Crestron Performance Audio Systems: Powersoft Amplifiers

Powersoft Duecanali and Quattrocanali power amplifiers—CA-PWRSFT-1604 and CA-PWRSFT-2404, respectively—are designed to meet the high-power requirements of large audio systems. Both amplifiers offer a range of applications from basic background music and paging, to larger sound reinforcement systems in auditoriums, meeting places and other large gathering spaces.

These amplifiers are extremely versatile and may be used in low impedance performance systems. The compact, 1 RU housing and supplied mounting rails for 19″ racks simplify installation while addressing space concerns. For high-impedance distributed systems, refer to Application Note (Doc. 8371) at www.crestron.com/manuals.

For additional amplifier wiring and operational details, refer to the CA-PWRSFT-1604 and CA-PWRSFT-2404 product manual at www.crestron.com/manuals.

Connections

To accommodate a variety of applications each amplifier includes several terminal block connectors. Depending on the attached loudspeaker, additional connectors may be required for terminations at the loudspeaker end.

Configurations

Each channel on a Powersoft amplifier can be independently configured for high-impedance (Hi-Z) distributed systems or low-impedance (Lo-Z) operation.

The amplifiers are configured for operations using DIP switches on the rear panel. Additional DIP switches configure High-Pass Filters (HPF) on each channel.

WARNING: To prevent damage to system components, ensure that the amplifier is powered off prior to changing any DIP switch setting.

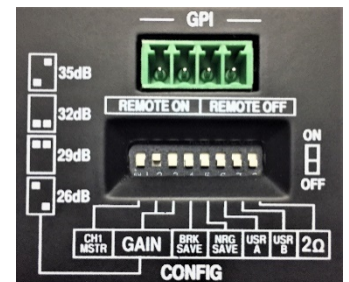**NOTE:** Refer to the product manual for details on wiring and additional DIP switch configurations.

Select Low Impedance Operation

All amplifier channels are factory-configured for Lo-Z operation. Additionally, the high-pass filter is disabled (**HPF Off**) and the gain is set to 32 dB. To set a channel for low-impedance operation, the channel mode switch must be set to **Lo-Z**.
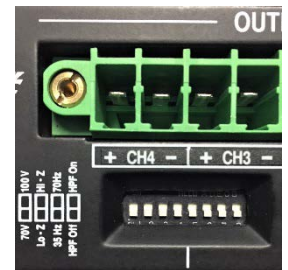
Set Gain

The CA-PWRSFT-1604 and CA-PWRSFT-2404 have four amplifier gain settings. The gain level is set from the GAIN section of the CONFIG DIP switches. Depending on the capabilities of the headend equipment driving the amplifier, you may choose to modify the amplifier's input sensitivity.

Most contemporary audio systems include a DSP upstream of the amplifier input. The DSP's analog output gain settings are configured to achieve operational levels aligned with amplifier gain to prevent the DSP or amplifier from distorting the signal.

The amplifier should have sufficient Maximum Power per channel to meet or exceed the loudspeaker's power rating.

Using an amplifier that is too underpowered relative to the loudspeaker's power handling capacity may result in a clipped signal. A clipped signal creates harmonics, or DC voltages, that may cause damage to connected loudspeakers or other equipment.

To avoid clipping, set the DSP's Maximum Output Level to a level that is greater than the amplifier's Maximum Input Level. In this case, the amplifier would distort before the DSP's digital-to-analog converter is overdriven.

A good system design requires system components configured for optimum gain when feeding the next component downstream (also known as gain staging). When configured correctly, this ensures that the complete signal path from acoustic input at the microphone-to-loudspeaker output (also known as the system gain structure) is optimized.

To optimize gain staging with the amplifier, the Crestron Avia™ Audio tool includes an Output Gain object with level control that configures the digital level feed to the D/A converter. An analog gain control is provided after the D/A converter for Full Scale (FS) output to drive the amplifier input.

Crestron recommends a gain setting of 26 dB when using Crestron Avia DSPs. Additional amplifier gain settings are shown below for use with other DSPs.

	Gain	INPUT SENSITIVITY @ 8 Ω		
		Vpeak	VRMS	dBu
CA- PWRSFT-1604	26	5.7	4.0	14.2
	29	4.0	2.9	11.2
	32	2.9	2.0	8.2
	35	2.0	1.4	5.2
CA- PWRSFT-2404	26	4.9	3.5	13.0
	29	3.5	2.5	10.0
	32	2.5	1.7	7.0
	35	1.7	1.2	4.0

3-Way System Configuration, Single Amplification

The following example shows a DSP-1280 and CA-PWRSFT-1604 2-channel amplifier driving two 3-way loudspeakers.
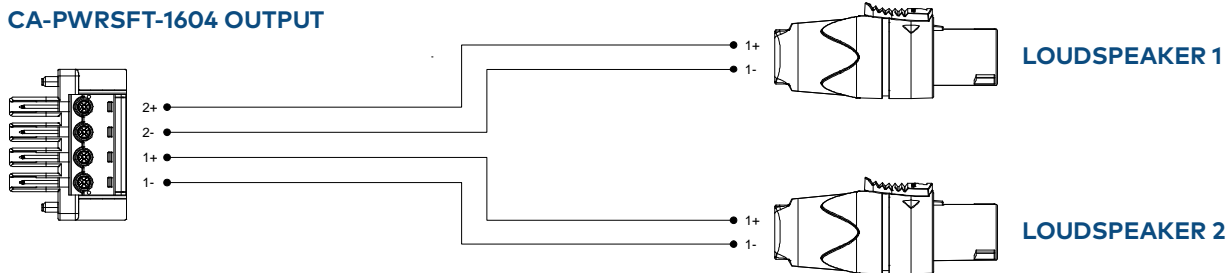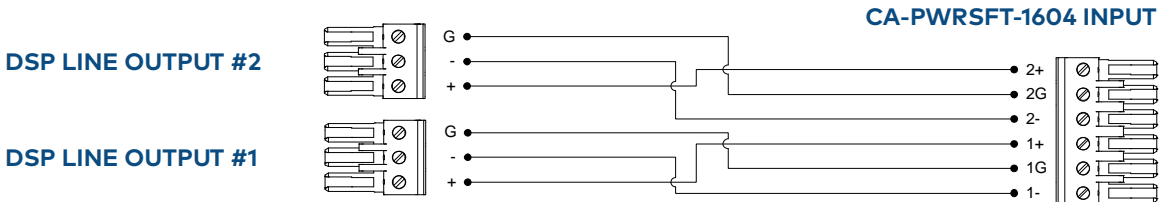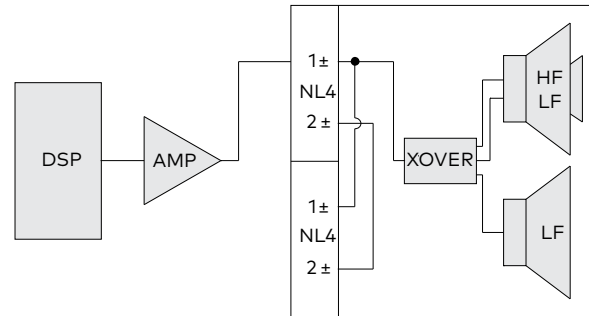
Equipment List:

(1) Crestron Avia DSP-1280 12x8 Digital Signal Processor

(1) CA-PWRSFT-1604 Powersoft Duecanali 1604, 2-Channel Power Amplifier

(2) Vector™ CD896 Performance Loudspeakers, Dual 8″ 2-Way Coaxial + Low Frequency Drivers

(2) Two-conductor speaker wires

(2) Neutrik® NL4 loudspeaker connectors

The two balanced outputs of the DSP-1280 feed the two inputs of the CA-PWRSFT-1604 amplifier. The amplifier's outputs terminate to Neutrik speakON® NL4 connectors at the loudspeakers. The NL4's pair #1 ± terminals deliver power to the loudspeaker. Each loudspeaker features a second NL4 connector (wired in parallel) to provide a signal pass-through to an additional loudspeaker.

Connection Diagram
3-way Loudspeaker Driven by One Amp Channel

3-Way System Configuration, Bi Amplification

The following example shows a DSP-1280 and CA-PWRSFT-2404 4-channel amplifier driving two bi-amplified 3-way loudspeakers.

Equipment List:

(1) Crestron Avia DSP-1280 12x8 Digital Signal Processor

(1) CA-PWRSFT-2404 Powersoft Quatrocanali 2404, 4-Channel Power Amplifier

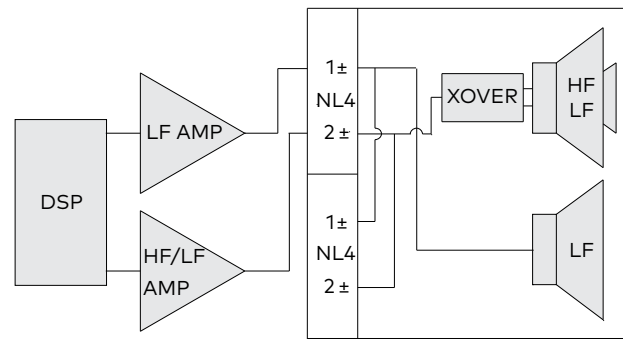(2) Vector™ CD1295 Performance Loudspeakers, Dual 12″ Bi-Amplified 3-Way Coaxial

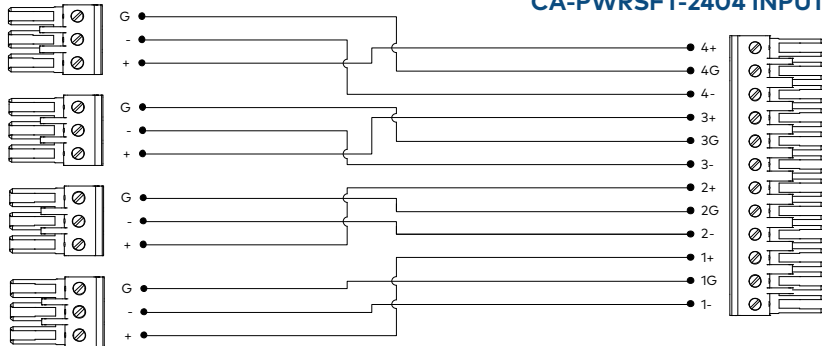(2) Four-conductor speaker wires

(2) Neutrik® NL4 loudspeaker connectors

The four balanced outputs of the DSP-1280 feed the four inputs of the CA-PWRSFT-2404 amplifier. The amplifier's outputs terminate to Neutrik speakON NL4 connectors at the loudspeakers. The NL4's pair #1 ± terminals deliver power to the loudspeaker's low frequency transducer, while the #2 ± terminals deliver power to the loudspeaker's coaxial transducer. Each loudspeaker features a second NL4 connector (wired in parallel) to provide a signal pass-through to an additional loudspeaker.
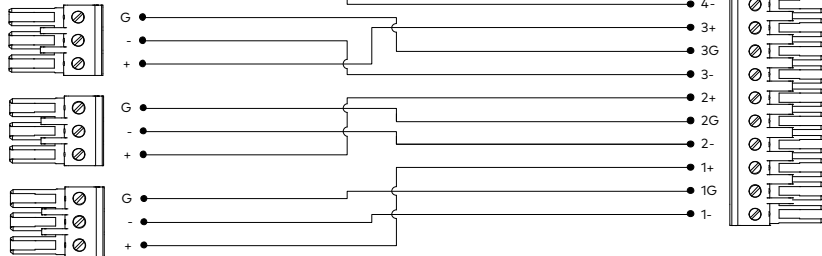
Connection Diagram
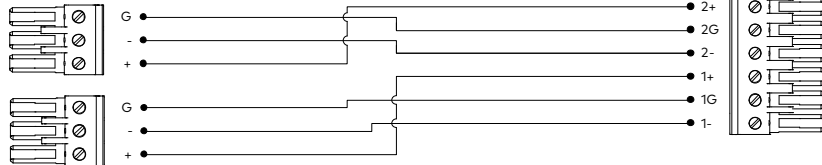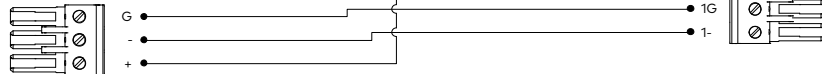3-way Loudspeaker Driven by Two Amp Channels
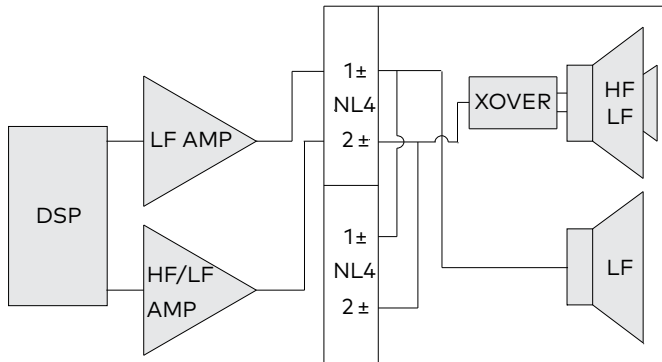
4-Way System Example

The following example shows a DSP-1280 with a CA-PWRSFT-2404 amplifier and a CA-PWRSFT-1604 amplifier driving two bi-amplified 3-way speakers and one subwoofer (respectively).

Equipment List:

(1) Crestron Avia DSP-1280 12x8 Digital Signal Processor

(1) CA-PWRSFT-1604 Powersoft Duecanali 1604, 2-Channel Power Amplifier

(1) CA-PWRSFT-2404 Powersoft Quatrocanali 2404, 4-Channel Power Amplifier

(2) Vector™ CD1295 Performance Loudspeakers, Dual 12" Bi-Amplified 3-Way Coaxial

(1) Vector SUBS15 Performance Subwoofer, 15"

(2) Four-conductor speaker wires

(1) Two-conductor speaker wire

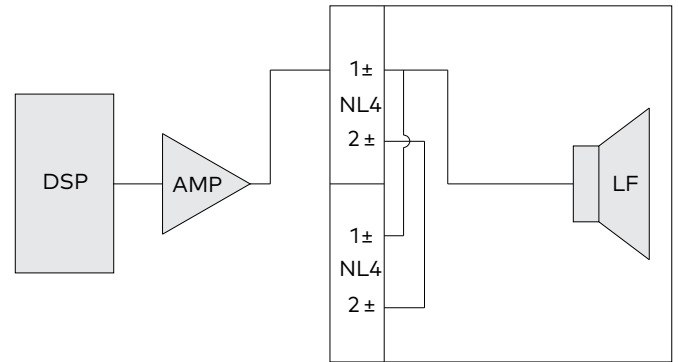(3) Neutrik® NL4 loudspeaker connectors

The balanced outputs of the DSP-1280 feed the inputs of the amplifiers; four outputs to the CA-PWRSFT-2404, and one output to the CA-PWRSFT-1604. The amplifier's outputs terminate to Neutrik speakON NL4 connectors at the loudspeakers.
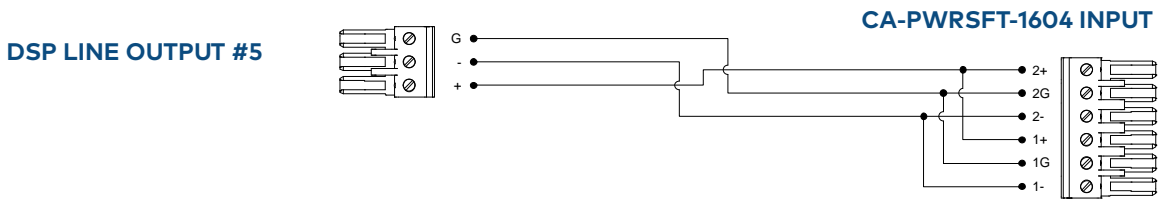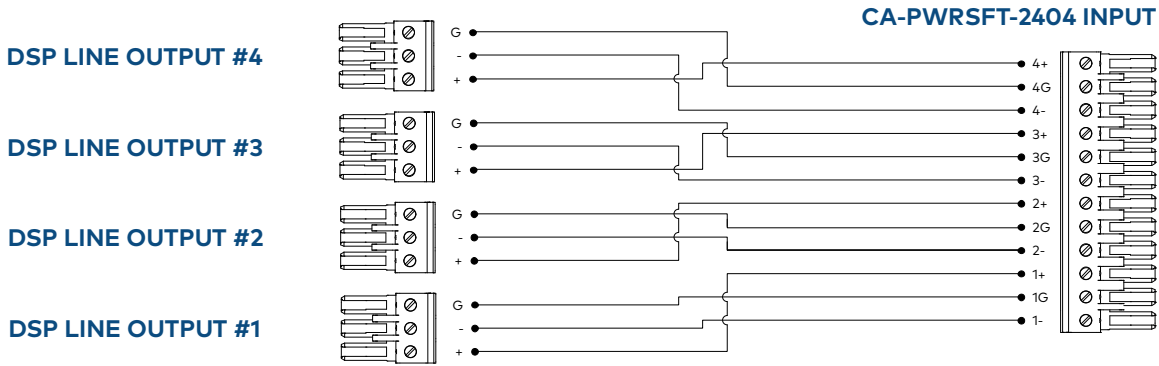
- **CA-PWRSFT-2404 to Vector CD1295:**
  The NL4's pair #1 ± terminals deliver power to the loudspeaker's low frequency transducer, while the #2 ± terminals deliver power to the loudspeaker's coaxial transducer.

- **CA-PWRSFT-1604 to Vector SUBS15 (Bridged):**
  The NL4's pair #1 ± terminals deliver power to the subwoofer.

Each loudspeaker features a second NL4 connector (wired in parallel) to provide a signal pass-through to an additional loudspeaker.
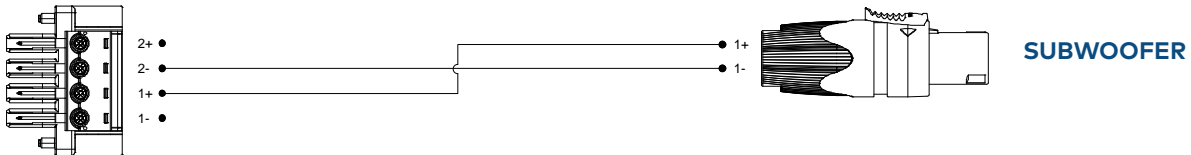
Connection Diagram
3-way Loudspeaker Driven by Two Amp Channels

Connection Diagram
1-way Loudspeaker Driven by One Amp Channel

DSP LINE OUTPUT #4

DSP LINE OUTPUT #3

DSP LINE OUTPUT #2

DSP LINE OUTPUT #1

CA-PWRSFT-2404 INPUT

DSP LINE OUTPUT #5

CA-PWRSFT-1604 INPUT

CA-PWRSFT-1604 BRIDGED OUTPUT

SUBWOOFER

CA-PWRSFT-2404 OUTPUT

LOUDSPEAKER 1
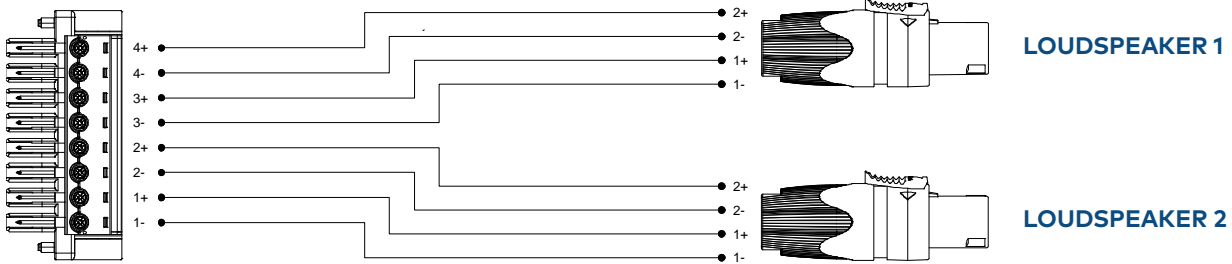
LOUDSPEAKER 2

Powering Vector Performance Loudspeakers

There are many systems configurations available using the Crestron Avia Audio tool, Powersoft amplifiers and Vector Loudspeakers. Depending on requirements for channel assignments and amplifier loading, more complex systems are possible. As a general starting point in determining amplifier sizing and quantity for use with Vector loudspeakers, refer to the chart below with the loudspeaker use per amplifier.

All subwoofer references require the amp to operate with a bridged output; all other loudspeakers operate in a non-bridged configuration.

| Vector Model	2 x 800 WPC	4 x 600 WPC
	CA-PWRSFT-1604 Vector Loudspeakers Per AMP	CA-PWRSFT-2404 Vector Loudspeakers Per AMP
CS699	4	8
CS1295	2	4
CS1265	2	4
CS1595	2	4
CS1565	2	4
CD896	2	4
CD1295	1	2
CD1265	1	2
CD1595	1	2
CD1565	1	2
SUBS15	1 Bridged	2 Bridged
SUBS18	1 Bridged	2 Bridged
SUBD18	1/2 Bridged	1 Bridged

Crestron Avia Channel Strips

Vector loudspeaker channel strips for all models are posted on the Crestron website. These strips are intended for use with the Crestron Avia Audio tool and take advantage of the processing power in the Crestron Avia DSP to provide an optimized system response.

Download channel strips from https://www.crestron.com/en-US/Software-Firmware/Software/Crestron-Toolbox/Vector_Output_Strips_Avia_DSP/1.

Shown below is a library of Vector channel strips to choose from for application to the DSP's analog outputs.
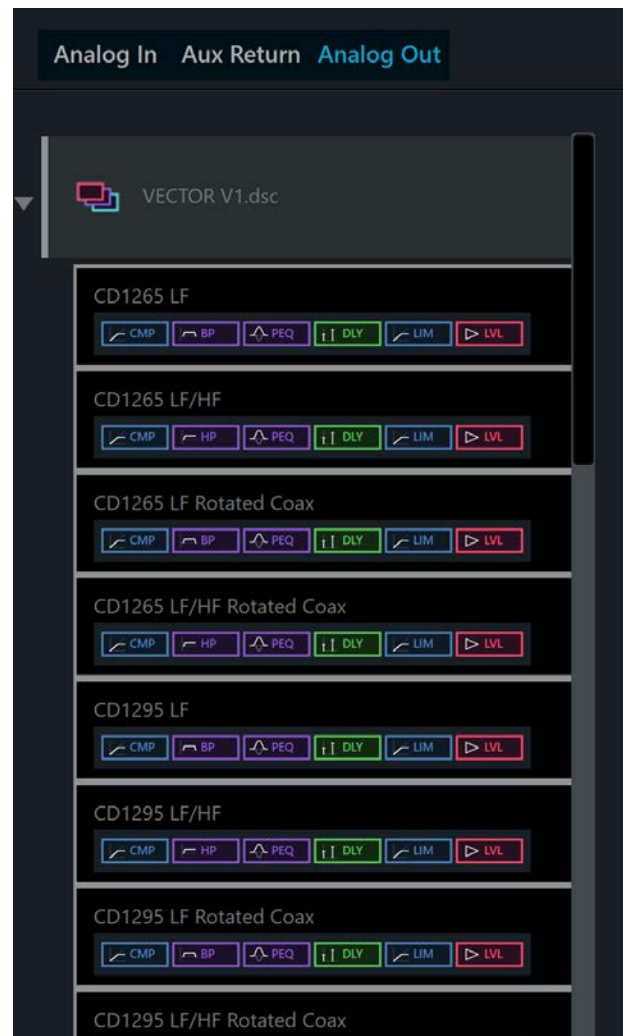
Shown below is the Parametric Equalizer in the Analog Output Strip for the Vector CD896. The application of channel strips to the target DSP output is a simple drag-and-drop operation.
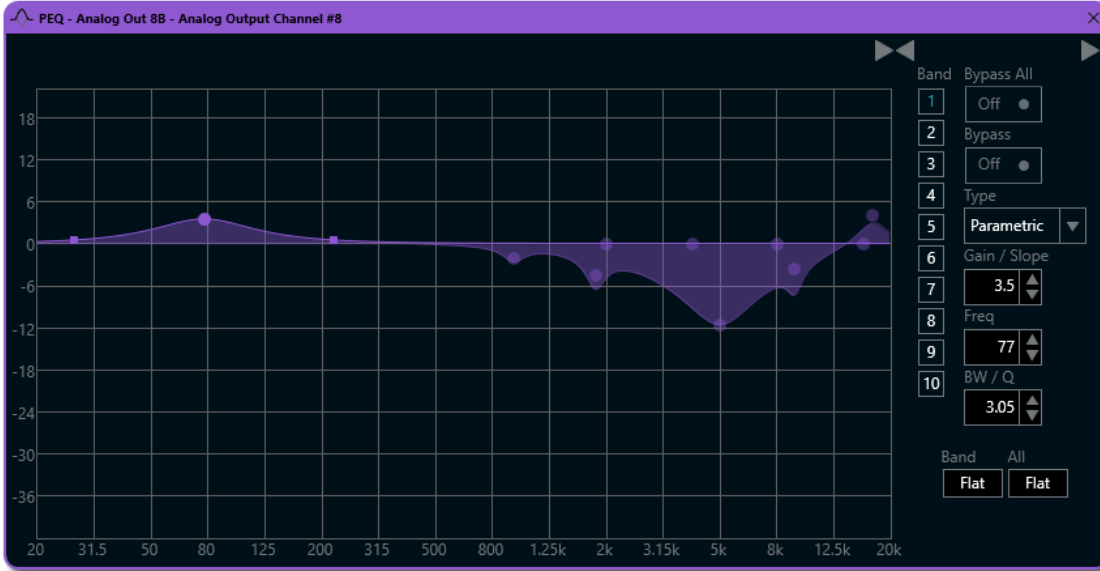
Refer to the Crestron Avia Audio tool help file for details on creating new channel strips or applying strips from the library.

Crestron Database

Modules for the Duecanali 1604 and Quattrocanani 2404 amplifiers are available from the Crestron Application Market at http://applicationmarket.crestron.com/powersoft-ca-1604-2404/

They can also be found in the Crestron database.

CA-PWRSFT-1604 v1.0 (cm)
CA-PWRSFT-2404 v1.0 (cm)