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A **BELDEN** BRAND

NV9640

NV9000 CONTROL PANEL

User's Guide

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Electrostatic Discharge (ESD) Protection



Electrostatic discharge occurs when electronic components are improperly handled and can result in intermittent failure or complete damage adversely affecting an electrical circuit. When you remove and replace any card from a frame always follow ESD-prevention procedures:

- Ensure that the frame is electrically connected to earth ground through the power cord or any other means if available.
- Wear an ESD wrist strap ensuring that it makes good skin contact. Connect the grounding clip to an *unpainted surface* of the chassis frame to safely ground unwanted ESD voltages. If no wrist strap is available, ground yourself by touching the *unpainted* metal part of the chassis.
- For safety, periodically check the resistance value of the antistatic strap, which should be between 1 and 10 megohms.
- When temporarily storing a card make sure it is placed in an ESD bag.
- Cards in an earth grounded metal frame or casing do not require any special ESD protection.

Cautions for LCD and TFT Displays



Excessive usage may harm your vision. Rest for 10 minutes for every 30 minutes of usage.

If the LCD or TFT glass is broken, handle glass fragments with care when disposing of them. If any fluid leaks out of a damaged glass cell, be careful not to get the liquid crystal fluid in your mouth or skin. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all times.

Protection contre les décharges électrostatiques (DES)



Une décharge électrostatique peut se produire lorsque des composants électroniques ne sont pas manipulés de manière adéquate, ce qui peut entraîner des défaillances intermittentes ou endommager irrémédiablement un circuit électrique. Au moment de remplacer une carte dans un châssis, prenez toujours les mesures de protection antistatique appropriées :

- Assurez-vous que le châssis est relié électriquement à la terre par le cordon d'alimentation ou tout autre moyen disponible.
- Portez un bracelet antistatique et assurez-vous qu'il est bien en contact avec la peau. Connectez la pince de masse à une *surface non peinte* du châssis pour détourner à la terre toute tension électrostatique indésirable. En l'absence de bracelet antistatique, déchargez l'électricité statique de votre corps en touchant une surface métallique *non peinte* du châssis.
- Pour plus de sécurité, vérifiez périodiquement la valeur de résistance du bracelet antistatique. Elle doit se situer entre 1 et 10 mégohms.
- Si vous devez mettre une carte de côté, assurez-vous de la ranger dans un sac protecteur antistatique.

- Les cartes qui sont reliées à un châssis ou boîtier métallique mis à la terre ne nécessitent pas de protection antistatique spéciale.

Précautions pour les écrans LCD et TFT



Regarder l'écran pendant une trop longue période de temps peut nuire à votre vision. Prenez une pause de 10 minutes, après 30 minutes d'utilisation.

Si l'écran LCD ou TFT est brisé, manipulez les fragments de verre avec précaution au moment de vous en débarrasser. veillez à ce que le cristal liquide n'entre pas en contact avec la peau ou la bouche. En cas de contact avec la peau ou les vêtements, laver immédiatement à l'eau savonneuse. Ne jamais ingérer le liquide. La toxicité est extrêmement faible, mais la prudence demeure de mise en tout temps.

Recycling

Visit www.grassvalley.com for recycling information.

Certification and Compliance

Safety Compliance



c

This equipment complies with the requirements of CSA/UL/IEC/EN 60950-1, 2nd Ed. + AM1, Safety of information technology equipment.

us The power cords supplied with this equipment meet the appropriate national standards for the country of destination.

Electromagnetic Compatibility



This equipment has been tested for verification of compliance with FCC Part 15, Subpart B requirements for class A digital devices.

Note: 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.



This equipment has been tested and found to comply with the requirements of the EMC directive 2004/108/EC:

- EN 55022 Class A Radiated and conducted emissions
- EN 61000-3-2 Limits for harmonic current emissions
- EN 61000-3-3 Limitation of voltage fluctuations and flicker

- EN 61000-4-2 Electrostatic discharge immunity
- EN 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity
- EN 61000-4-4 Electrical fast transient immunity
- EN 61000-4-5 Surge transient immunity
- EN 61000-4-6 Conducted disturbances immunity
- EN 61000-4-8 Power frequency magnetic field immunity
- EN 61000-4-11 Voltage dips, short interruptions and voltage variations immunity

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Preface

Chapter 1 is an introduction to the NV9640 User's Guide.

Summary

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Chapter Structure

The following chapters provide detailed information regarding the NV9640 control panel:

- Chapter 1, [Preface](#), (this chapter) outlines ways to use this guide.
- Chapter 2, [Introduction](#), provides a functional description of the NV9640.
- 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.

Note:

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

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 ▲ 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 NV9640 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 NV9640.

Summary

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Summary

The NV9640¹ is a hierarchical control panel featuring 30 LCD function buttons (illuminated in various colors and having 1 to 3 lines of text) and a small vacuum fluorescent display having 8 lines of 42 characters. It can operate in X-Y mode or in multi-destination (MD) mode. Operators can switch between modes at any time.

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



Fig. 2-1: NV9640 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: NV9640 Rear

1. An equivalent NV9640V—a GUI that is called a “virtual panel”—is available. It emulates the NV9640.

The NV9640 provides a *tree-structured* (or hierarchical) button layout. Configurers can define a “tree” of button pages in such a way that each of the 30 LCD buttons 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 30 button functions at any particular place in the tree.

Configurers will use ‘Navigate’ buttons to create new button pages (subtrees). During operation, NV9640 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 panel can also display predefined button pages. For instance, a “category” button, when pressed, will display one or more pages of sources or destinations through which the operator may browse. A “menu” button presents a page of menu options.

Panel Organization

Function Buttons

The NV9640 has an array of 30 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 89](#), for a color chart.

Although you can see a list of the pages in the tree during configuration, the structure of the tree is not evident on the panel itself. The panel operator must commit the tree structure to memory to be able to use the panel. It is up to the person configuring the panel to design a usable tree 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, ‘Page Up’ and ‘Page Down’ buttons remain unlit until there is an opportunity to scroll up or down, respectively. By default, 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, the panel displays viewable data 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. (They *must* do so if the operator is to make such selections.)

Scrolling is necessary when a list of items—for instance, source devices—exceeds the number of buttons available for the items. The panel adds 'Forward' and 'Back' buttons as necessary. Panels that use multi-destination mode will probably require 'Page Up' and 'Page Down' buttons.

Alphanumeric Display

The 8×42 alphanumeric display provides real-time feedback for the operators as they press buttons to execute takes and other operations. The panel functions in two modes: X-Y or multi-destination. The display changes according to the mode:

	Preset	Status	Level/Dest
X - Y	-----	-----	HD
Dest		CAM--1	SD
VTR 1		CAM--1	AUDIO 1
		+CAM--1	AUDIO 2
		+CAM--1	AUDIO 3
		+CAM--1	AUDIO 4
	-----	-----	TIMECODE
Page 1			

X-Y mode

	Preset	Status	Level/Dest
MultiDest		CAM--1	VTR--1
		CAM--1	VTR--2
		CAM--1	VTR--3
		CAM--1	VTR--4
		CAM--1	VTR--5
		CAM--1	VTR--6
		CAM--1	VTR--7
		CAM--1	VTR--8
Page 1			

Multi-destination mode

In either case, the display has 8 lines. Operators might need to scroll the display to see additional information. ('Page Up' and 'Page Down' buttons can be used to scroll the display.)

Display Fields

The display has 4 columns:

- Level/Dest.

In X-Y mode, this column identifies the levels of the currently selected destination. That destination is identified in the information column. In the illustration above, 'VTR 1' was selected. Operators might need to scroll to see or select a level.

In MD mode, the 'Level/Dest' column presents all the MD destinations defined in the NV9640 configuration. (Actual destinations are defined in the configuration of the system controller.) Operators might need to scroll to see or select a destination.

- Status.

The status column indicates what source was routed to the destination.

In X-Y mode, the status column represents the levels of a source or the levels of multiple sources under breakaway. These are called the *current source(s)*. The presence of '-----' in the status or preset columns means that that particular level is not defined for the destination. Therefore, no source selection for that level is possible. The illustration above shows that levels HD and 'TimeCode' are not defined for VTR 1.

In MD mode, the status column represents the sources routed to each of the destinations in the 'Level/Dest' column. Again, these are the *current sources*.

- Preset.

The preset column indicates what source will be routed to a destination when the operator presses the 'Take' button.

In X-Y mode, the preset column represents the levels of a source or the levels of multiple sources under breakaway. These are called the *preset source(s)*. After the take, they disappear from the preset column and re-appear in the status column, reflecting that the preset sources have now become current sources.

In MD mode, the preset column indicates the sources that will be routed to selected destinations in the 'Level/Dest' column. These are the *preset source(s)*. After the take, they disappear from the preset column and re-appear in the status column, reflecting that the preset sources have now become current sources.

- Information (not labeled).

The first entry in this column is "X - Y" or "MultiDest" unless you have entered salvo mode, menu mode, or setup mode. See chapter 5 for those topics.

The bottom-most entry in this column is always the page number of the display.

In X-Y mode, the second entry is always the word "Dest" as a title for the third entry which identifies the current destination. In the preceding illustration, the current destination was VTR--1.

In MD mode, there are no entries in this column other than "MultiDest" and the page number.

The display fields can show either names from a name set or system mnemonics for devices depending on (1) the state of the 'Name Set Toggle' button (if the panel has one), (2) the default name set (3) the existence of name sets in the NV9000 configuration. (An alias is a name defined in a name set.)

Flags

The display also shows flags of different kinds next to the sources and destinations.

Selection Marks

At the far right of the display are marks (3 small bars) that turn on to indicate selections.

In X-Y mode, the marks turn on to indicate that a level is selected and are not visible otherwise. (The operator makes level selections in the button array.)

In MD mode, a mark appears to the right of the currently selected destination (and of all the currently selection destinations in hold mode).

Other Signs

A plus sign (+) indicates that additional information is available. There is an 'Info' button that operators may press to view the additional information.

In MD mode, an asterisk (*) directly after a source indicates a breakaway on that destination.

An 'L' indicates that a device has been locked. A 'P' indicates that a device has been protected. NV9640 operators may lock, protect or release destinations. It is important for operators to know that other operators may lock, protect, or release sources and destinations.

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 NV9000 control system.

During configuration, you can prescribe NV9640 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 77](#), for complete detail.

Modes of Operation

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.
- 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 using selection buttons, choose a source, and repeat for all desired routes. Then press 'Take'. Takes are "all level," and breakaways cannot be performed.
 - ▲ A 'Hold' button allows you to select many MD destinations at once.
- 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 NV9640. It can be combined with the other two modes. You can create many different forms of "single-destination" mode.

To understand single-destination mode, you must understand the different button types. Please read the Configuration and Operation chapters and then see [Single-Destination Mode](#) (page 39).

The secondary modes of panel operation are:

- Setup mode—where the NV9640 is freshly powered up, but disconnected from the network. In this mode, you can preset the NV9640'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.)

- Menu mode—pressing a Menu button places the NV9640 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 62](#).
- 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 64](#).

Other NV9640 Functions

The NV9640 can be configured to perform the following additional functions:

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

The NV9640 provides the following additional features:

- The NV9640 supports multiple-level breakaways in X-Y mode. This lets you route multiple sources to the same destination *on different levels*.
- The panel supports gang or dub switching in multi-destination mode.
- Broadcast data routing in X-Y mode.
- Level mapping.
- Button page “templates”—global navigation templates and suffix templates—for easier configuration.

3 Installation

Chapter 3 provides installation and connection instructions.

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Package Contents

If you have ordered one or more NV9640 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.

Depending on your order, the NV9640 items that can ship include:

- One or more NV9640 control panels.
- One or two power supplies for each NV9640, with straps that secure the AC power cords to the power supplies.
- 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 NV9640 (including any system controllers, other 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.

Installation

Follow these steps to install a NV9640 control panel:

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

The NV9640 is designed to mount in a 19" rack. Rack-mounting 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 3.00" (76.2 mm) vertically and allow approximately 1/8" (3 mm) of movement horizontally.

- 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 NV9640.
- 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 83](#) for details on the PS0001 power supply. See also [Power Cord Retention](#) on [page 90](#).

- 4 Connect tally (GPIO) input devices and output devices at the DB25 GPI connector. You can use the optional WC0053 breakout cable to make these connections. See Chapter 6, [GPIO](#), on [page 77](#) 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 NV9640 control panel. Contact Grass Valley if you need to obtain the latest version of this NV9000 configuration software.

You may use the Panel IP Configuration Utility if you want to your NV9640 to have a static IP address or to use DHCP. The panel, as it comes from the factory, defaults to DHCP.

Initialization

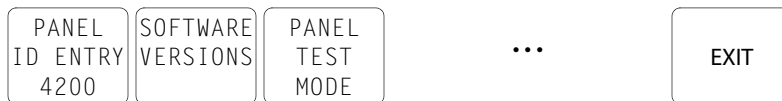
Before your system controller can communicate with an NV9640, you must give it a panel ID. Follow these steps for each NV9640 you are installing:

- 1 Power up the NV9640. Do not connect its Ethernet cable. (Disconnect it if it is connected.)

After a few seconds, the alphanumeric display will show 'Acquire IP Address' at the top and show the panel's current panel ID. The 2 left-most buttons and the right-most button in the top row now read:

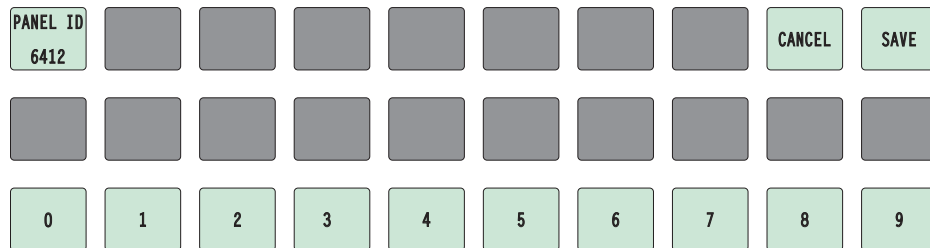


- 2 Press the 'Menu' button to enter the menu. The menu button now displays 'Exit'. At any time during this process, you can press the exit button to "back out of" the process. You might have to press it more than once.
- 3 Find and press 'Panel ID Entry' among the panel buttons on the left.



The 'Panel ID' button shows the current panel ID — in this example, it is 4200.

- 4 After you press 'Panel ID Entry', the panel illuminates 10 "digit" buttons on the bottom row of buttons. Press the digits of your intended panel ID in order — up to 8 digits. Then press the 'Save' button (on the right) to save the ID, or press the 'Cancel' button 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 (which reappears) 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 NV9640 configuration in NV9000-SE Utilities and upload the configuration to the NV9640. You need the panel ID to create a NV9640 configuration. When you upload the configuration, the panel ID you entered in NV9000-SE Utilities designates the actual panel to which the upload will occur. If no actual panel has that ID, the upload cannot occur.

Testing

As shown above in step 3, a panel test function is available when the NV9640 is disconnected from the system controller. Run the test to determine the health of your NV9640. See [Setup Mode](#) on [page 73](#) for detail. Press the 'Software Versions' button to review the versions of installed software and firmware.

These are points to consider after you install your NV9640 control panel(s):

- 1 Do the buttons illuminate? When an NV9640 powers up, its two leftmost LCD buttons are supposed to turn green. Does it pass the panel test mentioned above?
- 2 When the NV9640 powers up and it is connected to the system controller, it should initialize completely. (That takes a few seconds.) The NV9000 system should load whatever configuration exists for that panel and the buttons appropriate for that configuration should light in the colors appropriate for the top-level button page of that configuration.

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

- ▲ The NV9640, by default, acquires its IP address through DHCP on the system controller's panel/router network. 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 top left 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? With the typical noise levels in a facility, it can sometimes be difficult to tell. Use the 'System' pages of NV9000-SE Utilities to make the determination.
- 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? Is it useful? Can the operator perform tasks and perform other operations?

The design of an NV9640 "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 NV9640.

Summary

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Persons not interested in NV9640 configuration need not read this chapter.

Summary

The NV9640 has a “multi-page” user interface. Each of its 30 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 another set of functions). The set of button pages is not limited in size. Panel operators navigate to different button pages to perform different tasks.

We say that the user interface is tree-structured (or hierarchical) although it is not always a “tree” in the strictest sense. (You can construct a tree-like graph of the button pages.)

The NV9640, in addition, has an 8×42 alphanumeric display that presents the status of operations as they occur. An NV9640 panel should be configured with at least one ‘Page Up’ button and at least one ‘Page Down’ button with which the operator can scroll the display.

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

NV9000-SE Utilities is the software with which to configure the NV9640. Figure 4-1, following, shows the default NV9640 panel configuration page from NV9000-SE Utilities.

Adding a Panel to an NV9000 Configuration

You must create configurations for the NV9640 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:

Control Panels x

Panel ID Filter: Control Panel Name Filter: Panel Type Filter: User Filter: All

Panel ID	Panel	Panel Type	Configuration Name	User
6404	9640-4	NV9640	\\nvision\envy\usersys\live\prod 6404.640	EnvyUser

Edit Selected Control Panels **Add Control Panel** Delete Control Panel

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

Add Control Panel x

Type: NV9640

ID: 6408

Name: Demo640

User: EnvyUser

Configuration Options:

New, named: copied from: PROD 6403.640

Existing: PROD 6403.640

New (default), named: D640

Previous Next Finish Cancel Suffix Navigate

Choose "NV9640" from the 'Type' field. In the ID field, enter the panel ID you assigned to the panel while it was in setup mode. Give a name to the panel in the name field and select a user.

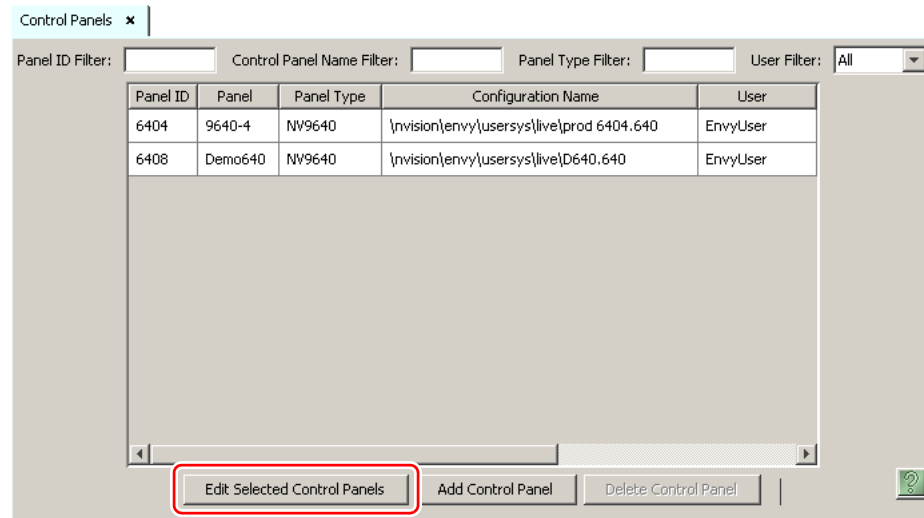
When you are creating a panel configuration you have 3 options. These options are presented in the 'Configuration Options' area:

- 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 NV9640 configuration file is .640. 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 41.

Return to the 'Control Panels' page to view your new entry. To edit an NV9640 configuration, either double-click its list entry or select the entry with a check in the checkbox and then click 'Edit Selected Control Panels':



You will then see the panel configuration page for the selected NV9640.

The following section of this guide discusses using the panel configuration page in which you configure an NV9640.

- ▲ 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 41.

NV9640 Panel Configuration Page

This is the default NV9640 panel configuration page in NV9000-SE Utilities:

The screenshot shows the NV9640 Panel Configuration Page. The window title is "Panel: C640 x". The main area is titled "Button Layout - NV9640 : C:\Documents and Settings\dougcox\CtrlSysConfigs\605C Doug\configs\C640.640". It features a grid of 8 rows and 8 columns of buttons. The first two rows are labeled "Multi-Destination Display" and "Click a line to edit". The buttons are labeled "Page Up", "Break Away", "Page Down", "Menu", "Take", and "Info".

Callouts on the left side of the image point to the following sections:

- Panel Image: Multi-Destination Section (points to the top-left grid area)
- Button Definition Section (points to the "Button Definitions" section)
- Button Page Table (points to the "Page Table" section)
- GPIO Definitions (points to the "Outputs" and "Inputs" sections)

Callouts on the right side of the image point to the following sections:

- Panel Image: Button Section (points to the top-right grid area)
- Panel Options (points to the "Panel Options" section)

The "Button Definitions" section includes fields for "Button Type" (Page Up), "Button Color" (Blue), and "Button Caption" (Page Up). The "Page Table" section contains a table with the following data:

Page Number	Page Name	Links to Page Num(s)
1	Default	
2	Breakaway	1

The "Panel Options" section includes various settings such as "Default Mode" (Multi-Destination Mode), "Release Mode" (Normal Release), "Default Destination" (None), "Preset Monitor" (None), "Status Monitor" (None), "XY Data Routing Mode" (Automatic), "MD Data Routing Mode" (Automatic), "Default Name Set" (System Name: 0), and "Multidest Device Limit" (8). There is also a "NOTE: Double click Page Down / Page up to show next / previous Multi-Destination Display page." and several checkboxes for advanced options like "User Programmable ID", "Save Preset Default", "Hold Preset Default", "Enable Destination Lock", "Enable Destination Protect", "Source Master Default", "Hide Sources not configured on this panel", "Deselect All Destinations and Turn Off Hold After Take", "Jump to Multidest Selection When Switching to XY", "Flip-Flop Source & Preset After Take", "Enable Force Release", "Jump Back After Source Selection", "Jump Back After Take", "Jump Back After Destination Selection", "Src/Dst Immediate Take", "Page VFD Only", and "Clear Preset Mapping". A "Clear Configuration" button is also present.

At the bottom of the page are two buttons: "Revert to Saved" and "Save".

Fig. 4-1: NV9640 Configuration Page (Default)

Similar pages exist for NV9640 suffix templates and for global navigation templates. See [Global Navigation](#) on page 41.

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 NV9640 panel.
On the right are 30 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. Double-clicking a 'Navigate' button, for instance, causes the button's "subpage" to appear.
Double-clicking a 'Page Up' or 'Page Down' button allows you to scroll through multi-destination pages that are represented in the image of the alphanumeric page.
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. Undefined buttons are dark and have no text.
- Button definitions.
In this section, configurers make button assignments, using its pull-down menus and text fields.
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. The button page at the top of the list (or root of the tree) is called "Default."
During operation, category buttons can display device subpages when pressed. Those subpages are not definable in NV9000-SE Utilities. The button page list 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.
See [Button Page List](#) on [page 35](#).
- GPIO definitions.
In this section, configurers may define GPIO logic. The control panel has a rear connector that provides 4 relay outputs and 8 optically isolated inputs. See [GPIO](#), [page 77](#), for more information. (Note that the graphical buttons represent *connector terminals* and not actual buttons.)
- Panel options.
In this section, configurers may specify the behavioral characteristics of the panel.

Configuration Tasks

The person configuring an NV9640 panel will want to consider how best to use the hierarchical nature of the button tree to support the devices and routers in the router control system at hand. The task is non-trivial.

In support of that effort, the configurer 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 and outputs.

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

The configurer must keep in mind that the operator generally cannot view the entire button tree at a glance.

The configurer 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 NV9640 to redisplay the *previous* page.
- Place a "Navigate" button on each page, where the navigate button causes the NV9640 to display a *specific* page.

▲ The operator can always return from system-generated pages (e.g., device lists) using the 'back' button.

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 recommend that you place exactly 8 selection buttons on a page and that they reference all display indexes.

Commitment Buttons

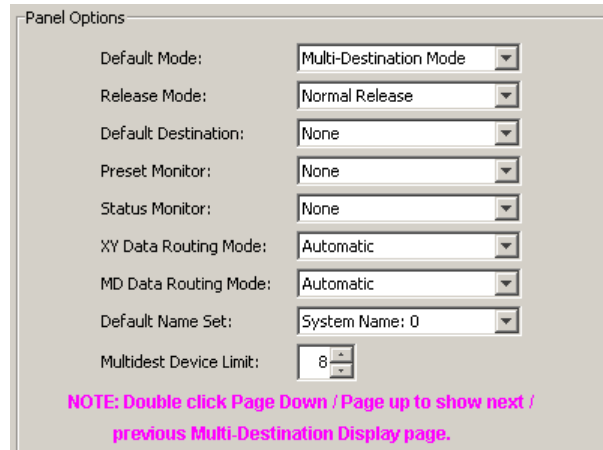
Two buttons at the bottom of the configuration page are self-explanatory and present on most configuration pages:

- 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 panel options section, at the right of the configuration page, has two parts: drop-down menus and checkbox options. These are the drop-down menus:



Panel Options

Default Mode: Multi-Destination Mode

Release Mode: Normal Release

Default Destination: None

Preset Monitor: None

Status Monitor: None

XY Data Routing Mode: Automatic

MD Data Routing Mode: Automatic

Default Name Set: System Name: 0

Multidest Device Limit: 8

NOTE: Double click Page Down / Page up to show next / previous Multi-Destination Display page.

The note in magenta text tells you how to scroll multi-destination pages (in the alphanumeric display) during configuration. Your configuration should have at least one 'Page Up' and 'Page Down' button if you wish to do this. A double-click is required. It is assumed that the configuration loaded in the NV9640 and available to operators will have the same 'Page Up' and 'Page Down' buttons.

The minimum number of destinations for multi-destination mode is 8. If you have the minimum, there is no need for scrolling during configuration. You may leave some (or all) MD destinations undefined. Scrolling is disabled unless you have chosen more than 8 destinations as the multi-destination device limit.

These are its drop-down menu options:

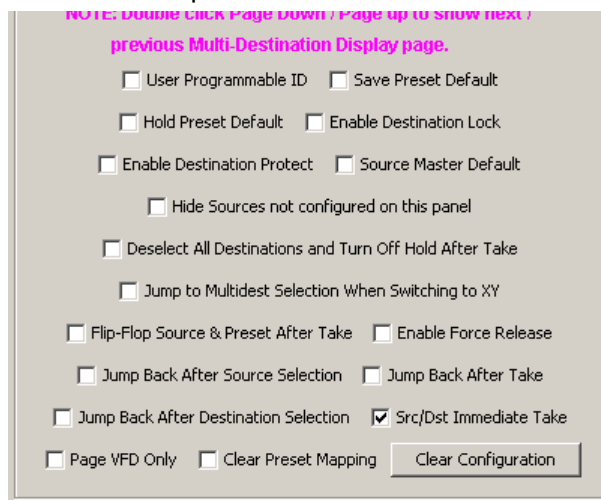
Default Mode	X-Y Mode	Starts the panel in XY mode after a reset. See Defaults on page 85.
	Multi-Dest Mode	Starts the panel in multi-destination mode after a reset.
Release Mode	Normal Release	This panel can release "locks" and "protects" set by the designated user (at this panel or any other panel).
	Force Release	This panel can release locks and protects set by any user.
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 does not 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, in the status column of the display, the source entry 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	If the control port is in use for the source or destination device, the system takes all (selected) levels except control. It does not 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. An operator can determine whether the control level is free by switching momentarily to X-Y mode and examining the destination's levels.

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 not choose 'System Name' if you are configuring any 'Name Set Toggle' buttons.
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.) (If the configuration has 8 MD destinations, MD scrolling is disabled.)

Checkbox Options

The checkbox options section is at the bottom of the panel options section:



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

By default, all the check box options are clear except 'Src/Dst Immediate Take'. That particular option is enabled by default.

The 'Clear Configuration' button removes **all** configuration data from the panel. The panel then has a blank configuration. If you click this button by mistake, you can regain the previously saved configuration by clicking the 'Revert to Saved' button.

The following items are the checkbox 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 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 machine control routers.)
"Source is master" is used for duplication, or broadcast routing, on a machine 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 level (machine control) 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.
- 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 NV9640 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 current destination when you switch from MD mode to X-Y mode.
 - ▲ The X-Y destination shown will be the default destination when the panel is in MD "hold" mode and multiple destinations are selected—if a default destination is specified in the configuration. Otherwise, no destination will be selected.
- Flip-flop source and preset after take.
Swaps the preset source and the currently routed source for this destination after a take.
- 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 'Src/Dst' button connects a source to a destination. When this box is checked (as it is in the default NV9640 configuration) the button performs an immediate take. When the box is clear, the button sets up the take and the operator must press a 'Take' button to complete the take.
- Page VFD only.
You can configure the panel so that when the operator presses 'Page Up' or 'Page Down', either the display (a vacuum fluorescent display or VFD) scrolls, the items on selection buttons scroll, or both the display and the items on the selection buttons scroll:

Scroll the VFD only	Check this option. Do not define a VFD/SEL Toggle button. The VFD scrolls 8 lines at a time.
Scroll either the VFD or the selection buttons	Leave the option unchecked and define at least one VFD/SEL Toggle button. The VFD scrolls 8 lines at a time. The selection buttons scroll modulo the number of selection buttons.
Scroll both at the same time	Leave the option unchecked and do not define a VFD/SEL Toggle button. Both the VFD and the selection buttons scroll 8 items at a time.
- Clear Preset Mapping.
If you check this box, all preset mappings (channels, or levels, mapped and tieline presets) clear at the beginning of each suffix button press.
If you clear this check box, all preset mappings are retained. Note that the most recently made tieline preset (if one was made) is retained even if the ultimately taken source does not require a tieline. The tieline is wasted.

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 NV9640 device list changes also.

The number and names of categories can also change over time and the NV9640 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 41](#).

Button Specification

The button definitions section has several controls:

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

- Button Type: Source/Destination (dropdown)
- Button Caption: Sample, Button, Text (three stacked text boxes)
- 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 local 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.
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 close-up shows the '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 local pages." When the operator presses a navigation button, its target page appears on the buttons. Any page can have multiple navigation 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 available through 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 not present for all 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 from button type to 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 41](#).

The Navigate button is a special case. It invoking an "Edit Navigate Button" dialog during configuration. See ['Edit Navigation Button' Dialog](#), on [page 32](#).

Button Types

Note that different subsets of these button types are available when you are defining a global suffix template or a global navigation template. See [Global Navigation](#) on [page 41](#).

These are the button types available for NV9640 configurations:

Type	Description
Back	<p>The 'Back' function places the predecessor of the current button page on the panel.</p> <p>The panel software can introduce a "back" button if an automatically generated list has more entries than can fit on a page.</p>
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 Broadcast Routes on page 68. See also the Source Master button, following.</p>
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.</p> <p>When you choose either 'Src Category' or 'Dst Category', the 'Use global suffix page to select devices' checkbox becomes enabled and a 'Suffix Page' drop-down menu appears. You can select a suffix template in the drop-down menu.</p> <p>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 Global Navigation on page 41 for further detail.</p> <p>The default button text will be the category name. You 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. We recommend you use this button because it is 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>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>

Type	Description
Destination Lock	<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, an "L" appears next to the destination in the display when it is locked. In X-Y mode, an "L" appears next to selected levels in the display when they are locked.</p>
Destination Protect	<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>Note: 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, a "P" appears next to the destination in the display when it is protected. In X-Y mode, a "P" appears next to selected levels in the display when they are protected.</p>
Free Source	<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>A 'Forward' displays and activates the next button page in an automatically generated sequence.</p> <p>There is no explicit 'Forward' button type; configurers cannot create forward buttons explicitly.</p>
Global Navigate	<p>A global navigation button is very much like a navigation button to the operator. However, during configuration, it selects a previously defined "global navigation" template. The template itself may have structure that ordinary button pages have. It can include any button type except additional global navigate buttons. See Global Navigation on page 41.</p>
Hold	<p>Toggles the panel in and out of "hold" mode. In multi-destination mode, hold mode retains destination selections after a take. In X-Y mode, hold mode retains breakaway levels after a take. (There are other effects. See Selection Buttons on page 36.)</p>
Information	<p>The information button displays auxiliary information about level mapping and perhaps other matters. The operator presses the information button once to see the information and again to hide the information.</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. The Level Map mode is cancelled when the next normal take is performed involving the selected destinations.</p>

Type	Description
Menu	<p>This button puts the NV9640 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.</p> <p>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 Menu Mode on page 70.</p>
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.</p> <p>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.</p> <p>(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 ‘Edit Navigation Button’ Dialog on page 32 for detail.</p>
Page Down	<p>Scrolls a list <i>down</i>. Lists include categories, source devices, and destination devices. Scrolling is necessary when the list exceeds the number of buttons available for the list.</p> <p>“Page Down’ also scrolls through multi-destination devices in multi-destination mode and through levels in X-Y mode.</p>
Page Up	<p>Scrolls a list <i>up</i>. Lists include categories, source devices, and destination devices. Scrolling is necessary when the list exceeds the number of buttons available for the the list.</p> <p>“Page Up’ also scrolls through multi-destination devices in multi-destination mode and through levels in X-Y mode.</p> <p>When the operator is displaying a list of devices from a category, the ‘Page Up’ button will return the operator to the page containing the category button.</p>
Panel Lock	<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>

Type	Description
Preset Release	Removes locks and protects from preset source devices. This button is not needed if source locks and protects are not used in your system.
Previous Source	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. The button does not restore the previous destination. If the user changed the destination and presses 'Previous Source', the take will not restore the previous route.
Quick Source	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. The 'None' entry is merely a placeholder. Do not choose 'None'.
Salvo	Executes a salvo. When you assign a Salvo button, a drop-down list appears in which you select a system salvo. The 'None' entry is merely a placeholder. Do not choose 'None'. (You can generate salvo buttons automatically in the 'Edit Navigation Button' dialog when you create a navigation button.) See 'Edit Navigation Button' Dialog on page 32.
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.

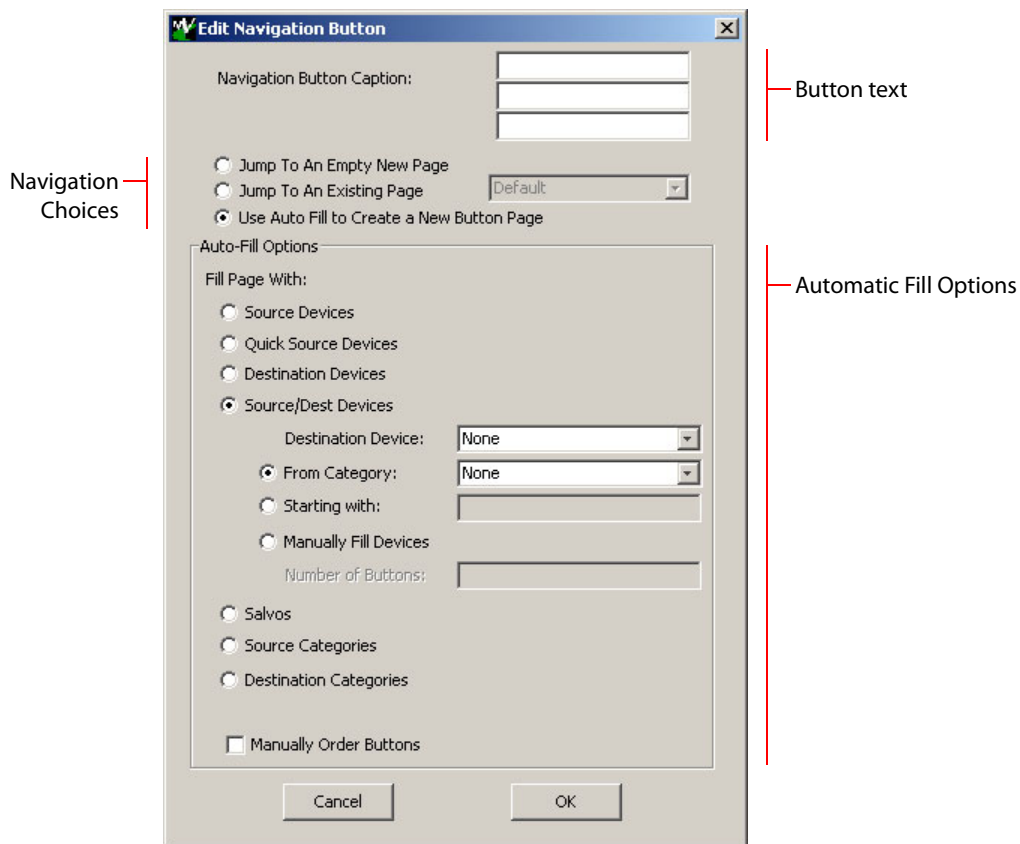
Type	Description
Selection	<p>Selection buttons have many functions, not the least of which is to give feedback (e.g., source and destination mnemonics) when the operator is performing takes.</p> <p>You should configure exactly 8 selection buttons (on any button page) if you want to support level selection in XY 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 'Page Up' and 'Page 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 'Page Up' and 'Page Down' buttons activate and the operator can scroll through the destinations.</p> <p>See Selection Buttons on page 36 for further detail.</p> <p>During configuration, when you assign a selection button, two additional drop-down menus appear: 'Display Index' and 'Multidst Device'.</p> <p>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 Panel Options 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>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>
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 Broadcast Routes on page 68.</p>

Type	Description
Source/ Destination	<p>A source/destination button selects both a source and a destination at one time.</p> <p>Source/destination buttons can be configured to perform immediate takes. (It is a NV9640 panel option.) If they are not so configured, the operator must also press a 'Take' button to effect a take.</p>
Take	<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>In most cases, configurers should provide the operator a 'Take' button.</p>
Undefined	<p>Makes the button undefined and inactive. On the actual panel, it will remain unlit (dark).</p>
VFD/SEL Toggle	<p>The button is toggle. In one state, it makes the display (VFD) scroll when the operator presses 'Page Up' or 'Page Down'. In the other state, it makes the items on selection buttons scroll. The selection buttons represent levels when the panel is in X-Y mode and represents destinations in MD mode. Thus, there are 3 scrolling options:</p> <ul style="list-style-type: none"> • Scroll the VFD only. The VFD scrolls 8 lines at a time. The selection buttons do not scroll. The panel option 'Page VFD Only' is checked and there is no 'VFD/SEL Toggle' button. See Panel Options on page 19. • Toggle between scrolling the VFD only and the selection buttons only. The VFD scrolls 8 lines at a time. The selection buttons scroll modulo the number of selection buttons. • Scroll the VFD and selection buttons at the same time. Both the VFD and the selection buttons scroll 8 items at a time. The panel option is unchecked and there is no 'VFD/SEL Toggle' button. <p>This button has no configuration options. The button legend is fixed. Depending on which state the button is in, it will read "Paging VFD" or "Paging Sel Buttons."</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 Level Grouping on page 52.</p> <p>The button has no effect in multi-destination mode.</p> <p>This button has no configuration options.</p>

Type	Description
Virtual Level Expand	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 Level Grouping on page 52. The button has no effect in multi-destination mode. This button has no configuration options.
XY/MD Mode	Switches the panel between X-Y mode and multi-destination mode. 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.

'Edit Navigation Button' Dialog

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 navigation choices:

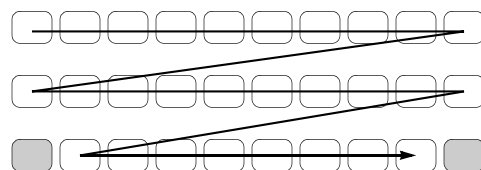
- Jump to an empty new page.
This option creates a new page in the button tree. During operation, the navigation button you are creating will cause the NV9640 to display, or jump to, that page. The name of the page and the button caption are what you type in the three lines for the button caption. You 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 option does **not** create a new page in the button tree. The navigation button you are creating will cause the NV9640 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.
NV9000-SE Utilities (SE) 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 | Salvo buttons |
| Destination buttons | Source category buttons |
| Source/destination buttons | Destination category buttons |
| Quick source buttons | |

Automatic fill has a "manually order buttons" option where you can reorder the list items as you wish. See [Automatic 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 29, SE places 28 items on a page where the bottom left button is a back button and the bottom right button is a "forward" button. The last page of the automatic fill will not have a forward button and might not be completely filled.

The fill occurs in left-to-right, top-down, order:



During operation, the navigation button will cause the NV9640 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 button page list.

Automatic Fill Options

- **Source Devices**

SE assigns sources to buttons in new button subpage(s). If it has too many sources 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.

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**

Automatic fill using destination devices is the same as for source devices, except that destination devices are chosen. In the case of manual fill, blank destination buttons are created.
- **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**

SE 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**

SE 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

buttons are labeled with the category names. You can edit the button captions. 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 re-positioned where the black line is when you release your mouse button.

Button Page List

This section is the region below the button definition section. It lists the pages of the button 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.

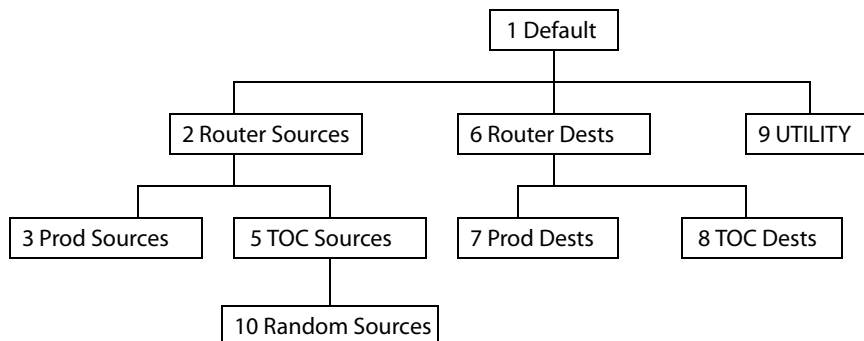
To delete a page or pages from the tree, select the pages in the button page list, right-click the list, and choose one of the deletion commands from the context menu that appears.

- ▲ 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 a button page list:

Page Number	Page Name	Links to Page Num(s)
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.

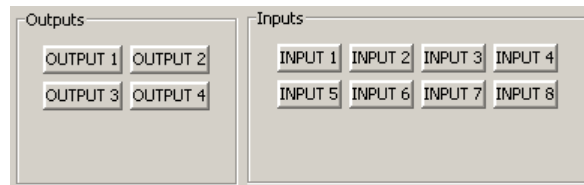
- ▲ Navigation buttons do not jump to global suffix pages or global navigation pages. Only global navigation buttons jump to global navigation pages; only category buttons jump to suffix pages. However, the operator will probably see no appreciable difference between the button types. See [Global Navigation](#) on [page 41](#).

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.)

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 NV9640 has no actual tally buttons. These buttons represent the 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 77](#).

Selection Buttons

Selection buttons have many functions, not the least of which is to provide feedback (e.g., source and destination mnemonics on the face of the buttons) when the operator is performing takes.

Selection buttons support level selection in XY mode and device selection in multi-destination mode.

You should configure at least one selection button (for feedback). You may configure as many selection buttons as are suitable for your system. For instance, if your system has a maximum of 12 levels for any device, it might make sense to have 12 selection buttons.

Operators can scroll through multiple pages of levels in X-Y mode and through multiple pages of devices in MD mode. There are 3 options for scrolling:

- 1 Scrolling the display only. The items on the selection buttons do not scroll.
When an operator scrolls the display *only*, it scrolls by 8 lines at a time.
- 2 Scrolling the selection buttons only. The items on the display do not scroll.
When an operator scrolls the selection buttons *only*, they scroll modulo the number of buttons. For instance, if there are 9 buttons, they scroll in groups of 9 items.
- 3 Scrolling both the display and the selection buttons at the same time. This behavior can occur only when the panel has no 'VFD/SEL Toggle' button.
When both the display and the selection buttons scroll, they scroll by 8 items, regardless of the number of selection buttons.

If the panel has a 'VFD/SEL Toggle' button, operators can switch between options 1 and 2. The button will read either "Paging VFD" or "Paging Sel Buttons."

Selection (of levels or MD devices) is affected by 'Hold' mode. (See the [Information](#) button, [page 27](#).) 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](#).

Selection Button Behavior

XY Mode

When the panel is in XY mode, a set of selection buttons presents a set of virtual levels. The levels displayed on the buttons 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 'Page Up' and 'Page 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 devices.

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 device is not selected.

(Perform MD destination population by clicking lines in the image of the display and scrolling when necessary. See [Multi-Destination Configuration](#) on [page 39](#).)

If there are more destinations than selection buttons, the operator can scroll through the destinations using 'Page Up' and 'Page Down' buttons. Including those buttons on the button page that has the selection is strongly recommended.

- ▲ Note that the maximum number of MD destinations is configured in multiples of 8, from 8 to 512.

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 display.

- ▲ 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 of your button pages. During configuration, when you assign a selection button, an additional drop-down menu appears: ‘Display Index’.

The drop-down menu for the button’s *display index* has exactly 8 entries—one for each line of the alphanumeric display.¹

The display index identifies one of the lines in the display. Assigning a display index to a selection button makes it correspond to the line of the display.

1. The term *display index* means something quite different on certain other panels such as the NV9641.

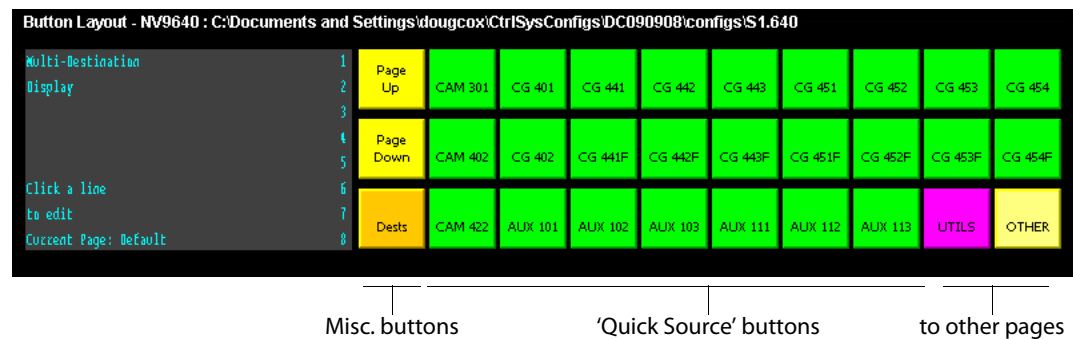
- ▲ The range of display indexes corresponds to the number of selection buttons, but the maximum range is 1–8. More than 8 selection buttons is useless.
- ▲ Unless you will always have fewer than 8 levels defined **and** 8 or fewer MD destinations defined, it is advisable to place exactly 8 selection buttons on your button page. It is obviously advisable to position the selection buttons in order on the button page.
- ▲ To review the virtual levels and their display indexes, go to the 'Level Sets' page in NV9000-SE Utilities and view any level set in your configuration.

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.

Single-destination mode is not a distinct mode. It can be blended with either of the other two modes. You can create many different forms of “single-destination” mode. This mode *need not have just one destination*.

The simplest form presents a group of “quick source” buttons. This illustration shows 25 quick source buttons, coupled with a few navigation buttons for (1) selecting a destination and (2) other functions:



If you configure a default destination in the panel options, all the quick sources could be taken to a (single) default destination with no need for destination selection.

Other more complex forms of “single-destination” mode are conceivable.

Multi-Destination Configuration

Multi-destination (MD) devices are a subset of all destination devices that the operator may use in the ways supported by MD mode. You can configure a panel to have from 8 to 512 MD destinations in increments of 8 destinations. Not all of those need be used. Those that are not used are considered “undefined.”

- ▲ It is possible to have duplicate entries in the MD destination set. For example, it might be useful to have one or two MD destinations available at all times.

Multi-destination configuration uses the display portion of the panel graphic in the panel configuration page. It also uses 'Page Up' and 'Page Down' buttons—also in the panel graphic—to select a group of MD destinations that will appear in the display. The display scrolls by 8 lines when you click a scroll button.

- ▲ You should make sure your configuration page shows a 'Page Up' and a 'Page Down' button if you intend to configure more than 8 MD destinations.

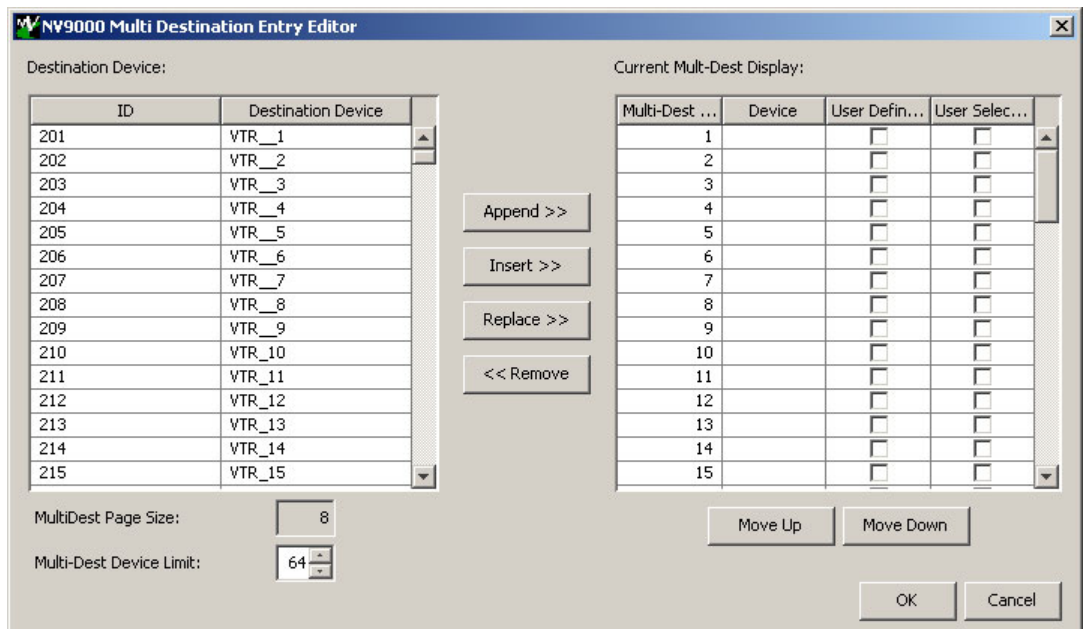
The limit to the number of MD devices is controlled by a panel option. If the limit is 64, for example, the display can scroll through 8 pages of 8 rows, regardless of whether these rows have been assigned a destination.

Initially the list of MD destinations is empty and all you will see in the display are numbered blank lines. After you assign MD destinations to the numbered lines, the destinations' mnemonics appears on those lines.

How to Configure MD Destinations

Follow these guidelines.

- 1 Click any line in the display. (A single click is all that is required.) A dialog appears. This is the multi-destination entry editor:



On the left is a list of *all* destinations defined in the NV9000 system. On the right is a table of the MD destinations you are defining. The number of rows in this table is equal to the maximum number of MD destinations your configuration allows.

To define an MD destination, select a destination on the left and copy it, using either the 'Append' button, the 'Insert' button, or the 'Replace' button, to the right.

The 'Append' button *appends* the selected destination to the end of your set of MD destinations.

The 'Insert' button places the selected destination immediately *above* whatever MD destination you have highlighted on the right.

The 'Replace' button *replaces* whatever MD destination you have highlighted on the right with the selected destination from the left.

The 'Remove' button *removes* highlighted MD destinations from the right.

At the bottom left, there is a scroll box in which you can adjust the maximum number of MD destinations. (The page size is indicated as fixed at 8 entries. You cannot change the page size.)

At the bottom right, are 'Move Up' and 'Move Down' buttons. You can use these to adjust the position in the list of any MD destination.

After you have finished configuring MD destinations, click OK (or cancel, if you want to discard your entries). The MD destinations you have configured now appear in the display section of the panel graphic. They will subsequently appear in the display of the panel when it is operating in MD mode.

You can edit the set of MD destinations later, adding or removing entries as you wish.

MD Destination Options

On the right side of the multi-destination entry editor, each MD destination has two checkboxes. One is in the 'User Definable' column and the other is in the 'User Selectable' column.

User-Definable

When the MD destination is "user definable," the operator may choose a different destination using the panel buttons. "User definable" is the default for all MD destinations. Uncheck the 'User Definable' box if you want to prevent the operator from changing this MD destination.

User-Selectable

When the MD destination is "user selectable," the operator may select it and assign a different source to it using the panel buttons. That is also the default for all MD destinations. Uncheck the 'User Selectable' box if you want to prevent the operator from taking a source to this destination.

Global Navigation

NV9000-SE Utilities supports what are known as "global navigation" pages for NV9640¹ 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 NV9640 configurations. Navigate templates support all functions except 'Global Navigate'. That is because templates cannot be nested.

Templates themselves are **not** NV9640 configurations.

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

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 NV9640. 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:

The screenshot shows a window titled "Control Panels" with a table of control panels. The table has columns for ID, Panel ID, Panel, Panel Type, and Configuration Name. Two rows are highlighted with red boxes: ID 14 (Nav1, NV9640 Navigation) and ID 16 (Sfx1, NV9640 Suffix). Red arrows point from the text "Navigation Template" and "Suffix Template" to the "Panel Type" column of these rows.

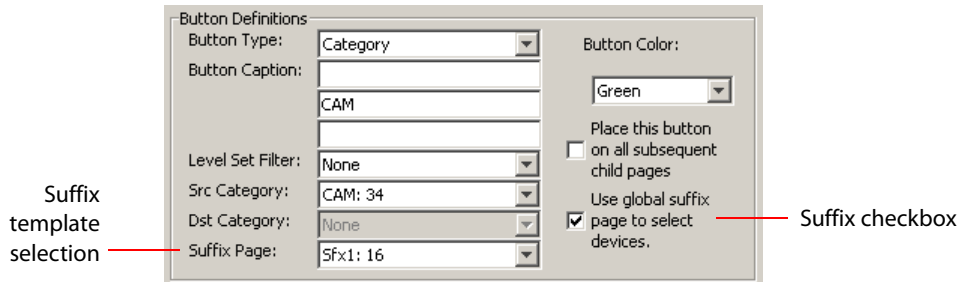
ID	Panel ID	Panel	Panel Type	Configuration Name
9	6414	6414	NV9641	\nvision\envy\usersys\live\6414.641
10	6408	Demo640	NV9640	\nvision\envy\usersys\live\D640.640
13	787	Single1	NV9640	\nvision\envy\usersys\live\S1.640
14	788	Nav1	NV9640 Navigation	\nvision\envy\usersys\live\Nav1.40.navigate
16	789	Sfx1	NV9640 Suffix	\nvision\envy\usersys\live\Sfx1.640.suffix

The words "Navigate" and "Suffix" appear in the 'Panel Type' and 'Configuration Name' columns.

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 additional '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 suffix in the category-suffix method used under NV9000 systems. The method "builds" device names as a category name concatenated with one or more suffixes. For example, the device name for suffix "114" in category VTR is "VTR114."

- ▲ There are different ways to join the category with the 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:

Button Definitions

Button Type: Global Navigate

Button Caption: Global

Navigation Btn: Nav1: 14

Button Color: Blue

Place this button on all subsequent child pages

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)

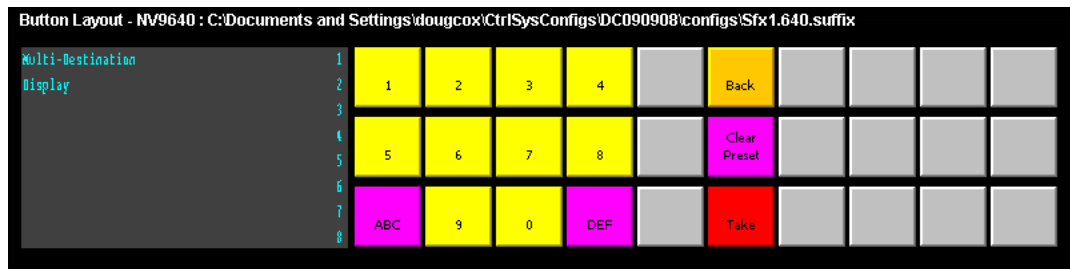
- ▲ The global navigation pages are copies made from the navigate template. They are not the template or a link to the template. The 'Global Navigate' buttons in the panel configuration that reference a navigate template do have links to their templates.

The global navigation template provides all the button types available for panel configurations except additional 'Global Navigate' buttons. Other than that, a global navigation page is functionally identical to any ordinary button 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 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. When the operator presses a numeral or a suffix, the numeral or suffix is appended to the mnemonic of the device being identified.

- ▲ 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.

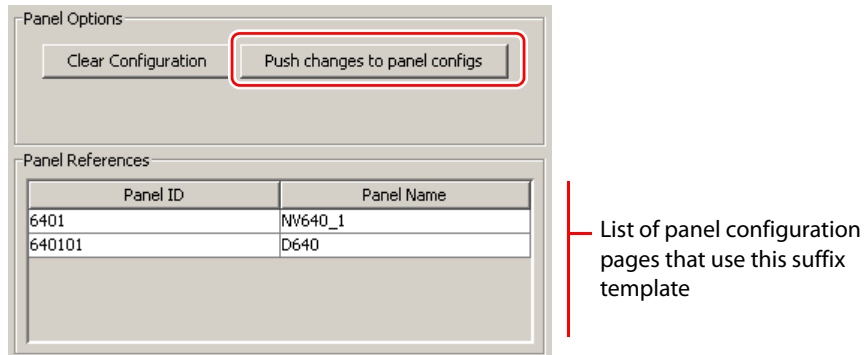
The operator can use a 'Clear Preset' button to cancel a mistaken entry and start over.

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 NV9640 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

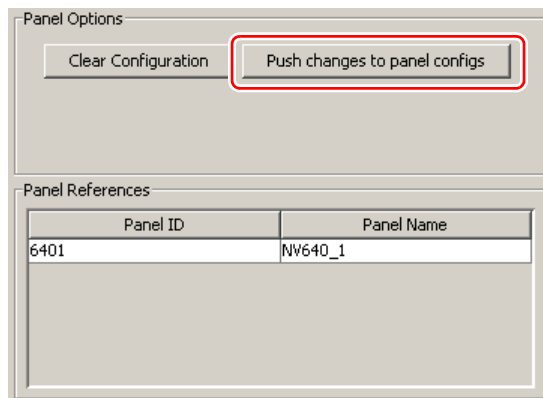
Composing a navigate template is not substantially different from composing panel configurations. The only difference is that navigate templates do not have 'Global Navigation' buttons.

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':



The screenshot shows a software interface with two main sections. The top section, titled 'Panel Options', contains two buttons: 'Clear Configuration' and 'Push changes to panel configs'. The 'Push changes to panel configs' button is highlighted with a red rectangular border. The bottom section, titled 'Panel References', contains a table with two columns: 'Panel ID' and 'Panel Name'. The table has one row with the values '6401' and 'NV640_1' respectively.

Panel ID	Panel Name
6401	NV640_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 NV9640.

Summary

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<i>Salvo Mode</i>	70
<i>Menu Mode</i>	70
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This chapter is intended specifically for the NV9640 panel **operator**.

Summary

As an NV9640 operator, you will be confronted initially with a relatively small panel—30 buttons of various colors and a small alphanumeric display. Because the NV9640 is a “hierarchical” control panel, 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—causes the panel to display different button “pages.”

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 structure.

The user interface of an NV9640 in one installation can be radically different from the user interface of an NV9640 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 some of 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.

The alphanumeric display (8 lines of 42 characters) shows the status of takes (pending or complete) in X-Y mode or multi-destination mode under normal circumstances. The display presents information or menu items as isolated cases warrant. You can scroll the display as necessary.

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.
- Virtual level buttons (in X-Y mode) or MD destination buttons (in MD mode).

- Status of preset and current sources and the selected destination(s).

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

- ▲ Please refer to the *NV9000-SE Utilities User's Guide* (or the NV9000-SE Utilities help files) if you are unfamiliar with the concepts used in this chapter.

Modes of Operation

The panel operates primarily in either "X-Y mode" or a "multi-destination mode." An XY/MD button can toggle between the modes. (The configurer can specify the default mode.)

The primary modes of operation are:

- X-Y mode—individual control of router *levels*. Choose a destination, optionally choose desired breakaway levels, choosing a source or sources, and press 'Take' to complete a desired route. Sources are taken only on selected levels.
- Multi-destination (MD) mode—lets you view and control multiple destinations. The button tree presents destination devices on selection buttons. You can scroll through the MD device list using 'Page Up' and 'Page 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.

- Single-destination mode—A single destination is defined during configuration. You have only to choose a (quick) source. The take is automatic when you are using quick sources.

Single-destination mode is not a distinct mode and actually need not involve only a single destination. It can be combined with X-Y mode or multi-destination mode.

Secondary modes are:

- Setup mode—where the NV9640 is freshly powered up, but *disconnected from the network*. In this mode, the configurer can preset the NV9640's panel ID and perform a few diagnostic tasks.

Usually, only configurers need be concerned with setup mode.

See [Setup Mode](#) on page 73.

- 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 NV9640 in "menu" mode. In menu mode, the LCD button array becomes a menu button panel that changes as needed during menu operation. Some menu data are presented on the alphanumeric display.
- 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 70.

Button Legends

There are many different button function types (about 32) and the legend that appears on any button varies with the type and depends on the configurer's intentions. 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 NV9640 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, a 'Take' button is disabled until you have a destination and a source selected. Then, the 'Take' button goes high tally (red, by default).

By default, category buttons show the category mnemonic and source buttons show the source device mnemonic. By default, destination buttons show the destination device mnemonic and salvo buttons show the salvo mnemonic.

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.

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 59.

If you have more levels than buttons, you can use 'Page Up' and 'Page Down' scroll buttons to view all the levels. (Those buttons are disabled when there is nothing to scroll.) There are 3 options for scrolling:

- Scrolling the display only. The items on the selection buttons do not scroll.
- Scrolling the selection buttons only. The items on the display do not scroll.
- Scrolling both the display and the selection buttons at the same time. This behavior can occur only when the panel has no 'VFD/SEL Toggle' button.

If the panel has a 'VFD/SEL Toggle' button, you can switch between options 1 and 2. The button will read either "Paging VFD" or "Paging Sel Buttons."

When you scroll the selection buttons, they scroll modulo the number of buttons. For instance, if there are 9 buttons, they scroll in groups of 9 items.

The display shows up to 8 levels at a time, as determined by the current destination:

	Preset	Status	Level/Dest
X - Y	-----	-----	HD
Dest	VTR--2	CAM--1	SD
VTR 1	VTR--2	CAM--1	AUDIO 1
	VTR--2	CAM--1	AUDIO 2
	VTR--2	CAM--1	AUDIO 3
	VTR--2	CAM--1	AUDIO 4
	-----	-----	TIMECODE
Page	1		

The display shows the current destination at the left. Here, it is VTR 1. The 3 columns show the preset source, current source, and the level names for the current destination, respectively.

The symbols at the very right of the display indicate whether a level is selected. Here, levels HD, audio 3, and timecode are **not** selected.

The recommended configuration has 8 selection buttons—each button matches a line in the display. It is possible for your panel to have more or fewer than 8 selection buttons on any particular button page.

In X-Y mode, the selection buttons represent levels. Each button displays 3 lines of text:



The *top* line of text identifies the current source and should be identical to the matching entry in the ‘Status’ column of the display. The *middle* line identifies the preset source and should be identical to the matching entry in the ‘Preset’ column of the display. If there is no ‘Take’ pending, the preset fields will be blank, both in the display and on the buttons. The *bottom* row of text shows a level for the current destination and should be identical to the matching entry in the ‘Level/Dest’ column of the display.

If the current destination had a breakaway, the sources will be different across the levels. 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 ‘HD’, and ‘Timecode’ here. (Audio 3 is available but not selected and is therefore low-tally.)

Level buttons for which there is no level defined remain blank. Lines in the display for which there is no level defined also remain blank.

Level Mapping

If a level was level-mapped, the display shows a plus sign next to the level name.

See [Level Map](#) on [page 59](#) for usage information.

Virtual Level Expand and Contract

If the levels for a particular device belong to a virtual level group, you can collapse the display of levels to its minimal possible representation (just the group names) or expand the display of the levels so that all individual levels are displayed.

Use the ‘Virtual Levels Contract’ button to collapse the list of levels. Use the ‘Virtual Levels Expand’ button to expand the list of levels.

See [Level Grouping](#) on [page 52](#).

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.

To assign a source to an MD destination, select the destination using a selection button and locate and press a source button. You might have to scroll the display to find the MD destination of interest. (In hold mode, you can assign a source to several MD destinations at once.)

In this example, the displays shows that two sources, CAM--4 and CAM--5, were preset to 2 destinations, VTR--2 and VTR--3, respectively:

	Preset	Status	Level/Dest
MultiDest		CAM--1	VTR--1
	CAM--4	CAM--2	VTR--2
	CAM--5	CAM--3	VTR--3
		CAM--4	VTR--4
		CAM--5	VTR--5
		CAM--6	VTR--6
		CAM--7	VTR--7
Page 1		CAM--8	VTR--8

The recommended configuration has 8 selection buttons—each button matches a line in the display. In MD mode, the selection buttons represent destinations in the MD destination set. It is possible for your panel to have more or fewer than 8 selection buttons on any particular button page.

Each button displays 3 lines of text:

CAM--1 VTR--1	CAM--2 CAM--4 VTR--2	CAM--3 CAM--5 VTR--3	CAM--4 VTR--4	CAM--5 VTR--5	CAM--6 VTR--6	CAM--7 VTR--7	CAM--8 VTR--8
------------------	----------------------------	----------------------------	------------------	------------------	------------------	------------------	------------------

The top line of text shows the current sources. The middle line of text shows the preset sources. The bottom line shows the destinations. If you scroll the display, the legends on the selection buttons change to match the 8 destinations shown in the display.

If an MD destination is undefined, it has no name on the display, and the matching button has is not illuminated and has no text.

After a take, the preset source becomes the current source. The preset column of the display becomes blank and the middle text rows of the selection buttons become blank.

Lists

The NV9640 can produce lists of devices, categories, and salvos automatically—on the buttons.

Lists of categories and salvos are generated statically—during configuration. Lists of sources and destinations can be generated dynamically—on-the-fly during operation—and might vary from day to day. Long lists (more than 28 items) are characterized by the presence of “Back” and “Forward” buttons in the list. You can move to the next set of entries in the list by pressing the forward button. Press the back button to go to the previous set. A final “back” returns to the page containing the button that displayed the list.

Levels or MD devices presented on the display are also list entries. To scroll through lists of levels or MD destinations, use the ‘Page Up’ and ‘Page Down’ buttons.

Operating Concepts

Status for most or all operations is presented on the alphanumeric display (and occasionally on certain buttons).

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 NV9000 recognizes its levels and which source devices are allowed to be routed to the destination and limits your selection to those sources.

Breakaway

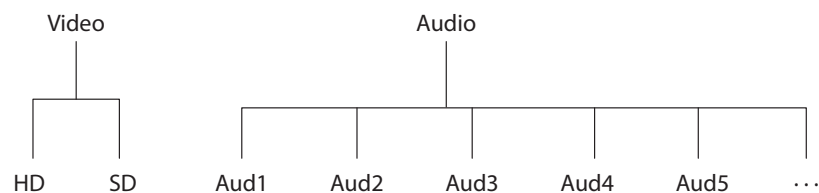
Routes can be all-level in which case they are taken on all levels defined for the destination. The acceptable sources for a route have the same levels as, or some configured mapping to, the levels of the destination.

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 NV9640, 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.

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.

NV9640 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 keypad, you can "construct" a device name. Each press of the keypad appends a digit or a suffix to the category name. The device name appears in the alphanumeric display as you construct it.

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 NV9640 has four classes of button functions:

- Dedicated functions, such as 'Default State', 'Chop' or 'Quick Source'.
- Variable functions, such as 'Category', 'Source', or 'Destination'. A category button identifies a specific category. A source button identifies a specific source. A destination button identifies a specific destination. A button page will usually contain more than one category, source, or destination button. Often, category lists, source lists, and destination lists span multiple pages.
- Special functions, such as 'Navigate', 'Global 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 panel either (1) displays a list of devices belonging to the category or (2) displays a "suffix page." See [Global Navigation](#) on [page 41](#). A device list, if it is long, spans more than one button page.

At present, there are 35 button types, not including "undefined" which is not a true button type:

Back	Hold	Quick Source
Broadcast	Information	Source is Master
Category	Level Map	Salvo
Chop	Menu	Save Preset
Clear Preset	Name Set Toggle	Selection Buttons
Default State	Navigate	Source
Destination	Page Down	Take
Destination Lock	Page Up	VFD/SEL Toggle
Destination Protect	Panel Lock	Virtual Level Expander
Free Source	Preset Release	Virtual Levels Contract
Global Navigate	Previous Source	XY/MD Mode
Forward	Source/Destination	

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.

A back button has no effect on the contents of the alphanumeric display.

See also [Forward](#).

Broadcast

A broadcast button applies to a data (or machine control) level only. 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 68](#) 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) causes the display of a category's device list or (2) displays a "suffix page." See [Global Navigation](#) on [page 41](#). A category button represents 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, the NV9640 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 NV9640 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, the NV9640 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 entered 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. However, it is possible for a suffix page to have fewer buttons.

Chop

When a "chop" function is supported by a router, the button is a toggle that enables and disables "chop." Chop is 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 removes all preset entries (while leaving the panel in the same mode).

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 NV9640 to its most recent power-up state. You may consider this button an emergency button or a "soft reset" button.

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

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

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, but static, pages or (2) as a result of pressing a destination category button, in which case, the destinations buttons are generated dynamically. In either case, you navigate through multiple pages by pressing the back and forward buttons.

The button text is normally the destination name, but the configurer can give it any text. Dynamically generated destination lists, however, use the device names defined in the NV9000 configuration.

Destination names are often created as a concatenation a category mnemonic with a device index.

▲ Note that an MD destination button is actually a selection button and is not a destination button.

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.

MD Mode

In MD mode, a locked destination has an "L" next to it when it appears in the display. When you select a locked MD destination with a button, the 'Destination Lock' button goes high-tally.

The 'Destination Lock' button text is normally "Dest Lock" and when a selected MD destination is locked, the button legend becomes "Dest Unlock."

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. A locked level has an "L" next to it when it appears in the display.

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.

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

See [Lock, Protect, and Release](#) on page 66.

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.

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, a protected destination has a "P" next to it when it appears in the display. 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 66.

Free Source

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

Use it as if it were a source.

(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

This button displays and activates the next button page of an automatically generated list.

A forward button is never high-tally. A forward button is generated by the system when the current page of a list has more than 28 or 29 elements. Otherwise, the list is at its last page and a forward button would do nothing. 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.

MD Mode

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 display reflects the selected destinations. The buttons for the selected destinations remain high-tally.

Without hold enabled, the panel has no destinations 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 change your mind and selected another source).

X-Y Mode

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.

Information

The 'Information' button presents auxiliary information on the alphanumeric display. Such information might be level-mapped sources.

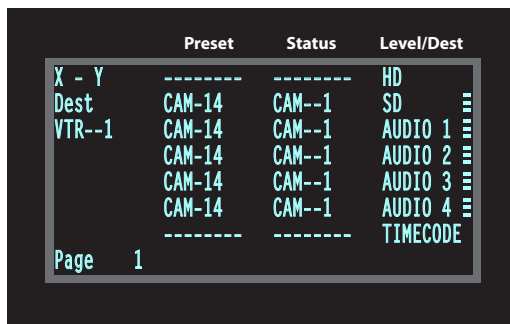
The default button text is "Info" but the button can have any legend.

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:

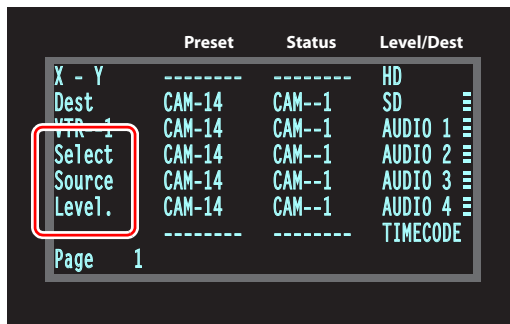
- 1 Select a source. Here, the source is CAM-14:



	Preset	Status	Level/Dest
X - Y	-----	-----	HD
Dest	CAM-14	CAM--1	SD
VTR--1	CAM-14	CAM--1	AUDIO 1
	CAM-14	CAM--1	AUDIO 2
	CAM-14	CAM--1	AUDIO 3
	CAM-14	CAM--1	AUDIO 4
	-----	-----	TIMECODE

Page 1

- 2 Press 'Level Map'. The button goes bright and the display tells you to "Select Source Level."

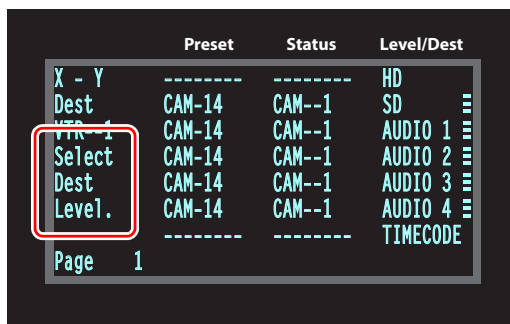


	Preset	Status	Level/Dest
X - Y	-----	-----	HD
Dest	CAM-14	CAM--1	SD
VTR--1	CAM-14	CAM--1	AUDIO 1
Select Source Level.	CAM-14	CAM--1	AUDIO 2
	CAM-14	CAM--1	AUDIO 3
	CAM-14	CAM--1	AUDIO 4
	-----	-----	TIMECODE

Page 1

Press a level button.

- 3 The display now says "Select Dest Level."

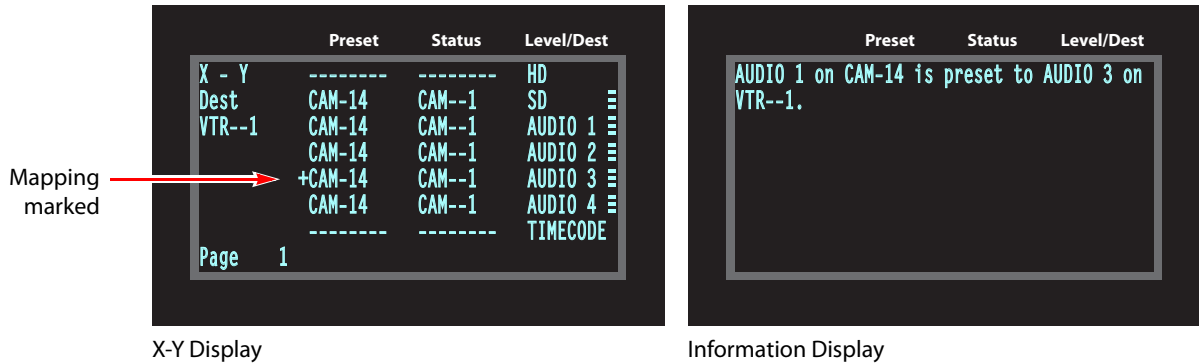


	Preset	Status	Level/Dest
X - Y	-----	-----	HD
Dest	CAM-14	CAM--1	SD
VTR--1	CAM-14	CAM--1	AUDIO 1
Select Dest Level.	CAM-14	CAM--1	AUDIO 2
	CAM-14	CAM--1	AUDIO 3
	CAM-14	CAM--1	AUDIO 4
	-----	-----	TIMECODE

Page 1

Press another level button.

- At this point, the level mapping is complete. The display shows a plus sign next to the level indicating that you can view details about the level using an 'Information' button:



After you view the information, press the 'Information' button again to return to the X-Y display.

- Finally, press 'Take'. After the take, the plus sign(s) migrate from the preset column to the status column with the rest of the source data. You can view the level mapping after the take.

You can create multiple level mappings. 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.

Menu

The button puts the NV9640 panel in menu mode and places a small 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 or you can view panel data. The LCD button text varies with context in menu mode.

See [Menu Mode](#) on [page 70](#) for more detail.

Name Set Toggle

A '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 configurer'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.

See the [Category](#) button type.

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

Page Down

This button scrolls a list of levels in X-Y mode or a list of MD devices in MD mode. There are 3 options for scrolling:

- Scrolling the display only. The items on the selection buttons do not scroll.
- Scrolling the selection buttons only. The items on the display do not scroll.
- Scrolling both the display and the selection buttons at the same time. This behavior can occur only when the panel has no 'VFD/SEL Toggle' button.

If the panel has a 'VFD/SEL Toggle' button, you can switch between options 1 and 2. The button will read either “Paging VFD” or “Paging Sel Buttons.”

When you scroll the selection buttons, they scroll modulo the number of buttons. For instance, if there are 9 buttons, they scroll in groups of 9 items.

This button scrolls the list *down*. The 'Page Down' button becomes enabled when it is possible to scroll down and is disabled when it is not possible.

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

Page Up

This button scrolls a list of levels in X-Y mode or a list of MD devices in MD mode. There are 3 options for scrolling:

- 1 Scrolling the display only. The items on the selection buttons do not scroll.
- 2 Scrolling the selection buttons only. The items on the display do not scroll.
- 3 Scrolling both the display and the selection buttons at the same time. This behavior can occur only when the panel has no 'VFD/SEL Toggle' button.

If the panel has a 'VFD/SEL Toggle' button, you can switch between options 1 and 2. The button will read either "Paging VFD" or "Paging Sel Buttons."

When you scroll the selection buttons, they scroll modulo the number of buttons. For instance, if there are 9 buttons, they scroll in groups of 9 items.

This button scrolls the list *up*. The 'Page Up' button becomes enabled when it is possible to scroll up and is disabled when it is not possible.

The default button text is "Page Up" but the button can have any legend.

Panel Lock

A panel lock button prevents 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.

The button is a toggle: press the 'Panel Lock' button to lock the panel. Press it again to unlock the panel.

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 NV9640.)

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

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

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

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.

Normally, the button text is the source's mnemonic, but the configurer can assign any text to the button.

Salvo

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

The button text is the salvo name. When you press the salvo button, the panel temporarily enters "salvo" mode and presents a message similar to this one on the display:



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 (and the 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 Buttons

Selection buttons correspond to the 8 lines of the alphanumeric display. A selection button selects or deselects what appears on a line of the display. In X-Y mode, the display shows levels and selection buttons select or deselect levels. In MD mode, the display shows MD destinations and the selection buttons select or deselect MD destinations. A selection button is high-tally when its associated level or MD device is selected and low-tally otherwise.

We assume here that if a button page in your panel has any selection buttons, it has exactly 8 selection buttons. Fewer than 8 result in problems; those in excess of 8 would be superfluous.

When you scroll the display using the 'Page Up' or 'Page Down' buttons, the legends on the selection buttons change to match the display.

X-Y Mode

When the panel is in X-Y mode, a selection button represents a virtual level present on the alphanumeric display. Pressing one or more selection buttons selects (or deselects) the levels associated with the buttons. A marker appears in the right-most column of the display for selected levels.

- ▲ When all levels are selected, pressing a level button turns them all off except the one pressed.

- ▲ If there are more than 8 levels, scrolling is enabled. Deselecting virtual levels in X-Y mode prepares a breakaway take.

Hold mode preserves the level selection after a take. See [Hold](#).

MD Mode

When the panel is in MD mode, a selection button represents an MD device present on the alphanumeric display. If there are more devices than selection buttons, scrolling is enabled. Pressing a selection button selects the device.

- ▲ Certain MD destinations might be unassigned. They appear blank in the display and the corresponding buttons are dark.

When your panel is in hold mode, you can select more than one destination at once. If your panel is not in hold mode, MD destinations are mutually exclusive: you can select only one at a time.

If you have enabled 'Hold' mode,

- 1 Select one or more MD devices. Scroll the MD device display 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,

- 5 Select an MD device. Scroll the MD device display as needed.
- 6 Select a source.
- 7 Repeat steps 5 and 6 until your presets are complete.
- 8 Press 'Take'. The selected MD devices become unselected.

The configurer can allow you to redefine certain MD destinations. To do so is simple: (1) select an MD destination on a selection button, (2) choose a destination that is not on a selection button. You might have to navigate or scroll through a destination list to choose one.

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.

Normally, the button text is the source device's mnemonic, but the configurer can assign any text to the button.

See [Preset Release](#) on page 62 and [Destination](#) on page 56.

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 configurator may assign other text to the button.

Source is Master

During data level (i.e., machine control) 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. Pressing the button again reverts the roles.

The 'Source is Master' button is used to initiate "broadcast" control routes. See [Broadcast Routes](#) on page 68.

▲ Pressing the 'Source is Master' button turns off the 'Broadcast' button and vice versa. The default button text is "Source Master" but the button can have any legend.

Take

In X-Y mode, a take button routes the preset source device(s) on selected levels to the selected destination device.

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. The term "undefined button" has meaning primarily to the configurator and not the operator.

VFD/SEL Toggle

The button is toggle. In one state, it reads "Paging VFD" and makes the display (VFD) scroll when the operator presses 'Page Up' or 'Page Down'. In the other state, it reads "Paging Sel Buttons" and makes the items on selection buttons scroll. The selection buttons represent layers when the panel is in X-Y mode and represent destinations in MD mode.

If your panel does not have a 'VFD/SEL Toggle' button, it will do one of two things:

- Scroll the VFD only. The selection buttons do not scroll.
- Scroll both the VFD and selection buttons at the same time.

This behavior is a configuration option.

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 52.

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 52.

The button has no effect in multi-destination mode.

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 changes to read "XY-MD In XY Mode" or "XY-MD In MD Mode" according to the mode you have selected. The alphanumeric display also reflects the current mode.

Lock, Protect, and Release

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

Definitions

Owner	The user ID of a panel where a lock or protect was issued.
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 NV9640 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 3 scenarios.

XY Mode

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

Single-Destination Panel

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

- 1 Select a source 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 Select a source.
- 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 alternate device names for any and all devices in the NV9000 system. The alternate device names 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 alternate name 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. In contrast, machine control routes are typically point-to-point. Therefore, to control multiple machines requires that you 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 a ‘Source is Master’ button to activate the mode. The mode 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 column of the display reads "FREE" for the machine control level (in X-Y mode). If your panel is in multi-destination mode, you might switch to X-Y mode momentarily to see this.

When a take involving a machine control level is blocked on the control level, the display displays the message "Control In Use."

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 display shows "Control in Use" and the Take button is still high-tally, 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. The 'Destination' field of the display shows the destination you chose.
- 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 it off, (2) select the destination you had chosen for the chop, then (3) select any source.

Salvo Mode

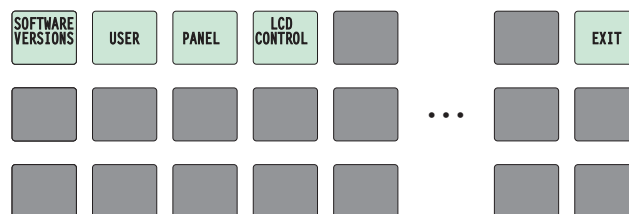
The NV9640 enters a minor "salvo mode"¹ when you press a salvo button. Salvo mode is a temporary mode, usually brief, where you are given an opportunity to reconsider the salvo you are about to execute. The NV9640's display tells you the name of the salvo and instructs you to press the take button to execute the salvo. If you wish to cancel the salvo before it executes, press the salvo button again.

After you press take or cancel the salvo, the panel returns to its previous mode. See [Salvo](#) on [page 63](#).

Menu Mode

The NV9640 enters menu mode when it has a menu button and you press it.

The menu has 4 menu choices and an exit button:



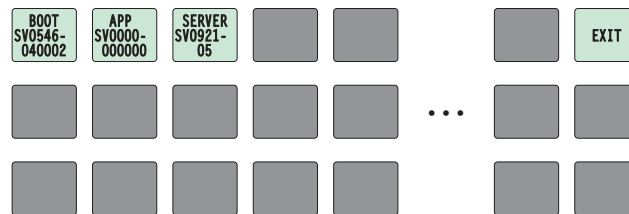
1. Other panels, such as the NV9601, have a more extensive "salvo mode."

Press 'Exit' when you want to leave the menu and return to the previous button page. The alphanumeric display a sort of roadmap of the button menu:



Software Versions

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

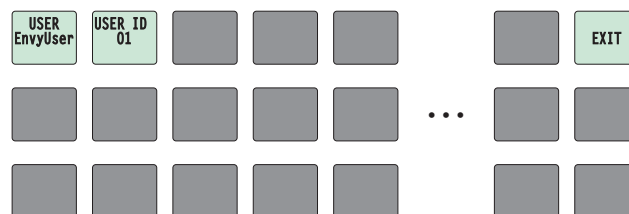


The 3 buttons on the left tell you the current versions of the software in the NV9640. Generally, this is of no relevance unless you are in a diagnostic situation.

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

User

Press the 'User' button to view user data:



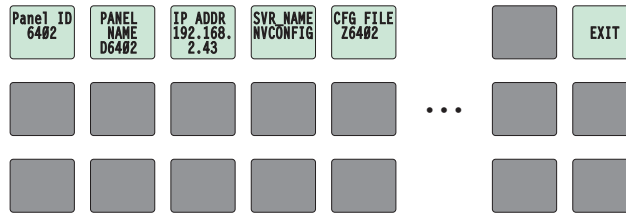
The 2 buttons on the left tell you the user name and user ID as determined by the router control system. These are **not** the Windows user name or ID.

- ▲ 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. 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 system controller's panel/router network.

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

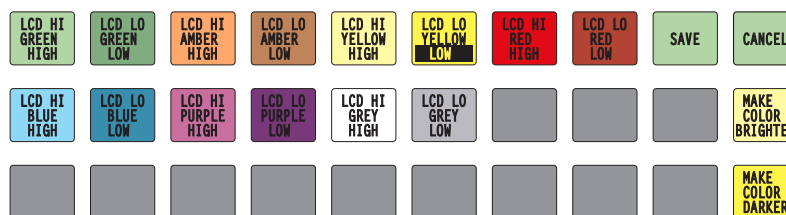
Press the 'LCD Control' button to view and change LCD brightness. When you do, the current LCD button state appears on the 14 top left buttons:



The 14 buttons occur in pairs—one pair for each defined color. The pair shows the high tally and low tally values for the particular 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 either the 'Make Color Lighter' button or the 'Make Color Darker' button, whichever is available:



Controls (only one or the other of these is available at any moment)

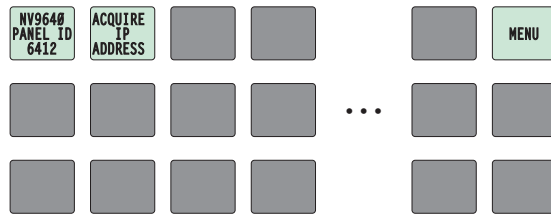
If you make a change, press 'Save' to commit the change or press 'Cancel' to discard the change. If you have made no changes, just press 'Exit' to return to the menu.

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 89](#) for a color chart.

Setup Mode

Setup mode occurs when the NV9640 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.

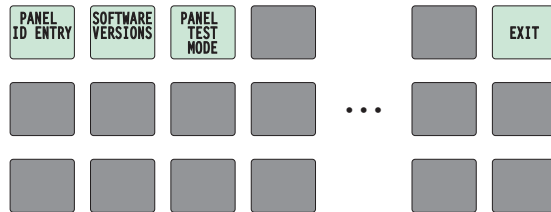
The panel powers up with 3 buttons illuminated in green:



▲ It can take up to 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.

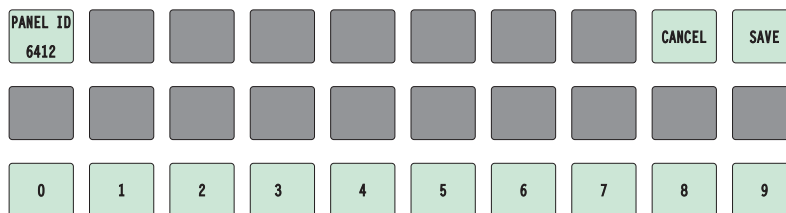
Press the 'Menu' button at the far right to access the setup menu:



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 keypad appears:

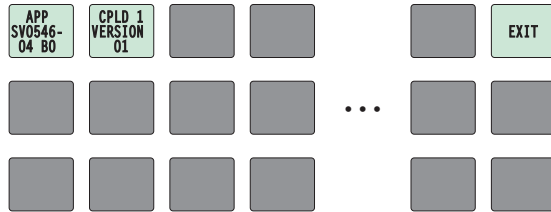


Use the numeric button array as a keypad to enter a panel ID. What you enter appears on the 'Panel ID' button at the top left.

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.

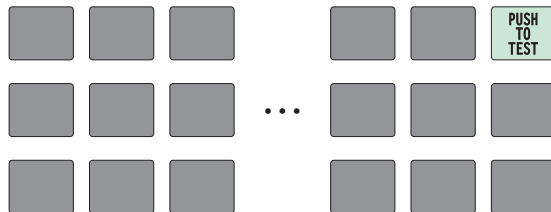
In the setup menu, press the 'Software Versions' button. Three buttons appear:



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

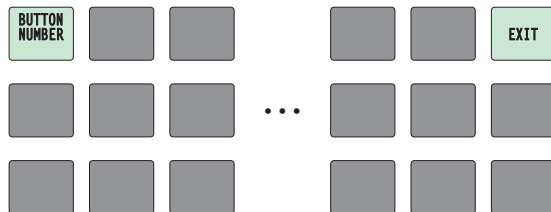
- Panel Test Mode.

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.

Summary

<i>The Interface</i>	77
<i>GPIO Configuration Concepts</i>	78
<i>Configuring Outputs</i>	79
<i>Configuring Inputs</i>	81

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 NV9640—in the router control system. The router control system can trigger events that—through the relays in the NV9640—switch your tally devices.

The DB25 connector, labeled “GPI Interface” at the rear of the NV9640 presents the tally signals. There are 8 input signals and 4 pairs of output signals.

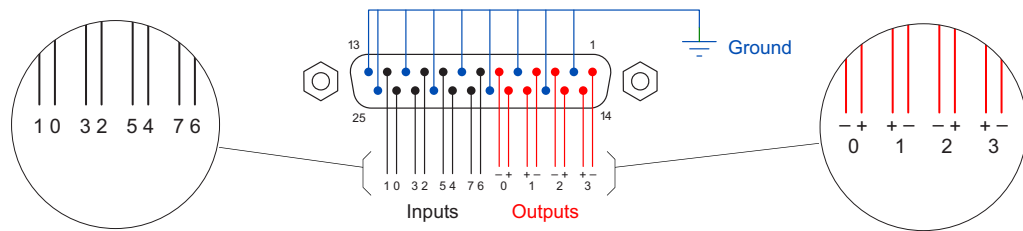


Fig. 6-1: GPI Interface

Input

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

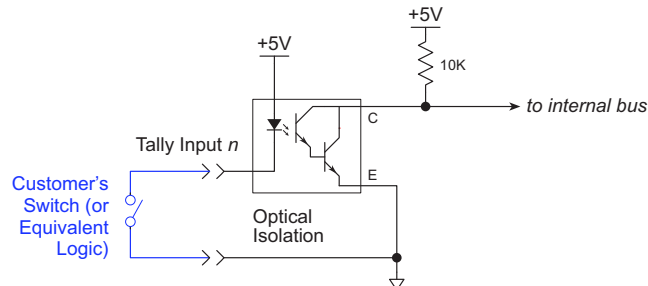


Fig. 6-2: GPI Input

When the input transitions off or transitions on, the NV9640 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 10Ω and current capability of 150 mA. It can withstand 200VAC.

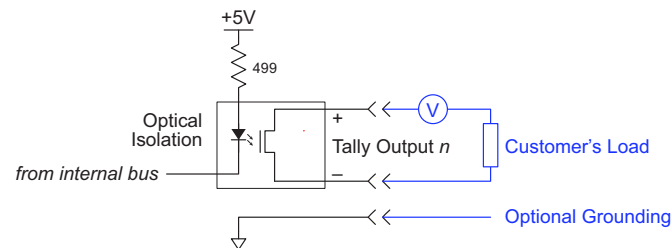


Fig. 6-3: GPIO Output

When a condition (defined for the relay) occurs, the router control system notifies the NV9640 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.)

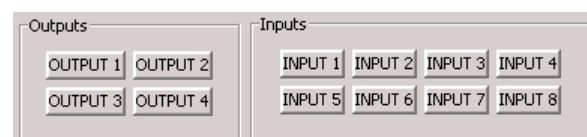
GPIO Configuration Concepts

These are the I/O characteristics of the NV9640'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 GPIO Section of the NV9640 Page

SE's NV9640 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 NV9640 control panel.

Configuring Outputs

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

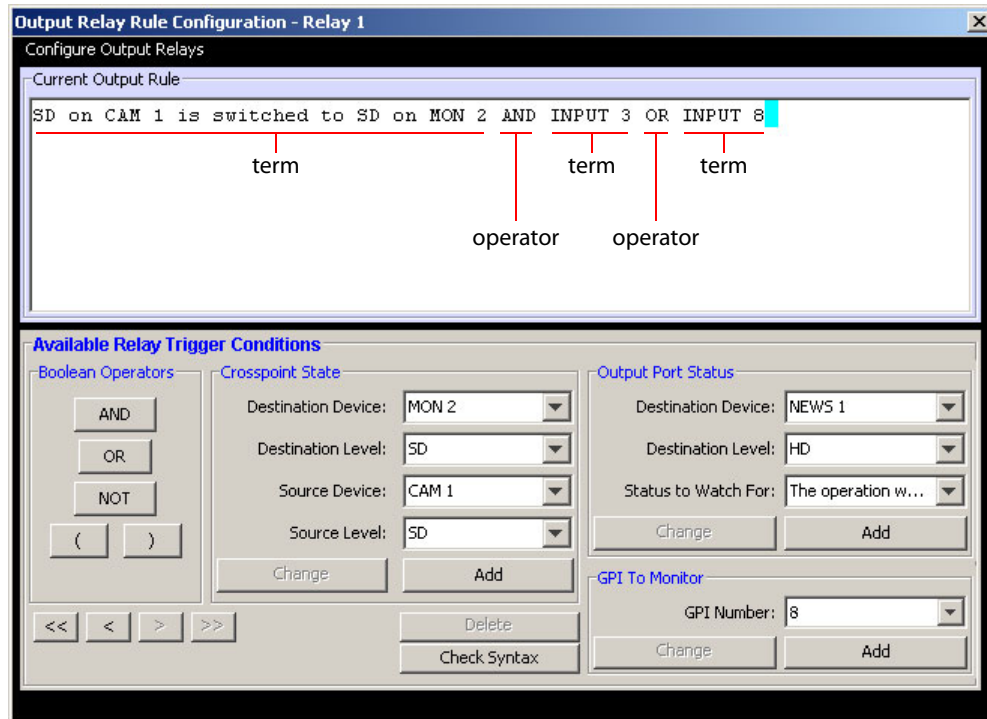


Fig. 6-4: Relay Rule Dialog

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	

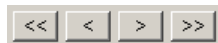
As an example, choosing 'Used as broadcast slave', device VTR3, and level CTRL for output port status produces the sub-expression:

```
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 NV9640 inputs and other system-wide events. The router control system sends signals to the NV9640 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, an 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.

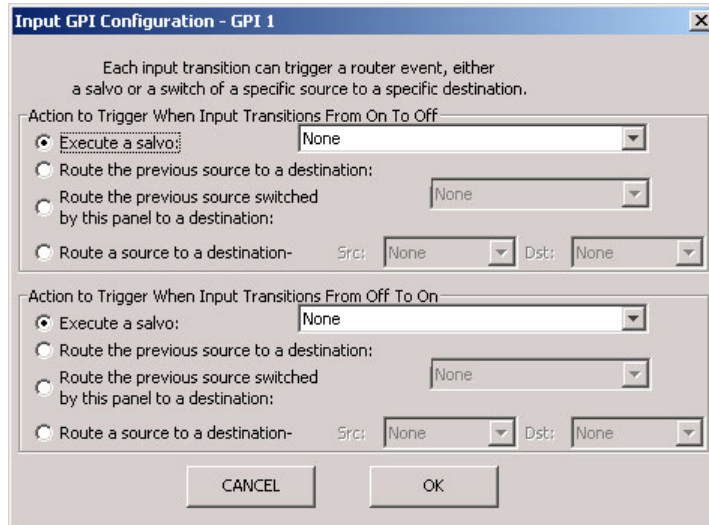
This is a summary of Boolean operations:

- 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 NV9640 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 NV9640 has 4 relays that can switch on or off your external devices, based on (1) NV9640 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 NV9640 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 NV9640.

Summary

<i>Power Specifications</i>	83
<i>NV9640 Specifications</i>	84
<i>Environmental Specifications</i>	85
<i>Defaults</i>	85
<i>Drawings</i>	86

Power Specifications

NV9640 Power Specifications

Specification	Detail
DC power	External power supply: 12 VDC \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, 12 VDC, 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:

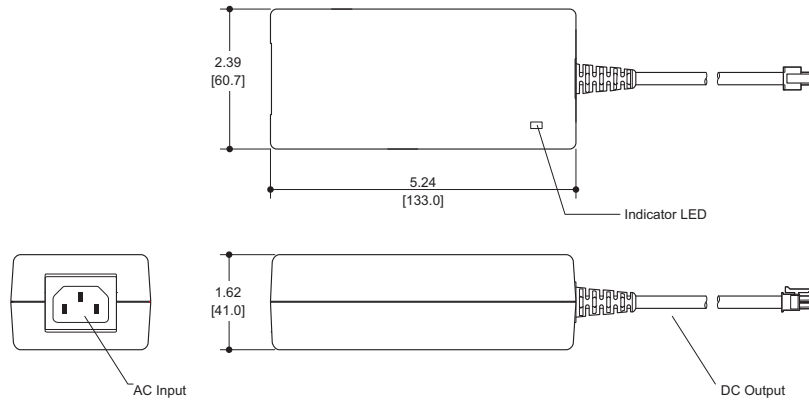


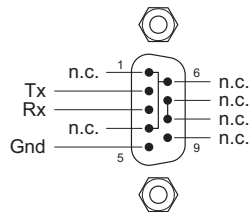
Fig. 7-1: The power output has Molex 4-pin plug. See [Power Cord Retention](#) on page 90.

NV9640 Specifications

NV9640 Physical Specifications

Specification	Detail
Dimensions	Height: 3.47 in (88.1 mm), fits EIA 2 RU (3.5 in or 88.9 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 120 VAC; 6 W nominal.
Weight	1.916 kg (4.22 lb)
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

NV9640 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 button page for a new NV9640 configuration has one sub-page (“Breakaway”), a ‘Take’ button, ‘Page Up’ and ‘Page Down’ buttons, and two other buttons.



The “breakaway” button is a navigation button that displays a page of selection buttons.

The default panel options are:

Panel mode:	Multi-destination.
Release mode:	Normal.
Default destination:	None.
Preset Monitor:	None
Status Monitor:	None
XY Data Routing:	Automatic.
MD Data Routing:	Automatic.
Default name set:	System names
Multidest Device Limit:	8. (This is the lowest value. The upper limit is 512.)
Src/Dst Immediate Take	Enabled (checkbox checked).
All other options:	Disabled (check boxes clear).

The tally inputs and outputs are all 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.

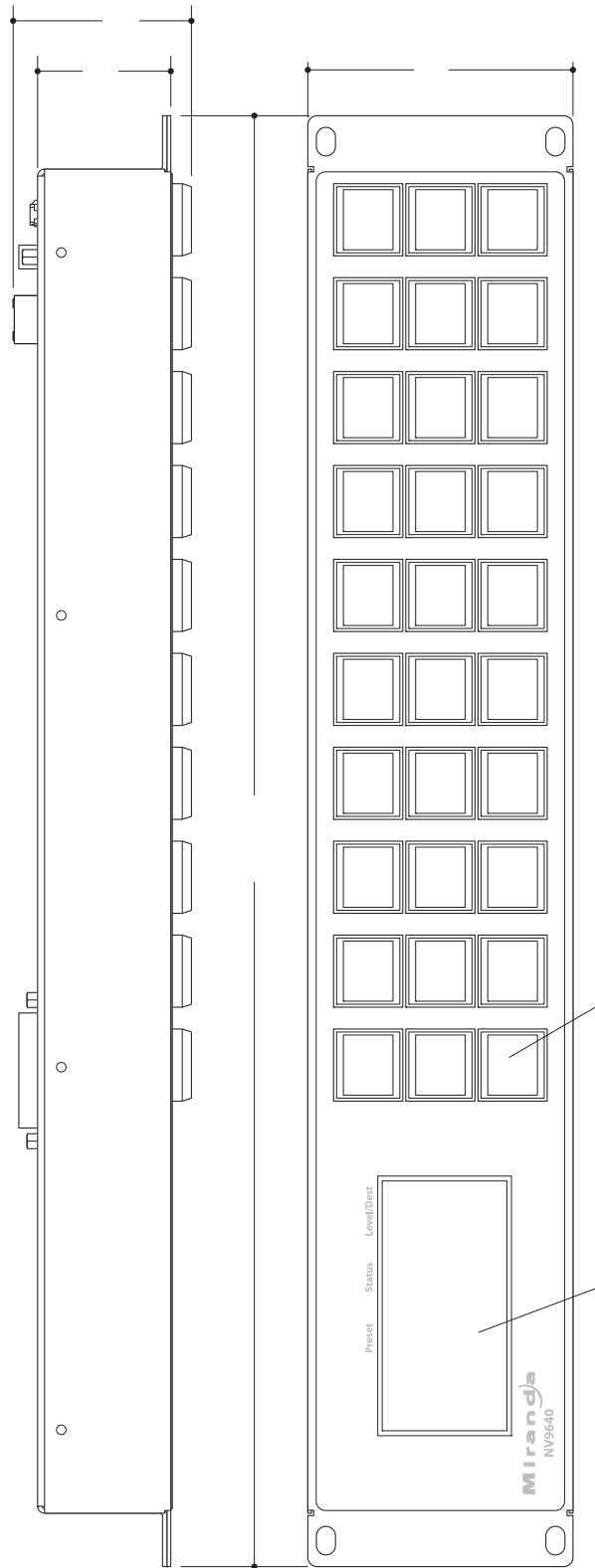


Fig. 7-2: Front and Top Views of the NV9640

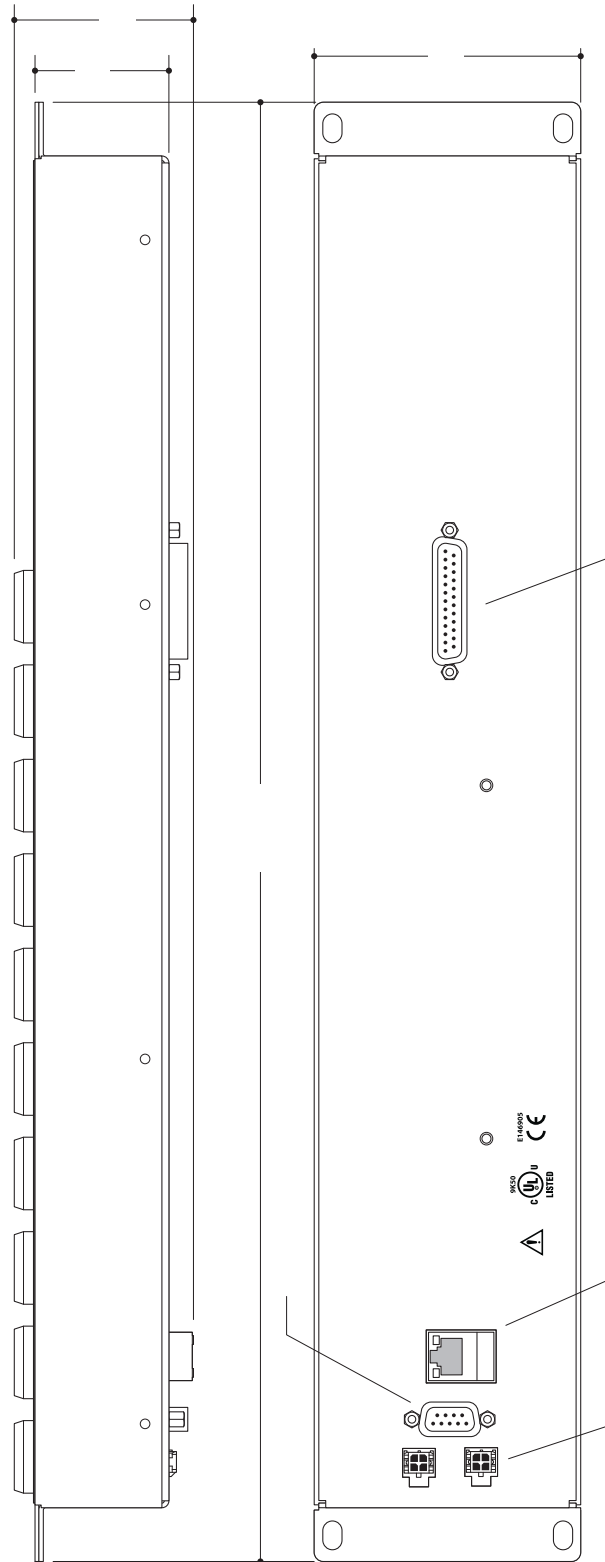


Fig. 7-3: Rear and Top Views of the NV9640

8

Misc. Topics

Chapter 8 provides the following.

Summary

<i>LCD Buttons</i>	89
<i>Power Cord Retention</i>	90
<i>Ordering Information</i>	91

LCD Buttons

The 16 LCD buttons have 3 lines of text, 8 characters each. The text can be blank. 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 14 button colors:

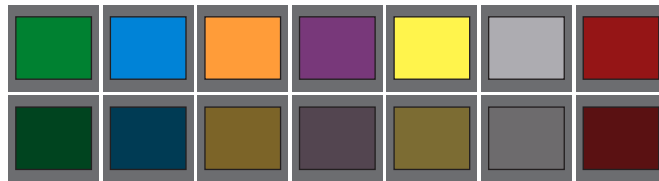


Fig. 8-1: Button Colors

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.

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 NV9640 components:

PS0001	12V power supply, 4-pin Molex connector, with cord, and cord retention strap.
NV9640	NV9000 control panel. 30 button, 2RU, XY/MD, hierarchical.
WC0053	Optional breakout cable for the tally interface

abc

Glossary

AES/EBU	(Audio Engineering Society/European Broadcasting Union). AES and EBU are standards organizations.
Breakaway Category	A condition where a destination has multiple sources on different levels. 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. The NV9640 does not support categories or category selection.
Data routing	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 NV9640 provides certain data routing options including a 'Broadcast' button.
Device	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.
GPIO	General Purpose Input and Output. A generic term for the NV9640's tally interface. The tally interface is called the "GPI Interface" at the rear of the NV9640.
Level set	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.
Multi-Destination (Mode)	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.
Operator	The term operator (a.k.a. user) usually refers to users other than the system administrator or configurer. An operator is responsible for making the routes.
Physical level	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.
PIN	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.
Port	A port is the physical connection on a router. A port can only be an input port or an output port.
Salvo	A salvo is a stored group of commands that can be recalled and executed at an NV9000 control panel.
Source/ Destination	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

	<p>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.</p> <p>A device can be both a source and destination. An example of such a device is a VTR.</p>
System administrator	<p>The system administrator is the person responsible for installing, configuring, and maintaining a router control system.</p>
Tally	<p>(1) High or low button illumination.</p> <p>(2) Tally interface <i>to be defined</i>.</p>
Virtual level	<p>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.</p>
X-Y (mode)	<p>A mode on an 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.</p>

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For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An online form for e-mail contact is also available from the website.

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