

# NV9641

NV9000 Control Panel

## User's Guide

UG0025-04

19 Nov 2014



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Title	NV9641 User's Guide
Part Number	UG0025-04
Revision	1.4 (19 Nov 14)

## Change History

Rev.	Date	ECO	Description	Approved
1.0	24 Apr 13	18826	Initial release	D.Cox
1.4	19 Nov 14	19357	New format. Added Korean compliance statement. Client assignments (in server mode) preserved over power cycles.	D.Cox

## Safety Compliance

### **FC** FCC Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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All of the equipment described in this manual has been designed to conform with the required safety and emissions standards of the European Community. Products tested and verified to meet these standards are marked as required by law with the CE mark.

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## Important Safeguards and Notices

This section provides important safety guidelines for operators and service personnel. Specific warnings and cautions appear throughout the manual where they apply. Please read and follow this important information, especially those instructions related to the risk of electric shock or injury to persons.

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#### WARNING

Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any service other than that contained in the operating instructions unless you are qualified to do so.

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## Restriction on Hazardous Substances (RoHs)

Grass Valley is in compliance with EU Directive RoHS 2002/95/EC governing the restricted use of certain hazardous substances and materials in products and in our manufacturing processes.

Grass Valley has a substantial program in place for RoHS compliance that includes significant investment in our manufacturing process, and a migration of Grass Valley product electronic components and structural materials to RoHS compliance.

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1-800-719-1900 (toll-free) or  
1-530-265-1000 (outside the U.S.).

## Symbols and Their Meanings



The lightning flash with arrowhead symbol within an equilateral triangle alerts the user to the presence of dangerous voltages within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle alerts the user to the presence of important operating and maintenance/service instructions.



The Ground symbol represents a protective grounding terminal. Such a terminal must be connected to earth ground prior to making any other connections to the equipment.



The fuse symbol indicates that the fuse referenced in the text must be replaced with one having the ratings indicated.



The presence of this symbol in or on Grass Valley equipment means that it has been designed, tested and certified as complying with applicable Underwriter's Laboratory (USA) regulations and recommendations.



The presence of this symbol in or on Grass Valley equipment means that it has been designed, tested and certified as essentially complying with all applicable European Union (CE) regulations and recommendations.

## General Warnings

A warning indicates a possible hazard to personnel which may cause injury or death. Observe the following general warnings when using or working on this equipment:

- Heed all warnings on the unit and in the operating instructions.
- Do not use this equipment in or near water.
- This equipment is grounded through the grounding conductor of the power cord. To avoid electrical shock, plug the power cord into a properly wired receptacle before connecting the equipment inputs or outputs.
- Route power cords and other cables so they are not likely to be damaged.
- Disconnect power before cleaning the equipment. Do not use liquid or aerosol cleaners; use only a damp cloth.
- Dangerous voltages may exist at several points in this equipment. To avoid injury, do not touch exposed connections and components while power is on.
- Do not wear rings or wristwatches when troubleshooting high current circuits such as the power supplies.
- To avoid fire hazard, use only the specified fuse(s) with the correct type number, voltage and current ratings as referenced in the appropriate locations in the service instructions or on the equipment. Always refer fuse replacements to qualified service personnel.
- To avoid explosion, do not operate this equipment in an explosive atmosphere.
- Have qualified service personnel perform safety checks after any service.

## General Cautions

A caution indicates a possible hazard to equipment that could result in equipment damage. Observe the following cautions when operating or working on this equipment:

- When installing this equipment, do not attach the power cord to building surfaces.
- To prevent damage to equipment when replacing fuses, locate and correct the problem that caused the fuse to blow before re-applying power.
- Use only the specified replacement parts.
- Follow static precautions at all times when handling this equipment.
- This product should only be powered as described in the manual. To prevent equipment damage, select the proper line voltage on the power supply(ies) as described in the installation documentation.
- To prevent damage to the equipment, read the instructions in the equipment manual for proper input voltage range selection.
- Some products include a backup battery. There is a risk of explosion if the battery is replaced by a battery of an incorrect type. Dispose of batteries according to instructions.
- Products that have (1) no on/off switch and (2) use an external power supply must be installed in proximity to a main power outlet that is easily accessible.
- To reduce the risk of electrical shock, plug each power supply cord into a separate branch circuit having a separate service ground.



# toc

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# 1

## Preface

Chapter 1 is an introduction to the NV9641 User's Guide.

### Topics

<a href="#">Chapter Structure</a> .....	1
<a href="#">The PDF Document</a> .....	1
<a href="#">Terms, Conventions and Abbreviations</a> .....	2
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## Chapter Structure

The following chapters provide detailed information regarding the NV9641 control panel:

- Chapter 1, [Preface](#), (this chapter) outlines ways to use this guide.
- Chapter 2, [Introduction](#), provides a functional description of the NV9641.
- Chapter 3, [Installation](#), provides installation, connection, and initialization instructions.
- Chapter 4, [Configuration](#), provides configuration instructions.  
This chapter is for configurers, primarily.
- Chapter 5, [Operation](#), provides operating instructions.  
This chapter is for operators, primarily.
- Chapter 6, [GPIO](#), describes the tally (a.k.a. GPIO) interface and tells you how to configure it.
- Chapter 7, [Technical Details](#), provides electrical, mechanical, and environmental specifications, product drawings, and default settings.
- Chapter 8, [Misc. Topics](#), presents a glossary and miscellaneous instructions and information.
- An [index](#) and [glossary](#) are also provided for your reference.

## The PDF Document

This guide is provided in PDF format, allowing you to use Acrobat's "bookmarks" to navigate to any desired location. You can also easily print a hardcopy. Please note:

- Use the Table of Contents or the bookmarks page to jump to any desired section.
- Many hyperlinks are provided within the chapters.
- Use the Index to jump to specific topics within a chapter. Each page number in the index is a hyperlink.
- Use Acrobat's 'Go to Previous View' and 'Go to Next View' buttons to retrace your complete navigational path.

Use the 'First Page', 'Previous Page', and 'Next Page', and 'Last Page' buttons to go to the first, previous, next, or last page within a PDF file.

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**Note**

To display the navigation buttons, right-click the Tool Bar area, and check 'Navigation'.

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- Use Acrobat's extensive search capabilities, such as the 'Find' tool and 'Search' tool to perform comprehensive searches as required.

## Terms, Conventions and Abbreviations

The following conventions are used throughout this guide:

- The symbol **p** denotes either an example or a special message.
- Entries enclosed in single quotation marks or Capital Letters denote physical control panel buttons, configuration buttons, or menu items.
  - Click 'Apply' to ...
  - Press the SRC 12 button ...

The following terms and abbreviations are used throughout this guide:

- The term "control panel" refers to the NV9641 control panel and to NV96xx control panels, in general.
- "High tally" means that a button is brightly illuminated.
- "Low tally" means that a button is illuminated at low intensity. Most buttons assume a low tally state until selected.
- "MD" is an abbreviation for multi-destination.
- "SE" is an abbreviation for NV9000-SE Utilities.

## Other Documentation and Software

You should read and be familiar with the material presented in the following documents:

- NV960, NV920, or NV915 Quickstart Guide(s).
- NV9000-SE Utilities User's Guide (or NV9000-SE Utilities help files).
- The router manuals for whatever routers you have in your system.

You should also be familiar with the NV9000-SE Utilities software and NV9000 family router control systems.

# 2 Introduction

Chapter 2 provides a functional description of the NV9641.

## Topics

- [Summary](#) ..... 3
- [Panel Organization](#) ..... 4
- [Modes of Operation](#) ..... 6
- [Other NV9641 Functions](#) ..... 7

## Summary

The NV9641<sup>1</sup> is a 1RU control panel featuring 16 LCD function buttons (illuminated in various colors and having 1 to 3 lines of text) and 2 up/down (scroll) buttons.

This 1RU panel is organized as shown in figures 2-1 and 2-2:



Fig. 2-1: NV9641 Front

At the rear, in addition to power, serial, and network connectors, is a 25-pin GPIO (tally) connector that supports 4 optically isolated relay outputs and 8 optically isolated inputs:

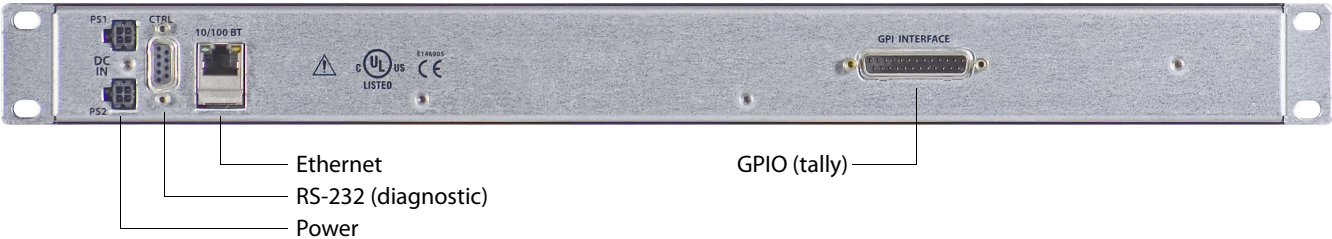


Fig. 2-2: NV9641 rear

1. An equivalent NV9641V—a GUI that is called a “virtual panel”—is available. It emulates the NV9641.

## Behavioral Models

Configurers can place the NV9641 in one of two behavioral model: XY/MD and paging. The behavioral models are distinct and it is not possible for the operator to switch from one model to the other.

### XY/MD Model

Under this model, the NV9641 provides a *tree-structured* (or hierarchical) button layout. You can define a “tree” of buttons in such a way that each of the 16 LCD buttons (illuminated in various colors and having 1 to 3 lines of text) can either (1) execute a function or (2) select a subtree (i.e., present an entirely new set of functions at a different level in the tree). The tree, with its subtrees, is not limited in size.

We use the term “button page” or “page” to mean the set of 16 button functions at any particular place in the subtree.

Configurers will use ‘Navigate’ buttons to create new button pages (subtrees). During operation, NV9641 users will press a ‘Navigate’ button to access a subtree. However, ‘Navigate’ buttons are typically not labeled “Navigate”; they would be labeled according to the specific function they perform in your system.

- ▲ The up/down buttons scroll through lists of devices, through levels in X-Y mode, and through pages of multi-destination devices.

When the operator is scrolling through devices, and is at the first page of devices, the up button returns the panel to the “parent” page—the page that contained the category button that accessed the device pages.

### Paging Model

Under this model, the NV9641 provides a list of button pages, through which the operator may scroll using the up/down buttons. In this case, the term “button page” means a set of buttons accessed by the up/down buttons. The button pages are **not** organized as a tree. There are no navigation buttons under paging mode.

The paging model has fewer functions than the XY/MD model.

## Panel Organization

### Function Buttons

The NV9641 has an array of 16 LCD buttons. Each has 3 lines of text (up to 8 characters per line). The buttons can display one of seven colors dynamically: nominally red, green, blue, purple, amber, yellow, or grey. We say a button is “dark” when its LCD is turned off.

During configuration, you can assign any of the 7 colors to a button.

Each LCD button has *four* levels of brightness: off, low, medium, and high, and supports *three* operational levels: high tally, low tally, and off. High tally can be either medium or high brightness and low tally can be either low or medium brightness. High tally is always constrained to be brighter than low tally. See [LCD Buttons](#), page 85, for a color chart.

Although a configurer can see the tree or list of pages during configuration, the structure of the button pages is not evident on the panel itself. The panel operator must commit the structure to

memory to be able to use the panel. It is up to the person configuring the panel to design a simple and logical structure.

Some buttons functions are assigned by the system depending on the context. For example, if a button page is to represent all sources in a category, and that list changes, the button subtree adjusts in size dynamically. The panel software adds a “forward” button and a “back” button if there are more sources than buttons. Pressing the ‘Forward’ button takes you to the next page of sources. Pressing the ‘Back’ button takes you to the previous page of sources.

Some button states depend on context. Many buttons remain unlit when their functions are disabled. For example, the up and down scroll buttons remain unlit until there is an opportunity to scroll up or down, respectively. For example, an XY/MD button turns green for X-Y mode and amber for multi-destination mode. ‘Save Preset’ goes low tally when you press ‘Clear Preset’.

The LCD buttons display a menu if the operator presses a menu button. When the operator make a menu selection, viewable data are displayed on the LCD buttons. In some cases, the operator can enter data (such as panel ID or LCD brightness) using buttons that allow data entry.

Configurers can define ‘Selection’ buttons that select a level during a breakaway setup or that select destinations in multi-destination (MD) mode. (You *must* do so if the operator is to make such selections.)

## Up/Down Buttons

The two small buttons (next to the printed arrows) illuminate when scrolling is possible. The up button illuminates when you can scroll up; the down button, when you can scroll down.

Scrolling is necessary when a list of items — for instance, source devices — exceeds the number of buttons available for the items.

Operators will use the up/down buttons to view different button pages when the panel is configured according to the paging model.

## Tally Interface

At the rear of the panel is a DB25 connector that provides 8 tally inputs and 4 tally outputs. (The outputs are solid state relay outputs.) Both inputs and outputs are optically isolated.

During configuration, you can construct Boolean logic that switches the outputs on. The terms of the logic expressions are states of the source and destination devices, etc., controlled by the NV9641.

During configuration, you can prescribe NV9641 behavior that depends on the tally inputs.

What you connect to the tally interface is, of course, up to you. Grass Valley provides a breakout cable (WC0053) for the tally connector as a purchase option.

The NV9000-SE Utilities on-line help documentation calls the tally interface a GPIO interface. On the rear of the panel, it is labelled a “GPI interface.”

See Chapter 6, [GPIO](#), on page 73, for complete detail.

## Modes of Operation

Under the paging model, the panel operates in a limited X-Y mode.

Under the XY/MD model, the panel operates in either X-Y mode or multi-destination (MD) mode. A single button (XY/MD) can toggle between the modes. A third mode—called “single-bus,” “single-destination,” or “button-per-source” mode—can be emulated in either X-Y mode or MD mode.

The primary modes of operation are:

- X-Y Mode—individual control of all router *levels*. Choose a destination, optionally choose desired breakaway levels, choose a source, and press ‘Take’ to complete a desired route.
- Single-Destination Mode.  
Single-destination” mode is not a distinct mode, but we mention it because it is a mode on some other panels and can be simulated on the NV9641. It can be combined with the other two modes. You can create many different forms of “single-destination” mode. This mode may in fact have more than a single destination.  
Although single-destination mode is not complicated, to understand it you need to understand the different button types. Please read the Configuration and Operation chapters and then see [Single-Destination Mode](#) (page 42).
- Limited X-Y Mode.  
When the panel is configured according to the paging model, we can say it is in limited X-Y mode. In limited X-Y mode, takes are all-level and apply to a single destination.
- Multi-Destination Mode—lets you control multiple destinations. The LCD buttons display destinations and sources. You can scroll through destination lists using the ‘Up’ and ‘Down’ buttons. Select a destination, choose a source, and repeat for all desired routes. Then press ‘Take’. Takes are “all level,” and breakaways cannot be performed.
  - ▲ ‘Hold’ mode allows you to select many MD destinations at once.

The secondary modes of panel operation are:

- Setup Mode—where the NV9641 is freshly powered up, but disconnected from the network. In this mode, you can preset the NV9641’s panel ID and perform a few diagnostic tasks.
- Salvo Mode—pressing a Salvo button (and then the ‘Take’ button) executes a salvo. (The duration of a salvo is indeterminate.) Salvo mode tends to be very brief.
- Menu Mode—pressing a Menu button places the NV9641 in “menu” mode. In menu mode, the LCD button array becomes a menu that changes as needed during menu operation.

Other modes of operation are:

- Hold mode—when you press the ‘Hold’ button, hold mode becomes active and when you press it again, hold mode becomes inactive. See [Hold](#) on page 59.
- Save preset mode—when you press the ‘Save Preset’ button, ‘Save Preset’ mode becomes active and when you press it again, ‘Save Preset’ mode becomes inactive. See [Save Preset](#) on page 62.



## Other NV9641 Functions

The NV9641 can be configured to perform the following additional functions:

- Previous source, free source, and “quick” source.
- Lock/protect/release for destinations.
- Return to a pre-defined (or default) state.
- Hold breakaway levels.
- System salvos.
- Forced release of locked or protected devices.
- Device selection using indexes or suffixes.

The NV9641 provides the following additional features:

- Multiple-level breakaways in X-Y mode. This lets you route multiple sources to the same destination *on different levels*.
- Gang or dub switching in multi-destination mode.
- Broadcast data routing in X-Y mode.
- Level mapping in X-Y mode.
- Button page “templates”—global navigation templates and suffix templates—for easier configuration.



# 3 Installation

Chapter 3 provides installation instructions for the NV9641.

## Topics

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## Package Contents

If you have ordered one or more NV9641 control panels from Grass Valley, inspect the shipping container for damage. If you find any container damage, unpack and inspect the contents. If the contents are damaged, notify the carrier immediately.

As you unpack the shipping container, look for the packing slip and compare it against the contents to verify that you received everything as ordered. If anything is missing (or if you find equipment damage unrelated to shipping), please contact technical support. Refer to [Grass Valley Technical Support](#) on page 99.

Depending on your order, the NV9641 items that can ship include:

- One or more NV9641 control panels.
- One or more power supplies, with straps that secure the AC power cords to the power supplies.
- A user's guide (this document), NV9000-SE Utilities software, and other material.<sup>1</sup>
- A quick-start guide (hard copy).
- Optional WC0053 breakout cable.

The package does not contain network cables, serial cables, or mounting screws.

You do not need to take any special precautions regarding ESD.

This document does not address the shipment or installation of any other equipment or software that can be used in conjunction with the NV9641 (including any system controllers, NV96xx control panels, EC9700 GUI, EC9710 GUI, and configuration programs such as UniConfig, MRC, or NV9000-SE Utilities).

This document does briefly address the use of NV9000-SE Utilities and the Panel IP Configuration Utility as they pertain to panel configuration.

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1. You can obtain software and documentation updates through Grass Valley customer service.

## Installation

Follow these steps to install a NV9641 control panel:

- 1 Mount, and secure, the panel in the rack.

The NV9641 is designed to mount in a 19" rack. This is not a requirement.

Place the panel in position in your rack. Attach the panel to the rack frame, using screws appropriate for your rack. The panel's mounting slots are spaced 1.25" (32mm) vertically and allow approximately 1/8" (3mm) of movement horizontally.

The up and down buttons are clear plastic and accept customer-defined button legends. You may install button legends at any time. See [Scroll Button Legends](#) on page 85.

- 2 We assume that you have an Ethernet switch connected to the "Panel and Router Network" port of your system controller. Connect an Ethernet cable from that switch to the RJ-45 port at the rear of the NV9641 panel.
- 3 Connect one or both power supplies. First connect the 4-pin connector to PS1 or PS2 on the rear of the router. The connectors are keyed and snap into place. There is only one way they fit. Do not force them. Then connect the power supply to AC power.



A second power connection is for redundancy only (protection against failure) and is not a requirement for operation.

Refer to [Power Specifications](#) on page 79 for details on the PS0001 power supply. See also [Power Cord Retention](#) on page 86.

- 4 Connect tally (GPIO) input devices and output devices.

You can use the optional WC0053 breakout cable to make these connections.

See Chapter 6, [GPIO](#), on page 73 for detail regarding the tally interface.

## Installing Software and Documentation

This document is available through the Grass Valley web site.

You must use NV9000-SE Utilities to configure the NV9641 control panel. Contact Grass Valley to obtain the latest version of this NV9000 configuration software.

You may use the Panel IP Configuration Utility if you want your NV9641 to have a static IP address or to change it back to DHCP. The panel, as it comes from the factory, defaults to DHCP.

## Initialization

Before your system controller can communicate with an NV9641, you must give it a panel ID. Follow these steps for each NV9641 you are installing:

- 1 Power up the NV9641. Do not connect its Ethernet cable (or disconnect it if it is connected). After a few seconds, the alphanumeric display will show 'Acquire IP Address' and show the panel's current panel ID. The 2 left-most buttons and the right-most button in the top row now read:



- 2 Press that button to enter the menu. The button now displays "EXIT." At any time during this process, you can press the exit button to "back out of" the process. You might have to press it more than once.
- 3 Find 'Panel ID Entry' among the 4 panel buttons on the left that have become green. Press it.



The 'Panel ID' button shows the current panel ID—in this example, it is 470.

- 4 The panel now illuminates (in green) 10 "digit" buttons. Press the digits of your intended panel ID in order—up to 8 digits. Then press 'Save' (on the right) to save the ID or 'Cancel' to discard the ID.

The new panel ID does not appear until you exit the menu after saving.

- 5 You may use any other menu function at this time. When you are finished, press the exit button to leave the menu.
- 6 After you designate the panel ID, reconnect the Ethernet cable. The system controller will detect your panel in a few seconds. (**All** panel IDs must be unique.)

You can now prepare an NV9641 configuration in NV9000-SE Utilities and upload the configuration to the NV9641. You will need a panel ID to create a NV9641 configuration. When you upload the configuration, the panel ID you entered in NV9000-SE Utilities designates the actual panel. If no actual panel has that ID, the upload cannot occur.

## Testing

A panel test function is available when the NV9641 is disconnected from the system controller. Use it to determine the health of your NV9641. See [Setup Mode](#) on page 70 for detail.

These are points to consider after you install your NV9641 control panel(s):

- 1 Do the buttons illuminate? When an NV9641 powers up, its two leftmost LCD buttons are supposed to turn green. Does it pass the panel test mentioned above?
- 2 When the NV9641 powers up and it is connected to the system controller, it should initialize completely. (That takes about 30 seconds.) Whatever configuration exists for that panel should be loaded and the buttons appropriate for that configuration should light in the colors appropriate for that configuration.

If you continue to see “No Server,” “Acquiring IP Address,” or “Locating Network” on button 2, you might have a problem. Reboot everything and try again.

- ▲ The NV9641, by default, acquires its IP address through DHCP on the panel/router network of the system controller. You can use the Panel IP Configuration Utility to force the panel to have a static IP address.

If (in setup mode) you do not see your designated panel ID on the first button, you have either not initialized the panel or no configuration has been created for your panel in NV9000-SE Utilities.

- 3 Is the system controller actually running? It can sometimes be difficult to tell.
- 4 Is NV9000-SE Utilities installed and operating? If so, can you upload a configuration to the specified panel?
- 5 Does the configuration actually work? Can the operator perform tasks and perform other operations?

The design of an NV9641 “operator interface” is non-trivial. You might want to consider how well your operator interface works in addition to the basic question of whether it works.

# 4 Configuration

Chapter 4 provides configuration instructions for the NV9641.

## Topics

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Persons not interested in NV9641 configuration need not read this chapter.

## Summary

The NV9641 has a “multi-page” user interface. Each of its 16 buttons (illuminated in various colors and having 3 lines of text) can either (1) execute a function or (2) select another button page (i.e., present an entirely new set of functions). The set of button pages is not limited in size. Panel operators navigate to different button pages to perform different tasks.

A NV9641 has two distinct behavioral models, with some functions in common:

- XY/MD model.
- Paging model.

The user interface of the XY/MD model is tree-structured (or hierarchical) although it is not always a “tree” in the strictest sense. Users can access various button pages through navigation buttons.

The user interface of the paging model is not tree-structured. Button pages are arranged in a list instead. Users scroll through pages using the up and down buttons at the right of the panel.

The NV9641 uses its up and down buttons for scrolling through various lists and pages.

At the rear of the panel, a DB25 connector supports 8 tally inputs and 4 tally outputs.

The software with which to configure the NV9641 is NV9000-SE Utilities. Figure 4-1, following, shows the default NV9641 panel configuration page from NV9000-SE Utilities.

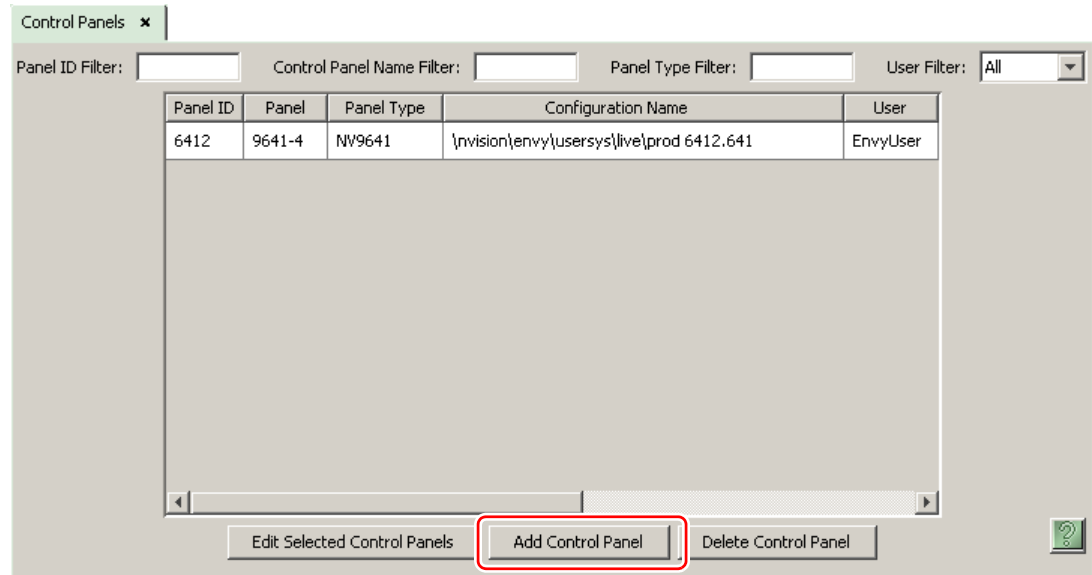
The Panel IP Configuration Utility is also available if you want the NV9641 to take a static IP address.

## Adding a Panel to an NV9000 Configuration

You must create configurations for the NV9641 using NV9000-SE Utilities. We assume that you are familiar enough with NV9000-SE Utilities that you can understand the following material. It is not difficult material, but some of the concepts might not be familiar to everyone.

It takes only a few seconds to add a new panel configuration.

After launching NV9000-SE Utilities, choose 'Control Panels' from the Configuration pane in the navigation area. The 'Control Panels' configuration page appears:



Click 'Add Control Panel' at the bottom of the configuration page. The 'Add Control Panel' page appears:

Type: NV9641

ID: 6418

Name: Demo641

User: EnvyUser

Configuration Options:

New, named: [ ] copied from: PROD 6413.641

Existing: PROD 6413.641

New (default), named: D641

Previous Next Finish Cancel Suffix Navigate

Choose "NV9641" from the 'Type' field. Enter the panel ID you assigned to the panel (during initial power-up) in the ID field. Give a name to the panel in the name field and select a user.



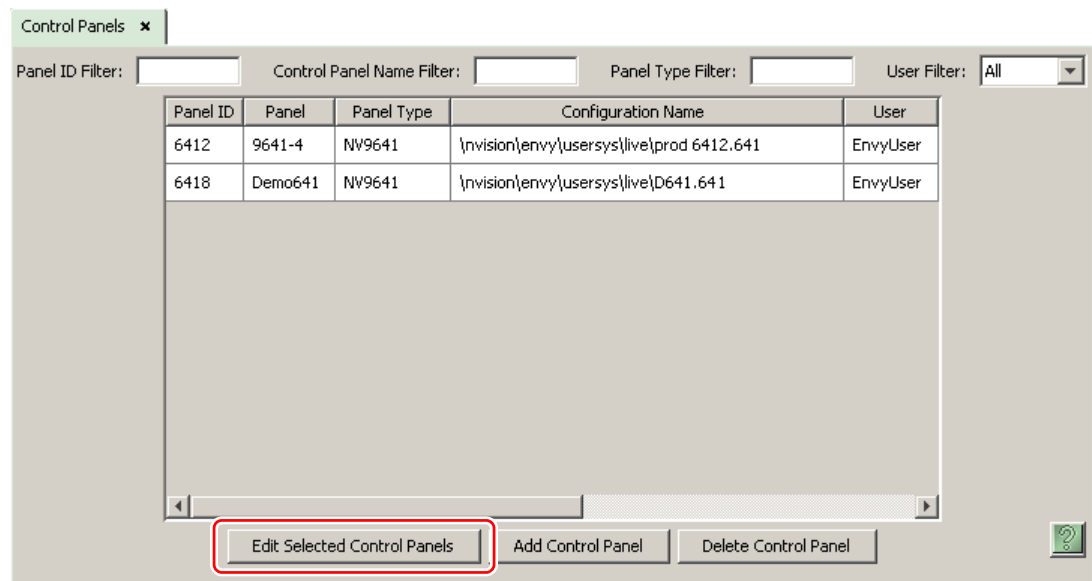
When you are creating a panel configuration you have 3 options. These options are presented in the 'Configuration Options' area:

- 1 Make a copy of an existing configuration file, giving it a new file name.
- 2 Use an existing configuration file. (This allows several panels to share a single configuration.)
- 3 Create an entirely new configuration file.

In the first and third cases, you will create a new configuration file whose name you designate. The file extension for an NV9641 configuration file is .641. Click 'Next' or 'Finish' to proceed.

▲ There are 2 other buttons: 'Suffix' and 'Navigate'. Pressing either of these buttons creates a button page template, not a panel configuration. See [Global Navigation](#) on page 43.

Return to the 'Control Panels' page to view your new entry. To edit an NV9641 configuration, either double-click its list entry or select the entry and then click 'Edit Panel Configuration':



You will then see the panel configuration page for the selected NV9641.

The following section of this guide discusses using the panel configuration page to configure an NV9641.

▲ The entries in the list can be (1) actual panel configurations (2) global navigation templates or (3) global "suffix" templates. See [Global Navigation](#) on page 43.

## NV9641 Panel Configuration Page

This is the default NV9641 panel configuration page in NV9000-SE Utilities:

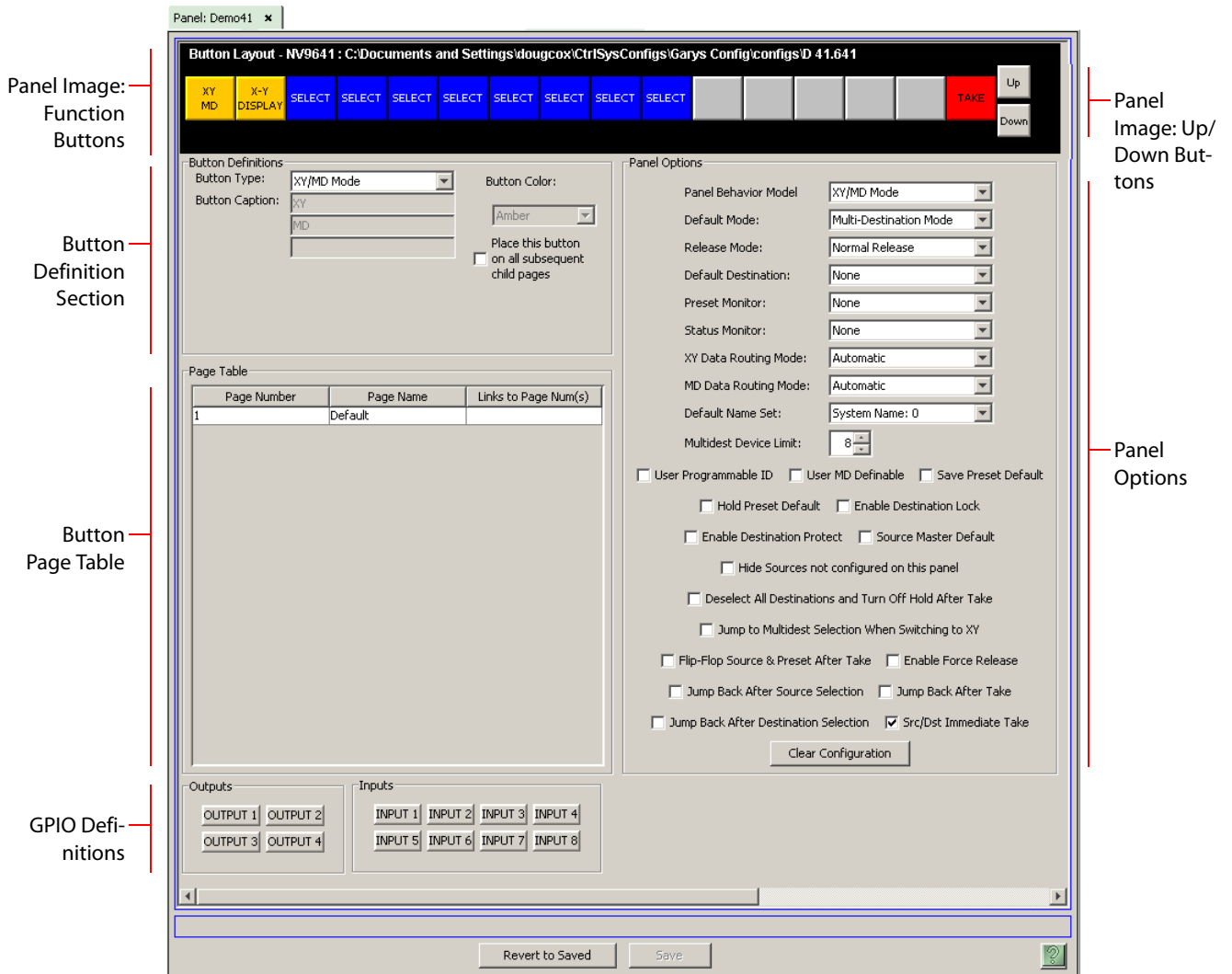


Fig. 4-1: NV9641 Configuration Page (Default)

Similar pages exist for NV9641 suffix templates and for global navigation templates. See [Global Navigation](#) on page 43.

The items on the page shown in Figure 4-1 apply under the “XY/MD” behavioral model. A somewhat different page appears when you choose the “paging” behavioral model. See [Options under the Paging Model](#) on page 23.

After you configure buttons, and button pages, the appearance of the panel buttons will have changed.

At the bottom of the page are two important configuration buttons: ‘Revert to Saved’ and ‘Save’. The ‘Save’ button commits modifications you have just made. The ‘Revert to Saved’ button restores the last saved version of the panel configuration, canceling any changes you just made.

## Regions of the Configuration Page

Above the 'Revert to Saved' and 'Save' buttons (always present) there are 5 main regions:

- A graphic representation of the NV9641 panel.

On the left are 16 LCD function buttons. Click on a button to assign a function to it. In some cases, you can click or double-click certain buttons to execute the button function. Clicking an up or down button allows you to scroll through selection button blocks for MD destination assignments. Unless you are configuring a suffix template or working on a "paging mode" panel configuration, you can double-click a 'Navigate' button to make the button's "subpage" appear.

When you are working on a paging mode configuration, the up and down buttons select the previous or next pages. (The down button also creates new pages if you happen to be at the end of the page list.)

Buttons can be illuminated in several colors: green, amber, yellow, red, blue, purple, and grey. There are 3 levels of illumination: high tally (bright), low tally (muted) and off. Undefined buttons are turned off (dark) on the actual panel and are gray in the configuration page.

- ▲ Buttons disabled during operation have text, but are dark on the control panel.

On the right are the two scroll buttons. These are not configurable functions. They do not perform up or down functions in the configuration page except when you are configuring selection buttons for MD destinations and then only when you have enabled more than 8 MD destinations.

- Button definitions.

In this section, configurers make button assignments, using its pull-down menus and text fields. The menus and fields vary with the button type.

See [Button Definitions](#), following.

- Button page table.

This section — the region below the button definition section — displays a list of the individual pages of the tree structure under the XY/MD model or the list structure under the paging model. The button page at the top of the table is called "Default." In the XY/MD model, it is the root of the tree.

Under the XY/MD model, category buttons can display device subpages when pressed. Those subpages are **not** definable in NV9000-SE Utilities and the button page table does not display the device subpages accessed through category buttons. Category buttons can also display suffix pages when pressed. Suffix pages **are** included in the button page table.

Category buttons are not available under the paging model.

See [Button Page Table](#), following.

- GPIO definitions.

In this section, you may define GPIO logic. The control panel has a rear connector that provides 4 relay outputs and 8 optically isolated inputs. See [GPIO](#), page 73, for more information.

- Panel options.

In this section, you may specify the behavioral characteristics of the panel. See [Panel Options](#) on page 19.

## Configuration Tasks

The person configuring an NV9641 panel will want to consider how best to use the button page tree under the XY/MD model or the list structure of the button page list under the paging model to support the devices and routers in the router control system at hand. The task is non-trivial. The paging model is simpler but the XY/MD model is richer.

In support of that effort, the configurator will do the following:

- Select panel options.
- Assign functions to buttons.
- Create pages (subtrees) of buttons. (Do this using the Navigation button type).
- Define logic for some or all of the tally inputs or outputs.

A configuration should lead the operator through required tasks. It is possible to make navigation of the panel intuitive through the judicious use of color and text on the LCD buttons.

The configurator must keep in mind that the operator generally cannot view the entire button page structure at a glance.

For XY/MD configurations, and for global navigation templates, the configurator must also keep in mind that the operator must be able to reach any page in the tree. In particular, the operator, having navigated down a subtree, must have some way to navigate back up the subtree. There are several ways to ensure this. Two are listed here:

- Place a "Back" button on each subpage. The "back" button causes the NV9641 to redisplay the *previous* page.
  - Place a "Navigate" button on each page, where the navigate button causes the NV9641 to display a *specific* page.
- ▲ The operator can always return from system-generated pages (e.g., device lists) using the 'up' button.

For paging configurations, the operator can always use the up and down buttons to move from page to page.

The panel operator, in most cases, needs a 'Take' button and at least one selection button. In addition to their basic function, selection buttons provide feedback about the preset source device and level mapping. A 'Clear Preset' button is strongly recommended.

- ▲ We also recommend that you place exactly 8 selection buttons on a page.

## Commitment Buttons

Two buttons at the bottom of the configuration page are self-explanatory and present on most configuration pages:

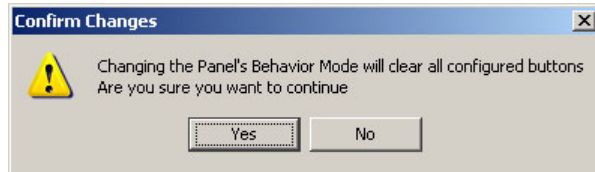
- Revert to Saved. Press this button if you want to discard any recent changes you have made.
- Save. Press this button to commit all your recent changes.

Neither of these actions is reversible.

## Panel Options

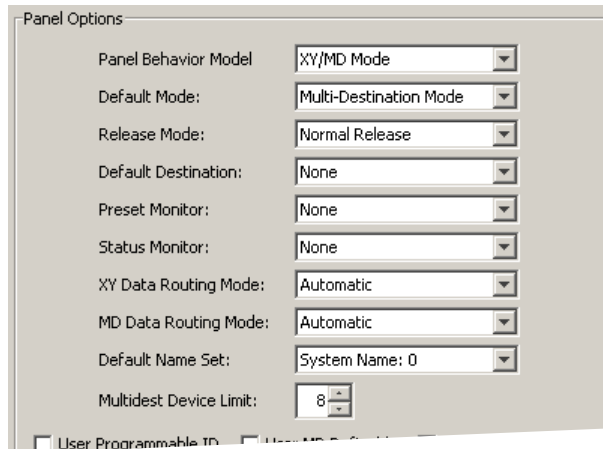
The first panel option selects the behavioral model of the panel: *XY/MD* or *paging*. The panel options differ between the two models. The default model is *XY/MD* mode.

Changing from one behavioral model to the other will erase the panel configuration. A confirmation warning appears when you make the change:



### Options under XY/MD Model

This is the top part of the panel options section, as it appears at the right of a configuration page under the *XY/MD* model:



### Drop-Down Menus

These are its options:

Panel Behavior Model	XY/MD Mode	The panel configuration uses the <i>XY/MD</i> model. <i>XY/MD</i> supports a tree of button pages and allows the operator the choice of <i>X-Y</i> mode (multiple levels, single destination) or <i>MD</i> mode (all levels, multiple destinations) at any time.
	Paging Mode	The panel configuration uses the paging model. Paging uses an ordered list of button pages and does not support <i>X-Y</i> mode or <i>MD</i> mode. The paging model supports a limited <i>X-Y</i> mode.
Default Mode	X-Y Mode	Starts the panel in <i>XY</i> mode after a reset. <sup>a</sup>
	Multi-Dest Mode	Starts the panel in Multidest mode after a reset.
Release Mode	Normal Release	This panel can release “locks” and “protects” set by the designated user (at this panel or any other panel).
	Force Release	This panel can release locks and protects set by any user.

## Configuration

### Configuration

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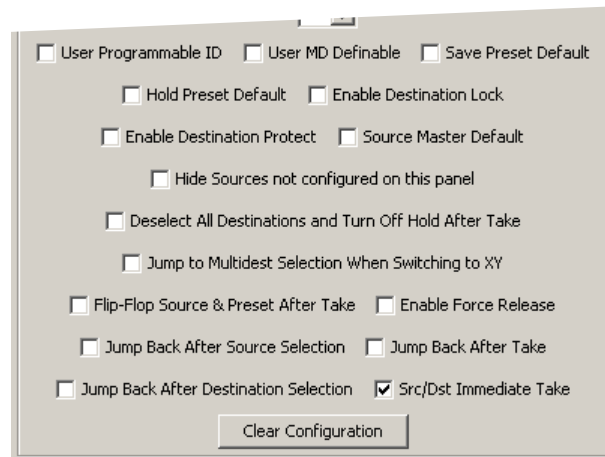
Default Destination	None	After a reset, the panel displays no destination device. (This is not recommended.)
	<device>	The Panel uses the specified device as the destination after a reset. (The 'Default State' button also returns the panel to this destination.)
Preset Monitor	None	The preset source video is not sent to a monitor.
	<device>	The preset source video for the selected destination appears on the specified monitor (device).
Status Monitor	None	The current source video is not sent to a monitor.
	<device>	The current source video for the selected destination appears on the specified monitor (device).
XY Data Routing Mode	Automatic	If a machine control (i.e., data) level is involved in a route, the system makes the route on the control level even if the control port is in use on the source or destination device. It breaks the previous control connection and then makes a new control connection for the route in progress.
	Semi-automatic (recommended)	If the control port is in use for the source or destination device, the system takes all (selected) levels except control and allows the operator to perform the control level route by pressing 'Take' a second time. The operator may cancel the control-level take by pressing a button other than 'Take.' If the control port is not in use, the control level take occurs normally.
	Manual	If the control port is in use for the source or destination device, the system takes all (selected) levels except control. It <b>does not</b> perform the control level route. If the control port is not in use, the control level take occurs normally. To carry out a take on a machine control port that is in use, the operator must first free the port by performing a "tristate" take on the port, that is, taking the device (as a source) to itself (as a destination) on the control level. A take can occur on the machine control level if, on the selection button for the control level, the status line is "FREE."

MD Data Routing Mode	Automatic	If a machine control (i.e., data) level is involved in a route, the system makes the route on the control level even if the control port is in use on the source or destination device. It breaks the previous control connection and then makes a new control connection for the route in progress.
	Manual	<p>If the control port is in use for the source or destination device, the system takes all (selected) levels except control. It <b>does not</b> perform the control level route.</p> <p>If the control port is not in use, the control level take occurs normally.</p> <p>To carry out a take on a machine control port that is in use, the operator must first free the port by performing a "tristate" take on the port, that is, taking the device (as a source) to itself (as a destination) on the control level.</p> <p>An operator can determine whether the control level is free by switching momentarily to X-Y mode and examining the destination's levels on selection buttons.</p>
Multidest Device Limit	(Selectable in multiples of 8)	The number of multi-destination entries you are defining. (Strictly speaking, this is not a limit, but a <i>count</i> .) The default, and lowest value, is 8. The maximum is 512. (If you have more entries than devices, you can leave some MD destinations unassigned.)
Default Name Set	System Name	A list of "name sets" appears in the drop-down menu. The name sets can be defined under the System Management pane of NV9000-SE Utilities. Choose 'System Name' in this list if you do not want, or do not care about, device name aliases. Do <b>not</b> choose 'System Name' if you are configuring any 'Name Set Toggle' buttons.

a. See [Defaults](#) on page 81.

### Checkbox Options

The checkbox options section is just below the panel options section, enclosed in the same box.:



A check in the box enables the option. Clearing the checkbox disables the option.

The following items are the checkbox options under the panel options.

- User-Programmable ID.  
Allows the panel ID to be changed locally at the control panel (in menu mode).
- Save Preset Default.  
Makes 'Save Preset' mode active when the panel reverts to its default state (after a Default State button is pressed, or when the panel is restarted).
  - ▲ **A** 'Save Preset' button is needed only when you want the operator to be able to view or change the mode.
- Hold Preset Default.  
Makes "hold" mode active when the panel reverts to its default state (after a Default State button is pressed, or when the panel is restarted).
  - ▲ **Note:** a 'Hold' button is needed only when you want the operator to be able to view or change the mode.
- Enable Destination Lock.  
Check 'Enable Destination Lock' so that any 'Destination Lock' button on the panel will function.
- Enable Destination Protect.  
Check 'Enable Destination Protect' so that any 'Destination Protect' button on the panel will function.
- Source (Is) Master Default.  
Makes a control-level source the *controlling* device (or master device) by default. Otherwise, the destination is the master by default. (The option is specifically for use with NVISION series data routers.)  
"Source is master" is used for duplication, or broadcast routing, on the control level. "Destination is master" is for machine-to-machine editing. If you do not select the "source master default" option, you can place a 'Source is Master' button on the panel.
  - ▲ **Note:** a 'Source is Master' button is a toggle that reverses the direction of data routing for devices used in data (control) level takes.
- Hide sources not configured on this panel.  
Causes the names of source devices that are not presently configured for this particular panel to be hidden. When another panel changes the source to one not configured for this panel, this panel displays asterisks instead.
- Deselect all destinations and turn off hold after take.  
After selecting many MD destinations (with 'Hold' mode on), it can be time-consuming and error-prone to find them all (and no others) to deselect them after a take. When you enable this option, the NV9641 does exactly that (and turns off hold mode).
- Jump to multi-dest selection when switching to XY.  
Makes the currently selected multi-destination device the preset destination when you switch from MD mode to X-Y mode.
  - ▲ The X-Y destination chosen is unpredictable when the panel is in MD "hold" mode and multiple destinations are selected.



- Flip-flop source to preset after take.  
Swaps the preset source and the currently routed source for this destination.
- Enable force release.  
Allows operators to execute a force release.
- Jump back after source selection.  
After you make a source selection, the panel reactivates the *default* button page.
- Jump back after take.  
After you press a 'Take' button, the panel reactivates the *default* button page.
- Jump back after destination selection.  
After you make a destination selection, the panel reactivates the *default* button page.
  - ▲ Jumping back to the default page is usually helpful, but in some configuration designs, might not be. You can design your panel configuration to take advantage of the jump-back behavior.
- Src/dst immediate take.  
A 'Source/Destination' button selects a source and a destination. When this box is checked (as it is in the default NV9641 configuration) the button performs an immediate take. When the checkbox is clear, the button sets up the take and the operator must press a 'Take' button to complete the take.

## Options under the Paging Model

This is the panel options section, as it appears at the right of a configuration page under the paging model:

The screenshot shows a 'Panel Options' dialog box with the following settings:

- Panel Behavior Model: Paging Mode
- Default Destination: None
- Preset Monitor: None
- Status Monitor: None
- Default Name Set: System Name: 0
- User Programmable ID
- Enable Destination Lock
- Enable Destination Protect
- Source Master Default
- Hide Sources not configured on this panel
- Enable Force Release
- Src/Dst Immediate Take
- Clear Configuration button

## Drop-Down Menus

These are the drop-down menu options under the paging model:

Panel Behavior Model	XY/MD Mode	The panel configuration uses the XY/MD model. XY/MD supports a tree of button pages and allows the operator the choice of X-Y mode (multiple levels, single destination) or MD mode (all levels, multiple destinations) at any time.
	Paging Mode	The panel configuration uses the paging model. Paging uses an ordered list of button pages and does not support X-Y mode or MD mode. The paging model supports a limited X-Y mode.
Default Destination	None	After a reset, the panel displays no destination device. (This is not recommended.)
	<device>	The Panel uses the specified device as the destination after a reset. (The 'Default State' button also returns the panel to this destination.)
Preset Monitor	None	The preset source video is not sent to a monitor.
	<device>	The preset source video for the selected destination appears on the specified monitor (device).
Status Monitor	None	The current source video is not sent to a monitor.
	<device>	The current source video for the selected destination appears on the specified monitor (device).
Default Name Set	System Name	A list of "name sets" appears in the drop-down menu. The name sets can be defined under the System Management pane of NV9000-SE Utilities. Choose 'System Name' in this list if you do not want, or do not care about, device name aliases. Do <b>not</b> choose 'System Name' if you are configuring any 'Name Set Toggle' buttons.

## Checkbox Options

A check in the box enables the option. Clearing the checkbox disables the option.

The following items are the checkbox options under Panel Options.

- User-Programmable ID.  
Allows the Panel ID to be changed locally at the control panel (in menu mode).
- Enable Destination Lock.  
Check 'Enable Destination Lock' so that any 'Destination Lock' button on the panel will function.
- Enable Destination Protect.  
Check 'Enable Destination Protect' so that any 'Destination Protect' button on the panel will function.
- Source (Is) Master Default.  
Makes a control-level source the *controlling* device (or master device) by default. Otherwise, the destination is the master by default. (The option is specifically for use with NVISION series data routers.)

“Source is master” is used for duplication, or broadcast routing, on the control level. “Destination is master” is for machine-to-machine editing. If you do not select the “source master default” option, you can place a ‘Source is Master’ button on the panel.

▲ **Note:** a ‘Source is Master’ button is a toggle that reverses the direction of data routing for devices used in data (control) level takes.

- Hide sources not configured on this panel.

Causes the names of source devices that are not presently configured for this particular panel to be effectively hidden. When another panel changes the source to one not configured for this panel, this panel displays asterisks instead.

- Enable force release.

Allows operators to execute a force release.

- Src/dst immediate take.

A ‘Source/Destination’ button selects a source and a destination. When this box is checked (as it is in the default NV9641 configuration) the button performs an immediate take. When the checkbox is clear, the button sets up the take and the operator must press a ‘Take’ button to complete the take.

These options, available under the XY/MD model, are **not** available under the paging model:

- Save Preset Default•Deselect all destinations and turn off hold after take
- Hold Preset Default•Jump to multi-dest selection when switching to XY
- Jump back after source selection•Jump back after destination selection.
- Jump back after take•Flip-flop source to preset after take.

## Button Definitions

There are four classes of button functions:

- Dedicated functions, such as ‘Default State’ or ‘Chop’.
- Variable functions, such as ‘Category’ or ‘Source’. With this type of button, additional selections are needed to complete the button configuration.
- Special functions, such as ‘Navigate’ and ‘Back’. These functions allow the panel operator to move from one button page to another. (The Navigate button is unique: it initiates a dialog in which you create a subtree.
- System-generated button functions. These are buttons that are generated dynamically (by the router control system) during operation. An example of system-generated buttons is a device list generated when the user presses a category button. The set of devices in a category can change over time (as the configuration database changes); the NV9641 device list changes also.

The number and names of categories can also change over time and the NV9641 will track those changes too.

When a device list appears on the panel, the system lights the 'up' button so the operator can easily return to the page containing the category button.

---

#### Note

Certain button fields contain a colon (:) and number after the data in the field. The number is the record ID of the object in the NV9000 configuration database. The record IDs can be ignored but might be of some use when the configurer is searching for items in the configuration database.

---

There are different sets of button types for global suffix pages and for global navigation pages. See [Global Navigation](#) on page 43.

## Button Specification

The button definitions section has several controls:

The screenshot shows a 'Button Definitions' dialog box with the following controls:

- Button Type: Source/Destination (dropdown)
- Button Caption: Sample (text box), Button (text box), Text (text box)
- Level Set Filter: None (dropdown)
- Src Device: ARC 402: 7 (dropdown)
- Dst Device: DDR 405: 605 (dropdown)
- Button Color: Green (dropdown)
- Place this button on all subsequent child pages:
- Use custom button text:

The controls vary according to the button type.

- |                |   |
|----------------|---|
| Button Type    | A pull-down menu where you may select a button type.  |
| Button Caption | Three text boxes in which you can enter three lines of button text up to 8 characters each. SE provides a default for the button caption.<br>Some buttons do not allow you to enter button text. Category buttons, for example, use the category mnemonic as the button text. |
| Button Color   | A pull-down menu where you can select a button color: amber, blue, green, grey, purple, red, or yellow:   |

The screenshot shows a 'Button Color' dropdown menu with the following options:

- Green
- Amber
- Blue
- Green
- Grey
- Purple
- Red
- Yellow

Each of the 7 defined colors has two brightness levels.

**Note:** in usage, buttons are dark if their functions are disabled. Buttons are low tally if they are available. Buttons are high tally when they are active. (An exception to this is the LCD brightness submenu when the panel is in menu mode.) Some button types are never high-tally.

Check box      "Place this button on all child pages." When the operator presses a 'Navigate' button, its target page appears on the buttons. Any page can have multiple navigate buttons and therefore multiple target pages. If you check this option, the button you are defining will occur, *in the same position*, on all pages in the subtree under the navigation button.

A "back" button is a good candidate for such a button. The back button returns the operator to the previous page. (Back buttons are automatically placed on list pages and most navigation target pages.)

Check box      "Use custom button text." This checkbox is present only for certain button types.

The option allows you to define specific button text for certain buttons such as the 'Src/Dst' button. By default, the button gets the source name and destination name as text. The option, when checked, overrides the default.

Be careful: unchecking this box alters the text you entered.

When you choose a button type, additional drop-down menus can appear, depending on the button type, allowing you to further specify the button's behavior. Available options and selections vary with the button type.

There are other button definition options that become available when you are defining a category button or a global navigation button and you have defined one or more suffix pages or global navigation pages. These options are described under [Global Navigation](#) on page 43.

The Navigate button is a special case, invoking an "Edit Navigate Button" dialog. See ['Edit Navigation Button' Dialog](#), following.

## Button Types

The buttons available under the paging model are a subset of those available under the XY/MD model. Following are all the button types. A "P" next to the button name indicates that is available under paging mode:

Type	Paging	Description
[Back]		The 'Back' function places the predecessor of the current button page on the panel. The panel software can introduce a "back" button if an automatically generated list has more entries than can fit on a page.
Broadcast	P	On the data (control) level, the button enables a broadcast take to an <i>additional</i> controlled device, after a broadcast route has been initiated with a "source is master" control-level take to the <i>first</i> controlled device. The button is useful in dubbing applications or when a backup (redundant) device is in use. See <a href="#">Broadcast Routes</a> on page 66. See also the <a href="#">Source Master</a> button, following.

Type	Paging	Description
Category		<p>Displays a category's device list.</p> <p>When you assign a category button, two additional drop-down menus appear: 'Src Category' and 'Dst Category'. Choose a category from one of the category lists. When you choose a source category, the destination categories become inaccessible and vice versa: a category button must be either a source category or a destination category. You must choose 'None' in either category list to switch to the other category list. If you choose a suffix template, when the operator clicks the category button, the suffix page appears. If you do not, a list of devices in the category appears. See <a href="#">Commitment Buttons</a> on page 18 for further detail.</p> <p>The default button text will be the category name. Configurers can override the default text.</p>
Chop		<p>When a chop function is supported by the router, the button is a toggle that enables and disables rapid switching of the selected destination device between the current source and the preset source. This chop function is used to test system timing.</p>
Clear Preset		<p>Erases preset entries, while leaving the panel in the same mode. This button is recommended as a "safety" feature.</p> <p>The clear preset button has the side effect of switching off 'Save Preset' mode.</p>
Default State		<p>Returns the panel to its most recent power-up state. That is called the <i>default state</i>.</p>
Destination	P	<p>Selects a destination.</p> <p>When you assign a destination button, a drop-down menu appears: 'Destination Device'. Choose a device from the list.</p> <p>The 'None' entry is merely a placeholder. Do not choose 'None'.</p> <p>The button text is normally the destination mnemonic, but override the default text.</p>
Destination Lock	P	<p>Sets or removes a "lock" on the current destination device. The lock can be removed only by the user that originally set the lock, or by a panel that has "Force Release" enabled.</p> <p>In MD mode, the button of a locked destination appears bright red and its button legend is 'Locked by &lt;user&gt;' and the 'X-Y Display' button turns dark red.</p> <p>In X-Y mode, the 'X-Y Display' button is low-tally red (not amber) when the preset destination is locked.</p>

Type	Paging	Description
Destination Protect	P	<p>Sets or removes a “protect” on the current destination device. The protect can be removed only by the user that originally set the protect, or by a panel that has “Force Release” enabled.</p> <p><b>Note:</b> a protect prevents <i>others</i> from routing to a destination; a lock prevents <i>anyone</i>— even the user who issued the lock— from routing to the destination.</p> <p>In MD mode, the button of a protected destination appears bright red and its button legend is ‘Protected by &lt;user&gt;’ and the ‘X-Y Display’ button turns low-tally red.</p> <p>In X-Y mode, no changes are visible on the panel operated by the user who issued the protect. On other user’s panels, of any type, the destination appear protected.</p>
Free Source	P	<p>Defines a phantom device that can be used to release or “free” devices on the data (control) level. A free source is also used with tielines to free the tieline for others to use. The free source is configured in the <i>Level Set Details</i> page of NV9000-SE Utilities.</p>
[Forward]		<p>The panel software can introduce a “forward” button if an automatically generated list has more entries than can fit on a page.</p> <p>Technically, a ‘Forward’ button is a navigate button with the label “FORWARD” and that points to the next button page in the automatically generated sequence.</p> <p>There is no explicit ‘Forward’ button type.</p>
Hold		<p>The button turns hold mode on or off. In multi-destination mode, hold mode allows multiple destination selections and also retains destination selections after a take. In X-Y mode, hold mode retains breakaway levels after a take. (There are other effects. See <a href="#">Selection Buttons</a> on page 39.)</p>
Level Map		<p>Cross-connects levels (in the same physical router). The function is typically used to shuffle audio channels, for example, to connect AES1/2 to AES3/4.</p> <p>The Level Map mode is cancelled when the next normal take is performed involving the selected destinations.</p>
Menu	P	<p>This button puts the NV9641 panel in menu mode and displays a menu on the LCD buttons that provides access to a variety of panel options. The button is required if you want the user to have access to the menu. By pressing certain LCD buttons, the user makes menu selections and may enter data (such as panel ID) or change LCD brightness values. The LCD button text varies greatly with context in menu mode. See <a href="#">Menu Mode</a> on page 68.</p>

Type	Paging	Description
Name Set Toggle		<p>The button toggles the panel between its default name set and the “system name” set. One or the other becomes the active name set. The button definition has no fields to configure.</p> <p>If the default name set is the system name set, the button would be a no-op. Therefore configurers should not create a ‘Name Set Toggle’ button if the default name set is ‘System Names’.</p> <p>The status, preset, or destination displays use the active name set—either the default name set (aliases) or the system name set. However, that when the panel is displaying aliases, and a device does not have an alias, the panel displays the system name.</p>
Navigate		<p>During operation, a navigate button selects and displays a “target” button page. During configuration, a navigate button presents a dialog in which you can enter details of the target page. After you do so, SE displays the target page’s buttons on the panel image and adds the subtree to the tree window in the lower left corner if it is not there. (You’ll use the navigate function to create new button pages.)</p> <p>The default text for a Navigate button depends on what you assign it. Sometimes it is “Navigate.” You will probably want to change it to something meaningful.</p> <p>See <a href="#">‘Edit Navigation Button’ Dialog</a> on page 34 for detail.</p>
Panel Lock	P	<p>Prevents accidental changes to the panel settings, especially router crosspoints. When the panel is locked, the button array becomes blank except for the Panel Lock button which becomes high tally red. Pressing the Panel Lock button again reverts the panel to its previous mode.</p>
Preset Release		<p>Removes locks and protects from preset source devices. This button is not needed if source locks and protects are not used in your system.</p>
Previous Source	P	<p>Presets the previously routed source to the currently selected destination. The operator must next press take to restore the previous source. This function is useful when a user makes a route in error.</p> <p>The button does <b>not</b> restore the previous destination. If the user changed the destination and presses ‘Previous Source’, the take will not restore the previous route.</p>
Quick Source	P	<p>A quick source button selects a source and performs an immediate take. When you assign a quick source button, a drop-down menu appears in which you choose a source device.</p> <p>The ‘None’ entry is merely a placeholder. Do not choose ‘None’.</p>
Salvo	P	<p>Executes a salvo.</p> <p>When you assign a Salvo button, a drop-down list appears in which you select a system salvo.</p> <p>The ‘None’ entry is merely a placeholder. Do not choose ‘None’.</p> <p>(You can generate salvo buttons automatically in the ‘Edit Navigation Button’ dialog when you create a navigation button.) See <a href="#">‘Edit Navigation Button’ Dialog</a> on page 34.</p>



Type	Paging	Description
Save Preset		When this function is enabled (its button is high tally), whatever is on preset is retained (on preset) after a take. When the function is disabled (its button is low tally), preset is cleared after a take.
Selection		<p>Selection buttons have many functions, not the least of which is to give feedback (e.g., source and destination mnemonics) when the operator is performing takes.</p> <p>You should configure exactly 8 selection buttons (on any button page) if you want to support level selection in X-Y mode and MD device selection in MD mode.</p> <p>When the panel is in XY mode, a set of selection buttons presents a set of virtual levels for the selected destination device. If there are more levels than selection buttons, the up/down buttons activate and the operator can scroll through the level list.</p> <p>When the panel is in MD mode, a set of selection buttons presents a set of MD devices. If there are more destinations than selection buttons, the up/down buttons activate and the operator can scroll through the destination list.</p> <p>See <a href="#">Selection Buttons</a> on page 39 for further detail.</p> <p>During configuration, when you assign a selection button, two additional drop-down menus appear: 'Display Index' and 'Multidst Device'. The drop-down menu for the button's <i>display index</i> has as many entries as the current page has selection buttons. Choose a virtual level's display index for the selection button for when the button is used in X-Y mode. Normally, your set of display indexes would be sequential from left to right.</p> <p>The drop-down menu for the <i>multi-destination device</i> allows you to specify the MD destination for the button. Do this for all the devices that you want to be selectable in MD mode.</p> <p>On the configuration page, when there are more MD devices than selection buttons, the up and down buttons become active and you can scroll through the set of MD devices to assign them to select buttons. (You can have up to 128 MD devices, in multiples of 8. See the 'Multidest Device Limit' box under <a href="#">Panel Options</a> on page 19.) You do not have to commit every MD device to a button. MD buttons that are uncommitted are no-ops.</p>
Source	P	<p>A source button selects a source. (Note that a quick source button selects a source and also performs an immediate take.)</p> <p>When you assign a source button, a drop-down menu appears: 'Source Device'. Choose a device from the list.</p> <p>The 'None' entry is merely a placeholder. Do not choose 'None'.</p>

Type	Paging	Description
Source Master		<p>Means “source is the master” and makes the source device the master. Otherwise, the destination is the master.</p> <p>The button is a toggle: Press it once to make the source the master (it goes high-tally); press it again to make the destination the master (the button is low-tally).</p> <p>A panel option allows you to make “source is master” the default. In this case, the button still toggles between “source is master” and “destination is master,” and the button, if present, is high-tally by default.</p> <p>The ‘Source is Master’ button is also used to initiate “broadcast” control routes. See <a href="#">Broadcast Routes</a> on page 66.</p>
Source/ Destination	P	<p>A source/destination button selects both a source and a destination at one time. A source/destination button can be configured to perform an immediate take. If it is not, the operator must also press a ‘Take’ button to effect a take.</p> <p>When you assign a source/destination button, two drop-down menus appears: ‘Source Device’ and ‘Destination Device’. Choose a device from each list. A ‘None’ entry is merely a placeholder. Do not choose ‘None’.</p>
Take	P	<p>In X-Y mode, a take button switches the preset source device to the selected destination device on selected levels.</p> <p>In MD mode, a take button switches the preset source device(s) to the selected destination device(s) on all levels.</p> <p>Under the paging model, a take button switches the preset source device to the selected destination device on all levels.</p> <p>In most cases, configurers should provide the operator a ‘Take’ button.</p>
Undefined	P	<p>Makes the button undefined and inactive. On the actual panel, it will remain unlit (dark).</p>
Virtual Level Contract		<p>In X-Y mode, this button causes the alphanumeric display to show virtual levels at the <i>highest</i> level of grouping (with the least detail). The button affects only virtual levels that have been grouped. See <a href="#">Level Grouping</a> on page 54.</p> <p>The button has no effect in multi-destination mode.</p> <p>This button has no configuration options.</p>
Virtual Level Expand		<p>In X-Y mode, this button causes the alphanumeric display to show virtual levels at the <i>lowest</i> level of grouping (with the most detail). The button affects only virtual levels that have been grouped. See <a href="#">Level Grouping</a> on page 54.</p> <p>The button has no effect in multi-destination mode.</p> <p>This button has no configuration options.</p>

Type	Paging	Description
X-Y Display	P	<p>The 'X-Y Display' button displays current route status — in X-Y mode or multi-destination mode. Pressing this button has no effect. It also displays other messages in other circumstances, as required.</p> <p>Prior to a take, the 'X-Y Display' button displays the preset destination name (and turns low-tally red if that destination is locked or protected by another user.)</p> <p>After a take, the 'X-Y Display' button also displays the current source name.</p> <p>If there is no destination selected, the 'X-Y Display' button says so.</p>
XY/MD Mode		<p>Switches the panel between X-Y and multi-destination (MD) modes.</p> <p>The configuration page lets you specify a color for this button, but the color you specify is ignored. The button is always green for XY mode and amber for multi-destination mode.</p>

## 'Edit Navigation Button' Dialog

- ▲ Navigation buttons, and their corresponding target pages, are available only under the XY/MD model. The 'Edit Navigation Button' dialog is therefore available only under the XY/MD model.

During configuration, when you choose 'Navigate' for a selected button, NV9000-SE Utilities displays an 'Edit Navigate Button' dialog in which you specify navigation button details:

At the top, this dialog presents 3 lines on which you can enter text for the button caption. In this dialog, The 3 lines you enter here are concatenated to form the name of the page in the button page table and *might be* the button caption, depending on context.

- ▲ The button caption is independent of the page name. You can change either without affecting the other.

The dialog has 3 options:

- Jump to an empty new page.

This option creates a new page in the button tree. During operation, the navigation button you are creating will cause the NV9641 to display, or jump to, that page. The name of the page and the button caption are what you type in the three lines for the button caption. You can change the name of the page in the button page list. At the time you create it, the page is empty. After the page is created, you can select it at any time and edit its buttons.

- Jump to an existing page.

This options does **not** create a new page in the button tree. The navigation button you are creating will cause the NV9641 to display the page you select in the associated drop down menu. The button caption is what you type in the three lines for the button caption.

- Use “auto fill” to create a new button page.

The software creates at least one new button page, filling the page(s) with button functions according to the fill options you specify. Automatic fill has several suboptions:

Source buttons	Source category buttons
Destination buttons	Destination category buttons
Source/destination buttons	Salvo buttons
Quick source buttons	

Automatic fill has a “manually order buttons” option where you can reorder the list items as you wish. See [Auto-Fill Options](#), following.

Automatic fill creates as many new pages in the button tree as required to support the number of fill items. If the number of items is greater than 15, SE places 14 items on a page where the leftmost button is a back button and the rightmost button is a “forward” button. The last page of the automatic fill will not have a forward button and might not be completely filled.

- ▲ In contrast, category device lists do not have back or forward buttons, but employ the up and down buttons for scrolling.

During operation, the navigation button will cause the NV9641 to display the first of the auto-fill pages. The operator uses the back and forward buttons to scroll through the list.

The button caption is what you type in the three lines for the button caption. You can change the names of the automatic fill pages in the button page list. After the pages are created, you can select any of them at any time and edit its buttons.

During configuration, you can double-click a navigation button to view and edit its target page. Any page can have navigation buttons. You can also select pages by double-clicking on the page's page number field in the tree window.

## Auto-Fill Options

- Source Devices

There are 3 sub-options under ‘Source Devices’:

- ‘From Category’. Specify a category other than ‘None’. The fill list will include all the devices in the category.
- ‘Starting with’. Specify an initial substring. For example, if you specify “V,” all sources whose names start with “V” are included in the list.
  - ▲ If you leave the ‘Starting with’ field blank, the page will list all devices.
- ‘Manually Fill Devices’. Specify the number of buttons you want to be assigned. The software creates as many subpages as are required to hold the buttons. The buttons are source buttons, but remain blank so that you can assign sources to them manually.

- Quick Source Devices

Automatic fill using quick source buttons for source devices is the same as for source devices, except that quick source buttons are used. In the case of manual fill, blank quick source buttons are created.

- Destination Devices  
Auto-fill using destination devices is the same as for source devices, except that destination devices are chosen.
- Source/Dest Devices  
This option creates subpages of 'Source/Destination' buttons. All use the same destination, which you specify in the 'Destination Device' field that becomes enabled for this option. The sources can vary according to the sub-option:
  - 'From Category'. The fill list will include all the source devices in the category you choose.
  - 'Starting with'. Specify an initial substring. For example, if you specify "CA," all sources whose names start with "CA" are included in the list.
    - ▲ If you leave the 'Starting with' field blank, the page(s) will create 'Src/Dst' buttons for all source devices.
  - 'Manually Fill Devices'. Specify the number of buttons you want to be assigned. The software creates as many subpages as are required to hold the buttons. The buttons are 'Src/Dst' buttons, but remain blank so that you can assign sources and destinations to them manually.
- Salvos  
The software assigns salvos to buttons in new button subpage(s). If it has too many salvos to fit on the subpage, it creates further subpages as needed. The software adds 'Back' and 'Forward' buttons when more than one subpage is required.
- Source Categories  
The software assigns source categories to buttons in new button subpage(s). If there are too many source categories to fit on the subpage, it creates further subpages as needed. The software adds 'Back' and 'Forward' buttons when more than one subpage is required. Categories that are both source and destination categories are included.
- Destination Categories  
Automatic fill using destination categories is the same as for source categories, except that destination categories are chosen.
- Manually order buttons  
If you check the 'Manually order buttons' box, SE presents a dialog that lists the sources, destinations, categories, or salvos you selected. You may reorder the items. To do so, **double-click** on a row in the ordered list and drag it up or down to the position that you want. The new position will be indicated by a slightly heavier black line. The row you selected is repositioned where the black line is when you release your mouse button.

## Button Page Table

The page table under the XY/MD models differs from the page table under the paging model. Under XY/MD, the page table represents a hierarchical (tree) structure of button pages. Under the paging model, the page table represents a list structure of button pages.

## XY/MD Model

This page table lists the pages of the button page *tree*. It has 3 columns: 'Page Number', 'Page Name', and 'Link to Page Num(s)'.

The button page at the top (or root) of the tree is called "Default." Initially, the tree has just the default page, until you add other pages.

To select a page for editing, double-click its entry in the 'Page Number' column.

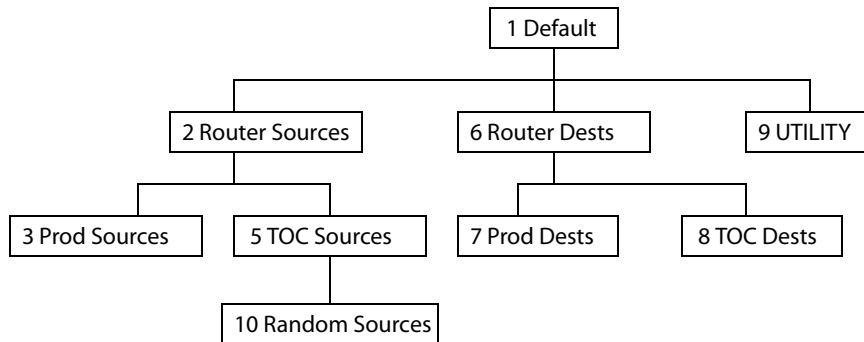
To delete a page or pages from the tree, select the pages in the button page list, right-click the list, and choose one of the deletion commands from the context menu that appears.

- ▲ Be aware when deleting pages from the tree that the deletion does **not** remove any navigation buttons from any button page.

This is a sample of the page table under the XY/MD model:

Page Number	Page Name	Referrers
1	Default	
2	Router Sources	1
3	Prod Sources	2
5	TOC Sources	2
6	Router Dests	1
7	PROD Dests	6
8	TOC Dests	6
9	UTILITY	1
10	Random Sources	5

It represents this tree structure:



You can change the name of a page by double-clicking the page's name field and editing its text. Changing the name of a page does not cause a change to the caption of the navigation button and vice versa.

During configuration, you will use 'Navigate' buttons to create new pages. During configuration, you can double-click a 'Navigate' button to jump to its page.

During operation, panel operators will press navigation buttons, global navigation buttons, or category buttons to jump to other pages.

- ▲ Navigation buttons do not jump to global suffix pages or global navigation pages. Only global navigation buttons jump to global navigation pages; only category buttons jump to suffix pages. However, the operator will probably see no appreciable difference between the button types. See [Global Navigation](#) on page 43.

When you double-click the page number field of a page you want to edit, the image of that page appears in the panel graphic area.

The 'Links to Page Num(s)' column lists, for any page, the other pages that refer to it. Using the links column you can mentally examine the tree structure or create a sketch of the tree structure. You might note that if the link field of a page is empty, the page is inaccessible during operation. (The exception is the default page which is always available after reset. It might become unavailable in a configuration that has subpages with no 'back' buttons.)

## Paging Model

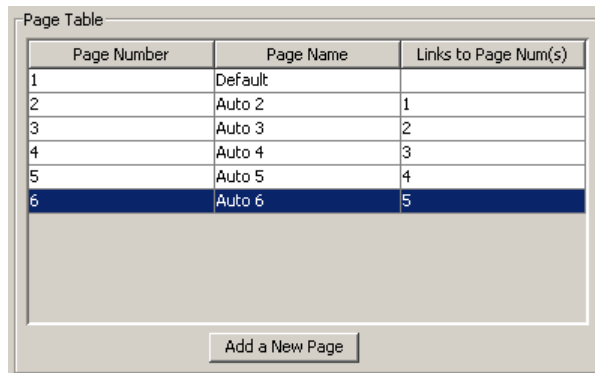
The page table lists the pages of the button page list. It has 3 columns: 'Page Number', 'Page Name', and 'Link to Page Num(s)'.

The button page at the top (or root) of the tree is called "Default." Initially, the tree has just the default page, until you add other pages.

To select a page for editing, double-click its entry in the 'Page Number' column.

To delete a page or pages from the tree, select the pages in the button page list, right-click the list, and choose one of the deletion commands from the context menu that appears.

This is a sample of a page table under the paging model:



Page Number	Page Name	Links to Page Num(s)
1	Default	
2	Auto 2	1
3	Auto 3	2
4	Auto 4	3
5	Auto 5	4
6	Auto 6	5

It represents a list structure. When the operator presses the 'Up' button, the preceding page appears, unless the operator is viewing the first page. When the operator presses the 'down' button, the following page appears unless the operator is viewing the last page.

You can use the scroll buttons to select a page for editing. You can also double-click an entry in the 'Page Number' column to select a page for editing.

To append a page to the list, either click the 'Add a New Page' button or click the 'Down' button when you are viewing the last page. New pages are named automatically.

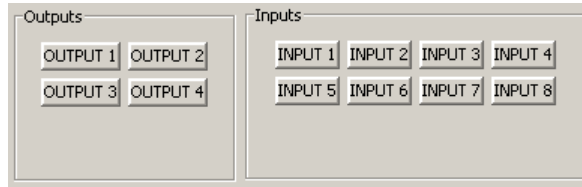
You can change the name of a page by double-clicking the page's name field and editing its text. (The page name is not apparent to the operator.)

The 'Links to Page Num(s)' column lists, for any page, the other pages that refer to it. Under the paging model, only one such referring page exists and that is the predecessor in the list. The first page, named "Default," has no predecessor.



## Tally (GPIO) Window

Below the tree window is the tally section of the configuration page.



It has two sections: inputs and outputs. By clicking on one of the input or output buttons, you can configure the input or output.

(The NV9641 has no actual tally buttons. It does have a DB25 connector at the rear. The buttons are present in the configuration page to allow you to configure the tally interface.)

If you are interested in configuring the tally interface, read Chapter 6, [GPIO](#), on page 73.

## Selection Buttons

▲ Selection buttons are available only under the XY/MD model.

Selection buttons have several functions:

- Select levels in X-Y mode.
- Select MD destinations in MD mode.
- Provide feedback (e.g., current source, preset source, and destination mnemonics, and breakaway and lock status) when the operator is performing takes.

Selection buttons are configured with (1) a display index in the range 1–8 and (2) an MD destination device name. (Either of those items could be 'none'. However, if the display index is 'none', the button will be unusable.)

You should configure at least one selection button (for feedback). We recommend that you configure *exactly 8* selection buttons (on any particular button page).

Although you can place any number of selection buttons on a given page, the NV9641 can use only 8. Selection buttons beyond that will duplicate other selection buttons. Selection buttons scroll through levels in X-Y mode or through MD destinations in MD mode. To scroll, the operator presses the up/down buttons.

The selection buttons scroll *modulo the number of buttons* present on the button page. For example, if the page has 5 selection buttons, scrolling will cause the selection buttons to represent, and show, MD destinations 1–5, then 6–10, and 11–15 and so on. In X-Y mode, the selection buttons would represent, and show, levels 1–5, then 6–10, and 11–15 and so on, subject to the number of levels defined for a given destination.

▲ Sometimes certain levels or MD destinations are undefined. The selection buttons for undefined levels or undefined MD destinations appear dark.

Selection (of levels or MD devices) is affected by 'Hold' mode. (See the [Hold](#) button, page 29.) The user may toggle Hold mode at any time. Using the selection buttons follows hold mode or normal mode, whichever is in effect at the moment. Normal mode is the default—unless you specify otherwise in the [Panel Options](#).

## Behavior

### XY Mode

When the panel is in X-Y mode, a set of selection buttons presents a set of virtual levels. The levels displayed correspond to the levels in the level set of a selected destination device. If a selection button is dark and blank, the level does not exist in the level set. If a selection button is dark, but has text, the level exists, but is not defined for the selected device. If a selection button is high-tally, the level is selected. If a selection button is low-tally, the level is not selected.

If there are more levels than selection buttons, the up/down buttons activate and the operator can scroll through the levels.

### MD Mode

When the panel is in MD mode, a set of selection buttons presents a set of MD destinations. If a selection button is blank, an MD device was not assigned to it. If a selection button is high-tally, the MD device is selected. If a selection button is low-tally, the MD destination is not selected.

If there are more destinations than selection buttons, the up/down buttons activate and the operator can scroll through the destinations.

- ▲ Note that the number of MD destinations is configured in multiples 8, from 8 to 512. Not all MD destinations need to be defined. You can have duplicate definitions if it suits your purposes.

## Selection

### XY Mode—Normal

When the operator selects a destination, all selection buttons that have levels defined for the destination turn on (high-tally). The operator may select or deselect any levels as required, by pressing selection buttons and perhaps scrolling the selection buttons.

- ▲ Note that if the operator selects a level when all levels are on, all the *other* levels become unselected (low-tally).

Selecting a new destination again turns on all selection buttons that have levels defined.

- ▲ 'Source/Destination' buttons are "all level"—not subject to level selection.

### XY Mode—Hold Mode

In hold mode, when the operator selects a destination, previously deselected levels (defined for the destination) remain selected for additional takes and previously unselected levels remain deselected. (Individual levels turn on or off as the user selects them.)

### MD Mode—Normal

When the user selects an MD device, all selection buttons are mutually exclusive: when the operator presses one button, any others that were selected turn off. To perform MD takes, the operator alternately selects an MD device and then a source until all intended devices have been preset. Then the operator presses 'Take'.

(In normal mode, any selected MD devices become unselected after the take.)

### MD Mode—Hold Mode

In hold mode, selection buttons are **not** mutually exclusive. To perform MD takes, the operator selects one or more MD devices. All of them turn on (high-tally). The operator then selects a source (which becomes preset for all the selected devices).

The operator can preset another source to another set of destinations by deselecting selected destinations, selecting other destinations, and selecting another source.

When all intended destinations are preset, the operator then presses 'Take'.

(In hold mode, the MD devices remain selected after the take.)

## Configuration

You can configure selection buttons on any page you want. During configuration, when you assign a selection button, two additional drop-down menus appear: 'Display Index' and 'Multidst Device'.

- ▲ It is advisable to create all selection buttons for the page before you actually configure them.

### Display Index

The drop-down menu for the button's *display index* has as many entries as the current page has selection buttons, *but only up to a limit of 8*.

Assign a display index to each of the selection buttons for when the buttons are used in X-Y mode. Normally, your set of display indexes would be sequential from left to right. The display indexes you assign to selection buttons apply to **all** defined level sets.

- ▲ During configuration, you can scroll through the selection buttons to access the complete range of MD destinations. Scrolling during configuration does **not** affect the display indexes.
- ▲ During operation, the operator can scroll the buttons through all levels when a level set has more levels than there are buttons. Similarly, the operator can scroll through all MD destinations. During operation, the display indexes are not explicitly evident but they do provide the ordering of the levels on the selection buttons.
- ▲ To review the virtual levels and their display indexes, go to the 'Level Sets' page in NV9000-SE Utilities and view any of the level sets in your configuration.

### MD Device

The drop-down menu for the MD device allows you to specify the MD destination for the button. Do this for all the destinations that you want to be selectable in MD mode.

On the configuration page, when there are more MD devices than selection buttons, the up and down buttons become active and you can scroll through the set of MD devices to assign them to selection buttons.

(You can enable up to 512 MD devices, in multiples of 8. See the 'Multidest Device Limit' box under Panel Options on page 19.) You do not have to commit every selection button to an MD device. MD buttons that are uncommitted are dark and do not operate.

## How to Configure Selection Buttons

Follow these steps to assign virtual levels and MD devices to selection buttons.

- 1 Decide how many selection buttons you want on the button page. We strongly recommend 8 selection buttons. Create those selection buttons by clicking on the buttons and choosing 'Selection' as the button type. For each one, assign the button a display index. (Display indexes range from 1 to 8.)
- 2 Choose a number of MD destinations (in multiples of 8) in the 'Multidest Device Limit' box under the panel options. The maximum is 512.
- 3 For each selection button, choose an MD destination. You may use 'none' if you do not want to assign an MD destination to the button.
- 4 Press the down button if, after configuring each selection button, you have additional MD destinations to commit to selection buttons. The next set of selection buttons appears on the NV9641 image.
- 5 Repeat steps 3 and 4 until you have committed all the MD destinations that you want. Remember that MD destinations (and virtual levels) scroll modulo the number of buttons on the page.

When you are done, the selection buttons you have defined support some or all virtual levels and support some or all MD devices.

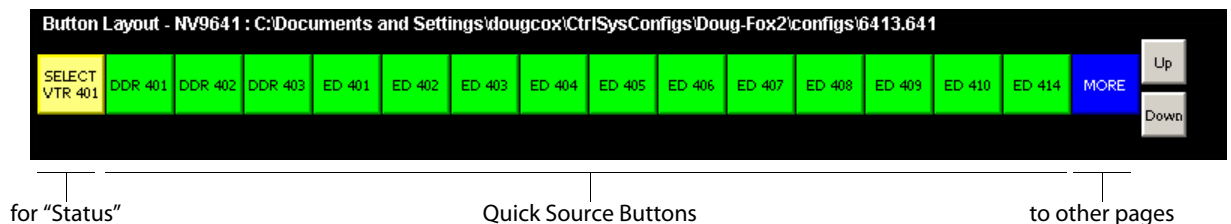
## Single-Destination Mode

Single-destination mode (a.k.a., "single-bus" or "button-per-source" mode) can be emulated in either X-Y mode or MD mode or when the panel is configured under the paging model.

Single-destination mode is **not** a distinct mode. It can be blended with either X-Y mode or MD mode. You can create many different forms of "single-destination" mode. This mode may actually have more than one destination.

### The Simplest Form

The simplest form presents a group of "quick source" buttons, one selection button showing the destination so you can see what source you last chose, and perhaps a navigation button if you need it. This example shows 14 quick sources, a selection button, and one navigation button:



One part of the configuration is specifying a default destination in the panel options during configuration. The default destination displays on the selection button. Taking a source to that destination is as simple as pressing a quick-source button.

The other part of the configuration is checking 'Hold Preset Default' in the panel options. That ensures that the route you made remains highlighted on the selection button. The selection button is used as a "status" button. It shows the current source and the destination mnemonics.

- ▲ The operator must press the selection button once to enable source selection.

## Global Navigation

NV9000-SE Utilities supports what are known as “global navigation” pages for NV9641<sup>1</sup> control panels. Global navigation pages are templates — patterns — that may be used and reused in the creation of NV9640 configurations.

There are two types of global navigation pages: ‘Suffix’ and ‘Navigate’. A navigate template may define a single button page or an entire subtree of pages. A suffix template is a single page only. The buttons allowed in a suffix template are a small subset of the buttons supported by NV9641 configurations. Navigate templates support all functions except ‘Global Navigate’. That is because templates cannot be nested.

Templates themselves are **not** NV9641 configurations.

Follow these steps to create either type:

- 1 Choose ‘Control Panels’ from the ‘Configuration’ pane. Then click ‘Add Control Panel’.
- 2 In the ‘Add Control Panel’ page, complete the details as you would for a panel: The panel type is NV9641. Specify a panel ID, a name, and choose ‘New’ in the options section.
- 3 Rather than click the ‘Next’ or ‘Finish’ button, click the ‘Suffix’ or ‘Navigate’ button. Doing so creates a global navigation page of the appropriate type.

Using a suffix page is different from using a navigation page.

## Names

After adding global navigation templates to your N9000 configuration, you will see them identified as such in the control panel list:

Panel ID	Panel	Panel Type	Configuration Name
6414	6414	NW9641	\nvision\envy\usersys\live\6414.641
64181	Demo641	NW9641	\nvision\envy\usersys\live\D641.641
787	Single1	NW9641	\nvision\envy\usersys\live\S1.641
788	Nav1	NW9641 Navigation	\nvision\envy\usersys\live\Nav1.641.navigate
789	Sfx1	NW9641 Suffix	\nvision\envy\usersys\live\SF1.641.suffix

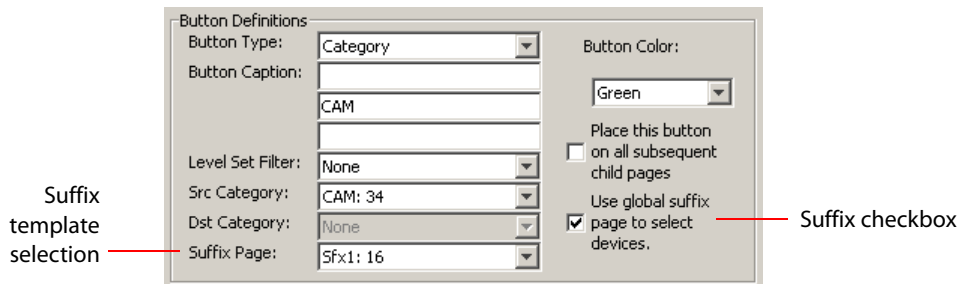
The words “Navigate” and “Suffix” appear in the ‘Panel Type’ and ‘Configuration Name’ columns.

1. NV9000-SE Utilities also supports global navigate templates for the NV9641 and NV9642.

## Referencing a Suffix Template

Suffix pages can be accessed through 'Category' buttons.

When you create a 'Category' button, the button type region displays a checkbox option: 'Use global suffix page to select devices':



When you check the option, an addition 'Suffix Page' field appears. Choose one of the suffix templates in the drop-down list. The suffix page appears in the panel configuration's button page list:

Page Number	Page Name	Links to Page Num(s)
1	Default	
2	Breakawy	1
10	Sfx1	1
11	Nav1	1
12	Gnav Sub Page	11

▲ The suffix page is a copy of the suffix template. It is not the template or a link to the template. Category buttons in the panel configuration that reference a suffix template do have links to their templates.

▲ The suffix page allows operators to enter a **numerical** suffix (that is, an index).

The suffix page typically has a simulated numeric keypad with which operators enter a device index in the category-index paradigm used under NV9000 systems. The paradigm is where the device name is expressed as the category name concatenated with the index. For example, the device name for index 114 in category VTR is "VTR114."

▲ There are different ways to join the category with the index or suffix (such as with hyphens). Refer to the *NV9000-SE Utilities User's Guide* if you need information about that.

In addition to its numeric keypad, the suffix page must have a 'Back' button. It could have a 'Take' button and a few other buttons.

The same suffix template can be used for both source and destination categories.

If you do not check the 'Use global suffix page to select devices' box, the category button produces, during operation, a list of all the devices in the category, on one or more button pages. You cannot view those (dynamically created) button pages in NV9000-SE Utilities.

## Referencing a Navigate Template

Navigate pages can be accessed through 'Global Navigate' buttons.

When you create a 'Global Navigate' button, the button definition has a 'Navigation Btn' field:

Choose a navigate template in that field. The global navigation page and any of its subpages appears in the panel configuration's button page list:

Page Number	Page Name	Links to Page Num(s)
1	Default	
2	Breakawy	1
10	Sfx1	1
11	Nav1	1
12	Gnav Sub Page	11

└ Global navigation page(s)

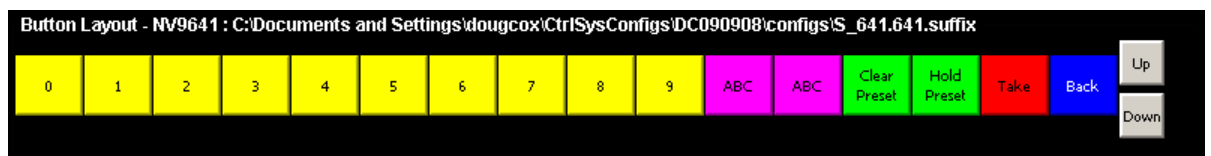
- ▲ The global navigation pages are copies made from the navigate template. They are not the template or a link to the template. The 'Global Navigate' buttons in the panel configuration that reference a navigate template do have links to their templates.

The global navigation template provides all the button types available for panel configurations except additional 'Global Navigate' buttons. Otherwise, a global navigation page is functionally identical to a navigation page.

A global navigation page should at least have a back button.

## Composing Suffix Templates

Suffix templates have only a few button types. Essentially what you can do with a suffix template is create a "keypad." This is an example:



The keypad itself (the first 12 buttons here) consists of 'Category' buttons. The designation "category button" has little relation to "category buttons" in panel configurations. Here, the category button simply places a numeral or a suffix on the button page. The two buttons labeled 'ABC' and 'DEF' yield suffixes. When the operator presses a numeral or a suffix, the numeral or suffix is appended to the name of the device being identified.

- ▲ Alphanumeric suffixes are typically single characters.
- ▲ It is an NV9000-SE Utilities feature that certain numerals become disabled if there is no device index in the category that contains that numeral. It is possible for *all* numerals to be disabled. For example, if there are 23 devices in the category that caused the suffix page to be displayed, then after the operator presses two numerals, all further entry is disabled.

- ▲ It is logical to include a 'Take' button on suffix templates used by source categories. It is not logical to include a 'Take' button on suffix templates used by destination categories. However, if a suffix template can be used for either sources or destinations, then a 'Take' button is at your discretion.

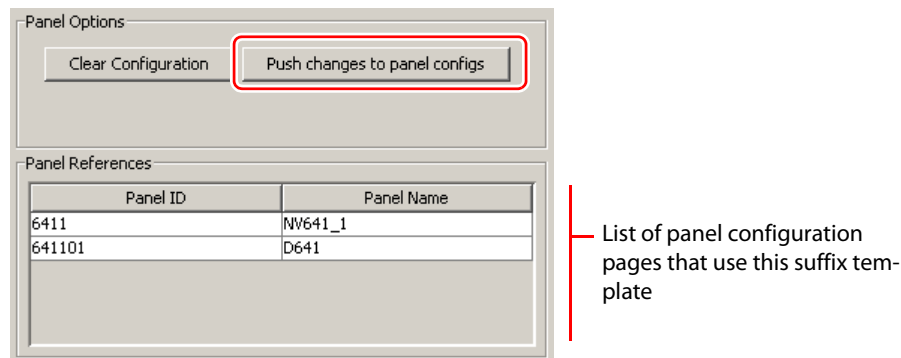
The operator can use a 'Clear Preset' button to cancel a mistaken entry and start over.

Every suffix template must have a 'Back' button, and may have a 'Take' button, a 'Clear Preset' button, or a 'Hold' button. There are no other button types. You can duplicate buttons. The arrangement of the "keypad" is at your discretion.

## Template Changes

If you make a change to a suffix template and it is in use (you'll see the entries in the list) you'll probably want to click 'Push changes to panel configs'. When you do, the configuration software adjusts all NV9641 panel configurations to use the modified suffix template. This might override changes you have made to the copy of the suffix page in some panel configuration.

If you make a change to a suffix template and it is in use by one or more panel configurations, you will want to click 'Push changes to panel configs'. You can see the panel configurations in the list under 'Panel References':



When you click 'Push changes to panel configs', the configuration software adjusts all panel configurations to use the modified suffix template.

If you want to update the suffix page in only some of your panel configurations, create an alternate version of your suffix template and change the panel configurations to use one or the other as desired.

## Composing Navigate Templates

Composing a navigate template is not substantially different from composing panel configurations. The only difference is that navigate templates do not have 'Global Navigation' buttons.

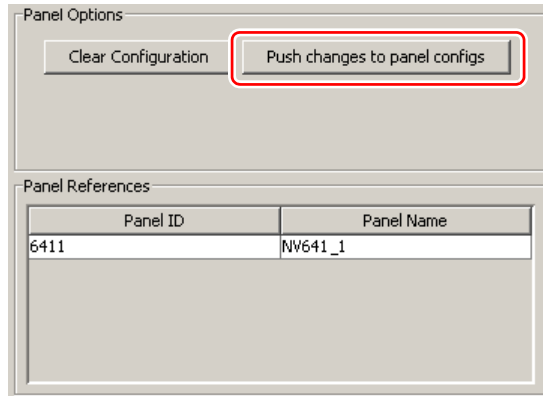
Usage differs, however. Navigate templates can be referenced by panel configurations. And that is the point: you can create multiple panel configurations that, because they reference a navigate template, can all be guaranteed to include the same button pages.

(Navigation templates themselves are not panel configurations.)



## Template Changes

If you make a change to a navigate template and it is in use by one or more panel configurations, you will want to click 'Push changes to panel configs'. You can see the panel configurations in the list under 'Panel References':



Panel Options

Clear Configuration    Push changes to panel configs

Panel References

Panel ID	Panel Name
6411	NV641_1

List of panel configuration pages that use this navigate template

When you click 'Push changes to panel configs', the configuration software adjusts all panel configurations to use the modified navigate template.

If you want to update the global navigation page in only some of your panels, create an alternate version of your navigate template and change the panel configurations to use one or the other as desired.



# 5 Operation

Chapter 5 provides operating instructions for the NV9641.

## Topics

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<a href="#">Menu Mode</a> .....	68
<a href="#">Setup Mode</a> .....	70

This chapter is intended specifically for the NV9641 panel **operator**.

## Summary

As an NV9641 operator, you will be confronted initially with a small panel— 16 buttons of various colors with brief legends and certain color codes.

Your NV9641 will be configured according to one of two behavioral models:

- XY/MD

The XY/MD model supports a *tree* of different button pages and gives you the choice of X-Y mode (multiple levels, single destination) or MD mode (all levels, multiple destinations) at any time.

- Paging

Under the paging model, the panel presents button pages in a list through which you may scroll, and supports what can be called limited X-Y operation. That is, paging mode allows single-source, single-destination takes on all levels (of the selected destination).

▲ The panel uses one model or the other. You cannot switch between the models.

Because the XY/MD model is “hierarchical” or tree-structured, you can view, at any one time, one button “page” of a potentially large number of pages in the hierarchy of a button “tree.” Pressing certain buttons— navigation buttons, for example— causes the panel to display different button “pages.”

Because the paging model is list-structured, you can scroll through the pages using the up and down buttons at the right of the panel. The paging model is simpler than the XY/MD model.

The design of the user interface is entirely at the discretion of the configurer. You, the user, depend on the configurer having designed a logical and usable tree or list structure.

The user interface of an NV9641 in one installation can be radically different from the user interface of an NV9641 in another installation. It is impossible to describe operations in great detail because there is no one interface. What we can do, however, is give you general advice and, of course, specific information on the behavior of the different button types and operational modes.

Because the panel's buttons can have arbitrary legends, a button's legend might or might not indicate its function. Operators and configurers will have to communicate about the meaning of the buttons in the button tree.

Physically, you will find

- Navigation buttons to go up or down in the button tree, or to a specific page in the tree.
- Function buttons (e.g., select a source or lock a destination).
- Lists of sources, destinations, source categories, destination categories, or salvos.
- Sets of virtual level buttons (in X-Y mode) or sets of MD destinations (in MD mode).
- Two scroll buttons (up and down).

At any particular time, some of the buttons are enabled or disabled. Some are high-tally; some are low-tally; and some are off (undefined). The buttons have different colors, the choices of which depend on the configurer's intentions and on Grass Valley convention.

- ▲ Please refer to the other router system documentation if you are unfamiliar with the concepts used in this chapter. See [Other Documentation and Software](#) on page 2 for a list.

## Modes of Operation

Because the panel operates under either the XY/MD or the paging model, we can say there are four primary modes. Under the XY/MD model, the panel operates in either "X-Y mode" or a "multi-destination mode." A single button (XY/MD) can toggle between the modes. (The configurer can specify the default mode.)

Under the paging model, the panel operates in limited X-Y mode only.

The primary modes of operation are:

- X-Y mode— control of individual router *levels*. Choose a destination, optionally choose desired breakaway levels, choose a source, and press take to complete a desired route. Sources are taken only on selected levels.
- Multi-destination (MD) mode— control of multiple destinations. The button tree presents MD destination devices on selection buttons. You can scroll through the MD device list using the 'Up' and 'Down' buttons. Select one or more MD devices, choose a source, and repeat for all desired routes. Then press 'Take'. Takes are "all level," and breakaways cannot be performed.

MD mode allows you to make multiple routes in a single take.

- Limited X-Y mode— individual control of router *levels*. Choose a destination, optionally choose desired breakaway levels, choose a source, and press take to complete a desired route. Sources are taken only on selected levels.
- Single-destination mode— not a distinct or a real mode, but a specific way of using any of the other modes. Single-destination mode is typically an application of 'Quick Source' buttons.

Secondary modes are:

- Setup mode— where the NV9641 is freshly powered up, but *disconnected from the network*. In this mode, the configurer can preset the NV9641's panel ID and perform a few diagnostic tasks.

Usually, only configurers need be concerned with setup mode.

See [Setup Mode](#) on page 70.

- Salvo mode—pressing a salvo button and then a take button executes a salvo. The duration of a salvo is indeterminate.
- Menu mode—pressing a menu button places the NV9641 in “menu” mode. In menu mode, the LCD button array becomes a menu button panel that changes as needed during menu operation.

The menu button is for operators. There is nothing in the menu that concerns operators except LCD brightness. An operator may use the menu to set LCD brightness. Administrators and configurers may use the menu to view or change the panel ID, or to determine the software and firmware revisions.

See [Menu Mode](#) on page 68.

## Button Legends

There are many different button function types (about 30) and the legend that appears on any button varies with the type. Button legends have 3 lines of 8 characters. One or more lines of a button legend can be blank.

Buttons are also color-coded. The colors are specified in the NV9641 configuration. In most cases, buttons that are high-tally (bright) are active or selected. Buttons that are low-tally (muted) are inactive or unselected. Buttons that are dark either have no function or are momentarily disabled. As an example, the take button is disabled until you have a destination and a source selected. Then, the take button goes high tally (red, by default).

Category buttons show the category mnemonic. Source buttons show the source device mnemonic. Destination buttons show the destination device mnemonic. Salvo buttons show the salvo mnemonic. The legends on other button types are defined by the configurer.

Of particular interest are the legends on the selection buttons and the X-Y Display button in both X-Y and multi-destination modes. These buttons carry 3 lines of important information.

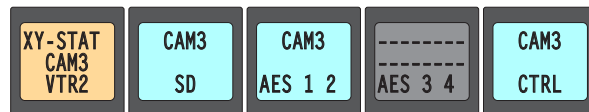
- ▲ Only a subset of button types is available under the paging model. The paging model does not support level selection, level mapping, or multiple destination selection.

## Levels

In X-Y mode, a set of selection buttons presents a set of virtual levels that you can select and deselect for breakaway takes. Call them “level” buttons for the sake of simplicity. You can also use the level buttons to perform level-mapping. See the [Level Map](#) function on page 60.

If you have more levels than buttons, you can use the up/down scroll buttons to view all the levels. The up/down buttons light up when you can scroll.

Each level button displays 3 lines of text:



Destination VTR2 selected, as shown on the XY status button.

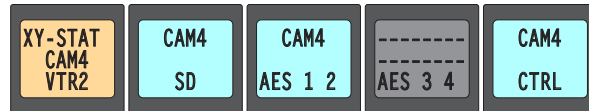
The **top** line of text identifies the current source. If the current destination had a breakaway take, the sources will be different across the set of level buttons. If the destination does not include a particular level, that button will be dark, but it will show the level name, as is the case with AES 3/4 here.

When a source is *preset*, prior to a take, the level buttons show the preset source on the **middle** line of text and the buttons turn yellow:



Source CAM4 preset prior to a take. Current source shown on XY status button and in the top row on the level buttons.

After a take, the level buttons show the new source on the top line of text and on the XY status button:



Source CAM4 now current, as shown on the XY status button and level buttons.

The **bottom** line of text always shows the level mnemonic.

### Level Mapping

If a level was level-mapped, the first line is reverse-field and the middle line shows the source level for the mapping.

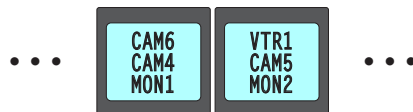


This example is the button for virtual level AES 3/4. Level AES 1/2 (from the source VTR1) has been mapped to AES 3/4 at the destination device.

### MD Devices

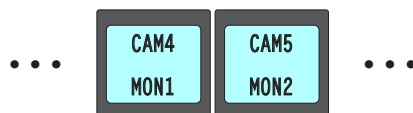
In multi-destination (MD) mode, a set of selection buttons presents a set of MD devices. To perform an MD take, you assign sources to as many MD devices as you like and then press 'Take'. The multiple takes occur simultaneously. Call these "dest" buttons for the sake of simplicity.

In this example, sources CAM4 and CAM5 were preset to 2 destinations, MON1 and MON2, respectively:



The top line of text shows the current source. The middle line of text shows the preset source. The bottom line shows the destination.

After a take, the preset source becomes the current source. The buttons show the current source on the top line:



If a breakaway occurred (in X-Y mode) for a particular destination, the MD destination button shows the destination mnemonic in reverse-field.



The reverse field lets you know that this destination has a breakaway take. The top line of text represents the source for the breakaway on the primary level of the route.

## Lists

The NV9641 can display devices, categories, and salvos in automatically generated lists under the XY/MD model. There are three kinds of lists:

- Generated during configuration of a navigation button. These lists are characterized by the presence of "Back" and "Forward" buttons in the list. Traverse these lists by pressing the back or forward buttons. A final "back" returns to the page containing the button that displayed the list.
  - Automatically generated as the result of pressing a category button. These lists are characterized by the activation (and illumination) of the up and down buttons. Traverse these lists by pressing the up and down buttons. A final "up" returns to the page containing the category button that displayed the list.
  - Virtual levels or MD devices presented on selection buttons. These sets are also characterized by the activation (and illumination) of the up and down buttons.
- ▲ Automatically generated device lists, category lists, and salvo lists do not exist under the paging model.

## Operating Concepts

### Levels

In the NV9000-SE Utilities and in the NV9000 router control system, routes occur on *levels*. A level is typically SD, HD, analog video, AES, analog audio, or machine control. Various devices are defined as sending and receiving signals on certain levels. The set of levels handled by a device belong to what is called a *level set*.

A source can be routed to a destination if it has the same set of levels, i.e., it belongs to the same named level set. A source can be routed to a destination in a different level set if the NV9000 configuration has the appropriate level mapping.

The effect of this is that when you, the operator, choose a destination, the system controller recognizes its levels and which source devices are allowed to be routed to the destination and limits your selection to those sources.

### Breakaway

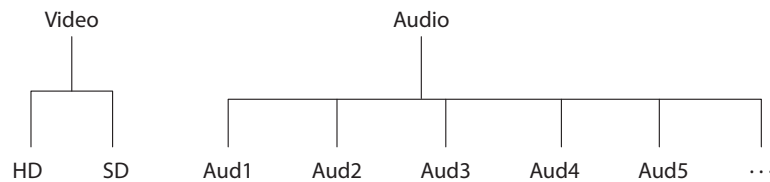
Routes can be all-level in which case they are taken on all levels defined for the destination. The acceptable sources for a route have the same levels as, or some configured mapping to, the levels of the destination.

A breakaway can occur in X-Y mode. A breakaway is where you take different sources to the same destination — on different levels.

It is not possible to take different sources to the destination on the same level. For instance, you cannot take SD from two different sources. The outcome would be noise even if you could do it. (That is because routers are not mixers.)

## Level Grouping

Virtual levels can be grouped. This diagram illustrates grouping:



There are two types of virtual levels: basic and abstract. Basic virtual levels are those that correspond to actual physical levels. Abstract virtual levels do not correspond to physical levels. In the illustration, the 5 “Aud x” levels are grouped under ‘Audio’. The two video levels are grouped under ‘Video’.

The levels ‘Video’ and ‘Audio’ are abstract levels; the other levels are basic levels.

- ▲ The NV9641, at present, ignores the concept of level groups, and presents any configured level groups as completely expanded. That is, it always displays basic levels and never abstract levels.

## Hold

Hold mode (and hold buttons) apply in both X-Y mode and multi-destination mode.

### Breakaway

In X-Y mode, a hold button retains breakaway levels after a take.

Simply press the hold button at any time before the take.

A hold button is a toggle. Press it once to put the panel in hold mode; press it again to remove hold mode.

### Multi-Destination Mode

In multi-destination mode, hold mode allows you to select more than one MD destination at a time. The selections also remain selected after a take.

## Category Selection

In the NV9000 system, devices are assigned to categories, where the devices within the categories are either numbered or identified by alphanumeric suffixes. For instance, a category representing cameras might be CAM and the cameras in the category might be named CAM1, CAM2, and so on.

NV9641 category buttons can represent either a source category or a destination category (but not both). When you pressing category buttons to begin device selection, one of two things occurs:

- The panel displays a list of all devices in that category. If the list has more entries than will fit on the available buttons, you can scroll through multiple pages of devices using ‘Back’ and ‘Forward’ buttons to find the device you want.
- The panel displays a “suffix page” which contains a keypad containing numerals and possibly alphanumeric suffixes, and perhaps some other functions. By pressing keys of the key-



pad, you can “construct” a device name. Each press of the keypad appends a digit or a suffix to the name thus far constructed. The device name does not appear when you press the numerals or suffixes, but will appear on selection buttons (levels, in X-Y mode and MD devices, in MD mode) after you return from the suffix page.

Suffixes may be numeric or alphanumeric, and up to 4 characters in length. Any device may have up to 8 suffixes. However, device mnemonics are limited to 8 characters. Therefore, the usual — and default — suffixes are just the numerals 0–9.

Example: you want to select the source device CAM\_12.

- 1 Press the category button labeled 'CAM'.

The display for this source shows 'CAM'.

- 2 If you see a list of devices, scroll until you find CAM\_12 and press that button.

- 3 Or if you see a keypad, press '1' and then press '2'.

At this point, you could press a 'Clear Preset' button — on the suffix page with the keypad — to erase the digits or suffixes you entered. 'Clear Preset' does not return to the previous page but allows you to re-enter digits or suffixes.

- 4 When you have the desired source selected, press a 'Back' button to return to the previous page.

## Buttons

The NV9641 has four classes of button functions:

- Dedicated functions, such as 'Default State' or 'Chop'.
- Variable functions, such as 'Category' or 'Source'. A category button identifies a specific category. A source button identifies a specific source. A button page can contain more than one category or source. Often, category lists and source lists span multiple pages.
- Special functions, such as 'Navigate', 'Back', and 'Forward'. These functions allow the panel operator to move from one button page to another.
- System-generated button functions. When you press a category button, the router control system generates a list of devices belonging to the category. The device list, if it is long, spans more than one button page.

At present, there are 32 button types, not including “undefined” which is not a true button type:

<a href="#">Back</a>	<a href="#">Global Navigate</a>	<a href="#">Save Preset</a>
<a href="#">Broadcast</a>	<a href="#">Hold</a>	<a href="#">Selection</a>
<a href="#">Category</a>	<a href="#">Level Map</a>	<a href="#">Source</a> (P)
<a href="#">Chop</a>	<a href="#">Menu</a> (P)	<a href="#">Source/Destination</a> (P)
<a href="#">Clear Preset</a>	<a href="#">Name Set Toggle</a>	<a href="#">Source is Master</a>
<a href="#">Default State</a>	<a href="#">Navigate</a>	<a href="#">Take</a> (P)
<a href="#">Destination</a> (P)	<a href="#">Panel Lock</a> (P)	<a href="#">Virtual Level Expander</a>
Destination Lock (P)	<a href="#">Preset Release</a>	<a href="#">Virtual Levels Contract</a>
<a href="#">Destination Protect</a> (P)	<a href="#">Previous Source</a> (P)	<a href="#">X-Y Display</a> (P)
<a href="#">Forward</a>	<a href="#">Quick Source</a> (P)	<a href="#">XY/MD Mode</a>
<a href="#">Free Source</a> (P)	<a href="#">Salvo</a> (P)	

Here, the buttons that are available under the paging model are flagged with the letter “P.” Not listed here are the up and down buttons.

### Back

Redisplay the *previous* button page. (The previous buttons become active.)

A back button may have any legend and be any color, but typically its legend is just “BACK” and typically, its color is blue, as for back buttons generated automatically for lists. A back button is never high-tally.

See also [Forward](#).

### Broadcast

A broadcast button applies to the data (or control) level. The button assigns one controlling device (the master) to multiple controlled devices (the slaves). The function is useful in dubbing applications. See [Broadcast Routes](#) on page 66 for more information.

▲ Pressing the ‘Broadcast’ button turns off the ‘Source is Master’ button and vice versa.

The default button text is “Broadcast” but a broadcast button can have any legend.

### Category

A category button either (1) displays a category’s device list or (2) displays a “suffix page.” See [Global Navigation](#) on page 43. A category button is associated with either a source category or destination category.

The button text is normally the category name, but the configurer can give it any text. Category names tend to be short.

### Device List

When you press a category button and it is configured for a device list, the NV9641 displays the first of perhaps several pages of device buttons. You can scroll the pages using back and forward buttons. If you press ‘Back’ while on the first page of the list, the NV9641 returns to the page containing the category button.

The button text is normally the category name, but the configurer can give it any text. Category names tend to be short.

It is a common convention that buttons for source categories and devices are green and buttons for destination categories and devices are amber.

### Suffix Page

When you press a category button and it is configured for a suffix page, the NV9641 displays a suffix page which will contain buttons forming a numeric keypad, other buttons that represent alphanumeric suffixes and perhaps a few other buttons. Use the keypad to enter an index or suffixes of a device within the category. If you make a mistake, press the ‘Clear Preset’ button and try again.

When you have finished entering an index or suffixes, press either the back button or the take button if present. The panel will have tracked your entries by concatenating the index or suffixes to the current destination name (for a destination category) or to a preset source name (for a source category).

While you are pressing digits to enter an index, some of the numeric buttons can become disabled. They do so because there are no further categories that can be selected using those buttons. For example, if you have 14 devices in a category, numbered 1–14, after you press the digit 1, digits 5, 6, 7, 8, and 9 go dark. The digits 0–4 remain because they can be part of a valid index.

The same is true for suffixes: if a suffix cannot be used for a device name, it is disabled.

- ▲ Keep in mind that device names are limited to 8 characters.
- ▲ A keypad normally has 10 buttons, 0–9, and may have some number of buttons assigned to alphanumeric suffixes. However, it is possible for a suffix page to have fewer buttons.

When you press a category button, the NV9641 displays the first of perhaps several pages of device buttons. You can scroll the pages using the up and down buttons. If you press 'Up' while on the first page of the list, the NV9641 returns to the button page containing the category.

The button text is the category name. Category names tend to be short.

It is an Grass Valley convention to use green for source category buttons and amber for destination category buttons.

## Chop

When a "chop" function is supported by the router, the button is a toggle that enables and disables chop: a rapid switching of the selected destination device between the current source and the preset source.

The chop function is used to test system timing and would not be used during normal operation.

The default button text is "Chop" but a chop button can have any legend.

Select a preset source and press 'Chop' to start the chop function. Press 'Chop' again to stop the chop function.

## Clear Preset

The 'Clear Preset' button erases all preset entries (while leaving the panel in the same mode). It is generally a "safety" feature.

The clear preset button has the side effect of switching off 'Save Preset' mode.

The default button text is "Clear Preset" but the button can have any legend.

## Default State

This button returns the NV9641 panel to its most recent power-up state. You can consider this button an emergency button or a "soft reset" button.

- ▲ This button does **not** affect any routes. Only the panel itself is reset.

The default button text is "Default State" but the button can have any legend.

## P Destination

This button selects a destination.

A destination button can occur on any page, but destination buttons often appear in destination lists. Destination lists can occur either (1) in automatically configured pages, in which case

you navigate the list by pressing “back” and “forward” buttons or (2) as a result of pressing a destination category button, in which case you navigate by pressing the up and down buttons. The button text is normally the destination device’s mnemonic, but the configurer can assign the button any text on pages that are not automatically generated.

A destination button goes high-tally when the destination is selected.

- ▲ An MD destination button (actually a selection button) is not the same as a destination button.

## P Destination Lock

This button is a toggle that sets or clears a *lock* on the current destination. The lock can be removed at the panel that originally set the lock, at a panel that has the same user ID, or by a forced release at any panel.

The ‘Destination Lock’ button text is normally “Dest Lock” and when a selected MD destination is locked, the button legend becomes “Dest Unlock.”

### MD Mode

In MD mode, when you select a locked MD destination with a button, the ‘Destination Lock’ button goes high-tally.

In MD mode, a locked destination appears bright red and its button legend is ‘LOCKED by <user>’ and the ‘X-Y Display’ button turns dark red.

To lock or unlock MD destinations, select the destinations and press a ‘Destination Lock’ button.

### X-Y Mode

In X-Y mode, you may lock or unlock the current destination on each of its levels. Select the level(s) and press the ‘Destination Lock’ button to perform the lock. Select locked levels and press the ‘Destination Lock’ button to unlock them.

In X-Y mode, the ‘X-Y Display’ button turns dark red for a locked destination.

To lock or unlock the X-Y destinations, press a ‘Destination Lock’ button.

See [Lock, Protect, and Release](#) on page 65.

## P Destination Protect

This button is a toggle that sets or clears a *protect* on the current destination device. The protect can be removed at the panel that originally set the protect, at any panel that has the same user ID, or by a forced release at any panel.

- ▲ **Note:** a protect prevents *others* from routing to a destination; a lock prevents *anyone*— even the user who issued the lock— from routing to the destination.
- ▲ You may lock a protected destination, but you cannot change a locked destination to a protected destination directly. You must first unlock it, then apply the protection.

The ‘Destination Protect’ button text is normally “Dest Protect” and when a selected MD destination is protected, the button legend becomes “Dest Unprotect.”

### MD Mode

In MD mode, when you select a protected MD destination with a button, the 'Destination Protect' button goes high-tally.

To protect or unprotect MD destinations, select the destinations and press a 'Destination Protect' button.

### X-Y Mode

In X-Y mode, you may protect or unprotect the current destination on each of its levels. Select the level(s) and press the 'Destination Protect' button to perform the protect. Select protected levels and press the 'Destination Protect' button to unprotect them. A protected level has a "P" next to it when it appears in the display.

See [Lock, Protect, and Release](#) on page 65.

## P Free Source

This button selects a phantom device that can be used to release or "free" devices on the data (machine control) level. A free source can also be used with tielines to free the tieline for others to use.

Use this button as if it were a source button.

The actual free source is configured in the *Level Set Details* page of NV9000-SE Utilities.

The default button text is "Free Source" but the button can have any legend.

### Forward

Displays and activates the next button page in an automatically generated list.

A forward button is never high-tally. A forward button is generated by the system when a list has more than 16 elements. Forward buttons are always accompanied by "back" buttons.

See also [Back](#).

### Hold

The 'Hold' button is a toggle. Press it once to activate "hold" mode, press it again to deactivate "hold." The button is high-tally when hold mode is active and low-tally when it is not.

You can activate or deactivate hold mode at any time during an MD selection or a breakaway selection in X-Y mode. Your selection remains intact and the panel subsequently operates in hold mode or non-hold mode according to the hold button state.

The default button text is "Hold Preset" but the button can have any legend.

In MD mode, turning hold mode on allows you to select more than one destination button at a time. When you select a source, the source applies to all selected (high-tally) destinations. If hold is still on when you press 'Take', the selected destinations remain selected and the X-Y Display button reflects the source and the first of the selected destinations.

Without hold enabled, the X-Y Display button reverts to "No MD Dest Selected" after an MD take and the buttons for the selected destinations go low-tally.

When hold is active, all selected MD destinations get the source you selected most recently (in case you changed your mind and selected another source).

In X-Y mode, the hold button causes breakaway levels to be retained after a take. The levels you selected (and deselected) remain lit (or unlit) as they were before the take.

### Level Map

The 'Level Map' button cross-connects levels (typically in the same physical router). The function is typically used to shuffle audio channels, for example, to connect AES1/2 to AES3/4.

Follow these steps to create a level mapping:

- 1 Select a source.
- 2 Press 'Level Map'. It goes bright and the XY Display button says "Select Src Level." Press a level button.
- 3 The XY Display button now says "Select Dest Level." Press a level button.
- 4 Finally, press 'Take'. (This does not execute a normal take — only the level mapping.)

Level mappings are typically used for AES levels.

The level map mode is cancelled when the next normal take is performed involving the selected devices.

The default button text is "Level Map" but the button can have any legend.

## P Menu

The button puts the NV9641 panel in menu mode and displays a menu, on the LCD buttons, that provides access to a variety of panel options.

By pressing any of the menu buttons, you may enter data (such as panel ID) or change LCD brightness values. The LCD button text varies with context in menu mode.

See [Menu Mode](#) on page 68 for more detail.

### Name Set Toggle

An 'Name Set Toggle' button toggles the panel between its default name set and the "system name" set. Whichever name set you select becomes the "active" name set.

- ▲ 'Name Set Toggle' buttons are disabled while a category selection is in progress.
- ▲ The panel requires that category/suffix device selection be performed using the names in the system name set. However, it displays the device you selected using the active name set. We recommend that you switch to the system name set prior to category/suffix device selection and return to your preferred name set afterward.

### Navigate

A navigate button displays and activates one of the button pages defined in the panel configuration. We call that the "target" button page.

The target page can be an ordinary button page (defined during configuration) or it can be the first page of a list. Lists are characterized by "back" and "forward" buttons on the panel. Such lists can be categories (source or destination), sources, destinations, or salvos.

Navigate buttons have no specific default text and it is the configurator's job to provide text that is meaningful. The text should help identify the contents of the target page.

Just press the navigate button to access the target page.

Other kinds of buttons can cause the display of a target page. These include 'Global Navigate' buttons and category buttons. In practice, navigate buttons, global navigate buttons, and category buttons are nearly indistinguishable, although the pages they display can be quite different.

### Global Navigate

A 'Global Navigate' button functions the same way a navigate button does. Global navigate buttons exist mainly for the convenience of the configurer. Operators should rarely notice any difference between global navigation buttons and other navigation buttons.

Global navigate buttons, however, access only static button pages. They do not access list pages. That is because configurers have no list options for global navigate buttons.

### P Panel Lock

A panel lock button prevents accidental changes to the panel settings, especially router cross-points. When the panel is locked, the button array becomes blank except for the 'Panel Lock' button which becomes high-tally red. The button is a toggle: pressing the 'Panel Lock' button again reverts the panel to its previous state.

The button text is either "Panel Lock" or "Panel Unlock."

### Preset Release

This button removes locks and protects from preset source devices. (If source locks and protects are not used in your system, this button is not needed.)

If you select a source and someone else has locked or protected the source, your panel will illuminate the 'Preset Release' button and tell you who locked or protected the source. You can release it if your panel has "forced release" enabled. (Note that you cannot lock or protect sources with the NV9641.)

Press the 'Preset Release' button to release the source.

The default button text is "Preset Release" but the button can have any legend.

### P Previous Source

This button presets the previously selected source for the current destination. This function is useful when you make a route in error.

To recover the previous source, press 'Previous Source'. When you do, the 'Take' button goes high-tally. Then press 'Take' to recover the source.

▲ The button does **not** restore the previous destination. If you have changed the destination and press 'Previous Source', the take will not restore the previous route.

The default button text is "Previous Source" but the button can have any legend.

### P Quick Source

A quick source button selects a source and performs an immediate take.

Quick source and source buttons are similar, except that the quick source performs a take. Be aware of which buttons are quick sources so you do not perform an accidental take. (A quick source button is always high-tally.)

The button text is the source device's mnemonic, but the button can have any legend.

## P Salvo

This button executes a system salvo. A salvo is a pre-defined set of NV9000 commands.

The button text is the salvo's mnemonic. When you press the salvo button, the panel temporarily enters "salvo" mode. To confirm that you want to execute the salvo, press a 'Take' button. (You might have to navigate to a 'Take' button.) When you press the take button, the salvo begins executing immediately. Salvos are typically short in duration.

If you want to cancel the salvo before it executes, press the salvo button again.

System salvos are defined in NV9000-SE Utilities. You can review the defined salvos in NV9000-SE Utilities or communicate with the panel's configurer regarding the function of any salvos in your panel configuration.

## Save Preset

This button is a toggle: it enables or disables "save preset" mode. When this function is enabled (its button is high tally), whatever is on preset is retained (on preset) after a take. When the function is disabled (its button is low tally), whatever is on preset is discarded after a take.

The default button text is "Save Preset" but the button can have any legend.

## Selection

Operators use selection buttons to select and unselect levels in X-Y mode and to select and unselect MD destinations in MD mode.

A button page that has selection buttons will have up to 8 of them.

## X-Y Mode

When the panel is in X-Y mode, a selection button presents a virtual level that corresponds to the display index for the button and the preset source or destination device. Pressing selection buttons selects or unselects the levels associated with the buttons.

- ▲ When all levels are selected, pressing a level button turns them all off except the one pressed.
- ▲ If there are more levels than selection buttons, scrolling is enabled.

Selecting virtual levels in X-Y mode prepares a breakaway.

Hold mode preserves the level selection after a take.

If there are more virtual levels than buttons, the up/down scroll buttons illuminate and you can scroll through sets of levels. The panel scrolls modulo the number of selection buttons visible. For instance, if your button page has 4 selection buttons, scrolling will show levels 1-4, 5-8, 9-12, and so on.

## MD Mode

When the panel is in MD mode, a selection button presents an MD device. Pressing selection buttons selects or unselects the MD destinations associated with the buttons.

If you have enabled 'Hold' mode,

- 1 Select one or more MD devices. Scroll the MD device list as needed.
- 2 Select a source.
- 3 Repeat steps 1 and 2 until your presets are complete.



4 Press 'Take'. The selected MD devices remain selected.

If you have **not** enabled 'Hold' mode,

- 1 Select an MD devices. Scroll the MD device list as needed.
- 2 Select a source.
- 3 Repeat steps 1 and 2 until your presets are complete.
- 4 Press 'Take'. The selected MD devices become unselected.

A selection button displays (1) level data in X-Y mode or (2) destination (and source) mnemonics in MD mode.

A selection button goes high-tally when its associated level or MD device is selected and low-tally otherwise. A selection button is red when its MD device is locked or protected.

▲ MD buttons that are uncommitted are dark and do not operate.

If there are more MD destinations than buttons, the up/down scroll buttons illuminate and you can scroll through MD destinations. The panel scrolls modulo the number of selection buttons visible. For instance, if your button page has 4 selection buttons, scrolling will show MD destinations 1–4, 5–8, 9–12, and so on.

## P Source

A source button selects a source. (Note that a quick source button selects a source and also performs an immediate take.)

Quick source and source buttons are similar, except that the quick source performs a take. Be aware of which buttons are quick sources so you do not perform an accidental take.

The button text is the source device's mnemonic.

See [Preset Release](#) on page 61.

## P Source/Destination

A source/destination button selects both a source and a destination and optionally performs an immediate take. The take is an all-level take.

A configuration option governs source/destination buttons. When the option is enabled, source/destination buttons perform an immediate take, without requiring the operator to press a take button.

When the option is disabled, the button merely selects the source and destination (on all levels). The operator must then press the take button.

By default, the button shows the source name and the destination name, but the configurer may assign other text to the button.

### Source is Master

During data (i.e., control) level takes, this button makes the source device the master. Otherwise, the destination is the master.

The button is a toggle that reverses the direction of data routing. For example, if the destination is the master and the source is the slave, pressing a 'Source is Master' button reverses their roles.

The 'Source is Master' button is used to initiate "broadcast" control routes. See [Broadcast Routes](#) on page 66.

▲ Pressing the ‘Source is Master’ button turns off the ‘Broadcast’ button and vice versa. The default button text is “Src Mstr” but the button can have any legend.

## P Take

In X-Y mode, a take button switches the preset source device to the selected destination device on selected levels.

In MD mode, a take button switches the preset source device(s) to the selected destination device(s) on all levels.

The default button text is “Take” but the button can have any legend.

## Undefined

An undefined button cannot be used and appears dark (unlit) on the panel.

## Virtual Level Expander

In X-Y mode, this button causes the alphanumeric display to show virtual levels at the *lowest* level of grouping (with the most detail). The button affects only virtual levels that have been grouped. See [Level Grouping](#) on page 54.

The button has no effect in multi-destination mode.

## Virtual Levels Contract

In X-Y mode, this button causes the alphanumeric display to show virtual levels at the *highest* level of grouping (with the least detail). The button affects only virtual levels that have been grouped. See [Level Grouping](#) on page 54.

The button has no effect in multi-destination mode.

## P X-Y Display

The ‘X-Y Display’ button displays status in either X-Y mode or MD mode. It also displays other messages in other circumstances, as required. Pressing this button has no effect.

Prior to a take, the status includes the selected destination and *current* source. After a take, the status includes current source and current destination. The ‘X-Y Display’ button turns low-tally red if that destination is locked (by anyone) or protected (by another user).

If there is no destination selected, this button says so.

The button appears in whatever color the system assigns it—typically amber or dark red.

▲ Prior to a take, the *preset* source name is displayed on any selection buttons present on the panel. After a take, the selection buttons continue to display the source name, which is now the *current* source name.

In MD mode, the X-Y Display button shows (1) current source, (2) preset source, and (3) destination for one of the selected MD devices—the first one if more than one are selected.

## XY/MD Mode

This button switches the panel between X-Y and multi-destination modes. The button is green for X-Y mode and amber for multi-destination mode.

The button text is controlled by the panel software.

## Lock, Protect, and Release

In a multi-user system, routes made by one user must be made safe from being accidentally or maliciously change by another user.

### Definitions

Owner	A person who locks or protects a device is the <i>owner</i> of the device.
Source lock	No one can use the source.
Source protect	No one but the owner can use the source.
Destination lock	No one can route to the destination.
Destination protect	No one but the owner can route to the destination.
Release	To remove a lock or protect.

Some control panels can lock or protect both sources and destinations. However, The NV9641 provides locks and protects for destinations only.

A forced release is when the lock or protect is removed by someone other than the owner. A forced release can be performed:

- At any panel configured with release mode set to "forced release".
- At any other panel with "force release" enabled.

The 'Destination Lock' and 'Destination Protect' buttons are toggles. Press the lock (or protect) button to lock (or protect) a destination. Press the button again to release the lock (or protect).

## Takes

Following are brief instructions on how to perform a take in the 3 modes.

### XY Mode

- 1 If required, enter X-Y mode. (Use the XY/MD button.)
  - 2 Navigate to a destination and select it.
  - 3 Optionally choose breakaway levels.
  - 4 Navigate to a source, select it, and press 'Take'.
- OR
- 5 Navigate to a quick source, and select it. The take is automatic.

### Single-Destination Mode

(This assumes that the destination was pre-selected during configuration.)

- 1 Navigate to a source, select it, and press 'Take'.
- OR
- 2 Navigate to a quick source, and select it. The take is automatic.

### MD Mode

- 1 If required, enter MD mode. (Use the XY/MD button.)
- 2 Scroll to a destination and select it.
- 3 Navigate to a source and select it.

- 4 Repeat steps 2 and 3 for all destinations you intend to use.
- 5 Press 'Take'.

When 'Hold' is enabled in MD mode, you can select many MD destinations at once. Subsequently selecting a source assigns the source to all selected MD destinations. You can turn 'Hold' on and off as you require during an MD take.

## Name Sets

NV9000-SE Utilities allows configurers to define multiple *name sets*. Each name set contains aliases (alternate names) for any and all devices in the NV9000 system. The aliases can appear in the displays of your panel.

Further, your panel can have a 'Name Set Toggle' buttons that allows you to switch between the "default" name set and the "system name" set. Whichever name set you are currently using is the *active* name set.

There is always a 'System Name' set. That name set includes the device names defined within the NV9000 configuration. Any other name sets are optional.

Device selection using categories and suffixes requires that you enter device names using the *system name set*. However, the display shows the device name as it is represented in the *active name set*.

For example, suppose the system name for a destination is "VTR\_42" and its alias is "Prod\_A." Follow these steps to select the device using category selection:

- 1 Switch to destination mode if necessary.
- 2 Press a VTR category button. (Suffix buttons become enabled.)
- 3 Press 4, then 2. The device is selected, but the name appearing in the destination display is "PROD\_A."

In this example, you could press the 'Name Set Toggle' button a number of times to see that PROD\_A and VTR\_45 are, in fact, the same device.

If you are using aliases, we recommend that you switch to the system name set during device selection and switch back to your preferred name set afterward.

Note that when the panel is displaying aliases, and a device does not have an alias, the panel displays the system name.

## Broadcast Routes

It is easy and normal to route a source to multiple destinations for audio and video routers. For machine control, routes are typically point-to-point. Therefore, to control multiple machines requires that the operator perform a "broadcast" operation using a 'Broadcast' button.

During broadcast, the source device controls one or more destination devices.

## Making Broadcast Routes

Follow these steps to broadcast control signals:

- 1 Ensure that the panel is in "source is master" mode. It is either in "source is master" mode by default or you must press the 'Source is Master' button to activate the mode. It is active when the 'Source is Master' button is high-tally.
  - 2 Select a destination and preset a source. Then press 'Take'.
  - 3 Press the 'Broadcast' button.
  - 4 Select a destination and preset a source. Then press 'Take'.
  - 5 Repeat steps 3 and 4 to add other machines to the set of controlled devices.
- ▲ In MD mode, with hold mode active, you can select multiple broadcast destinations with a single take.

Implicit in the 'Broadcast' button is the "source is master" mode. It is not necessary to press 'Source is Master' repeatedly. The reason you must press 'Source is Master' the first time is that "broadcast mode" is not yet active.

### Removing Broadcast Routes

To cancel a route, route the source to another destination normally.

To remove a destination from the set of broadcast destinations, route another source (e.g., the free source) to the destination.

### Data Routing

There are 3 data routing options that affect sources and destinations that have a machine control level (i.e., a data level). These options govern what happens when a source or destination device is to be used.

#### Automatic Data Routing

A take involving a machine control level occurs naturally on all selected levels, including the machine control level, regardless of whether an affected machine control port is in use. The system breaks any existing control connections involved with the source and destination and makes a new control connection for the source and destination.

This data routing option applies in both operating modes.

#### Manual Data Routing

If a control port for the source or destination is "in use," a take involving a machine control level occurs on all levels *except* the machine control level. You must break either the source's control connection, the destination's control connection, or both of those existing connections before you can take the source to the destination on the machine control level. To break a connection, route a device (as a source) to itself (as a destination) on the machine control level. When the connection is broken, the status line of the machine control level's selection button reads "FREE" (in X-Y mode). If your panel is in multi-destination mode, you might switch to X-Y mode momentarily to see this.

If neither of the control ports for the source or destination are in use, the take occurs naturally without any further action required. Note that the ports will become "in use" after the take you are performing.

This data routing option applies in both operating modes.

## Semi-Automatic Data Routing

This data routing option applies only in X-Y mode.

If a control port for the source or destination is “in use,” a take involving a machine control level occurs on all levels *except* the machine control level. Nevertheless, you are given the opportunity to complete the take on the machine control level by pressing the ‘Take’ button a second time.

If neither of the control ports for the source or destination are in use, the take occurs naturally without any further action required. Note that the ports will become “in use” after the take you are performing.

Follow these steps to take the data level as a breakaway:

- 1 Select a destination.
- 2 Select a source.
- 3 Examine the display and the take button.
- 4 If the Take button is still high-tally (and the selection button for the machine control level is yellow), press the ‘Take’ button again to complete the take.

You can cancel the control-level take by pressing a button other than ‘Take’.

## Chop

The chop function is a diagnostic function for routers that support chop. It allows you to switch rapidly between two sources at a particular destination. The chop interval is defined in the NV9000 configuration. The default chop interval is 6 *fields*.

Follow these steps to use chop:

- 1 Select a destination.
- 2 Select a source. This is the first source.
- 3 Press the chop button.
- 4 Select another source. This is the second source. The chop is immediately activated on the routers (of the default destination) that support chop.

To terminate the chop, (1) press the chop button again to turn off chop, (2) select the destination you had chosen for the chop, then (3) select any source.

## Menu Mode

The NV9641 enters menu mode when it has a menu button and you press it.

The menu has 4 menu choices and an exit button:



Press ‘Exit’ when you want to leave the menu and return to the previous button page.

## Software Versions

Press the 'Software Versions' button to view the software and firmware versions:



The 3 buttons on the left tell you the current versions of the software in the NV9641. Generally, this is of no relevance unless you are in a diagnostic situation.

Press 'Exit' on the right to return to the menu.

## User

Press the 'User' button to view user data:



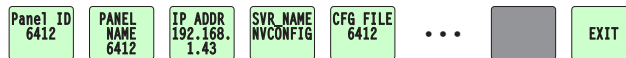
The 2 buttons on the left tell you the user name and user ID as determined by the router control system. These are **not** the Windows user name or ID. Again, this is of no relevance unless you are in a diagnostic situation.

- ▲ User names are important in lock, protect, and release situations. The user who "owns" a lock or protect is identified by a user name.

Press 'Exit' on the right to return to the menu.

## Panel

Press the 'Panel' button to view panel data:



The 5 buttons on the left tell you the panel ID, and other useful information about the panel, in particular, the panel's IP address. These are useful in a diagnostic situation and during configuration. This information helps you ensure that you are sending the correct configuration file to the correct panel.

- ▲ The panel acquires its IP address through DHCP on the panel/router network of the system controller.

If the 'Panel ID' button is high-tally, you may change the panel ID. Normally, only your system administrator would do that.

Press 'Exit' on the right to return to the menu.

## LCD Control

Press the 'LCD Control' button to view and change LCD brightness. When you do, the current LCD button state appears on the 14 left-most buttons:



The 14 buttons on the left occur in pairs — one pair for each defined color. The pair shows high tally and low tally for the color.

You can change high-tally from high to medium brightness and change low tally to medium or low brightness, as long as high tally is brighter than low tally. (They cannot both be medium, for instance.)

To change a color's brightness, select the button for the color you want to change. Press the up button (next to the arrow) to make it brighter. Press the down (next to the arrow) to make it darker. When you do the brightness level ("High," "Medium," or "Low") is indicated on the button:



This illustration shows that high-tally green was changed to medium brightness and low-tally amber was also changed to medium brightness.

If you make a change, press 'Save' to commit the change or press 'Cancel' to discard the change. Otherwise, just press 'Exit' to return to the menu.

The actual colors cannot be represented accurately in print or in a PDF file displayed on your screen. There is a small amount of variation in color from button to button. See [LCD Buttons](#) on page 85 for a color chart.

## Setup Mode

Setup mode occurs when the NV9641 is disconnected from its network and is freshly powered up. In setup mode, you can set or change the panel ID, determine software versions, and perform a test of the panel's buttons. It is in setup mode that you must initially set the panel ID. The panel powers up with 3 buttons illuminated in green:



▲ It might take 30 seconds for the menu buttons to appear.

In this illustration, the panel ID was already set to 6412. The "Acquire IP Address" is a status message during initialization. Until you connect the panel to its network, the status message will remain the same.

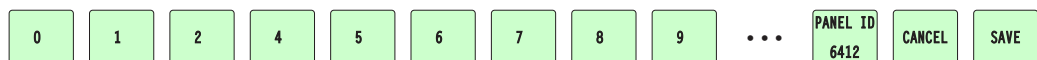
Press the 'Menu' button at the far right to access the setup menu:



There are 3 setup menu choices. The 'Exit' button at the far right allows you to leave the menu.

- Panel ID Entry.

Press the Panel ID Entry button to set the panel ID. A numeric button array appears:



Use the numeric button array as a keypad to enter a panel ID. What you enter appears on the 'Panel ID' button on the right.

To make the ID permanent, press 'Save'; to cancel your entry, press 'Cancel'. In either case, you will be returned to the setup menu.

- Software Versions.



In the setup menu, press the 'Software Versions' button. Three buttons appear:



The 2 buttons on the left give the software version numbers. Use the 'Exit' button on the right to return to the setup menu.

- Panel Test Mode.

In the setup menu, press the 'Panel Test Mode' button. One button appears:



Press the 'Push to Test' button repeatedly to execute the test. Each time you press the button, the panel illuminates all its LCD buttons in a single color, changing the color each time you press the button. Keep pressing the button until all 7 colors (high and low tally) have been displayed and 'Button Number' appears on the left button:



When 'Button Number' appears, you can test individual buttons. Press any button except 'Exit' which is on button 16. When you do, the button number appears under "Button Number" on button 1 and the button you pressed blinks rapidly on and off for about a half second. The up and down buttons are buttons 17 and 18 respectively and you can test these buttons the same way. When you have finished testing buttons, press 'Exit' to return to the setup menu.

The panel test shows you (1) whether all the buttons are working and how well and (2) whether the software and firmware are working.

When you are finished using the setup menu, press 'Exit' one or more times to return the panel to its normal pre-connected state.

When you connect the panel to its network, the panel leaves its setup state and begins to initialize in its normal operational state. After a short time, the panel will have initialized to its configured state and will display its default button page.



# 6 GPIO

Chapter 6 provides information about the tally (GPIO) interface.

## Topics

<a href="#">The Interface</a> .....	73
<a href="#">GPIO Configuration Concepts</a> .....	74
<a href="#">Configuring Outputs</a> .....	75
<a href="#">Configuring Inputs</a> .....	77

## The Interface

The tally interface includes 8 optically isolated inputs and 4 solid-state relay outputs (also optically isolated). Tally devices you connect to inputs can trigger events—through the NV9641—in the router control system. The router control system can trigger events that—through the relays in the NV9641—switch your tally devices.

The DB25 connector, labeled “GPI Interface” at the rear of the NV9641 presents the tally signals. There are 8 input signals and 4 pairs of output signals.

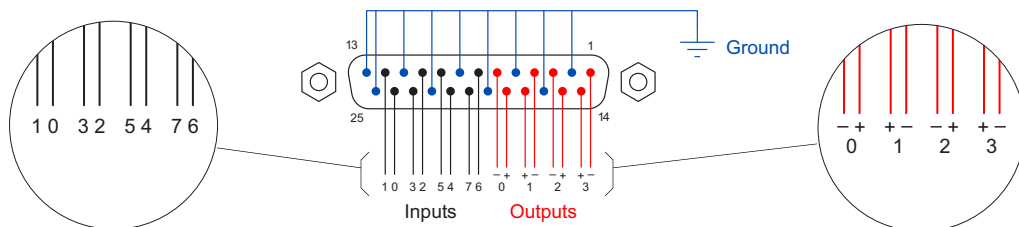


Fig. 6-1: GPI Interface

## Input

The tally inputs expect contact closure to ground, through the ground pins on the connector, to trigger a GPI input event.

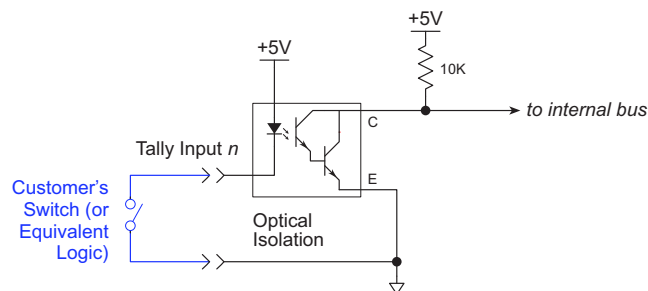


Fig. 6-2: GPI Input

When the input transitions off or transitions on, the NV9641 notifies the router control system, which carries out the task defined for the input (if a task has been configured).

During contact closure, a current of 1.2mA flows. A maximum of 48VDC can be applied to the tally input for less than 5 seconds without failure. No voltage above 5VDC should be continuously applied.

## Output

A tally output is a solid state relay (no audible click) with a maximum resistance of 10W and current capability of 150mA. It can withstand 200VAC.

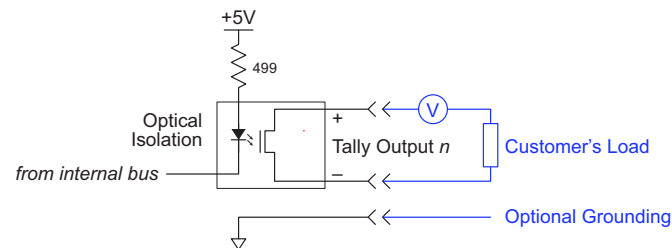


Fig. 6-3: GPI Output

When a condition (defined for the relay) occurs, the router control system notifies the NV9641 which then opens or closes the relay. The relay switches the customer's circuit on or off. (It does not power the circuit. Customers must provide their own power.)

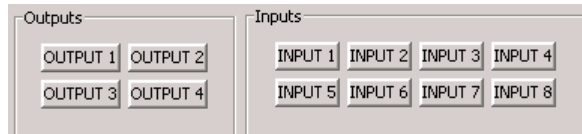
## GPIO Configuration Concepts

These are the I/O characteristics of the NV9641's tally interface:

- Eight optically isolated inputs (sometimes called GPIs) that can be configured to trigger an event when the input transitions from off to on and to trigger another event on a transition from on to off. Events include:
    - Execute a salvo.
    - Route the "previous source" switched by *any* panel to a destination.
    - Route the "previous source" switched by *this* panel to a destination.
    - Route a source to a destination.
  - Four relays that can be configured to switch on a number of conditions:
    - One or more routes occurring on specific levels.
    - Conditions involving output ports (destination, level).
    - A transition on one or more of the panel's tally inputs.
- ▲ The pinout of the NV9641's connector might differ from the pinout of other control panels.

## The GPIO Section of the NV9641 Page

SE's NV9641 configuration page provides a GPIO section, below the tree window:



Click on a button under 'Outputs' to configure one of the 4 tally outputs.

Click on a button under 'Inputs' to configure one of the 8 tally inputs.

▲ There are no actual GPIO *buttons* on the NV9641 control panel.

## Configuring Outputs

Clicking an output button (one of 4) displays a "Relay Rule" dialog for the output:

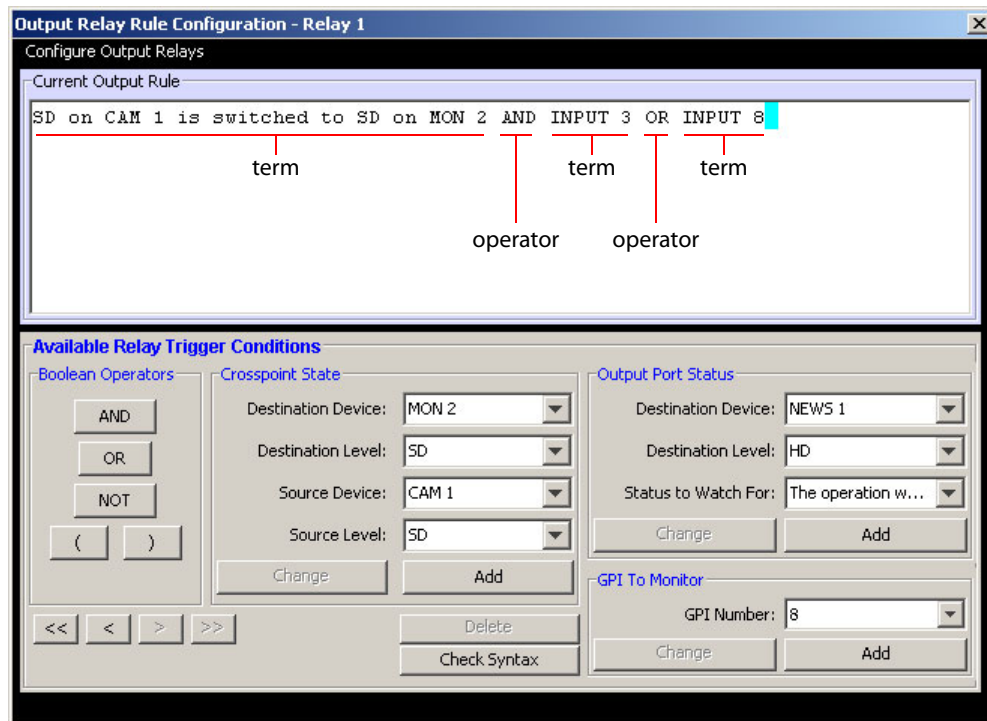


Fig. 6-4: Relay Rule Dialog

In this dialog, you create a Boolean expression involving sources destinations, port status, and GPI (input) status. When the conditions of the Boolean expression are met (i.e., the expression is "true") the relay closes. When the conditions are not met, the relay opens. Figure 6-4 shows one such Boolean expression.

Boolean expressions comprise *terms* and *operators*. The operators include those indicated on the left: AND, OR, and NOT. Expressions can be parenthesized to control the order of evaluation. Operator precedence is normally NOT > AND > OR. All parenthesized expressions are evaluated first; expressions in nested parentheses are evaluated before those in outer parentheses.

Terms (i.e., operands) are generated by choosing entries in the other fields in this dialog and clicking 'ADD'. The example shows the following:

Dest. Device: MON2 Dest. Level:SD  
Source Device: CAM1 Source Level:SD

Choosing these items (and clicking ADD) produces the Boolean sub-expression:

SD on CAM1 is switched to SD on MON2

In Figure 6-4, that sub-expression is ANDed with another sub-expression

INPUT 3 OR INPUT 8

The relay will turn on when the *entire* expression is true. That is, when the switch occurs and either of the inputs (3 or 8) transitions from off to on.

(To allow a relay to switch when an input transitions from on to off, precede the input term by "NOT." For example, the expression

INPUT 3 OR NOT INPUT 8

will evaluate TRUE when either input 3 goes on or input 8 goes off.)

You can also include one or more sub-expressions regarding the state of output ports. You must choose a entry in the drop-down menu. These are the choices:

- The operation was successful
- Destination port locked
- Destination port protected
- Router offline / unavailable
- No tieline available
- Used as master point to point
- Used as master without responses
- Used as broadcast master
- Used as slave point to point
- Used as slave without responses
- Used as broadcast slave

As an example, choosing 'Used as broadcast slave', device VTR3, and level CTRL for output port status produces the sub-expression:

CTRL on VTR3 has status of 'Used as broadcast slave.'

which you can combine with other sub-expressions as you require.

The actual logic takes place in the router control system, based on the state of the NV9641 inputs and other system-wide events. The router control system sends signals to the NV9641 instructing it to open or close its relays.

Four arrow buttons at the lower left corner of the relay dialog allow you to traverse the expression you are building:



The left double arrows highlights the first term or operator in the expression. The right double arrow positions you at the very end of the expression where you may add more items.

The single arrows select and highlight the previous or next terms, operators, or spaces between terms and operators. If you wish to change a term, you may highlight it, reconstruct the term in the appropriate entry fields, and click the 'Change' button to effect the change.

Using the arrows is the only way to position between two items or at the end of the expression. You can double-click a term or an operator to select it directly.

You can click 'Check Syntax' to evaluate the syntax of your complete expression. Generally, a syntax error will have occurred because you forgot an operator between terms or you have an extra operator at the end. You can click 'Delete' to delete a selected term.

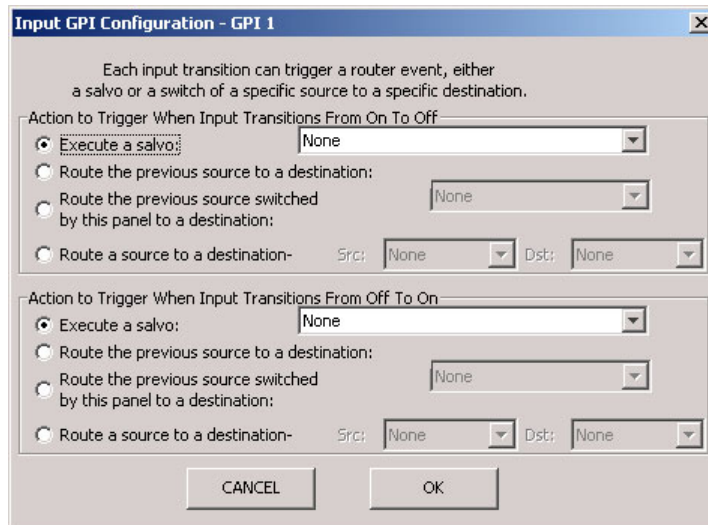
This is a summary of Boolean operations:

- All operands evaluate either TRUE or FALSE.
- AND = true if ALL terms are true; false if ANY term is false.
- OR = false if ALL terms are false; true if ANY term is true.
- NOT = true if term is false; false if term is true (i.e., negation).

▲ Relay output expressions can be as rich (or complex) as you require.

## Configuring Inputs

Clicking an input button (one of 8) displays the GPI input dialog:



An event is signalled when a transition occurs on the input from on to off or from off to on. You can configure the NV9641 to recognize either occurrence on any of the 8 inputs, and specify one of 4 behaviors for each event or both:

1 Execute a salvo.

If you choose this behavior, select a salvo ID in the salvo drop-down list.

**Note:** Although it is not evident in the GPIO input dialog (or anywhere else), a 'Previous Source' command in a salvo chooses the most recent source that is *different* from the current source (for a designated destination).

2 Route the "previous source" (that was switched by **any** control panel) to a destination, even if it is the same as the current source.

If you choose this behavior, select a destination in the destination drop-down list.

3 Route the "previous source" switched by **this** panel to a destination, even if it is the same as the current source.

If you choose this behavior, select a destination in the destination drop-down list.

4 Route a source to a destination.

If you choose this behavior, select a source and a destination in the two drop-down lists.

### **GPIO Summary**

The NV9641 has 4 relays that can switch on or off your external devices, based on (1) NV9641 input transitions and (2) events in the router control system.

Its 8 inputs can be switched on or off by your external devices. When an input transitions on or off, the NV9641 can respond with one of 4 actions, such as executing a salvo. (It is the system that actually executes the salvo.)



# 7 Technical Details

Chapter 7 provides electrical and mechanical specifications for the NV9641.

## Topics

<a href="#">Power Specifications</a> .....	79
<a href="#">NV9641 Specifications</a> .....	80
<a href="#">Environmental Specifications</a> .....	81
<a href="#">Defaults</a> .....	81
<a href="#">Drawings</a> .....	81

## Power Specifications

### NV9641 Power Specifications

Specification	Detail
DC power	External power supply: 12VDC $\pm$ 10%, 5 A.
Power consumption	11 W maximum, 6 W nominal.
Regulatory	UL listed and CE compliant.

### Power Supply Specifications

Specification	Detail
AC power	90–264 VAC (127–300 VDC), 47–447 Hz. Inrush current < 50 A at 230 VAC, cold start, at 25 °C, Input current < 2.0 A rms at 115 VAC; < 1.0 A at 230 VAC.
DC power	$\leq$ 60 W, 12VDC, 5 A (5.4 A peak), Regulation $\pm$ 2%. Ripple $\leq$ 120 mV.
Efficiency	Efficiency > 80% at full load typical, 115 VAC.
Weight	1.06 lb (0.48 kg).
Regulatory	UL listed and CE compliant.

The power supply is an Grass Valley PS0001-00:

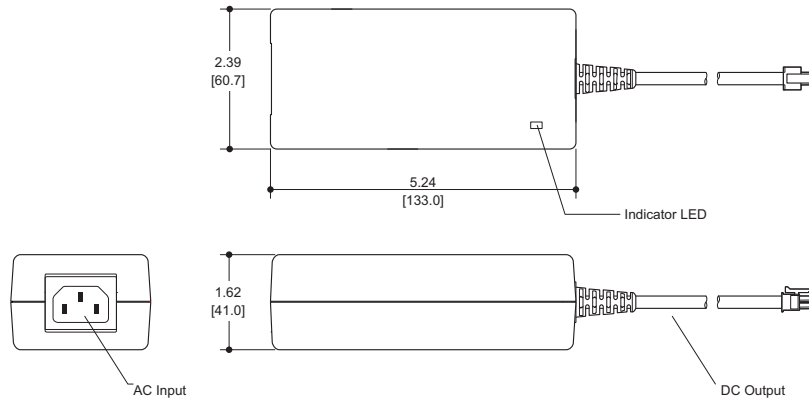


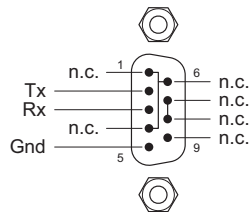
Fig. 7-1: The power output has Molex 4-pin plug. See [Power Cord Retention](#) on page 86.

## NV9641 Specifications

### NV9641 Physical Specifications

Specification	Detail
Dimensions	Height: 1.72 in (43.7 mm), fits EIA 1 RU (1.75 in or 44.5 mm), Width: 19.0 in (482.6 mm).
Depth	1.80 ± 0.01 in (45.7 mm), enclosure. 2.36 in (59.9 mm) overall.
Power	≤ 11 W max at 120VAC; 6W nominal.
Weight	2.59 lb (1.177 kg)
Connectors	Power: 2 connectors, Molex 4-pin, keyed. Ethernet: 1 connector, 10/100BaseT, RJ-45 jack. RS-232: 1 connector, 9-pin D type, for diagnostics and upgrades. GPIO: DB25.
Tally Interface (GPIO)	Input: ≤ 5 VDC continuous; ≤ 48 VDC for less than 5 seconds; 1.2 mA when on. Output: ≤ 150 mA; ≤ 200 VAC.
Grounding terminal	None.

The RS-232 connector has this pinout:



Pins 1, 4, and 6 are tied together and pins 7 and 8 are tied together. None of those pins are connected to any circuitry.

# Environmental Specifications

## NV9641 Environmental Specifications

Specification	Detail
Operating temperature	0–40°C, ambient.
Relative humidity	0 to 90%, non-condensing.
Cooling	No fan required.

# Defaults

## Initial Panel State

Multi-destination mode or X-Y mode, selectable.  
 Destination: the configured default.  
 Buttons: high-tally is maximum brightness; low-tally is low brightness.

## Configuration Page

The initial configuration page for a new NV9641 configuration provides 8 selection buttons (recommended), an XY/MD mode selection button, an X-Y Display button, and a take button.



The default panel options are:

- Panel mode: Multi-destination.
- Release mode: Normal.
- Default destination: None.
- XY Data Routing: Automatic.
- MD Data Routing: Automatic.
- Default name set: System names.
- Multidest Device Limit: 8.
- Src/Dst Immediate Take: Enabled.
- All other options: Disabled (check boxes clear).

The tally inputs and outputs are initially undefined.

## DHCP

The panel is set up to respond to DHCP from the factory. It is possible to assign the panel a fixed IP address using the Panel IP Configuration Utility.

# Drawings

The drawings on the following pages identify features and provide overall and critical dimensions.

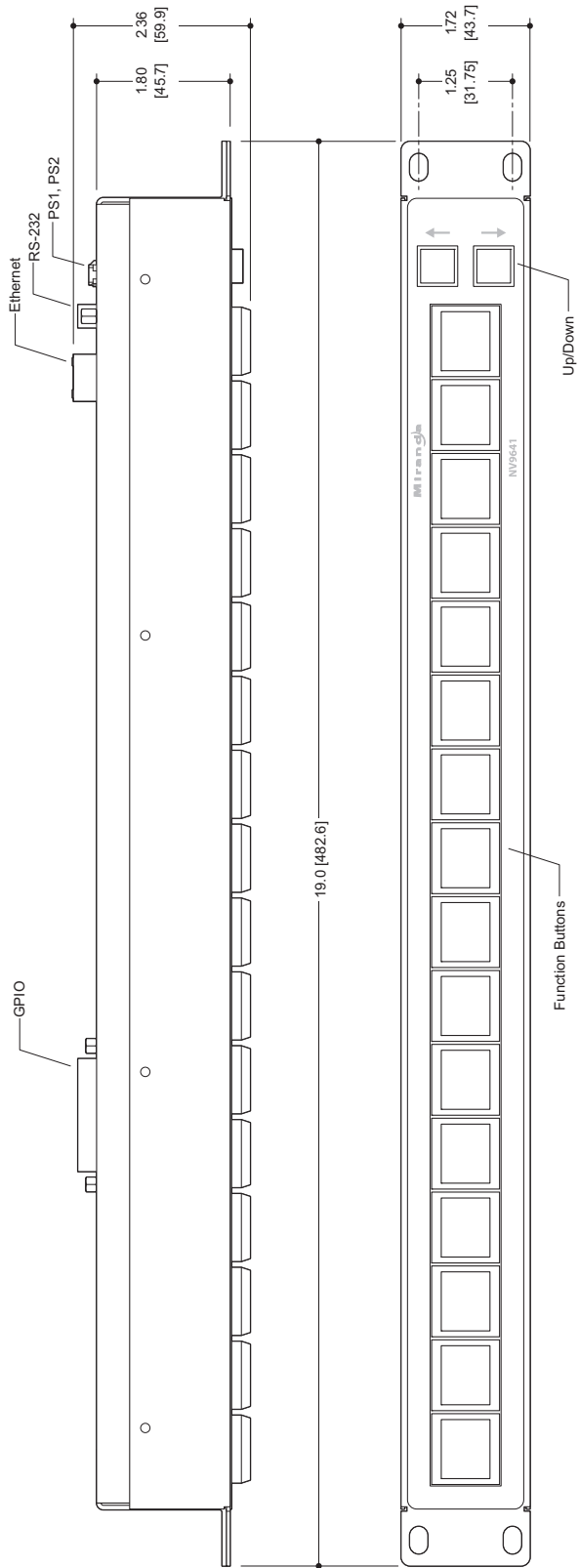


Fig. 7-2: Front and Top Views of the NV9641

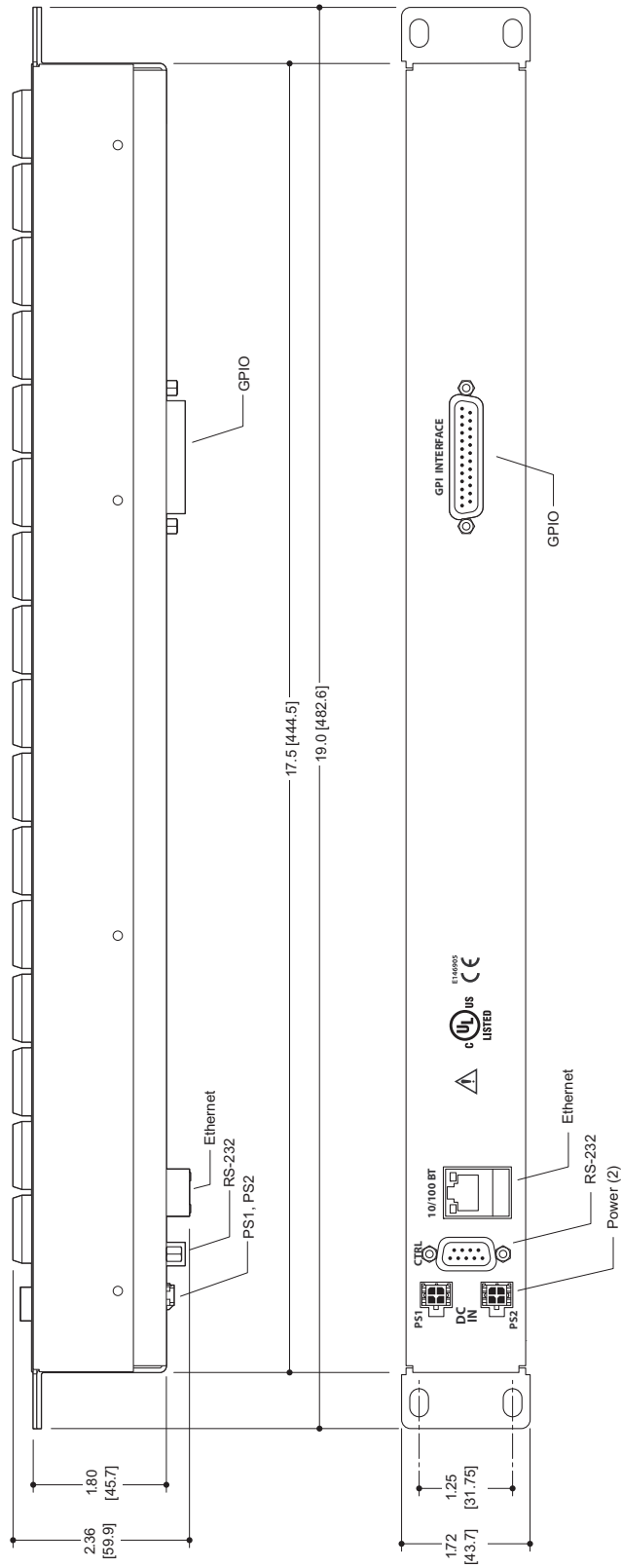


Fig. 7-3: Rear and Top Views of the NV9641



# 8

## Misc. Topics

Chapter 8 provides the following.

### Topics

<a href="#">LCD Buttons</a> .....	85
<a href="#">Scroll Button Legends</a> .....	85
<a href="#">Power Cord Retention</a> .....	86
<a href="#">Ordering Information</a> .....	87

## LCD Buttons

The 16 LCD buttons have 3 lines of text, 8 characters each. The buttons can be of 7 colors in 4 brightness levels: high, medium, low, and off. "Off" is not quite black—you can read black text on the "off" background.

The following is an approximate representation of the button colors:

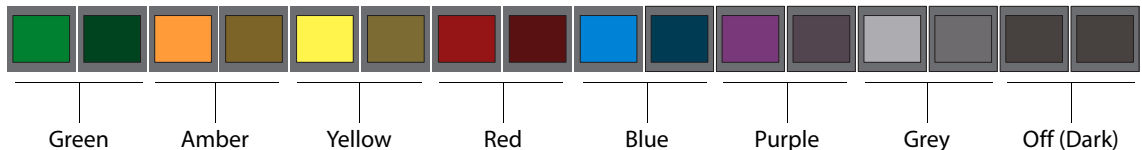


Fig. 8-1: Button Colors

The best way to view this illustration is on a computer monitor. A color printer cannot represent these colors nor can a black and white printer.

Each color is represented in Figure 8-1 as a (high-tally, low-tally) pair.

The colors of the up and down buttons are fixed. When they are off, they are white. When they are on, they are said to be "amber." This amber is not the same as for the LCD buttons: it is pale and almost yellow.

The buttons are 24.5 mm × 23.5 mm with the LCD portion about 20 mm × 16.5 mm. The button legend appears in a 64 × 32 pixel matrix.

## Scroll Button Legends

You can create legends for the two up/down scroll buttons. Use a desktop publishing program to create your own button legends. The legends should be transparent and no larger than 0.40" × 0.40" (10 mm square). A 3/8" (9.5 mm) square insert will allow a little clearance.

The clear plastic material used for overhead transparencies is suitable for printing legends.

To apply a label to a button, pull the clear plastic cap from the button, insert the label in the cap, and replace the cap. The caps come off easily. No tools are required. We recommend that you not use adhesive.

## Power Cord Retention

Use the supplied retention strap to keep the AC power cord firmly connected to the power supply. Follow these steps to use the strap:

- 1 Firmly insert the AC power cord into the power supply. Examine the last figure in this section to see how the strap should be applied.
- 2 Placed the Velcro retention strap, fuzzy side up, on top of the power supply with the buckle loop approximately 1 inch from the AC input side and the remaining strap around the cord end and down:



- 3 Holding the buckle in place, lift the strap up and around the cord end so the strap overlaps itself:



- 4 Holding the buckle loop in place, route the strap around the back of the supply diagonally across so that it sticks out on the left below the output cord:



- 5 Continue the strap around toward the buckle loop and through the loop. Cinch the strap tightly. While keeping tension, place the 2 inch strap end (with Velcro loops) down on the fuzzy part to complete the process:





- 6 Examine the strap though its path around the cord and power supply. Be sure that no slack exists and that it is tight the full length of the strap. If necessary, adjust and cinch it more tightly.

## Ordering Information

These are the NV9641 components:

PS0001	12V power supply, 4-pin Molex connector, with cord, and cord retention strap.
NV9641	NV9000 control panel. 16 button, 1RU, XY/MD/paging, hierarchical.
WC0053	Optional breakout cable for the tally interface



# G

## Glossary

<b>AES/EBU</b>	(Audio Engineering Society/European Broadcasting Union). AES and EBU are standards organizations.
<b>Breakaway</b>	Selecting a subset of virtual levels for a route.
<b>Category</b>	A category represents a set of devices. (The concept of categories exists to make it easier to select devices at a control panel.) A category can contain sources, destinations, or devices that are both sources and destinations. Each device in the category has a unique selection index within that category. Each category has a mnemonic ID associated with it.
<b>Data Routing</b>	Data routing (a.k.a., machine control routing) is a bidirectional form of routing. Routes are characterized by a controlling device and controlled device(s). The NV9641 provides certain data routing options including a 'Broadcast' button.
<b>Device</b>	A "device" is a grouping of input and output ports that define a logical entity. (The logical entity often represents a real device, but it does not have to be a real entity.) For example, a system might have 3 levels: video, AES, and time code. A hypothetical device in this system is Camera 1, which consists of video on input port 1 of the video router, AES on input port 5 of the AES router, and time code on input port 8 of the time code router.
<b>GPIO</b>	General Purpose Input and Output. A generic term for the NV9641's tally interface. The tally interface is called the "GPI Interface" at the rear of the NV9641.
<b>Level set</b>	A level set is a group of virtual levels that are commonly used together when switching devices. A level set also defines the mapping of each virtual level within the level set to a single physical level. All levels in a level set have a unique display index within that level set.
<b>Multi-Destination (Mode)</b>	A mode on an NV9000 control panel that presents many destinations at once, in contrast to X-Y mode. An operator may route sources to multiple destinations in a single take. Multi-destination mode does not permit the selection of breakaway levels.
<b>Operator</b>	The term operator (a.k.a. user) usually refers to users other than the system administrator or configurator. An operator is responsible for making the routes.
<b>Physical Level</b>	Multiple routers provide different "physical levels" on which to switch the signals of devices. Any particular device might send or receive HD, SD, AES, time-code, or machine-code signals.
<b>PIN</b>	The system administrator may create a single "super user" personal identification number (PIN) that functions as a passcode. A PIN is 4–6 digits in length. The PIN allows certain operators to perform functions such as (1) forced release on a control panel that is configured for normal release or (2) changing the ID of a control panel.
<b>Port</b>	A port is the physical connection on a router. A port can only be an input port or an output port.
<b>Salvo</b>	A salvo is a stored group of commands that can be recalled and executed at a NV9000 control panel.
<b>Source/ Destination</b>	The term "source device" is used interchangeably with "source" and the term "destination device" is used interchangeably with "destination." A source is a device that is connected to one or more input ports. A destination is a device that is connected to one or more output ports. An example of such a device would be a monitor.

## Glossary

---

	A device can be both a source and destination. An example of such a device is a VTR.
<b>System administrator</b>	The system administrator is the person responsible for installing, configuring, and maintaining a router control system.
<b>Tally</b>	(1) High or low button illumination. (2) Tally interface <i>to be defined</i> .
<b>Virtual level</b>	Virtual levels allow the system administrator to define a single physical router level as multiple levels. Within a physical level, any port can be mapped to any virtual level. For example, an AES matrix could be divided into AES 1/2 and AES 3/4 <i>virtual</i> levels.
<b>X-Y (mode)</b>	A mode on a control NV9000 control panel that switches one destination at a time, in contrast to multi-destination mode. In X-Y mode, some panels can display the virtual levels for the selected destination. Operators using those panels can perform breakaway level selection and level mapping.

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