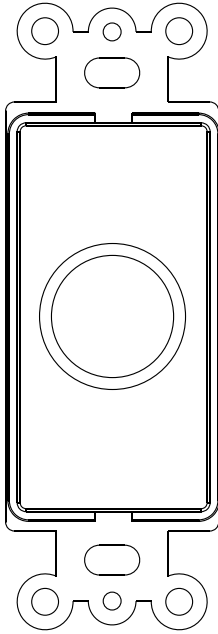# INSTRUCTIONS
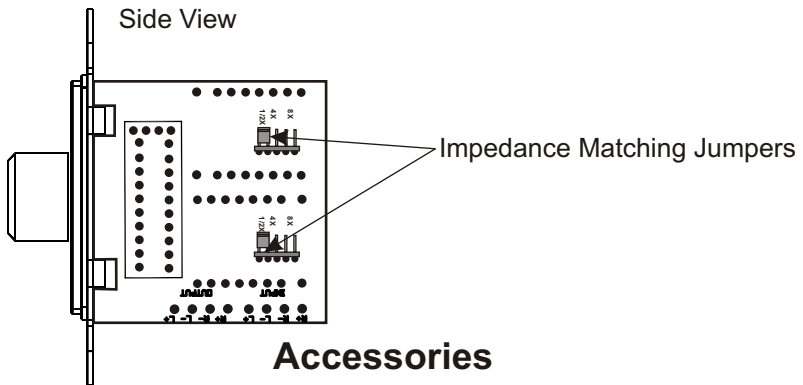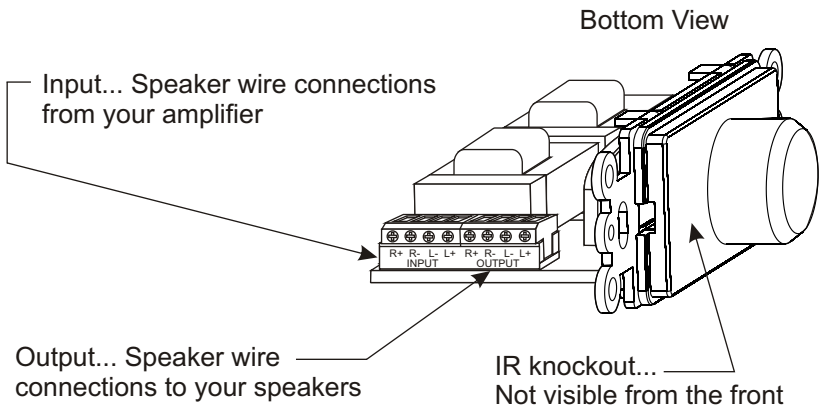
VC-302
Impedance Matching Volume Control

CHANNEL VISION™

2006 CHANNEL VISION TECHNOLOGY

The **VC-302** is an impedance matching volume control with an IR receiver knockout. The knockout allows Channel Vision's IR-2400 to be integrated with the volume control for applications that require IR repeating. The VC-302 comes with white, ivory, and almond knobs and face plates to easily match other wall plates in the room.
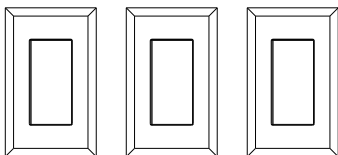
Features:
- Protects your amplifier against low impedance loads
- Knockout for mounting Channel Vision's IR-2400
- Supports up to 8 pairs of speakers
- Fits in a single-gang low-voltage ring or open-back j-box
- Supports 14 - 20 AWG speaker wire

Bottom View

Input... Speaker wire connections from your amplifier

R+ R- L- L+ R+ R- L- L+
INPUT   OUTPUT

Output... Speaker wire connections to your speakers

IR knockout...
Not visible from the front

Side View

Impedance Matching Jumpers

Accessories

Trim Plates

Face Plates

Knobs

Ivory

Almond
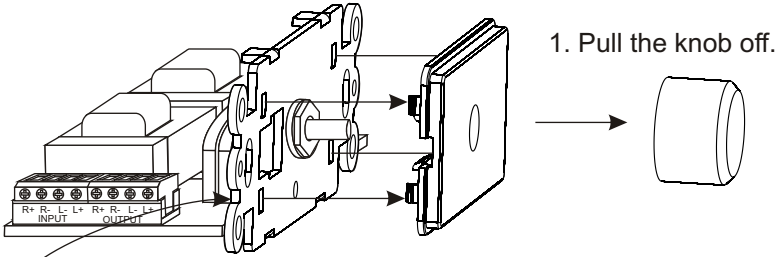
White

Ivory

Almond

Ivory

Almond
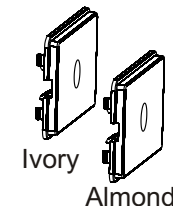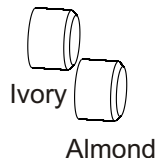
Changing the Knob & Face Plate Color

Remove the existing knob and face plate.

1. Pull the knob off.

Gently press tabs from back side using a flat blade screwdriver.

2. Remove the face plate by pressing on the 4 tabs that protrude through the metal plate.

To install the new knob and face plate, simply reverse the process shown above.

How Impedance Matching Works

Amplifiers have minimum impedance specifications for the speakers that will be connected to them. This is usually 8 or 4 ohms. Most speakers are either 8 or 4 ohms. Thus, most amplifiers are designed to drive one pair of speakers. When additional speakers are connected in parallel (wired to the same amplifier terminals) the resulting impedance is reduced. This is why impedance matching volume controls are used.

The VC-302 provides three impedance magnifier settings: 1/2x, 4x, and 8x. These settings are used to magnify or compensate for low impedance loads that result from wiring multiple speakers in parallel. Although the calculations needed to determine the correct magnifier setting are simple, you can use the chart below as guide to quickly find the correct setting for your application. (Note: when no impedance matching is required, use the 1/2x setting).
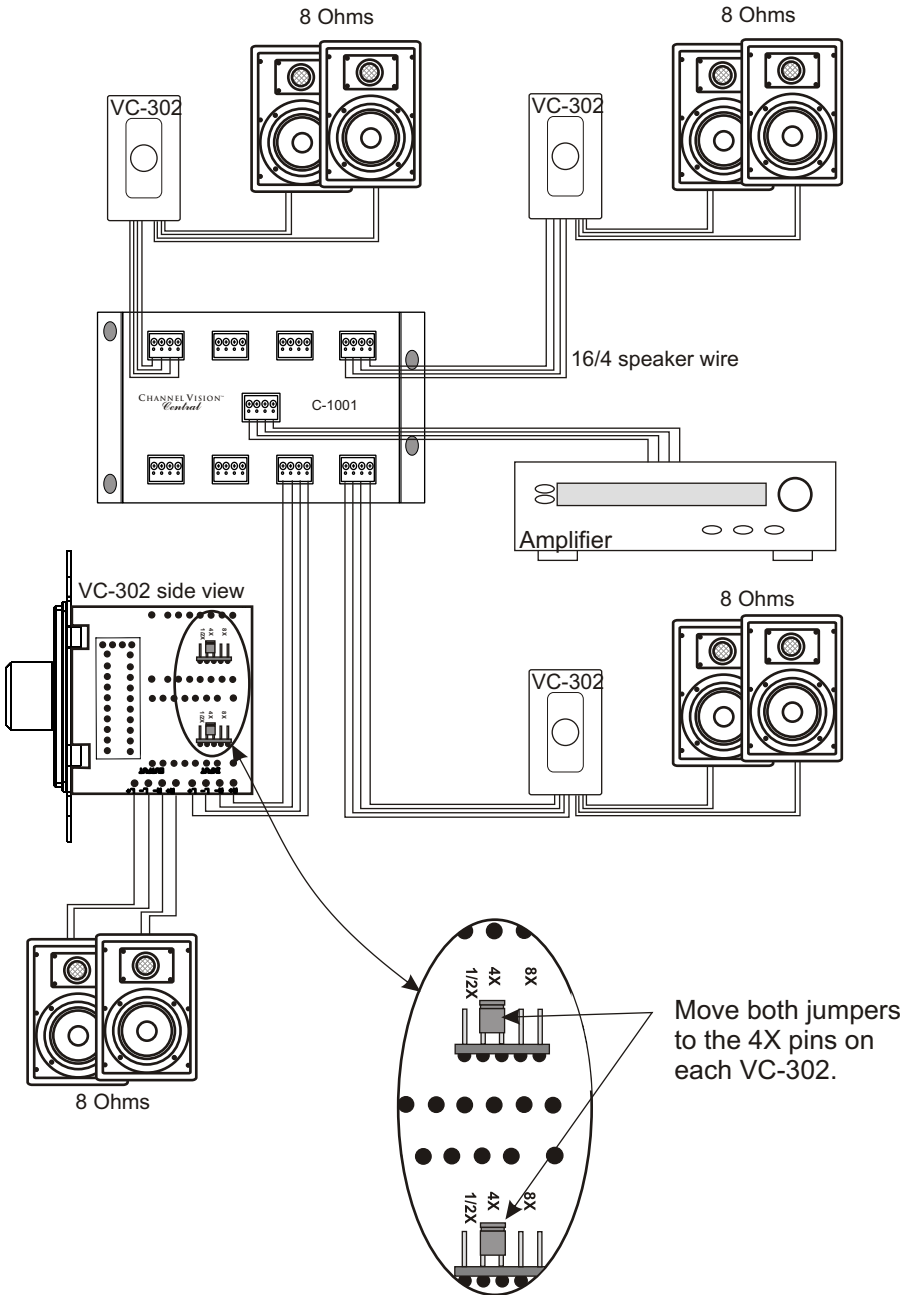
See chart for more information.

With no impedance matching		With impedance matching volume control VC-302	
Number of 8 Ohm speakers in parallel	Impedance (Ohms)	Magnifier Setting	Resulting Impedance (Ohms)
2	4	1/2X	8
3	2.66	4X	10.64
4	2	4X	8
5	1.6	8X	12.8
6	1.33	8X	10.64
7	1.14	8X	9.12
8	1	8X	8

Example:
If you have 4 pairs of 8-ohm speakers connected in parallel, then move the jumpers to the 4X position as on the following page.

3

Typical Installation Diagram

8 Ohms

8 Ohms

VC-302

VC-302

CHANNEL VISION™
Central

C-1001

16/4 speaker wire

Amplifier

VC-302 side view

8X
4X
1/2X

8X
4X
1/2X

8 Ohms

VC-302

8 Ohms

8X
4X
1/2X

Move both jumpers
to the 4X pins on
each VC-302.

8X
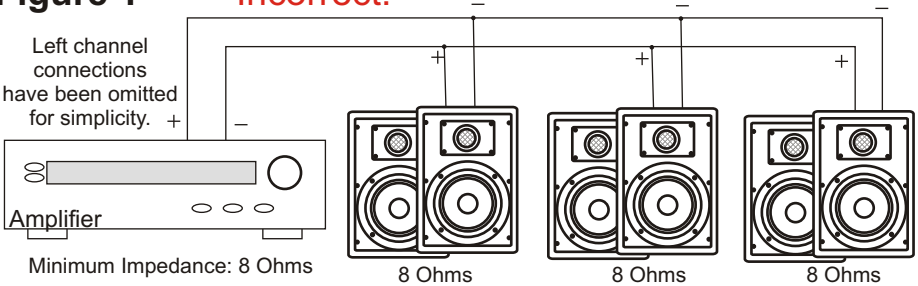4X
1/2X

Understanding Impedance Calculations

Let's examine a hypothetical system:
Joe Blow has one amplifier and he decides to hook 3 pairs of 8-ohm speakers in **parallel** to it. (see Figure 1)
The amplifier is rated for a minimum load of 8 ohms.
Result: Joe Blow, blows up his amplifier (or at least puts it into thermal overload).

Figure 1   Incorrect!

Left channel connections have been omitted for simplicity.

Amplifier

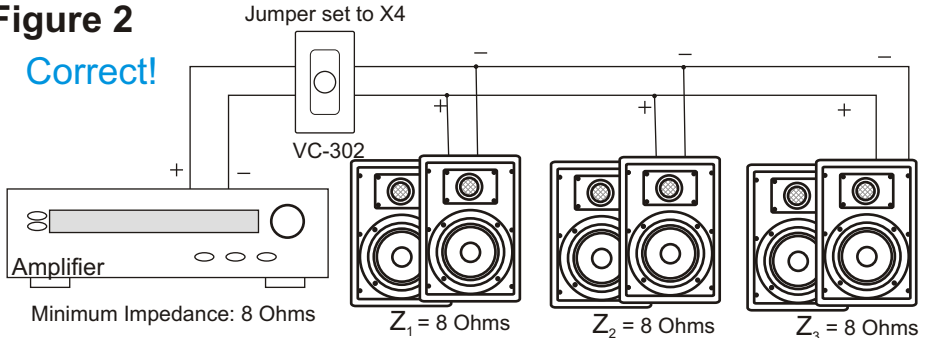Minimum Impedance: 8 Ohms

8 Ohms   8 Ohms   8 Ohms

There are two approaches that Joe could have taken:
1. Buy one impedance matching volume control and hook 3 speakers up to it. (see Figure 2)
2. Buy 3 impedance matching volume controls and connect one in line before each pair of speakers. (see Figure 3)

Suppose Joe Blow chooses option one and buys one VC-302 volume control and connects it in line between his amp and 3 pairs of 8-ohm speakers.

Figure 2
Jumper set to X4

Correct!

VC-302

Amplifier

Minimum Impedance: 8 Ohms

Z_1 = 8 Ohms Z_2 = 8 Ohms Z_3 = 8 Ohms

Joe needs to do the math: He remembers that he can calculate the total parallel impedance (Z_{Total}) by finding the reciprocal of the sum of reciprocals.

Thus: $Z_{Total} = \dfrac{1}{\left(\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3}\right)} = \dfrac{1}{\left(\frac{1}{8} + \frac{1}{8} + \frac{1}{8}\right)} = \dfrac{1}{\frac{3}{8}} = \dfrac{1}{0.375} = 2.66$ Ohms
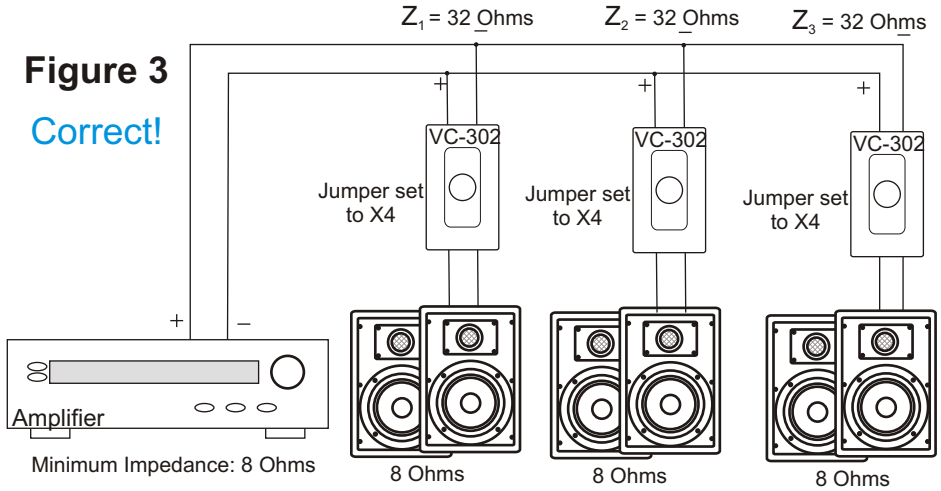
2.66 Ohms is much lower than the 8-Ohm minimum that he was supposed to connect to his amp Joe sets the jumpers on his VC-302 to the X4 position. This magnifies the impedance times 4.
Thus: 2.66 ohms x 4 = 10.64 ohms. This is more than the 8-ohm minimum so the amplifier should operate safely.

Suppose Joe Blow buys three VC-302 volume controls and connects each one in line before each pair of speakers. In this case the impedance of each pair of speakers is magnified so the impedance presented to the amplifier is more than the speaker's nominal value. Suppose that Joe sets the jumper to the X4 position. This will magnify the 8 ohm speakers to look like a 32 ohm load for the amplifier.

$$\text{Thus: } Z_{\text{Total}} = \frac{1}{\left(\frac{1}{Z_1} + \frac{1}{Z_2} + \frac{1}{Z_3}\right)} = \frac{1}{\left(\frac{1}{32} + \frac{1}{32} + \frac{1}{32}\right)} = \frac{1}{\frac{3}{32}} = \frac{1}{0.9375} = 10.66 \text{ Ohms}$$

10.66 Ohms is more than the 8-ohm minimum so the amplifier should operate safely.

Figure 3

Correct!

Z_1 = 32 Ohms Z_2 = 32 Ohms Z_3 = 32 Ohms

VC-302   VC-302   VC-302

Jumper set to X4   Jumper set to X4   Jumper set to X4

Amplifier

Minimum Impedance: 8 Ohms   8 Ohms   8 Ohms   8 Ohms

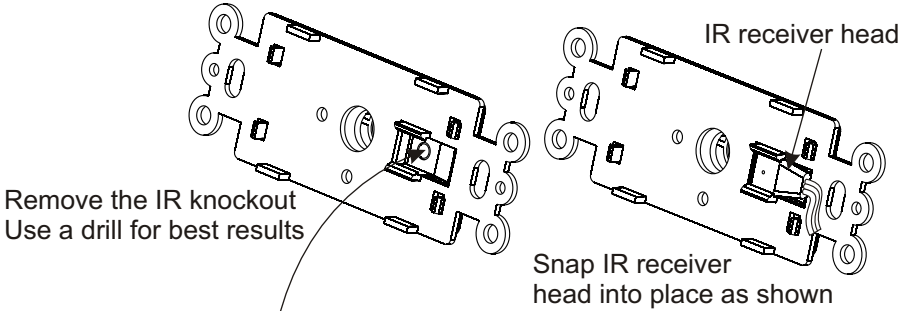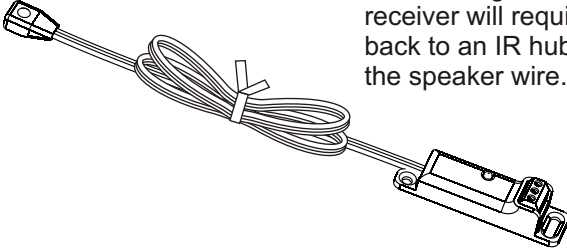## What if you don't like Math?

If you don't want to be a mathematician, then you can always set the magnifier to the X8 setting, but the speakers won't be as loud.

To avoid doing the math shown on the previous pages, simply follow the chart on page 3.
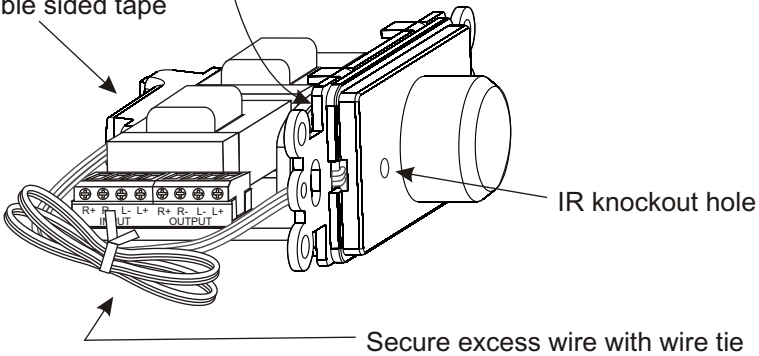
Integrating an IR Receiver

IR-2400 IR receiver

The IR-2400 can be easily mounted inside the VC-302 to provide inconspicuous IR repeating. When using this option remember that the IR receiver will require its own wiring to connect back to an IR hub. IR signals will NOT run on the speaker wire.

IR receiver head

Remove the IR knockout
Use a drill for best results

Snap IR receiver
head into place as shown

Attach IR-2400 with
double sided tape

R+ R- L- L+   R+ R- L- L+
INPUT   OUTPUT

IR knockout hole

Secure excess wire with wire tie

For details regarding IR system connections please refer to the IR-2400 manual.

CHANNEL VISION™
10 Year Limited Warranty

Channel Vision Technology will repair or replace any defect in material or workmanship which occurs during normal use of this product with new or rebuilt parts, free of charge in the USA, for ten years from the date of original purchase. This is a no hassle warranty with no mail in warranty card needed. This warranty does not cover damages in shipment, failures caused by other products not supplied by Channel Vision Technology, or failures due to accident, misuse, abuse, or alteration of the equipment. This warranty is extended only to the original purchaser, and a purchase receipt, invoice, or other proof of original purchase date will be required before warranty repairs are provided.

Mail in service can be obtained during the warranty period by calling (800) 840-0288 toll free. A Return Authorization number must be obtained in advance and can be marked on the outside of the shipping carton.

This warranty gives you specific legal rights and you may have other rights (which vary from state to state). If a problem with this product develops during or after the warranty period, please contact Channel Vision Technology, your dealer or any factory-authorized service center.

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channelvision.com

234 Fischer Avenue, Costa Mesa, California 92626
(714)424-6500 • (800)840-0288 • (714)424-6510 fax