

Room Combining Made Easy

When it comes to conference room combining systems that also include video projectors, the cost and complexity of the system can get dramatic. Normally a three room combining system with video projection requires a control system to operate the complexity of the video matrix switching, video projector, audio system and screen controls. Adding the cost of the video matrix, control system, touch panels and programming to make it all work might exceed your client's budget.

With today's digital audio systems the system design and installation complexity of the audio system just got a bit easier. Gone are all those relays, mixers, audio distribution amplifiers, and a whole lot of wires. Now there is just a black box with inputs from the rooms and outputs to the room's amplifiers. The biggest dilemma a system designer now faces is justifying a rack to house one or two pieces of equipment.

To add convenience these digital audio systems include simple wall-mounted panels for easy user control. From these panels a user is able to recall presets and operate the room's volume control. Some of these digital audio systems even include logic connections for recalling presets and providing operational status.

Using the room control features provided by these digital audio systems may even include the ability to control other devices. For example, it is possible to control both the audio system and the video projector from the wall-mounted panel. This is made possible by interfacing the audio system with a video projector controller. Recalling a preset on the audio system causes one of the logic outputs to go on. This logic output is then used to instruct the video projector controller to turn on the video projector.

Rane Corporation <http://www.rane.com> offers five digital audio products in their line of Remote Programmable Multiprocessors (RPM) devices, two of which offer the logic needed for projector control. Their RPM 44 and RPM 88 include both logic inputs and outputs called Versatile Input Port (VIP) and Versatile Output Port (VOP). Another feature these RPMs offer is an RS-485 port to communicate with Rane's Smart Remote products. These remotes mount in a single gang wall box and three versions are offered, the SR 2, SR 3 and SR 4. The SR 2 provides volume control, while the SR 3 and SR 4 allow for volume and preset control (or source selection). The SR 3 has a 98 x 64 pixel LCD display that can be programmed with up to 16 pages of custom graphic images, while the SR 4 has eight status LEDs to represent a preset (or source). It's also possible to duplicate control locations with these remotes allowing controls that track each other from the room and simultaneously at the rack, for example.



Rane RPM 44



Now you are probably wondering, just how does the audio system turn on the video projector? TekVox, Inc. <http://www.tekvox.com> offers a video projector controller called TEK 1. This device is basically an IP based mini-control system with an RS-232 port, along with four logic inputs, two logic outputs and two relays. The TEK 1 is normally used as an asset management system for display devices called TekPatrol™. Since the TEK 1 has logic inputs, it can easily be controlled by the logic outputs from the Rane RPM.



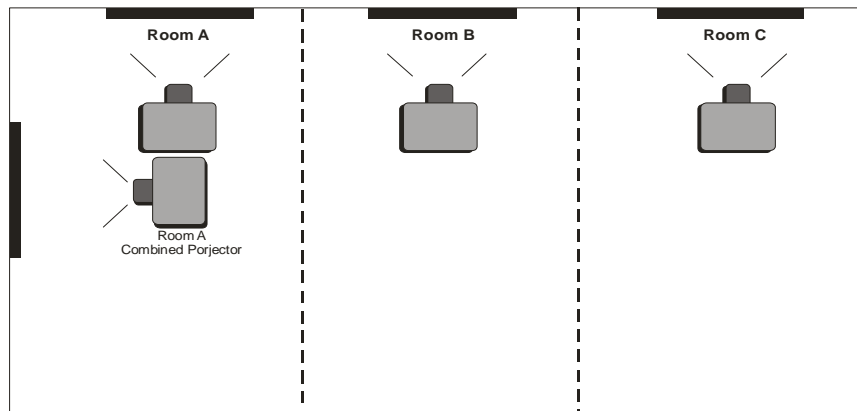
TekVox TEK 1

Unlike typical control systems, the TEK 1 does not require a control system programmer to make it work. All the installer needs to know are some basic IP configuration methods. To simplify the configuration, control and monitoring of a TEK 1 TekVox integrated the configuration, control and monitoring software together into one program called TekManager. Within TekManager a configuration program called TekWizard instructs the installer through a step-by-step process to setup a TEK 1.

Case Study

The Harris County Department of Education (HCDE) <http://www.hcde-texas.org/> located in Houston, TX is a nonprofit tax-assisted organization dedicated to educational resources for the Harris County school districts. One of the services HCDE provides is meeting rooms for teacher technology training. Like many other facilities HCDE required room combining along with video projection and control, but the budget did not allow for the extra cost of a control system and the programming that goes along with it. To solve these issues HCDE consulted with Claude Moore and Mike Slattery of TekVox, Inc. <http://www.tekvox.com>.

Below is an illustration of the room combining system installed at HCDE. This system uses a fourth video projector to display the combined video.



HCDE Combined Room Layout



One of the features HCDE was looking for was a way to remotely monitor and control their video projectors and LCD displays. For this solution the TekPatrol™ asset management system by TekVox was selected. TekPatrol is a group of software and hardware products to provide asset management, remote monitoring, remote control and security for display devices. To control a display device TekPatrol uses an IP based mini-control system called TEK 1. Unlike other control systems, a TEK 1 does not require programming; instead a TEK 1 is configured using a program called TekWizard where the installer selects from a list of display drivers. To provide extra functionality macros can be defined and executed from events generated by changes in input levels at the logic inputs.

Since TEK 1s are already being used to control the video projectors, a solution was needed to provide a low cost user interface. The Rane RPM 44 with its SR 3 Smart Remotes and programmable logic inputs and outputs proved to be the best solution.

Each room has its own SR 3 for controlling both the audio system and TEK 1. From the LCD remote the user is able to turn on and off the video projector, lower the screen and control the room's audio level. Only at the SR 3 in room A is the user able to change the room's configuration and power on the combined video projector.

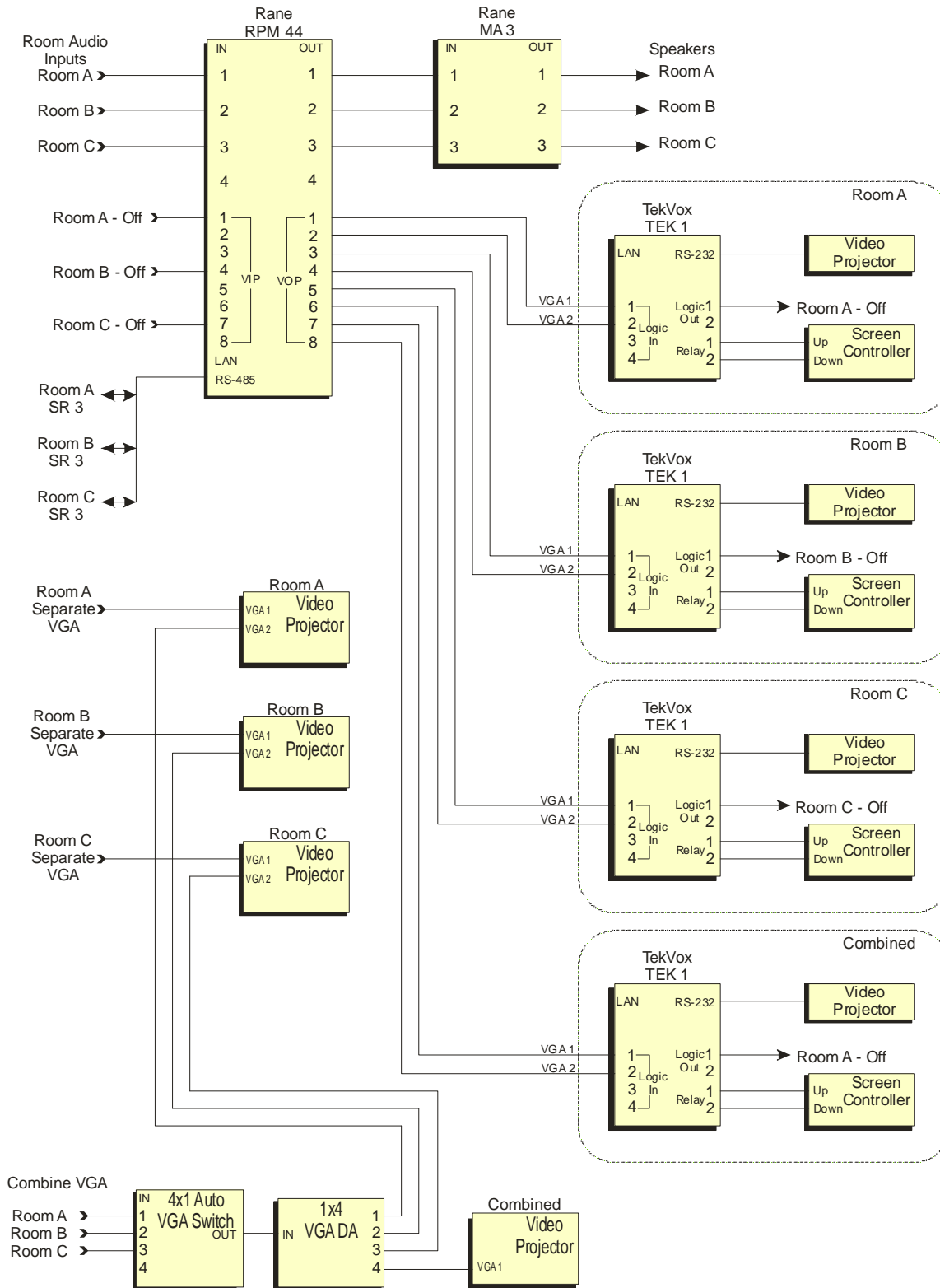


The SR 3 remotes have two functions. Rotating the knob without pressing it changes the audio level for the room or combined rooms. If the knob is pressed in and rotated, a series of LCD pages are displayed to indicate a selectable operation. To select an operation just release the knob on the desired page.

Each room has a wall plate with two VGA connectors labeled Separate and Combine. A VGA signal connected to the Separate VGA connector is only displayed at the video projector in the associated room. The Combine VGA connector displays the VGA signal on all video projectors.

A room's Separate VGA connector connects directly to the VGA 1's input on a video projector in the associated room. By selecting VGA 1 on a room's video projector the separate VGA signal is displayed. To allow routing of a VGA signal to all rooms the Combine VGA connector is distributed using an auto-VGA switch and a VGA distribution amplifier. Selecting VGA 2 on a video projector displays the combine VGA signal. Only one combine input can be connected and displayed at the same time.

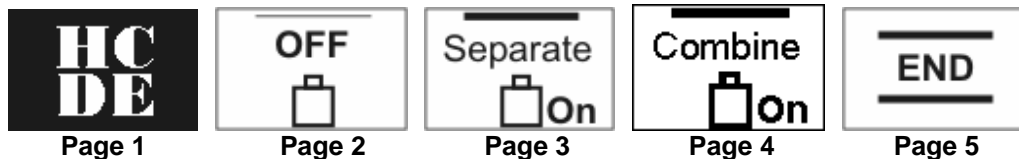
The following drawing illustrates the connections between the Rane RPM 44 and TEK 1s. When a page is selected on an SR3, a corresponding preset is recalled in the RPM. A page that illustrates projector control recalls a preset that enables the RPM VOP connection to a TEK 1.



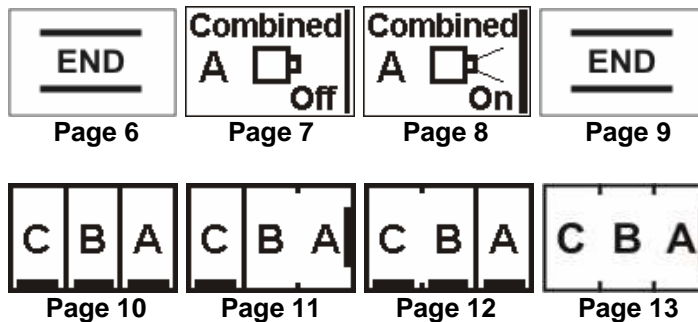
Description of SR 3 LCD Pages

Each room has its own SR 3 remote and from the remote a user is able to control room volume and operate an associated video projector. Since room A becomes the display for combined operation, this remote is able to control the combined video projector and change the room configuration.

As a user steps through the LCD pages on the SR 3 the following pages are displayed:



From the SR3 in Room A the user is able to step through the control of the combined video projector and the room configuration. The SR 3 for room A has the following extra pages:



LOGO and END

Releasing the knob on the HCDE Logo and END pages has no effect on the system. Select these pages when just viewing the pages.

OFF

Releasing the knob while on the Off page shuts down the video projector and raises the screen for the associated room.

Separate On

Releasing the SR 3 knob while on the Separate On page turns on the video projector, sets its video input to VGA 1 and lowers the screen for the associated room.

Combine On

Releasing the knob while on the Combined On page turns on the video projector, sets its video input to VGA 2 and lowers the screen for this room.

The following are only performed in Room A. There are two END pages between the user and configuration pages. This should help deter a user from selecting a configuration page.



Combine A On

Releasing the knob on Combined A On page turns on the combined video projector in Room A, sets its video input to VGA 1 and lowers the screen for this projector. Only the combine connection is displayed on this projector.

Room Configuration

Selecting a configuration page turns off all the projectors. Always select a configuration before starting an event.

There are four selectable configuration pages:

1. Separate
2. Combined AB
3. Combined BC
4. Combined ABC

Separate

This configuration operates the rooms individually. The volume control on each remote only operates the room each is in.



Combined AB

This configuration combines rooms A and B, and leaves room C by itself. The volume control on the remotes in rooms A and B work together, and room C operates by itself.



Combined BC

This configuration combines rooms B and C, and leaves room A by itself. The volume control on the remotes in rooms B and C work together, and room A operates by itself. The combined video projector is not used in this configuration, although the Combine VGA connectors may still be used by selecting the Combine On page.



Combined ABC

Combining all of the rooms links all of the level controls on the remotes together.



Configuring the RPM 44 and TEK 1s

The Rane RPM 44 uses a drag-and-drop audio flow creation method that allows individual configured processing blocks, individual VOP pins, and remote configurations to be saved in presets. Using these preset features makes the RPM flexible and easy to configure.

Since the RPM needs to control the TEK 1s using the VOP pins, a configuration table is utilized to help guide the system designer through the process. Using a table assists in keeping track of which SR 3 remote LCD page maps to which RPM preset which in turn configures the TEK 1. Each room has its own table to link an operational name with the



SR 3 LCD page, RPM preset, the RPM VOP pin used, the Logic input used on the TEK 1 and the output operation of the TEK 1.

In this design the TEK 1s are able to instruct the RPM 44 to go to an off state for a room. This is accomplished by using the VIP pins on the RPM 44. Each VIP pin is associated with a preset and connecting pins to ground recalls the associated preset. Pin 1 always recalls preset 1, Pin 2 recalls preset 2 and so on. The VIP presets used in this system must match the preset turning off the projector.

The following VIP pins are used:

Pin	Operation
1	Room A Projector 1 & 2 Off
4	Room B Projector Off
7	Room C Projector Off

Room A SR3

Set Maximum Number of Pages to 13.

Room A Projector and TEK 1-A1

Name	SR3 Page	RPM Preset	RPM VOP	TEK 1 Logic In	TEK 1 Macro	TEK 1 Output
Screen Up						Relay-1
Screen Dn						Relay-2
Logo Page	1					
Projector Off	2	1	1-Off 2-Off	1-Open 2-Open	1	Off
Projector On Separate	3	2	1-On 2-Off	1-Closed 2-Open	2	On VGA 1
Projector On Combined	4	3	1-On 2-On	2-Closed 2-Closed	3	On VGA 2
End	5, 6 & 9					
Separate	10	12				
Combine AB	11	13				
Combine BC	12	14				
Combine All	13	15				

Room A Combined Projector and TEK 1-A2

Name	SR3 Page	RPM Preset	RPM VOP	TEK 1 Logic In	TEK 1 Macro	TEK 1 Output
Screen Up						Relay-1
Screen Dn						Relay-2
Projector Off	7	10	7-Off	1-Open	1	Off
Projector On	8	11	7-On	1-Closed	2	On VGA 1



Room B SR3

Set Maximum Number of Pages to 5.

Room B Projector and TEK 1-B

Name	SR3 Page	RPM Preset	RPM VOP	TEK 1 Logic In	TEK 1 Macro	TEK 1 Output
Screen Up						Relay-1
Screen Dn						Relay-2
Logo Page	1					
Projector Off	2	4	3-Off 4-Off	1-Open 2-Open	1	Off
Projector On Separate	3	5	3-On 4-Off	1-Closed 2-Open	2	On VGA 1
Projector On Combined	4	6	3-On 4-On	2-Closed 2-Closed	3	On VGA 2
End	5					

Room C SR3

Set Maximum Number of Pages to 5.

Room C Projector and TEK 1-C

Name	SR3 Page	RPM Preset	RPM VOP	TEK 1 Logic In	TEK 1 Macro	TEK 1 Output
Screen Up						Relay-1
Screen Dn						Relay-2
Logo Page	1					
Projector Off	2	7	3-Off 4-Off	1-Open 2-Open	1	Off
Projector On Separate	3	8	3-On 4-Off	1-Closed 2-Open	2	On VGA 1
Projector On Combined	4	9	3-On 4-On	2-Closed 2-Closed	3	On VGA 2
End	5					

