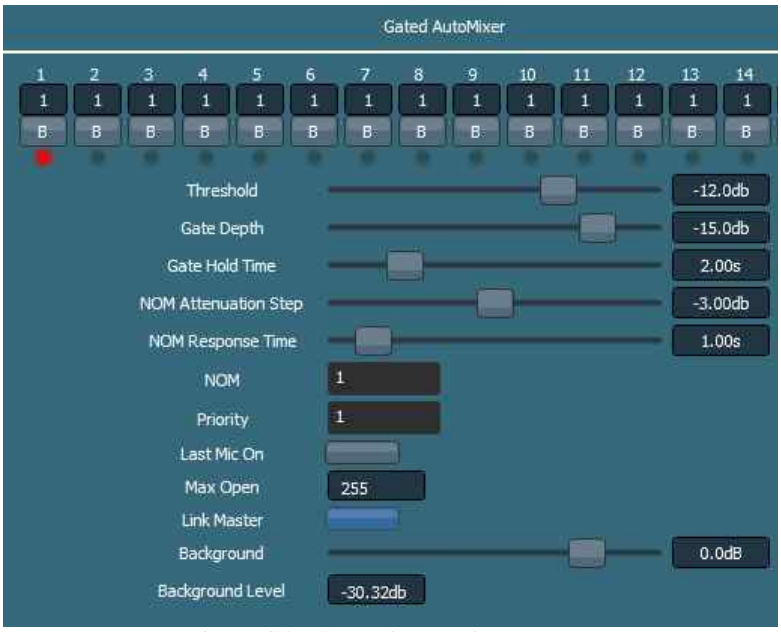


Figure 6-15: Automixer device controls

The Link Master button defaults to enabled (blue color). If two or more AMX8.8CN are linked together, it is absolutely necessary to only have one device set to master and the other devices must have link master disabled. If not, the NOM calculation goes into a loop and the value will ramp up.

Figure 6-16: Automixer linking fault – both devices set to Master

Figure 6-16 above shows the Automixer GUI pages (overlapping) for two linked AMX8.8CN and an inspection of the NOM text boxes will show that the NOM indicator is

ramping up and showing over 100 microphone channels open, despite the channel open LED's showing gate closed for each channel.

Figure 6-18 below, shows a correct configuration, where one AM8.8CN is configured as Link Master and one as link Slave. In this situation, where one microphone gate LED is open on each of two linked AMX8.8CN's, the NOM text box correctly shows NOM=2.

Figure 6-17: Automixer – correct Master-slave operation

6.4.3.2 16 x 7 Matrix Mixer

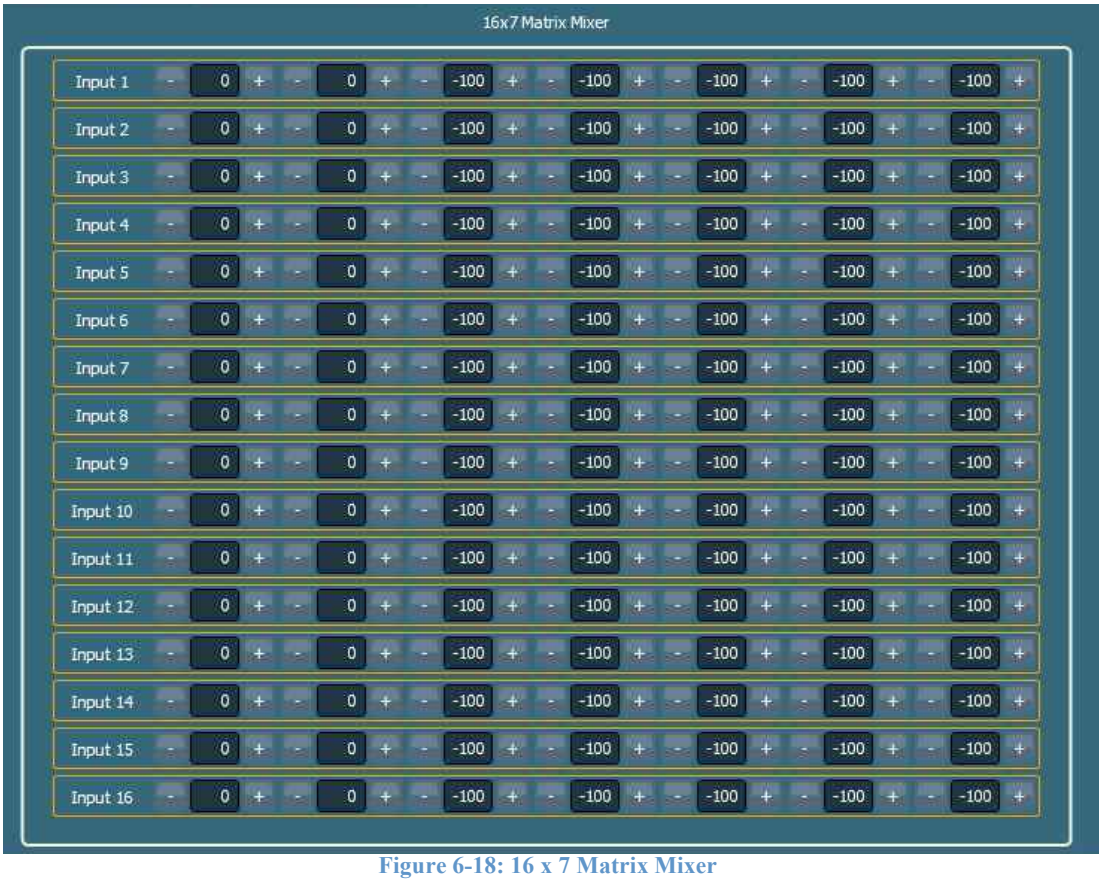


Figure 6-18: 16 x 7 Matrix Mixer

Figure 6-18 above shows the mixer gain settings for each of the 16 x 7 crosspoints (total 112 crosspoints). The mixer gain settings can be entered directly into the text box as a

numeric value (eg -100 for -100dB, or 0 for 0dB). Alternatively, the + and – buttons either side of the text box can be used to increase or decrease the settings in 1dB increments.

Values can range from 0dB to -100dB.

The left side of the Page shows the 16 input channels. The top side of the page shows the 7 output channels. In Figure 6-18 above, inputs 1 to 16 are all mixed together at 0dB and sent to Output 1. Additionally, inputs 1 to 16 are all mixed together at 0dB and sent to Output 2. All other crosspoints are at -100db, ie off.

6.4.3.3 Mixer Output Gain, Mute and Meters

Simple Gain and Mute controls have been placed on the 7 output channels of the Matrix Mixer (see Figure 6-19 and Figure 6-20 below).

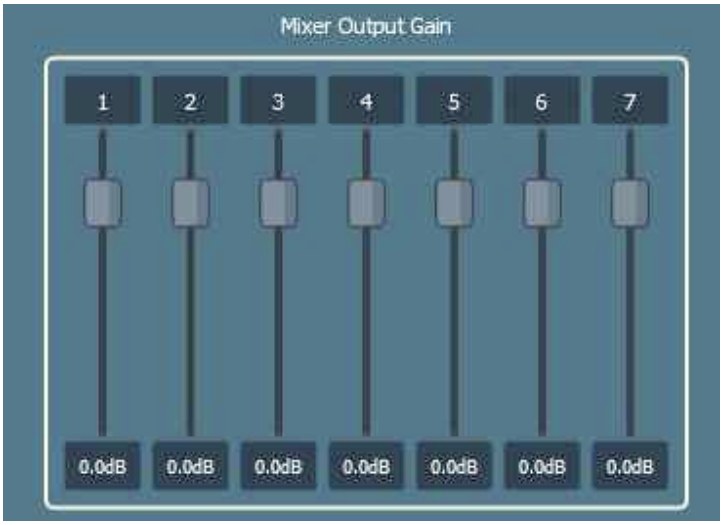


Figure 6-19: Mixer Output Gains

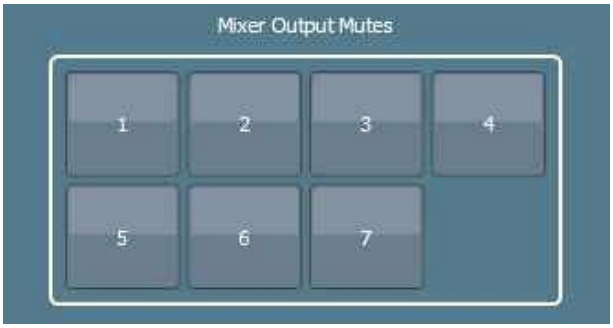


Figure 6-20: Mixer Output Mutes

6.4.4 Output Controls

6.4.4.1 Output High Pass and Low Pass Filters

Figure 6-21 and Figure 6-22 below show the control pages for the Output Low Pass and High Pass filters.

NOTE: The Low and High Pass filters are simple 12dB/Oct filters except for the following, which as 24dB/Oct Linkwitz Riley filters, so they can be used as Crossovers for a simple Mid-High to Sub-Bass split in a Meeting Room.

Figure 6-21: Output Channel Low Pass

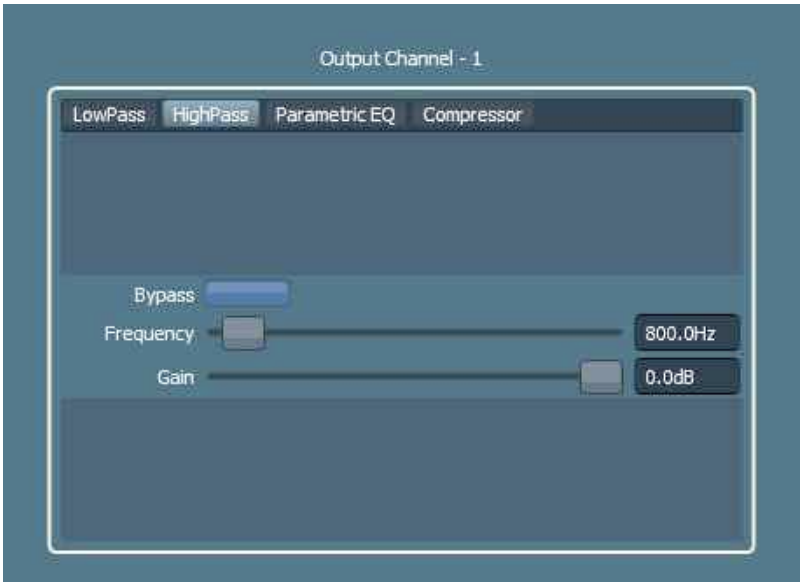


Figure 6-22: Output Channel High Pass

The controls are…

- **Bypass**: Bypasses the action of the Filter and Gain stage
- **Frequency**: The Frequency represents the -3dB point of the slope 20Hz-20kHz

- **Gain**: Sets the output gain of the filter

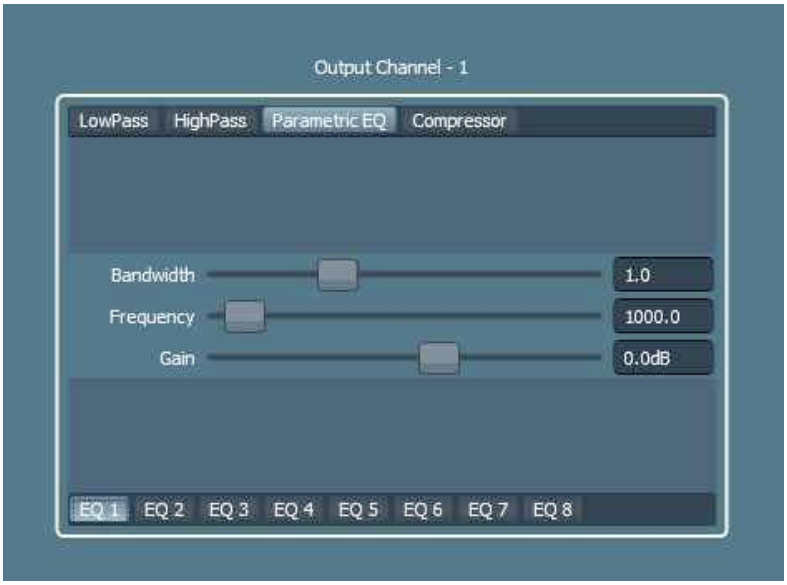


Figure 6-23: Output Channel Parametric EQ

Figure 6-24: Output Channel Compressor

6.4.4.2 Output Gain, Delay and Meters

The final stage is the output Gain, Delay and meters. Analog output Channels 1-4 have a simple Gain stage feeding the Output Meters. The Gain is adjustable from +12 to -100dB (see Figure 6-25 below).

Analog output channels 5-8 are derived from a 4 tap Delay connected to output channel 5 of the 16x7 Matrix mixer. Each output of the Delay has a Gain stage adjustable from +12 to -100dB and a Delay adjustable from 0mSec to 50mSec (see Figure 6-27 below).

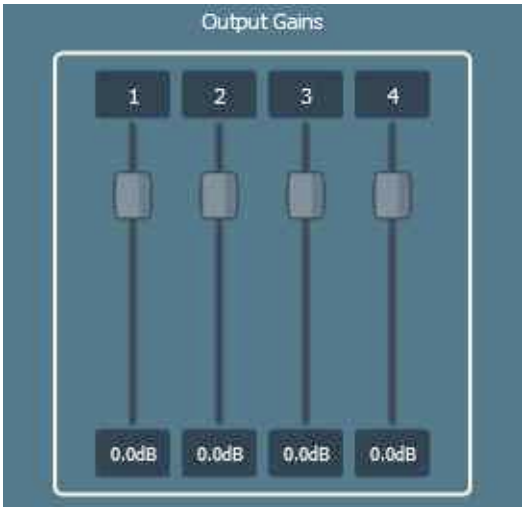


Figure 6-25: Output Gain Channels 1-4

Figure 6-26: Output Gain and Delay Channels 5-8

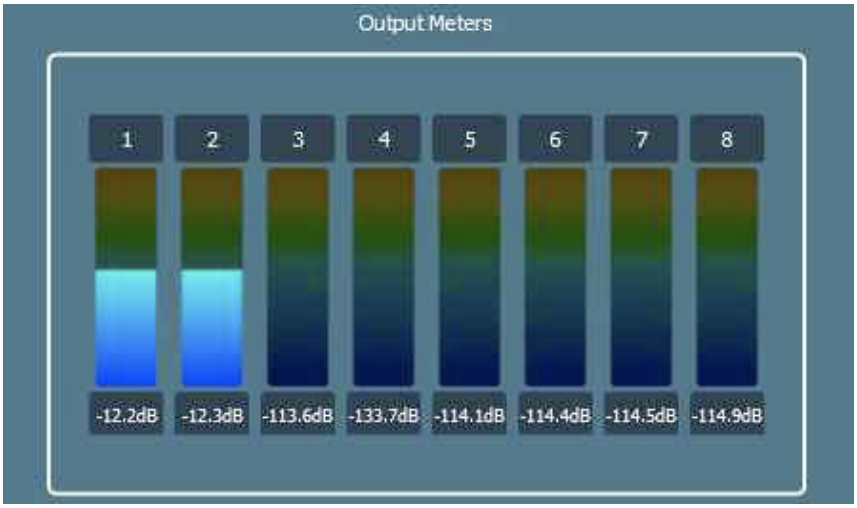


Figure 6-27: Final Output Meters

6.5 Presets

When the GUI first connects to the device, **it does not upload DSP values**. This is due to the way the Cirrus chipset parses DSP parameters and values. The only way to recall DSP values is to recall a preset (usually preset 1- the power-up preset). The process for making changes to the settings is as follows…

- Connect to the device
- **Immediately recall the desired preset values (usually from Preset 1- the power up preset).**
- Make the required changes
- Save to the preset

If the user connects to the device, makes changes before recalling a preset and then saves the settings, then most of the values in the preset will be lost.

Figure 6-28: Preset Page

Figure 6-28 above shows the Preset page. There are two methods to store and recall from preset, either to/from DSP/Flash or to/from a preset file stored on the host PC.

Note: Preset files from the earlier GUI (1.10) and Firmware (1.2.6) are NOT compatible with the preset files from the current GUI and firmware. It is essential that the user does not use preset files with a date prior to 2011 with the 2.0.3 firmware and 2.0.18 GUI.

There are 4 optional presets, where the power up preset is always configured as Preset 1. If no values are stored in Preset 1, then there will be no power up preset.
The presets operate by first selecting the desired preset number from the pull down menu (see Figure 6-29 below).

Figure 6-29: Preset Selection

This will make the preset 'active' and the store-recall buttons will be applied to those presets, as follows…

- The "Store to DSP" button packs the DSP controls, GUI specific control DSP control information, the CobraNet™ Setup page information and the AMX8.8CN settings and sends the packet for storage in serial flash in a memory space allocated for the chosen preset #. This process will take around 10 seconds
- The "Recall from DSP" button directs the HMI processor to retrieve the chosen preset # data from serial flash and send the GUI specific DSP control information to the GUI and then to parse through the saved CobraNet™ Setup page settings and implement it via the HMI. The parsing process will take up to 10 seconds, due to the time taken to restore data to the CobraNet™ flash.
  Notes:
  - The changes are only seen in the GUI when that page is selected and the operator requests updates for that page.
  - If there is no preset in flash, then an error message will be shown.
  - The full preset value load takes around 10 seconds due to the thousands of DSP values that need to be recalled.
- The "Store to File" process creates a "Preset #".cfg file that is (by default) stored in the MTS folder in program files (see Figure 6-30 below). The save to file option allows the user to do the following…
  - Archive all settings. This allows the customer to upload them to a replacement AMX8.8CN if a failure occurs.
  - Allow the user to transfer similar configurations settings from one preset to another or one AMX8.8CN to another, ie in large projects, where many parameters have the same values.
- The "Recall from File" pulls the data from the *.cfg file directly into the DSP flash for the selected preset. See Figure 6-31 below.

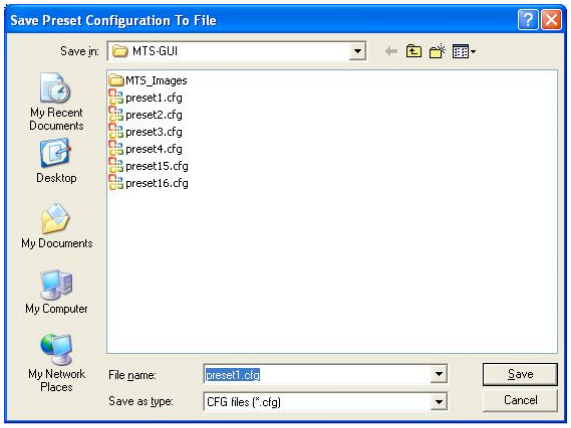


Figure 6-30: Save Preset to File Menu

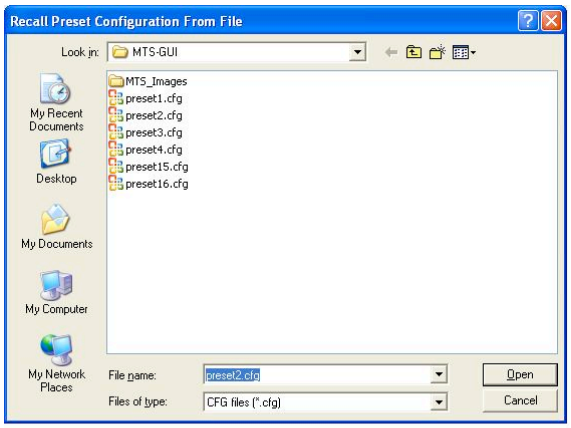


Figure 6-31: Recall Preset from File Menu

Note: The "Recall from File" process loads the settings directly into the DSP flash and NOT into the GUI or RAM. If the user requires to use the settings in the GUI, then "Recall from File" should be followed by "Recall from DSP". That will ensure that the values are loaded into both the DSP preset and the GUI/RAM.

The selected Store/Recall button will blank out during the saving and loading processes. Do not try to perform any actions during this period, see Figure 6-32 below. Do not attempt any other actions until the saving and loading process has completed.

Figure 6-32: Button fades during Save/Recall Process.

Note: when a preset is recalled from file, the preset is loaded in the selected preset in flash. For example, if the preset menu is set to “1” and preset2.cfg file is recalled, this preset data will be saved in the preset 1 flash location. Therefore, you must set the preset menu number prior to recalling a preset from file, since the recall from file action also stores the recalled preset into flash.

7 Sniffing MAC/IP address

If the IP address has been changed via the GUI and the address lost/fogotten, then a simple MAC/IP sniffer application can be used to poll the AMX8.8CN and find the details of the Ethernet port. There are a number of such applications available on the internet. The simplest is CC Get MAC address..

http://www.youngzsoft.net/cc-get-mac-address/

A range of IP addresses is entered into the software and those used will be listed, along with the MAC address. This is a very simple way of tracking down errant IP addresses.

For the Cobranet IP address, CNDISCO will perform the same task.

7.1.1 Using Cobranet Discovery (or an MIB Browser) to find the LAN IP address

Another method for locating the LAN IP address is to use Cobranet Discovery (see Figure 7-1 below).

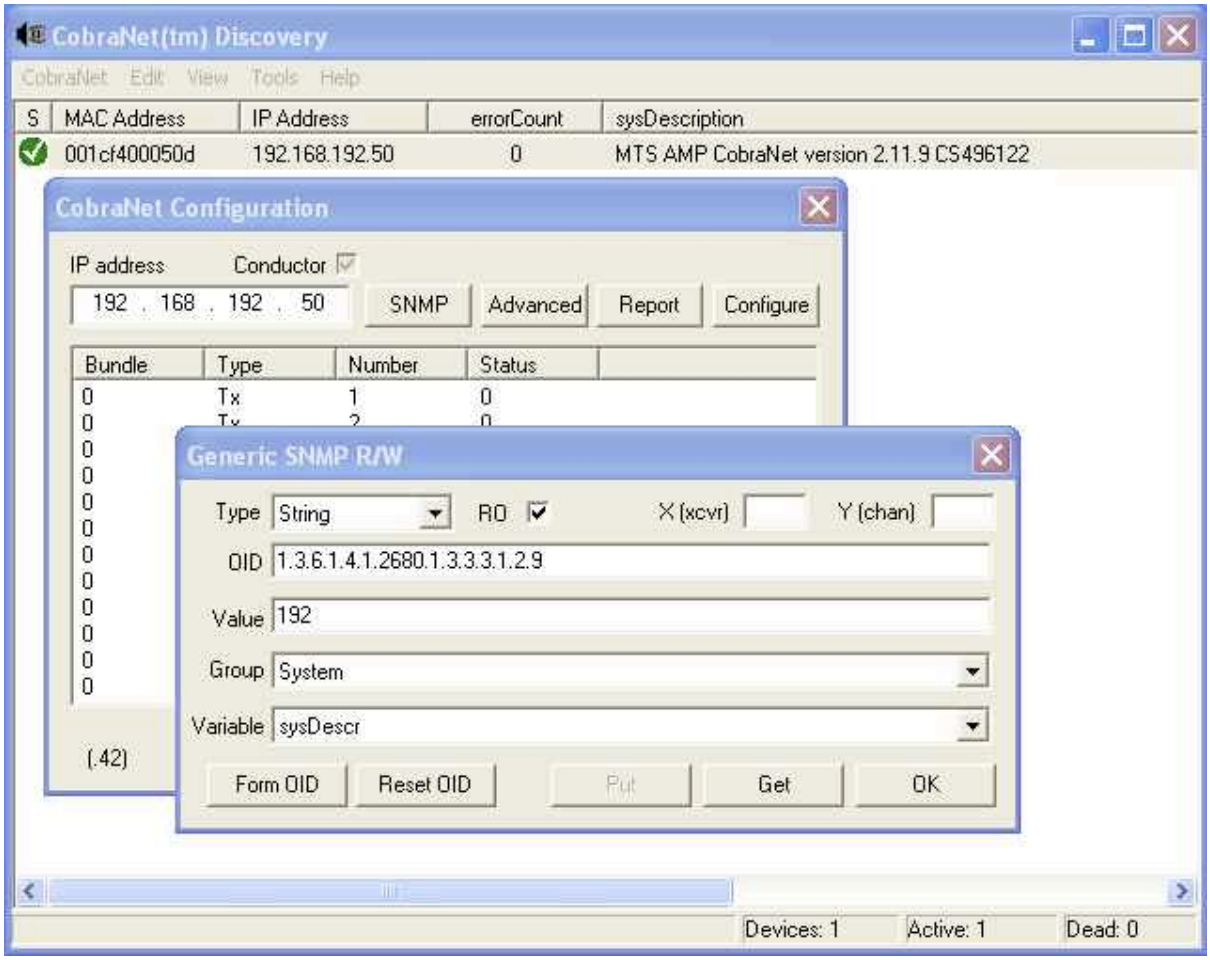


Figure 7-1: Screenshot of the Cobranet Discovery SNMP browser

The Cobranet Discovery preferences will need to have the SNMP browser switched on.

Once SNMP has been enabled, select the AMX8.8CN or AMX8.8CN device, select SNMP and then enter 1.3.6.1.4.1.2680.1.3.3.3.1.2.9 into the OID and press “Get”. This will return the first octet of the IP address. The full IP address is as follows…

- 1.3.6.1.4.1.2680.1.3.3.3.1.2.9: First Octet (Default 192)
- 1.3.6.1.4.1.2680.1.3.3.3.1.2.10: Second Octet (Default 168)
- 1.3.6.1.4.1.2680.1.3.3.3.1.2.11: Third Octet (Default 192)
- 1.3.6.1.4.1.2680.1.3.3.3.1.2.12: Fourth Octet (Default 100)

The IP address can also be using any MIB browser, such as the free download from iReasoning…

http://ireasoning.com/mibbrowser.shtml

The MIB browser will require the Cirrus Logic CNDSP MIB file to be uploaded. This is available from the Cirrus Logic website, or from MTSi.

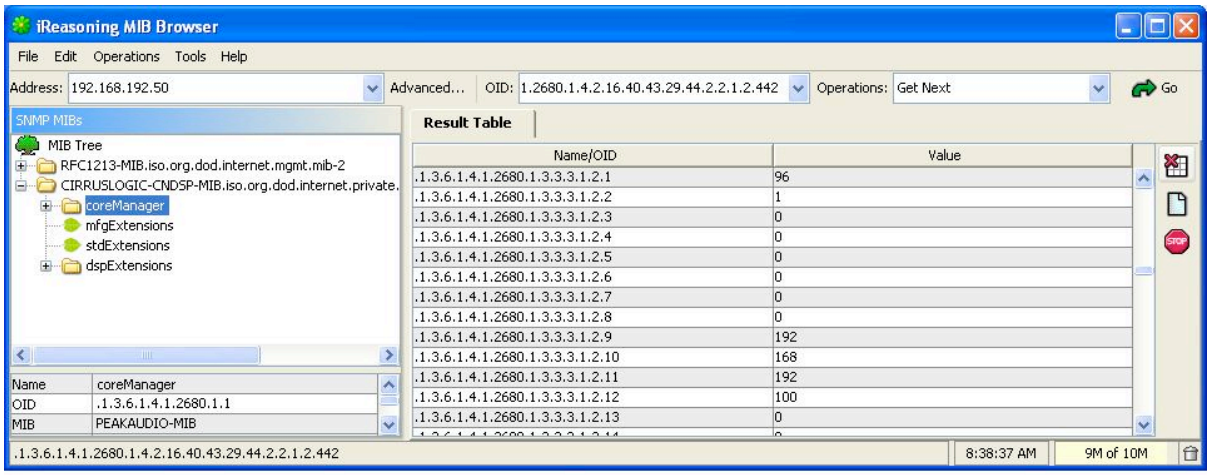


Figure 7-2: Using an MIB Browser to find the LAN IP address (192.168.192.100)

8 TELNET Control

The Ethernet port provides the TELNET protocol for communication with 3rd party control systems such as AMX or Crestron. To launch a simple TELNET command in Windows XP, do the following…

- Click Start, then select Run
- Type "TELNET"
- Press enter
- Type “Open “ followed by the IP address of the Amplifier Ethernet port.
- Type “h” to see the help instructions

A command window similar to Figure 8-1 will open.

In Windows VISTA, the TELNET client is not loaded by default. To load, use the following procedure…

- Click Start then select Control Panel.
- Select Programs and Features.
- Select Turn Windows features on or off.
- Select the TELNET Client option.
- Click OK.
- A dialog box will appear to confirm installation. The TELNET command should now be available.

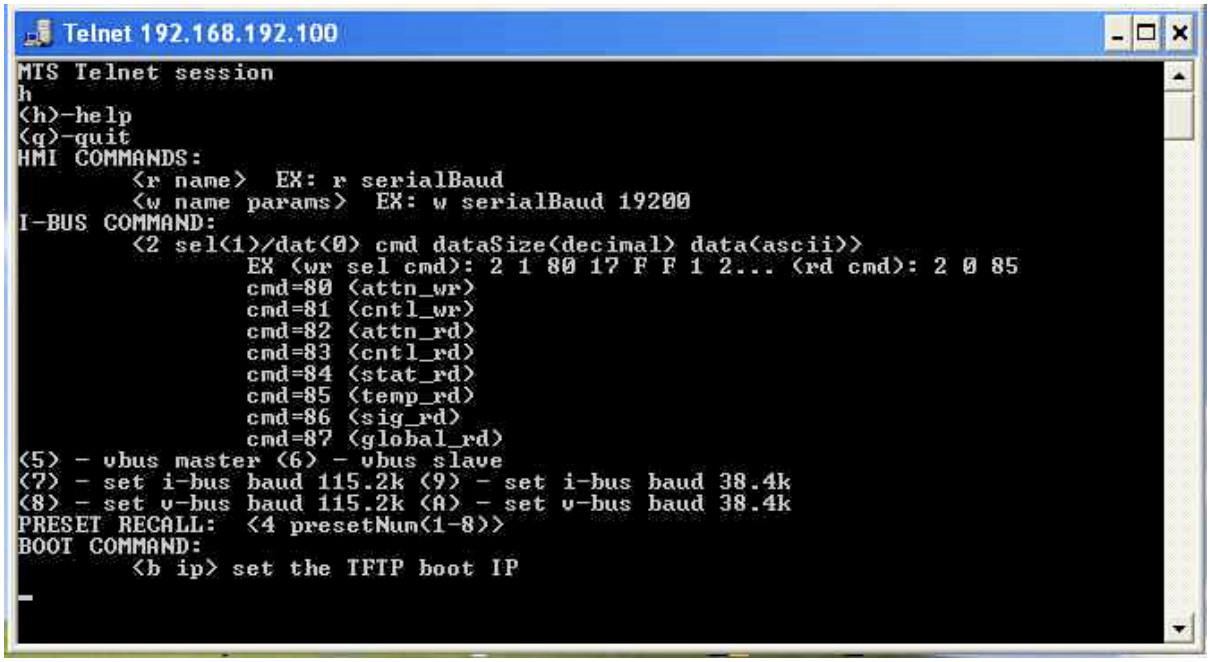


Figure 8-1: Screen shot of TELNET session and instructions.

The instruction set is as follows:-

- h – help (displays menu as Figure 3.3 above)
- q – quit

- r/w <Name> < Parameters> - (hmi command where Name is Name from CobraNet™ Programmer's Reference PM25)
- 2 <cmd type> <cmd> <data size> <data> - This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored.
- 4 <preset number 1-8 in decimal> (recall preset)
- 5 – set unit as V-Bus master. This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored
- 6 – set unit as V-Bus slave. This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored
- 7 – set I-Bus baud rate to 115.2k. This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored
- 8 – set V-Bus baud rate to 115.2k. This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored
- 9 – set I-Bus baud rate to 38.4k. This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored
- A – set V-Bus baud rate to 38.4k. This is for the MTS amplifier and does not apply to the AMX8.8CN or AMX8.8CN and should be ignored

NOTE: only DSP settings can be saved via TELNET. This command is intended to cater to customized DSP configurations. The MTS GUI should be used for the standard configuration.

The screenshot in Figure 8-2 shows an example of setting CobraNet™ bundle addresses, where the instruction sequence is "r" to read/"w" to write an HMI (CobraNet™) command, "rxBundle" is the Bundle receiver command given in Cirrus Logic's programmers manual (PM25) "2" represents the receiver number (Note: all HMI commands are "0" referenced, therefore receiver bundle 1 is address 0, bundle 2 is address 1, etc; so rxBundle 2 is actually Receiver Bundle 3).

Figure 8-2 shows reading the value of Bundle 1 (rxBundle 0) as 0, then Bundle 1 is set to 256 and then reading the value confirms the setting as 256.

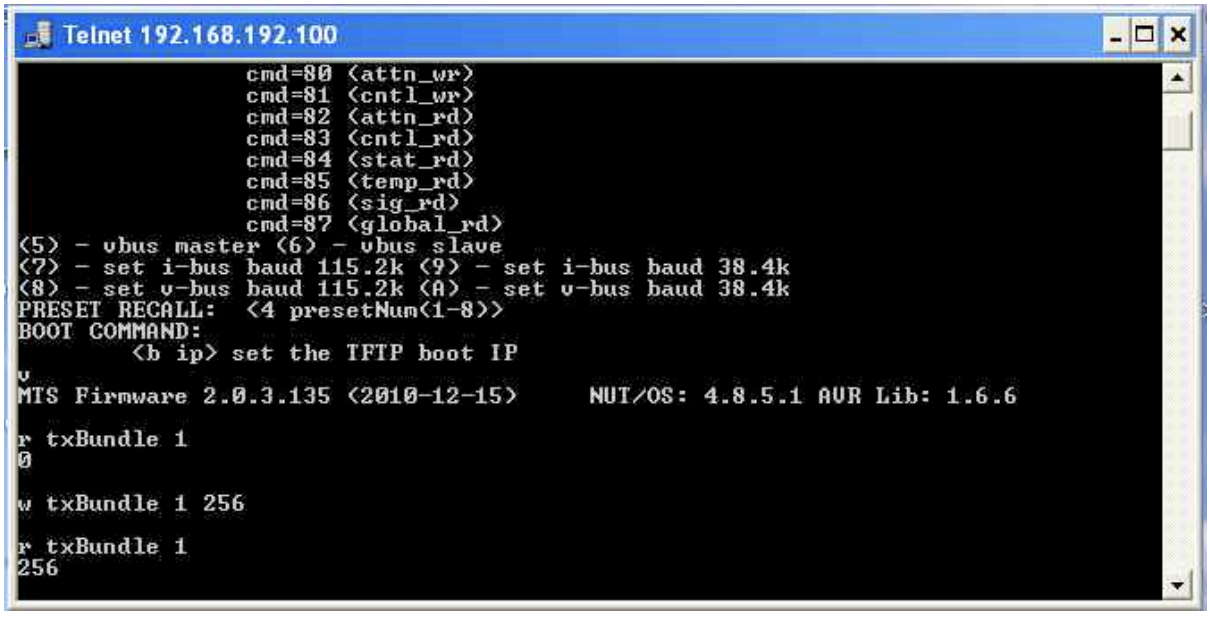


Figure 8-2: Setting CobraNet™ Parameters

Similarly, Figure 8-3 below shows the setting of DSP parameters.

Figure 8-3: Setting CobraNet™ DSP parameters

The instruction sequence is “r” for an HMI (CobraNet™) command, “controlRWValue” is the DSP read/write command instruction “50” represents the DSP offset (see section 3.2.2 above) for router output channel 1 (see Figure 8-4 below). The Router output channel 1 (Offset 50) is initially read set at input channel 0 (ie mute) and is then set to input channel 12 .

```
  </device>
- <device id="7" title="25x32 Router" type="router_NxM_basic" path="25x32 Router">
    <coefficient name="output_select_1" offset="50" mode="RW" signed="1" fract_bits="0"
      oid="1.3.6.1.4.1.2680.1.4.2.16.40.43.29.44.2.2.1.2.51" />
    <coefficient name="output_select_10" offset="59" mode="RW" signed="1" fract_bits="0"
      oid="1.3.6.1.4.1.2680.1.4.2.16.40.43.29.44.2.2.1.2.60" />
    <coefficient name="output_select_11" offset="60" mode="RW" signed="1" fract_bits="0"
      oid="1.3.6.1.4.1.2680.1.4.2.16.40.43.29.44.2.2.1.2.61" />
    <coefficient name="output_select_12" offset="61" mode="RW" signed="1" fract_bits="0"
      oid="1.3.6.1.4.1.2680.1.4.2.16.40.43.29.44.2.2.1.2.62" />
```

Figure 8-4: XML output showing Router “output_select 1” is offset number 50

9 Firmware

9.1 Cobranet Firmware

The Cobranet firmware is updated using the free utility (Cobranet Discovery) from Cirrus Logic – see Figure 9-1 below.

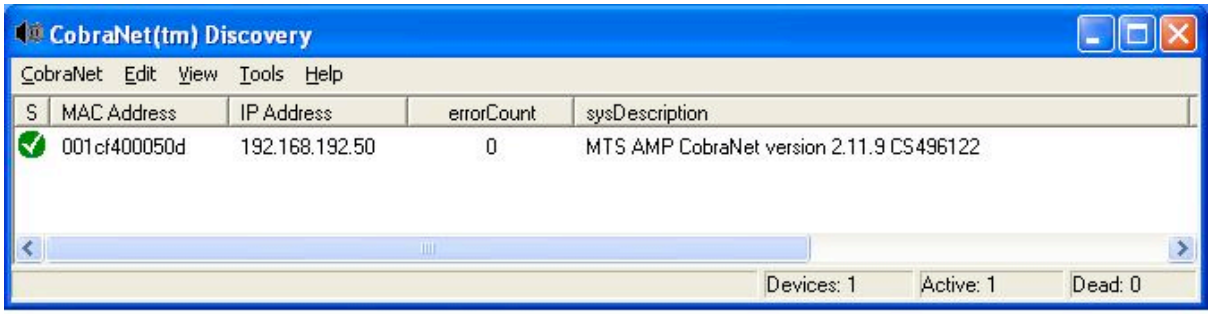


Figure 9-1: Cobranet Discovery showing 2.11.9 firmware

After loading the CNDISCO application, Advanced features will need to be enabled. Enabling advanced features in CNDISCO allows you to put any version of firmware on any hardware-compatible Cobranet module you wish. CNDISCO needs to have the particular firmware version of a device in its firmware directory in order to properly identify the device for compatible firmware upgrades. Should the situation arise where you know the device is a specific model but CNDISCO says there are no compatible firmware upgrades, using the advanced feature, you'll be able to update the firmware anyway.

How to enable the advanced feature: Firstly, open cndisco.ini in Notepad. Its usually in a directory like this: C:\Program Files\Peak Audio\CobraNet Discovery. Then find the Configuration section. It usually looks something like this:

[Configuration]
Adapter Index=[10] [10] Broadcom NetXtreme 57xx Gigabit Controller
Firmware Location=C:\Program Files\Peak Audio\CobraNet Discovery\firmware

Start a new line after one of the lines in that section and type in Advanced Feature=1. It should look something like this when you're done:

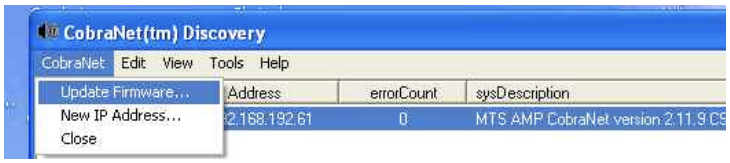
[Configuration]
Adapter Index=[10] [10] Broadcom NetXtreme 57xx Gigabit Controller
Firmware Location=C:\Program Files\Peak Audio\CobraNet Discovery\firmware
Advanced Feature=1

Save the file and exit Notepad. The advanced feature is now enabled.

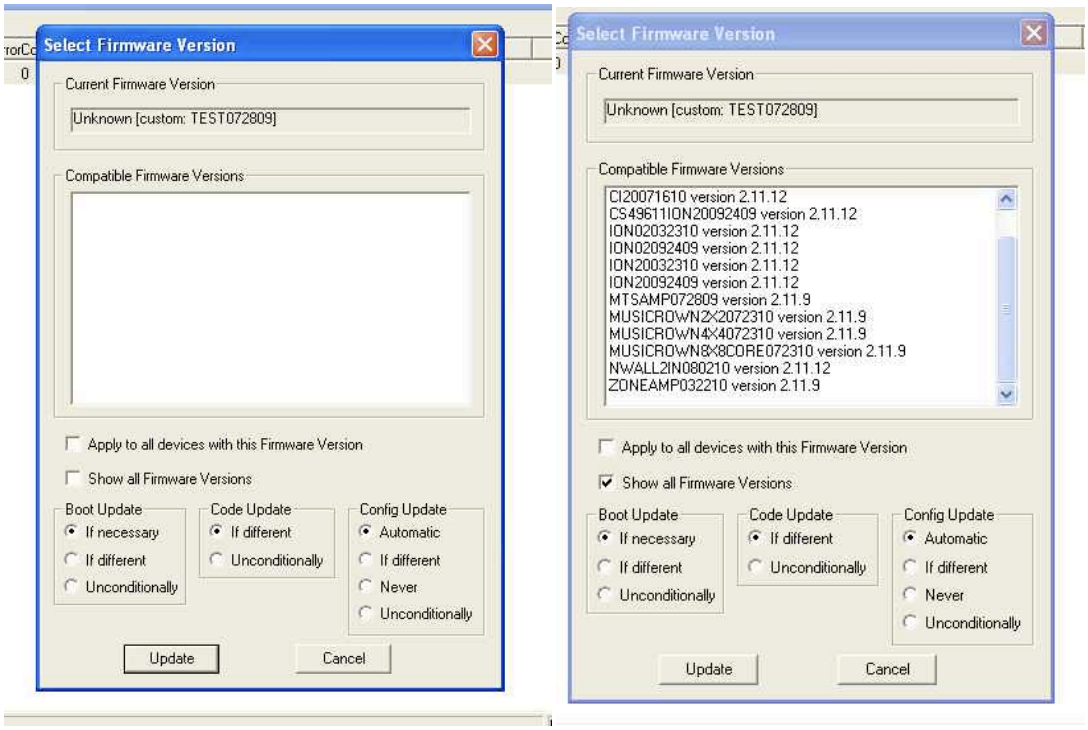
Now save the MTS cobranet binary file “MTS_2_11_xx.bin” to the Firmware folder and use CNDISCO to upload the firmware. Please ensure that you ONLY use the MTS binary,

otherwise it will be lacking the amplifier specific controls needed for the correct operation of the product..

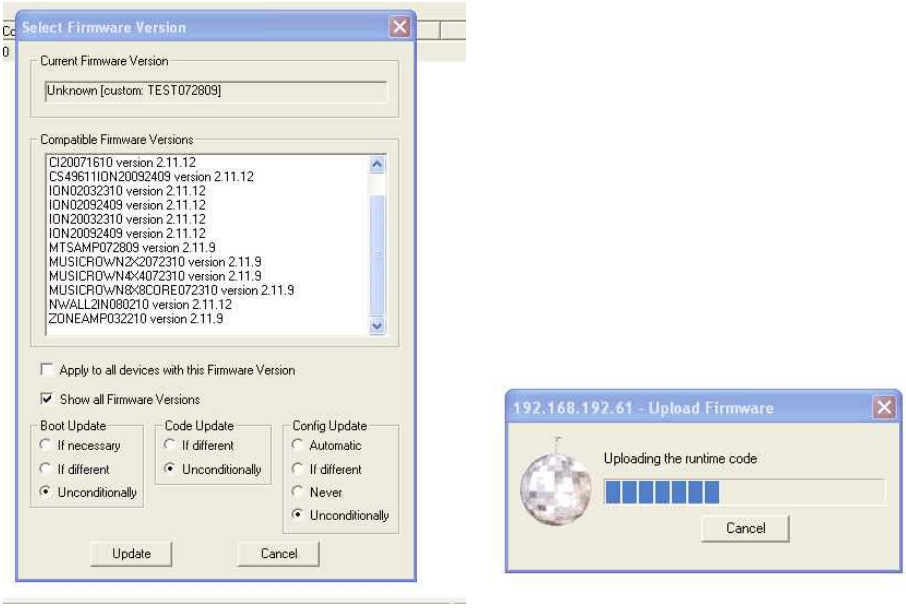
First Click on Cobranet and then choose Upload firmare…



Now when you update the firmware you'll see a check box in the "Select Firmware Version" dialog box marked "Show All Firmware Versions". Check the box and you'll be able to choose from all the firmware versions stored in the firmware directory.



Then choose all “Unconditionally” and select the “MTS_2_11_xx.bin”… binary and hit Update. You will get a warning, so accept and then see the updating dialog box below. Once completed, power cycle the product.



9.2 Ethernet Firmware

9.2.1 Version Number

The firmware version can be checked using TELNET to talk to the LAN port. TELNET is opened in a cmd windows as shown in Figure 9-2 below.

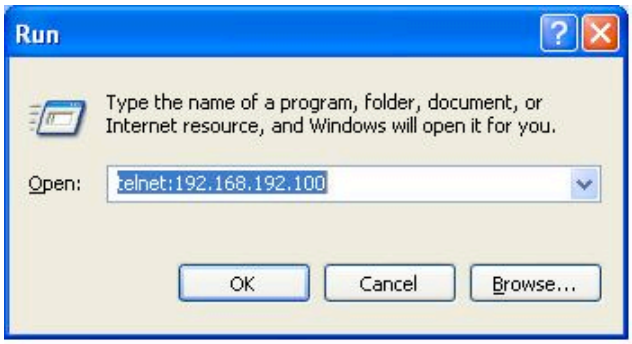


Figure 9-2: Open a TELNET session

Once the TELNET session has been opened the user can select “h” and “enter” to see the help menu and then select “v” and “enter” to see the firmware revision number (see Figure 9-3 below.

Windows VISTA and Windows 7 does not ship with TELNET enabled. To enable TELNET use the following instructions…

- Start
- Control Panel
- Programs And Features
- Turn Windows features on or off
- Check Telnet Client
- Select OK

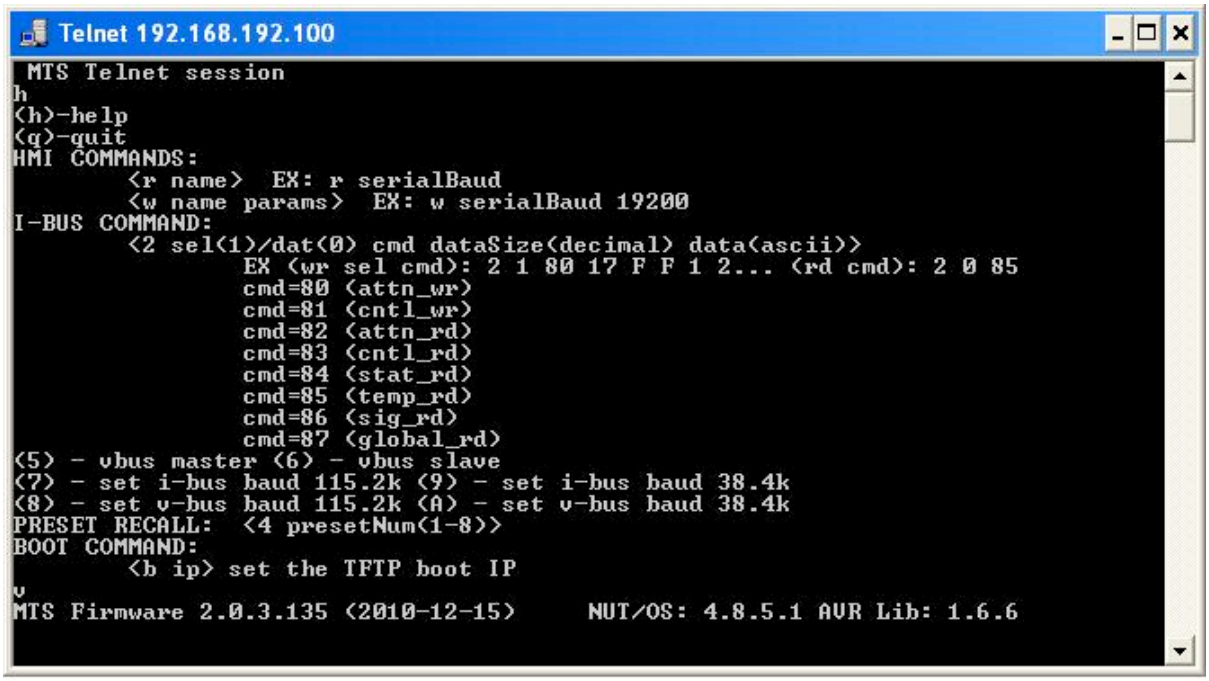


Figure 9-3: Help and Version commands

9.2.2 Updating Firmware

The firmware for the Ethernet port is updated using a TFTP utility from MTSi, as follows…

- Set the Host PC to IP address 192.168.192.101. Ensure that Windows Firewall (or other Firewalls) are either switched off or set to allow port 69 to communicate.
- Set the target AMX8.8CN or AMX8.8CN device LAN port to IP address 192.168.192.100
- Open the TFTP utility – see Figure 9-4 below and select the location of the "apploadbin" binary file. "apploadbin" is the Ethernet port host processor firmware.
- Press "Start" and the TFTP utility will show "listening"
- Cycle power on the target AMX8.8CN or AMX8.8CN device.
- The TFTP utility will start to upload. If it stalls (see Figure 9-6 below), then stop and restart the utility. Sometimes it will take 2-3 attempts
- The TFTP utility will indicate success (see Figure 9-7) once the upload is complete.

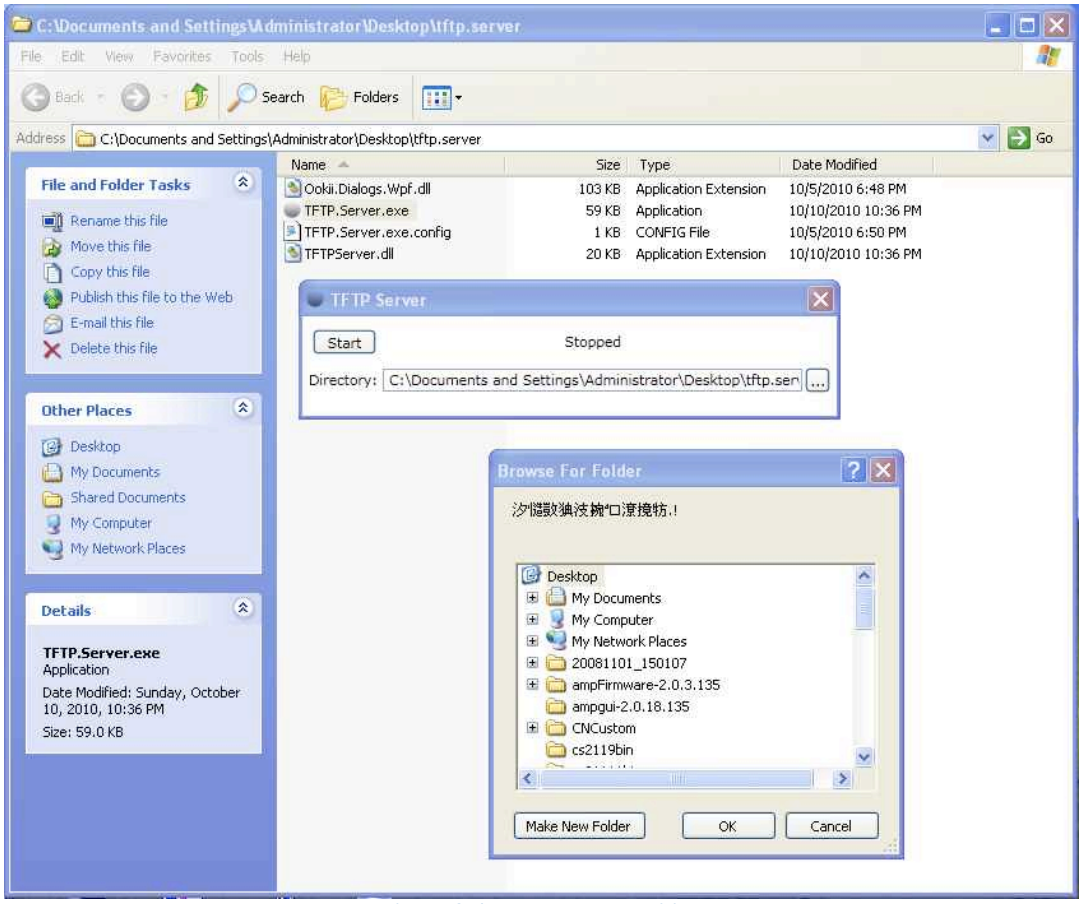


Figure 9-4: TFTP server utility

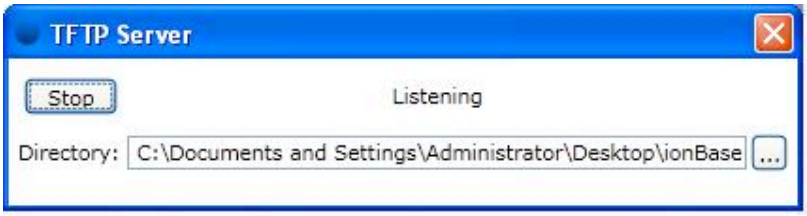


Figure 9-5: TFTP utility listening

Figure 9-6: TFTP failure

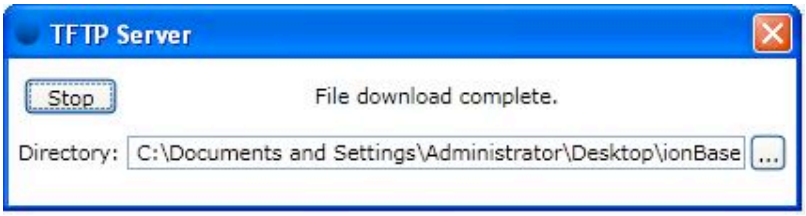


Figure 9-7: TFTP upload successful

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