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# PART I - INTRODUCTION

## Overview

Welcome to the world of the **SmartPanel**, the perfect control system for small projector installations.

The **SmartPanel** is the right choice for permanent single projector installations because it is cost-effective and easy to configure.

The Panel provides **users** with a *simple, reliable* way to control a projector.

- Unlike a remote control, the Panel is never lost, pointed the wrong way, or in need of batteries. The Panel replaces cryptic feature names and menus of rarely used functions with simple, point-of-connection controls.
- Users are always provided with feedback about the status of the projector.
- The control system behavior is simple and uniform, regardless of projector model. Once familiar with the Panel, users can control different projector models at the same site with no additional training.

The Panel provides **installers** with a *pre-programmed* and *easily configured* solution to simple control tasks.

- Modules provide high quality patch points for common projector sources.
- The Panel's modular design and two form factors allows it to be custom tailored for every installation.
- Configurable relays are provided to control common external devices such as switchers and powered screens.
- No programming is necessary, only configuration with an easy-to-use Windows™ utility. All the software needed to configure the Panel is included, and updates and additional utilities are provided on the SP Controls website.

This guide gives you everything you need to successfully install and configure the **SmartPanel**. All we assume is that you are familiar with the projector you've chosen, and that you have done small projector installations before.

From all of us at SP Controls, thanks for your interest and business. We hope that the **SmartPanel** makes your job easier by simplifying installations, while satisfying your end users on all fronts – cost, ease of use, and reliability.

**Note:** The **SmartPanel** is *not* a switcher; it is strictly a control system. Your design should rely on switching built into your projector or external switchers.

# A First Look at the SmartPanel

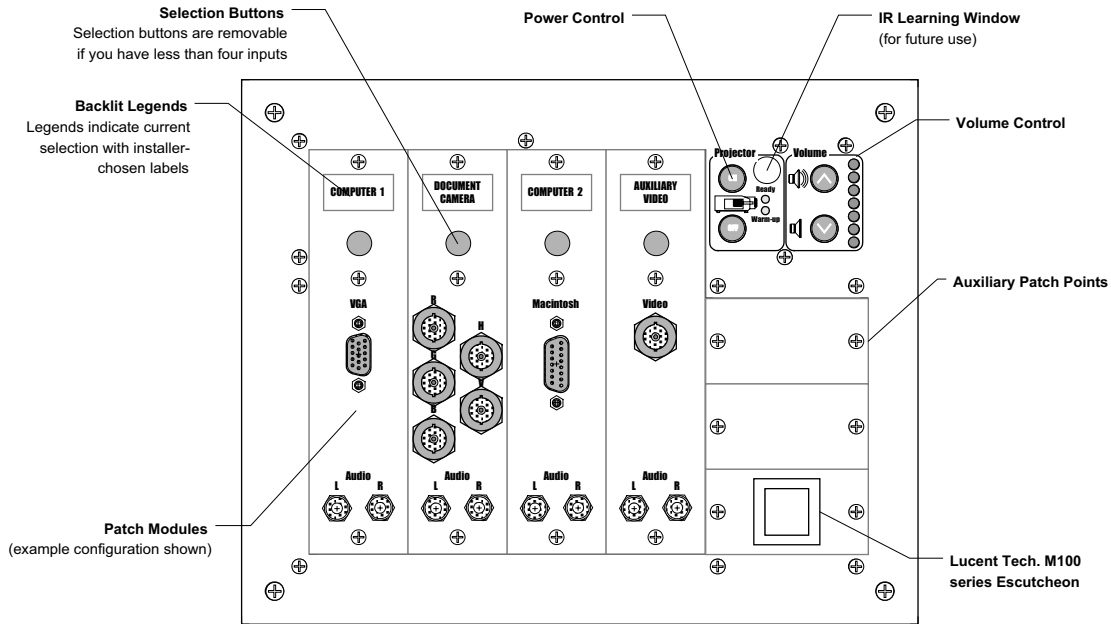


Figure 1: Full-size SmartPanel (SP2-CHAS) with Modules installed

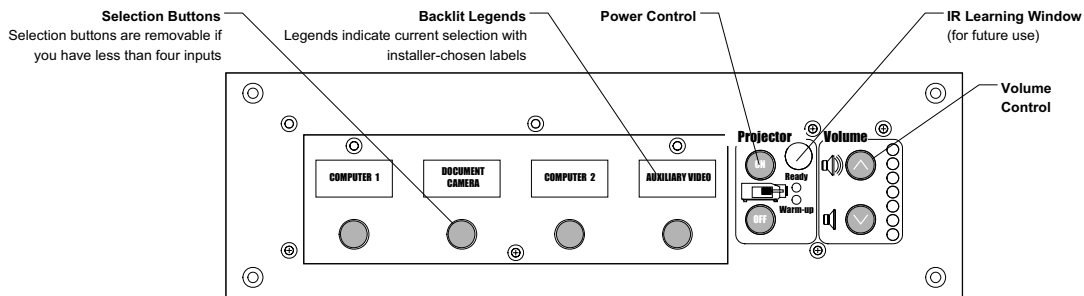


Figure 2: The Mini SmartPanel (SP2-SMCHAS)

The assembled **SmartPanels** shown in **Figure 1** and **Figure 2** demonstrate the following features:

- Four **selection buttons** control projector input switching.
- **Power buttons** control projector power. The user is given feedback of the projector's status by a pair of LEDs. The Panel uses RS-232 or current sensors to remain in sync with projectors.
- **Volume buttons** control volume, which is indicated on an LED bar graph. An optional **Audio Follow Video Preamp** is available for use with external audio solutions, such as self-powered speakers.
- **Back-lit Legends** are readable in any light. Legends appropriate for each installation are chosen and inserted by the installer. Custom Legends can be prepared.

Our goal was elegant and straightforward design. We hope that we succeeded and that you find the Panel intuitive to use.

## Two Form Factors to Fit Every Installation

The SmartPanel comes in two form factors to fit every installation and budget.

### Full-Size SmartPanel

The assembled **SmartPanel** in **Figure 1** is configurable with four **Modules** and three **Auxiliary Modules**. The Modules provide point-of-control connection for portable projector sources, such as laptops, so users can patch in and control the system at the same location.

Modules are chosen, ordered and attached by the installer. Selection-only Modules (with no patch points) are available for permanently installed devices, and blanks are available for installations that have fewer than four input devices.

**Note:** Facing the front of the Panel, the leftmost Module is “input one,” and the rightmost “input four”.

### Mini “Control-Only” SmartPanel

The **Mini SmartPanel** is an elegant, small-footprint alternative for installations where space or aesthetics are at a premium. The Mini SmartPanel provides the same comprehensive control over projectors as the full-size Panel, without integrated patch points. Auxiliary Patch Points can be integrated when the Panel is mounted in a drawer (*SBL-1050B*) or rack (*SP2-RACKSM-MOD*).

The **Mini SmartPanel** is available in several finishes to match any décor.

**Note:** Unless otherwise noted, instructions and directions apply to both form factors. The full-size SmartPanel and control-only SmartPanel are identical from a configuration and wiring perspective. Only the facia differs.

## Before Installing the SmartPanel

Before you assemble, configure and install the **SmartPanel**, review this documentation. Informed configuration decisions make your installation go smoothly and ensure that the Panel is easy for clients to use.

### Using the Configuration Utility

The **SmartPanel** is configured using the included **Configuration Utility** (for Windows™). The Utility lets you tailor the Panel's control of your projector for your installation.

### Outline of this Document

**Part I - Introduction** continues with a review of the packing list of the Panel and a guide to installing and using the **Configuration Utility**.

**Part II - Configuring and Using the Panel** discusses the features of the Panel. Controls and features are defined. Examples demonstrate common configuration changes with the **Configuration Utility**.

Assembly and wiring of the Panel are described in **Part III - Assembly and Installation**.

**Part IV - Supporting Documentation** provides a troubleshooting guide and standard disclaimers and contact information.



## PARTS LIST

Before reading further, you should review the following packing list to familiarize yourself with the **SmartPanel** and its component parts. Verify that the complete Panel package and any optional accessories you ordered were shipped.

<b>SmartPanel Chassis</b>	The control unit and Module frame itself. Includes one projector control RS-232 port, one RS-232 configuration port, one Wired Remote/Infrared port, one power sensor input, and seven low voltage relays.
<b>Power supply</b>	12V 600mA DC regulated
<b>Legends</b>	Pre-printed Legends to be inserted beneath each Module, each describing an input (e.g., <i>COMPUTER 1</i> , <i>DOCUMENT CAMERA</i> , etc.). Blanks are included. The matching font is TrueType™ Impact.
<b>IR emitter</b>	Dual blink type emitter to be affixed to the projector's IR window. The emitter glows red while emitting IR to aid troubleshooting.  <b>Note:</b> When the Panel is configured for Wired Remote, the emitter is not used.
<b>8 Self-tapping 6-32 screws</b>	For mounting the <b>SmartPanel</b> into a backbox ( <i>not included</i> ). Only four screws are needed but extras are provided.
<b>Configuration and Installation Guide</b>	This document.
<b>SmartPanel Configuration Utility</b>	CD-ROM containing Windows™ <b>Configuration Utility</b> software and a suite of Drivers for popular projector models. The Utility allows you to configure how the Panel controls the projector.  <b>Note:</b> To use this software you need an RS-232 cable (standard male 9-pin to female). This cable is <i>not</i> included.

*OPTIONAL COMPONENTS* – included only if ordered.

<b>Modules (4)</b> ( <i>SP2-CHAS</i> )	The exact Modules accompanying your Panel are specified at the time of order. Arrangement on the chassis is determined by the installer at the time of assembly. <b>Note:</b> Modules are <i>only</i> needed with the full-size SmartPanel.
<b>Audio Follow Video Preamplifier</b>	Accessory provides switching and preamplification for all Panel inputs. A video switching section provides additional video inputs for installations requiring more video inputs than the projector supplies. The Preamplifier can be configured to set gain and/or bass and treble equalization for each channel.  <b>Note:</b> The Preamplifier is not needed if the projector's internal speakers and internal volume control are used.
<b>Rack mount kit</b>	Accessory kits allow the Panel to be mounted in a standard 19" rack. The <i>SP2-CHAS</i> rack mount occupies five rack units. The <i>SP2-SMCHAS</i> rack mount occupies two rack units.
<b>Auxiliary Patch Points</b> ( <i>SP2-SMCHAS with SP2-RACKSM-MOD or SLB-1050B</i> )	The exact Auxiliary Patch Points accompanying your Panel are specified at the time of order. Arrangement on the chassis is determined by the installer at the time of assembly.  <b>Note:</b> Auxiliary Patch Points are needed with the control-only SmartPanel <i>only</i> when it is mounted in Modular Rack Mount ( <i>SP2-RACKSM-MOD</i> ) or Slide Out Drawer ( <i>SLB-1050B</i> ).

**Table 1: Parts list**

# INSTALLING THE CONFIGURATION SOFTWARE

After unpacking the **SmartPanel**, you should install the included **Configuration Utility** software and verify that you can communicate with the Panel.

The **Configuration Utility** requires Windows 95™ or later. Make sure you have an 9-pin male to 9-pin female RS-232 cable (wired straight through), which is not included. This cable connects your computer to the Panel's **Configuration Port** (upper left, Panel rear).

## Running the Installation Program

To install the **Configuration Utility** software, insert the Utility CD-ROM into your floppy drive and run the **Setup** program found on that disk. This program installs the Utility on your computer. By default, the Utility and its accompanying files (e.g., projector drivers and their application note) are placed in the

```
\Program Files\SPC\
```

directory on your main hard disk (usually C:). A shortcut to the Utility is placed in your Windows *Start* button menu as **Start: Programs: SmartPanel Utilities: SmartPanel Configuration Utility**.

## Connecting the Panel to your Computer

To configure the Panel, you must supply it with power and connect it to your PC (a laptop is convenient), as shown in **Figure 3**.

Power should be supplied to the Panel with the included 12VDC regulated power supply. When powered, all of the lights on the Panel rapidly flash in sequence as it runs through a power-on self-test. If this self-test does not occur, make sure you have correctly powered the unit (see **Wiring Panel Power** or the **Troubleshooting Guide** if necessary).

Connect the Panel to your computer by attaching the male 9-pin end of your RS-232 cable (not included) to the Panel's **Configuration Port**. Attach the female end of the cable to any free Com Port on your computer.

**Note:** It is your responsibility to make sure that the Com Port you are using is enabled and configured correctly. You don't need to worry about communications settings (e.g., baud rate), but you do need to make sure that the communication port you wish to connect through has not been disabled at the hardware level (if you have used the Com Port before for other applications, you should have no problems).

**Note:** It is *not* necessary to disconnect the Panel from the projector to run the **Configuration Utility**.

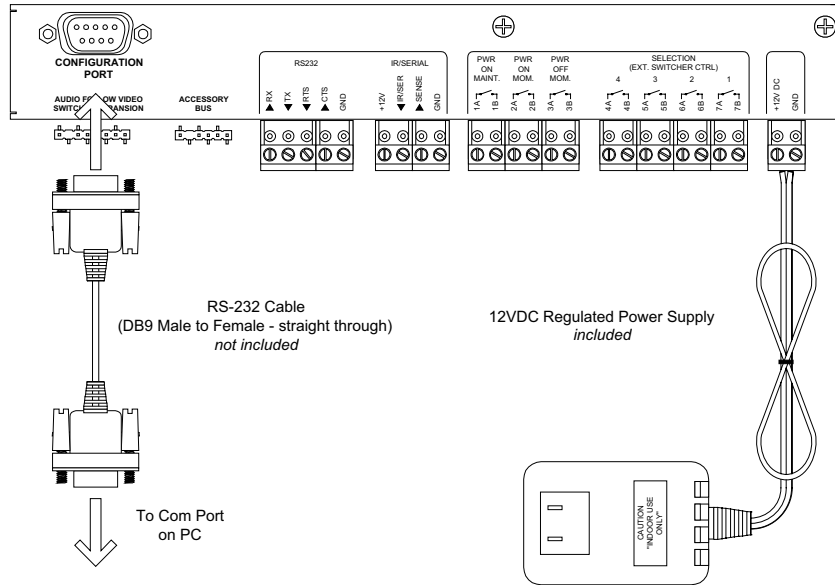


Figure 3: Connecting the SmartPanel to your computer

## Specifying a Com Port

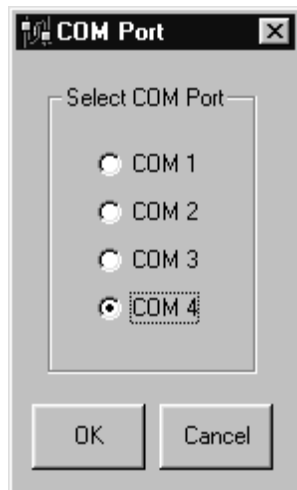


Figure 4: Selecting the Com Port

Before configuring the **SmartPanel** you must specify the **Com Port** you are using to connect to it.

When you run the **Configuration Utility** for the first time the dialog shown in **Figure 4** will appear. Select the Com Port you are using and press **OK**.

**Note:** The dialog does not allow you to select a Com Port that is disabled or being used by another program.

The Utility remembers the port selected and uses it in subsequent sessions. If you later attach to the Panel through a different port, change the active port with the **Configuration Utility's Communications** pulldown.

After a Com Port is selected, the Utility should appear as shown in **Figure 5**.

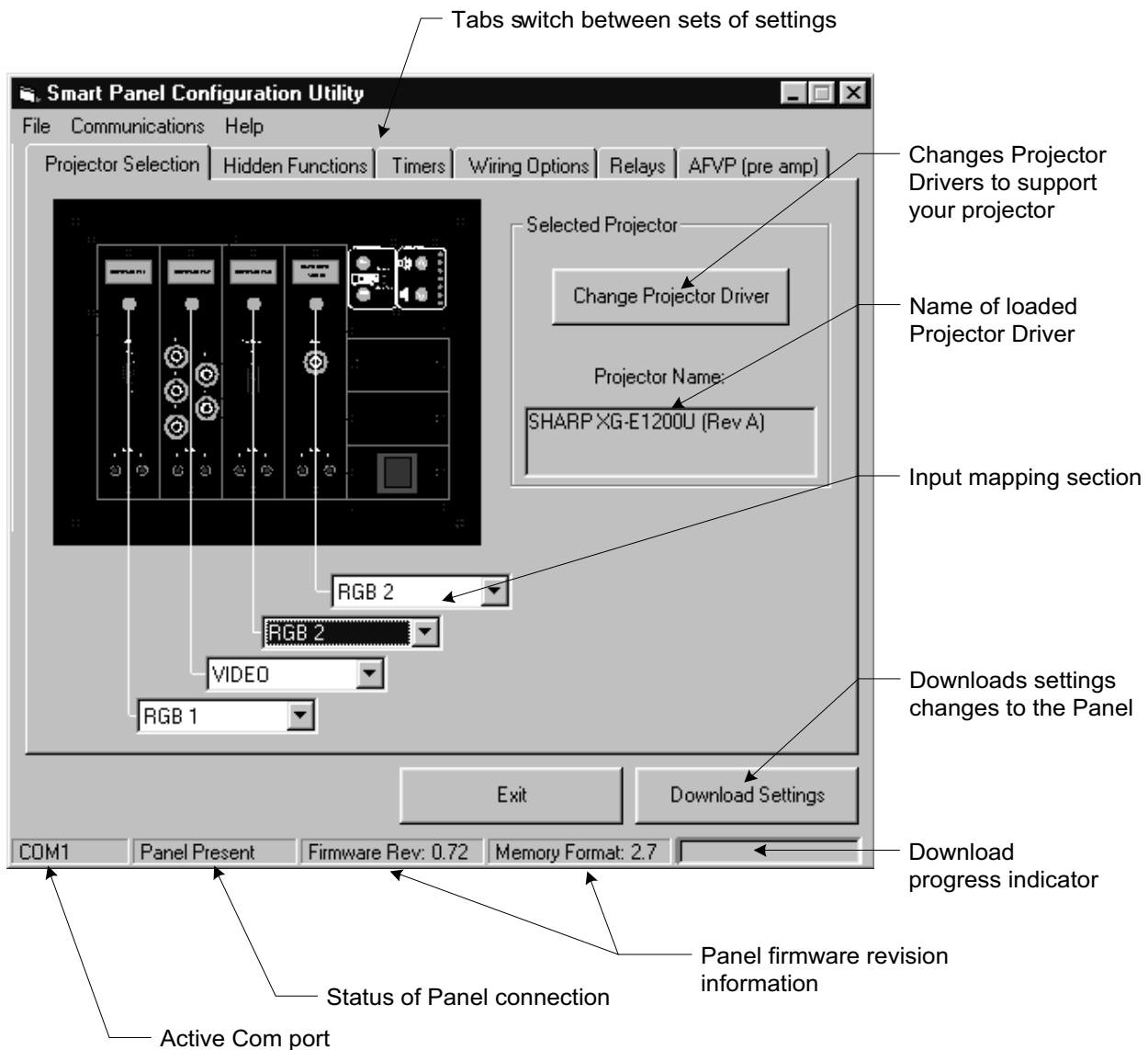


Figure 5: The Configuration Utility

## Using the Configuration Utility

The **Configuration Utility** configures your **SmartPanel** to work with your projector and lets you tailor its behavior for your installation. Panel configuration consists of:

- selecting a Projector Driver,
- setting configuration options, and
- downloading changes to the Panel.

## Changes must be downloaded

Changes made with the Utility are *not* sent to the Panel until you hit the **Download Settings** button. Do not expect to see any changes in Panel behavior until changed settings are downloaded to the Panel.

### The status bar

The status bar at the bottom of the Utility window provides feedback on the current state of the Utility (and Panel, if it is connected and detected).

The first field, farthest to the left, identifies which Com Port the Utility is using to connect to the Panel.

The second field from the left indicates the Panel's connection status, as follows:

- **Panel Present** indicates that the RS-232 cable is correctly connected to the Panel.
- **Connected** indicates that the RS-232 cable is connected to a device, but that it does not appear to be a **SmartPanel** (this can happen if the Panel is connected but not powered).
- **Not Connected** indicates that the RS-232 cable does not appear to be connected to any device.

**Note:** When the **Configuration Utility** does not detect any Panel on the active Com Port the **Download Settings** button is disabled.

The rightmost field provides feedback on any download in progress. The remaining fields display version information about the attached Panel. These fields are discussed in the sections that follow.

### Panel settings are retrieved by the Configuration Utility

The Utility retrieves the current settings of any Panel connected to the computer.

When the connected Panel's current settings are retrieved, the third and fourth fields in the status bar display the firmware and memory format revision numbers of the Panel for customer support use.

After Panel settings are retrieved, the Utility opens the **Projector Driver** file *last downloaded* to the Panel. If this Driver is not in the directory into which the Utility was installed, a dialog labeled **Open Proj File** will appear and prompt you to find the Driver (.prj) file.

If you know where this file is, identify it. If it is not available (for example, because the Panel was originally configured with a different computer), press **Cancel**.

Once Panel settings are retrieved you can examine and modify them as described in **Part II - Configuring and Using the Panel**.

**Note:** Do not change configuration settings when no Panel is connected, or before Panel settings are retrieved. *Changes made before connecting the Panel (or before the Panel is recognized by the Utility) will be overwritten if existing settings are retrieved.*

## How to download settings

Configuration changes are saved to the Panel with the **Download Settings** button, found in the lower right corner of the **Configuration Utility**. Downloading is only possible after the Panel is correctly connected and its existing settings have been retrieved.

While downloading the cursor becomes an hourglass, and a bar graph indicator (at the lower right of the Utility) flushes to indicate progress. Downloading should take no more than thirty seconds.

After a successful download, the Panel resets itself. Changes are effective as soon as a download finishes and the Panel resets. If for some reason the Panel does not reset, you should download again.

Occasionally, communications may fail during downloading. If any errors occur during download, try downloading again. If you are unable to successfully download, make sure the Panel has been detected.

If you never successfully download, put the Panel in download-only mode as described below.

**Note:** Future revisions of the **Configuration Utility** software will allow users to save copies of Panel configuration settings on the PC, but this is not supported in the initial release. Check the SP Controls website for new versions.

**Note:** The **AFVP** tab of the Utility is active only when an **Audio Follow Video Preamp** is connected to the Panel. The Panel automatically detects whether a Preamp is present.

## Download-Only Mode

The **SmartPanel** has a **download-only mode** to ensure it can always be configured or updated. In this mode, the Panel does not communicate with the projector<sup>1</sup>. The only communication allowed while the Panel is in download-only mode is the downloading of configuration or driver changes.

Download-only mode allows reconfiguration of the Panel should configuration memory become corrupted. Reconfiguration is essential in these cases, as corrupt memory disrupts control of the projector and may in rare cases cause serious Panel behavior problems such as “freezing.”

When in download-only mode the Panel the red **Warm-Up** indicator LED blinks continuously while the Panel is on<sup>2</sup>.

The Panel *automatically* places itself in download-only mode if it detects any of a variety of special conditions, such as corrupted configuration memory, or firmware compatibility problems.

<sup>1</sup> RS-232 power polling is suspended while the Panel is in download only mode.

<sup>2</sup> Blinking of the **Warm-Up** indicator when the Panel is *off* indicates that the projector is cooling; see **The Lockout Timer**.

### **Manually placing the Panel in download-only mode**

The Panel is *manually* placed in download-only mode by pressing and holding the **On**, **Off** and **Selection Four** buttons while applying power. This combination of keys was chosen because it is unlikely to occur by accident.

Manual activation of download-only mode facilitates reconfiguration should serious corruption of configuration memory occur.

### **Restoring normal operation after using download-only mode**

Download-only mode is exited by removing and restoring power to the Panel.

If download-only mode was entered automatically because a problem was detected by Panel firmware self checks, that problem must be remedied before the Panel will function normally. In most cases, re-downloading the appropriate Driver and configuration restores normal operation.

If the Panel is unable to complete a download session in download-only mode, or persists in automatically entering the mode whenever powered on, it may have developed hardware problems and require service.





# PART II - CONFIGURING AND USING THE PANEL

## PROJECTOR DRIVERS

### Selecting a Projector Driver

**Projector Drivers** contain information on the behavior, control requirements, and features of each projector the **SmartPanel** can control. The Panel uses Drivers to control different projectors and other display devices.

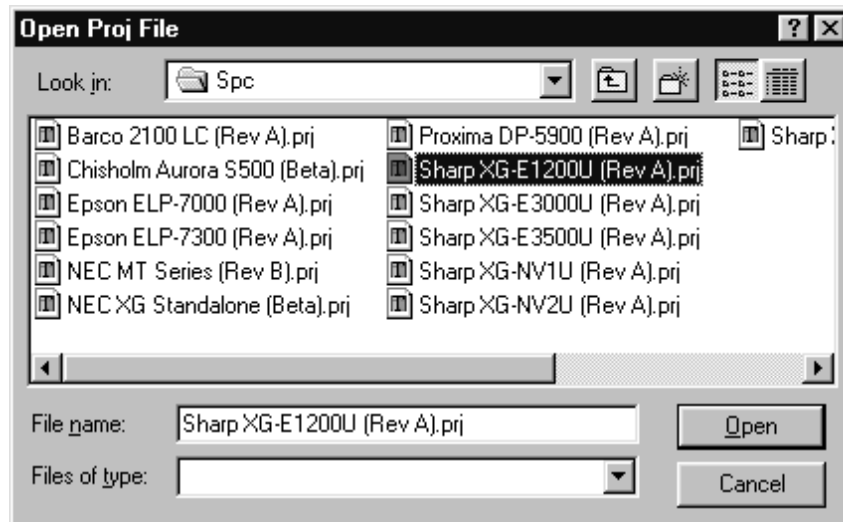
Drivers are distributed as **.prj** files. Drivers for several popular projectors are installed with the **Configuration Utility** during setup. New and updated Drivers are available at the SP Controls website (see **Contacting SP Controls**). The Panel is configured with a Driver at the factory<sup>3</sup>.

**Note:** We assume you verified that a Driver was available for your projector *before* designing for and purchasing a **SmartPanel**. However, new Drivers do become available as projectors enter the market.

To configure the Panel to work with your projector, change Drivers as follows:

- Connect your PC to the Panel and install the **Configuration Utility** as described above.
- Run the Utility and wait for the Panel to be detected and its settings retrieved.
- Press the **Change Projector Driver** button in **Projector Selection** (as shown in **Figure 8**).

An **Open Proj File** dialog will appear as shown in **Figure 6**.



**Figure 6: Projector Driver selection dialog**

<sup>3</sup> When this manual was written, the Panel was shipped configured for the **Sharp XG-E3000U**.

The dialog opens on the directory into which the Utility was installed (by default, `\Program Files\SPC\`). This directory is where Drivers are installed during Utility setup. When you download new drivers from the website, you should place them in this directory.

Select a Driver from the list and press **Open**. The new Driver is loaded into the Utility, which should then display the Driver's default settings. The new Driver and settings are *not* sent to the Panel until you download.

Press **Cancel** if you decide not to load a Driver. Current settings will remain unchanged.

**Note:** Changing the Projector Driver does *not* affect settings for relays or the **Audio Follow Video Preamp**.

#### Example 1: Selecting a Projector Driver

In this example, you configure your Panel with the *Sharp XG-E1200U* Driver.

To configure the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- make sure the **Projector Selection** tab is showing;
- click the **Change Projector Driver** button;
- in the dialog that appears, select the Driver named **Sharp XG-E1200U**, as shown in **Figure 6<sup>4</sup>**;
- press the **Open** button;
- wait for the Driver file to load into the Utility, as shown in **Figure 8**;
- optionally, adjust configuration settings as necessary;
- download the new settings by clicking **Download Settings**.

The Panel will now send control commands and use timers appropriate to the Sharp XG-E1200U.

## Projector Driver Application Notes

Every Projector Driver has a **Projector Driver Application Note**. This document describes:

- the default configuration settings specified by the Driver,
- requirements for wiring to and controlling the projector (e.g., RS-232 cable pinouts), and
- any known problems with the projector, or side effects of using specific features.

Always read the Application Note for tips and advice on using the Panel with the supported projector. We put our time into the Application Notes so you don't waste yours learning every detail of every projector.

**Note:** When you select a Driver and open it, the Driver's default configuration is loaded, *even if the Panel is already configured for that Driver*. This allows you to restore a Driver's default settings.

<sup>4</sup> The Drivers listed in the dialog vary depending on which Drivers you have installed.

## Projector Drivers and Application Notes on the Website

SP Controls, Inc. is continually creating and updating Drivers. New projector models are released, the Panel is installed to control legacy projectors, and existing Drivers are improved as we receive feedback from installations in the field.

To get the latest Drivers and their Application Notes, visit the SP Controls, Inc. website at:

<http://www.spcontrols.com>

At the site, visit the *Downloads and Support* section, and select *Projector Drivers*. Instructions for downloading and installing Drivers and Application Notes are available on the site itself.

You can also download the Configuration Utility, this *Guide*, and other useful documents.

**Note:** *Always* check the website for new and updated Drivers *before* doing an installation!

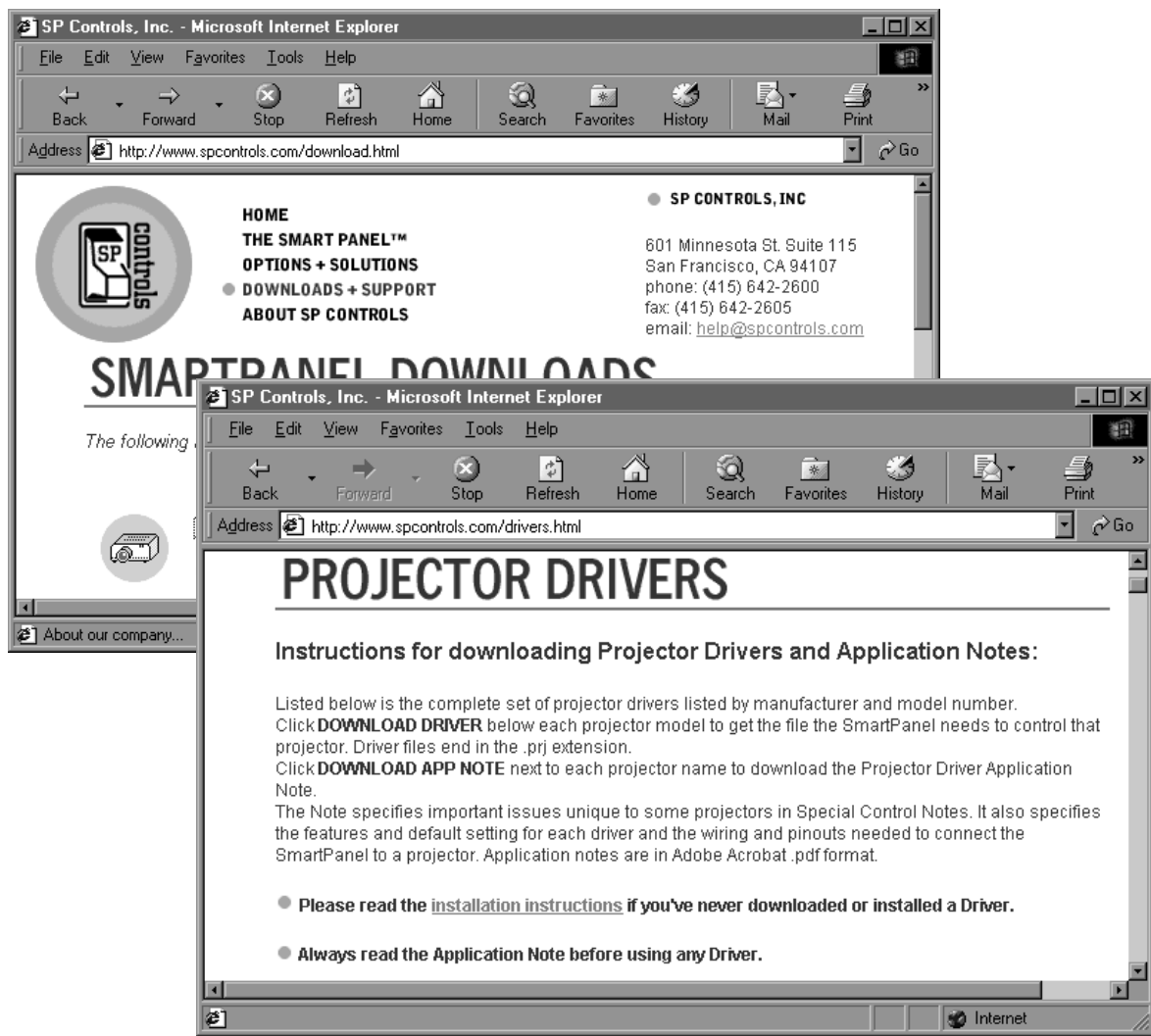


Figure 7: The latest Drivers are always available on the SP Controls, Inc. website

## INPUT SOURCE SELECTION AND INPUT MAPPING

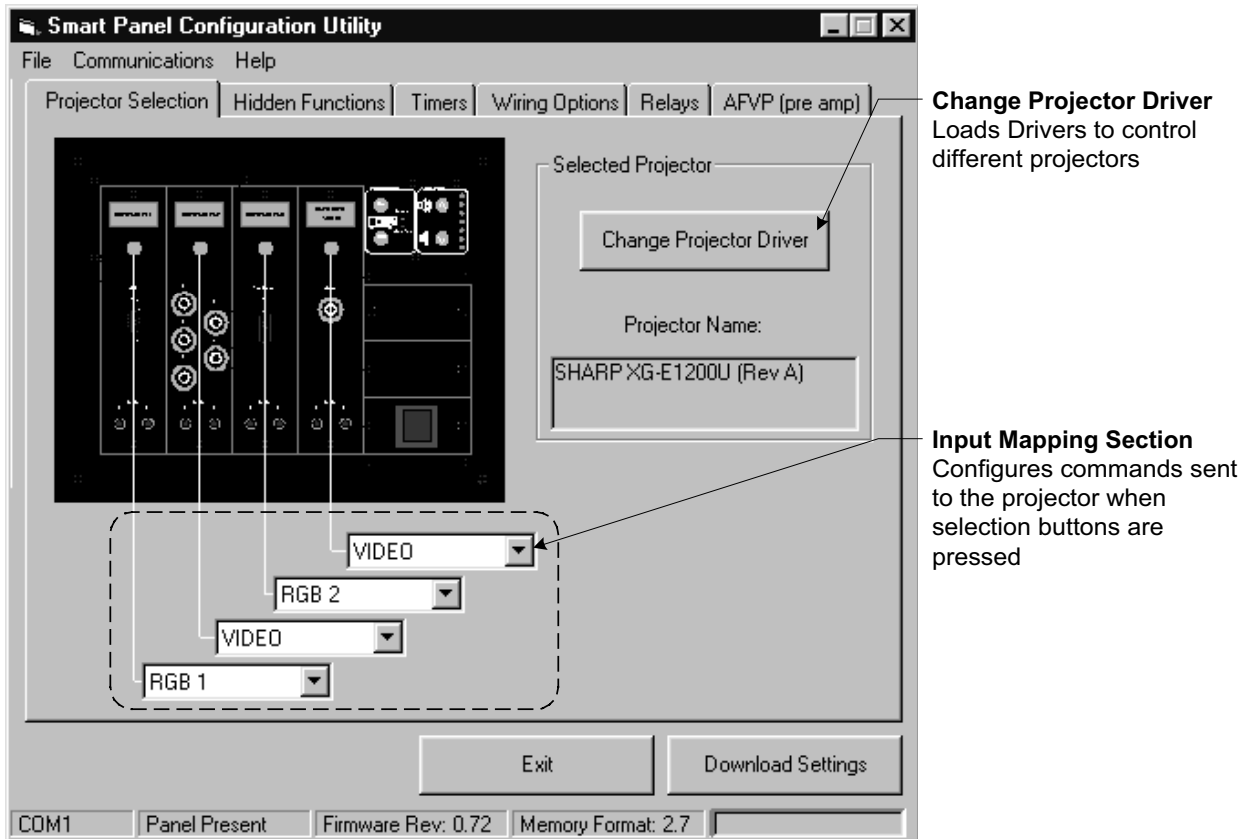


Figure 8: Input Mapping and changing the Projector Driver

### Using the Panel to Select Input Sources

The **SmartPanel** makes changing the projected input source easy and intuitive.

To change the projector source, press one of the Panel's four **selection buttons**.

**Note:** The **SmartPanel** is *not* a switcher; it is a control system. The Panel controls input source selection by directing the *projector* to switch between *the projector's* inputs, or by controlling external switchers with its selection relays.

## What input source selection does from the installer's perspective

The projector (and any external switcher) is controlled with the four selection buttons.

When a selection button is pressed, the Panel:

- sends a command to the projector, telling it to switch inputs;
- opens and closes **selection relays** on the Panel to control third-party switchers<sup>5</sup>; and
- brightens the appropriate Legend to show the new selection.

This section explains how these behaviors are configured.

## Mapping Projector Inputs

**Input mapping** is the process of configuring the Panel to send the projector particular input source selection commands when selection buttons are pressed.

For a discussion of coordinating input mapping with selection relays controlling external switchers, see the end of this section (a complete treatment is found in **Selection Relays**).

### Why inputs must be mapped

The command sent when a selection button is pushed must be configured because there is *no fixed relationship between the Panel's selection buttons and the projector's inputs*.

We could have made selection button one *always* switch the projector Video, and selection button two correspond to *RGB*, but this was a bad idea.

This is true because:

- different projectors have different *numbers* and different *types* of inputs, not to mention different conventions on how sources are labeled and selected;
- the large **SmartPanel** Modules are designed to be arranged in any order, while the selection buttons occupy fixed locations on the Panel;
- every installation has different input source *devices* to switch between; and
- several selectable sources may use the *same* input at the projector, and be switched by a third-party switcher.

### How to map inputs

The **Configuration Utility** allows you to specify which of a projector's inputs is switched to when each selection button is pressed.

As shown in **Figure 6**, each selection button is graphically associated with a projector input. The input associated with, or *mapped* to, a particular selection button is shown in the box called out for that button. The input displayed for each selection button is the one the projector is instructed to switch to when that button is pressed.

---

<sup>5</sup> The **Audio Follow Video Preamp** provides is configurable to provide 4x1 composite video or 2x1 S-Video switching . See **Video Switching with the Audio Follow Video Preamp**.

To change a button's input mapping, click the input box associated with it. A list of the projector's built-in inputs appears in the form of a pulldown list box. Inputs vary by projector model; for a list of the inputs available on a specific model of projector, see the **Projector Driver Application Note** that accompanies the projector's Driver.

The input list is identical for each of the four buttons. Any button can be mapped to any projector input.

**Note:** A button can be mapped to any input regardless of how the other buttons are mapped. When more than one button is mapped to the same projector input, an external switcher must be used to switch between source devices; the Panel's selection relays can control this switcher.

**Note:** The Modules shown on the **Configuration Utility** panel graphic do *not* change during input mapping. There is no fixed correspondence between projector inputs and Modules.

### **A note on using relays to control an external switcher**

External switchers are commonly used when multiple input sources are mapped to a single projector input. We assume you are familiar with using switchers in this fashion.

The **SmartPanel** can control external switchers (such as those manufactured by Altinex™) with its configurable, low-voltage **selection relays**. These relays close according to the active selection and can be configured for either momentary or maintained closure.

See **Selection Relays** below for specifics on how to use selection relays to control an external switcher.

**Note:** An external switcher may be unnecessary when using the **Audio Follow Video Preamplifier**, as it provides 4x1 composite video or 2x1 S-Video switching. See **Video Switching with the Audio Follow Video Preamp**.

**Example 2: Mapping Inputs**

In this example, you configure your Panel input mappings for an installation using a Sharp XG-E1200U. You map input one to *RGB 1*, input three to *RGB 2*, and inputs two and four to *VIDEO* as shown in **Figure 8**.

Since this installation uses two video sources and the Sharp has only one video input, we'll assume you're using an external switcher or the **Audio Follow Video Preamplifier** to switch video before it reaches the projector's VIDEO in. We also assume that the Panel has been configured with the `Sharp XG-E1200U.prj` Driver as shown in **Example 1**.

To configure the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **Projector Selection** tab;
- click in the Input One list box; from the list that appears, select *RGB 1*;
- click in the Input Two list box; from the list that appears, select *VIDEO*;
- click in the Input Three list box; from the list that appears, select *RGB 2*;
- click in the Input Four list box; from the list that appears, select *VIDEO*;
- download the new settings by clicking **Download Settings**.

The Panel's selection buttons one and three will now make the Sharp switch to its RGB 1 and RGB 2 inputs respectively. Selection buttons two and four will now *both* make the Sharp switch to the input wired to VIDEO.

**Figure 9** shows how a Panel with inputs mapped in this fashion might be assembled.

## Coordinating Input Mapping with Modules and Legends

The following elements must be kept consistent while configuring and assembling your Panel:

- the projector input mapped to each button,
- the Modules installed – their type and order,
- the Legend inserted for each Panel button, and
- the selection relays settings that control any external switcher.

### Module Placement for the Large Chassis

We assume that if you are using the full-size **SmartPanel (SP2-CHAS)**, you already have the Modules for your installation. A discussion of Modules is included in **Modules and Legends**, below.

Module arrangement is a decision you and your client make together. We strongly recommend discussing the arrangement of Modules with your clients – especially those that will actually use the Panel – before installation.

There is no “default” or “standard” order for Modules, since every installation has different users, devices, and Modules.

## Auxiliary Patch Point Placement for the Small Chassis with Rack Mount Kit or Drawer

We assume that if you are using the control-only **SmartPanel** (*SP2-SMCHAS*) with the *SP2-RACKSM-MOD* Modular Rack Mount Kit or *SLB-1050B* Slide Out Drawer, you already have the Auxiliary Patch Points for your installation. A discussion of Patch Points is included in **Auxiliary Patch Points** below.

Auxiliary Patch Point arrangement on a rack mount or drawer is a decision you and your client make together. We recommend discussing the arrangement of Patch Points with your clients – especially those that will actually use the Panel – before installation.

There is no standard order for Auxiliary Patch Points, since every installation has different users, devices, and Patch Points.

## Making it All Work Together

The Legends inserted during assembly should identify the source associated with each permanently installed device (such as “VCR” or “DVD”), and the type of input for any Module (such as “Aux Video” or “Laptop”). See **Inserting Legends** for instructions on inserting the Legends.

If an external switcher is used, the Panel must be configured to control it. See **Relays** below for details on how to configure the Panel to control an external switcher.

Finally, your wiring (e.g., of patch points and permanent source devices to the projector) must be consistent with your configuration choices.

Be sure to document all the choices you make for your future reference. It’s a good idea to provide the client with a copy of the Panel’s configuration details, in case someone else updates or troubleshoots the room in the future.

**Note:** In our experience, mistakes are minimized if the person who assembles and installs the Panel also configures it!



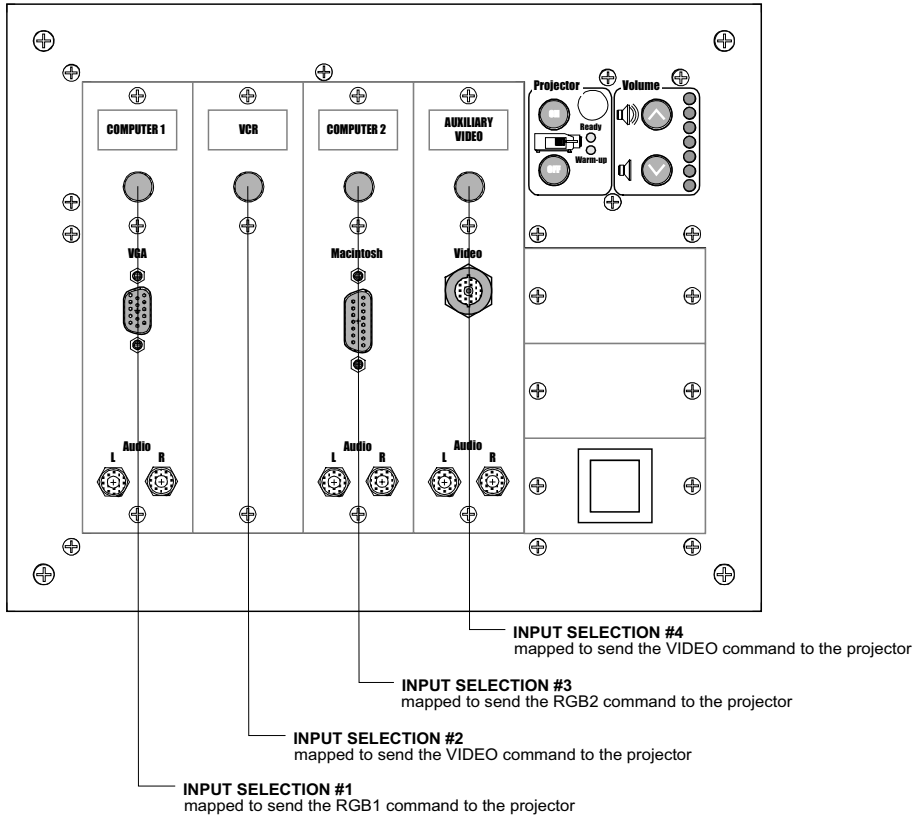


Figure 9: Example coordination of Input Mapping with Modules and Legends

# HIDDEN FUNCTIONS

The **SmartPanel** can control more than volume, input selection, and power. Up to seven additional commands can be mapped to the buttons on the Panel. These commands, called **hidden functions**, let users access advanced projector features.

Typical hidden functions in today's installations include on-screen menus, Picture-in-Picture, digital zoom, image adjustment and lens controls.

Hidden functions are used by pressing *and holding down* the **On** button, then pressing another Panel button. The **On** button is used as a "shift" key.

Hidden functions are mapped using the **Configuration Utility** and are provided on a projector-by-projector basis. The Application Note for each Projector Driver lists the functions available for that projector, and specifies the Driver's default hidden function configuration.

Hidden functions are one of the most powerful features of the Panel.

**Note:** When a button is pressed while the **On** button is held down, it does **not** perform its normal function; i.e., pressing **[On]-Volume Up** does not raise volume, it sends the hidden function (possibly none) configured for **Volume Up**.

## Why functions are hidden

Power, volume, and input selection are appropriate controls for everyday users.

However, there is occasional need to access advanced projector functions. Installers, for example, need access to lens controls (to focus and adjust the projector), and power users sometimes want to use digital zoom, or adjust how the projector syncs to their laptop.

Hidden functions provide for this sort of advanced control without compromising the simplicity of the Panel's interface. Remember, one of the main goals of the Panel is to make controlling a projector simple and easy for the everyday user.

We strive to provide a rich enough set of hidden functions for each projector that remote controls needn't be used alongside the Panel.

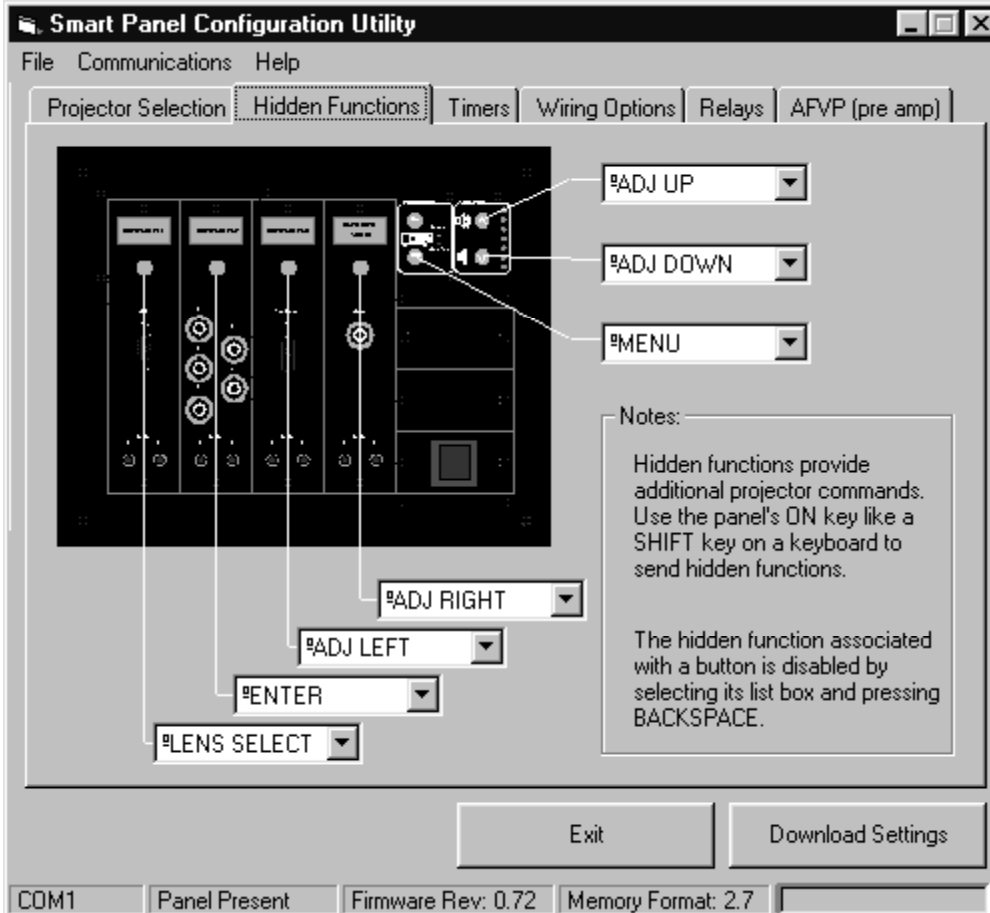


Figure 10: Hidden Functions

## Mapping Hidden Functions

The configuration process for hidden functions is identical to input selection mapping (see **Mapping Projector Inputs**).

As shown in **Figure 10**, each Panel button except **On** can be associated with a projector command on the **Hidden Functions** tab of the **Configuration Utility**. The command *mapped* to a particular button is shown in the box called out for that button. The command displayed in each box is the one sent to the projector when the button is pressed while **On** is held down.

To change a button's hidden function mapping, click the input box associated it. A list of the projector's available hidden functions appears in the form of a pull-down list box. This list is identical for each button; any button can be mapped to any command regardless of the other mappings.

**Note:** It often makes sense to use one set of hidden functions during installation (e.g., which access projector lens controls such as focus, zoom, and orientation), and another set after installation for power-users (e.g., on-screen menu functions to let power users adjust scan rates or horizontal and vertical correction for their laptop).

**Note:** The hidden functions provided vary from projector to projector. See a projector Driver's **Application Note** for a list of hidden functions available for that projector.

## Mapping No Hidden Function

To specify that no hidden function is to be associated with a particular button, click in the button's input box and press **Backspace**. A blank box indicates that no hidden function command is to be sent.

**Note:** Removing all the hidden function mappings is useful when you want to ensure users don't inadvertently adjust projector settings such as focus and zoom.

### Example 3: Mapping Hidden Functions

In this example, you configure your Panel's hidden functions mapping for an installation using a Sharp XG-E1200U. You map hidden functions to allow use of the Sharp's built-in on-screen menus, as shown in **Figure 10**.

We assume that the Panel has been configured with the `Sharp XG-E1200U.prj` Driver as shown in **Example 1**.

To configure the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **Hidden Functions** tab;
- click in the Volume Up list box; from the list that appears, select *ADJ UP*;
- click in the Volume Down list box; from the list that appears, select *ADJ DOWN*;
- click in the Power Off list box; from the list that appears, select *MENU*;
- click in the Input One list box; from the list that appears, select *LENS SELECT*;
- click in the Input Two list box; from the list that appears, select *ENTER*;
- click in the Input Three list box; from the list that appears, select *ADJ LEFT*;
- click in the Input Four list box; from the list that appears, select *ADJ RIGHT*;
- download the new settings by clicking **Download Settings**.

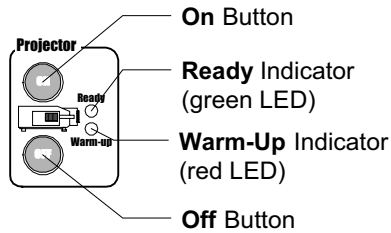
The Panel can now access features normally provided only through the remote control!

While holding **On** down, press **Off**. The Sharp's on-screen menu should appear. While the menu is visible, the four *ADJ* functions (**On** plus the Volume and two leftmost selection buttons) let you navigate through the menu. *ENTER* (**On** plus selection button two) selects menu options.

*LENS SELECT* (**On** plus selection button one) allows adjustment of lens effects such as Focus and Zoom, again with the *ADJ* functions.

**Note:** The hidden functions available vary by projector model. We can only provide hidden functions to access the features built-in to each projector.

# PANEL AND PROJECTOR POWER



**Figure 11: Power controls and indication**

## Power Controls and Indication

The Panel's **power buttons** are easy to use:

- To turn the projector on, press the **On** button.
- To turn the projector off, press the **Off** button.

The Panel powers itself on and off to match projector power. Projector power is verified using RS-232 polling or via third party power current sensors.

## Power States

### Projector power is more complex than on and off

It would be nice if on and off were all there was to projector power. However, contemporary projectors have power cycling complexities that can confuse users accustomed to the straightforward behavior of consumer audio-visual devices. The most awkward of these complexities are projector warm-up time, and the minimum prudent time between bulb-off and bulb-on cycles.

In our experience, user confusion about power states arises as a result of:

- not knowing the power states a projector can be in,
- not knowing the control possible in each power state, and
- uncertainty as to which power state a projector is actually in.

Additional complications arise because every projector handles power states in a slightly different way.

The sections that follows explain how the Panel manages projector power states.

### Projector Power States

**Table 2** lists the power states we have identified, and upon which we based Panel behavior. This list should clarify our treatment of Panel and projector power in the sections that follow.

**Note:** Download-only mode is a special Panel mode with no relationship to projector functioning; it is included for comparison of Panel display. See **Download-Only Mode** for more information.

Power State	Description	Configurable Delay?	Panel Display	Panel Buttons Active
Off			None.	<b>On</b>
Waiting for strike	Delay between power-on request and bulb striking.	No	<b>Warm-Up</b> indicator lit. Input selection Legends back-lit.	None
Warm-Up	Delay before the image reaches full brightness.	No	<b>Warm-Up</b> and <b>Ready</b> indicators lit. Input selection Legends back-lit.	All
On			<b>Ready</b> indicator lit. Input selection Legends back-lit.	All
Lockout	Delay after power-off, before projector may be turned on again.	Yes	None. <b>Warm-Up</b> indicator blinks if <b>On</b> is queued.	<b>On</b> <sup>6</sup> <b>Off</b>
<i>Download Only</i>			<b>Warm-Up</b> indicator blinks while Panel is powered on.	All <sup>7</sup>

Table 2: Projector power states

## Panel vs. Projector Power

The Panel attempts to remain in sync with the Projector it controls at all times. When the projector is on, the Panel should be on, and vice versa. Therefore, “Panel power” and “projector power” are used somewhat interchangeably.

## Power Status Indicators

Projector power states are generally communicated to the user with indicators on the projector itself. However, these indicators (usually LEDs) are invisible to anyone holding a remote twenty feet away.

To alleviate user confusion about power states, there are two power status indicators on the **SmartPanel** that communicate the projector’s power state:

- a red LED acts as a **Warm-Up** indicator, and
- a green LED acts as **Ready** indicator.

The **Ready** indicator comes on when the Panel believes the projector is on and controllable. It stays on as long as this is believed to be the case.

**Note:** When the Panel is waiting for the projector bulb to strike the **Ready** light remains dark and the projector cannot be controlled. Most projectors do not accept control during this time.

<sup>6</sup> During lockout, the power-on command is *queued*; it is not sent until delay expires. Pressing **Off** cancels queued power-on requests.

<sup>7</sup> In download-only mode, no communication takes place with the projector; therefore, buttons perform only cosmetic functions (e.g., selecting an input changes the input displayed on the Panel, but not command the projector to switch inputs). Relays, however, function normally.

## The Warm-Up Timer

The **Warm-Up** indicator lights up while the projector is warming up. The indicator is intended to reassure users that the projector is coming on and all is well, even if the projected image is not yet visible or at full brightness.

Warm-up time varies by projector model and is not configurable. Each projector is timed; we include this information in the **Projector Driver**.

When the projector has been on long enough for the image to be visible and at or near full brightness, the **Warm-Up** indicator goes off.

**Note:** The Panel receives no feedback from the projector as far as image brightness goes, so the accuracy of warm-up timing may vary depending on your projector and bulb age, etc..

## The Lockout Timer

The Panel has a configurable **lockout timer** that protects the projector during its cooling cycle.

The timer prevents users from re-powering the projector after it has been turned off for a specified amount of time. The “lockout time” is the number of seconds that the projector is allowed to cool after being powered off, before the lamp can be re-struck.

### How the Lockout Timer affects users

When necessary, the **Warm-Up** indicator blinks to warn users they are prevented from requesting power-on.

If a user presses **On** while the lockout timer is active, the **Warm-Up** indicator begins blinking and the power-on command is buffered, instead of being sent. Once a power-on request is buffered, the **Warm-Up** indicator continues blinking until:

- the lockout timer expires and the power-on request is sent to the projector, or
- the user presses **Off** to cancel the request.

*We strongly discourage* changing the factory default for lockout time, which is determined on a projector by projector basis.

However, lockout time is configurable. Setting the lockout time to one second (the shortest allowable delay) effectively disables the lockout feature.

**Note:** Lockout time is particularly important for projectors that use metal-halide bulbs. *Re-striking a hot metal-halide bulb significantly decreases its life span.*

**Note:** Some projectors have internal lockout timers to prevent rapid power cycling. Disabling the Panel's lockout timer may allow situations to occur in which the Panel believes and acts as if the projector is on, when it is really off. *We strongly discourage* configuring the Panel in any manner that allows the projector and Panel to get out of sync.

#### Example 4: Configuring the Lockout Timer

In this example, you adjust the lockout timer to sixty-five seconds, as shown in **Figure 12**.

To configure the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **Timers** tab;
- click in the **Lockout Timer** value box, and type 65;
- download the new settings by clicking **Download Settings**.

The Panel will now prevent users from turning the projector on within sixty-five seconds of turning it off. Trying to turn the Panel on during this time will queue the power-on command, but not send it until the timer expires.

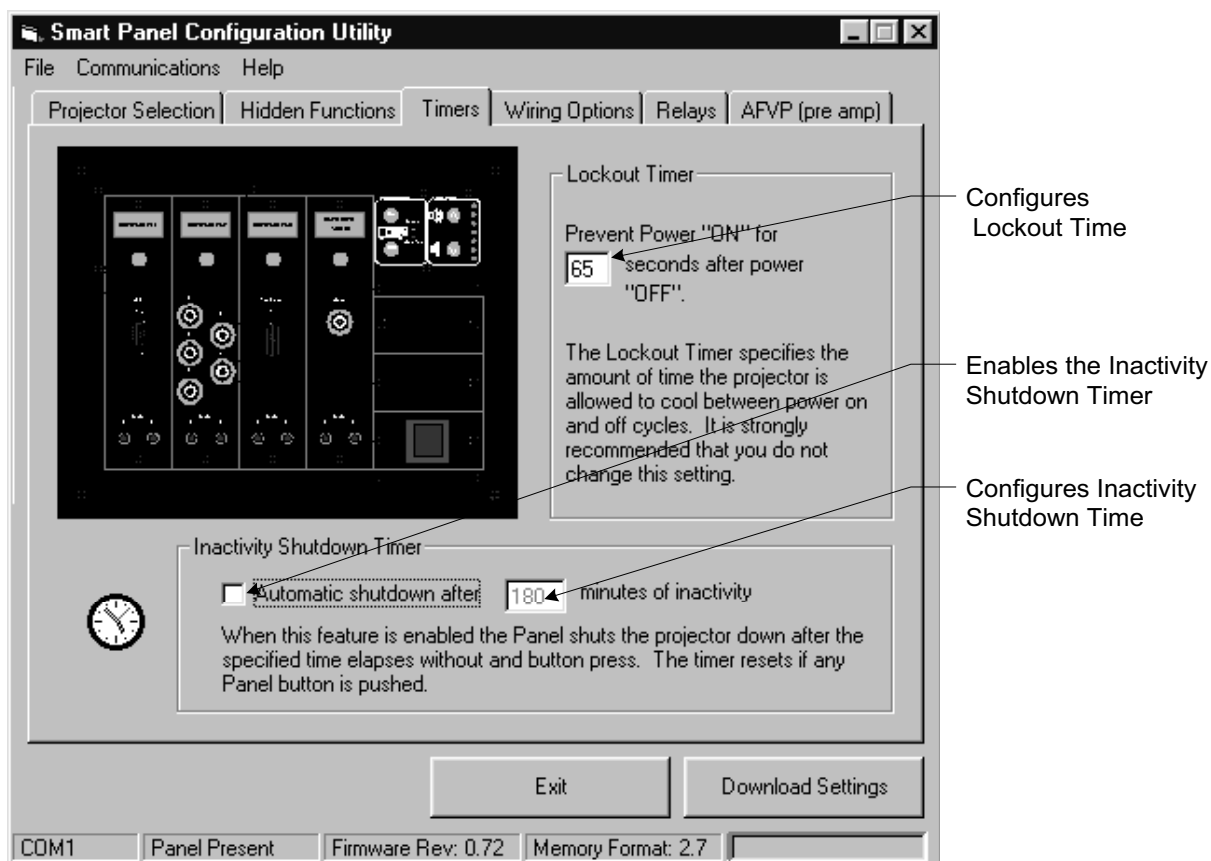


Figure 12: The Lockout and Inactivity Shutdown Timers

## The Inactivity Shutdown Timer

The **Inactivity Shutdown Timer** lets the Panel shut itself and the projector off *automatically*, if a specified time passes during which no Panel button is pressed. This is useful in situations in which the projector might be accidentally left on.



By default this feature is disabled. When enabled, feature works as follows:

- While the Panel is on, a timer keeps track of the elapsed time between button presses.
- Whenever a Panel button is pressed, the timer is reset to zero.
- If the timer ever reaches the time specified by the installer, the Panel turns itself and the projector off, exactly as if the Panel **Off** button were pressed.

Like the lockout timer, inactivity shutdown is a bulb saving feature.

## Configuring the Inactivity Shutdown Timer

The Inactivity Shutdown Timer is configured with the **Configuration Utility** as shown in **Figure 12**. By default the timer is disabled.

The delay before automatic shutdown is configurable in minute increments. The timer can be configured to shut off the projector as long as 500 minutes (eight hours and twenty minutes) after the last Panel button is pressed.

As a rule of thumb, the timer should be configured with a delay at least half an hour longer than any anticipated projector use. For example, if the projector will be used during ninety minute classes, the timer should be set for at least two hours.

## How the Inactivity Shutdown Timer affects users

It is important to discuss the Inactivity Shutdown Timer with your client *before* enabling it, since when it is enabled the Panel shuts off the projector when the timer expires *even if a source is being projected*.

We recommend letting your client decide how this feature should be configured. Making sure the client knows how this feature works minimizes the chance of unpleasant surprises and support calls. It is particularly important to discuss whether situations will arise when projectors will be used for long periods without control being necessary (for example, to project a campus network feed).

**Note:** Shutdown *cannot* be configured to occur based on time of day.

**Example 5: Configuring the Inactivity Shutdown Timer**

In this example, your client asks to use the Inactivity Shutdown Feature. You discuss the matter and decides that the projector should shut off after three hours without a button press, as shown in **Figure 12**.

To configure the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **Timers** tab;
- enable the timer by clicking to check the **Inactivity Shutdown Timer** checkbox;
- click in the **Inactivity Shutdown Timer** value box, and type *180*;
- download the new settings by clicking **Download Settings**.

The Panel will now automatically shut itself and the projector off, if the projector is turned on and 180 minutes goes by without any Panel button being pressed.

To test this, turn the projector on and wait. If no buttons are pressed for an hour, the Panel will automatically turn itself and the projector off.

# PROJECTOR POWER STATUS FEEDBACK

**Smart Panel Configuration Utility**

File Communications Help

Projector Selection Hidden Functions Timers Wiring Options Relays AFVP (pre amp)

**PROJECTOR CONTROL**

RS232 IR/SERIAL

RX TX RTS CTS GND +12V IR/SER SENSE GND

Depending on the functions that you have selected, it may be necessary to wire both RS-232 and IR/SERIAL. If both are shown here, then you need to wire both.

**Power Status Feedback**

None  
 Current Sensor  
 RS232 Polling

Sets the method that the panel uses to determine if the projector is on or off. It is always good to use a feedback method to insure that the panel remains in sync with the projector.

**Control Wiring**

Wired Remote  
 IR Emitter

Indicates whether you will connect to the projector via a Wired Remote port or the IR squirt. The former is more reliable but can disable use of the handheld remote. Note: not all projectors have wired ports.

Exit Download Settings

COM1 Panel Present Firmware Rev: 0.72 Memory Format: 2.7

Callouts:

- Configures Panel to use no power status feedback
- Configures Panel to use a Current Sensor (must be wired) for feedback
- Configures Panel to use RS-232 (must be wired) for feedback
- Configures Panel to send Wired Remote signals
- Configures Panel to send IR signals (use included IR Emitter)
- Graphical indication of required control wiring for your configuration

**Figure 13: Power Status Feedback and Control Wiring**

You have probably encountered control systems that show devices as on when they are off or vice versa. This usually happens when control systems receive no feedback from the devices they control. Users dislike such systems, which they perceive as “lying” to them.

Therefore, we *strongly recommend* that you configure the **SmartPanel** to use power status feedback. As shown in **Figure 13**, you can configure *whether* and *how* the Panel uses feedback to determine if a projector is on.

## How Power Status Feedback affects users

When configured for power status feedback, the Panel attempts to remain in sync with the projector. If the Panel is on, and it receives feedback suggesting that the projector is off, it turns itself off, and vice versa.

Remaining in sync is useful in the rare cases when a projector fails, a power command fails to reach the projector, or a remote control is used to switch the projector on or off instead of the Panel.

**Note:** Depending on your projector and configured method of power feedback, it may take up to thirty seconds for the Panel to detect a change in the projector's state and shut itself on or off. See the **Projector Driver Application Note** for your projector for any notes about this issue.

## Using RS-232 Power Polling

When **RS-232 Polling** is selected, the Panel receives power feedback from the projector by periodically sending it commands via RS-232 and analyzing the responses it receives.

We have found this type of feedback to be highly reliable. Polling has the additional advantage that no custom hardware or extra wiring is required.

**Note:** Fortunately it is becoming common for projectors to provide feedback about their power status via RS-232. However, RS-232 polling is not yet available for all projectors. Check the **Projector Driver Application Note** for your projector to determine if power polling is possible with your make and model.

## Using a Power Current Sensor

If you cannot or do not want to use RS-232 polling, a second option is to use a power **Current Sensor**. Such sensors are widely available from other manufacturers at nominal cost.

Power current sensors work by monitoring the current being drawn by a projector to infer when the projector is on and off. When the projector is on and therefore drawing a lot of power, the current sensor closes a low voltage relay. When this output is wired to the Panel, the Panel can tell when the Projector is on and off.

There are downsides to the use of power current sensors, in addition to the expense they add to an installation. First, they must be calibrated *at the installation under field conditions*, which can require experimentation. Second, as projector bulbs age or other factors at the installation change, the "sweet spot" can drift and the sensor may need adjustment. Finally, the sensor must be located at the projector, but its output must be wired back to the Panel, resulting in an additional wire run.

See **Control Wiring** for more information on how to connect a third-party sensor to the Panel.

## Doing without power feedback

A final option is to use no feedback at all. This option is chosen by selecting **None**.

Doing without power status feedback is *strongly discouraged*. We believe it is always a good idea to provide the Panel with feedback.

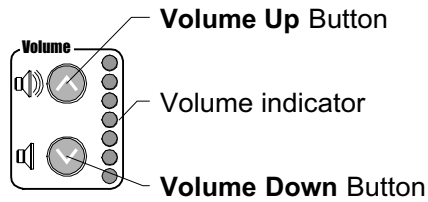
Consider the following examples of the situations that can arise when the Panel is unable to determine the power state of the projector:

- A projector automatically turns itself off after not receiving a valid video input for ten minutes (some models do this). The Panel continues to indicate that the projector is on.
- A user turns the projector on with a remote control. The Panel remains off and cannot control the projector.

These and similar cases should be avoided, since they undermine user trust in the Panel and installation as a whole.

**Note:** Some projectors use the same command for on and off. If you are using one of these projectors, the **Configuration Utility** forces you to select a feedback mechanism by disabling the *None* option. The side effects of getting out of sync with these projectors would be disastrous from a control point of view; the projector and Panel could remain indefinitely out of sync.

# VOLUME



## Volume Controls and Indication

The **SmartPanel** *volume controls* are easy to use:

- to increase volume, press the **Volume Up** button;
- to decrease volume, press the

**Volume Down** button.

**Figure 14: Volume control and indication**

Volume is indicated by the LED bar graph to the right of the volume buttons. Volume display can be *relative* or *absolute*.

The **SmartPanel** can control volume either through the projector's internal speakers or with an external audio solution. The former has the advantage of low cost; the latter provides considerably higher audio quality.

External audio solutions require the purchase, installation, and configuration of our optional **Audio Follow Video Preamplifier**. We believe the Preamplifier is extremely cost competitive, especially given the features it provides.

### Relative vs. absolute volume modes

The volume indicator (LED bar graph) displays volume **relatively** or **absolutely** according to the mode the Panel is in:

- In **absolute volume** mode, projector volume is always set to an exact level. The bar graph indicates volume like many other consumer devices (with the number of LEDs lit proportional to volume).
- In **relative volume** mode, the projector is simply told to *raise or lower* its current volume. The bar graph animates a "roll" to show that volume is being raised or lowered. When the up or down volume buttons are not being pressed, the bar graph does not show anything at all.

When using a projector's internal speakers, these modes depend entirely on the projector and are *not* configurable.

We provide absolute volume control wherever possible. However, some projector models and communication protocols do not support absolute level volume commands. In these cases, the Panel sends relative volume commands.

When using the **Audio Follow Video Preamplifier**, the Panel provides absolute volume control, unless it is configured for use as a switcher only<sup>8</sup>.

<sup>8</sup> When the **Audio Follow Video Preamplifier** is used as a switcher, and the projector is used for volume control, the Panel's volume mode depends on the *projector*.

**Note:** The **Projector Driver Application Note** for your projector indicates whether your projector supports absolute volume mode. Again, *volume mode depends on the manufacture's control interface to the projector; we have no control over this interface.*

**Note:** If your particular projector does *not* provide absolute control, but you require absolute volume feedback, you have the following options:

- rely on the on-screen display provided by the projector, if any;
- install an independent audio control system;
- use our optional **Audio Follow Video Preamplifier**.

## Using the Projector's Speakers

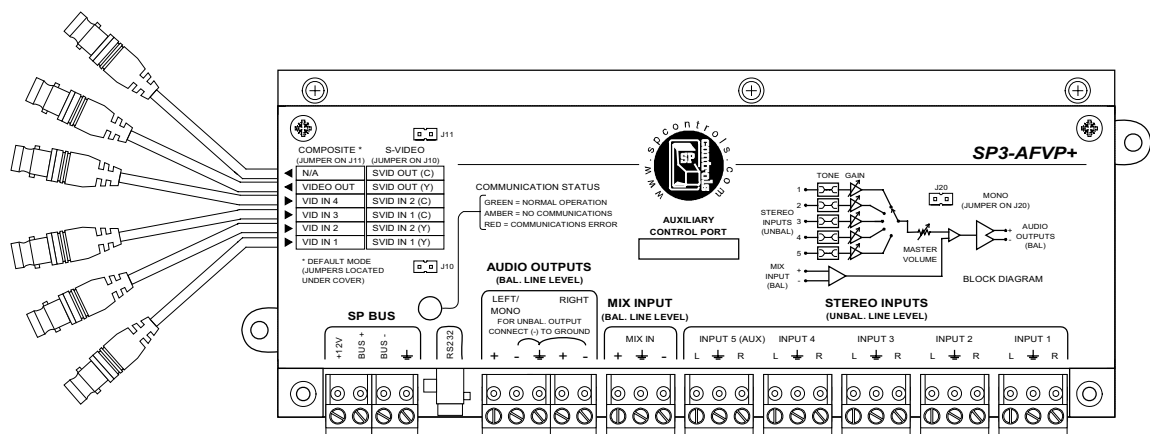
The simplest audio solution is to use your projector's internal speaker(s). By default, the Panel assumes that you wired audio to the projector, and sends volume commands to the projector.

We do not recommend using projector speakers for most installations, as their sound reproduction is generally mediocre. However, this is clearly the most cost-effective solution for clients who don't place a premium on sound quality.

Experience has proven that it's a good idea to demonstrate the sound quality of internal projector speakers *before* permanent installation.

## Using the Audio Follow Video Preamplifier

In many cases, sound quality superior to that of a projector's built-in speakers is desired. We designed the **SmartPanel** to accommodate such cases by offering a fully integrated accessory, the **SP3-AFVP+ Audio Follow Video Preamplifier**<sup>9</sup>.



**Figure 15: The SP3-AFVP+ Audio Follow Video Preamplifier (top view)**

<sup>9</sup> Model **SP3-AFVP+** replaces the discontinued **SP2-AFVP**. Configuration for both units is identical when used with the **SmartPanel**, except that the **SP2-AFVP** provided only composite video switching.

### When you need the Preampfier

You *must* purchase and install the Preampfier if your installation calls for an external audio solution. Two external audio solutions with which the Preampfier can be used are:

- self-powered speakers, and
- an external amplifier paired with speakers.

**Note:** The Panel chassis has no means of controlling volume itself; the Preampfier is offered as an option to give you more installation choices. This is appropriate as many installations do not need anything but the projector's audio system.

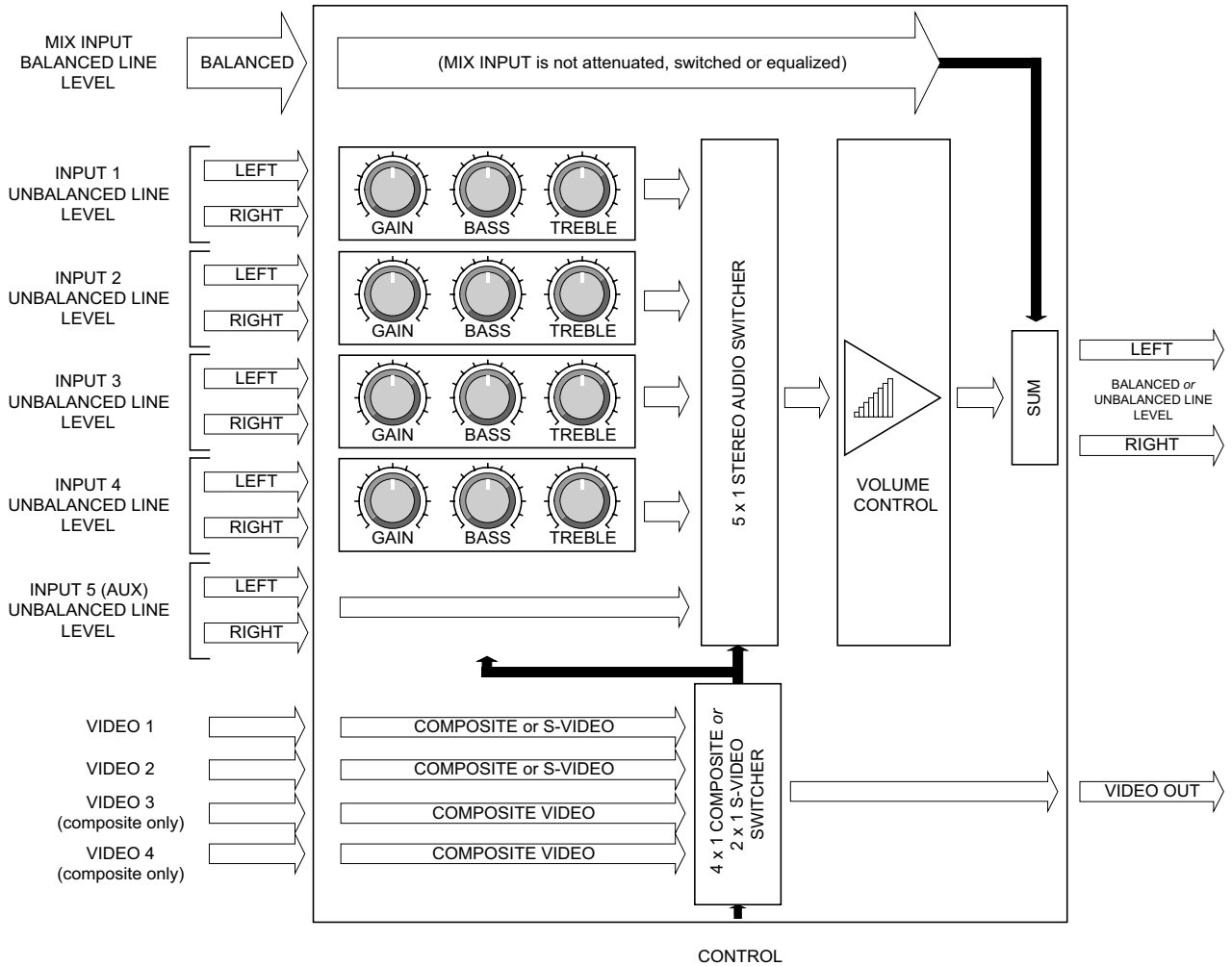


Figure 16: Functional block diagram of the SP3-AFVP+ Audio Follow Video Preampfier



## What the Audio Follow Video Preampifier does for you

The **SP3-AFVP+ Audio Follow Video Preampifier** is a 5x1 stereo audio switcher and true preampifier. It provides audio switching, and volume control through attenuation.

The AFVP+ has a fifth input to support audio-only fifth inputs via **SmartPanel** peripherals. Check the SP Controls, Inc. website for the latest information.

The AFVP+ also allows a sixth line-level input to mixed into the switched output, regardless of which input is active. This feature is primarily for use with speech reinforcement applications<sup>10</sup>.

The Preampifier can normalize each of the switched audio channels (one per input) individually, by providing up to 10dB of gain and plus or minus 12dB of bass and treble equalization. These settings are configured with the **Configuration Utility**.

Though it is a true preampifier, the Preampifier *can* be configured for use as a simple switcher (volume attenuation is disabled). Equalization is provided even when the unit is configured as a switcher.

The Preampifier also provides video switching, with no configuration necessary for 4x1 composite video. The *SP3-AFVP+* can alternately provide 2x1 S-Video switching, if desired. The unit is configured for S-Video mode via a jumper setting. See the Preampifier's *Installation Guide* for more information.

**Note:** When used as a Preampifier as opposed to a switcher, the Panel provides absolute volume control (and indication) *regardless of projector model*.

**Note:** When the Panel is *off*, audio and switched video are muted by the Preampifier.

**Note:** When the Preampifier is connected to the **SmartPanel**, the Panel automatically detects it and (unless otherwise configured) uses it to control volume.

## A functional description of the Audio Follow Video Preampifier

Familiarize yourself with the audio section of the Preampifier, shown in **Figure 16**.

On the left of the illustration, four stereo inputs are shown. Each input corresponds to one of the four Panel selection buttons. If you select input one (the leftmost selection when facing the front of the Panel), the Preampifier automatically switches out *AUDIO INPUT 1*; if you select input two, the Preampifier switches out *AUDIO INPUT 2*; and so on.

**Note:** The Preampifier is intended to do *all* of your audio switching. If the Preampifier's audio output is wired to an external audio system, there is no need to also run audio to the projector. In our experience, this is a real installation advantage as it keeps your line-level wiring short.

<sup>10</sup> Note that the *SP3-AFVP+* does *not* include a microphone level preampifier. When used with microphone-level inputs, a third-party microphone preampifier must be inserted *before* the signal reaches the Preampifier.

## Configuring the Audio Follow Video Preamp

When the Preamp is installed and connected to the Panel chassis, the **Configuration Utility** tab for the Preamp (labeled **AFVP**) becomes active, as shown in **Figure 17**. The sections that follow describe each of the Preamp's configuration options in detail.

**Note:** You can connect the **SmartPanel** to the Preamp *without* removing power from the chassis. For details see **Attaching the Audio Follow Video Preamp (optional)**

**Note:** The audio output stage of the Preamp is buffered with an op-amp that should be capable of driving a line up to 100 feet. If you exceed that distance, you may have to use additional line amplification.

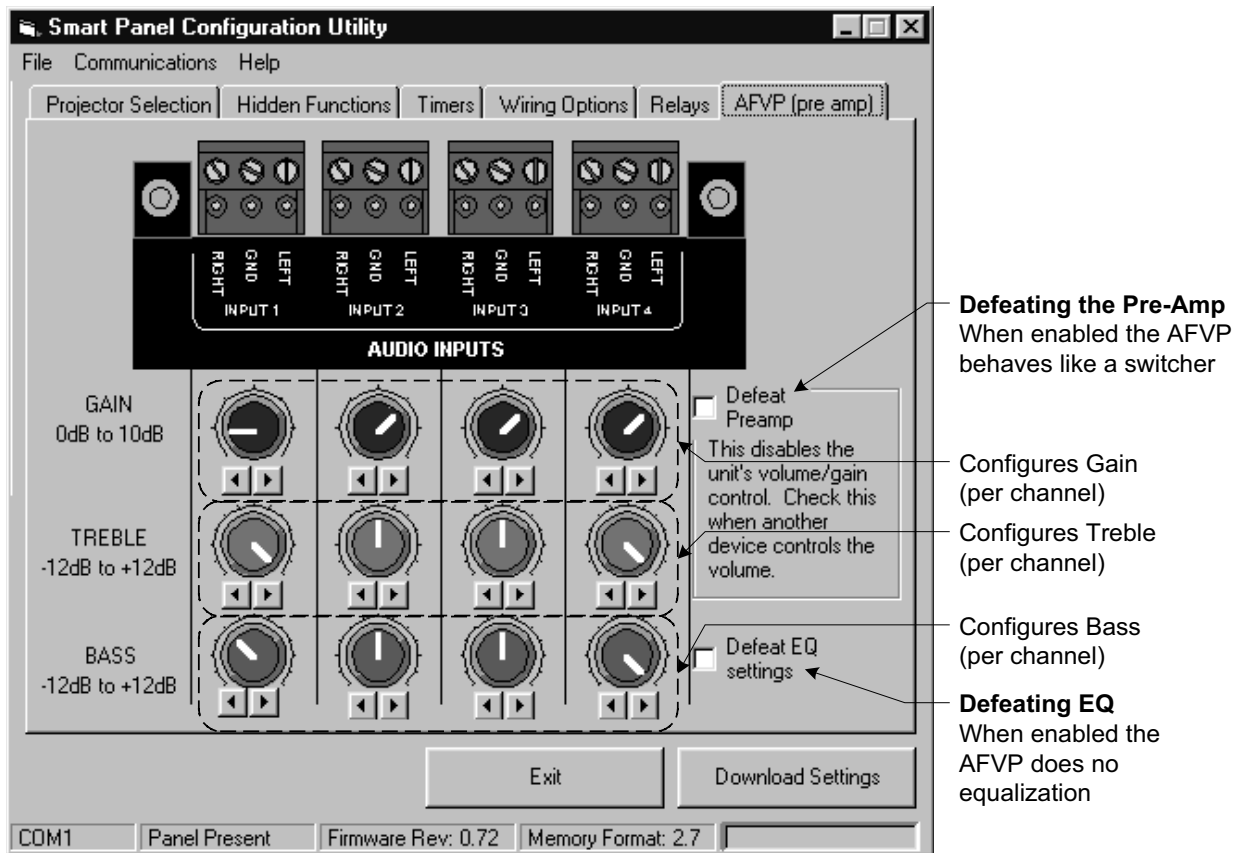


Figure 17: Configuring the Audio Follow Video Preamp

## Equalization

**Bass and treble** settings are configurable on a *per channel* basis. Knob order matches that of input mapping on the **Projector Selection** tab; input one is leftmost.

Each step cuts or boosts the signal by 2dB. At either extreme, equalization settings boost or cut a channel's signal by 12dB.

### Defeating equalization

The **Defeat EQ Settings** check box disables all channel-wise equalization settings. This feature is useful for "A-B" comparisons of clean and equalized versions of the same signal. Checking this box accomplishes the same thing as setting all EQ settings to flat, but preserves your settings.

By default this box is not checked.

**Note:** Equalization settings are preserved in the Panel's configuration, and are restored when the box is unchecked.

### Example 6: Adjusting Equalization Settings

In this example, you configure the Preamplifier to boost the bass for input one and to cut the treble for input three.

This example assumes you have purchased, installed and connected an **Audio Follow Video Preamplifier** to the Panel.

To configure the Panel and Preamplifier in this manner:

- connect the Panel to the Preamplifier and your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **AFVP** tab. It should appear as in **Figure 17**.
- Make sure the **Defeat EQ Settings** box is *not* checked, and the equalization knobs are *not* grayed out;
- click the *right* arrow beneath the *leftmost* knob in the **BASS** row until the knob rotates all the way clockwise;
- click the *left* arrow beneath the *third* knob in the **TREBLE** row until the knob rotates all the way counterclockwise;
- download the new settings by clicking **Download Settings**.

The Preamplifier will now equalize inputs one and three in a clearly audible manner. Equalization can be verified by performing an “A-B” test as follows:

- provide consistent audio sources for inputs one and three,
- select input one or three,
- check the **Defeat EQ Settings** checkbox, and
- re-download the settings to the Panel.

As soon as the Panel successfully downloads and resets, you should hear the difference. Uncheck the box and repeat to hear the equalized versions again.

## Gain

**Gain** settings are configurable on a *per channel* basis. Knob order matches that of the input mapping on the **Projector Selection** tab; input one leftmost.

Gain settings provide up to 10dB of boost for input devices that are (relatively) too soft.

Gain is primarily for use when mixing consumer and professional gear on the source side, or consumer gear on the input side with professional gear on the output (amplifier) side. Gain is useful in these cases since reference line level for professional and consumer equipment is different.

The default gain setting of 0dB prevents the Preamplifier from boosting the signal at all (i.e., if the input is a 1V sine wave, the output is a 1V sine wave).

**Note:** Increasing gain also increases the noise floor. Gain should only be used when absolutely necessary.

## Defeating Gain (converting the Preamplifier into a switcher)

The **Defeat Preamplifier** check box converts the Preamplifier into a switcher.

When preamplification is defeated, the **SmartPanel** does *not* use the Preamplifier for volume control. Instead, it uses the Preamplifier only for switching, and sends volume commands to the projector. In this case the Panel's volume indication behaves *exactly as if the Preamplifier were not present*. Therefore, if the projector only supports relative volume mode, volume display reverts to relative.

You might want to use the Preamplifier as a switcher:

- for installations that use the projector's speakers as the only audio output device, but use the Preamplifier for switching (to minimize the wiring that must be run to the projector); or
- when another device is used to independently control volume.

### Example 7: Adjusting Gain Settings

In this example, you configure your Preamplifier to boost the gain for input two.

This example assumes you have purchased, installed and connected an **Audio Follow Video Preamplifier** to the Panel.

To configure the Panel and Preamplifier in this manner:

- connect the Panel to the Preamplifier and your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **AFVP** tab. It should appear as in **Figure 17**;
- make sure the **Defeat Preamplifier** box is *not* checked, and the gain knobs are not grayed out;
- click the right arrow beneath the second knob in the **GAIN** row until the knob rotates all the way clockwise;
- download the new settings by clicking **Download Settings**.

As soon as the Panel successfully downloads and resets, you should hear the difference. Uncheck the box and repeat to hear the boosted versions again.

## Video Switching with the Audio Follow Video Preamplifier

The **video switching** portion of the **Audio Follow Video Preamplifier** provides four 4x1 composite video switching or 2x1 S-Video switching, as shown in the bottom of **Figure 16**. Video switching is provided for your convenience when working with projectors that have a limited number of video inputs.

Video switching on the Preamplifier is *automatic* and is tied to input selection. Video switching is not defeatable; however, you are free to leave all or part of this section unwired.

By default, the **SP3-AFVP+** is configured as a 4x1 composite video switcher. For information on configuring the Preamplifier as a 2x1 S-Video switcher, see the **SP3-AFVP+ Installation Guide**.

**Note:** Be sure to map your projector's version of **VIDEO** for all the composite video inputs switched through the Preamplifier, or **S-VIDEO** for all the S-Video inputs switched through the Preamplifier.

# CONTROL WIRING OPTIONS

This section describes the control wiring between the Panel and your projector.

RS-232 is almost always wired between the Panel and the projector<sup>11</sup>. Depending on the projector and your choice of projector commands, you may also have to wire either infrared (IR) or wired remote control lines from the Panel to the projector.

As shown in **Figure 13**, the Configuration Utility's **Wiring Options** tab:

- lets you configure the Panel for IR or wired remote control, and
- shows which wiring options you need to run between the projector and Panel.

## Deciding between Wired Remote and the IR Emitter

With many projectors, the choice of wired remote or IR emitter is up to you. However, some projectors do not have wired remote ports. In these cases, one of the options in the Utility is grayed out, and you do not have a choice.

There *are* differences between IR signals and wired remote signals (e.g., carrier and polarity), but we do the work of determining them for each projector. You merely need to configure the Panel for the connection you wish to wire.

### Using wired remote

In general, **wired remote** control is more reliable than IR control, even for identical control signals.

Unfortunately, using wired remote with many projectors *prevents* the use of the handheld remote. This can be annoying if someone has to pull the wired remote wire before using the remote, but remember that we address this problem with **Hidden Functions**.

### Using the included IR Emitter

On the other hand, use of the included **IR Emitter** presents problems as well. IR reception is affected by ambient light conditions; emitters come unstuck from the projector's IR window; and users can control projectors with remotes. The latter is a problem when users change the projector status in ways that the Panel cannot sense and adjust to; for example, changing the input selection with a remote leaves the Panel indicating the projector's input incorrectly.

**Note:** We recommend reading our discussion of **Hidden Functions** before deciding how to wire, as hidden functions may give you enough control that you don't need the remote for installation adjustments. In this case, using **Wired Remote** is usually the most reliable option.

<sup>11</sup> RS-232 cabling requirements for each projector are found in its **Projector Driver Application Note**.

## When the Panel uses RS-232 and Wired Remote/IR

The **Configuration Utility** uses pictures to indicate the control wires you need to run based on your projector and configuration decisions. The three possibilities are RS-232, Wired Remote and IR (the latter two being mutually exclusive).

The **Application Note** for your projector's Driver provides specific instructions for the control wiring you need to run, such as RS-232 pin outs and port names.

**Note:** Pin outs for RS-232 can vary considerably from projector to projector. *Always* read the **Projector Driver Application Note** for details on how to wire to your projector before attempting control.

**Note:** Though you only need to wire the control wires shown, it makes sense to always wire RS-232 and Wired Remote/IR, in case you reconfigure your Panel later.

## Why the Panel uses both RS-232 and Wired Remote/IR

To completely or best control a projector, we often require you to wire both RS-232 and Wired Remote/IR<sup>12</sup>.

RS-232 projector commands are used whenever sensible, as the communication is comparatively reliable. However, RS-232 is not always feasible, as the projector command set varies by manufacturer and often by model. While some manufacturers do a good job designing their command set and protocols, many do not. Finally, some codes, especially dynamic ones (such as remote mouse controls or checksums), are not easily generated "on the fly."

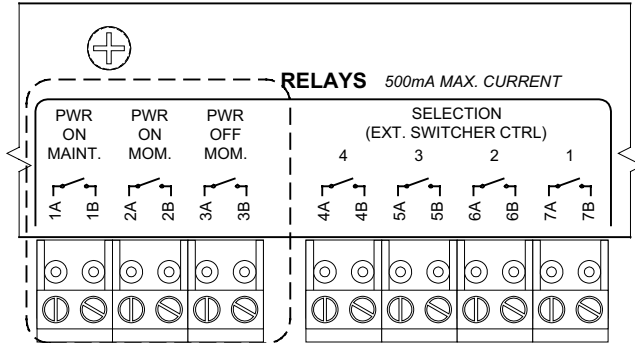
Also, IR commands work best in certain cases. They are usually the best choice for commands which repeat rapidly (e.g., zoom and focus).

Finally, in many cases the commands available via IR/Wired Remote are not available via RS-232, and vice versa.

**Note:** In some cases control wiring requirements depend on your input and hidden function mapping. In these cases, you should be aware (when selecting Hidden Functions and performing input mapping) that commands that will be sent via Wired Remote/IR are indicated by a small icon before their names.

<sup>12</sup> Certain projectors and configurations send all commands via RS-232, or all via Wired Remote/IR.

# RELAYS



**Figure 18: Power relays (Panel rearview)**

In addition to controlling the projector, the **SmartPanel** provides configurable **relays** that can be used to control other devices common to small projector installations, such as switchers, screens, and lights.

There are two sets of relays on the back of the Panel, as shown in

**Figure 18:**

- *power relays*, which open and close according to the power state of the Panel; and
- *selection relays*, which open and close according to the current input selection.

**Note:** The **SmartPanel** relays are *low voltage only*. This applies for *all* settings and situations. All of the relays on the board are rated at 500mA max current. *Under no circumstances is high voltage to come into any conduit or backbox that the Panel uses.*

**Note:** No relay terminals are tied to any others. If you use multiple relays to control the same device, you must wire the commons yourself.

**Note:** Factory relay settings are silk-screened onto the back of the Panel. If you change any of the relay options, ignore this silk-screening.

## Power Relays

The leftmost three relays (labeled **1** to **3**) are **power relays**, which open or close according to whether the Panel and projector are on.

The power relays are intended to automate equipment that can accept contract closure for control. Examples of such devices are power controllers (for rack power), screens, lifts, and lighting dimmers.

As shown in **Figure 19**, power relay settings can be configured with the **Configuration Utility**.

There are two configurable options for each power relay:

- whether it closes when the system goes *on* or *off*, and
- whether this closure is *momentary* or *maintained*.

The mutually exclusive *ON* or *OFF* checkboxes determine which power state a relay is associated with. A power relay closes only when the Panel power changes to *become* the state it is associated with.



The *Momentary* checkbox associated with each power relay determines whether its closure is *momentary* or *maintained*. In the *momentary* case, the relay only closes for a few hundred milliseconds when power changes to its associated state.

When the relay is *maintained* (the *Momentary* checkbox is unchecked), the power relay closes and remains closed as long as the Panel is the power state it is associated with.

**Note:** The order of the power relays as shown in the **Configuration Utility** is the same as the order of the relays when the Panel is viewed from the *rear*. That is, the leftmost check boxes apply to the leftmost relay (labeled **1A-1B**).

### Example 8: Using a Power Relay for Screen Control

In this example, you use a power relay to control an electric screen that has two low-voltage control terminals, *up* and *down*. You want the screen to automatically come down whenever the projector is on, so you configure the relays according to the silk-screening on the rear of the Panel, as shown in **Figure 19**.

To configure and wire the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **Relays** tab;
- check the **ON** checkbox for the relay labeled *PWR ON MAINT (1)*;
- check the **ON** checkbox for the relay labeled *PWR ON MOM (2)*;
- check the **OFF** checkbox for the relay labeled *PWR OFF MOM (3)*;
- make sure the *Momentary* checkbox for the relay labeled *PWR ON MAINT (1)* is *clear*;
- check the *Momentary* checkbox for the relay labeled *PWR ON MOM (2)*;
- check the *Momentary* checkbox for the relay labeled *PWR OFF MOM (3)*;
- download the new settings by clicking **Download Settings**;
- wire the relays to the screen controls as indicated – i.e., wire the relay labeled *PWR OFF MOM (3)* and the relay labeled *PWR ON MOM (2)* to the screen's *Up* and *Down* controls respectively.

Now, whenever the Panel powers on, the screen will go down, since the *PWR ON MOM* relays closes momentarily (simulating a button press). Likewise, when the projector turns off, the *PWR OFF MOM* relay closes momentarily, causing the screen to rise.

The first power relay (*PWR ON MAINT*) remains unwired. Since it is configured to stay closed as long as the system is powered, a possible use for it would be to connect it to a power controller to switch power to an external audio amplifier.

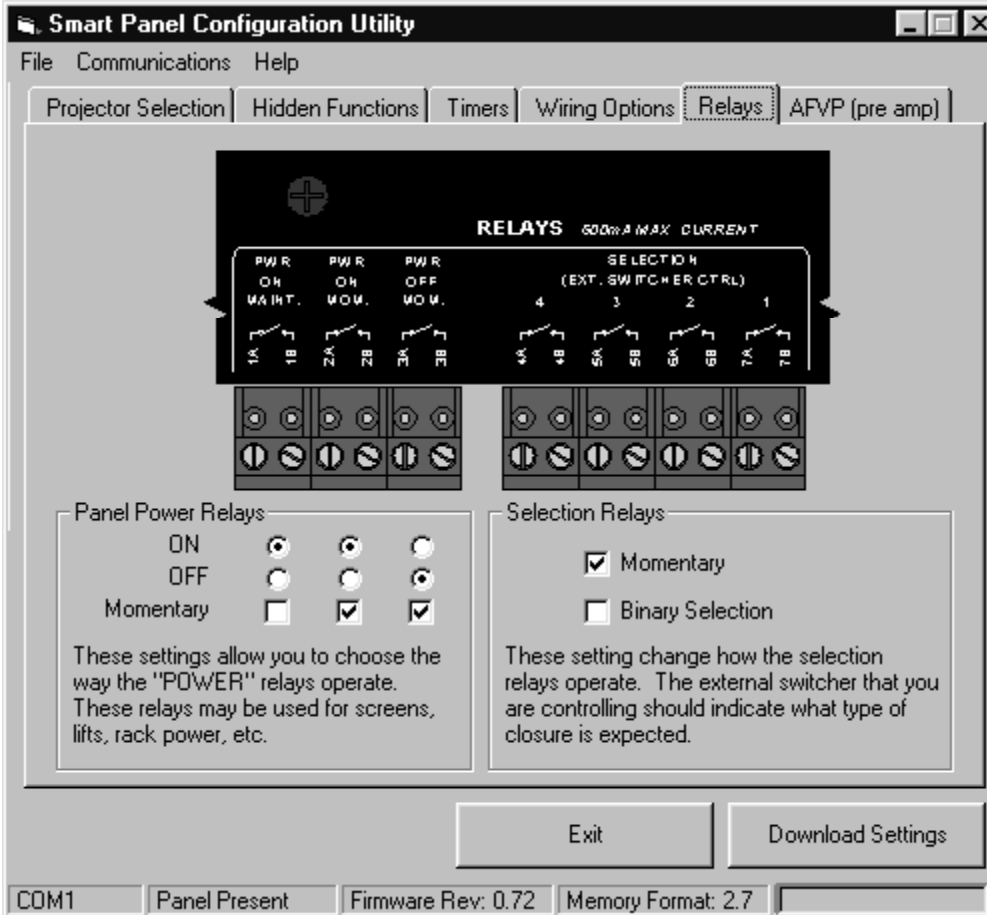
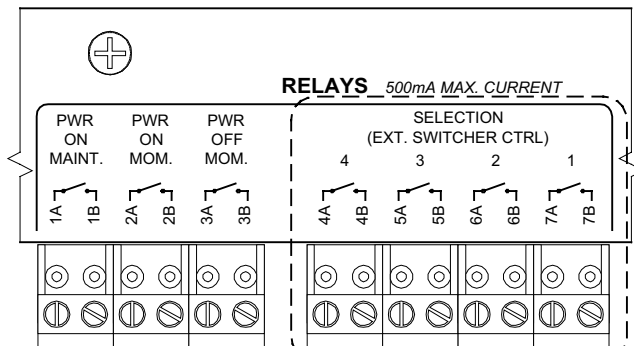


Figure 19: Configuring relays

## Selection Relays



**Figure 20: Selection relays (Panel rearview)**

The rightmost four relays (numbered **4** to **7**) are **selection relays**, which open and close according to the current *selection* of the Panel.

When the Panel is powered off, all of the selection relays open.

Most small switchers (e.g., those made by Altinex™) accept contact closure control of their switching. The **selection relays** are intended to be used to control such switchers.

There are two configuration options for the selection relays, which control their behavior as a *group*:

- whether selection relay closure is *momentary* or *maintained*, and
- whether the relays indicate selection *directly* (only one closed at a time, per selection), or *encoded in binary* as a group.

As shown in **Figure 19**, selection relay settings are configured using the **Configuration Utility**.

The *Momentary* checkbox (under *Selection Relays*) determines whether the selection relays as a group close *momentarily* or are *maintained*. In the former case, relays only close on selection change for a few hundred milliseconds. When *Maintained*, they remain closed as long as the Panel selection (and power) remain constant.

The *Binary Selection* checkbox determines whether selection relays as a group close on a one-to-one basis with selections, or encode the current selection as a *binary number*. There are a few switchers (NEC's in particular) that expect binary encoding; check your switcher manual for specifications on how it expects to see the closure. Be careful – different models from the same manufacturer can vary.

**Example 9: Using the Selection Relays with an External Switcher**

In this example, you use selection relays to control an external switcher. We assume that you have previously configured your Panel so that inputs two and four both map to the *VIDEO* input on a *Sharp XG-1200U*, as in **Example 2**. You want to use an external switcher to switch the sources wired to inputs two and four. You configure the relays for use with an Altinex™ switcher that needs *momentary* closure but *not* binary encoding, as shown in **Figure 19**.

To configure and wire the Panel in this manner:

- connect the Panel to your computer and run the **Configuration Utility**;
- wait for current Panel settings to be retrieved;
- select the **Relays** tab;
- check the *Momentary* checkbox under *Selection Relays*;
- make sure the *Binary Selection* checkbox is *clear*;
- download the new settings by clicking **Download Settings**;
- wire the relays to the external control input on the switcher so that the relay labeled *[Selection] 2* appropriately selects one input into the switcher, and the relay labeled *[Selection] 3* appropriately selects the other;
- wire the output of the switcher to the *VIDEO* input of the Sharp.

Now, whenever the Panel selection changes to either two or four, the switcher will switch the appropriate video signal to the Projector *VIDEO* input. Assuming you have correctly mapped inputs two and four to switch the projector to its *VIDEO* input (as in Example 2), the correct video signal will be displayed.

## MODULES AND LEGENDS

The **SmartPanel** patch points and their identifying labels are chosen and inserted by the installer. Since Legends and Modules are installer-specified, a wide variety of installations are accommodated without the need for any custom ordering<sup>13</sup>.

### Legends

**Legends** identify the input devices (or types) associated with a Panel input.

A preprinted set of Legends is included with the Panel for a wide variety of common inputs. Custom Legends can also be printed on transparency film (see **Inserting Legends** for details). Blank Legends are provided should you need to make custom Legends.

### Selecting and Arranging Modules or Auxiliary Patch Points

Four **Modules** are chosen and attached to the full-size Panel chassis during installation. These pre-made metal plates provide connector hardware such as BNC's and RCA audio connectors.

Numerous Modules are available for the full-size **SmartPanel** (*SP2-CHAS*), each with a different set of connectors. These connectors provided patch points at the place of projector control. **Figure 21** shows some of the Modules currently available. If your installation uses custom or unusual connectors, order *SP2-SWITCH* Modules and have them drilled.

Similarly, **Auxiliary Patch Points** may be chosen and attached to either the *SBL-1050B* Slide Out Drawer or *SP2-RACKSM-MOD* for use with the control-only Panel (*SP2-SMCHAS*). See the next section for more information on Auxiliary Patch Points.

Modules are named according to the connectors they provide. Except for the *SP2-BLANK* blank Module, each Module also has:

- a window that allows a back-lit Legend to be displayed, and
- a port that allows a selection button to protrude.

Module and Auxiliary Patch Point choice is straightforward once you identify the projector's inputs. The *SP2-SWITCH* Module is appropriate for permanently installed devices; if you need to switch between less than four source devices, the *SP2-BLANK* blank Module is appropriate to fill out the Panel<sup>14</sup>.

The placement of Modules on the chassis must be coordinated with the input mapping configured and Legends inserted. **Figure 9** shows a Panel with Modules that have been coordinated with Legends and input mapping.

Placement of Auxiliary Patch Points is generally more flexible, since (a) there are often only two Auxiliary Patch Points with connectors, reducing ambiguity, and (b) Auxiliary Patch Points do not need to be tied to specific input buttons.

<sup>13</sup> You will need to arrange patch points for removable devices when using the Mini Panel.

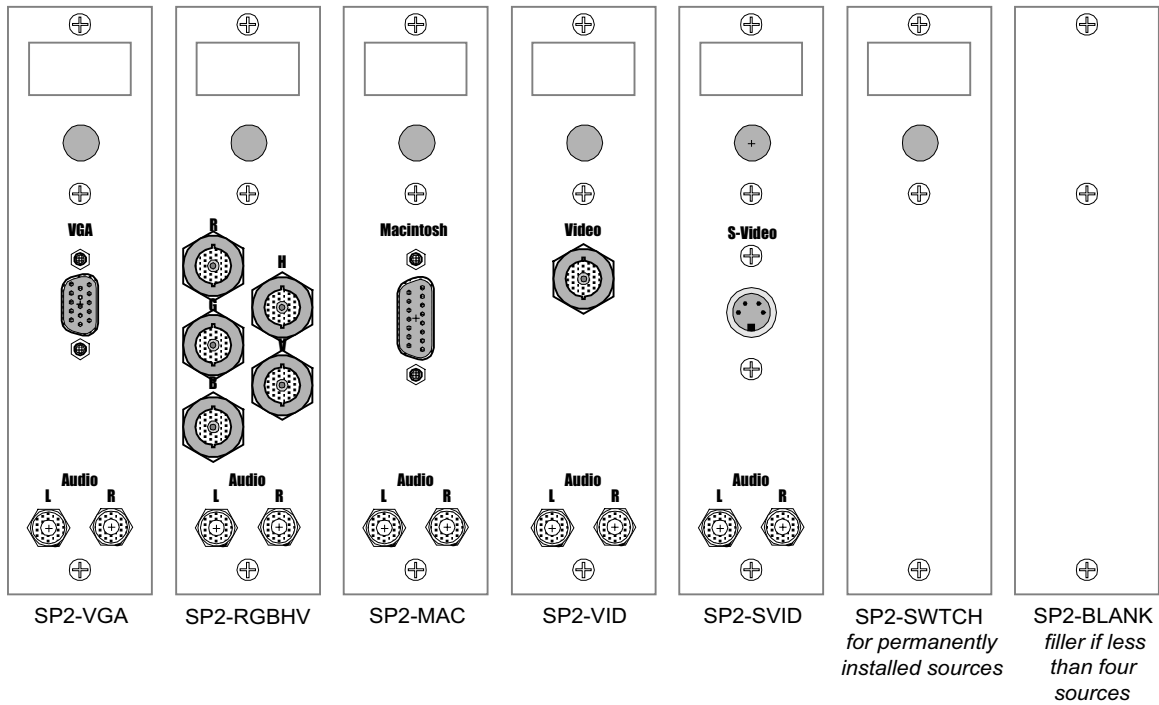
<sup>14</sup> Presumably your choice of Modules was made during installation design. The Modules you need should have been specified in your Panel order and shipped with the chassis.

Remember that the connectors on the Modules and Auxiliary Patch Points are points to land input wiring; they don't imply anything about how the to wire to the projector.

We assume that *you* know the projector you are using and have designed your installation with its limitations in mind – e.g., the number and type of inputs it accepts, its wiring and pin-out idiosyncrasies, etc..

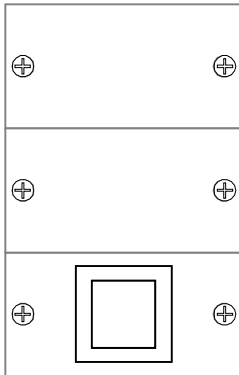
**Note:** Remember that the Modules provide patch points only – the **SmartPanel** is *not* a switcher; it is a control system.

**Note:** We use only the highest quality insulated industry-standard connectors for the Modules.



**Figure 21: Some of the Modules available for use with the full-size Panel. Versions with 1/8" mini stereo audio connectors, no-solder S-Video connectors, etc. are also available.**

## AUXILIARY PATCH POINTS



**Figure 22: Auxiliary Patch Points on a full-size Panel**

On the right-hand side of the full-size **SmartPanel** are three **Auxiliary Patch Points**, as shown in **Figure 22**.

Unless otherwise specified when ordered, the full-size Panel comes with one blank Patch Point, one Patch Point with an SP Controls logo, and one Patch Point with a square plastic piece in the center.

Auxiliary Patch Points may also be used with the control-only **SmartPanel**, when it is mounted in one of the accessories that accommodates them. Unless otherwise specified when ordered, however, no Auxiliary Patch Points come with the control-only Panel.

At the time of writing, Auxiliary Patch Points are used with the *SP2-RACKSM-MOD* Rack Mount Kit and *SBL-1050B* Slide Out Drawer.

Auxiliary Patch Points are available with VGA and video connectors for this application. See the **Product List** (available on the SP Controls website) for details.

Patch Points also allow you to use custom connectors for your installation. For example, you can add an XLR connector for use with a speech reinforcement system<sup>15</sup>) alongside the standard Panel controls and connectors.

The Patch Point with the plastic square in the center houses a Lucent Technologies™ escutcheon for use with the Lucent M100 series jacks. Lucent carries an ethernet jack for network connection fiber, video, and F-connector models. You can order the CAT5 ethernet jack from SP Controls, the part number is *SP2-ETH-M100*.

**Note:** If you want to put a logo on the Panel, an Auxiliary Patch Point is an ideal place to do so. This is especially true because the Patch Points can be sent out for silk-screening without the Panel having to go with them.

**Note:** For custom Patch Points, it is up to you to have the metal punched.

<sup>15</sup> As additional peripherals for the Panel become available, they will often be provided with a form factor that allows them to be installed in the auxiliary patch points bays

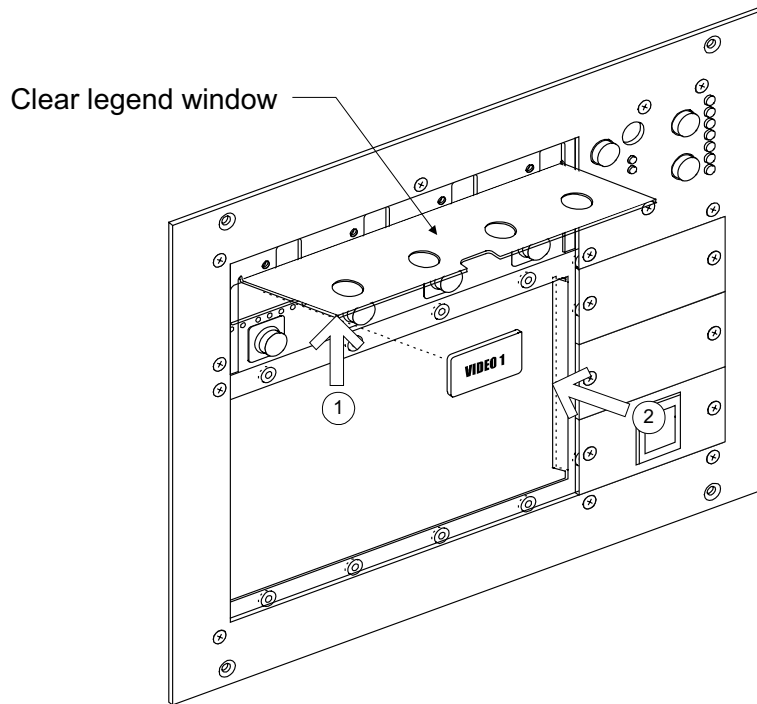




## PART III - ASSEMBLY AND INSTALLATION

This section details the assembly and installation of the **SmartPanel**.

### SMARTPANEL ASSEMBLY



#### Inserting Legends

Legends identify the source devices selected by the Panel selection buttons. A bag of Legends identifying common source devices was included with your Panel (see **Table 1**).

Blank Legends are included so you can make your own, should you find not a preprinted Legend for one of your source devices.

The font used on the included labels was 14 pt TrueType™ Impact.

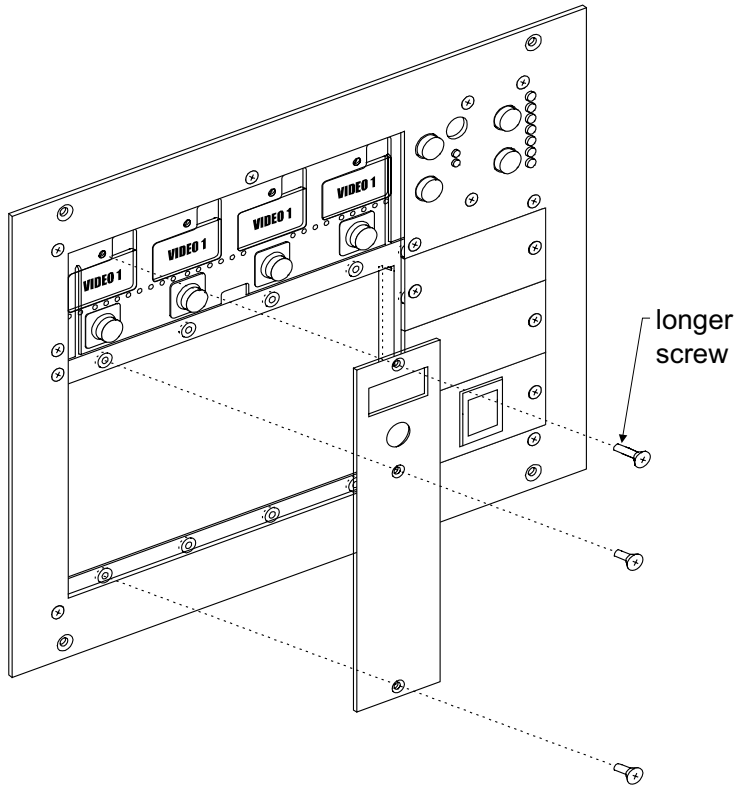
**Note:** The Panel should *not* be powered during this step!

**Figure 23: Inserting Legends. Do *not* bend sharply!**

It is easiest to insert Legends with the Panel lying flat on a table. Before beginning, remove the protective film from each Legend to be inserted.

1. *Taking care not to bend it too sharply*, lift the clear plastic window. If you bend the plastic too far, it may develop a crease.
2. Slide each Legend into its slot. Make sure it is correctly oriented!
3. If you are using any blank Modules, remove the rubber button where the blank is to go; otherwise, you will not be able to screw it down properly.

**Note:** You may find it easiest to remove the four selection buttons while inserting the Legends.



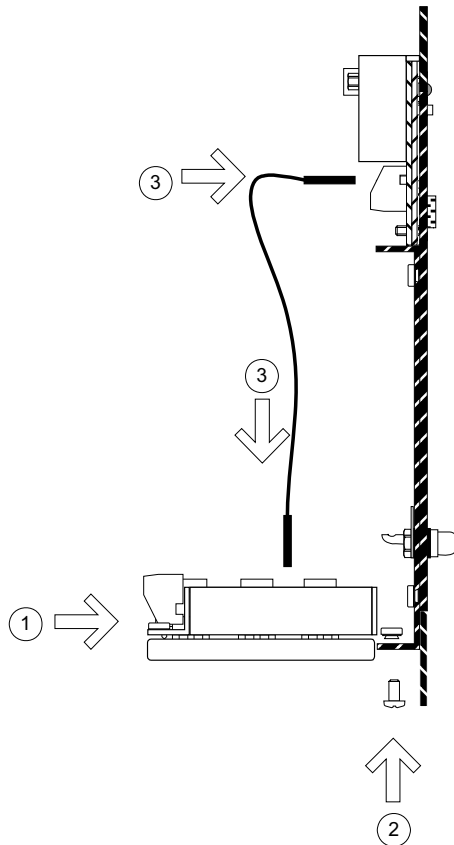
## Inserting the Modules (SM2-CHAS ONLY)

Screw each of your four Modules into place with the three screws provided.

See **Coordinating Input Mapping with Modules and Legends** for a discussion of Module placement.

**Note:** As shown, the long screw goes in the *top* hole.

**Figure 24: Attaching the Modules. Note position of the long screw.**



## Attaching the Audio Follow Video Pre-amplifier (optional)

If you are using the optional **Audio Follow Video Pre-amplifier**, you may wish to attach it as follows.

1. Place the Pre-amplifier above the metal lip on the bottom rear side of the chassis.
2. Use the three screws provided to secure the Pre-amplifier in place.
3. Attach the 8-pin control cable to the chassis (at the port labeled *Audio Follow Video Switcher Expansion*) and then to the Pre-amplifier (at the port labeled *Auxiliary Control Port*).

**Figure 25: Attaching the Audio Follow Video Pre-amplifier**

**Note:** Never plug the 8-pin control cable into the port labeled *Accessory Bus*! Doing so may damage your AFVP or Panel!

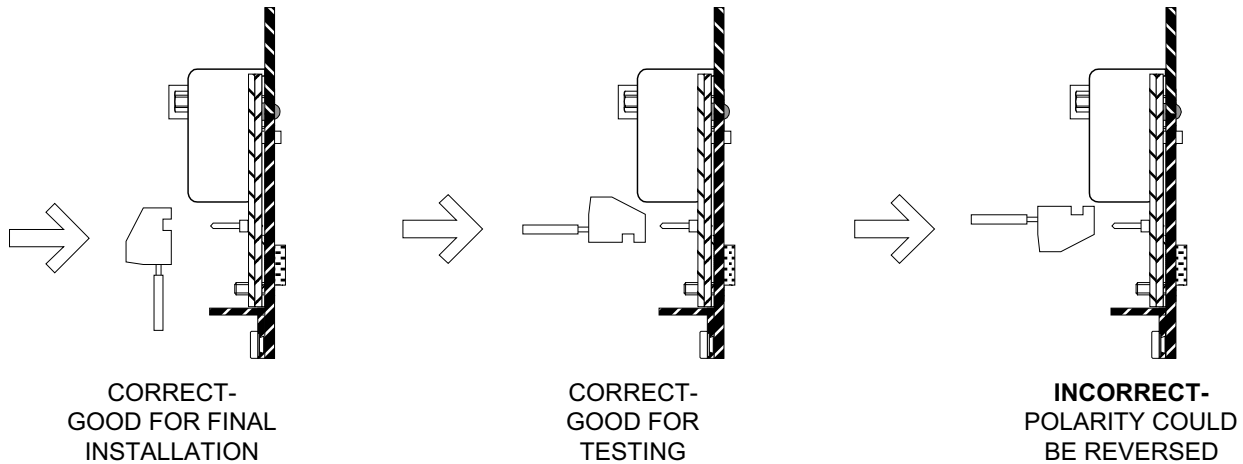
**Note:** Though recommended, the Pre-amplifier does *not* have to be physically secured to the Panel chassis. You may find you cannot attach the Pre-amplifier if you are using a shallower than recommended backbox, or are installing the **SmartPanel** in an environment where space is limited. In this case you may skip steps one and two.

**Note:** Be sure to correctly position the keying pin on the cable.

**Note:** Be sure to correctly position the keying pin on the cable.

# SMARTPANEL INSTALLATION

## Installing the Terminal Blocks



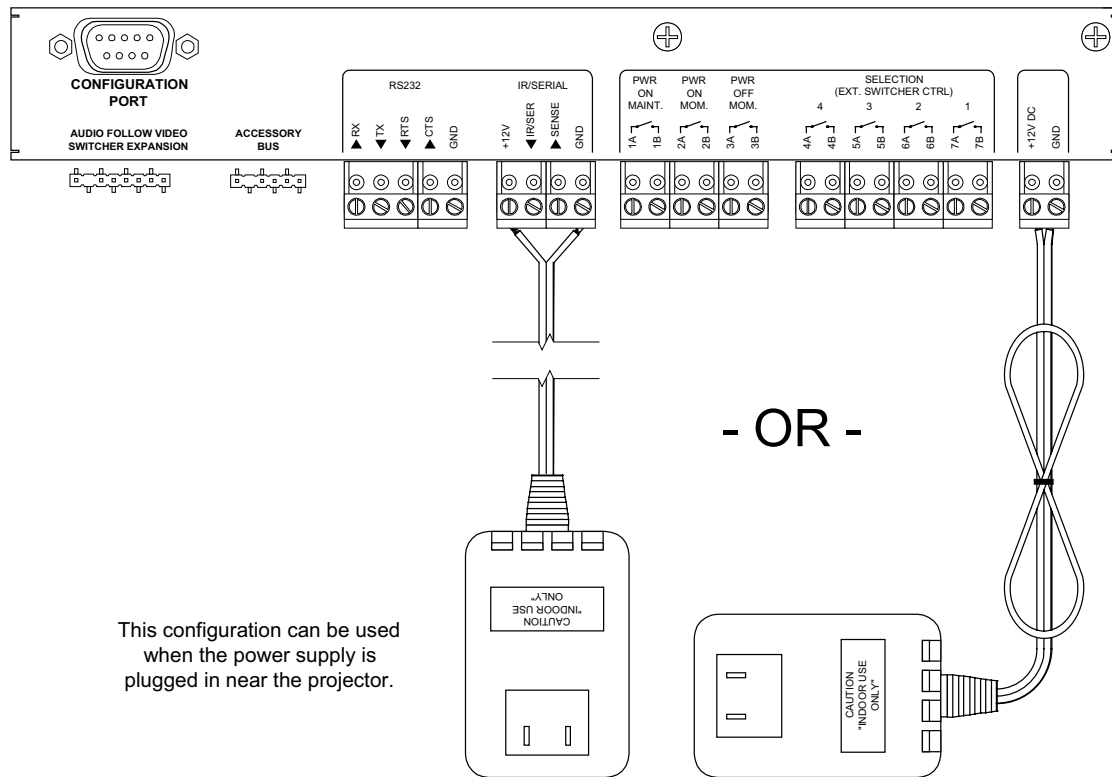
**Figure 26: Installing the phoenix connector terminal blocks**

The included phoenix connector terminal blocks can be inserted onto their headers in three different ways, two correct and one incorrect, as shown in **Figure 26**.

**Note:** We recommend using only the two leftmost methods shown in **Figure 26**. The rightmost method allows terminal blocks to be inserted backwards, which can cause communications failure and power to be inserted with the wrong polarity.

**Note:** *Never* pry under a terminal block with a screwdriver when removing it, as this may damage the printed circuit board underneath.

## Wiring Panel Power



This configuration can be used when the power supply is plugged in near the projector.

**Figure 27: Wiring Panel power**

Power can be applied to the Panel in two places as shown in **Figure 27**.

**Note:** Plugging the **SmartPanel** power supply in at the *projector's* power receptacle (as shown on the left in **Figure 27**) simplifies wire pulls, especially when using multi-conductor cable for control. In the latter cases, Panel power and projector control are handled in a single cable.

**Note:** The Panel requires power all the time. The Panel must be powered even when it appears "off" to the user.

## Wiring the Relays

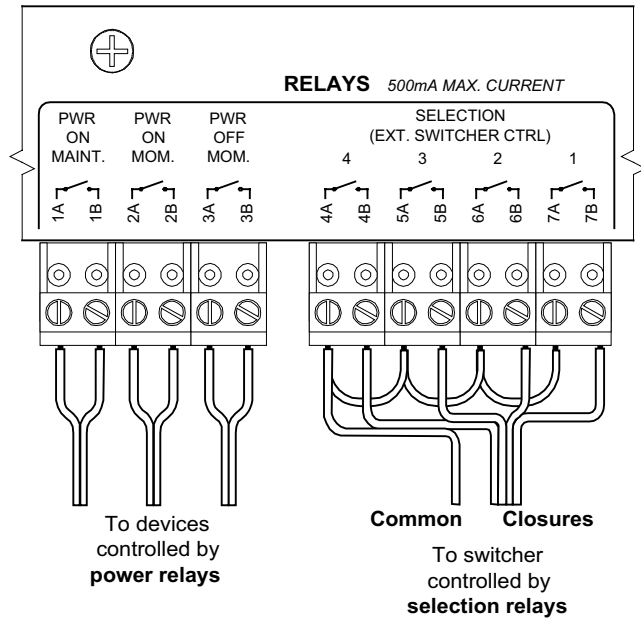


Figure 28: Wiring relays

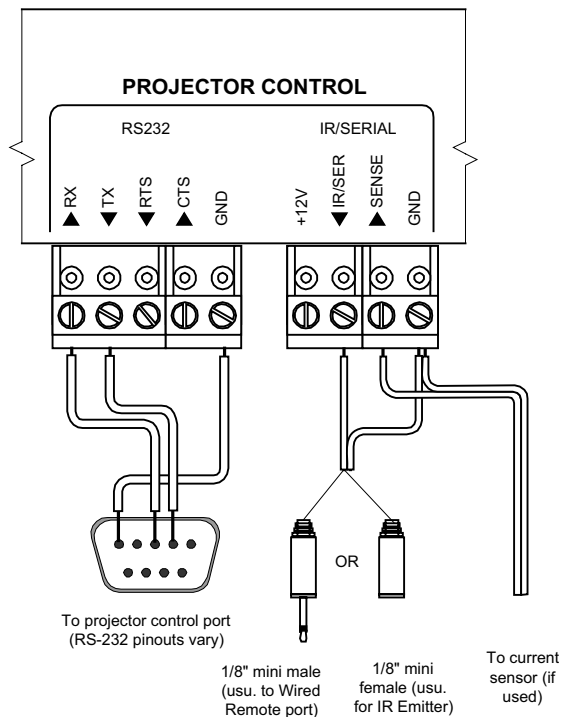
**Note:** All SmartPanel relays are *low voltage only* rated at 500mA max current. Under *no circumstances* is high voltage to be connected to the panel or come into any conduit or backbox that the Panel uses.

The exact wiring of the relays depends on your needs and the switching configuration. Relay configuration using the **Configuration Utility** is discussed in **Relays**.

**Note:** *Commons* may have to be combined when many relays communicate with the *same* device. Remember that commons are *not* true ground (as relay closures are electrically isolated from ground and from one another).

**Note:** *Never* combine the commons of two separate controlled devices. This may cause an electrical short within one or both devices!

## Wiring Projector Control



**Figure 29: Wiring projector control**

wired remote, attach a **female 1/8" mini-jack** (not included) to the cable at the projector end, rather than splicing the emitter cable.

Using an intermediate female 1/8" mini-jack:

- makes reversing the polarity going to the IR emitter difficult, and
- allows the projector to be removed without the emitter having to be pulled off the IR window.

### Current Sensor (optional)

If you are using a third-party current sensor, ensure that it provides simple closure to indicate projector power status. Wire this closure output to the Panel pin labeled **SENSE** and ground to the pin labeled **GND**.

**Note:** Most third-party current sensors require calibration to correctly identify the on and off states of your projector. Refer to the documentation for your sensor for details.

**Note:** The projector control that must be wired for your installation depends on the projector and your configuration, as discussed in **Control Wiring**.

### RS-232

The *actual* wiring of RS-232 varies based on projector. **Figure 29** shows one *example* RS-232 connection.

The **Projector Driver Application Note** for each projector specifies its RS-232 pinouts. Aspects that can vary are connector type and gender, RX and TX swapping, RTS-CTS use or looping, and DSR-DTR looping.

### Wired Remote/IR

**Note:** The ring of each **IR/Wired Remote** plug or jack *must* be connected to the **GND** terminal on the Panel.

When using the included IR emitter instead of

## Wiring Audio to the Audio Follow Video Preamplifier (Optional)

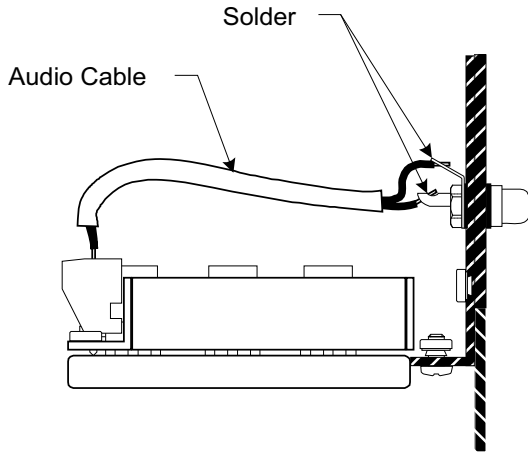


Figure 30: Wiring RCA audio to the Preamplifier

Stereo audio from Module or Auxiliary Patch Point RCA connectors is brought onto the **Audio Follow Video Preamplifier** as follows.

1. Cut several short pieces of wire. You should use wire manufactured for high-quality audio installation.
2. Solder to the *ground tab* and *center conductor* tab of the RCA connector.
3. Strip the wires and install them in the appropriate input terminal blocks on the Preamplifier.

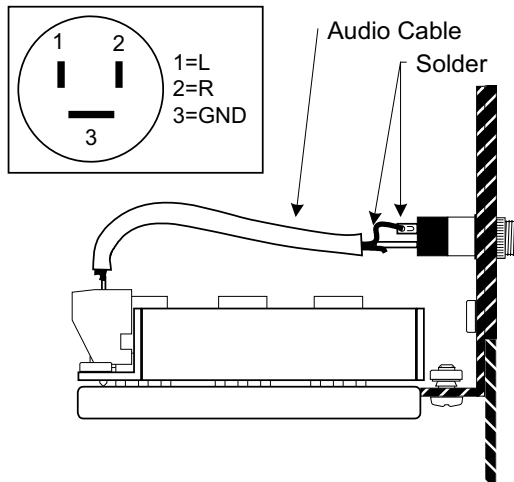


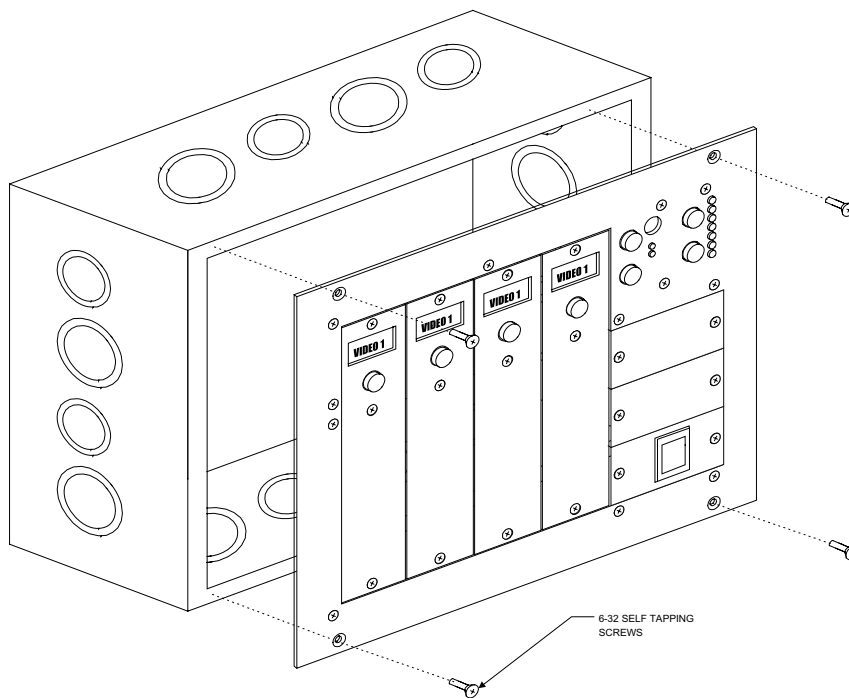
Figure 31: Wiring 1/8" audio to the Preamplifier

Stereo audio from Module or Auxiliary Patch Point 1/8" stereo mini connectors is brought onto the optional **Audio Follow Video Preamplifier** as follows.

1. Cut several short pieces of wire. You should use wire manufactured for high-quality audio installation.
2. Solder to the *ground tab* (longer tab, shown as 3 in the callout and on the connector) and *right* and *left* tabs of the RCA connector (labeled 1 and 2 in the callout and on the connector, respectively).
3. Strip the wires and install them in the appropriate input terminal blocks on the Preamplifier.



## Installing the SmartPanel in a Backbox



The **SmartPanel** was designed to fit in an 8x10 NEMA enclosure (we recommend the Hoffman A-E10X8X4).

Eight 6-32 self-tapping screws are included to secure the Panel to the box. Only four are needed; four extra are provided in case any are stripped during installation.

For other installation options, such as rack mount kits, drawers, podiums and desktop boxes, see the current

**Figure 32: Installing the SmartPanel in a backbox**

**Product List**, available on the SP Controls, Inc. website.

**Note:** When installing the Panel directly into a wall, it is *strongly recommend* that you use a backbox. Doing so makes the installation more secure and provides extra electromagnetic shielding.

**Note:** Take care when cutting the hole in the wall that will accommodate the Panel and backbox, as the Panel only slightly exceeds the outer dimensions of the specified backbox.

**Note:** Drilling pilot holes into the metal of the backbox is your responsibility.

**Note:** If you are using the **Audio Follow Video Preamp** you may not want to have any conduit enter the backbox from the bottom. The AFVP will block clear access to these conduits.

## PART IV - SUPPORTING DOCUMENTATION

This section provides supporting documentation for using your **SmartPanel**.

### TROUBLESHOOTING GUIDE

This section provides basic troubleshooting for the **SmartPanel**. If you cannot solve a problem with this guide, see **Customer support** in **Contacting SP Controls**.

---

**PROBLEM:**

I unpacked the Panel and plugged it in. It ran through a self-test and came up when I hit **On**, but it soon turned itself off. It does this every time I turn it on.

**DIAGNOSIS:**

The Panel is configured at the factory for projector power feedback via RS-232 polling. If the Panel is powered on without a connection to the projector, it automatically shuts itself off when it receives no response from the projector.

**SOLUTION:**

Configure the Panel for your projector and installation, or connect the Panel to the projector.

---

**PROBLEM:**

The Panel does not appear to power up.

**DIAGNOSIS:**

The Panel always runs through a hardware self-test when power is applied. If the Panel LEDs and back-lit Legends never illuminate, the Panel is not receiving power.

If the Panel visibly runs through a hardware self check when powered on, power is not the problem.

**SOLUTION:**

Ensure power from the provided 12V DC Power Supply is correctly connected to the Panel through either the main or optional 12V+ power inputs as shown in **Figure 27: Wiring Panel** power.

Check the polarity of the power inputs. If you are using the supplied Terminal Blocks, make sure they are connected as shown in **Figure 26: Installing the phoenix connector terminal blocks**. The Panel is diode protected from incorrect polarity.

---

**PROBLEM:**

When I power-on the Panel, all of its indicators slowly and continuously cycle.

**DIAGNOSIS:**

The Panel is repeatedly resetting and running through its hardware self-test.

**SOLUTION:**

This behavior has sometimes been observed when power to the Panel is removed and restored, and may occur when power is not correctly wired. Alternately, the phoenix connector terminal block bringing power onto the Panel may not be firmly seated.

Ensure that the provided 12V DC Power Supply is correctly connected to the Panel through either the main or optional 12V+ power inputs as shown in **Figure 27: Wiring Panel** power. You may wish to remove and restore power to the Panel.

If power appears to be correctly wired and removing and restoring power does not remedy this behavior, the Panel may be damaged.

---

**PROBLEM:**

The Panel turns itself off every time I turn it on, within a few seconds.

**DIAGNOSIS:**

If this happens after a short delay (e.g., 30 seconds), the Panel may be expecting and not receiving power feedback from the projector.

**SOLUTION:**

Check the configuration of the Panel. Depending on your projector and installation, the Panel may be configured for either current sensing (via a third-party current sensor) or for power polling via RS-232.

If you configured the Panel to use the current sensor option, make sure the sensor is correctly installed, calibrated, and connected to the Panel.

If you configured the Panel to poll for power via RS-232 (also the factory default setting), make sure the RS-232 to the projector is correctly installed and has not come loose.

**Note:** Power feedback can be disabled with the **Configuration Utility**. However, we *strongly recommend* that the Panel be configured to verify projector power state.

---

**PROBLEM:**

The Panel shuts itself and the projector off after a long delay, at least several minutes.

**DIAGNOSIS 1:**

The projector may be configured for an Inactivity Shutdown, and be shutting down when its timer expires and no key has been pressed for the configured delay.

**SOLUTION for Inactivity Shutdown Timer configuration:**

Check your Panel's configuration settings. The Inactivity Shutdown Timer delay may have been set for too short a time. You may wish to disable this feature entirely. See **The Inactivity Shutdown Timer** for more information.

**Note:** It is recommended that this feature be used to preserve the projector lamp bulb; for this reason, in most cases, a very long delay (240 or more minutes) is a better choice than disabling the feature entirely.

**DIAGNOSIS 2:**

Some projectors power themselves off after a delay if they receive no valid input signal. If the Panel is configured for power verification, it shuts itself off when the projector powers off.

**SOLUTION for projector automated shutdown:**

Disable this feature on the *projector* (to do so see the projector manufacturer's instruction manual; this is not a Panel issue).

---

**PROBLEM:**

After I turn the Panel off, the red **Warm-Up** indicator blinks when I try to turn it back on.

**DIAGNOSIS:**

The Panel is configured for a lockout delay; the blinking LED alerts users that the projector is cooling.

**SOLUTION:**

The Panel can be configured to protect the lamp bulb of most projectors by not allowing you to turn the projector back on for sixty or so seconds. The delay between power cycling is configurable with the **Configuration Utility** as discussed in **The Lockout Timer**. Setting the delay to one second effectively eliminates this behavior.

**Note:** It is *strongly recommended* that the Panel be configured to provide at least a twenty to thirty second lockout time to prevent rapid power cycling.

See the **Projector Driver Application Note** for the default lockout setting for your projector and any projector-specific lockout issues.

---

**PROBLEM:**

After I turn the Panel on, I can't press any buttons until the green **Ready** indicator comes on.

**DIAGNOSIS:**

Most projectors require a minimum power cycle time before they are ready receive user requests.

**SOLUTION:**

None. This is not a Panel issue.

Each projector Driver is configured to reflect the minimum safe delay before attempting communicating with a given model of projector.

---

**PROBLEM:**

I can turn the projector on, but input selection and/or volume keys aren't working, or vice versa.

**DIAGNOSIS 1:**

Cabling problem. The Panel is not connected to the projector or configured for the wiring used.

**SOLUTION for cabling problems:**

Make sure the Panel is correctly configured, and verify that all required cabling is correctly installed. As discussed in **Control Wiring Options**, the **Configuration Utility** indicates the necessary communications cabling.

Remember that as an aid to troubleshooting communication, we chose an IR emitter that lights up in the visible spectrum whenever it is emitting IR. If your IR squirt is always lit, or never lights, even when you are sending a command that the Utility indicates is an IR command, this is a sure sign that there is a problem with the Wired Remote/IR configuration or cabling.

Some other common problems:

1. **RS-232 cabling:** Most projectors have specific cabling requirements for control via RS-232. Issues specific to your projector (pinouts and gender, looping of RTS/CTS or DTR/DSR lines, etc.) are detailed in the **Projector Driver Application Note** that accompanies each Driver. *Use of the wrong RS-232 cable is the most frequent cause of communications failure between the Panel and a projector.* Also, make sure no wires have been crossed – RX with TX in particular.
2. **Wired Remote vs. IR:** Make sure that the Panel is correctly configured for the wiring option you have chosen. A sure sign the Panel is incorrectly configured is an IR squirt that is continuously lit – this usually indicates that the Panel is incorrectly configured for Wired Remote control (for which the line level is often inverted, hence the continuous output in the absence of any signal).
3. **IR squirt not attached:** Make sure that the IR squirt (if used) is affixed to the IR reception window of your projector.
4. **Wired Remote polarity reversed:** Make sure the tip and sleeve are correctly wired.
5. **Projector power:** Verify that the projector is receiving power. Most projectors have a “standby” LED to indicate that they are off but receiving power.

#### **DIAGNOSIS 2:**

The Panel is not correctly configured.

#### **SOLUTION for configuration problems:**

Use of the wrong projector driver – *even drivers for a different projector made by the same manufacturer* – or failure to configure a Panel prior to use guarantee that the Panel will not control the projector in the desired manner, if at all.

Also make sure that you have

- correctly mapped inputs as installed, and
- connected each patch point/source to the projector.

---

#### **PROBLEM:**

Some keys and commands seem to work, while others do not (especially, some selections work while others do not).

#### **DIAGNOSIS 1:**

Incomplete cabling.

If this problem affects some *types* of control but not others (i.e., power controls work but selection controls do not), the most likely explanation is that one control wire is correctly installed while the other is not.

#### **SOLUTION for incomplete cabling problems:**

As above, verify that *all* control cables are correctly constructed and installed.

Alternately, you may wish to do an “A-B” test removal of each type of command wiring, to determine which wire has failed.

**Note:** The **Configuration Utility** indicates which selection and hidden function commands are sent via Wired Remote/IR by pre-pending an iconic symbol to the name of the command; this may help isolate the nature of the problem.

## DIAGNOSIS 2:

The **Audio Follow Video Preamp** or external switcher is not working.

Confusing situations arise when (a) the projector is incorrectly controlled, but an external switcher or the Preamp is functioning properly; or (b) the projector is properly controlled, but an external switcher or the Preamp is incorrectly controlled, configured or wired.

### **SOLUTION for Audio Follow Video Preamp or external switcher:**

When using an external switcher or the Preamp, it is possible to see partial selection control as follows:

The Panel (by controlling an external switcher, or through the 4x1 composite video switching section of the Preamp) may correctly switch video to the video input of the projector, while the projector is not receiving the switching commands because of a control cabling problem. In this case, *video switching* works, but other commands (to switch to RGB, for example) do not<sup>16</sup>. In this case, diagnose and correct the control wiring problem as above.

The contrary case is also possible, i.e., an external switcher may be incorrectly configured or wired, or the Preamp may be incorrectly connected or its video section improperly wired, while control wiring to the projector is correct. In this case, the projector correctly switches *between* inputs (e.g., from RGB to VIDEO), but multiple sources switched through the external switcher or Preamp are not correctly switched.

Proper functioning of the Preamp in the absence of correct projector wiring can also produce confusing behavior where *audio* is correctly switched and controlled, but projector control fails.

---

## PROBLEM:

I can't use the projector's remote control (or unit-mounted controls); and/or the projector's on-screen menu keep disappearing.

## DIAGNOSIS 1:

Wired remote is disabling the remote control.

This can only be the case if you have wired control via the wired remote port on your projector. The manual for your projector should specify whether use of the wired remote port disable use of the remote control (or even the unit-mounted controls).

### **SOLUTION for wired remote disabling:**

Many functions you would commonly use a remote control for are provided as Hidden Functions. See **Hidden Functions** for details and the **Projector Driver Application Note** for your projector for a list of available functions.

If you cannot use Hidden Functions, the only solution in this case is to physically remove the wired remote cable.

---

<sup>16</sup> Of course, if you are using an RGB switcher, the same problem could be seen with RGB switching.

**DIAGNOSIS 2:**

The Panel has been configured to use RS-232 polling to verify projector power. This is not itself an error condition, but many projectors turn off on-screen menus or other on-screen adjustment controls when they receive commands from their control ports.

**SOLUTION for RS-232 polling interference:**

Polling can be temporarily suspended by depressing the Panel **On** button; no power polling commands are sent while button is held down. This allows use of hidden functions (which are often on-screen menu commands) or remote controls without interference from polling.

---

**PROBLEM:**

The Volume bar graph lights when I press a Volume key, but then goes blank. Why don't I see a volume level?

**DIAGNOSIS:**

The projector is sending *relative* volume commands to the projector (up and down only). This is not itself indicative of an error condition.

**SOLUTION:**

Relative volume behavior and animation is the expected behavior whenever the Panel is sending volume to a projector that does not provide Volume feedback (e.g., because volume commands are being sent by Wired Remote/IR). This is *not* configurable but a property of each projector model. The volume mode supported for each projector is specified in its **Projector Driver**

**Application Note.**

If absolute volume is necessary in a given installation or for a particular client, the best solution is usually to purchase the optional **Audio Follow Video Preamplifier**. See **Relative vs. absolute volume modes**.

---

**PROBLEM:**

I have attached the **Audio Follow Video Preamplifier**, but the **Configuration Utility** won't let me select the **AFVP** tab.

**DIAGNOSIS:**

Cabling problem. The cable connecting the Panel and Preamp is not firmly seated, etc.

**SOLUTION:**

The Panel automatically detects the presence of the Preamp. If the Utility recognizes that the Panel is present but not that the Preamp is attached, make sure that the cable connecting the Panel to the Preamp is correctly installed and well seated. If the cable is well attached, the Preamp or Panel may be damaged.

If the Utility doesn't even recognize that the Panel is connected, see below.

---

**PROBLEM:**

When I run the **Configuration Utility**, the Panel is not recognized.

**DIAGNOSIS:**

The Utility is not detecting the Panel through the configured Com Port.

**SOLUTION:**

1. Ensure that the Panel is receiving power. The **Configuration Utility** cannot configure the Panel unless it is receiving power (it does not have to be “on” however).
2. Make sure the correct RS-232 cable is connecting your PC with the Panel. Use of the wrong cable prevents the Utility from recognizing the Panel.
3. Make sure the Com Port you are using is not disabled by Windows, or being used by any other program.
4. Make sure the Utility is trying to use the correct Com Port (identified on the far left of the Utility status bar). If you are using a different Com Port than you specified during installation (you must choose a port the first time the Utility is run), use the *Communications* pulldown in the Utility to select the new port.
5. If the Panel exhibits other problems (e.g., it does not respond to button presses), there may be a problem with the Driver loaded or hardware. See below for the former case; otherwise, you may need to contact SP Controls or your vendor for support.

---

**PROBLEM:**

The Panel no longer accepts downloads, the **Configuration Utility** no longer recognizes the Panel, or the Panel now freezes whenever it is powered on.

**DIAGNOSIS:**

The Panel's EEPROM memory may have been corrupted. In certain very rare cases failure during download may corrupt this memory.

**SOLUTION:**

Reconfigure the Panel in download-only mode as described in **Download-Only Mode**.

---

**PROBLEM:**

When I run the **Configuration Utility** while connected to the Panel, I get an error message telling me that the Driver for the currently configured projector cannot be found.

**DIAGNOSIS:**

The Utility cannot find the projector Driver that was last downloaded to the Panel on your PC.

**SOLUTION:**

The Utility looks in the directory the Utility was installed into (by default `\Program Files\SPC\`) for the projector Driver last downloaded to the Panel.

If you using a different PC from the one originally used to configure the Panel, if you have reinstalled the **Configuration Utility**, or if you have moved or deleted any projector files, this message alerts you that the projector Driver cannot be found.

When the Utility cannot find the projector file you last downloaded, it lets you change timer, relay, wiring and similar settings but not change selection mappings or hidden functions (which require information from the projector Driver), until you place the appropriate projector Driver file into the Utility's directory.

Projector Drivers are available on the SP Controls website.

---



**PROBLEM:**

When I run the **Configuration Utility** while connected to the Panel, I get an error message telling me that the firmware of the Panel does not match that expected by the Utility.

**DIAGNOSIS 1:**

You are trying to use updated firmware with an old version of the Utility, or an updated version of the Utility with old firmware.

**SOLUTION for firmware version difference:**

The Utility verifies version information before attempting to download to the Panel. A mismatch should only be detected if you have replaced the firmware on your Panel, or are using a software update of the **Configuration Utility** on your Panel.

Check the SP Controls website for information on firmware and software updates, and the appropriateness of their use in your installation and situation.

**DIAGNOSIS 2:**

If you have not updated your firmware or software but are getting this error, the most likely cause is hardware failure.

**SOLUTION for hardware failure:**

The Panel's microprocessor has somehow been damaged or corrupted. Contact your vendor, as your Panel most likely needs to be repaired.

**PROBLEM:**

The red **Warm-Up** indicator blinks when the Panel is *on*.

**DIAGNOSIS:**

The Panel is awaiting configuration. The Panel is in download-only mode (as described in **Download-Only Mode**), either because this mode was selected accidentally, or because its configuration has been corrupted or does not match a newly installed firmware upgrade.

**Note:** If the **Warm-Up** indicator blinks when the Panel is *off* (when trying to turn the projector on), the Panel is in lockout mode and the configurable Lockout delay is timing out. See **The Lockout Timer** for more information.

**SOLUTION:**

1. If this problem occurs only once, the Panel may have been accidentally placed into Download Only Mode (see **Download-Only Mode**). In rare instances, this mode may be entered if the Panel unexpectedly resets while certain keys are being depressed. Removing and then restoring power to the Panel, or downloading to it from the **Configuration Utility**, should return the Panel to normal operation.
2. If you have upgraded the Panel firmware this behavior is to be expected. Details on how to reconfigure your Panel should have come with your upgrade. If in doubt, check the SP Controls website for more information.
3. If you have *not* upgraded your Panel firmware, the onboard memory may have become corrupted. You will not be able to retrieve to restore the configuration of your Panel, but may be able to return the Panel to use by re-downloading to it using the **Configuration Utility**.
4. If reconfiguration efforts fail, your memory may have been damaged. Contact your vendor or SP Controls customer support.

## SPECIFICATIONS

Panel dimensions	10.25"(w) x 8.25"(h) x 1.00"(d)
Wall cutout size with backbox	10.00"(w) x 8.00"(h)
Without backbox	9.00"(w) x 7.00"(h)
Recommended backbox	Hoffman A-SE10X8X4.
Shipping weight	Up to 7 lbs, depending on the options
Finish	Finely brushed black anodized aluminum
Power supply specifications	600mA, 12VDC regulated, CSA and UL approved
Relay specifications	500mA, 50V

# CONTACTING SP CONTROLS

## **www.spcontrols.com**

The SP Controls website at **www.spcontrols.com** provides:

- Up-to-date information about SP Controls product offerings and the **SmartPanel**.
- Software updates, including updates and fixes for the **Configuration Utility**.
- The latest **Projector Drivers** and **Projector Driver Application Notes**.
- Updates to this documentation.
- A complete **Product List** and information on forthcoming products and peripherals.

## **Customer support**

If you are having problems with the installation or have questions about the product, please call the SP Controls technical support line at (877) 367-8444, extension 7.

Customer support is also provided through the SP Controls website. Specific questions or help requests should be directed via e-mail to **help@spcontrols.com**.

## **Mailing address**

**SP Controls, Inc.**  
930 Linden Avenue  
So. San Francisco, CA  
94080  
USA

## WARRANTY

SP Controls warrants all **SmartPanels** and accessories against defects in materials and workmanship for a period of **three years** from the date of purchase from our distributor.

Although SP Controls thoroughly tested and reviewed this Documentation, there is no warranty, express or implied, with respect to quality, merchantability, or fitness for a particular purpose. Therefore, the **SmartPanel** and accessories are provided “as-is” and the purchaser assumes the entire risk as to quality and performance.

There are no obligations or liabilities on the part of the SP Controls Corporation for consequential damages arising out of or in conjunction with the use or performance of these products or other indirect damages with respect to loss of profit, revenue, or cost of removal and/or replacement. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights that vary from state to state. SP Controls’ maximum liability shall not exceed the price paid by the user.

All implied warranties, including warranties for merchantability and/or fitness, are limited in duration to three (3) years from the date of purchase. Proof of purchase must be provided with any claim.

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