

Crestron **C2N-DAP8**  
Digital Audio Processor

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Operations Guide



**CRESTRON**

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# Digital Audio Processor: C2N-DAP8

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## Introduction

### Features and Functions

The C2N-DAP8 is an eight-channel surround sound processor, designed to work in a Crestron® 2-Series control system. This unit will process either digital audio streams (S/PDIF) or analog signals, and generate up to 7.1 surround sound preamp outputs. Designed for the ultimate in home theater entertainment, the C2N-DAP8 provides multiple surround sound modes for virtually any room size and speaker configuration, with unmatched accuracy to satisfy the most discerning ear.

The functional summaries below and on the following page highlight the main features of the C2N-DAP8.

#### *Functional Summary –Audio*

- Multiple surround sound modes
- Automatic recognition of digital input audio coded format
- Up to eight channels (7.1) of home theater outputs
- One RJ-45 stereo input/output via CAT5
- Two coax digital inputs (S/PDIF)
- Two TOSLINK™ fiber optic digital inputs
- Five local (analog) stereo inputs
- Two stereo output pairs, one with volume/tone control; one fixed output
- Eight-channel, six-band parametric equalizer per channel
- PC-based software tool to set speaker configuration & bass management, delay control, input settings, output settings, and equalizers
- Two-channel audio decoding modes:  
Two-channel, Dolby Pro Logic, Dolby Pro Logic II, DTS NEO:6
- Multi-channel audio decoding modes:  
Dolby Digital, Dolby Digital EX, DTS 5.1, DTS ES Discrete 6.1, DTS ES Matrix 6.1

**Functional Summary – Miscellaneous**

- RJ-11 for RS-232 control of serial devices, or for uploading/upgrading firmware for the C2N-DAP8
- Mini-Cresnet for connection to Cresnet devices and main processor
- Front panel PWR and NET LEDs
- Touch-settable ID capable

The CNAMPX-7x200 7-channel, 200 watts per channel surround sound amplifier is the ideal companion product to the C2N-DAP8 surround sound processor.

The C2N-DAP8 provides digital surround sound processing along with CAT5 head end/local AV distribution functions. The result is cost-effective surround sound in any room of the house.

**Surround Sound Modes**

The C2N-DAP8 provides the following surround sound modes, permitting choice of the format that best suits the entertainment medium selected, the specific characteristics of the listening/viewing area, and the personal preferences of the listener.

***Dolby Digital 5.1***

Typically, 5.1-channel audio consists of five discrete, full-range main channels (left, center, right, left surround, and right surround) plus a discrete, band-limited low frequency effects (LFE) channel for added bass (subwoofer). Dolby Digital bitstreams deliver full frequency bandwidth main channels, from 3 Hz to 20 kHz, and a limited frequency bandwidth LFE channel, from 3 Hz to 120 Hz.

***Dolby Pro Logic***

As a descendent of the advanced technology used in Dolby Stereo theaters, Dolby Pro Logic Surround decoders give enhanced spatial and directional effects when used in the home environment. Sophisticated logic steering techniques are used to extend the impact of the soundtrack over a wider listening area. Wide separation, smooth dynamic action, and proper spatial imaging are key characteristics of Pro Logic decoders.

***Dolby Pro Logic II***

Dolby Pro Logic II creates five full-bandwidth output channels from two-channel sources. This is done using an advanced, high-purity matrix surround decoder that extracts the spatial properties of the original recording without adding any new sounds or tonal colorations.

**Movie Mode**

The Movie mode is for use with VCRs, television shows, and all programs encoded in Dolby Surround. The result is an enhanced soundfield that approaches the quality of discrete 5.1-channel sound.

**Music Mode**

The Music mode is for use with any stereo music recordings, and provides a wide and deep sound space. The Music mode includes controls that allow the sound to be tailored to individual listening tastes.

- **Center Width.** This control allows center-channel sounds to be positioned between the center speaker and the left/right speakers over a range of eight steps. Step “3” uses a combination of all three front speakers to give the best vocal imaging and most seamless soundstage presentation, and is recommended for most recordings. Step “0” places all center sound in the center speaker. Step “7” places all center sound equally in the left/right speakers, just as in conventional stereo.
- **Dimension.** This control allows the user to gradually adjust the soundfield either toward the front or the rear. This can be useful to help achieve the desired balance from all the speakers with certain recordings that may contain either too much or too little spatial effect. Step “3” is the recommended setting, which has no effect on the sound. Steps “4” through “6” gradually move the sound forward, and steps “2” through “0” move the sound toward the surrounds.
- **Panorama.** This control extends the front stereo image to include the surround speakers for an exciting “wraparound” effect with side-wall imaging. It is particularly effective for recordings that have strong left- or right-channel elements in the mix, since these are detected and accentuated by the Panorama process.

All three of the above controls may be used alone or in any combination. After experimenting with them on a few programs, it is easy to understand their effect and which settings are preferable.

### ***Dolby Digital EX***

Dolby Digital EX creates six full-bandwidth output channels from 5.1 channel sources by adding a rear center channel. This is done using a matrix decoder that derives three surround channels from the two in the original recording. The center rear is matrixed into the rear 2-channels of the 5.1 soundtrack, like what Pro Logic does with the front three channels in the Pro Logic mode. The decoder takes the right rear and left rear information, which also contain the center rear information, and extracts the information so that the center rear channel is active. Thus, sound will be heard out of the center rear speaker as well as the right rear and left rear speakers. For best results, Dolby Digital EX should be used with movie soundtracks recorded with Dolby Digital Surround EX.

### ***DTS 5.1***

DTS 5.1 is a multi-channel digital signal format developed by Digital Theater Systems, Inc., that provides channels for the front left, right, and center, surround left and right, and LFE. The process used by DTS produces audio tracks that closely match the original master recording, with very little data compression.

### ***DTS ES Discrete 6.1***

With the DTS-ES Discrete 6.1 format, all 6.1 channels, including the surround back (SB) channel, are recorded independently using a digital discrete system. The main feature of this format is that because the SL, SR and SB channels are fully independent, the sound can be designed with total freedom and it is possible to achieve a sense that the acoustic images are moving about freely among the background sounds surrounding the listener from 360 degrees. Though maximum performance is achieved when sound tracks recorded with this system are played using a DTS-ES decoder, when played with a conventional DTS decoder the SB channel signals are automatically down-mixed to the SL and SR channels, so none of the signal components are lost.

### ***DTS ES Matrix 6.1***

With this format, the additional SB channel signals undergo matrix encoding and are input to the SL and SR channels beforehand. Upon playback, they are decoded to the SL, SR and SB channels. The performance of the encoder used at the time of recording can be fully matched using a high precision digital matrix decoder developed by DTS, thereby achieving surround sound more faithful to the producer's sound design aims than with conventional 5.1- or 6.1-channel systems. In addition, the bit stream format is 100% compatible with conventional DTS signals, so the effect of the Matrix 6.1 format can be achieved even with 5.1-channel signal sources.

When DTS-ES Discrete 6.1 or Matrix 6.1 encoded sources are decoded with a DTS-ES decoder, the format is automatically detected upon decoding and the optimum playing mode is selected. However, some Matrix 6.1 sources may be detected as having a 5.1-channel format, so the DTS-ES Matrix 6.1 mode must be set manually to play these sources.

### ***DTS Neo:6 Cinema***

This mode is optimum for playing movies. Decoding is performed with emphasis on separation performance to achieve the same atmosphere with 2-channel sources as with 6.1-channel sources.

This mode is effective for playing sources recorded in conventional surround formats as well, because the in-phase component is assigned mainly to the center channel and the reversed phase component to the surround (left, right, and back) channels.

### ***DTS Neo:6 Music***

This mode is suited mainly for playing music. The front (left and right) channel signals bypass the decoder and are played directly, so there is no loss of sound quality, and the effect of the surround signals output from the center and the surround (left, right, and back) channels add a natural sense of expansion to the sound field.

### ***Two-Channel***

This mode is used to play stereo source material in its pure unprocessed form.

### ***Low Frequency Effects (LFE)***

In 5.1, 6.1, and 7.1 surround formats, the point 1 represents an extra channel for LFE sounds (120Hz and below) that is decoded and routed to a subwoofer (if present). The LFE channel signal is added to any other low frequency signals routed to the subwoofer from channels unable to produce effective low frequency sound.

## **Parametric Equalizer**

The parametric equalizer consists of eight channels (one for each speaker) of six bandpass filter sections that permit you to correct for acoustic anomalies in the listening area or in the speakers themselves, and/or to establish preset values that enhance the sound conditions for favorite music or recording types.

The six bands are identical in function. Each delivers up to 12 dB of boost or attenuation, has an adjustable bandwidth control (from .02 octaves to 2 octaves), and a center frequency control range from 10 Hz to 20 KHz. Use each band anywhere in the audio spectrum, not just pre-selected ranges as typically found on graphic equalizers. In addition, you can select from among five filter types (low pass, high pass, EQ Filter, bass shelf, and treble shelf) or select no filter.



## Specifications

The following table summarizes the specifications for the C2N-DAP8.

### C2N-DAP8 Specifications

SPECIFICATION	DETAILS
Power Requirements	21 Watts (0.875 Amp @ 24 VDC)
Default NET ID	50
Control System Update Files <sup>1,2</sup> 2-Series Control System Update File	Version 3.044.CUZ or later
C2N-DAP8 Firmware	C2N-DAP8.1.04.44d.upg or later
Audio I/O	
AUDIO	RJ-45 Stereo differential I/O – Connects to CNX-BIPAD8
S/PDIF – A, B	2 RCA connectors for coax digital input (S/PDIF)
OPTICAL – C, D	2 Toslink fiber optic inputs (S/PDIF)
AUDIO IN – 2 to 6	10 RCA connectors for 5 local stereo input sources Input level = 2.5 VRMS Input impedance = 50K Ohms
AUDIO OUT – A	2 RCA connectors for fixed stereo output of analog crosspoint.
AUDIO OUT – B	2 RCA connectors for stereo output but with volume/tone control <ul style="list-style-type: none"> <li>- can be used w/TV if surround sound is not active</li> <li>- Output level = 1.8 VRMS maximum</li> <li>- THD+N &lt; 0.05% @ unity gain</li> <li>- S/N &lt; -96 dB @ maximum output level</li> <li>- Volume control range –80dB to +20 dB</li> <li>- Output impedance 50 Ohms</li> </ul>
AUDIO OUT – FRONT (L/R), SURROUND (L/R), BACK (L/R), CENTER, SUBWOOFER	8 RCA connectors for 7.1 surround sound output <ul style="list-style-type: none"> <li>- Output level = 3 VRMS maximum</li> <li>- Subwoofer output level = 8.5 VRMS maximum</li> <li>- THD+N &lt; 0.005% @ unity gain</li> <li>- S/N &lt; -94dB</li> <li>- Dynamic range &gt;113dB</li> <li>- Output impedance 200 Ohms</li> <li>- Volume control range –80dB to +12dB</li> </ul>
	Analog to Digital Converters: 24 bit 96KHz Digital to Analog Converters: 24 bit 192KHz Frequency Response: 20Hz to 20KHz ±0.2dB
Miscellaneous I/O	
RS-232	RJ-11 connector for RS-232 communication; supports baud rates of up to 115K and RTS/CTS hardware handshaking
NET	Mini-Cresnet for Cresnet connection
Front Panel Indicators	2 LEDs – PWR, NET
Surround Sound Modes	PCM up to 96KHz; Dolby Pro Logic; Dolby Pro Logic II; Dolby Digital 5.1; Dolby Digital EX; DTS 5.1; DTS ES Discrete 6.1; DTS ES Matrix 6.1; DTS Neo:6 Cinema; DTS Neo:6 Music
Environmental Temperature	41° to 113°F (5° to 45°C)
Humidity	10% to 90% RH (non-condensing)
Dimensions	Height: 3.48 in (8.84 cm) – with optional feet Width: 19.0 in (48.26 cm) – with ears 17.1 in (43.43 cm) – without ears Depth: 8.44 in (21.44 cm)
Weight	4.96 lb (2.23 kg)

- 1 The latest versions can be obtained from the Downloads | Software Updates section of the Crestron website ([www.crestron.com](http://www.crestron.com)). Refer to NOTE below.
- 2 Crestron 2-Series control systems include the AV2, AV2 with Card Cage, CP2, CP2E, PAC2, MP2, MP2E, PRO2, and RACK2.

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**NOTE:** Crestron software and any files on the website are for Authorized Crestron dealers and Crestron Authorized Independent Programmers (CAIP) only. New users may be required to register to obtain access to certain areas of the site (including the FTP site).

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## Physical Description

The C2N-DAP8 digital audio surround sound processor is housed in a black enclosure with labeling on the front and rear panels.

The front panel of the unit includes two standard LEDs (PWR and NET). All connections to the unit are made through the rear panel.

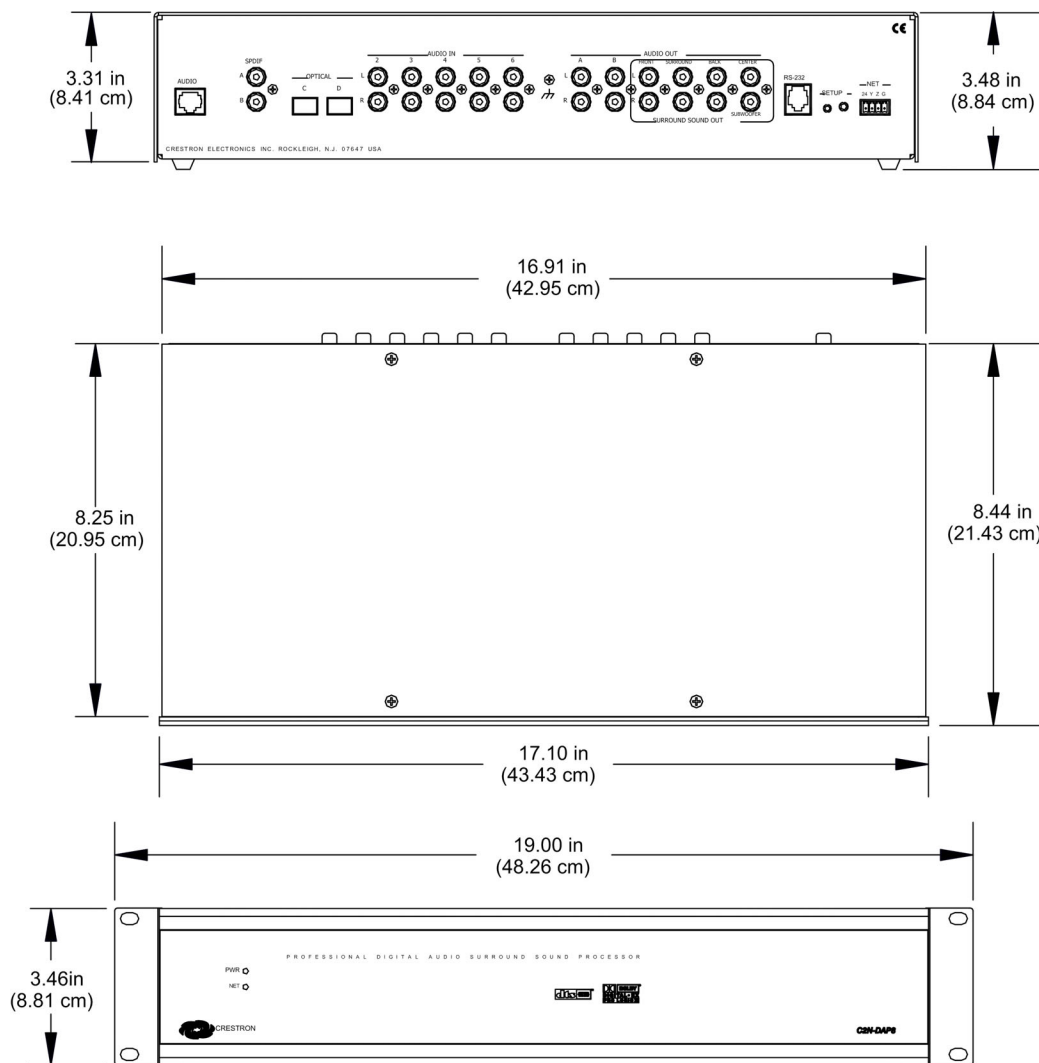
### *C2N-DAP8 Physical Views*



The dimensions for the C2N-DAP8 are shown in the illustrations on the next page.

For information on audio wiring, refer to “Hardware Hookup” which begins on page 14.

**C2N DAP8RC Overall Dimensions**



**Input and Output Ports**

**AUDIO**

The RJ-45 **AUDIO** port is used to transmit and receive analog stereo audio from the head end.

**SPDIF (Coaxial Digital Audio)**

These two RCA connectors (**A & B**) are used for coaxial digital input from local sources.

**OPTICAL**

These two Toslink ports (**C & D**) are used for fiber optic S/PDIF inputs.

**AUDIO IN**

These ten RCA connectors (**2 – 6, L & R**) provide for five local stereo input sources.

**⚡ (Chassis Ground)**

Use this chassis screw to connect the audio source(s) common ground(s) to the C2N-DAP8.

**AUDIO OUT**

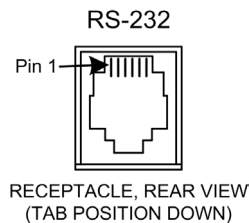
The two RCA connectors labeled **A** provide stereo output of the unit's analog crosspoint, without any processing.

The two RCA connectors labeled **B** provide stereo output of analog crosspoint, but with volume/tone control.

The eight RCA connectors that comprise the **SURROUND SOUND OUT** group, provide surround sound encoded output to the **FRONT**, **SURROUND**, **BACK**, **CENTER**, and **SUBWOOFER** channels. Typically, the **FRONT**, **SURROUND**, **BACK**, and **CENTER** outputs are routed to a surround sound amplifier such as the CNAMPX-7X200; the **SUBWOOFER** output goes to a powered subwoofer.

**RS-232**

The C2N-DAP8 provides one RJ-11 connector for RS-232 communication with a PC or third-party serial devices. This port supports baud rates up to 115K and RTS/CTS hardware handshaking. Data Set Ready (DSR) and Data Terminal Ready (DTR) are not supported. The pins are configured as shown in the following table.



PIN	FUNCTION
1	CTS (Clear to Send)
2	GND
3	RXD (Receive)
4	TXD (Transmit)
5	RTS (Request to Send)
6	Not connected

**NET**

This four-pin mini-Cresnet connector is used to supply unit power (24VDC) and for connection to other four-wire devices in the Cresnet system.

**SETUP LED and Pushbutton**

The SETUP pushbutton and its associated LED are located on the rear panel and are to be used for setup of the unit's network ID during the initial configuration of a Cresnet® system or when the device is being added/replaced. Refer to "Method B (Touch Settable IDs)" on page 11 for detailed information.

**LED Indicators**

The front panel **PWR** (Power) indicator illuminates when the unit is supplied with 24 volts DC from the network. The **NET** indicator flashes whenever communication occurs between the control system and the C2N-DAP8 (when the unit is polled on the network). The **NET** LED indicates that the current SIMPL Windows program has a network device defined at the same Net ID as the C2N-DAP8.

## Industry Compliance

As of the date of manufacture, this unit has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling (N11785).



**NOTE:** This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## Setup

### Network Wiring

**CAUTION:** Use only Crestron power supplies for Crestron equipment. Failure to do so could cause equipment damage or void the Crestron warranty.

**NOTE:** When installing network wiring, refer to the latest revision of the wiring diagram(s) appropriate for your specific system configuration, available from the Downloads | Product Manuals | Wiring Diagrams section of the Crestron website ([www.crestron.com](http://www.crestron.com)).

When calculating the wire gauge for a network run, the length of the run and the power factor (power usage in watts) of each network unit must be taken into consideration. If multiple network units are to be daisy-chained, the power factors of each unit must be added to determine the power factor of the entire chain. The length of the run in feet and the power factor of the run (in watts) should then be used in the following resistance equation.

$$R < \frac{40,000}{L \times PF}$$

Where: R = Resistance (refer to table below).  
L = Length of run (or chain) in feet.  
PF = Power factor of entire run (or chain).

The required wire gauge should be chosen such that the resistance value is less than the value calculated in the resistance equation. Refer to the table after this paragraph.

#### Wire Gauge Values

RESISTANCE (R)	WIRE GAUGE
4	16
6	18
10	20
15	22
13	Doubled CAT5
8.7	Tripled CAT5

**NOTE:** All network wiring must consist of two twisted-pairs. One twisted pair is the +24V conductor and the GND conductor; the other twisted pair is the Y conductor and the Z conductor.

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**NOTE:** When daisy-chaining Cresnet units, strip the ends of the wires carefully to avoid nicking the conductors. Twist together the ends of the wires that share a pin on the network connector, and tin the twisted connection. Apply solder only to the ends of the twisted wires. Avoid tinning too far up the wires or the end becomes brittle. Insert the tinned connection into the Cresnet connector and tighten the retaining screw. Repeat the procedure for the other three network conductors.

---

## Identity Code

Every equipment and user interface within the network requires a unique identity code (NET ID). These codes are recognized by a two-digit hexadecimal number from 03 to FE. The NET ID of each unit must match an ID code specified in the SIMPL Windows program. Refer to “Setting the Net ID in Device Settings” on page 41 for details of the SIMPL Windows procedure.

*Refer to the note on page 45 for a definition of Viewport.*

The NET ID of the C2N-DAP8 has been factory set to **50**. The NET IDs of multiple C2N-DAP8s in the same system must be unique. NET IDs are changed from a personal computer (PC) via the Crestron Viewport.

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**NOTE:** For detailed information on establishing communication between the PC and control system, refer to “Communication Settings” on page 45. If communication cannot be established, refer to the “Troubleshooting Communications” section in the respective Operations Guide for the control system.

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There are two different methods for setting the C2N-DAP8 NET IDs:

**Method A** (Cresnet address-settable ID), described below, requires that a single unit be the only network device connected to the control system. This method is necessary with a 2-Series control system upgrade file (CUZ) version prior to 3.008. It is optional with later versions of the operating system.

**Method B** (Touch-Settable IDs), which begins on page 11, applies to C2N-DAP8s in a Cresnet system with 2-Series control system upgrade file (CUZ) version 3.029 or later. These upgrades enable Touch-Settable ID (TSID) functionality, which makes it possible for the control system to recognize a network device via its serial number, which is stored in the device’s memory. This method does not require that any devices be disconnected from the network; NET IDs may be set with the entire Cresnet system intact. This method requires the use of the Crestron Viewport version 3.35 or later.

Use the appropriate method to set the C2N-DAP8 NET ID.

### **Method A (Cresnet address-settable ID)**

1. Ensure that the C2N-DAP8 is the only device connected to the control system.
2. Open the Crestron Viewport.
3. From the Viewport **Functions** menu, select **Set Network ID**. The Viewport will check the baud rate and then display the "Set Network ID" window.
4. In the "Set Network ID" window, select the C2N-DAP8 from the *Current Network Devices* text window.
5. Select the new NET ID for the C2N-DAP8 from the *Choose the new network ID for the selected device (Hex):* text box.

6. Click **Set ID** to initiate the change. This will display the message "ID command has been sent."
7. In the "Command Complete" window, click **OK**.
8. In the *Current Network Devices* window, verify the new Net ID code. (The Net ID can also be verified from the **Diagnostics** menu. Select the **Report Network Devices** command.)
9. In the "Set Network ID" window, click **Close**.

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**NOTE:** The new NET ID code may also be verified by selecting **Diagnostic | Report Network Devices** in the Viewport (alternately, select **F4**).

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10. Repeat this procedure for each C2N-DAP8 to be added to the system.

### **Method B (Touch Settable IDs)**

Before using this method, you should have a list of all current network devices and their Net IDs, to avoid assigning duplicate IDs.

#### Set Net ID by TSID

These procedures are for TSID-enabled network devices during the initial configuration of a Cresnet system or when such devices are being added/replaced.

1. Ensure that all C2N-DAP8s are connected to the control system.
2. Open the Crestron Viewport version 3.35 or later.
3. From the Viewport menu, select **Functions | Assign Cresnet ID by Serial Number**. The "Set Net ID by TSID" window appears. The window is first displayed with the data fields empty.

#### *"Set Net ID by TSID" Window*

The screenshot shows a dialog box titled "Set Net ID by TSID". At the top, there is a section labeled "Available Devices with Touch Settable ID's" which contains a large empty rectangular area and a button labeled "Search for Touch Settable Devices". Below this, the text reads "Please supply the Serial Number or TSID of the device:" followed by two input fields: "Serial Number:" and "TSID:", with "-or-" centered between them. Below the input fields, the text reads "Please supply the Cresnet ID it should be set to:" followed by a dropdown menu. At the bottom of the dialog are two buttons: "Cancel" and "OK".

4. Click on the **Search for Touch Settable Devices** button. The system searches the network and lists all TSID-enabled devices found. The list is similar to the report produced by pressing **F4** (Report Network Devices); the first eight digits of each line constitute the TSID number (hexadecimal form of the serial number).
5. As you enter either the serial number or TSID number of the device that requires a change, the corresponding TSID or serial number automatically appears in its appropriate field, and the list scrolls to and highlights the device listing. The listing should show the device's current Cresnet ID.
6. Enter the Cresnet ID that the device should be set to and click **OK**. The number you enter should appear on the list.

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**CAUTION:** This function does not prevent you from setting duplicate IDs. Be sure to check current assignments before entering the desired Cresnet ID number.

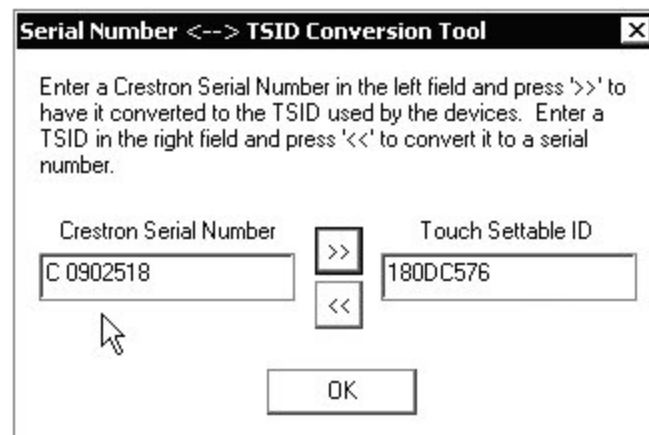
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### Serial Number to TSID Conversion

This utility is useful in a case where there are multiple devices of the same type on a network, you need to locate a particular one, you know the TSID but not the serial number, and your site installation list is based on device serial numbers. In this (or the reverse) situation, do the following:

1. Open the Crestron Viewport.
2. From the Viewport menu, select **Functions | Serial Number ↔ TSID Conversion Tool**. The “Serial Number ↔TSID Conversion Tool” window is displayed.

#### *“Serial Number to TSID Conversion Tool” Window*



3. Enter the serial number or TSID number as instructed; press the appropriate button to obtain the corresponding number.

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**NOTE:** Enter serial numbers, including spaces, exactly as they appear on the unit label. Alpha characters in serial numbers or TSID numbers may be entered in upper or lower case.

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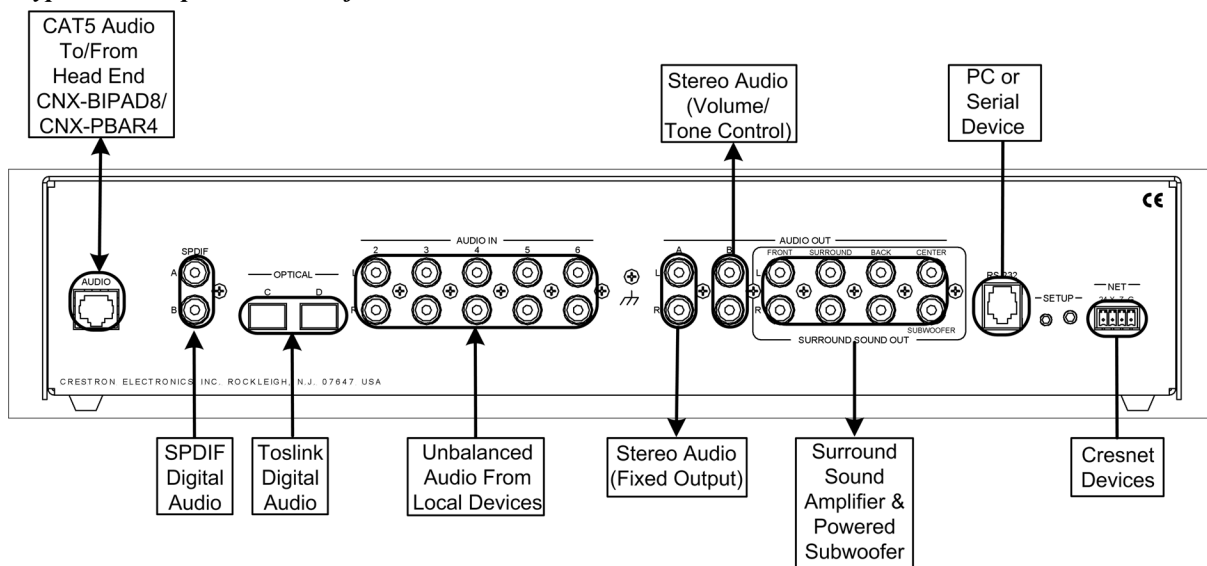


## Hardware Hookup

In addition to its capabilities as a surround sound processor, the C2N-DAP8 provides tremendous flexibility in audio signal distribution. Refer to “Audio Distribution” below for detailed information. Refer to the basic hookup diagram following this paragraph, and, other than making the power connection (NET) last, complete the connections in any order.

**NOTE:** Refer to “Network Wiring” on page 9 when making connections to the port labeled NET.

### Typical Hookup Connections for C2N-DAP8



### Audio Distribution

The C2N-DAP8 provides local inputs and outputs for audio. Typically, the C2N-DAP8 receives analog audio from the CNX-BIPAD8 via CAT5 cabling. In addition, it receives digital audio and analog audio from local sources via standard RCA connections and Toslink fiber optic connectors. The unit’s built-in audio matrix switcher distributes these inputs to local outputs.

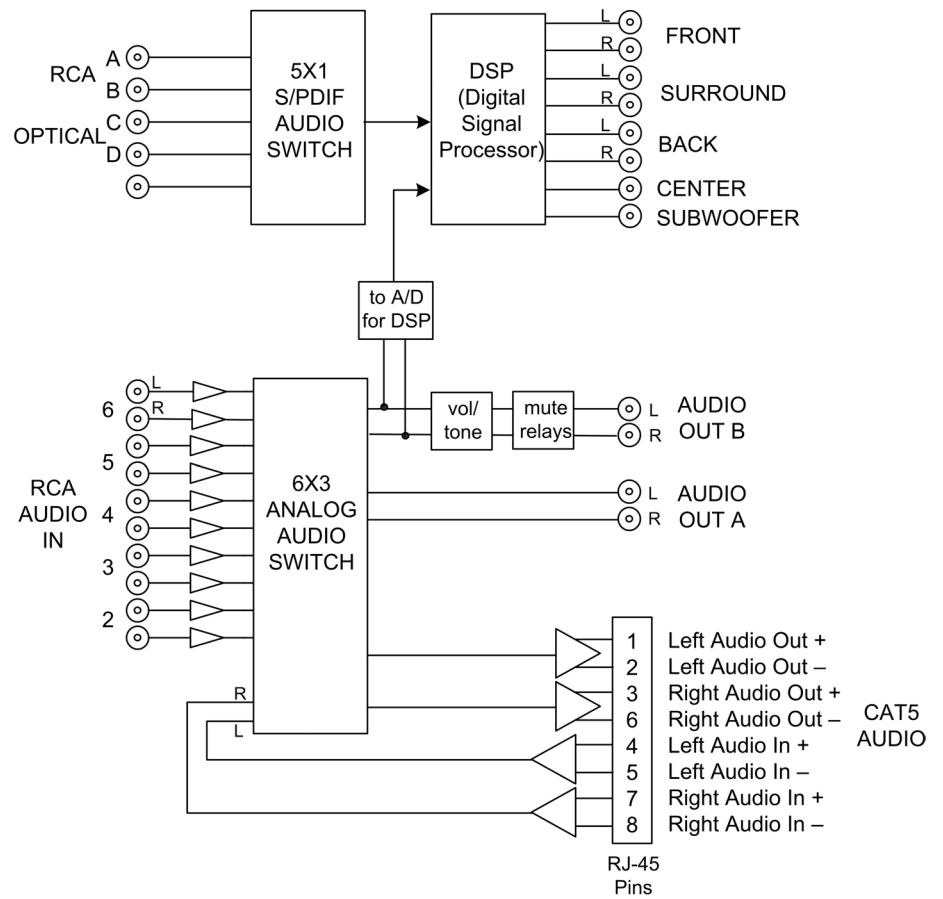
**NOTE:** The coax connection to audio inputs A and B and the optical connection to inputs C and D carry the same signal type, S/PDIF, but Toslink cabling is only good up to a maximum of 10 meters; the coax version can go 10 - 15 meters. This should be considered in your hookup planning.

The following paragraphs and the audio routing diagram on the next page describe signal distribution arrangements that are typical for the C2N-DAP8. Refer also to the Typical Surround Sound Configuration diagram on page 16.

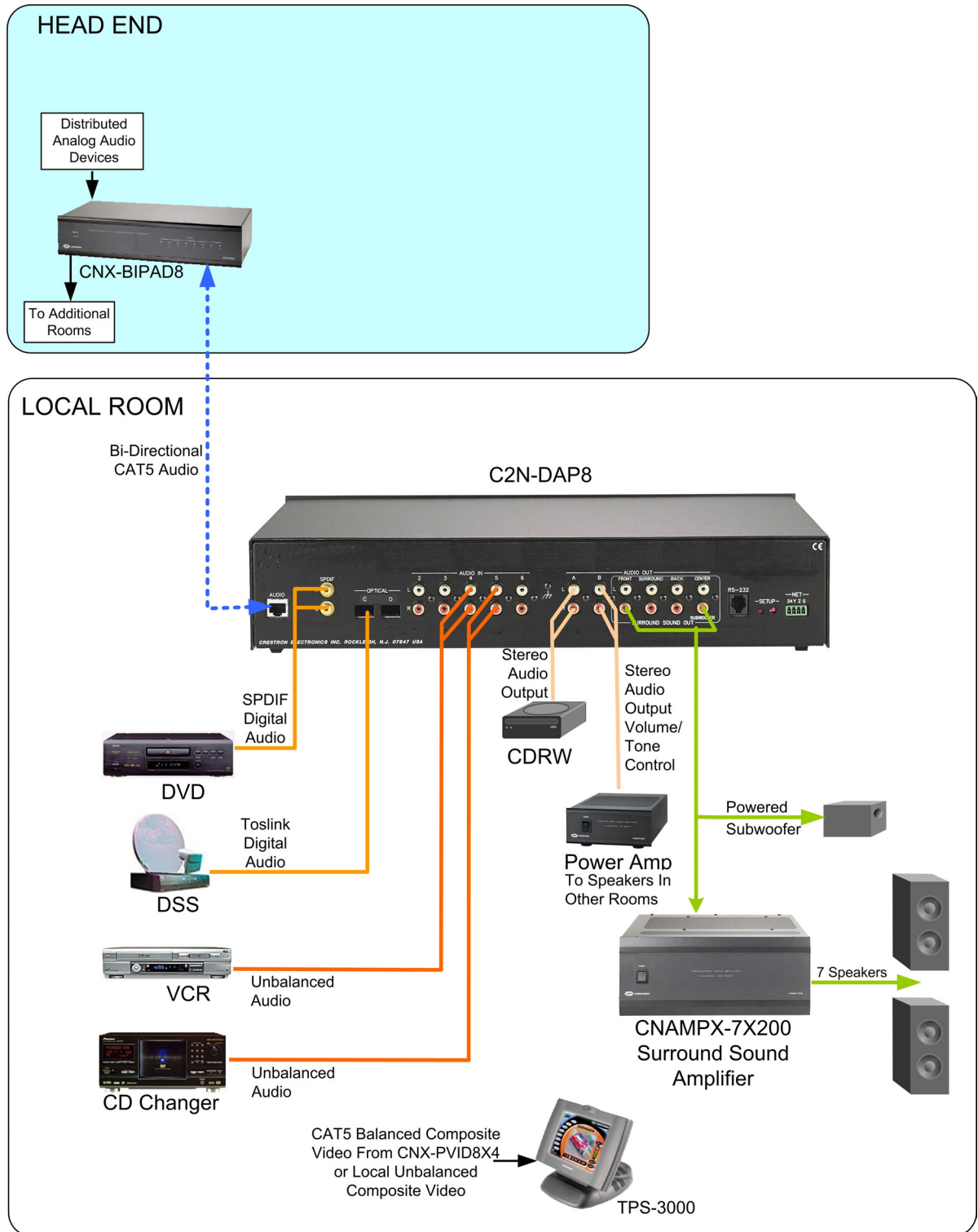
### Distribution of Analog Audio to/from the Head End

Analog audio from distributed source devices is supplied by the CNX-BIPAD8 (or CNX-PAD8) via CAT5 to the C2N-DAP8, then passed through a Crestron amplifier (CNAMPX-7X200), and delivered as speaker level audio to the local set of speakers. Analog audio can be directed from the C2N-DAP8 back to the CNX-BIPAD8 directly, via CAT5.

**Audio Routing**



*Typical Surround Sound Configuration*



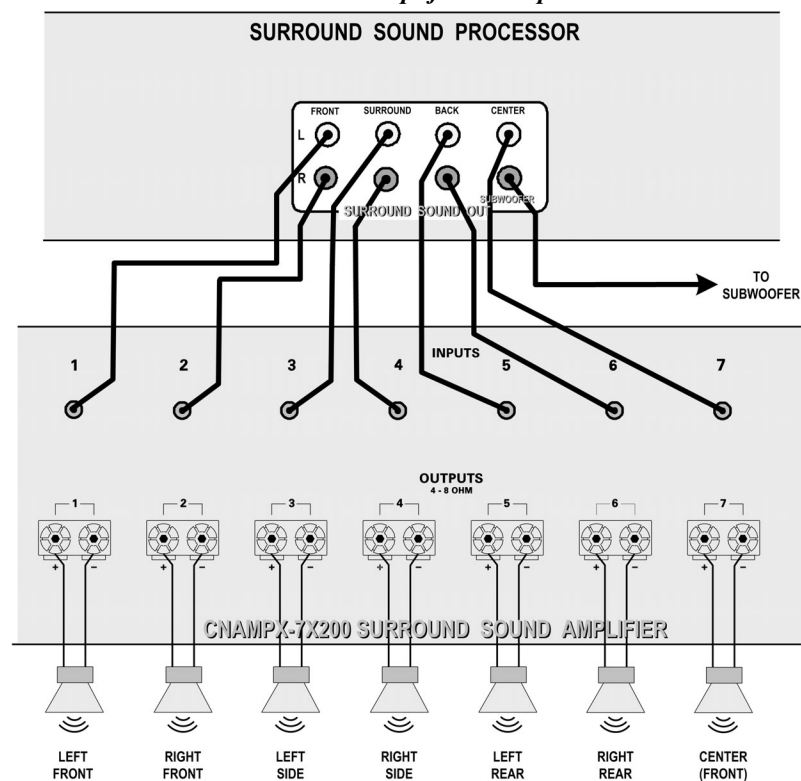
Refer to the diagram below and make the appropriate connections between the C2N-DAP8 surround sound outputs and the CNAMPX-7X200 surround sound amplifier and speakers.

**NOTE:** Each of the CNAMPX-7X200 amplifier’s seven channels is functionally identical and can be connected to the surround-sound processor in any convenient arrangement.

**NOTE:** Match the output of the processor to the coordinating speaker via the CNAMPX-7X200.

**NOTE:** Connect the subwoofer output to a powered subwoofer.

**Connection to Surround Sound Amplifier and Speakers**



**Speaker Types**

Different speaker types have different sound reproduction characteristics, which affect their performance in a home theater environment. Crestron makes no specific recommendations, and provides the following information for reference purposes only.

To create the most realistic surround sound experience, it is recommended that you match your speakers’ tonal characteristics. This is also known as ‘timbre matching.’

**Direct Radiating**

Direct radiating speakers provide a focused image, which makes it relatively easy to detect the general location of the sound (localization). This opposes the type of open sound you would expect in a large theater or concert hall.

### Bipolar

Bipolar speakers have drivers on opposite sides of their cabinets, wired in phase, and provide a diffuse sound. Sound radiates from both sides, so the sounds seem to be coming from all around instead of from a specific location. Because the sound is very open, it creates a larger ideal listening area, and speaker localization becomes more difficult.

### Dipolar

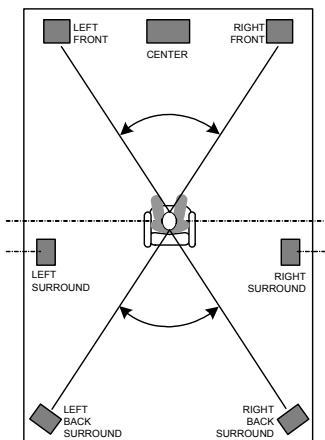
Dipolar speakers also have drivers on opposite sides of their cabinets and provide a diffuse sound. These speakers operate 180° out of phase and create a sound field that is more open than either the direct radiating or bipolar types. These speakers are typically used in surround channel applications, and speaker localization becomes the most difficult. This type of speaker is not recommended for front channels.

### Subwoofers

Subwoofers are specially designed to reproduce the lowest ranges of audible sound—usually from 120 Hz down to 20 Hz. These speakers are either powered or non-powered. Non-powered subwoofers require an external amplifier and power supply. Subwoofer output typically includes the information from the decoded LFE channel and will include the low frequency information from the left, right, center and surround channels when the speakers for those channels are unable to reproduce the low frequency sounds, and bass management is enabled.

### **Speaker Arrangements**

Refer to the diagram to the left of this paragraph and arrange the speakers in the listening area according to the following general guidelines. Refer to the instructions given in “Surround Sound System Setup” on page 18 for optimum placement.



- Place front speakers so their front surfaces are as flush as possible with the front of the viewing screen, and at an angle to the listening position of 45 to 60 degrees, with the primary drivers at ear level. Refer to manufacturer’s instructions. Most recommend placement one to three feet from the wall.
- Depending upon the type of speakers used, surround speakers are usually placed slightly behind and above ear level of the primary listening position, approximately six feet above the finished floor.
- Place the surround back speakers at the rear of the listening area and at an angle to the listening position of 60 to 90 degrees, with the primary drivers at or slightly above ear level, approximately six feet above the finished floor.
- Place the subwoofer according to the owners manual supplied with the speaker.

## Surround Sound System Setup

After completing the hardware hookup procedures, perform these procedures to set the C2N-DAP8 surround sound default values according to the actual environment of the listening area.

Crestron recommends the use of its Digital Audio Tools program (DAT) to configure the surround sound system because of the program’s simplicity, speed, and ease of operation. However, Crestron also supplies an Example Program with the C2N-DAP8 that can demonstrate the various features of the unit and serve as a model

program for those individuals who wish to do the system setup and room balancing functions via a touchpanel.

---

**NOTE: Crestron recommends setting the analog parameters of the C2N-DAP8 in only one way—either through the DAT software or through the SIMPL Windows program. However, if you must allow both, please read and understand this warning.** There are some subtleties that must be handled in a way that is a bit different from what you may be familiar with when using similar devices. For example, if you intend to directly set the C2N-DAP8 <Volume> analog input in your program, keep in mind that the <Volume\_FB> signal can be set to a different value through some other method (e.g., using the DAT software). In other words, the C2N-DAP8 actually stores these parameters, as opposed to a CNXVTC-3 or ST-VC, where the value is stored solely in the control system. If you were to just use an Analog RAMP symbol and send the output of the RAMP to the <Volume> input and jam it with the <Volume\_FB> output of the C2N-DAP8, Oscillations might result between the RAMP and the actual <Volume\_FB> value from the C2N-DAP8. **This could cause damaging volume levels to be sent to your speakers.**

Instead, use the "Analog Increment with Optional Feedback" (AINC) symbol. Connect the <aout> output of the AINC to the <Volume> input of the C2N-DAP8, then connect the <Volume\_FB> output of the C2N-DAP8 to the <[FbckSignal]> input of the AINC. This way, the program will always be updated with the true value of the C2N-DAP8. The same applies to any analog value that can be changed from two places (EQ, Trim, etc.).

---

## Test Equipment

No matter which method is used to set up the surround sound system in the listening area, the following items are required:

- SPL (Sound Pressure Level) Meter. Used to measure sound in decibels (dB). This is used to calibrate the speakers so each produces the same sound level at a given volume setting.
- Tape Measure. Used to measure distance from speakers to main listening position.

The following equipment is recommended to optimize the performance of the C2N-DAP8 relative to the listening area, speaker arrangement, and the user's preferences:

- Audio Spectrum Analyzer. Used to "see" a speaker's frequency response in a room. This is used with equalizers to adjust for a proper room response.
- Avia Guide to Home Theater, from Ovation Software ([www.ovationsoft.com](http://www.ovationsoft.com))

OR

Video Essentials, from DVD International ([www.videoessentials.com](http://www.videoessentials.com)).

The Avia Guide to Home Theater and the Video Essentials DVD discs provide information and extensive instructions, including video test patterns and audio test signals, for setting up a home theater environment.

## Crestron Digital Audio Tools

The Crestron Digital Audio Tools software program is available from the Crestron website. This program allows you to customize the configuration of the audio

processor to match the requirements of the listening/viewing area. You can specify the speaker configuration, adjust the delay settings (to permit sound from all the speakers to reach the listener at the same time), select the decoding mode for every signal type input, and adjust the output setting (gain) for each speaker. The program also provides the easiest method to configure the 8-channel, 6-band parametric equalizer that lets you set the frequency, gain, bandwidth, and filter type for each speaker to balance the listening area.

Refer to the help file that accompanies the software for more detailed information.

## Setup Procedures

Setting up the C2N-DAP8 surround sound processor consists of a number of steps that need to be accomplished in the order presented here.

1. Place an SPL meter at the designated “sweet-spot” location in the room. Measure the distance, to the nearest half foot, from the SPL meter to each speaker in the room, including the subwoofer.
2. Launch the DAT program, and set communications parameters as described in “Communications” on page 24.
3. Specify the room speaker arrangement as described in “Speaker Sizes / Bass Management” on page 25.
4. Using the measurements obtained in Step 1 above, set up the system delays as described in “Delay Settings” starting on page 26.
5. Select **Tools | Realtime Mode** from the menu bar (or click the **Realtime Mode** icon on the toolbar). Then, select **Tools | Source/Noise Steering** (or click the **Source/Noise Steering** icon), and use the information given in “Source/Noise Steering” on page 21, to send pink noise to each speaker to verify that the speakers are connected and functioning.
6. Using the instructions in “Using Source/Noise Steering for Calibration” on page 22, and in “Room Calibration” on page 27, perform room calibration procedures.
7. Perform the instructions given in “Input Settings” on page 28 to set the input levels for each of your audio sources.
8. Perform the instructions given in “Output Settings” on page 29 to set the relative gain for each speaker in the room for each decoding mode.
9. Follow the instructions given in “Graphic EQ” on page 31 to specify the number of graphic equalizers to be used in the system and to set their gain/attenuation level.
10. Refer to “Parametric Equalizers” on page 32 adjust the frequency response interaction within the room for each speaker in the system.

## DAT Program Procedures

After launching DAT, either open an existing program for the C2N-DAP8, or start a new program and choose the C2N-DAP8 template. The paragraphs that begin on the next page describe the features and functions of the DAT program. Use the DAT software to perform the setup procedures for the C2N-DAP8 in the order specified in the previous section.



### Toolbar Icons



The following paragraphs describe some of the unique toolbar icons that provide quick access to important digital audio tools functions.

### Realtime Mode

The Digital Audio Tools Realtime Mode permits all changes to be transferred to the device immediately. This is especially useful during calibration of the room.

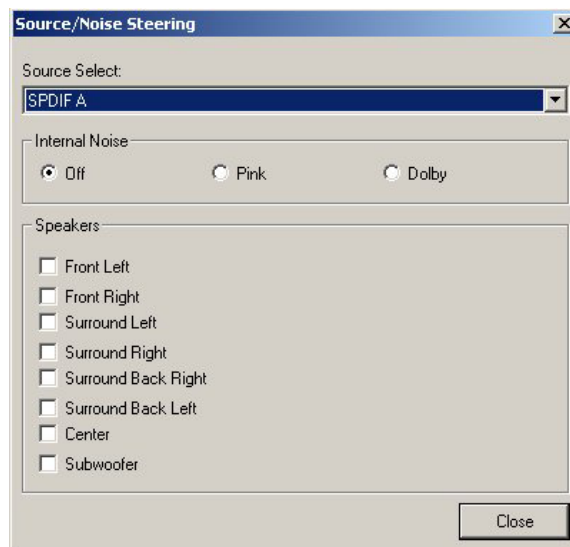
To select Realtime Mode, click the Realtime Mode icon on the Digital Audio Tools toolbar, select **Tools | Realtime Mode**. The system displays the following message:



As suggested in the message, synchronize the application and the device by performing a “Send To Device” or “Load From Device” transfer from the Communications tab screen before attempting any real-time equalizer configuration changes. Refer to “Communications” on page 24 for additional details.

### Source/Noise Steering

The Digital Audio Tools program “Source/Noise Steering” window is for selecting internal noise and external audio sources for calibrating the other parameters in the system. Refer to “Using Source/Noise Steering for Calibration” on page 22. The option is only available if you are working in Realtime mode. Clicking the Source/Noise Steering icon displays the screen shown below.



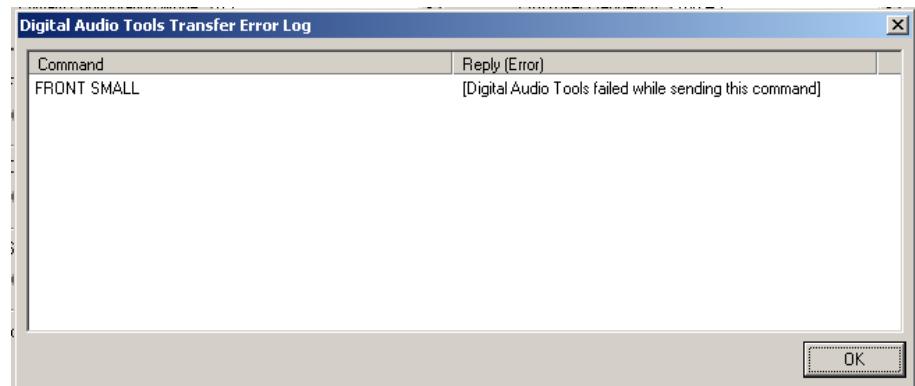
This screen lets you select any available source signal from any of the C2N-DAP8 audio ports or internal noise and direct it to a particular speaker to enable setting the filters for optimum response.

If you select one of the *Internal Noise* sources (**Pink** or **Dolby**), the *Source Select* drop down list is dimmed and unavailable.

If you select the *Internal Noise Off* setting, you may instead select an external audio source from any of the ports and select a speaker for the left channel of that audio source to be routed to. You would use this if you wanted to calibrate your system using an external noise source (i.e., a CD or DVD or calibration tool) or with a specific music or movie track.

### View Error Log

Clicking this button displays the error log (if one exists) as shown in the following illustration:



### Mute

Mute on the toolbar acts as a toggle. Clicking this icon immediately mutes the sound in all channels; clicking it again turns mute off.

**Mute** can also be accomplished by selecting **Tools | Mute** from the menu bar, or by pressing **F8**. To turn Mute off, you must select **Tools | Mute** again or press **Shift F8**.

The **Mute** button on the lower right of all screens is intended as a “panic” button to prevent damage to speakers in the event of sudden large increases in sound level, which can occur when switching from one sound source to another. Pressing this button again does not turn mute off. Turn mute off, after the problem is resolved, as stated above.

## ***Using Source/Noise Steering for Calibration***

Calibrating a room is a critical part of setting up a home theater. Without proper calibration, the impact of a movie or musical soundtrack will lack what the sound engineer had originally intended.

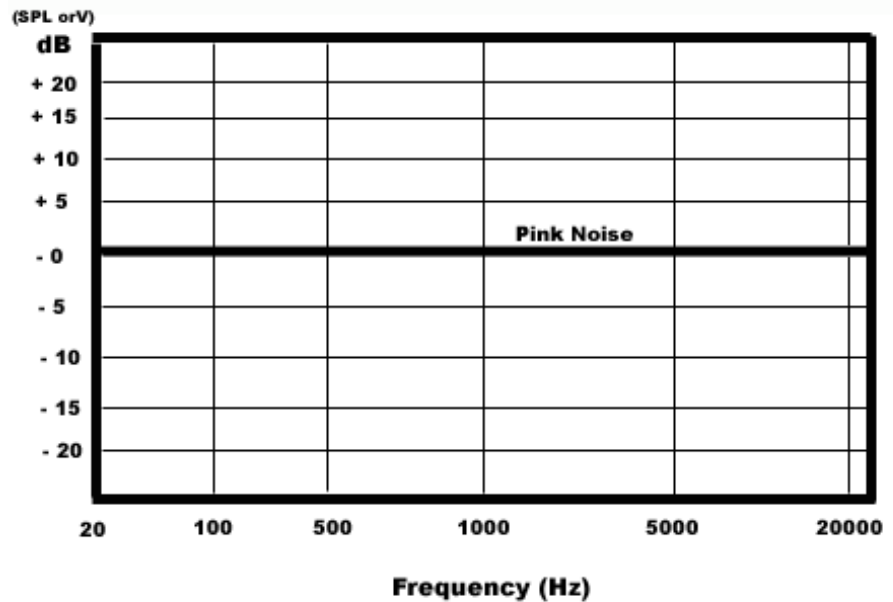
The Source/Noise Steering feature gives you three options to choose from to suit your calibration needs. The definitions below give you the function of each type of noise and its intended use for system calibration. The Source/Noise Steering feature should be used with an SPL Meter and/or a Real Time Analyzer (RTA) for the best possible calibration of the room.

### *Pink Noise:*

Pink noise is sound that is comprised of a random signal, with all audio frequencies present. It provides equal energy per octave to provide a flat response over all frequencies. (Refer to Graph 1 after the next paragraph for visual reference.)

The main function of pink noise is to calibrate a speaker's interaction within its given room. The reason that pink noise is used over other generated noises such as white noise is because of its equal power to all octaves. This makes it easier to calibrate for a flat plot on a real time analyzer, since the level will be uniform across every octave. Pink noise is provided by DAT software or you can use an external source such as a DVD or CD. This would be used with the *Room Calibration, Output Settings, Graphic EQ and Parametric EQ* tabs.

**Graph 1:**



**Dolby Noise:**

Dolby Noise is bandpass-filtered noise centered at 750Hz with a 12dB/octave roll off. Dolby Noise is used for setting speakers to the same level when calibrating a room.

**White Noise (External Source Only):**

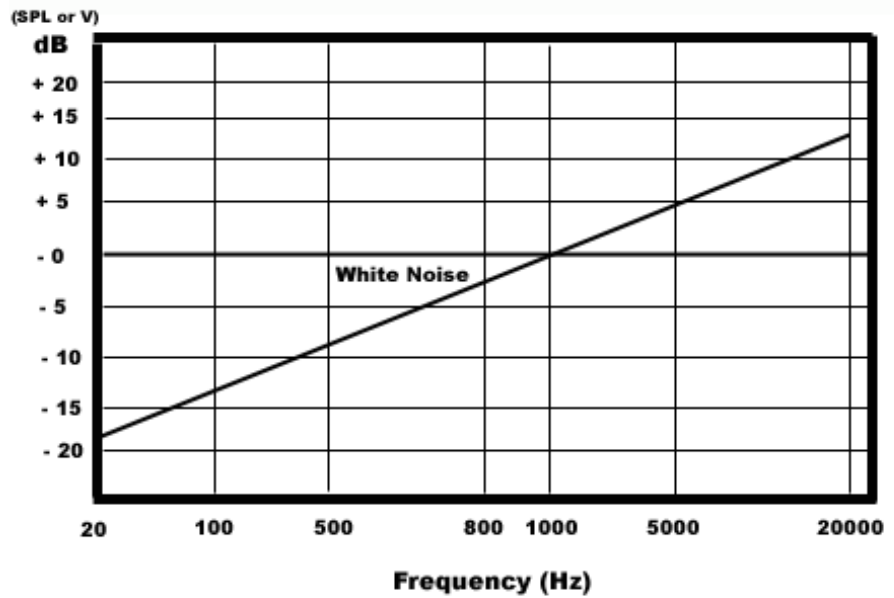
White noise is a sound that is comprised of a random signal, with all audio frequencies present, over time, and at various signal levels. It provides equal energy per Hz, which will give a 3dB per octave increase starting from the lower frequency range (20Hz) to the upper frequency range (20,000Hz). (Refer to Graph 2 after the next paragraph for a visual reference.)

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**CAUTION:** White noise is used to calibrate electronic equipment. It provides a signal to measure levels and drives the circuitry at all signals simultaneously. IT SHOULD NOT BE USED TO CALIBRATE SPEAKERS IN A ROOM. It can cause a speaker's tweeter to burn out and cause undesired response in the room due to the levels you would set based upon the calibration.

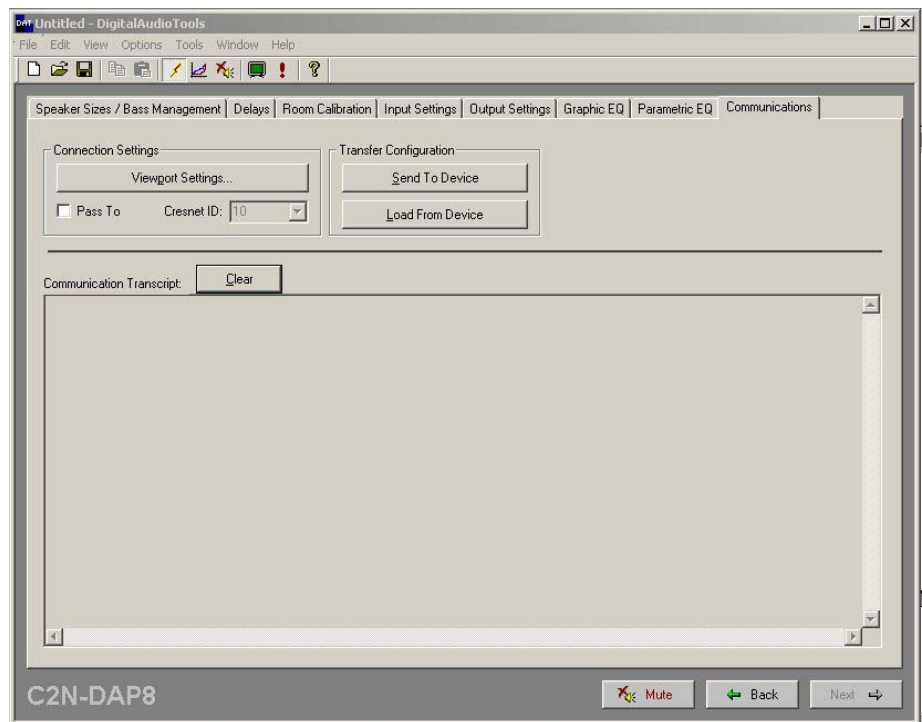
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**Graph 2:**



### Communications

The *Communications* tab allows you to define the settings for communication with the C2N-DAP8 in order to download existing files and upload new ones. It is important that you set the communication parameters first before doing any of the other setup procedures.



Set up for communications as follows:

1. Initially, the *Pass To* check box is not selected indicating a direct connection from your PC to the C2N-DAP8. Select *Pass To* if your PC and the C2N-DAP8 are connected through the control system via Cresnet. Make certain the *Cresnet ID* setting is correct (**50** is the default for the C2N-DAP8). Refer to “Identity Code” on page 10 for more information on setting the Cresnet ID.
2. Click on the *Connection Settings Viewport Settings* button to display the “Port Settings” window. Select **RS-232** as the connection type. Verify that an available COM port is selected, and that all communication parameters and necessary options from the “Port Settings” window are selected as shown in the illustration below. Click the **OK** button to save the settings and close the window.
3. Synchronize communication between the PC and the device by clicking the *Transfer Configuration Load From Device* button. This transfers any current settings of the C2N-DAP8 to the DAT program.

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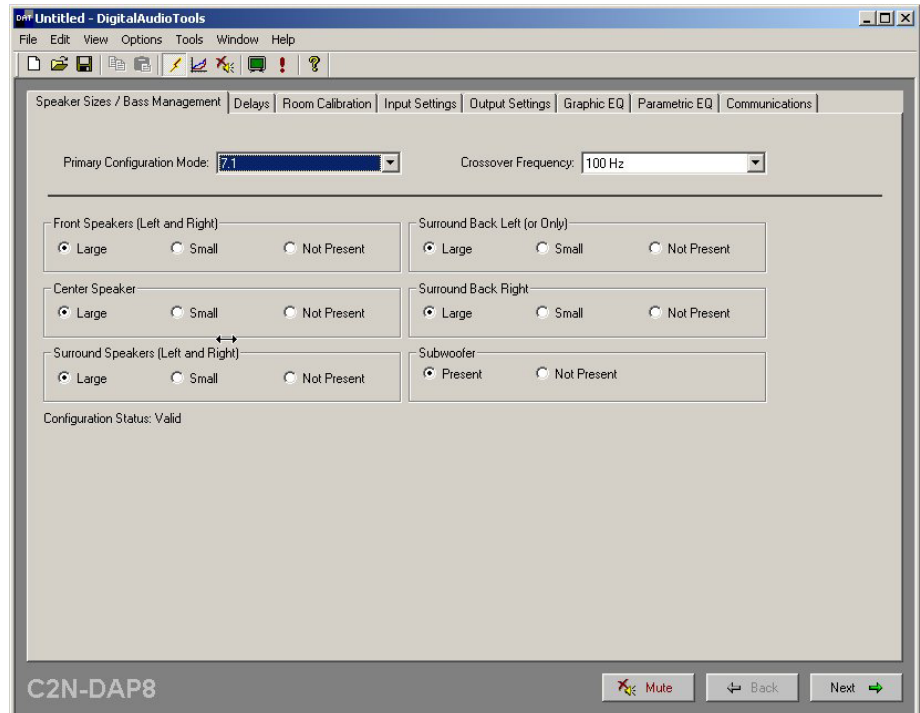
**NOTE:** Before making any adjustments via the DAT program, immediately save the program (use **File | Save As**) to preserve the current device settings. This is especially important if you are working on a device that has already been configured and you subsequently need to restore those settings.

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#### “Port Settings” Window

#### Speaker Sizes / Bass Management

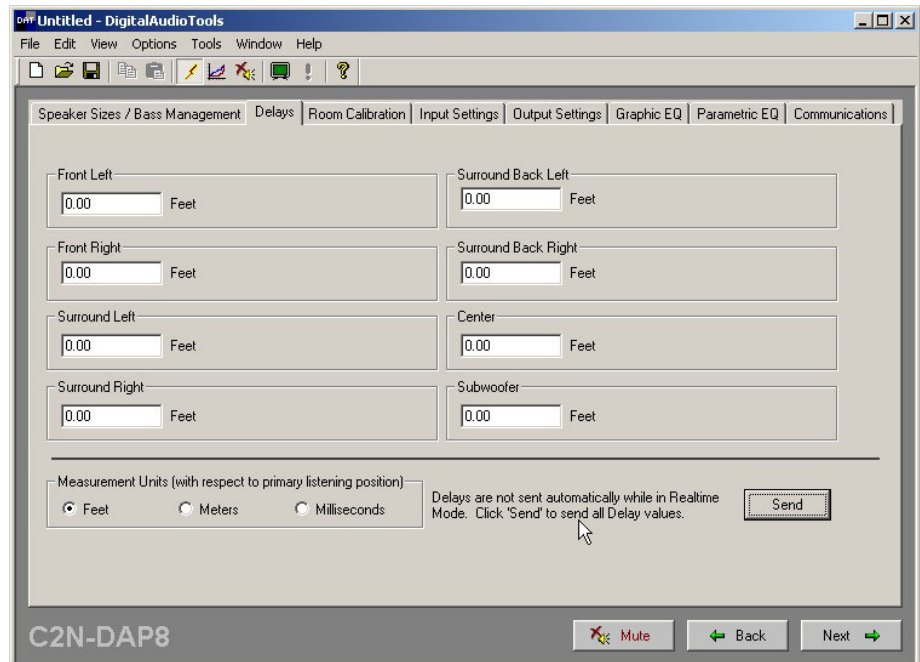
This screen lets you specify the room speaker arrangement, and set the crossover frequency for the subwoofer.



Click on the appropriate buttons to identify the existing speaker arrangement; use the *Crossover Frequency* drop-down list to specify the crossover frequency for the subwoofer (if present). The distinction between **Large** and **Small** speakers is their ability to provide *effective* sound in the low frequency range (120 Hz and below), not their physical size. Speakers designated as **Large** will receive low frequency signals. For speakers designated as **Small**, low frequency signals are filtered out and routed to the subwoofer. Check the rating of all speakers to determine their proper setting.

### Delay Settings

Select the *Delays* tab to display the following window.



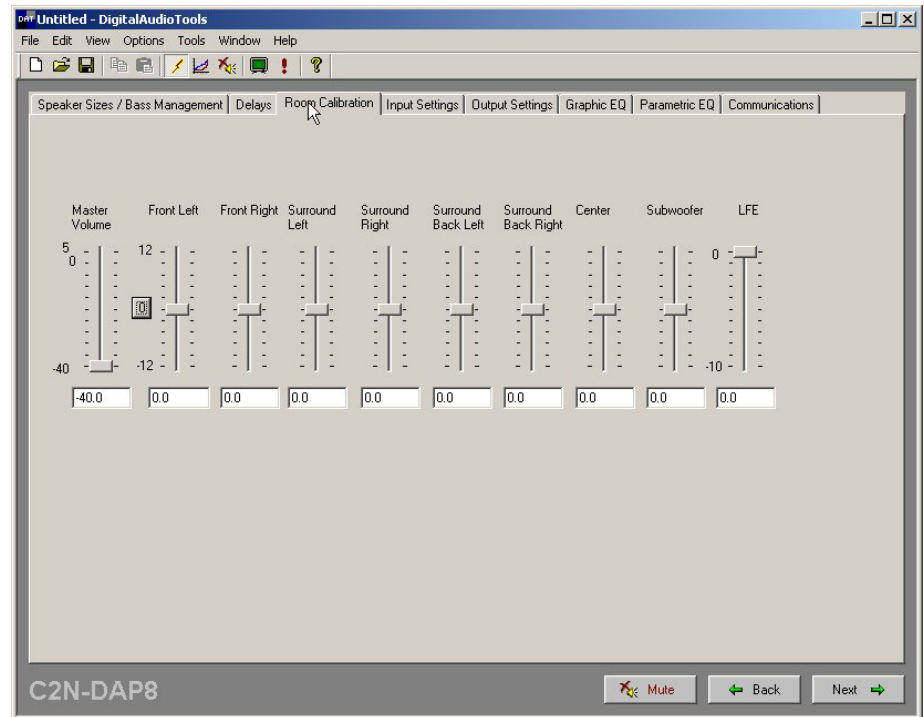
This screen lets you specify the distance—in feet or meters—between the speakers and the primary listener location (the so-called “sweet spot”). This is done to ensure that the sound from all speakers reach the listener’s ears at exactly the same time. Measure the distances and enter the values to the nearest half-foot (or nearest 0.15 meter); the software will calculate any necessary delays. Enter distances as accurately as possible.

You may also enter the delays in milliseconds by using a Real Time Analyzer (RTA) equipped to give a millisecond value from the time the sound was produced to the time it reaches the listener’s position. One example of such a device is the Audio Controls Iasys RTA.

Note that the delays are not sent automatically in Realtime Mode. Click on the **Send** button to transfer the delay settings to the device.

### Room Calibration

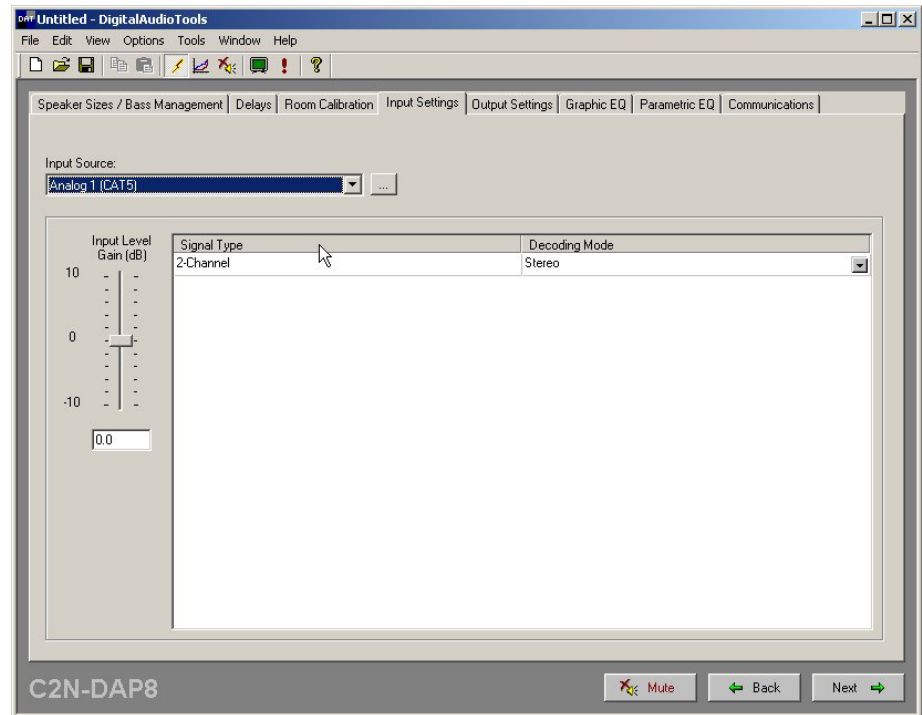
Any listening/viewing area has its own characteristics that can affect the quality of sound reproduction. The goal is to analyze the room and compensate for any unwanted effects (such as reflections from hard surfaces, and resonance at particular frequencies) so the listener hears what was intended when the material was recorded.



During room calibration, this screen lets you set the master volume (e.g., -10dB) and then modify the gain of each speaker in the system to make the sound of each speaker heard at the same level. Generally, a calibration level is chosen between 75dB and 85dB when playing Dolby Noise and all speakers are adjusted to the same level. The zero button to the left of the Front Left slider resets all speaker sliders to 0.00dB; the Master Volume and LFE settings are not affected.

## Input Settings

This screen allows you to set the input levels for analog audio sources. Using the **Input Level Gain (dB)** adjustment properly lets you compensate for analog sources with different input levels to obtain a seamless transition between sources at a given volume level. This screen also allows you to specify decoding modes for the various analog and digital inputs.



Selecting the button to the right of the **Input Source** pull-down list produces a window with a field where you can enter a specific name, such as CD Changer, VCR, or DVD, to help you keep track of multiple sources.

Each input source signal type can be assigned a specific decoding mode. The signal type for all analog sources is 2-channel. You can assign a decoding mode to each analog source via the *Decoding Mode* drop-down list. For example, you may want the input from your CD Changer to always be played in DTS-Neo:6 Music mode.

The C2N-DAP8 automatically recognizes the signal type that appears on its digital input sources. You can select the preferred decoding mode for each input type for each source from among the available types. Certain types have limited decoding modes available. For example, a DTS-ES Discrete input is limited to the DTS-ES Discrete or user controlled decoding modes. Refer to the table on the next page for a complete listing of the input modes and corresponding available decoding modes.

---

**NOTE:** The availability of decoding modes depends on your primary configuration mode (5.1, 6.1, 7.1) and your speaker configuration settings. The available decoding modes listed in the above table are based on a 7.1 primary configuration, with all speakers selected as **Large** and the subwoofer selected as **Present**.

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**NOTE:** For configuration settings, one or more signal type(s) and decoding mode(s) are dimmed to indicate they are not applicable.

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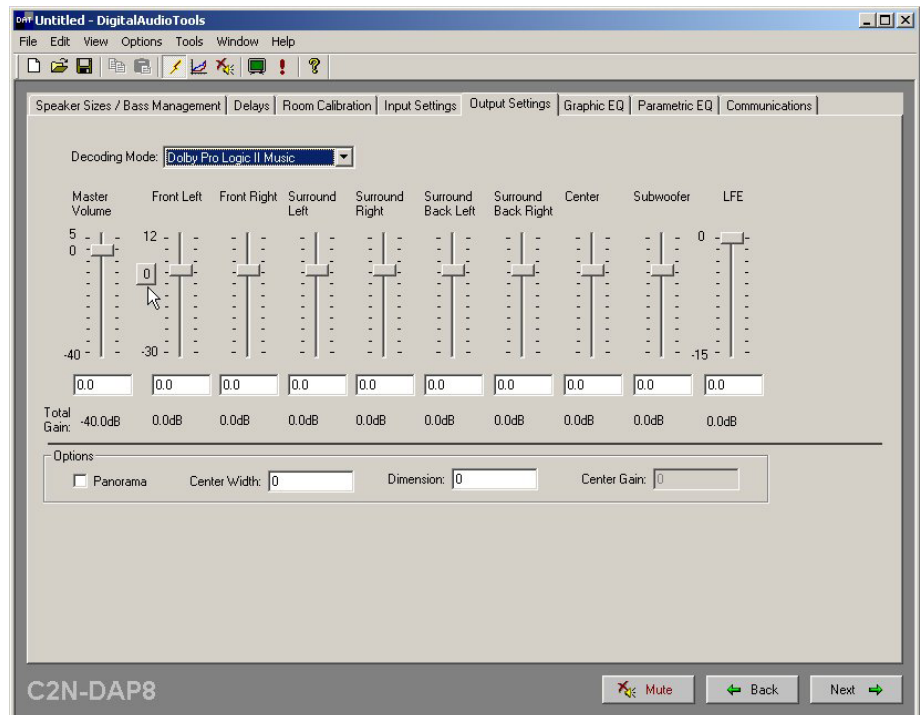


*Input Source Decoding Modes*

INPUT TYPE	AVAILABLE DECODING MODES
2-Channel	Stereo Dolby Pro Logic II Movie Dolby Pro Logic II Music Dolby Pro Logic II Matrix Dolby Pro Logic DTS Neo:6 Cinema DTS Neo:6 Music User Controlled
Dolby Digital 5.1	Dolby Digital 5.1 Dolby Digital EX User Controlled
Dolby Digital 2/0	Stereo Dolby Pro Logic II Movie Dolby Pro Logic II Music Dolby Pro Logic II Matrix Dolby Pro Logic User Controlled
Dolby Digital 2/0 Prologic	Stereo Dolby Pro Logic II Movie Dolby Pro Logic II Music Dolby Pro Logic II Matrix Dolby Pro Logic User Controlled
Dolby Digital EX	Dolby Digital 5.1 Dolby Digital EX User Controlled
DTS Digital Surround	DTS 5.1 DTS-ES Matrix User Controlled
DTS-ES Matrix 6.1	DTS 5.1 DTS-ES Matrix User Controlled
DTS-ES Discrete 6.1	DTS-ES Discrete User Controlled

**Output Settings**

Select the *Output Settings* tab to specify the relative gain for each speaker in the room for each decoding mode.



These settings allow you to make adjustments in the surround sound configuration to suit your personal preferences.

To adjust the gain settings, either click on the slider controls and drag them to achieve the desired setting, use the up and down arrow keys on the PC to adjust the setting, or type the value in the window. The Zero button to the left of the Front Left slider resets all speaker sliders to 0.00dB (the Master Volume and LFE sliders are not affected). Use the *Decoding Mode* drop-down to select among the available modes to alter their default settings (if there are default settings).

The *Panorama*, *Center Width*, and *Dimension* values are only available for Dolby Prologic II Music decoding. *Center Gain* is available only for DTS NEO:6 decoding and is used to adjust the gain of the center channel. (Refer to “DTS Neo:6 Cinema” and “DTS Neo:6 Music” on page 4.)

### Panorama

This control extends the front stereo image to include the surround speakers for an exciting “wraparound” effect with side-wall imaging. It is particularly effective for recordings that have strong left- or right channel elements in the mix, as these are detected and accentuated by the panorama process.

### Center Width

This control allows center-channel sounds to be positioned between the center speaker and the left/right speakers over a range of eight steps. Step “3” uses a combination of all three front speakers to give the best vocal imaging and most seamless soundstage presentation, and is recommended for most recordings. Step “0” places all center sound in the center speaker. Step “7” places all center sound equally in the left/right speakers, just as in conventional stereo.

### Dimension

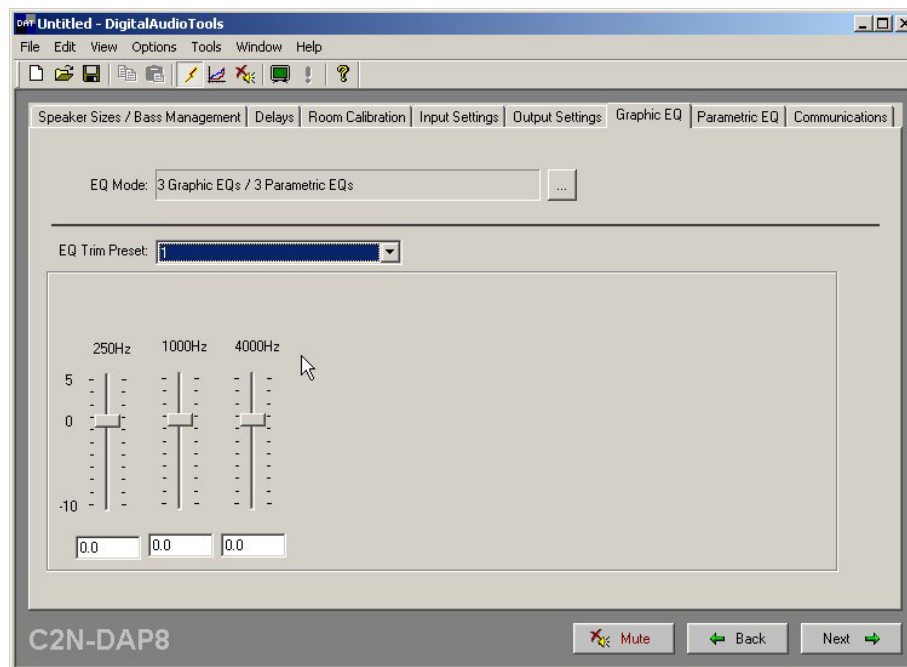
This control allows the user to gradually adjust the soundfield either towards the front or the rear. This can be useful to help achieve the desired balance from all the

speakers with certain recordings that may contain either too much or too little spatial effect. Step “0” is the recommended setting, which has no effect on the sound. Steps 1 through 7 gradually move the sound forward, and steps –1 through –7 move the sound toward the surround speakers.

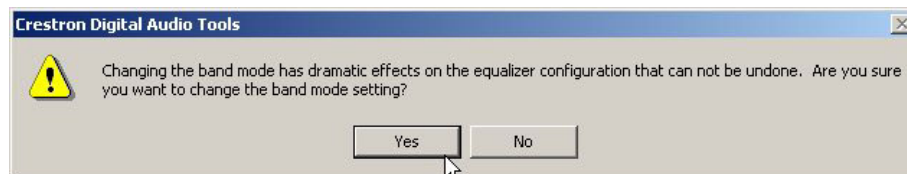
**NOTE:** The *Panorama*, *Center Field* and *Dimension* settings are only used in Prologic II music mode.

### Graphic EQ

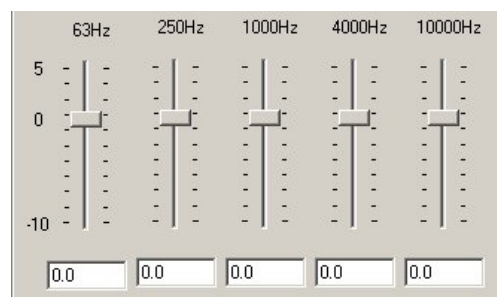
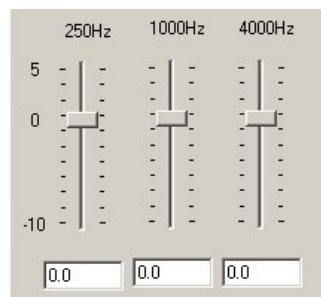
This tab lets you specify how many (0, 3, or 5) of the six available filters for each speaker will function like a standard graphic equalizer (with fixed frequencies and settable gain/attenuation only), and how many (the remainder) will function as parametric equalizers with settable frequency, gain, bandwidth, and filter type.



If you select **0** bands, all six filters will function as parametric equalizers. If you select **3** or **5** bands, the following warning appears:



When you click **YES**, the display includes the appropriate one of the two following screens.

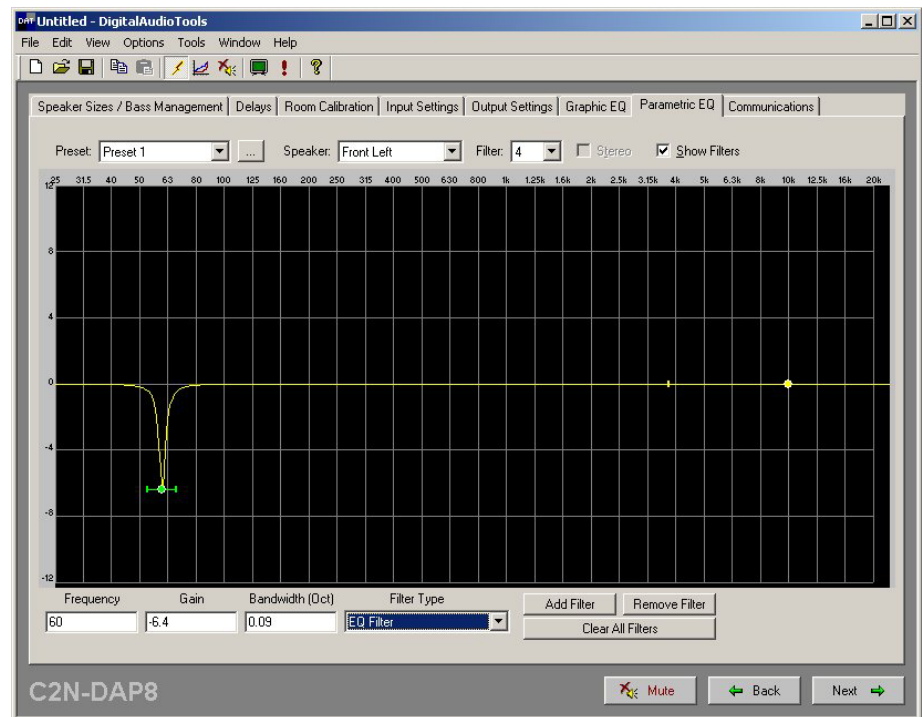


In either case, the filter frequencies are fixed, and the gain for each frequency is adjustable from 5 dB to -10 dB. The default gain is 0 dB.

If you choose either three or five graphic equalizer filters, you can also specify up to 10 trim presets using the *EQ Trim Preset* drop-down list.

### Parametric Equalizers

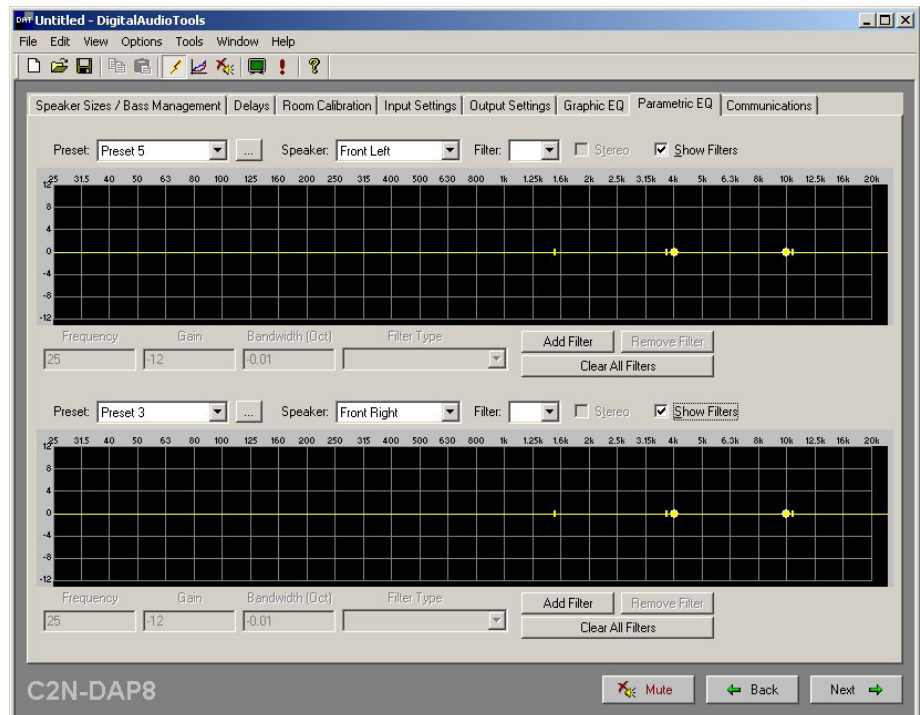
The *Parametric EQ* tab allows you to adjust the frequency response interaction within the room for each speaker in the system. You can attempt to achieve a flat room response, or you can enhance or attenuate the response at up to six different frequencies. In general, a flat room response is not pleasing to most ears. The purpose of achieving a flat response is to remove all unwanted audio conditions in the equipment and listening environment before making adjustments to satisfy the user's personal listening preferences.



For each speaker in the system (up to eight), you can set the gain, bandwidth and filter type at up to six different frequencies in the spectrum, for each of the five preset listening modes. Use the *Filter* drop-down list to select the filter to be set. You can set the frequency, gain and bandwidth values by typing them into the appropriate boxes, or by clicking and dragging the control handles in the display. 0

The DAT software helps simplify a system setup by permitting you to copy and paste filter or speaker or preset values from one to another.

The screen can also be set to display two equalizers at the same time. Select **Options | Number of Equalizers** and click on **1** or **2** as desired. (Refer to the illustration on the next page.)



## Example Program

The Example Program for the C2N-DAP8 demonstrates the various features of the unit. The program also serves as a basic model for those individuals who wish to do system setup and room balancing functions via a touchpanel. The program does virtually all of the functions that can be accomplished via the DAT software, and lets you immediately hear the results of your adjustments.

The example program for the C2N-DAP8 is available from the Crestron FTP site (<ftp://ftp.crestron.com/Examples>). Search for C2N-DAP8RC.Basic Example.zip.

The program is supplied designed to work with a Crestron TPS-4500 touchpanel and a 2-Series processor. If your system uses a different touchpanel, convert the program for that touchpanel.

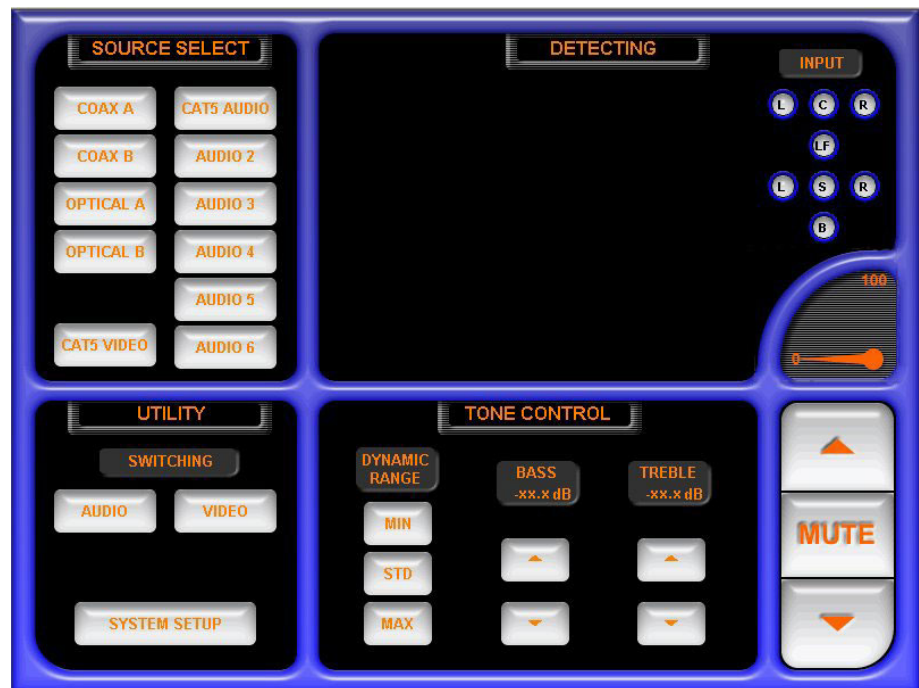
## Preparation

In preparation for running the Example Program, do the following:

1. Verify that all the necessary procedures detailed in “Setup” on page 9 have been completed.
2. Verify that communication setup procedures described in “Communication Settings” on page 45 have been completed.
3. After downloading the Example Program from the Crestron website, use the instructions given in “Upload via Crestron Viewport” on page 47, to load the .spz program to the control system and load the .vtz program to the touchpanel.

## Running the Example Program

Once the programs are loaded to the touchpanel and the control system, the main screen appears on the touchpanel.

*Example Program Main Screen*

The **MUTE** button and the up and down arrows at the lower right control the sound being supplied to the available speakers indicated by the LEDs in the upper right corner. The gauge shows the relative sound level.

The **SOURCE SELECT** pane is used to select the digital or analog audio source material connected to the unit's input ports.

The **UTILITY** pane lets you select the **AUDIO** switching utilities, or **SYSTEM SETUP**. (The **VIDEO** switching utility does not apply for the C2N-DAP8.)

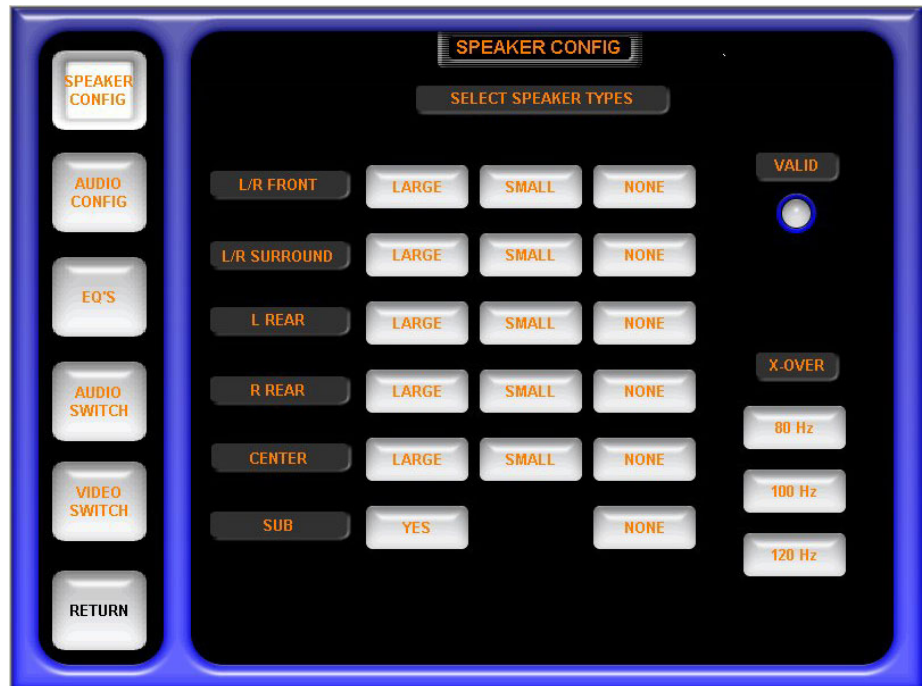
The **TONE CONTROL** pane provides controls appropriate to the chosen audio source and decoding mode. For example, the **DYNAMIC RANGE** selections **MIN**, **STD**, and **MAX**, shown in the illustration, apply the indicated amount of compression for Dolby Digital sources, as follows:

- **MIN** provides the highest compression ratio, bringing dynamic range close to that of a TV broadcast.
- **STD** provides the dynamic range recommended by sound engineers for general home viewing.
- **MAX** provides the full dynamic range of a cinema.

**System Setup**

To begin, select **SYSTEM SETUP**. The display provides a set of buttons you use to select the parts of the system to be configured—**SPEAKER CONFIG**, **AUDIO CONFIG**, and **EQ'S**—plus **AUDIO SWITCH** which is used to set the internal routing of audio signals. (The **VIDEO SWITCH** selection does not function for the C2N-DAP8.) Initially, the large screen area to the right is blank.

Select the first button, **SPEAKER CONFIG**. The screen displays the **SPEAKER CONFIG** window.

*SPEAKER CONFIG Window*

Use this screen to specify the speaker arrangement of your system and to set the crossover frequency for the subwoofer.

Click on the appropriate buttons to identify the existing speaker arrangement. Note that the front and the surround speakers are treated as pairs. Select the appropriate one of the *X-OVER* buttons to specify the crossover frequency for the subwoofer (if present). The distinction between large and small speakers here is their ability to provide *effective* sound in the low frequency range (120 Hz and below), not their physical size. Speakers designated as large will receive low frequency signals. Low frequency signals appearing in channels with speakers designated as small will be filtered out and routed to the subwoofer. Check the frequency range rating of all speakers to determine their proper setting.

*Audio Configuration*

Select the **AUDIO CONFIG** button. The screen displays the AUDIO CONFIG window. Use this screen to set up the volume trims, the delays, and the noise generator settings. These settings are used together during room calibration.



*AUDIO CONFIG Window*

Use the VOLUME TRIMS settings to specify the relative gain for each speaker in the room. Settings range from  $-12\text{dB}$  to  $12\text{dB}$  in  $0.5\text{dB}$  increments.

Use the DELAY X 1ms settings to specify the delays needed to ensure that the sound from all speakers reach the listener's ears at exactly the same time. Enter the delays, from 0 to 15 milliseconds, for each speaker by using a Real Time Analyzer (RTA) equipped to give a millisecond value from the time the sound was produced to the time it reaches the listener's position. One example of such a device is the Audio Controls Iasys RTA.

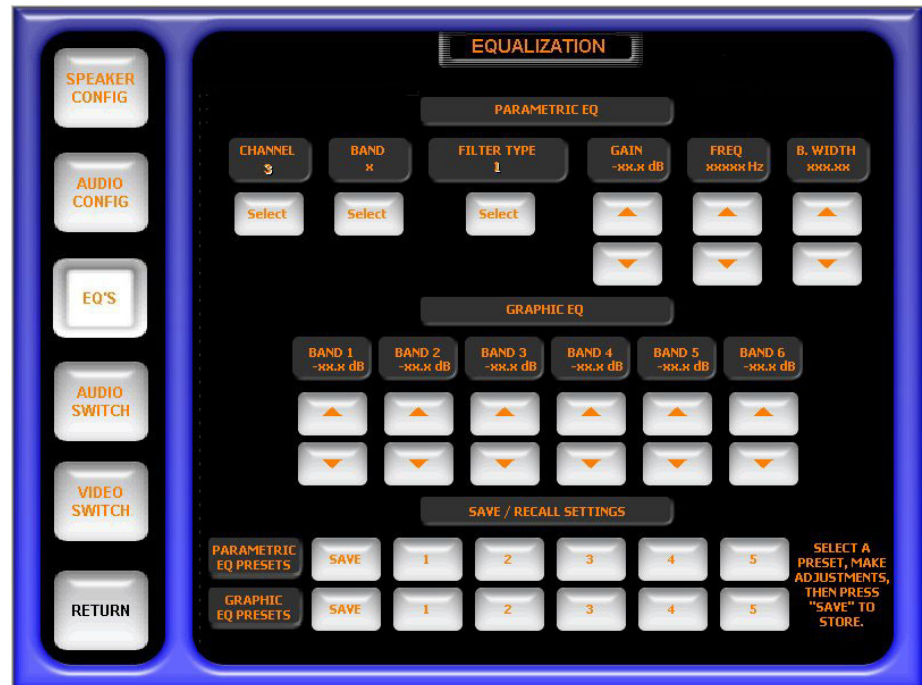
Use the NOISE GENERATOR buttons to select the noise source. The default **STD** (Dolby) button toggles to **PINK**. Press **BYPASS** to bypass all equalization filters and volume/tone controls. Use the **ON** and **MUTE** buttons to turn each speaker on and off.



## Equalization

Select the **EQ's** button to display the EQUALIZATION window used to specify the various filter settings for each speaker in the system.

### *EQUALIZATION Window*



Within the PARAMETRIC EQ section, you can specify parametric filters for up to eight speaker channels, up to six bands per channel, and specify the filter type, and the gain, center frequency, and bandwidth for each filter.

1. Press the CHANNEL **SELECT** button to specify the channel (LEFT, RIGHT, L. SIDE, R. SIDE, L. REAR, R. REAR, CENTER, and LFE).
2. Press the BAND **SELECT** button to select the band (1 through 6).
3. Press the FILTER TYPE **SELECT** button to select the filter type (EQ, BASS SHELF, TREB SHELF, LOW PASS, HIGH PASS, or BANDPASS).
4. Press the GAIN  $\triangle$  and  $\nabla$  buttons to set the gain from  $-20\text{dB}$  to  $+20\text{dB}$ , in  $0.5\text{dB}$  increments.
5. Press the FREQ  $\triangle$  and  $\nabla$  buttons to set the center frequency to  $20\text{Hz}$ ,  $40\text{Hz}$ ,  $80\text{Hz}$ ,  $160\text{Hz}$ ,  $320\text{Hz}$ ,  $640\text{Hz}$ ,  $1280\text{Hz}$ ,  $2560\text{Hz}$ ,  $5120\text{Hz}$ , or  $10\text{KHz}$ .
6. Press the B.WIDTH  $\triangle$  and  $\nabla$  buttons to set the bandwidth, in octaves, to  $0.10$ ,  $0.14$ ,  $0.20$ ,  $0.28$ ,  $0.40$ ,  $0.56$ ,  $1.00$ ,  $1.40$ ,  $2.00$ , or  $2.80$ .

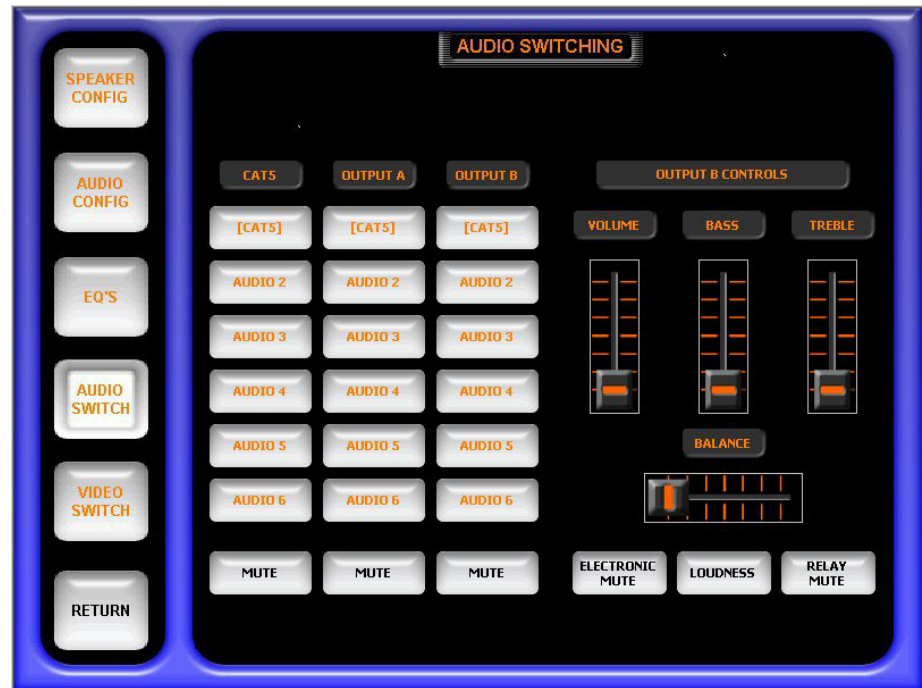
In the GRAPHIC EQ section, you can trim the gain for each of the filter bands from  $-12\text{dB}$  to  $+5\text{dB}$ , in  $0.5\text{dB}$  increments. Note that these are overall trims. That is, any adjustment you make to one of these *BAND* selections affects all filter settings for that band.

The SAVE/RECALL SETTINGS section lets you save up to five parametric EQ presets and up to five graphic EQ presets. Following the on-screen instructions, press a preset button (1 through 5), make adjustments, and press **SAVE** to store the settings. To recall a preset, select the preset button; the stored settings are applied.

### Audio Switching

Select the **AUDIO SWITCH** button to display the AUDIO SWITCHING window used to select the analog audio source you wish to appear on the three possible outputs.

#### *AUDIO SWITCHING Window*



This window lets you select the analog audio source that will appear on the CAT5, OUTPUT A, and OUTPUT B audio output connectors. You can also choose to mute the signal to those outputs.

The OUTPUT B CONTROLS section affects only the signals to OUTPUT B. The BASS, TREBLE, and BALANCE controls are initially set to their middle positions; the VOLUME control is set to its zero position.

The three buttons at the bottom provide both electronic and relay mute control of all outputs, and a standard 'loudness' selection that provides emphasized treble and bass. The electronic mute reduces the level of the output to  $-80\text{dB}$  (effectively silent); the relay mute opens the output circuits.

### Selecting Sources

After performing all the system setup procedures, press **RETURN** to display the default main screen. Use the SOURCE SELECT buttons to choose the desired audio source.



In the above illustration, **CAT5 AUDIO** is selected as the input source, and **DOLBY PROLOGIC II MUSIC** is the selected analog decoding mode. The **TONE CONTROL** setting area changes to provide controls for **WIDTH**, **DIMENSION**, and **PANORAMA**. The purpose of these controls, unique to the Dolby Pro Logic II Music mode, is described in “Dolby Pro Logic II” beginning on page 2.

When any of the digital audio inputs are chosen as the source selection, the system automatically detects the encoding method of the incoming signal and displays the appropriate decoding mode choices.

## Programming Software

*Have a comment about Crestron software?*

*Direct software related suggestions and/or complaints to Crestron via email ([software@crestron.com](mailto:software@crestron.com)). Do not forward any queries to this address. Instead, refer to “Further Inquiries” on page 51 for assistance.*

Setup is easy thanks to Crestron’s Windows®-based programming software. The following are recommended software version requirements for the PC:

- SIMPL Windows, version 2.04.1.1 or later, with Library update 227 or later.
- Crestron Database, version 15.9.6 or later.
- Crestron VisionTools® Pro-e (VT Pro-e) software for designing touchpanel pages.
- Digital Audio Tools version 1.01.05 or later, with configuration template for C2N-DAP8 including surround sound modes and parametric equalizer settings.

**NOTE:** The following are acceptable file extensions for programs that include a C2N-DAP8, developed for specific control system types:

.smw	<i>projectname.smw</i> (source file)
.spz	<i>projectname.spz</i> (compiled file for 2-series)
.umc	<i>projectname.umc</i> (SIMPL Windows user macro)
.ush	<i>projectname.ush</i> (compiled for SIMPL+)
.usp	<i>projectname.usp</i> (source code module for SIMPL+)
.daf	<i>projectname.daf</i> (DAT program output)

SIMPL (Symbol Intensive Master Programming Language) is an easy-to-use programming language that is completely integrated and compatible with all Crestron system hardware. The objects that are used in SIMPL are called symbols. SIMPL Windows offers drag and drop functionality in a familiar Windows® environment.

SIMPL Windows is Crestron's software for programming Crestron control systems. It provides a well-designed graphical environment with a number of workspaces (i.e., windows) in which a programmer can select, configure, program, test, and monitor a Crestron control system.

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**NOTE:** The following assumes that the reader has knowledge of SIMPL Windows. If not, refer to the extensive help information provided with the software.

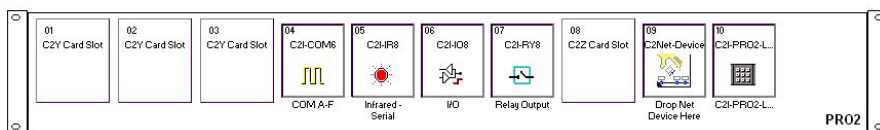
**NOTE:** In the following description, the PRO2 control system is used.

---

This section describes a sample SIMPL Windows program that includes a C2N-DAP8.

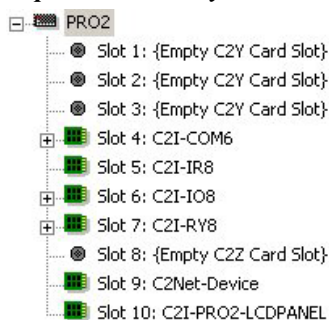
Configuration Manager is where programmers “build” a Crestron control system by selecting hardware from the *Device Library*. In Configuration Manager, drag the PRO2 from the Control Systems folder of the *Device Library* and drop it in the upper pane of the *System Views*. The PRO2 with its associated communication ports is displayed in the *System Views* upper pane.

### PRO2 System View



The *System Views* lower pane displays the PRO2 system tree (refer to figure below). This tree can be expanded to display and configure the communications ports.

### Expanded PRO2 System Tree



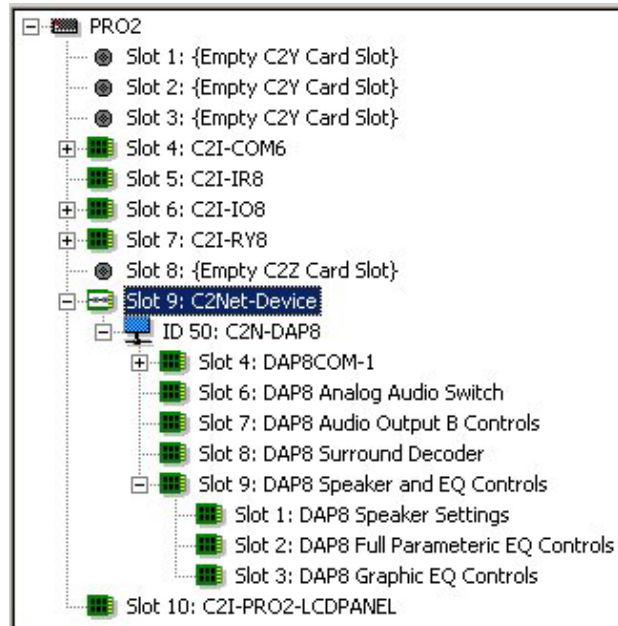
## C2Net-Device Slot in Configuration Manager

To incorporate a C2N-DAP8 into the system, drag the unit's symbol from the Cresnet Control Modules | Cresnet Audio Modules folder of the *Device Library* and drop it in *System Views*. The PRO2 system tree displays the unit in Slot 9, with a default NET ID of 50, as shown in the illustration on the next page.

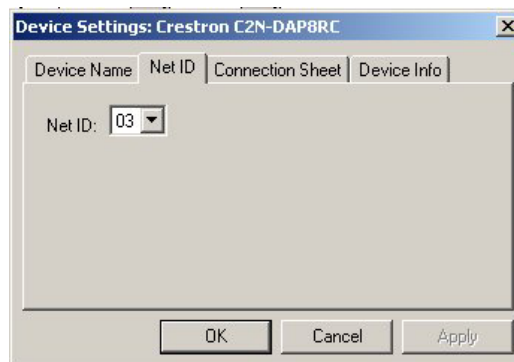
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**NOTE:** The first C2N-DAP8 in a system is preset with a NET ID of 50 when its symbol is dragged into the upper pane of *System Views*. Additional C2N-DAP8s are automatically assigned different NET ID numbers as they are added.

---

*C2Net Device, Slot 9***Setting the Net ID in Device Settings**

Double-click the C2N-DAP8 icon to open the “Device Settings” window. This window displays the C2N-DAP8 device information. If necessary, select the *NET ID* tab to change the unit’s NET ID, as shown in the following figure.

*C2N-DAP8 “Device Settings” Window*


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**NOTE:** SIMPL Windows automatically changes NET ID values of a device added to a program if a duplicate device or a device with the same default NET ID already exists in the program. Always ensure that the hardware and software settings of the NET ID match. For NET ID hardware setting details, refer to “Identity Code” on page 10.

---

**C2N-DAP8 Symbols in Programming Manager**

Programming Manager is where programmers “program” a Crestron control system by assigning signals to symbols. Due to the extensive functionality of the unit, a single C2N-DAP8 symbol in SIMPL Windows would be too complex. Instead, the C2N-DAP8 is broken up into slots. In Program Manager, expand the C2N-DAP8 to

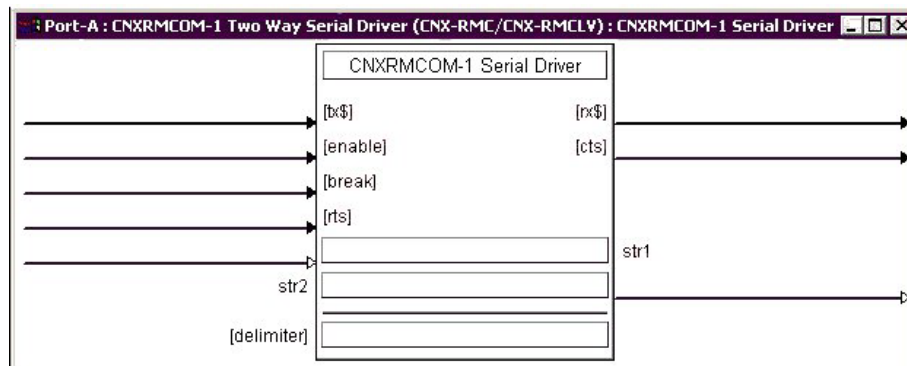
view the individual slots; then drag the desired symbol to *Detail View*. The C2N-DAP8 slots, sub-slots, and corresponding symbols are described in the following paragraphs. Because of their complexity, the description of the symbols for the Surround Sound Decoder symbol, Slot 08; the Speaker Settings symbol, Slot 09 Sub-Slot 1; the Full Parametric EQ Controls symbol, Slot 09 Sub-Slot 2; and the Graphic EQ Controls symbol, Slot 09 Sub-Slot 3, are described in the Appendix “Advanced Programming Symbols,” beginning on page 52, for those advanced programmers who wish to program them in SIMPL Windows.

**Slot 04: Built-in RS-232 Port**

This port serves two purposes: an RS-232 port for two-way communication with serial devices, and a console port for upgrading firmware. (Refer to “Uploading and Upgrading” on page 45.)

The symbol, shown below, is only used when the C2N-DAP8 communicates with a serial device. The bidirectional port supports baud rates up to 115K baud N81 and has RTS/CTS handshake signals. The tables below list the inputs/outputs and their functional description. Input and outputs enclosed by brackets ([...]) are optional.

**Two-Way Serial Driver Symbol**



**Built-in RS-232 Symbol Input Descriptions**

INPUT(S)	FUNCTION(S)
[tx\$]	More advanced signal processing can be done through serial strings and the tx\$ input line on the symbol.
[enable]	If signal is present on this input, it must be high to permit activity of the symbol. If the signal is low, the symbol is disabled.
[break]	Some devices use a break character before sending out any serial data. Break characters are sent out the port separated pace parameter.
[rts]	RTS is an output from the program to the C2N-DAP8 RS-232 port when the state of the RTS line is set.
str1	The C2N-DAP8 RS-232 port is capable of receiving complex serial data in the form of serial data strings on this input line.

**Built-in RS-232 Symbol Output Descriptions**

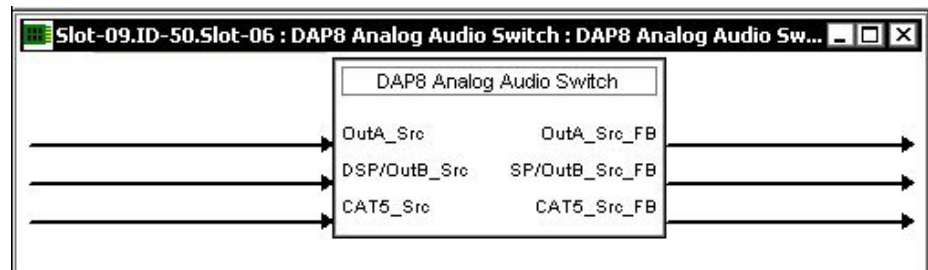
OUTPUT(S)	FUNCTION(S)
[rx\$]	More advanced signal processing can be done through serial strings and the rx\$ output line on the symbol.
[cts]	CTS is an input to the program that monitors the “Clear to Send” line status of the C2N-DAP8 RS-232 port.
str2	The C2N-DAP8 RS-232 port is capable of sending complex serial data in the form of serial data strings on this output line.



**NOTE:** When present, the delimiter is appended to every string of text in the port definition (both transmitted and received strings).

### Slot 06: DAP8 Analog Audio Switch

The DAP8 Analog Audio Crosspoint is a 6x3 stereo analog audio crosspoint built into slot 06 of the C2N-DAP8 surround sound processor. The DAP8 Analog Audio Crosspoint allows each of three stereo outputs to independently select one of six stereo audio inputs.



The C2N-DAP8 provides one CAT5 connector, labeled **AUDIO**, for stereo audio input *and* output. That is, one twisted pair carries stereo audio to the unit, and the other twisted pair carries stereo audio from the unit. The remaining audio inputs are RCA left/right connectors, labeled **AUDIO IN 2** through **6**.

In addition to the CAT5 audio output, the C2N-DAP8 provides two left/right RCA outputs, labeled **A** and **B**. Output **A** flows directly from the crosspoint with no additional processing. Output **B** is passed through a volume/tone controller on slot 07 of the C2N-DAP8. Thus output **B** can be adjusted for volume, bass, and treble. Refer to "Slot 07: Audio Output B Controls" on page 44.

Analog audio that is sent to output **B** will also be sent to the C2N-DAP8's internal DSP (digital signal processor) if analog source is selected. The DSP settings are controlled by the Surround Sound Decoder on slot 08; in some cases, the programming of the Surround Sound Decoder may affect the Analog Audio Switch settings. For example, if the program selects a different analog audio source for the DSP, then that source will also be sent to output **B** (and the feedback will be updated accordingly).

To switch a source to an output, each <Src> analog is initialized to a value that corresponds to the source, as shown in the following table.

#### *Analog Audio Symbol Source Signal Description (in Decimal Format)*

AUDIO SOURCE	VALUE
CAT5	1d
RCA	2d – 6d
No Source	0d

For example, to route the CAT5 audio input to output **B**, use an Analog Initialize symbol to set the value of <DSP/OutB\_Src> to 1. (Here, if no digital audio source is being used, the CAT5 audio will also be sent to the DSP.)

Similarly, to switch RCA input 4 to output **A**, initialize <OutA\_Src> to 4.

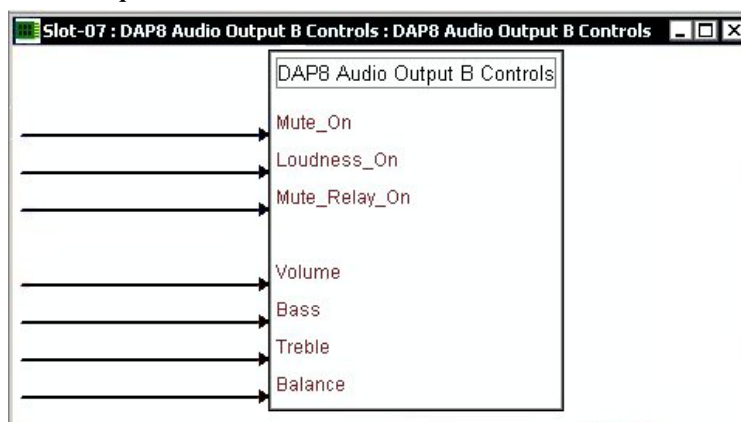
The feedback signals report the currently selected audio source for each output.

Again, in the case of output **B**, the feedback signal will be updated if the DSP selects a different analog audio source.

### Slot 07: Audio Output B Controls

The Audio Output B Controls module is a volume/tone controller built into slot 07 of the C2N-DAP8 surround sound processor. The C2N-DAP8 provides three outputs for analog audio: one CAT5 output and two left/right RCA outputs labeled **A** and **B**. Output **A** flows directly from the processor's internal Analog Audio Switch without additional processing, while output **B** is passed through the Audio Output B Controls volume/tone controller. The symbol is shown below.

#### Audio Output B Controls



#### Digitals

The <**Mute-On**> and <**Mute\_Relay\_On**> inputs cuts audio for as long as their respective signal remains high. The <**Loudness-On**> input activates the loudness function for as long as the input remains high, while the <**Mono-On**> input switches the audio setting from stereo to mono.

#### Analogs

The <**Volume**> analog input sets the volume level from 0% to 100%, which corresponds to a gain range of -80 to +20dB. The other analog inputs control bass, treble and balance settings relative to the 50% mark. That is, a <**Balance**> input with a value of 50% results in even distribution of audio between the left and right speakers (0% = full left; 100% = full right). Likewise, 50% indicates a neutral level for <**Treble**> and <**Bass**>.

---

**NOTE:** The symbols for the surround sound processor's Surround Sound Decoder symbol, Slot 08; the Speaker Settings symbol, Slot 09 Sub-Slot 1; the Full Parametric EQ Controls symbol, Slot 09 Sub-Slot 2; and the Graphic EQ Controls symbol, Slot 09 Sub-Slot 3, are very complex. Crestron strongly recommends using its Digital Audio Tools (DAT) software to configure these modules. However, they are described in "Appendix: Advanced Programming Symbols" beginning on page 52, for those advanced programmers who wish to program them in SIMPL Windows.

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## Uploading and Upgrading

Assuming a PC is properly connected to the entire system, Crestron programming software allows the programmer to upload programs and projects to the system and touchpanel after their development. However, there are times when the files for the program and projects are compiled and not uploaded. Instead, compiled files may be distributed from programmers to installers, from Crestron to dealers, etc. Even firmware upgrades are available from the Crestron website as new features are developed after product releases. In those instances, one has the option to upload via the programming software or to upload and upgrade via the Crestron Viewport.

---

**NOTE:** The Crestron Viewport utility accomplishes multiple system tasks, primarily via an RS-232 or TCP/IP connection between the control system and a PC. It is used to observe system processes, upload new operating systems and firmware, change system and network parameters, and communicate with network device consoles and touchpanels, among many other tasks. Viewport can also function as a terminal emulator for generic file transfer. All of these functions are accessed through the commands and options in the Viewport menus. Therefore, for its effectiveness as a support and diagnostic tool, the Crestron Viewport may be preferred over development tools when uploading programs and projects.

---

The following sections define how one would upload a SIMPL Windows program or upgrade the firmware of the C2N-DAP8. However, before attempting to upload or upgrade, it is necessary to establish communications.

### Communication Settings

---

**NOTE:** For laptops and other PCs without a built-in RS-232 port, Crestron recommends the use of PCMCIA cards, rather than USB-to-serial adapters. If a USB-to-serial adapter must be used, Crestron has tested the following devices with good results:

Belkin (large model) F5U103  
I/O Gear GUC232A  
Keyspan USA-19QW

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Other models, even from the same manufacturer, may not yield the same results.

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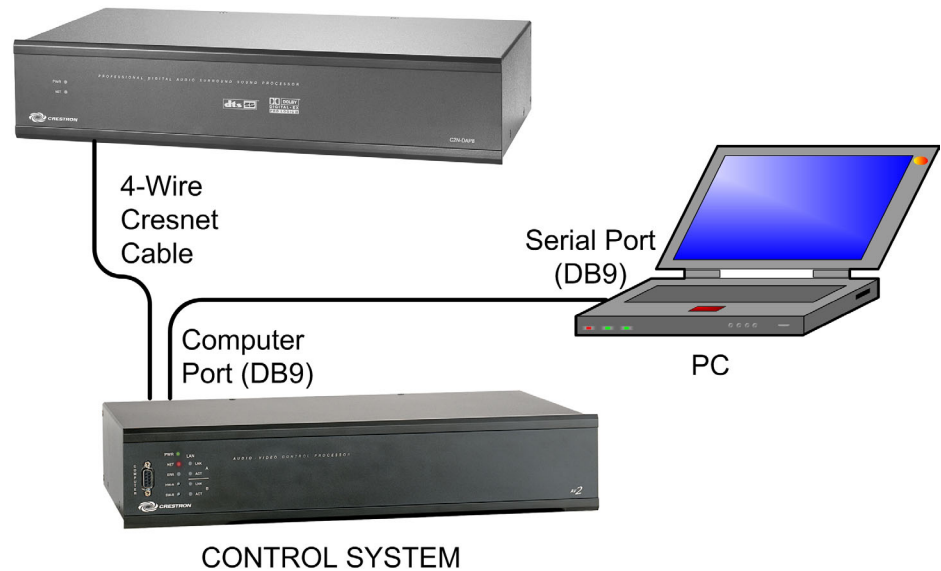
The procedure in this section provides details for RS-232 communication between the PC and the 2-Series control system. If TCP/IP communication is preferred, consult the latest version of the Crestron e-Control Reference Guide (Doc. 6052) or the respective Operations Guide for the control system. These documents are available from the Downloads | Product Manuals section of the Crestron website ([www.crestron.com](http://www.crestron.com)). Refer to the figure on the next page for a typical connection diagram when uploading files.

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**NOTE:** Use a standard DB9 male to female “straight-through” cable.

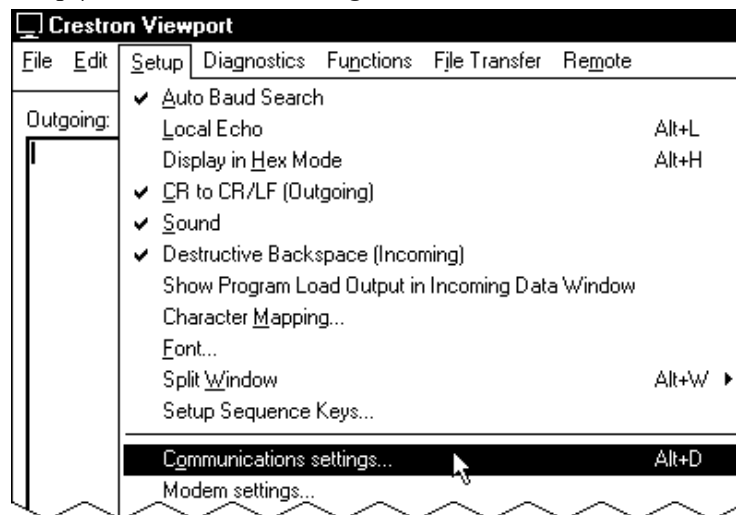
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*Typical Connection Diagram when Uploading  
C2N-DAP8*



1. Open the Crestron Viewport.  
Either launch the stand-alone version of Viewport, or start SIMPL Windows and from the menu bar, select **Tools | Viewport**.
2. Refer to the figure after this step. From the Viewport menu, select **Setup | Communications settings** (alternatively, press **Alt+D**) to open the "Port Settings" window.

*Setup | Communications Settings Command*



3. Select **RS-232** as the connection type. Verify that an available COM port (COM 1 is shown after this step) is selected, and that all communication parameters and necessary options from the "Port Settings" window are selected as shown after this step. Click the **OK** button to save the settings and close the window.

**“Port Settings” Window**


---

**NOTE:** The parameters shown in the illustration above are the port settings for a PRO2 control system. Consult the Operations Guide for the control system being used for exact parameter selection.

---

- To verify communication, select **Diagnostics | Establish Communications (Find Rack)**. This should display a window that gives the COM port and baud rate. If communication cannot be established, refer to the “Troubleshooting Communications” section in the respective Operations Guide for the control system.

## Uploading a SIMPL Windows Program

The SIMPL Windows file can be uploaded to the control system using SIMPL Windows or via the Crestron Viewport.

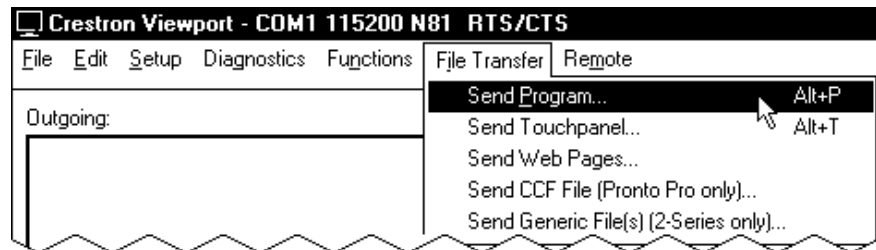
### Upload via SIMPL Windows

- Start SIMPL Windows.
- Select **File | Open** to view the “Open” window, navigate to the SIMPL Window file (.smw), and click **Open**.
- Select **Project | Transfer Program**.

### Upload via Crestron Viewport

- Verify that the procedure for “Communication Settings” that begins on page 45 has been performed.
- As shown after this step, select **File Transfer | Send Program** (alternatively, press **Alt+P**) from the Viewport menu.

*A control system source file has the extension .smw. A compiled SIMPL Windows file has the extension .spz for a 2-Series control system.*

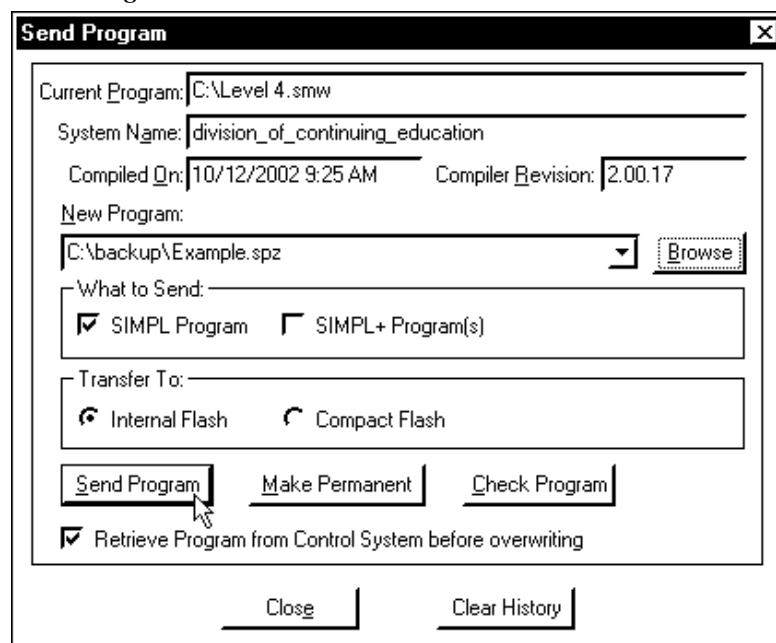
**File Transfer | Send Program Command**

3. The “Send Program” window appears, as shown after this step. Click **Browse**, locate the compiled file (.spz) and click **Open**. This will display the program's header information and enable one or both of the *What to Send* check boxes. If the program does not contain any SIMPL+ modules, only the *SIMPL Program* check box will be enabled. If it does contain SIMPL+ modules, then the *SIMPL+ Program(s)* check box will also be enabled. Select one or both check boxes and then click **Send Program** to begin the transfer.

---

**NOTE:** Refer to the respective Operations Guide for the control system for details about the other fields shown on the “Send Program” window.

---

**“Send Program” Window**

4. To verify that the program has been transferred successfully, select **Diagnostics | Report Program Information**. This should display a window that provides details about the current program loaded into the control system.

*A firmware upgrade file has the extension .upg*

## Firmware Upgrade

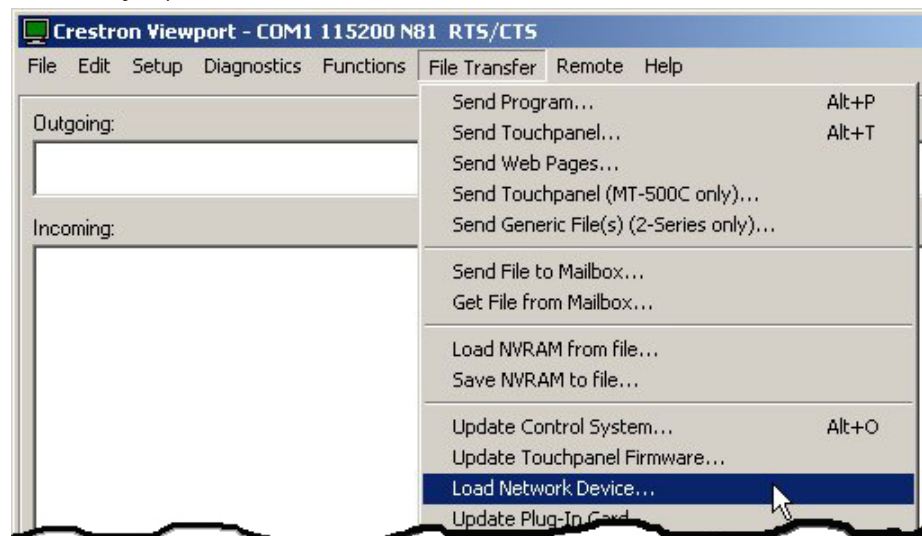
To take advantage of all the C2N-DAP8 features, it is important that the unit contains the latest firmware available. Therefore, please check the Crestron website ([http://www.crestron.com/downloads/software\\_updates.asp](http://www.crestron.com/downloads/software_updates.asp)) for the latest version of firmware. Not every product has a firmware upgrade, but as Crestron improves functions, adds new features, and extends the capabilities of its products, firmware upgrades are posted. To upgrade the firmware, complete the following steps.

1. Make sure that “Communication Settings” that begins on page 45 has been performed.

**NOTE:** It is possible to communicate with the C2N-DAP8 directly from a PC, using the Viewport and an STCP-501 interface cable (DB9 to RJ11). Use this method if you are uploading/upgrading only to a C2N-DAP8 that is already installed and you do not need to communicate to any other devices on the network, or uploading/upgrading to one or more C2N-DAP8s before they are installed. If you encounter a communication problem, enter **Alt-K** a few times (3-4) to clear it.

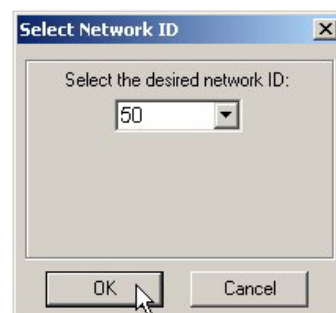
2. As shown after this step, select **File Transfer | Load Network Device** from the Viewport menu.

### *File Transfer | Load Network Device Command*



3. As shown after this step, select the NET ID of the C2N-DAP8 and then click **OK**. The “Open” window appears (refer to the subsequent graphic).

### *“Select Network ID” Window*

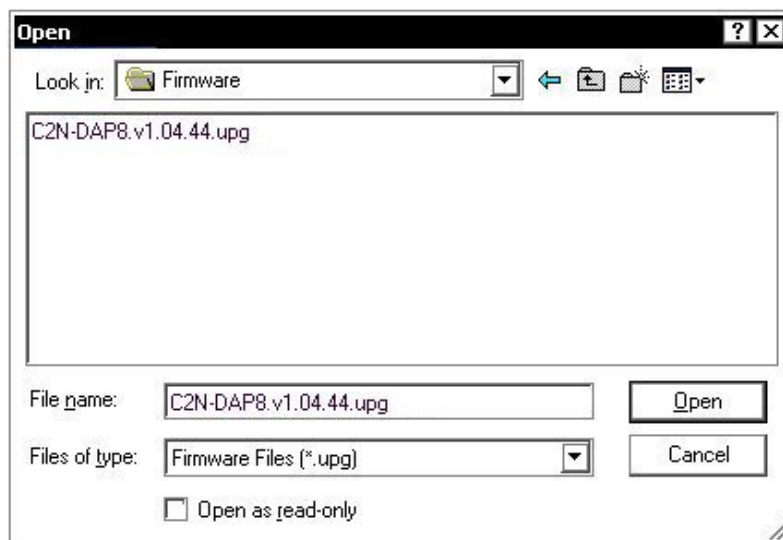


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**NOTE:** If problems arise when transferring any Cresnet file (touchpanel project/firmware), lower the port speed baud rate to 38400 to match the Cresnet bus speed.

---

### “Open” Window



4. Browse to the .upg file and click **Open** to begin the transfer.

---

Future upgrades may include upgrades to the DSP. In that event, the upgrade will consist of an upgrade file (xxx.upg) plus one or more DSP files. The uploading process would be the same, except that it will be important to load the accompanying .upg file first, and then upload the DSP files.

---

## Problem Solving

### Troubleshooting

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

#### *C2N-DAP8 Troubleshooting*

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
C2N-DAP8 does not function.	Incorrect power supply.	Use a Crestron power supply with sufficient power for the network.
<b>PWR</b> LED does not illuminate.	C2N-DAP8 is not receiving power.	Verify that cable plugged into <b>NET</b> port is secure.

*(continued on next page)*

*C2N-DAP8 Troubleshooting (continued)*

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
NET LED does not illuminate.	Improper NET ID.	Verify that C2N-DAP8 NET ID matches NET ID in software program.
	Loose network connection.	Verify that cable plugged into <b>NET</b> port is secure.
No sound from some or all speakers.	Power to the amplifier is not on.	Verify that amplifier power is on and that speaker connections are secure.
	Speaker connections do not match program configuration.	Verify that program configuration and speaker connections match.
	Incorrect or no source selected.	Verify that selected source has audio output.
	Surround sound mode setting is not correct.	Check surround sound mode if rear/center speakers are silent.

## Further Inquiries

If, after reviewing this Operations Guide, you cannot locate specific information or have questions, please take advantage of Crestron's award winning customer service team in your area. Dial one of the following numbers.

- In the US and Canada, call Crestron's corporate headquarters at 1-888-CRESTRON [1-888-273-7876].
- In Europe, call Crestron International at +32-15-50-99-50.
- In Asia, call Crestron Asia at +852-2341-2016.
- In Latin America, call Crestron Latin America at +5255-5093-2160.
- In Australia and New Zealand, call Crestron Pacific at +613-9480-2999.

## Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the C2N-DAP8, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website ([www.crestron.com](http://www.crestron.com)) periodically for manual update availability and its subjective value. Updates are available from the Downloads | Product Manuals section and are identified as an "Addendum" in the Download column.

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## Appendix: Advanced Programming Symbols

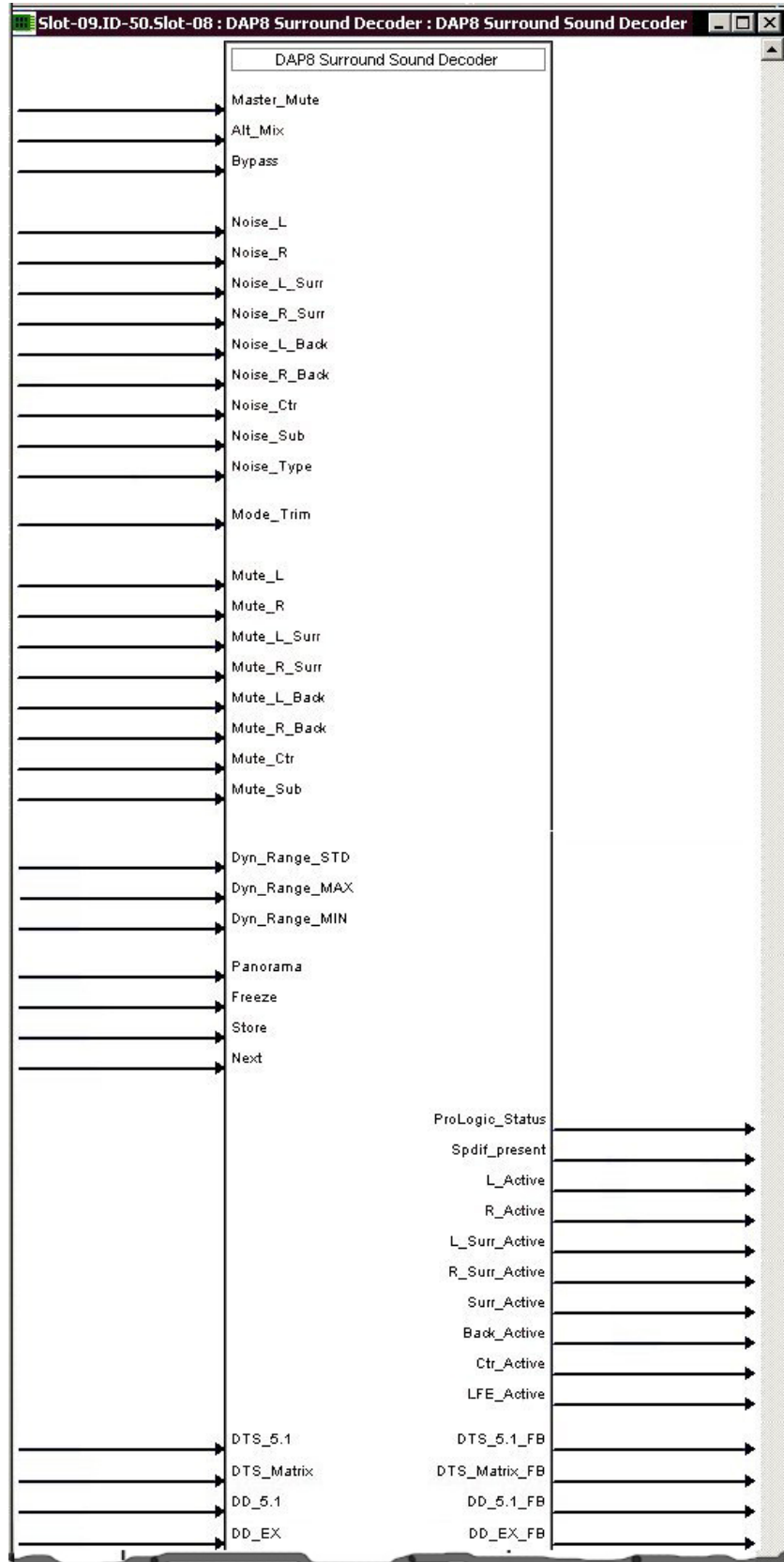
The symbols for the surround sound processor's Surround Sound Decoder symbol, Slot 08; the Speaker Settings symbol, Slot 09 Sub-Slot 1; the Full Parametric EQ Controls symbol, Slot 09 Sub-Slot 2; and the Graphic EQ Controls symbol, Slot 09 Sub-Slot 3, are very complex. Crestron strongly recommends using its Digital Audio Tools (DAT) software to configure these modules. However, they are described in this Appendix for those advanced programmers who wish to program them in SIMPL Windows.

### ***Slot 08: Surround Sound Decoder***

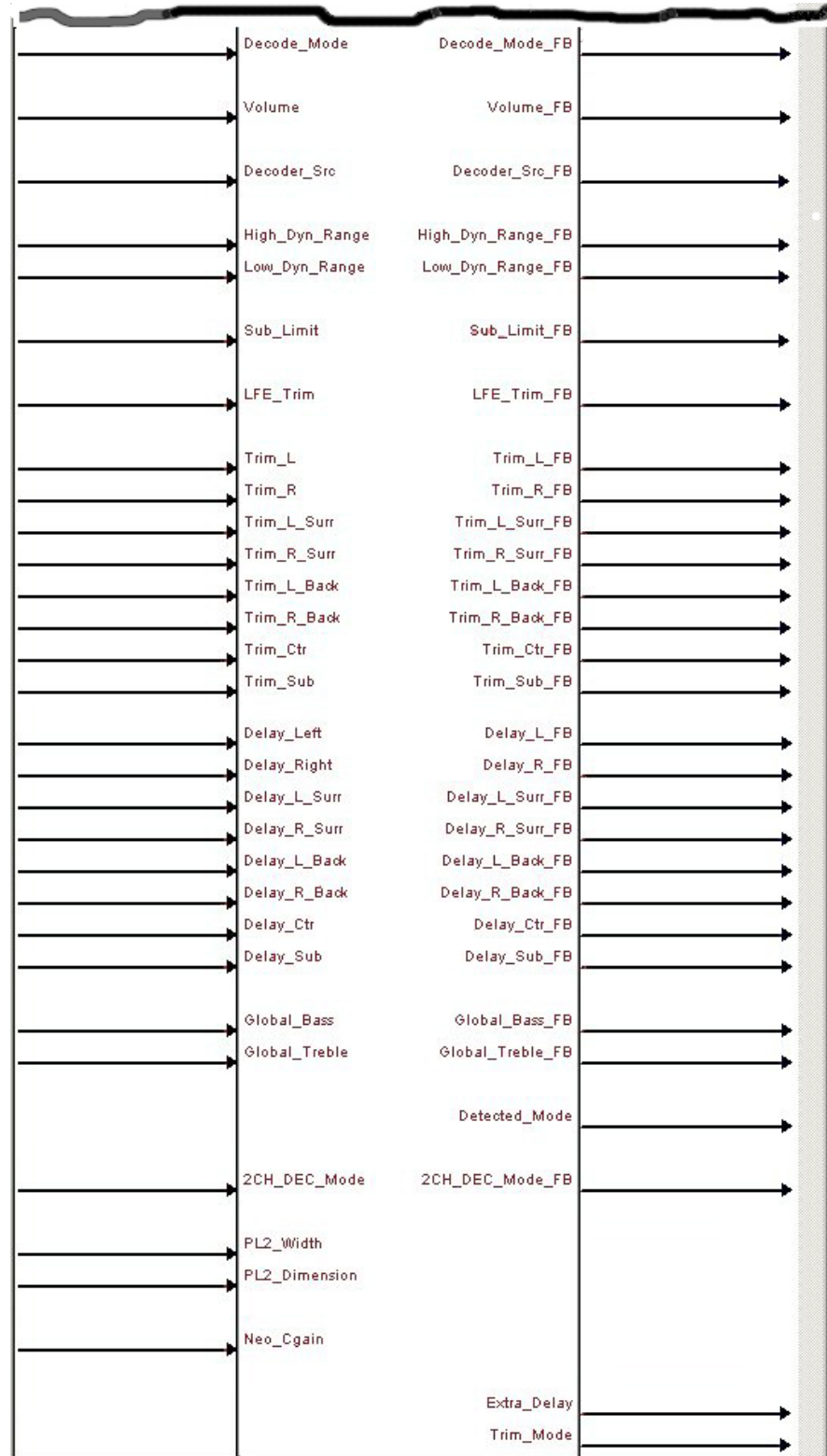
The Surround Sound Decoder is a digital signal processor (DSP) built into slot 08 of the C2N-DAP8 surround sound processor. The DSP can be programmed via SIMPL Windows and/or Crestron's Digital Audio Tools software. The Surround Sound Decoder symbol is complex, and is illustrated in two parts: the digital inputs and outputs, and the analog inputs and outputs, as shown on the next two pages. The tables following the illustrations describe the input and output signals. For additional details, press **F1** to access the SIMPL Windows help file.



*C2N- DAP8 Surround Sound Decoder - Digital Inputs and Outputs*



*C2N- DAP8 Surround Sound Decoder - Analog Inputs and Outputs*



*Surround Sound Decoder Digital Inputs and Outputs*

SIGNAL	TYPE (I/O)	FUNCTION								
Master_Mute	I	Mutes all surround sound audio for as long as the input is high. When the input goes low, all eight channels un-mute.								
Bypass	I	When high, this function bypasses the Global_Bass and Global_Treble settings, as well as Graphic/Parametric EQ. When in Bypass mode, the signal path is 24 bits rather than 20 bits, resulting in slightly improved audio fidelity.								
Alt_Mix	I	<p>Allows alternate downmix selection where speaker presence alone is not sufficient to determine the desired mix. In most applications, this signal can equal 0. Some infrequently used downmixing modes can be selected by setting this signal high. See the following:</p> <table border="0" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;"><b>Alt_Mix = 0</b></td> <td style="text-align: center;"><b>Alt_Mix=1</b></td> </tr> <tr> <td style="text-align: center;">L/R</td> <td style="text-align: center;">Lt/Rt</td> </tr> <tr> <td style="text-align: center;">2/2</td> <td style="text-align: center;">2/1</td> </tr> <tr> <td style="text-align: center;">3/2</td> <td style="text-align: center;">3/1</td> </tr> </table> <p>Note that the /1 in the 2/1 and 3/1 means that a single surround signal is generated even though it is directed to both the Ls and Rs speakers</p>	<b>Alt_Mix = 0</b>	<b>Alt_Mix=1</b>	L/R	Lt/Rt	2/2	2/1	3/2	3/1
<b>Alt_Mix = 0</b>	<b>Alt_Mix=1</b>									
L/R	Lt/Rt									
2/2	2/1									
3/2	3/1									
Noise_Type	I	Selects between Standard Noise (if 0) and pink noise (if 1). Standard noise (Dolby Noise) is bandpass-filtered noise centered at 750Hz with a 12dB/octave roll off. The Subwoofer channel has its noise centered at 50Hz. Pink noise rolls off at 3dB per octave starting at 23Hz.								
Noise_L through Noise_Sub	I	<p>The noise generator is activated when a Noise_L through Noise_Sub enable input is high.</p> <p>To generate noise, the DSP stops decoding and enters noise generation mode. This means that the previous source needs to be manually re-selected after noise generation is complete.</p>								
Mode_Trim	I	<p>When high, this function stores the volume, volume trims, and LFE trim values such that they are applied only to whichever decoding mode is currently running. This allows the volume and gain settings for a CD source, for example, to differ from those for a Dolby Digital DVD.</p> <p>If unused or set to zero, the trim values apply to all decoding modes, and the feedback signals will report the current settings.</p> <p>If set to 1, the feedback signals will show the system trims plus the mode-dependent trims for the current mode. The factory default for all the mode-dependent trims is zero; thus all modes default to the system trims. Adjusting the trims with Mode_Trim =1 alters values stored in the mode-dependent trims for the current mode.</p>								
Mute_L through Mute_Sub	I	When high, cuts audio to indicated channel for as long as input remains high. Audio un-mutes when input goes low.								
Dyn_Range_MIN, Dyn_Range_STD, Dyn_Range_MAX	I	<p>When high, will apply the indicated amount of compression for Dolby Digital sources, as follows:</p> <p>Dyn_Range_MIN provides highest compression ratio, bringing dynamic range close to that of a TV broadcast.</p> <p>Dyn_Range_STD provides dynamic range recommended by sound engineers for general home viewing.</p> <p>Dyn_Range_MAX provides full dynamic range of a cinema.</p> <p>The dynamic range digital inputs affect and will update the High_Dyn_Range_fb and Low_Dyn_Range_fb signals described later.</p>								

*(continued on next page)*

*Surround Sound Decoder Digital Inputs and Outputs (continued)*

SIGNAL	TYPE (I/O)	FUNCTION
Panorama	I	This setting applies to Dolby Pro Logic II Music mode. According to Dolby Laboratories, it extends the front stereo image to include the surround speakers for an exciting wraparound effect with side-wall imaging.
Freeze	I	The auto-detect mode will be suspended for as long as the Freeze input is high. This allows the C2N-DAP8 to be put into a specific decoding mode
Store	I	By default, the C2N-DAP8 operates in auto-detect mode, whereby the decoding mode is automatically selected depending on the incoming signal stream and the selected source. If the program selects an alternative decoding mode for a source, a rising edge of the Store will save the new decoding parameters for that type of signal stream.
Next	I	With each rising edge of Next, the DSP will cycle through the different decoding modes: PCM, Dolby Digital 2ch, Dolby Digital 2ch +L/Rt, Dolby Digital 5.1, Dolby Digital 5.1 EX, DTS 5.1, DTS ES Matrix, DTS ES Discrete.
ProLogic_Status	O	When high, indicates that Pro Logic decoding is active
Spdif_Present	O	When high, indicates that a valid SPDIF signal is present on the last selected digital source when the C2N-DAP8 is processing an analog signal.
Left_Active through LFE_Active	O	When high, indicates the presence of a signal coming in to the decoder on the corresponding channel. (This does not necessarily correspond directly to the physical outputs of the C2N-DAP8.)  Surr_Active refers to the presence of a surround channel, such as with a Pro Logic Encoded source, while Back_Active indicates a 6.1 or 7.1 encoded signal that will drive one or both of the back surround channels.
DTS_5.1, DTS_Matrix DTS_5.1_FB, , DTS_Matrix_FB	I  O	Control matrix generation of a rear surround channel (to left back and right back speakers) for DTS Digital 5.1 and DTS Digital ES Matrix encoded signals. Since the C2N-DAP8 contains automatic modes to control this, the user interface should use the _fb signals to indicate the current es matrix mode.
DD_5.1, DD_EX DD_5.1_FB>, DD_EX_FB	I  O	Control matrix generation of a rear surround channel (to Sbl/Sbr) for Dolby Digital 5.1 and Dolby Digital 5.1 EX encoded signals. Since the C2N-DAP8 contains automatic modes to control this, the user interface should use the _fb signals to indicate the current Dolby Digital matrix mode.

*Surround Sound Decoder Analog Input and Output Signals*

SIGNAL	TYPE (I/O)	FUNCTION														
Decode_Mode Decode_Mode_FB	I  O	The Decode_Mode input is reserved for future use. The feedback signal indicates the current decoding mode being used by the DSP, as follows:  <table border="1"> <thead> <tr> <th>Decode Mode</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>PCM</td> <td>0</td> </tr> <tr> <td>Dolby</td> <td>1</td> </tr> <tr> <td>DTS</td> <td>2</td> </tr> <tr> <td>Reserved</td> <td>3</td> </tr> <tr> <td>Analog</td> <td>4</td> </tr> <tr> <td>Reserved</td> <td>5</td> </tr> </tbody> </table>	Decode Mode	Value	PCM	0	Dolby	1	DTS	2	Reserved	3	Analog	4	Reserved	5
Decode Mode	Value															
PCM	0															
Dolby	1															
DTS	2															
Reserved	3															
Analog	4															
Reserved	5															

*(continued on next page)*

*Surround Sound Decoder Analog Input and Output Signals (continued)*

SIGNAL	TYPE (I/O)	FUNCTION																										
Volume Volume_FB	I O	Sets the master volume for all digital output channels. The volume is adjustable within a range of -80dB to +12dB. Thus valid values range from -800 (-80dB) to +120 (+12dB).																										
Decoder_Src Decoder_Src_FB	I O	Controls and reports the source currently used by the decoder.  <table border="0"> <thead> <tr> <th style="text-align: left;"><u>Source</u></th> <th style="text-align: left;"><u>Decoder Source</u></th> </tr> </thead> <tbody> <tr><td>Noise Generator (Special Case)</td><td>0</td></tr> <tr><td>SPDIF A</td><td>1</td></tr> <tr><td>SPDIF B</td><td>2</td></tr> <tr><td>Optical E</td><td>3</td></tr> <tr><td>Optical F</td><td>4</td></tr> <tr><td>CAT5 Video In 1-2-3-4</td><td>5</td></tr> <tr><td>CAT5 Audio In</td><td>6</td></tr> <tr><td>Audio In #2</td><td>7</td></tr> <tr><td>Audio In #3</td><td>8</td></tr> <tr><td>Audio In #4</td><td>9</td></tr> <tr><td>Audio In #5</td><td>10</td></tr> <tr><td>Audio In #6</td><td>11</td></tr> </tbody> </table> <p>Enabling any of the Noise generators sets Decoder_Src to zero, thus the previous source needs to be manually re-selected after noise generation is complete.</p> <p>Selecting any of the analog audio inputs (CAT5 through Audio In #6) will also affect the DAP8 Stereo Audio Switch setting on slot 06.</p>	<u>Source</u>	<u>Decoder Source</u>	Noise Generator (Special Case)	0	SPDIF A	1	SPDIF B	2	Optical E	3	Optical F	4	CAT5 Video In 1-2-3-4	5	CAT5 Audio In	6	Audio In #2	7	Audio In #3	8	Audio In #4	9	Audio In #5	10	Audio In #6	11
<u>Source</u>	<u>Decoder Source</u>																											
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CAT5 Audio In	6																											
Audio In #2	7																											
Audio In #3	8																											
Audio In #4	9																											
Audio In #5	10																											
Audio In #6	11																											
High_Dyn_Range, Low_Dyn_Range High_Dyn_Range_Fb, Low_Dyn_Range_FB	I O	Controls dynamic range compression in Dolby Digital sources. The control range is 0 to 100% (for minimum to maximum compression).  For most applications these signals need not be used, since the DYN_Range inputs described before offer adequate control of compression ratios.																										
Sub_Limit Sub_Limit_FB	I O	Sets the peak limit, or maximum output level of the subwoofer. The peak level is adjustable within a range of -25dB to 0dB. Values more negative than -24.0dB disable peak limiting (the default setting)																										
LFE_Trim LFE_Trim_FB	I O	Sets the amount of gain to the LFE, or Low Frequency Effects channel during bass management. The LFE trim is adjustable within a range of -15dB to 0dB.																										
Trim_L through Trim_Sub Trim_L_FB through Trim_Sub_FB	I O	Sets the gain of the indicated channel. The trim is adjustable within a range of -30dB to +30dB, although Dolby recommends a range of -12dB to +12dB. The Master Volume and the trim volume (and possibly other compensation terms) are added together to produce the output volume.																										
Delay_Left through Delay_Sub Delay_Left_FB through Delay_Sub_FB	I O	Sets the delay, in milliseconds, for the indicated channel. The delay is adjustable within a range of 0ms to 20ms, although the Dolby recommendations are 0ms to 5ms for the center channel and 0ms to 15ms for all other channels.  Certain Pro Logic decoding modes add a 10ms delay that is not displayed or accounted for here.																										
Global_Bass, Global_Treble Global_Bass_FB, Global_Treble_FB	I O	Sets the bass and treble settings for all digital output channels. The bass and treble are adjustable within a range of -18.0dB to +18.0dB.																										

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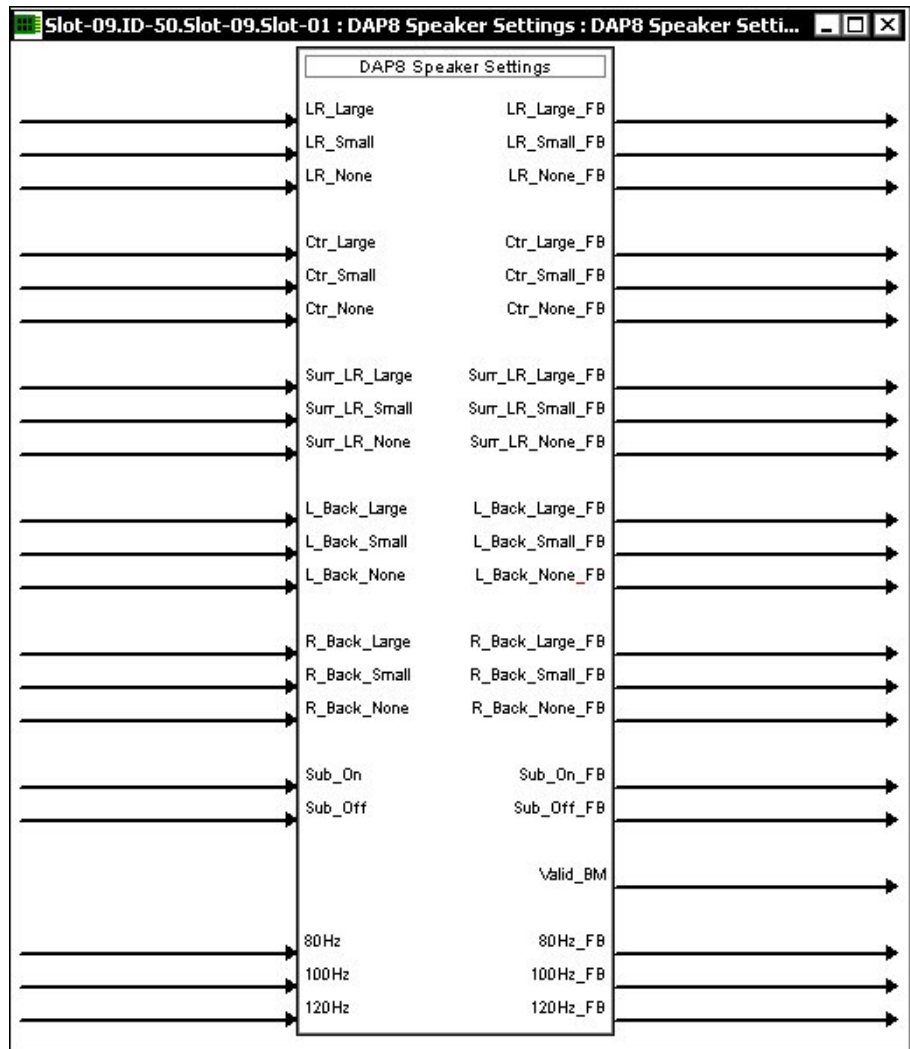
*Surround Sound Decoder Analog Input and Output Signals (continued)*

SIGNAL	TYPE (I/O)	FUNCTION																										
Detected_Mode	O	Indicates the type of signal currently being decoded, facilitating the use of mode-specific controls via subpages on a touchpanel.  <table border="0"> <thead> <tr> <th><u>Format</u></th> <th><u>Detected_Mode</u></th> </tr> </thead> <tbody> <tr><td>Undefined</td><td>0</td></tr> <tr><td>Detecting</td><td>1</td></tr> <tr><td>PCM audio, i.e., CD</td><td>2</td></tr> <tr><td>Analog</td><td>3</td></tr> <tr><td>Dolby Digital 5.1</td><td>4</td></tr> <tr><td>Dolby Digital 2-Channel</td><td>5</td></tr> <tr><td>Dolby Digital EX</td><td>6</td></tr> <tr><td>DTS</td><td>7</td></tr> <tr><td>DTS ES 5.1 Matrix</td><td>8</td></tr> <tr><td>Dolby Digital 2-Channel w/ Pro Logic Flag</td><td>9</td></tr> <tr><td>DTS ES 6.1 Discrete</td><td>10</td></tr> </tbody> </table>	<u>Format</u>	<u>Detected_Mode</u>	Undefined	0	Detecting	1	PCM audio, i.e., CD	2	Analog	3	Dolby Digital 5.1	4	Dolby Digital 2-Channel	5	Dolby Digital EX	6	DTS	7	DTS ES 5.1 Matrix	8	Dolby Digital 2-Channel w/ Pro Logic Flag	9	DTS ES 6.1 Discrete	10		
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DTS ES 5.1 Matrix	8																											
Dolby Digital 2-Channel w/ Pro Logic Flag	9																											
DTS ES 6.1 Discrete	10																											
2CH_DEC_Mode	I	Selects the decoding mode for a two channel signal (PCM, analog or Dolby 2-channel), as follows:  <table border="0"> <thead> <tr> <th><u>Mode</u></th> <th><u>2CH_DEC_Mode</u></th> </tr> </thead> <tbody> <tr><td>Stereo</td><td>0</td></tr> <tr><td>Dolby Pro Logic</td><td>1</td></tr> <tr><td>Dolby Pro Logic II Movie</td><td>2</td></tr> <tr><td>Dolby Pro Logic II Music</td><td>3</td></tr> <tr><td>Dolby Pro Logic II Matrix</td><td>4</td></tr> <tr><td>DTS Neo:6 Cinema</td><td>5</td></tr> <tr><td>DTS Neo:6 Music</td><td>6</td></tr> </tbody> </table> <p>Note that the C2N-DAP8 has certain automatic modes that can change the 2-channel decoding mode; the user interface should use the feedback from the C2N-DAP8 to indicate the current mode.</p>	<u>Mode</u>	<u>2CH_DEC_Mode</u>	Stereo	0	Dolby Pro Logic	1	Dolby Pro Logic II Movie	2	Dolby Pro Logic II Music	3	Dolby Pro Logic II Matrix	4	DTS Neo:6 Cinema	5	DTS Neo:6 Music	6										
<u>Mode</u>	<u>2CH_DEC_Mode</u>																											
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Dolby Pro Logic II Movie	2																											
Dolby Pro Logic II Music	3																											
Dolby Pro Logic II Matrix	4																											
DTS Neo:6 Cinema	5																											
DTS Neo:6 Music	6																											
2CH_DEC_Mode_FB	O																											
PL2_Width, PL2_Dimension	I	In Dolby Pro Logic II Music Mode (and only in that mode), several options may be selected: PL2 Width, PL2 Dimension, and Panorama.  Valid values for PL2_Width range from 0 to 7.  Valid values for PL2_Dimension range from 0 (for -3) to 6 (for +3).  (Panorama is defined within the list of digital inputs and outputs.)																										
Neo_Cgain	I	Sets the center image adjustment for DTS Neo:6 Music sources only. Valid values range from 0 (for 0.0) to 5 (for 0.5).																										
Extra_Delay	O	This analog signal is normally 0 and assumes a value of 10 if Pro Logic emulation or Pro Logic II Movie mode is active. These two modes provide an additional 10ms of delay; if desired, Extra_Delay can be summed into the surround delay values to display the actual delay rather than only the added delay.																										
Trim_Mode	O	Indicates the index used for mode-dependent streams.  <table border="0"> <thead> <tr> <th><u>Stream Type</u></th> <th><u>Trim_Mode</u></th> </tr> </thead> <tbody> <tr><td>Undefined</td><td>0</td></tr> <tr><td>PCM (Stereo)</td><td>1</td></tr> <tr><td>Dolby Pro Logic</td><td>2</td></tr> <tr><td>Dolby Pro Logic II Music</td><td>3</td></tr> <tr><td>Dolby Pro Logic II Movie</td><td>4</td></tr> <tr><td>Dolby Pro Logic II Matrix</td><td>5</td></tr> <tr><td>DTS NEO:6 Music</td><td>6</td></tr> <tr><td>DTS NEO:6 Cinema</td><td>7</td></tr> <tr><td>Dolby Digital 5.1</td><td>8</td></tr> <tr><td>Dolby Digital EX</td><td>9</td></tr> <tr><td>DTS 5.1</td><td>10</td></tr> <tr><td>DTS-ES Matrix</td><td>11</td></tr> </tbody> </table>	<u>Stream Type</u>	<u>Trim_Mode</u>	Undefined	0	PCM (Stereo)	1	Dolby Pro Logic	2	Dolby Pro Logic II Music	3	Dolby Pro Logic II Movie	4	Dolby Pro Logic II Matrix	5	DTS NEO:6 Music	6	DTS NEO:6 Cinema	7	Dolby Digital 5.1	8	Dolby Digital EX	9	DTS 5.1	10	DTS-ES Matrix	11
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### Slot 09, Sub-Slot 1 Speaker Settings Symbol

The C2N-DAP8 Speaker Settings module is built into slot 09 of the C2N-DAP8 surround sound processor. The digital input signals select the presence and size of the system speakers as well as the LFE crossover frequency; the digital output signals report the selections. Alternatively, the speakers can be configured via Crestron's Digital Audio Tools software, with no programming in SIMPL Windows.

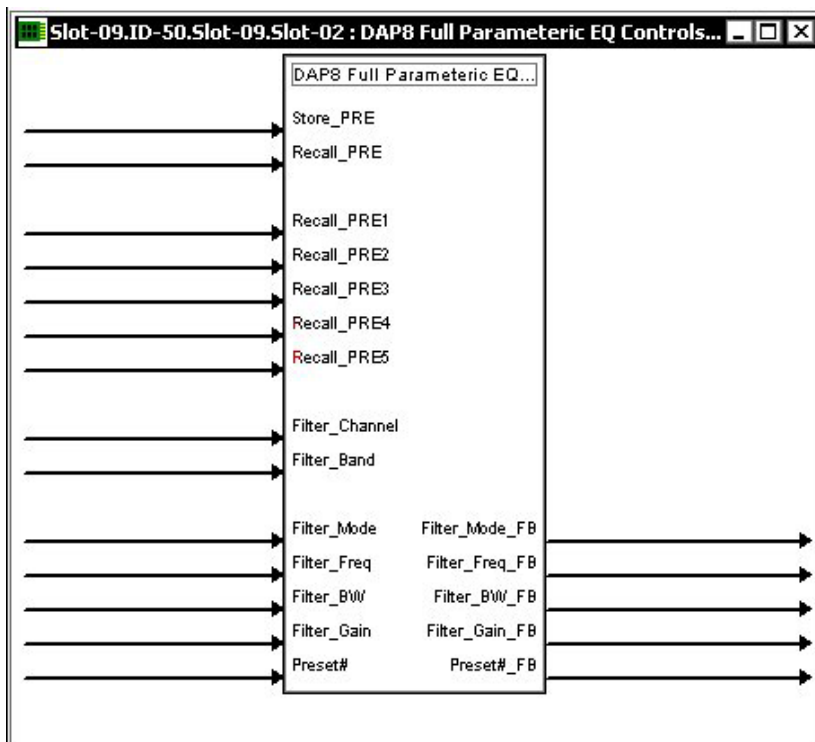
#### C2N- DAP8 Speaker Settings Module



### Slot 09, Sub-Slot 2 Full Parametric EQ Controls Symbol

The Full Parametric EQ Controls symbol allows you to define the characteristics of the parametric equalization filters and presets. The table following the symbol on the next page explains the inputs and outputs.

*C2N- DAP8 Full Parametric EQ Controls Module*



*Parametric Equalizer Control Signals*

SIGNAL	TYPE (D/A, I/O)*	FUNCTION																				
Store_PRE	DI	On the rising edge of Store_PRE, the current filter values will be stored in the preset specified by Preset#																				
Recall_PRE	DI	On the rising edge of Recall_PRE, the filter values of the specified Preset#_FB will be recalled and propagated to the outputs.																				
Recall_PRE1 through Recall_PRE5	DI	These inputs offer a simpler way to recall a preset directly. Preset#_FB will be updated, thus Store_PRE will store the last preset recalled.																				
Filter_Channel	AI	Selects the digital output channel as follows: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Filter_Channel</th> <th>Value</th> </tr> </thead> <tbody> <tr><td>Left Front</td><td>1</td></tr> <tr><td>Right Front</td><td>2</td></tr> <tr><td>Left Surround</td><td>3</td></tr> <tr><td>Right Surround</td><td>4</td></tr> <tr><td>Left Back</td><td>5</td></tr> <tr><td>Right Back</td><td>6</td></tr> <tr><td>Center</td><td>7</td></tr> <tr><td>Subwoofer</td><td>8</td></tr> <tr><td>No channel</td><td>0</td></tr> </tbody> </table>	Filter_Channel	Value	Left Front	1	Right Front	2	Left Surround	3	Right Surround	4	Left Back	5	Right Back	6	Center	7	Subwoofer	8	No channel	0
Filter_Channel	Value																					
Left Front	1																					
Right Front	2																					
Left Surround	3																					
Right Surround	4																					
Left Back	5																					
Right Back	6																					
Center	7																					
Subwoofer	8																					
No channel	0																					
Filter_Channels (cont'd)																						
Filter_Band	AI	Each channel has 6 programmable filter sections. This variable selects which band (from 1 to 6, or 0 for no band selected) to operate on. Specifying a band will display the current mode, frequency, bandwidth and gain for that filter. (Not all parameters apply to all filters types.)																				

*(continued on next page)*



*Parametric Equalizer Control Signals (continued)*

SIGNAL	TYPE (D/A, I/O)*	FUNCTION														
Filter_Mode Filter_Mode_FB	AI AO	<p>Sets the type of filter or EQ, as follows:</p> <table border="0"> <thead> <tr> <th>Filter_Mode</th> <th>Value</th> </tr> </thead> <tbody> <tr> <td>Off (no EQ)</td> <td>1</td> </tr> <tr> <td>Peaking EQ - boosts or attenuates specified frequency, as in a graphic equalizer band.</td> <td>2</td> </tr> <tr> <td>Bass Shelf - uniformly boosts or attenuates all frequencies below the Filter_Freq level. The amount of modification is given by Filter_Gain.</td> <td>3</td> </tr> <tr> <td>Treble Shelf - uniformly boosts or attenuates all frequencies above the Filter_Freq level. The amount of modification is given by Filter_Gain.</td> <td>4</td> </tr> <tr> <td>Low Pass - filters out all audio above the Filter_Freq level.</td> <td>5</td> </tr> <tr> <td>High Pass - filters out all audio below the Filter_Freq level.</td> <td>6</td> </tr> </tbody> </table>	Filter_Mode	Value	Off (no EQ)	1	Peaking EQ - boosts or attenuates specified frequency, as in a graphic equalizer band.	2	Bass Shelf - uniformly boosts or attenuates all frequencies below the Filter_Freq level. The amount of modification is given by Filter_Gain.	3	Treble Shelf - uniformly boosts or attenuates all frequencies above the Filter_Freq level. The amount of modification is given by Filter_Gain.	4	Low Pass - filters out all audio above the Filter_Freq level.	5	High Pass - filters out all audio below the Filter_Freq level.	6
Filter_Mode	Value															
Off (no EQ)	1															
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Low Pass - filters out all audio above the Filter_Freq level.	5															
High Pass - filters out all audio below the Filter_Freq level.	6															
Filter_Freq Filter_Freq_FB	AI AO	Selects the center frequency. Valid values range from 20 (20Hz) to 20000 (20KHz).														
Filter_BW Filter_BW_FB	AI AO	<p>Controls the bandwidth of a given filter, and is expressed in octaves. Although 'bandwidth' applies only to the peaking/EQ filters, the CN2-DAP8 can derive Q or slope from bandwidth to control the sharpness of high pass, low pass, and shelf filters. Use of uniform units permits clean transitions between filter types, such as from peaking/EQ to lowpass.</p> <p>For peaking/EQ, lowpass, and highpass, bandwidths in the range of 0.02 to 2.0 are appropriate. For the shelf filters, a range of 1.0 to 3.0 is appropriate. Smaller values represent a narrow band of boost or attenuation; larger ones represent a wide band of boost or attenuation.</p>														
Filter_Gain Filter_Gain_FB	AI AO	Boosts or attenuates the center frequency, or with shelving filters, all frequencies above or below the center frequency. Valid values range from -240 (-24dB) to +240 (+24dB).														
Preset# Preset#_FB	AI AO	The Preset# input defines the preset to be stored or recalled; thus valid values range from 1 through 5, or 0 for no preset. The Preset#_FB output reports the current preset.														

\*Signal types are shown as DI (digital input), DO (digital output), AI (analog input), or AO (analog output). The filter feedback signals report the state of the filter defined by Filter\_Channel and Filter\_Band.

### Slot 09, Sub-Slot 3, Graphic EQ Controls Symbol

The Graphic EQ Controls symbol allows you to define the characteristics of the graphic equalizer filters and presets.

The symbol's input and output signals are as follows:

#### Preset store/recall signals:

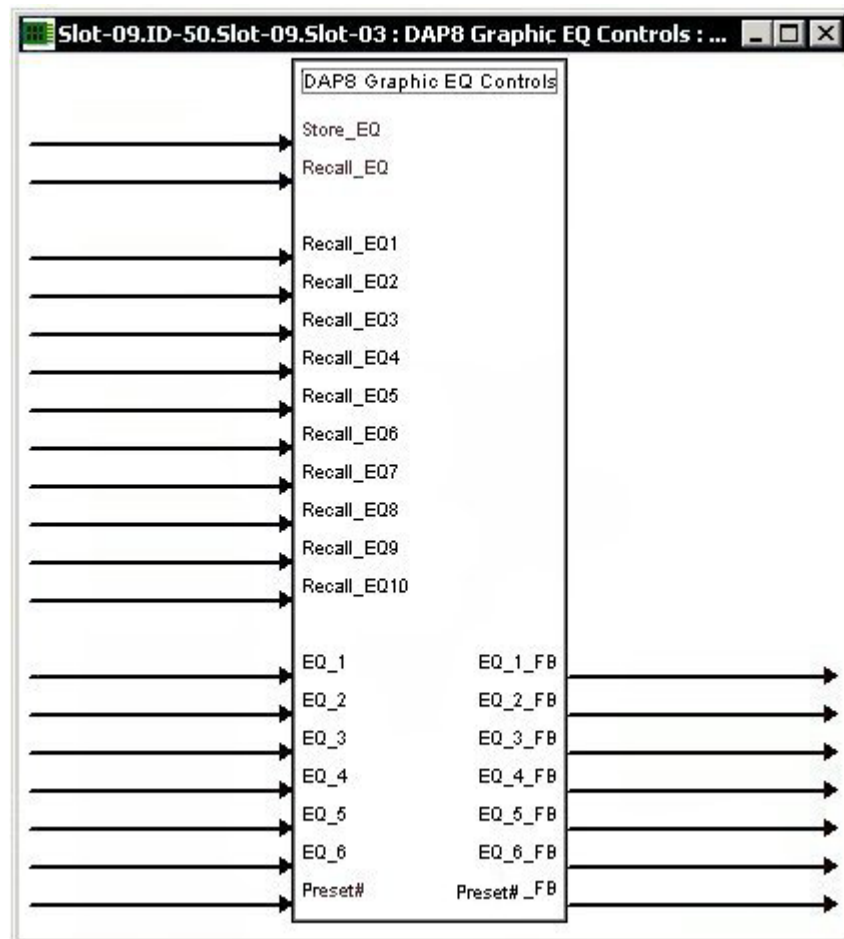
- Digital inputs: <Store\_EQ>, <Recall\_EQ>, <Recall\_EQ1> through <Recall\_EQ10>
- Analog input: <Preset#>
- Analog output: <Preset#\_FB>

#### Trim Values:

- Analog inputs: <EQ\_1> through <EQ\_6>
- Analog outputs: <EQ\_1\_FB> through <EQ\_6\_FB>

Operation of the module is described following the symbol illustration.

#### C2N-DAP8 Graphic EQ Controls Module



The C2N-DAP8 provides ten trim presets, where a trim preset is a set of all six <EQ> values.

On the rising edge of **<Store\_EQ>**, the six trim band values will be stored in the preset specified by **<Preset#>**. Valid values for **<Preset#>** range from 1 to 10. The **<Preset#\_F>** output reports the current trim preset.

On the rising edge of **<Recall\_EQ>** the values stored in the indicated **<Preset#>** will be recalled and propagated to the outputs. Here the **<EQ\_FB>** outputs may have different values than the inputs.

Alternatively, a rising edge of a **<Recall\_EQ#>** (1 through 10) input will recall that trim preset.

The **<EQ>** inputs adjust the gains of the 6 filters; thus **<EQ\_1>** corresponds to filter #1, **<EQ\_2>** corresponds to filter #2, and so forth. The gains are adjustable within a range of -10dB to +5dB, and are applied equally to 7 of the 8 channels (the subwoofer channel is excluded). All trim band values propagate immediately to the outputs.

Valid values for **<EQ>** range from -100 (-10dB) to +50 (+5dB). An **<EQ>** value of 0 (0dB) means that the signal will pass unaffected. Values above and below 0 will boost or attenuate the gain in increments of .1dB. That is, changing the analog value by 1 signifies a 0.1 decibel boost or attenuation.

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## Return and Warranty Policies

### Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange, or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number, and return address.
2. Products may be returned for credit, exchange, or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, Cresskill, N.J., or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee, plus shipping costs, on any products returned with an RMA.
3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

### CRESTRON Limited Warranty

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This warranty extends to products purchased directly from CRESTRON or an authorized CRESTRON dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended, or if it has been subjected to misuse, accidental damage, modification, or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced, or removed.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON is not liable for any claim made by a third party or made by the purchaser for a third party.

CRESTRON shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

Except as expressly set forth in this warranty, CRESTRON makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supercedes all previous warranties.

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**Operations Guide – DOC. 8186**  
**06.03**

Specifications subject to  
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