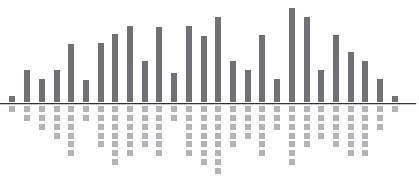
Symetrix

Symetrix White Paper:

How to scale, ramp and taper volume controls in SymNet Composer



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How to scale, ramp, and taper volume controls in SymNet Composer

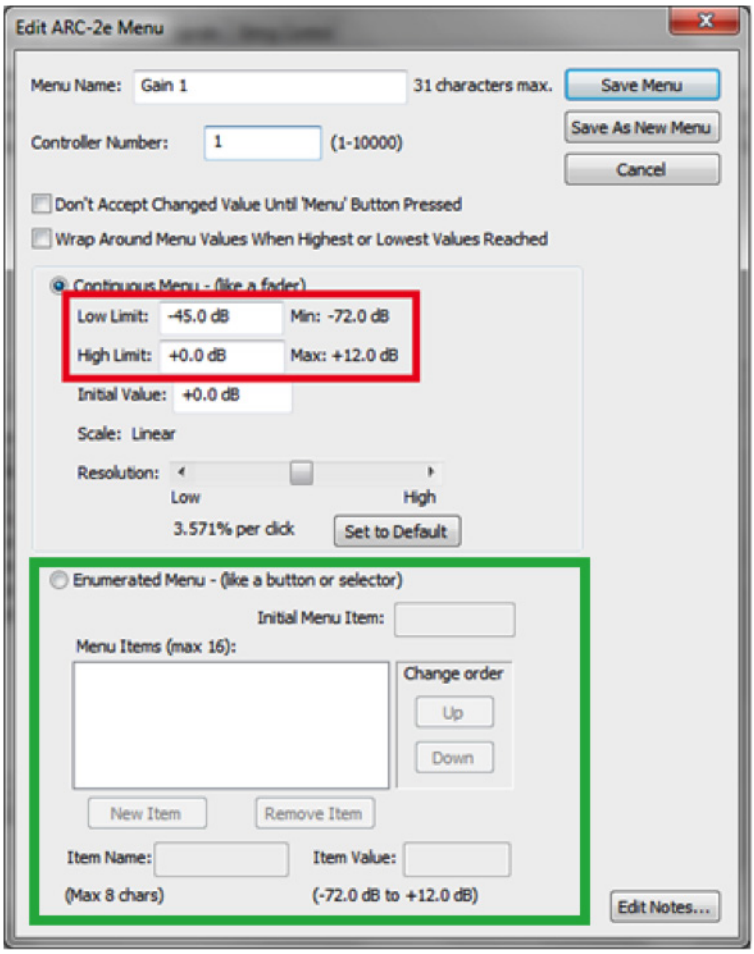
It is quite common for a volume control to be scaled before being handed to an end user. As an example, most volume faders in SymNet Composer go from -72 dB to +12 dB, whereas the integrator would like the end user to only have access to the range of -45 dB to 0 dB. Limiting this range of end user control on the volume fader is known as “scaling”.

It may also be desired to limit the speed at which a volume control can be adjusted, or “ramped”, up or down. Further, it may be desired to setup a volume fader “taper” to mimic a console fader that has compressed scale near the bottom of its range and is linear in dB everywhere else.

This tech will show the different methods for scaling, ramping, and tapering volume faders in SymNet Composer hardware (Edge, Radius 12x8, and Radius AEC) and SymNet Designer hardware (Solus 4,8, and 16).

Scaling in ARC Remote Controls:

Another aspect of scaling a volume fader that should be considered is that in every type of ARC remote (ARC-2e, Arc-K1e, and ARC-Web) volume controls can easily be scaled using the upper and lower range limits provided in the Edit Arc Menu dialog. *Shown in red below*



Additionally, the Enumerated Menu options allows for easily creating a custom list where the preset gain levels are tapered. Having a custom list of tapered gain levels also provides a way to label them with user friendly names, such as a list using Quiet, Normal, Loud, Louder, Loudest. *Shown in green above*

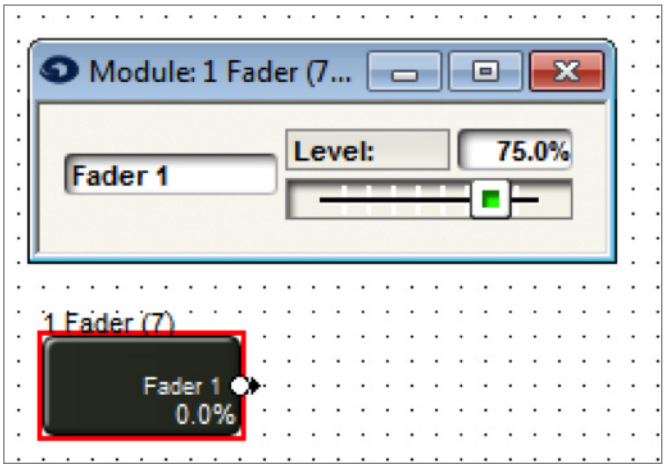
Considerations for Third Party Control Systems:

It should be noted that scaling, ramping, and tapering can applied when using a third party control system to manipulate a volume within SymNet, although the scope of this document does not cover the methods. Instead, consult the SymNet Composer Control Protocol Documents for more details on how a volume fader is controlled with a third party control system.

In many cases it may be necessary to scale the volume fader in SymNet after the third party control system has already been programmed and integrated into the system, and in which the scaling, ramping, or tapering is an afterthought. In these cases, the integrator may be trying to avoid editing the third party control system programming. As such, the following methods can be used to apply scaling, ramping, and tapering of a volume fader within the SymNet environment.

Control Input –→ Control Fader:

In order to scale, ramp, or taper a volume control in SymNet, a Control Fader from the Control Modules->Control Inputs in the Toolkit must first be added to the DSP design. User control will be assigned directly to the Control Fader which will output a control signal between 0% and 100% based upon the control fader position. This 0-100% control signal can then be manipulated with modules from Control Modules->Control Processes such as the Scaler, Ramp Processor, or Taper.

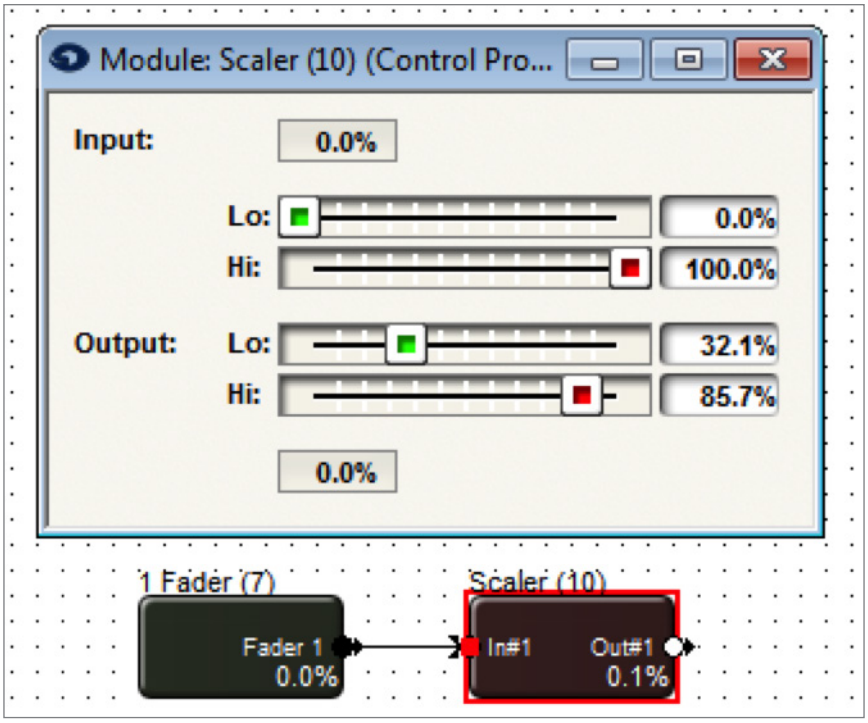


Note: Control signals are denoted with a black triangular anchor points and should not be confused with audio anchors. Keep control signals out of the audio signal path or damage to the speakers can occur.

Scaling a Volume in SymNet:

When it is desired to limit the upper and lower range limits of an audio fader, a scaler module must be used. The scaler module is located in the Toolkit under Control Modules->Control Processes.

In most cases, the scaler module will take the control fader output, which ranges from 0-100% and which is connected to its input, and scale it to some other range that will then limit the dB range on an audio fader in which the output of the scaler is assigned or wire to.



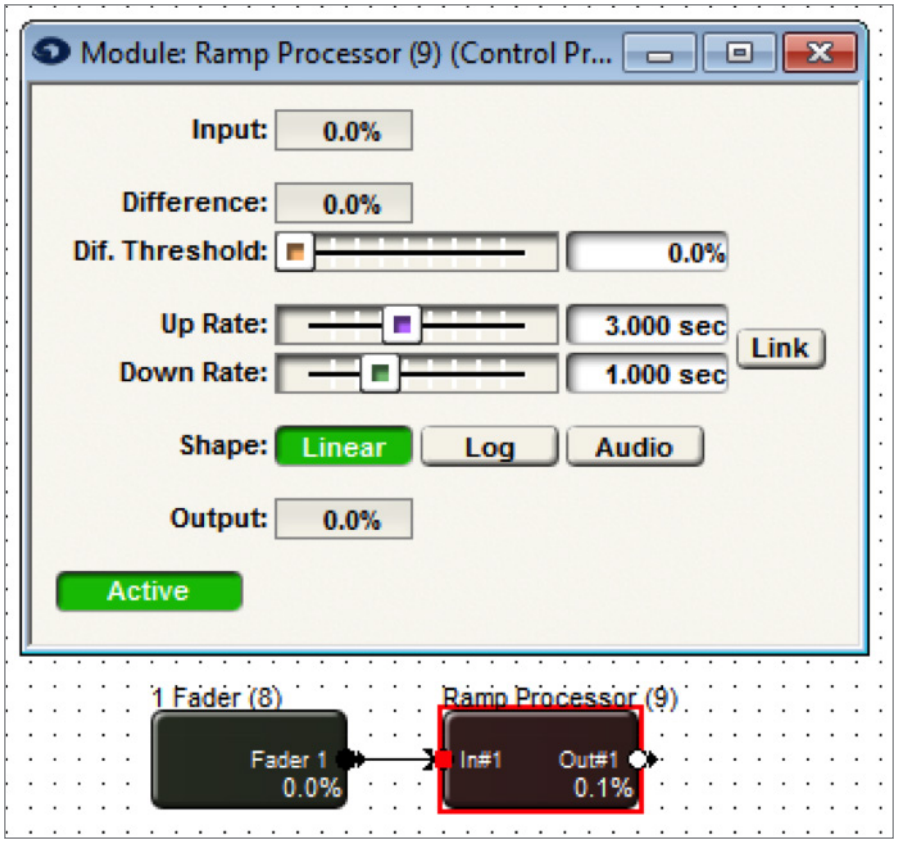
The scaler module has two sets of faders; input and output. The input faders tell the module what input percentage to respond to, which will typically be left at 0% and 100% respectively. The output faders will be the faders in which values other than 0% and 100% will be used, such that the low and high percentage values will limit the range of the audio fader assigned to the output of the scaler module.

As an example, when using a gain fader or mixer fader with a range of -72 dB to +12 dB, it may be desired to limit the end user range from -45dB to 0dB. To do this the Output Lo fader would be set to 32.1% for -45dB and the Output Hi fader would be set to 85.7% for 0dB.

More on this control signal assignment/wiring and how to figure out what percentage to use later in this document.

Ramping a Volume in SymNet:

When it is desired to control how fast a volume fader can ramp up or down, a ramp processor module must be used. The ramp processor module is located in the Toolkit under Control Modules->Control Processes.



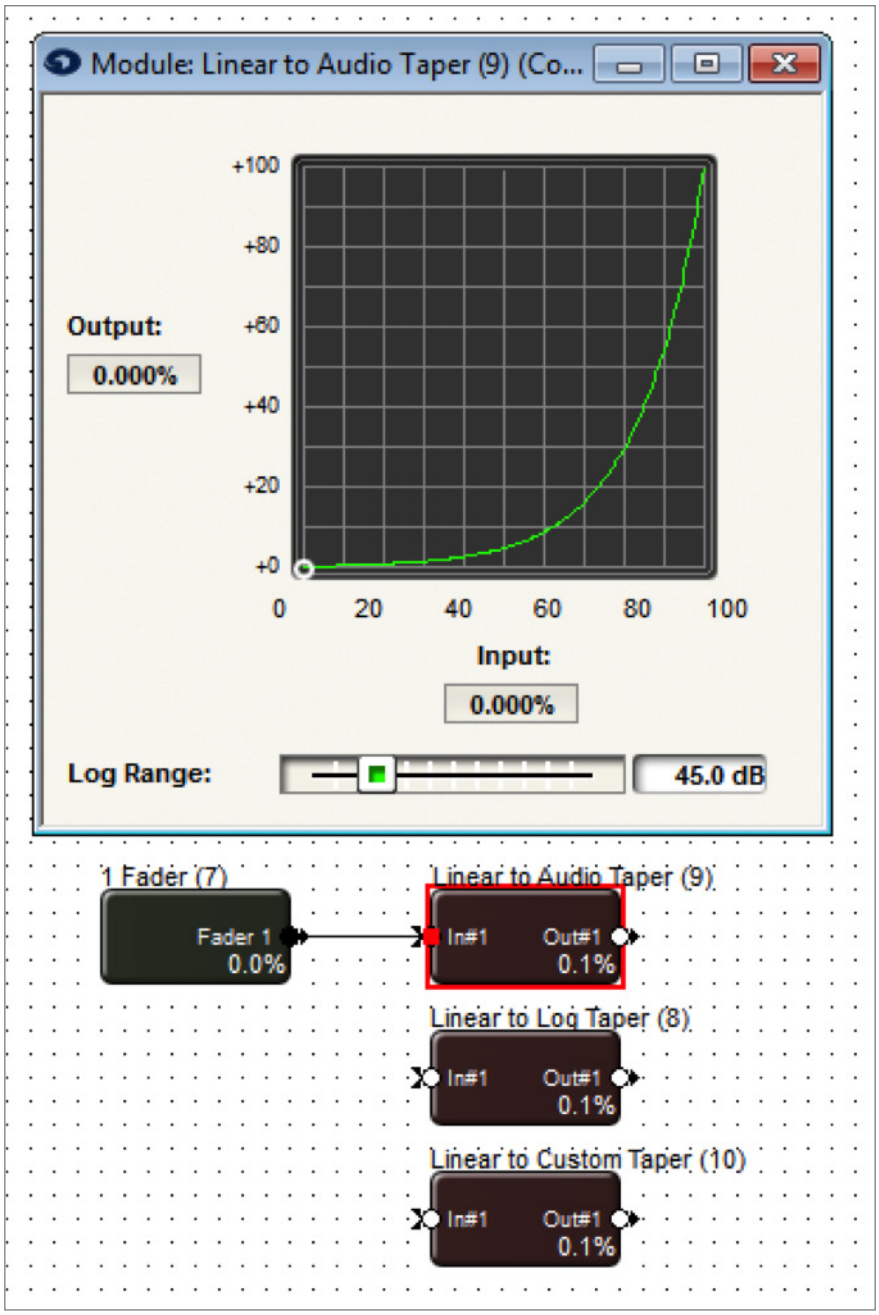
The ramp processor module has three faders. Dif (difference) Threshold determine how much a control signal must change before the ramp processor is activated and applies the Up or Down rate to the change. Up Rate and Down Rate control how fast it control signal output will change from its previous control signal level to a new control signal level. The Shape buttons control the type of taper applied to the up or down rate.

An example use of a ramp processor could be related to SymVue control of microphones in a house of worship install. A ramp processor could insure that if an operator accidently or inadvertently moved a fader to its upper range limit that it would not instantly jump to that level, but ramp to it, giving the operator time to correct his mistake. It could also provide a nice, smooth, fade out of the background music during an intermission at a theater.

Tapering a Volume in SymNet:

The Control Fader modules output is linear, so on occasion it may be desired to change the linear taper to a different type of taper. Under Control Modules->Control Processes there are three basic types of tapers that can be used to change the linear output of the control fader to a logarithmic, pseudo-logarithmic, or custom taper. The three types of taper modules are; linear to audio taper, linear to log taper, and linear to custom taper. The most commonly used taper is the Linear to Audio Taper module.

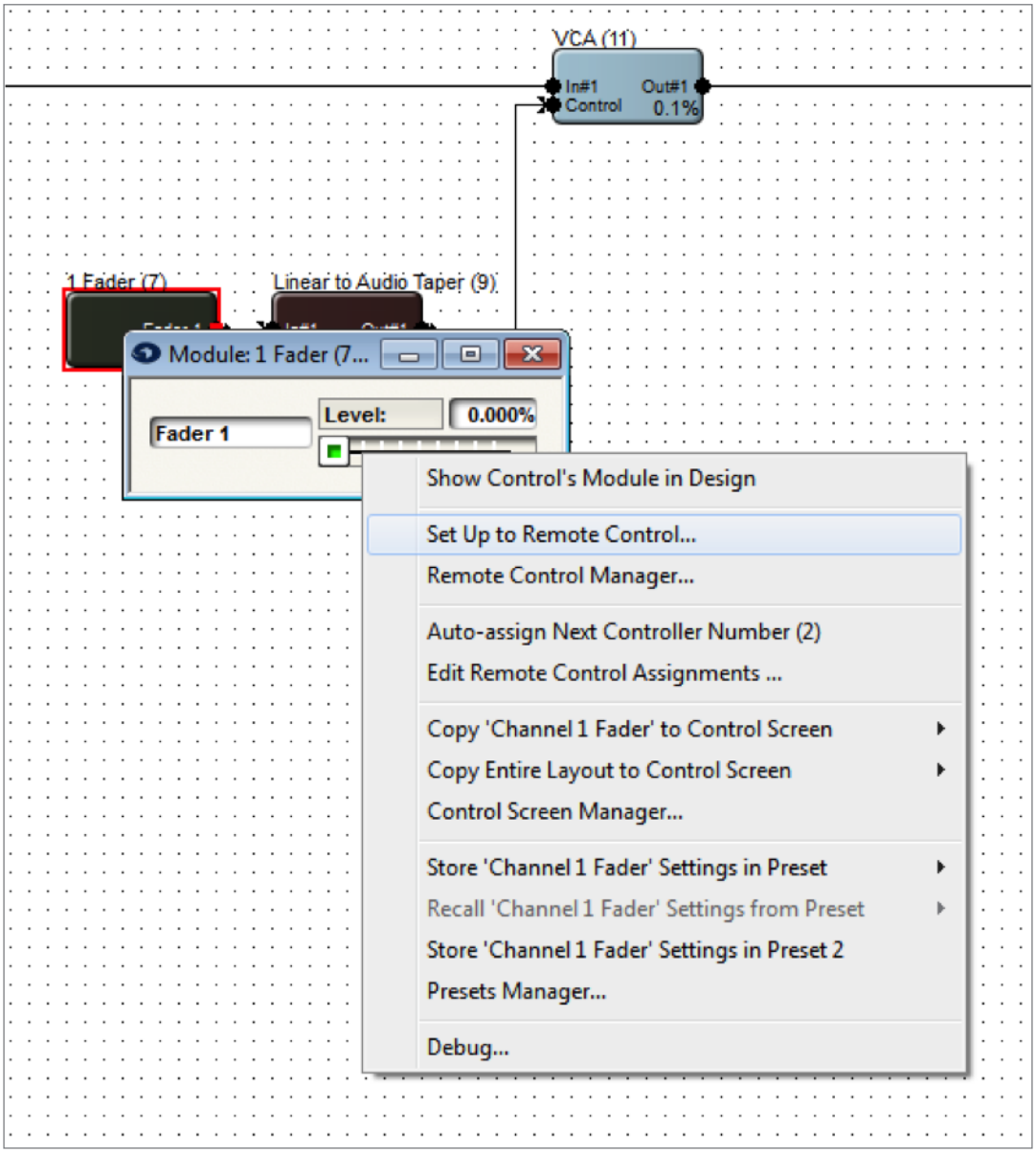
The Linear to Audio Taper module performs non-linear scaling of a continuous control signal. It converts a linear input signal to an audio taper (pseudo-logarithmic) output. It may be useful in controlling a logarithmic parameter from a linear source. Audio taper differs from log taper in that audio taper moves faster for low level inputs. It mimics a mixing console fader that has compressed scale near the bottom of its range and is linear in dB everywhere else. Technically, a linear taper is used for low-level inputs (<15%) and a log taper is used for the rest of the range. This curve can be best visualized on the graph by turning the Log Range control all the way down.



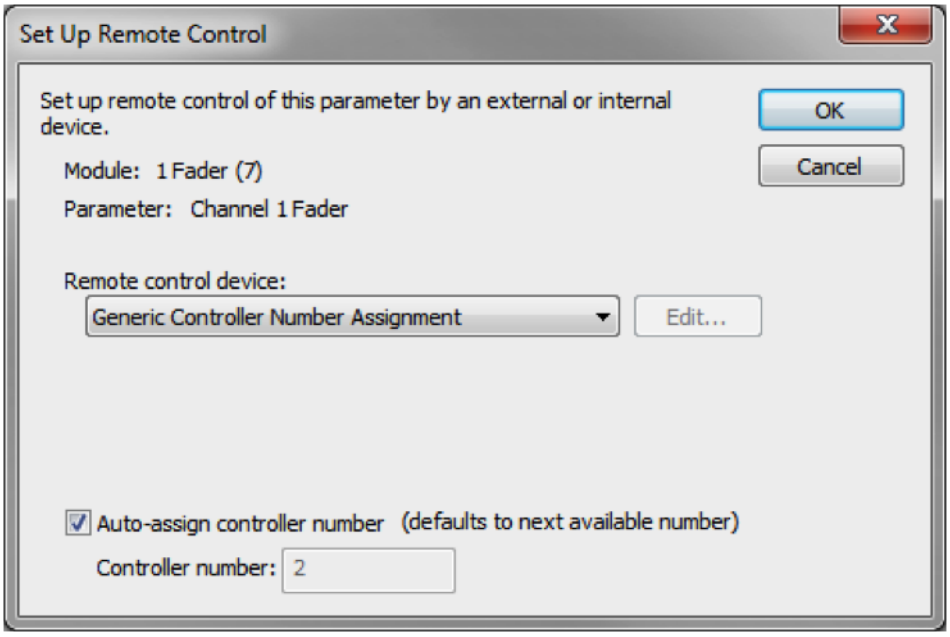
There is a single fader on the Audio Taper module which controls the shape of the audio taper curve. Large values for this parameter allow a wide range of control. Small values for this parameter give more precise control but over a smaller ranger before rapidly dropping to zero. Set this parameter according to how much range of control you want to allow. Adjust using the slider or click in the text entry box to specify a numerical value. Text displays indicate the levels of the input and output. A graph shows the characteristic curve.

How to Assign the Scaled, Ramped, or Tapered Control Signal to an Audio Fader:

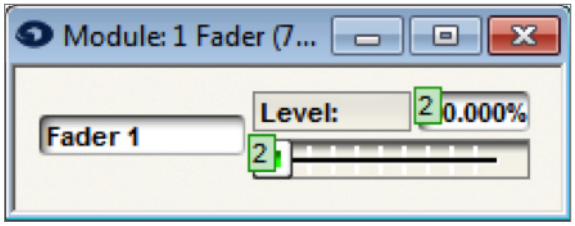
The first thing to do is assign a controller number to the control fader. This will be the controller number that an ARC, SymVue, or third party control system will use. First open the control fader user interface, right click the fader and choose "Set Up to Remote Control..."



A generic control number assignment can be assigned to the control fader for third party control system, or the Remote Control Device dropdown can be used to insert the control fader assigned into an ARC remote.



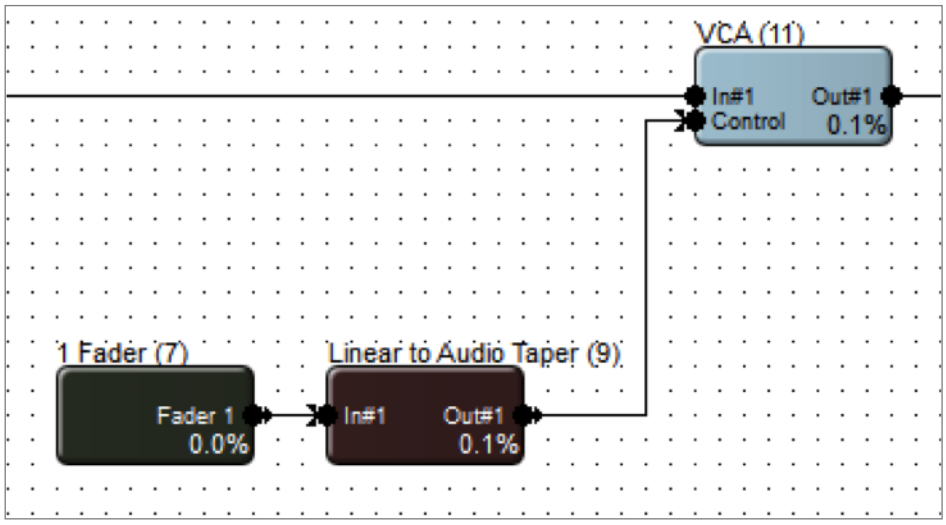
Once a controller assignment has been assigned to the control fader, it should be super-imposed over the user interface. (It the super-imposed controller assignment is not visible, hit Alt+M).



Next, the output of the scaler, ramp processor, or taper must be assigned to the audio fader or control input of a VCA.

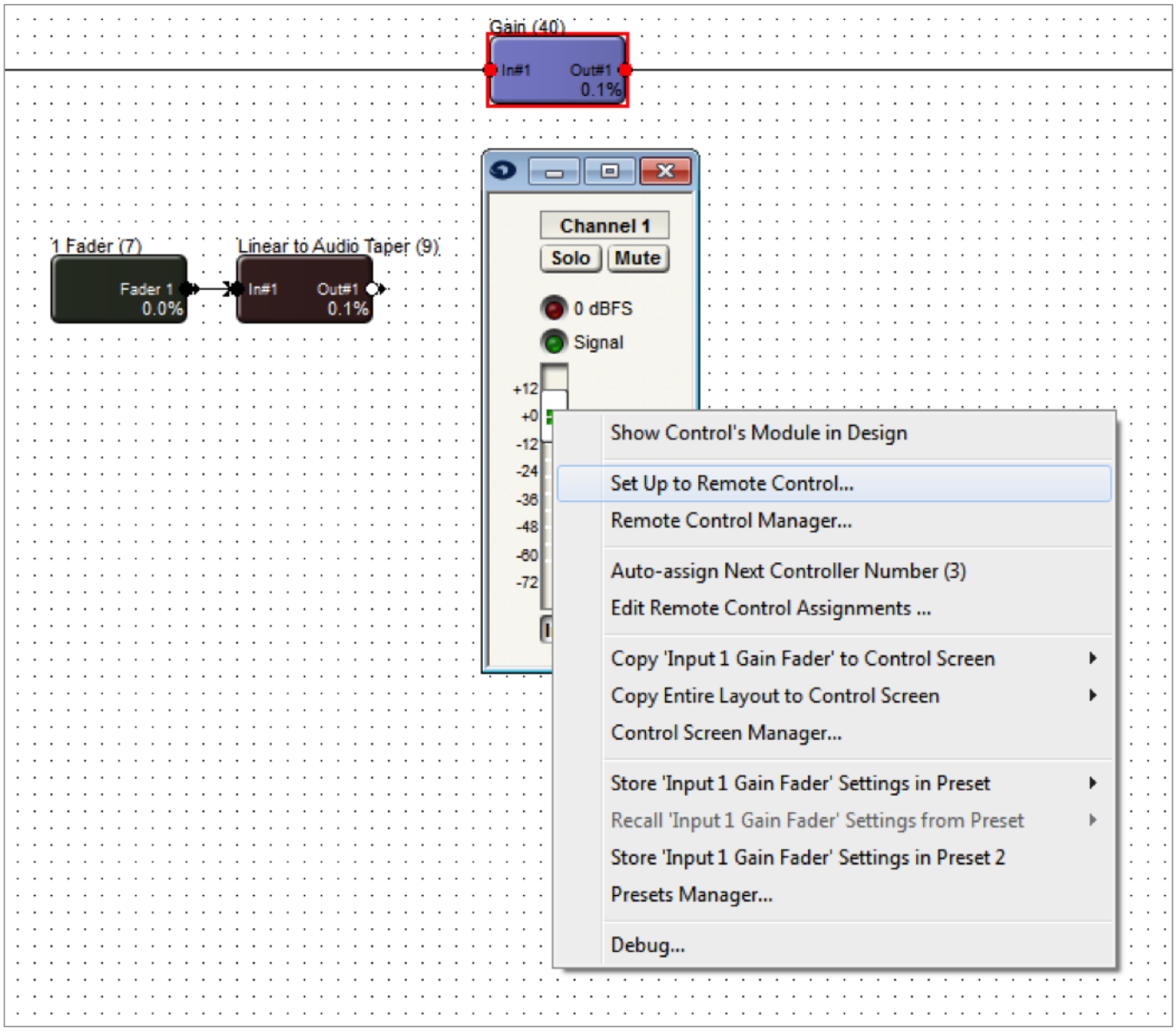
There are two methods for assigning the output of these control processes modules to control an audio fader in SymNet Composer.

The first method would be to wire the output of the control process module to the control signal input of a VCA.

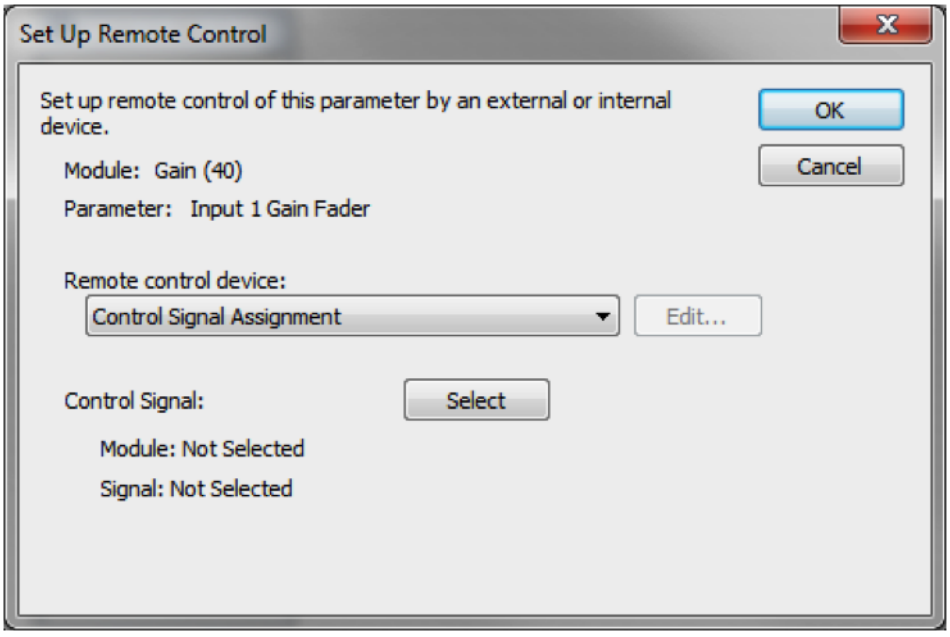


The second and more likely method would be to assign the control signal directly to a gain fader in a gain or mixer module. To do so, use the method outlined below.

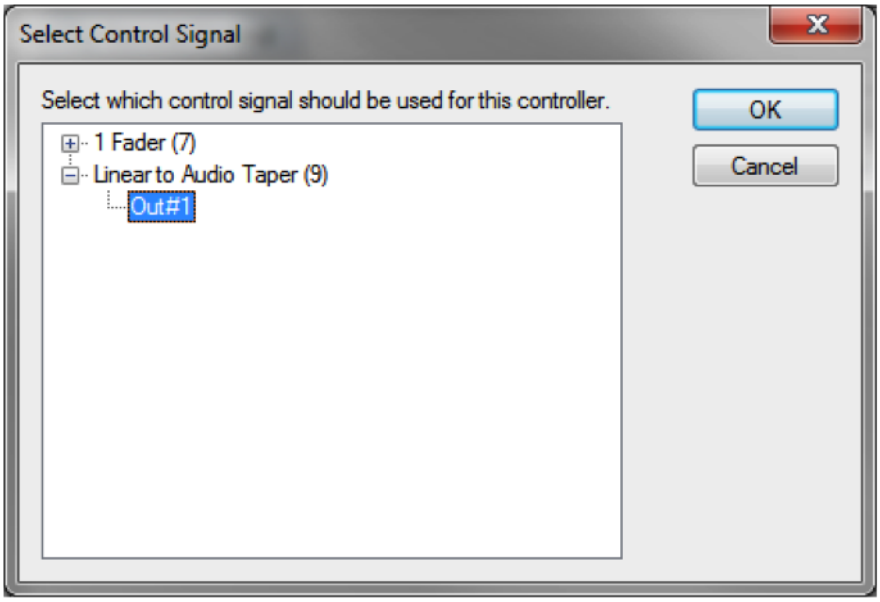
Open the Gain or Mixer module user interface. Right click the fader which will be controlled by the scaler, ramp processor, or taper module and choose "Set Up to Remote Control..."



From the Remote Control Device dropdown select “Control Signal Assignment”.

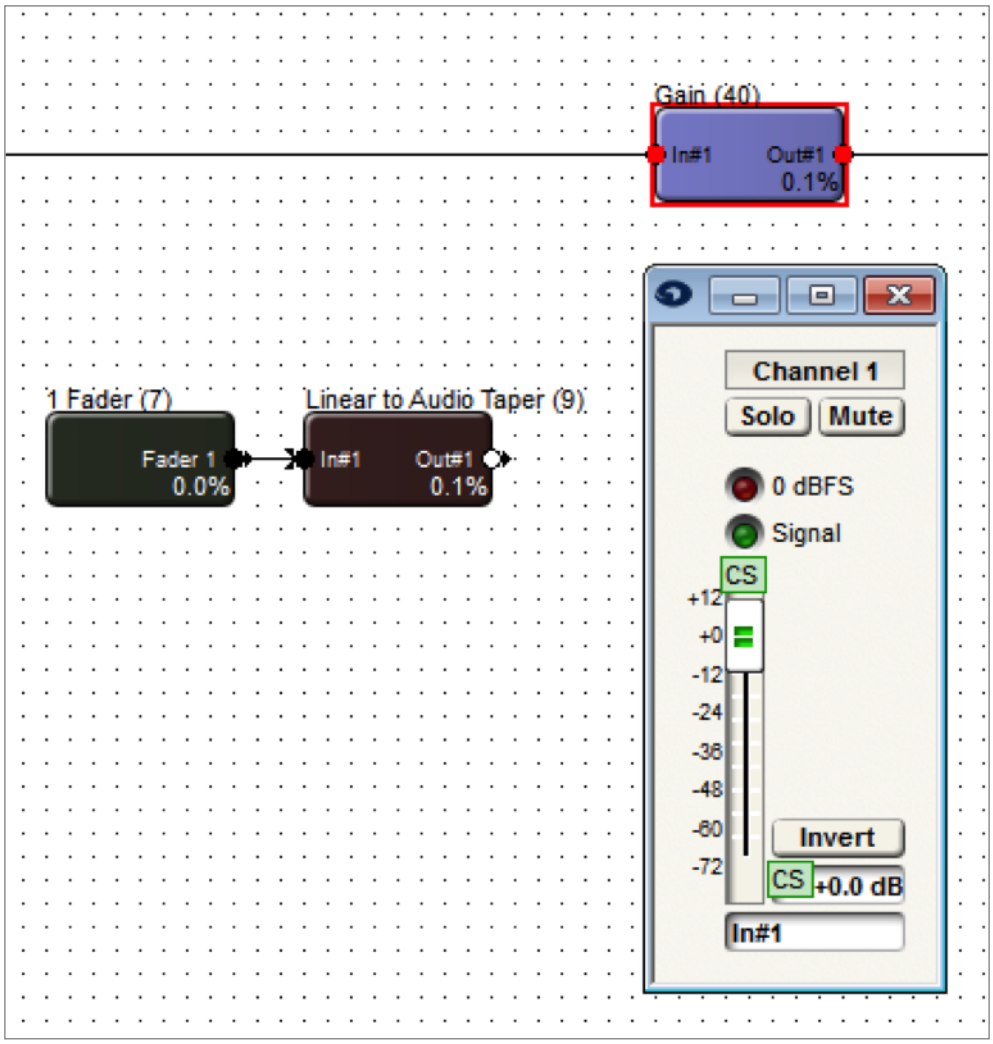


Hit the Select button. Use the navigation tree to select the output of the audio process module. In this example the output of an Linear to Audio Taper module is selected.



Click OK when done. And OK to close the Set Up Remote Control window.

The audio fader should now show that it is assigned to a control signal output with the super-imposed CS indication.



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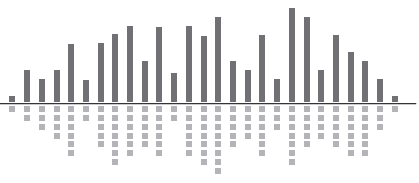

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