Crestron **ST-VC**
Volume Control Module
Operations Guide

CRESTRON

This document was prepared and written by the Technical Documentation department at:

# Contents

Volume Control Module: ST-VC

Description

Functional Description

The Volume Control Module is a digitally controlled 3-channel audio attenuator. Each channel has independent settings for volume, treble, bass, and mute. Transitions between any attenuation settings are "pop" free. The module is ideally suited to provide full audio control for systems without an IR-controlled integrated receiver. Choose a mixer, preamp, and amplifier. Then add a Volume Control Module to complete the system. In some applications the module's separate control of treble and bass may even eliminate the need for a graphic equalizer.

Volume, bass, and treble ramp times, scaling, preset levels, and volume muting may be specified on a per-channel basis (within the specified hardware range). Volume, bass, and treble are fully independent of each other on each channel. All of these various aspects are specified in software. Volume, bass, and treble control may be sent to more than one channel via software so as to support stereo applications.

Input impedance and balance are determined by external connections. Refer to the diagram below. Input and output are completely independent of each other. Therefore, it is possible to have a balanced input paired with an unbalanced output and vice-versa.

Examples of Balanced and Unbalanced External Connections

BALANCED INPUT
BALANCED OUTPUT EXAMPLE

UNBALANCED 10K INPUT
UNBALANCED OUTPUT EXAMPLE
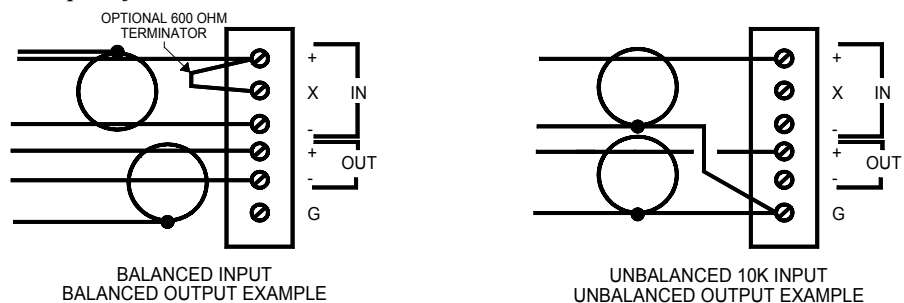
The treble and bass controls are independent from volume and are individually controlled for each channel. Each channel includes a muting relay with 104 dB attenuation. When the signal driving MUTEA goes high, the muting circuit is activated providing 104 dB drop from any preset volume level. Likewise channels

"B" and "C" are driving MUTEB and MUTEC, respectively. When the muting signal goes low, the muting circuit is deactivated and the volume and tone returns to its original preset level.

NOTE: MUTEALL is an override. All channels are muted when this signal is high. When it is low, the channels follow the state of MUTEA, MUTEB, and MUTEC.

Each channel is equipped with protective relays that turn ON only after safe conditions are sustained by the electronic circuitry. This feature protects the output from "pops" caused by accidental power-down/power-up conditions to the ST-VC.

If the ST-VC is under program control and the power is cycled to the ST-VC, it renews the volume, bass, and treble levels to the current program settings. The mute status (per channel and the mute-all) are also restored.

Models

There are two Crestron Volume Control Module configurations available: ST-VC and STI-VC. Configuration is based on the type of power availability. Use the ST-VC with a 120V power supply and the STI-VC with a 220V power supply. For purposes of this Operations Guide, the term ST-VC is used for either configuration.

Physical Description

The ST-VC, shown below, is housed in a black enclosure with silk-screened labels on the front and rear panels. On the front of the unit there are eight LEDs for indicating the unit's current status. All connections are made on the back of the unit. There are four rubber feet on the base of the unit for stability and to prevent slippage.
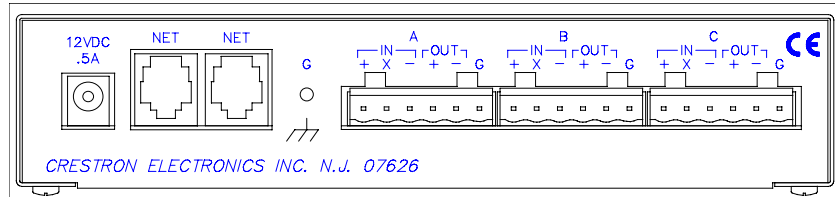
ST-VC Physical Views
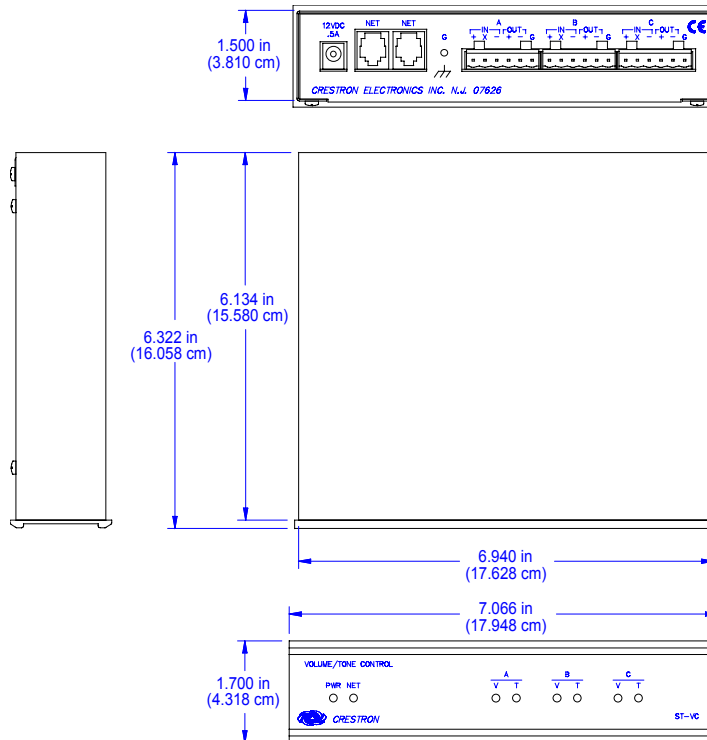
ST-VC Ports

A number of ports are provided on the back of the ST-VC. Each has a silk-screened label. Refer to illustration and descriptions below.

ST-VC Ports

12 VDC .5 A

NOTE: An external power pack is not supplied with the ST-VC. When the ST-VC is used as part of the Cresnet system, there is no need for a power pack. The unit gets its power from the network connection. A power pack is only necessary if the ST-VC is used with the STS system or as a stand-alone device. If either of these two STS system applications apply, the optional power pack can be purchased separately.

This direct current (DC) power socket connector is used to supply power via the external power pack. Crestron recommends specific power packs for its devices. The designated power pack for the ST-VC is Crestron part number **PW-1205** (**PWI-1210** for international use). If a power pack other than this Crestron model is obtained, verify that it meets the required specification and polarity as shown after this paragraph.

Power Pack Specification

CRESTRON POWER PACK	INPUT SPECS	OUTPUT SPECS
PW-1205	120VAC~60 hertz (Hz)	12VDC 0.5A
PWI-1210	230VAC~50Hz	12VDC 1.0A

Power Pack Output Connector Polarity

NET

These two 6-pin, 6-position RJ11 modular jacks are used to connect the ST-VC module to either the SmarTouch STS or Cresnet remote control system. When the module is part of the Cresnet system, power is provided via the NET connection; the power pack need not be attached. Two NET ports are available so that network units can be daisy-chained together.

NOTE: When making network connections, refer to the latest revision of the Network Modular Cable Requirements (Doc. 5682). The documentation can be obtained from the Downloads section of the Crestron website (www.crestron.com). Search for the MODULAR.PDF file.

NOTE: Most 4-connector phone cables are wired in a crisscross fashion and are not compatible with Crestron equipment.

If power pack is attached when module is part of the Cresnet system, power is drawn from the power pack. The module does not load the network power, but the network power remains chained.

G (Chassis Ground)

Use this chassis GND screw to ground the unit to the amplifier and audio source common GND.

Channels A - C

Connect these balance/unbalanced input (IN) ports to the AUDIO OUTPUT of any A/V equipment that needs volume, treble, and bass control. Connect the balance/unbalanced output (OUT) ports to an amplifier. The output stage is disconnected by each relay and connects the + and - lines to the signal ground when muted.

ST-VC Indicators

There are eight LED indicators located on the front panel of the ST-VC. Refer to illustration and descriptions below.

ST-VC Indicators
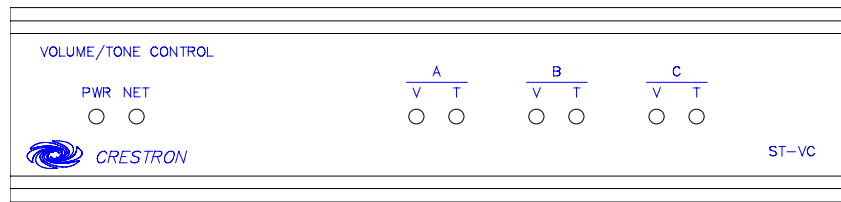
PWR (Power)

This green LED illuminates when power is supplied to the ST-VC.

NET

This yellow LED illuminates when communication between either the SmarTouch STS or Cresnet system and the ST-VC is established. Illumination indicates that the SIMPL program currently loaded has a network device defined at the same ID as the ST-VC.

V & T (Volume & Tone)

These red LEDs (one pair per channel) illuminate when there is volume (V) or tone (T, i.e., treble and bass) activity on any of the three channels. Activity includes increase, decrease, or mute.

Leading Specifications

The three tables after this paragrpah provide a summary of leading specifications for the ST-VC module and volume and tone particulars.

Leading Specifications of the ST-VC

SPECIFICATION	DETAILS
Power Requirements	12VDC external power pack or 24VDC, 0.25A, 6W - network
Default NET ID	10
Crestron Application Builder™	Version 1.0.9 or later[1 & 2]
Crestron Application Builder™ Templates	Version 1.4 or later[2]
SIMPL™ Windows®	Version 1.40.07 or later[2]
Crestron Database	Version 12.1.4 or later for SmarTouch Wizard support or 12.1.3 for regular support[2]
2-Series Control System Update[3]	Version C2-1008 or later[4]
CNMSX-AV/PRO Upgrade File	Version 5.10.11x or later[5]
CNRACKX/-DP Upgrade File	Version 5.10.11w or later[5]
CEN/CN-TVAV Update File	Version 5.12.05v or later[5]
ST-CP Update File	Version 4.01.00s or later[5]
Dimensions & Weight	Height: 1.70 in (4.31 cm) Width: 7.07 in (17.95 cm) Depth: 6.32 in (16.06 cm) Weight: 2.20 lb (1.00 kg)

1   This product is supported in the Crestron Application Builder Software, both in the Residential and Commercial versions. Contact Crestron Customer Service for licensing details.

2   The latest software versions can be obtained from the Downloads section of the Crestron website (www.crestron.com). New users are required to register in order to obtain access to the FTP site.

3   Crestron 2-Series control systems include the AV2, AV2 with Card Cage, CP2, CP2E, PAC2, PRO2, and RACK2.

4   Filenames for 2-Series control system update files have a CUZ extension and can be obtained from the Downloads section of the Crestron website.

5   CNX upgrade files are required for either CNMSX-AV/Pro or CNRACKX/-DP. Filenames for CNX upgrade files have a UPZ extension and ST-CP files are in one EXE or zipped UPZ file. All can be obtained from the Downloads section of the Crestron website. Update files are specifically designed for certain control systems. If an update file is loaded into a control system other than the device for which it was intended, it may lockup the control system, which would then have to be returned to Crestron. Update files with an "**S**" designator are for the ST-CP, "**V**" designator for CEN/CN-TVAV, "**W**" for CNRACKX-DP, and "**X**" for CNMSX-AV/Pro control systems. Control systems are able to recognize and reject incorrect update files. However, when updating control systems, do not ignore Crestron Viewport warning prompts or messages.

Volume Specifications of the ST-VC (Per Channel)

SPECIFICATION	DETAILS
Input Impedance	10K or 600 Ohms
Output Impedance	10 Ohms
Input	Balanced or Unbalanced
Output	Balanced or Unbalanced
Total Harmonic Distortion (THD)	-85 dB
Hum and Noise (ref. 0 Dbv)	-85 dB
Maximum Input Level (Flat Mode)	4V rms
Channel Separation	-90 dB
Attenuation Range (Excluding Mute)	0 to -76 dB (maximum)
Mute	-104 dB
Frequency Response	8 Hz to 60 KHz (-3 dB minimum)

NOTE: A chassis GND screw is provided in the back of the unit to ground the ST-VC to the amplifier and audio source common ground.

Tone Specifications of the ST-VC (Per Channel)

SPECIFICATION	DETAILS
Flatness (8 to 60 KHz flat mode)	+/- 0.2 dB
Bass Gain Range (100 Hz)	+/- 12 dB
Bass Step Size (100 Hz)	2 dB
Treble Gain Range (10 KHz)	+/- 12 dB
Treble Step Size (10 KHz)	2 dB

As of the date of manufacture, the Volume Control Module has been tested and found to comply with specifications for CE marking and Australian Compliance Mark.

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

Setup

Preparation for Use

Refer to the two hookup diagrams that follow this paragraph. The first diagram illustrates the connections to SmarTouch STS. The second diagram showns connections to the Cresnet system. Complete the connections in any order, regardless of whether the ST-VC is part of SmarTouch STS or the Cresnet system.

SmarTouch STS Hookup Connections for ST-VC
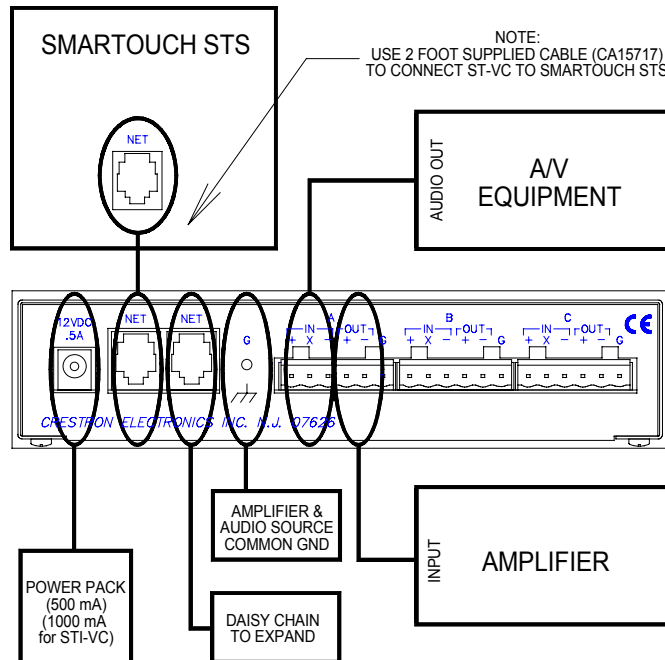
Cresnet System Hookup Connections for ST-VC
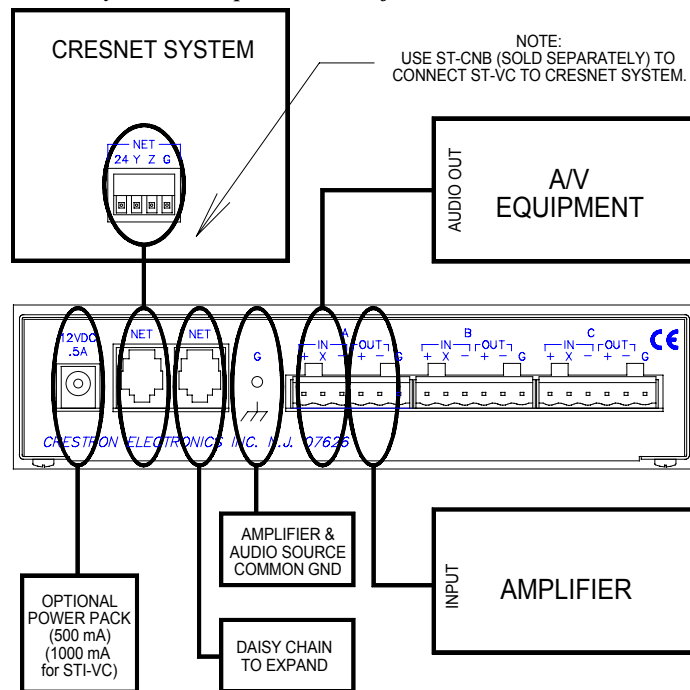
Identity Code

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. The NET ID of each ST-VC has been factory set to **10**. The NET IDs of multiple ST-VCs in the same system must be unique and changed from a PC via Viewport, which is available from SIMPL Windows or VisionTools™ Pro-e (VT Pro-e).

NOTE: VT Pro-e is a Windows compatible software package for creating Crestron touchpanel screen designs.

The method for changing the unit's NET ID is identical regardless of the software chosen. Complete the following steps to change the NET ID.

1. Attach one of the ST-VCs to the control system (verify that the software is running).

2. From the SIMPL Windows or VT Pro-e menu, select **Tools | Viewport** to open the Crestron Viewport.

3. From the Viewport menu, select **Functions | Set Network ID**. The software checks the baud rate and then opens the "Set Network ID" window.

4. In the "Set Network ID" window, select the ST-VC from the *Current Network Devices* text window.

5. From the *Choose the new network ID for the selected device (Hex):* text box, select the new NET ID for the ST-VC.

6. Click **Set ID** to initiate the change. This will display the "ID command has been sent" window.

7. In the "Command Complete" window, click **OK**.

8. In the *Current Network Devices* text window, verify the new NET ID code.

9. In the "Set Network ID" window, click **Close**.

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 ST-VC to be added to the network.

Programming

The ST-VC can be programmed using various Crestron tools. Crestron AppBuilder and SIMPL Windows define and set up the functions and actions appointed by the control system. The control system interprets the button presses on the touchpanel, carries out the command, and provides feedback to the touchpanel. The AppBuilder and SIMPL Windows are intended for users with different levels of programming knowledge. The flexibility of each tool is proportional to the degree of programming expertise (i.e., the more flexible, the more a programmer needs to know and account for). Of course, one can initiate programming using the easiest method (Crestron AppBuilder) and use advance techniques that are available from SIMPL Windows to customize the job.

Programming with the Crestron AppBuilder

Easiest method of programming that by itself does not offer the greatest amount of flexibility.

The Crestron AppBuilder offers automatic programming for such residential and commercial applications as audio distribution, home theater, video conferencing, and lighting. The interface of this tool guides you through a few basic steps for designating rooms and specifying the control system, touchpanels, devices, and functionality. The Crestron AppBuilder then programs the system, including all touchpanel projects and control system logic.

The Crestron AppBuilder is fully integrated with Crestron's suite of software development tools, including SIMPL Windows, VT Pro-e, Crestron Database, User IR Database, and User Modules Directory. The Crestron AppBuilder accesses these tools behind the scenes, enabling you to easily create robust systems.

Programming with SIMPL Windows

SIMPL (Symbol Intensive Master Programming Language) is an easy-to-use programing 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.

The next three sections describe a ST-VC within SIMPL Windows. The first section provides initial configuration information, the second section identifies the ST-VC

symbol and defines its inputs, and the final section provides the location of example program.

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

Configure ST-VC Program

To create a program with a ST-VC, refer to the table below for initial configuration information.
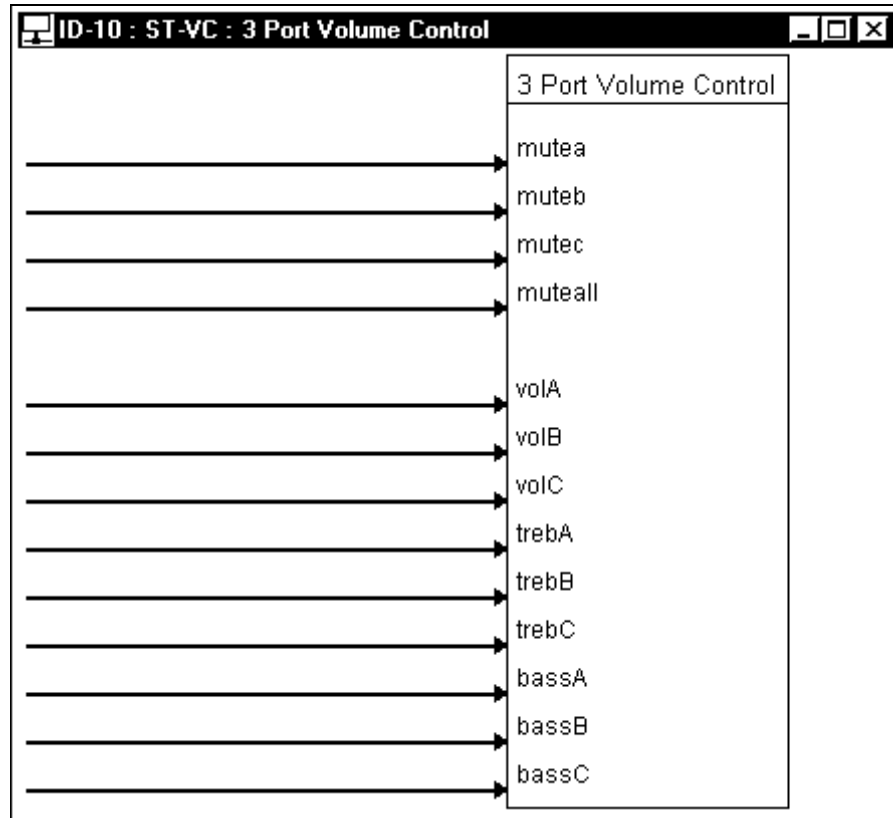
Configure ST-VC Program

SYMBOL FOLDER	SYMBOL REQUIRED	DROP WHERE	ADDITIONAL SETUP
Device Library, **Control Systems**	Desired control system	System Views	Refer to the documentation supplied with the specific control system for additional setup information.
Device Library, **Network Control Modules**	ST-VC	System Views, Cresnet Units	CHANGE NET ID (OPTIONAL) - Double-click on ST-VC (or single-click then right mouse-click) on ST-VC. Select Configure. Select NET ID then select desired hexadecimal ID.

SIMPL is Crestron's object-oriented programming language designated for easy implementation of the control system requirements. The objects that are used in SIMPL are called symbols.

ST-VC Symbol

The diagram after this paragraph shows the ST-VC symbol in SIMPL Windows. The table following the diagram lists the inputs and their functional descriptions.

Detail View of the ST-VC Symbol in SIMPL Windows' Programming Manager

ST-VC Symbol Input Descriptions

INPUT(S)	FUNCTION(S)
mutea, muteb, mutec	Each channel (A through C) has a corresponding muting relay with 104 dB attenuation. When any of these digital inputs goes high, the muting circuit provides a 104 dB drop from the current volume level. When the signal goes low, the volume setting returns to its previous level.
muteall	As long as this digital signal remains high, all channels are muted. When this input drops low, all channels return to their previous volume setting.
volA, volB, volC	Each of these analog inputs are independent of one another. The analog value of each signal determines the volume setting of the given channel. Each channel (A through C) can have discrete ramp times, scaling factors, preset levels, and so forth. Alternatively, multiple channels can have the same settings to support stereo applications.
trebA, trebB, trebC	Each of these analog inputs are independent of one another. The analog value of each signal determines the treble setting of the given channel. Each channel (A through C) can have discrete ramp times, scaling factors, preset levels, and so forth. Alternatively, multiple channels can have the same settings to support stereo applications.
bassA, bassB, bassC	Each of these analog inputs are independent of one another. The analog value of each signal determines the bass setting of the given channel. Each channel (A through C) can have discrete ramp times, scaling factors, preset levels, and so forth. Alternatively, multiple channels can have the same settings to support stereo applications.

Example Program

An example program can be obtained from the Downloads section of the Crestron website (www.crestron.com). Search for ST-VC.SMW. New users are required to register in order to obtain access to the FTP site.

This example program illustrates control over a ST-VC network device in a CNMSX-PRO system. In the example, channels A and B are tied together to provide control over a stereo source that has a left and right channel. Channel C is for mono source that only has one channel, such as a microphone. The system also has a FLAT input which will take the bass and treble levels for channels A, B, and C to 50%.

There is a MUTE ALL that simply toggles the MUTE ALL line on the ST-VC. When MUTE ALL is engaged, the mute states for A, B, and C are disregarded and all channels are muted. When MUTE ALL is released, channels A, B, and C will revert to their previous states.

Problem Solving

Troubleshooting

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

ST-VC Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Green PWR LED does not illuminate.	ST-VC is not receiving power.	Confirm that power pack securely plugged into outlet and that the connector is properly attached to the ST-VC.
		Verify that cables plugged into NET ports are secure (for Cresnet system only).
Yellow NET LED does not illuminate.	Improper NET ID.	Verify that ST-VC NET ID matches NET ID software program. Refer to "Identity Code" in this Operations Guide.
	Loose network connection.	Verify that cables plugged into NET ports are secure.
Channel (A, B, or C) red V/T LEDs do not illuminate.	Improper programming.	Confirm signal names and programming logic so that LEDs respond when functions are activated. Refer to "Programming with SIMPL Windows" in this Operations Guide for an example.
Hum on audio.	Grounding problem.	Either connect or remove chassis ground wire.

Further Inquiries

If after reviewing this Operations Guide for the Volume Control Module, you can not 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] or 1-201-767-3400.

- 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, call Crestron Pacific at +613-9480-2999.

For local support from exclusive Crestron factory-trained personnel in New Zealand, call Amber Technologies at +649-410-8382.

Future Updates

As Crestron improves functions, adds new features, and extends the capabilities of the ST-VC, additional information and programming examples 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.

The Downloads page of the Crestron website (www.crestron.com) directs the reader to the location and description of each update. Check the site periodically for update availability and its subjective value.

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

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

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 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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